Hewlett Packard Enterprise

Technical White Paper

HPE Solution Architecture for HPE Compute Scale-Up Server 3200 Predefined Configurations with Internal Storage for SAP HANA Solutions

Built with the Intel® Xeon® Scalable Processor (Intel Sapphire Rapids)

CONTENTS

EXECUTIVE SUMMARY

Hewlett Packard Enterprise is a leading provider for SAP solutions. With an extensive global footprint of solutions deployed at thousands of SAP customer sites, our solutions are ubiquitous across the application and database tier, including scale-up and scale-out configurations for all HANA Database workloads. We provide fully integrated Certified SAP HANA Appliances, Tailored Datacenter Integration (TDI), ECC, SAP BW/4HANA, and SAP S/4HANA solutions.

Our infrastructure portfolio for SAP HANA offers a comprehensive solution to a wide spectrum of customer requirements. From small and medium-sized businesses to the largest global enterprises, HPE delivers professional tailored experiences with solutions of all sizes that encompass both the application and database tiers.

This document describes the implementation of the HPE Compute Scale-up Server 3200 Predefined Configurations with internal storage configurations based on 4th Generation Intel® Xeon® Scalable Processor (Sapphire Rapids). These predefined configurations offer flexible choices of processors, memory, and storage that have been rigorously tested for performance.

Target audience: This document is for Enterprise Solution Architects, Deployment or Implementation Engineers, and others to learn about the implementation of HPE Solutions for SAP HANA using the HPE Compute Scale-up Server 3200 with internal storage. This document assumes the reader has a basic understanding of the SAP HANA database, Linux® operating systems, storage, and server hardware components.

Document purpose: This document describes the architectural and technical overview required while configuring HPE Compute Scale-up Server 3200 predefined configurations with internal storage for use in in-memory SAP HANA Database deployments.

INTRODUCTION

Hewlett Packard Enterprise offers customers flexible hardware options and strategies for running SAP in their data centers. With the choice between SAP HANA Certified Appliances and Tailored Datacenter Integration (TDI) deployment, HPE customers are empowered to seamlessly and easily integrate infrastructure that has been tailored to the requirements specific to their business. Read more about SAP HANA Certified Appliances and TDI in the Solution Overview section.

HPE Compute Scale-up Server 3200

Unmatched reliability, performance, and scale for mission-critical workloads, the HPE Compute Scale-up Server 3200 is the newest model in the HPE Compute Scale-up family of servers. These predefined configurations based on this highly reliable, scalable, and secure server start at four (4) and scales up to eight (8) powerful 4th generation Intel® Xeon® Scalable Processors, in 4 socket increments. Its modular architecture scales cost-efficiently to meet data growth needs.

To support growth of in-memory databases and data-intensive workloads, these HPE Compute Scale-up Server 3200 predefined configurations offer large, shared memory capacity ranging from 2TB to 16TB. utilizing 16 ultra-fast 4800MT/s DDR5 DIMMs per processor. Its flexible I/O subsystem, based on PCIe5.0, delivers 4x I/O bandwidth compared to prior models.

Extreme RAS (Reliability, Availability, Serviceability) features including advanced memory resiliency, “firmware first”, analysis engine, and auto self-healing ensures the highest reliability for mission critical applications. Superior security, including HPE Silicon Root of Trust and two TPM modules, protects your workloads and data against firmware attacks and malware. Optional deployment with HPE GreenLake provides flexible as-a-service consumption while maintaining on-premises control.

Key solution benefits include:

- SAP HANA Appliance Certification.
- Choice of Platinum processors with up to four (4) UPI links per socket providing unparalleled bandwidth and performance.
- Four (4) full-height + two (2) half-height I/O slots per four-socket chassis.
- Internal storage of up to sixteen (16) drive bays and optional DVD varies based on I/O support selected.
- Highly scalable and resilient.
- Highly flexible and well-tuned for SAP HANA ecosystem.
- Field upgrades are supported as investment protection.

- Provides a full range of services such as factory integration, on-site installation, and proactive support with a single point of contact.
- HPE Compute Scale-up Server 3200 Error Analysis Engine for better diagnostics, self-healing, and mission-critical reliability.

SOLUTION OVERVIEW

HPE offers a rich and highly differentiated infrastructure portfolio designed to address a broad range of customers' needs, reduce complexity and risk, and provide the fastest path to value.

SAP HANA system infrastructure should address a core set of requirements spanning data growth, application, and infrastructure uptime by maintaining the best-in-class application performance, the desired level of infrastructure, implementation, and service integration with the IT environment while delivering the best value for powering mission-critical landscapes.

With the release of 4th Generation Intel Xeon Scalable Processors, HPE has developed a new generation of mission-critical systems to offer a differential infrastructure portfolio-architecture to address Edge to Cloud needs for SAP HANA use cases and SAP Application implementations. For environments that require massive scale-up capabilities, the HPE Compute Scale-Up Server 3200 delivers an unmatched combination of performance, flexibility, availability, and scalability. HPE has come up with a solution offering for SAP HANA with the following mentioned SKU.

TABLE 1. Product SKU and Description

Product SKU	SKU Description	Category
S2A07A	SAP HANA HPE Compute Scale-up Server 3200 Solution with Internal Storage	Appliance

SAP HANA Tailored Datacenter Implementations

SAP HANA Tailored Data Center Integration (TDI) method of implementation of SAP HANA allows SAP customers to meet their business needs and protect their investments by using the existing hardware/software in their data centers. By using the existing infrastructure in their existing datacenter, customers can reduce capital expenditure and reduce the TCO (Total Cost of Investment) of their environment.

With TDI, customers can choose their preferred hardware vendors and infrastructure components from a menu of supported SAP HANA hardware. However, all compute server hardware must come from one SAP HANA partner.

Under SAP HANA TDI Phase V and VI, SAP has opened flexible deployment options. Workload-driven HANA system sizing and implementations for SAP HANA TDI Phase V and VI flexibility options are described as follows:

- Tailored customer sizing is allowed hence the system processor and memory sizing can be fine-tuned according to specific customer workloads.
- SAP HANA hardware partner translates the sizing results (SAPS, RAM, CPU, and disk I/O**) into customer-tailored system configurations using a wide range of CPUs (including lower-end CPUs, not the only top–bin CPUs).
- Certified hardware is required to be used for TDI implementation to ensure optimum performance.
- SAP HANA Database installation must be performed by SAP HANA-certified professional.
- SAP recommendations to go through the SAP HANA Go-Live check before production.

For more information on TDI and workload-driven sizing, refer to the SAP Document - "SAP HANA Tailored Data Center Integration – Overview".

SAP HANA Certified Appliance

SAP HANA is a multi-model column-oriented in-memory database which allows to run the high-speed analytical process at very high speeds and by reducing the latency to fetch the data from the disks. An in-memory database (IMDB) is a type of database that stores data in a computer's main memory (RAM) instead of on traditional disks or solid-state drives (SSD). SAP HANA is designed to process analytical process (OLAP) and transactional process (OLAP) at the same time. SAP HANA also provides advance search, analytics, and data integration capabilities for various types of structured and unstructured data.

As SAP HANA is a faster Database Management System, it needs a unique set of hardware to perform at its best capabilities. An SAP HANA Certified Appliance is a configuration of hardware and software which goes through a regressive process of full stack performance testing before being certified to run the SAP HANA by SAP. HANA Certified Appliances come with unique features as follows:

- Hardware and software stack is pre-configured by an SAP Hardware partner using certified components.
- Single SAP Certified Hardware Vendor and packaged/certified hardware.
- In contrast and support to the all-in-one-box approach.
- Fully supported by both, the Hardware partner and SAP.
- Fast implementation as taken care by experts.
- Solution validation done by SAP and partner.
- Support fully provided by SAP and partner.

Design objectives

This section dives into solution design details, giving exposure to the solution building blocks and capabilities in building HPE solutions for SAP HANA using HPE Compute Scale-up Server 3200 as compute block, internal disk drives as storage block, optional external DAS (HPE D3710 disk enclosure) for Dual Purpose, HPE Ethernet adapters as network Interface and HPE Smart Array controllers as a storage interface.

Figure 1 shows an overview of the solution building blocks.

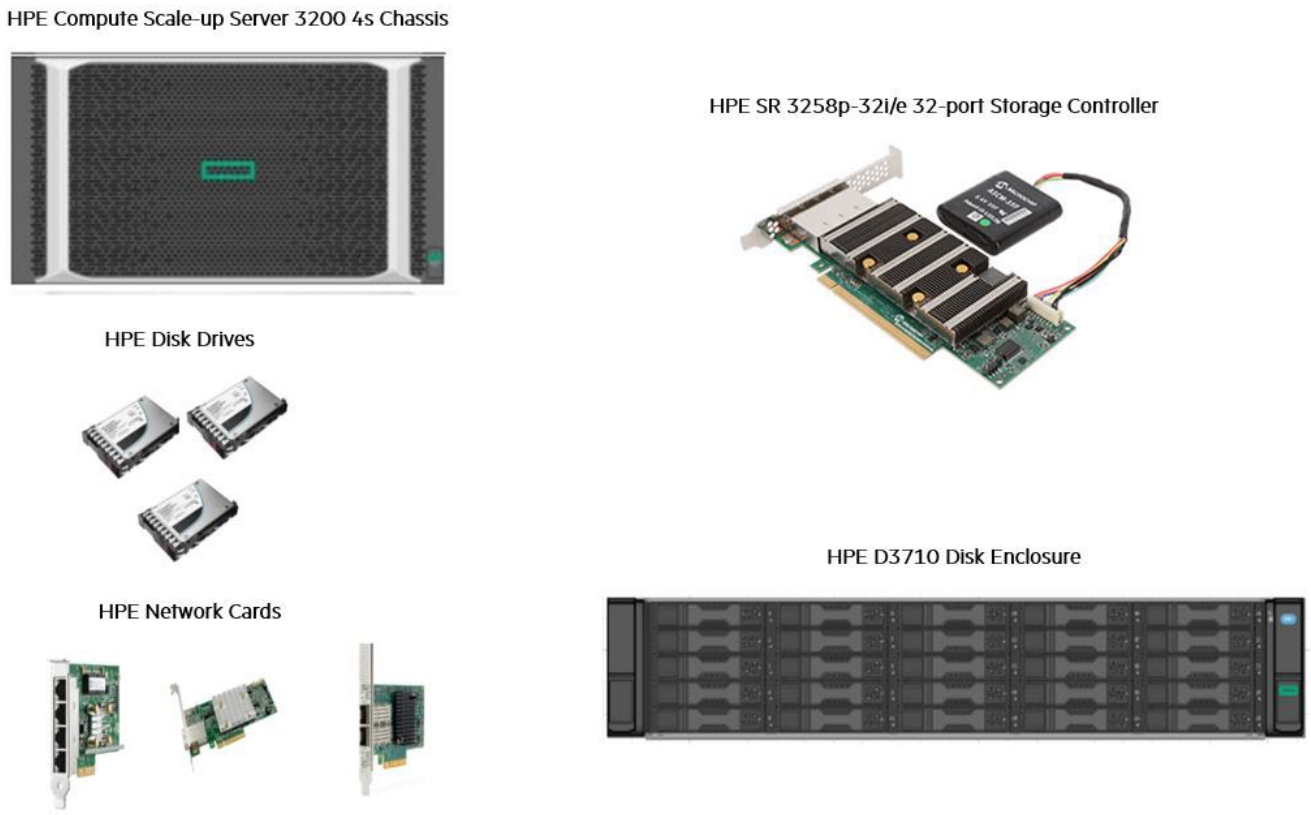

FIGURE 1. Overview of HPE solution building blocks

The HPE Compute Scale-up Server 3200 predefined configurations with internal storage are designed to support memory configuration starting from 2.0TB to 16.0TB using DDR5 DIMMs. It starts with a minimum of 4-sockets and expands up to 8-sockets to meet future growth requirements.

Figure 2 shows the overview of the HPE Compute Scale-up Server 3200 Predefined Configuration with Internal Storage for SAP HANA

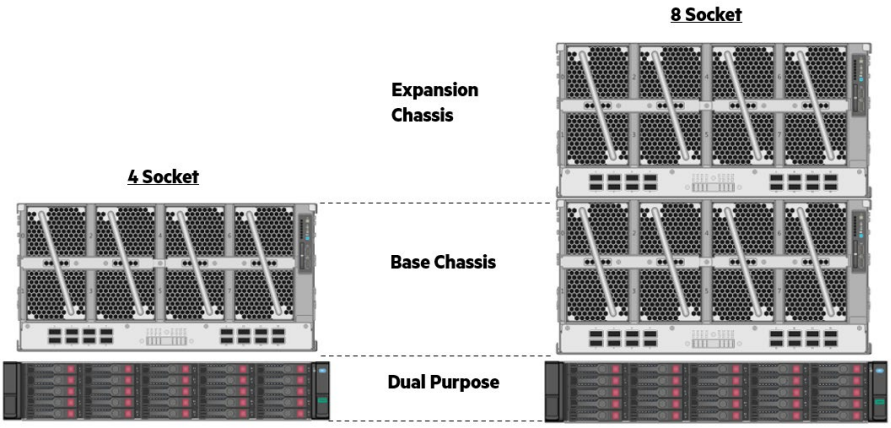

FIGURE 2. HPE Compute Scale-up Server 3200 Predefined Configuration with Internal Storage for SAP HANA

This modular architecture features four (4) Ultra Path Interconnect (Intel UPI) links per processor to deliver higher bandwidth, yielding high performance. It supports glueless architecture, with each 5U chassis supports up to 16 drives with RAID configurations (0, 1, 5, 6, 10, 50, 60) and hardware encryption, with a choice of 6 PCIe slots for enhanced data volumes for higher network connectivity.

In addition to the internal storage, customers have an option to choose a non-productional Dual-purpose storage, as shown in Figure 2, an additional HPE D3710 enclosure is included in the rack to configure HA/DR dual-purpose storage.

Solution Components

Tables 2 and 3 show the solution components for both 4 socket and 8 socket.

TABLE 2. HPE Compute Scale-up server 3200 with 4-Socket configurations

Solution Components	4-socket
Processors	4x CPU (4-Socket Base Chassis)
Model	Intel Xeon-Platinum 8490H (SAP HANA Appliance certification) Intel Xeon-Platinum 8468H (TDI only) Intel Xeon-Platinum 8454H (TDI only) Intel Xeon-Platinum 8444H (TDI only)
Memory (DDR5)	32 or 64 HPE Scale-up Server 3200 64GB (1x64GB) Dual Rank x4 DDR5-4800 Registered Standard Memory Kit 32 or 64 HPE Scale-up Server 3200 128GB (1x128GB) Quad Rank x4 DDR5-4800 Registered 3DS Standard Memory Kit
Network	OCP Option 1: 1x HPE Ethernet 1Gb 4P I350 – T4 OCP3 Adapter OCP Option 2: 1x HPE Ethernet 10Gb 2-port BASE-T BCM57416 OCP3 Adapter PCI Option 1: 2 or 4 HPE Ethernet 10/25Gb 2-port SFP28 MCX512F-ACHT Adapter – Mellanox Open NIC LP Gen3 2x per Adapter: HPE 25Gb SFP28 SR 100m Transceiver PCI Option 2: 2 or 4 Intel E810-XXVDA2 Ethernet 10/25Gb 2-port SFP28 Adapter 2x per Adapter: HPE 25Gb SFP28 SR 100m Transceiver
Internal storage: **OS & HANA DB**	1x HPE SR 3258p-32i/e 32-port 8GB Cache TriMode PCIe4 x16 Encrypted Controller Up to 10x NVMe SSD 6.4TB (Mixed Use)
SAN Backup (optional)	SAN Option 1: 2x HPE SN1100Q 16Gb 2P FC HBA SAN Option 2: 2x HPE SN1610Q 32Gb 2p FC HBA
Dual Purpose storage (optional)	1x HPE SR3254-16e/e 16-port 4GB Cache External 24G PCIe4 x16 Encrypted Controller 1x HPE Solutions D3710 Storage Block Disk Option 1: HPE 2.4TB SAS SFF SC DS HDD Disk Option 2: HPE 3.2TB SAS MU SFF SC DS SSD Disk Option 3: HPE 6.4TB SAS MU SFF SC DS SSD

TABLE 3. HPE Compute Scale-up server 3200 with 8-socket configurations

Solution Components	8-socket
Processors	8x CPU (4-Socket Base Chassis + 4-Socket Expansion Chassis)
Model	Intel Xeon-Platinum 8490H (SAP HANA Appliance certification) Intel Xeon-Platinum 8468H (TDI only) Intel Xeon-Platinum 8454H (TDI only) Intel Xeon-Platinum 8444H (TDI only)
Memory (DDR4) **per chassis**	32 or 64 HPE Scale-up Server 3200 64GB (1x64GB) Dual Rank x4 DDR5-4800 Registered Standard Memory Kit 32 or 64 HPE Scale-up Server 3200 128GB (1x128GB) Quad Rank x4 DDR5-4800 Registered 3DS Standard Memory Kit
Network **per chassis**	OCP Option 1: 1x HPE Ethernet 1Gb 4P I350 – T4 OCP3 Adapter OCP Option 2: 1x HPE Ethernet 10Gb 2-port BASE-T BCM57416 OCP3 Adapter PCI Option 1: 2 HPE Ethernet 10/25Gb 2-port SFP28 MCX512F-ACHT Adapter – Mellanox Open NIC LP Gen3 2x per Adapter: HPE 25Gb SFP28 SR 100m Transceiver PCI Option 2: 2 Intel E810-XXVDA2 Ethernet 10/25Gb 2-port SFP28 Adapter 2x per Adapter: HPE 25Gb SFP28 SR 100m Transceiver
Internal storage: **OS & HANA DB** **per chassis**	1x HPE SR 3258p-32i/e 32-port 8GB Cache TriMode PCIe4 x16 Encrypted Controller Up to 8x NVMe SSD 6.4TB (Mixed Use)
SAN Backup (optional) **BASE chassis**	SAN Option 1: 2x HPE SN1100Q 16Gb 2P FC HBA SAN Option 2: 2x HPE SN1610Q 32Gb 2p FC HBA
Dual Purpose storage (optioNal) **BASE chassis**	1x HPE SR3254-16e/e 16-port 4GB Cache External 24G PCIe4 x16 Encrypted Controller 1x HPE Solutions D3710 Storage Block Disk Option 1: HPE 2.4TB SAS SFF SC DS HDD Disk Option 2: HPE 3.2TB SAS MU SFF SC DS SSD Disk Option 3: HPE 6.4TB SAS MU SFF SC DS SSD

SOLUTION HARDWARE

This section describes in-depth details of the solution's hardware components.

HPE Compute Scale-up Server 3200

HPE has developed a solution to empower data-first modernization for mission-critical applications. The HPE Compute Scale-up Server 3200 is a powerful, single-system solution that uses a modular, scale-up architecture to reliably handle the workloads at the core of business. These workloads span the full data continuum, including systems of record that process transactions, systems of intelligence that analyze data, and systems of insight that are fueled by that intelligence and augmented with AI to drive the business forward. The Intel powered HPE Compute Scale-up Server 3200 offers a unique combination of scalability, reliability, and security to power critical databases and applications like SAP HANA.

The HPE Compute Scale-up Server 3200 predefined configurations with internal storage utilize the HPE Superdome Flex modular architecture. Customers can start with four 4th Gen Intel Xeon Scalable processors in a 5U chassis and seamlessly scale up to 8 sockets. The server provides a single pool of shared memory and compute resources. This scale-up architecture reduces server sprawl and is easier to manage compared to scale-out deployments. By handling everything in one system, scale-up architectures also eliminate internode latency and the need to break up and reassemble large datasets. This can enable faster time to insight than is possible with scale-out deployments.

For more information on product specification, please refer the Quickspecs. Note that all hardware components listed in product Quickspecs are not supported for SAP HANA implementation.

Figure 3 shows the front and rear view of the 4 socket HPE Compute Scale-up Server 3200 chassis. In rear view of the chassis 6x PCIe I/O slots, 16x SDD bays, OCP card slots and 4x Power supplies are visible.

FIGURE 3. HPE Compute Scale-up Server 3200 chassis front and rear view (For 4 socket).

Processor

Intel launched its 4th Gen Intel Xeon scalable processors (Sapphire Rapids) in January 2023. This new generation of processor are purpose-built to improvise data center performance, efficiency, security, and capabilities for AI, cloud computing, networks, edge computing, and supercomputers with potentially greater power derivative against the previous generation. Intel is partnering with customers to offer customized solutions and systems using the new products to meet computing needs at scale by optimizing the workload specific processors.

HPE Compute Scale-up Server 3200 supports many processors based on the thermal power consumption rating. The support matrix is listed in Table 4.

TABLE 4. Processor Support Matrix

Model	Long Name	Frequency	Core	TDP	Cache	Quantity	Appliance
8490H	Intel Xeon-P	1.9GHz	60	350W	112.5MB	4 / 8	
8468H	Intel Xeon-P	2.1GHz	48	330W	105MB	4 / 8	
8454H	Intel Xeon-P	2.1GHz	32	270W	82.5MB	4 / 8	
8444H	Intel Xeon-P	2.9GHz	16	270W	45MB	4 / 8	

Memory

HPE Compute Scale-up Server 3200 is offered with DDR5 memory for SAP HANA configurations. As per SAP HANA T-shirt sizing range of memory configurations are offered. Table 4 shows the available memory configuration offered with various combinations of DIMMs.

HPE Compute Scale-up Server 3200 predefined configurations with internal storage for SAP HANA can be configured with 4-socket 8TB memory while 8-socket can reach up to 16TB of memory in a single system.

An 8 socket, 16TB memory (8s/16TB) configuration is the largest memory configuration available for these predefined configurations. This paper shows what memory configurations are available and what has been tested. In production environments, performance and sizing requirements should be evaluated appropriately.

Table 5 shows the memory configuration available for SAP HANA Certified Appliance for HPE Compute Scale-up Server 3200.

TABLE 5. HPE Compute Scale-up Server 3200 Appliance Memory Configuration

Configuration	Product #	2048GB	4096GB	8192GB	16384GB
HPE Compute Scale-up Server 3200 4-Socket	R9N71A	X	X	X	
HPE Compute Scale-up Server 3200 8-Socket	R9N73A		X	X	X

To offer a specific memory configuration to customers, there are memory combinations available for SAP HANA Appliance as well as for TDI configurations. To achieve SAP HANA memory various DIMM combinations are listed in table 6.

These memory combinations are chosen carefully to satisfy the SAP HANA implementation rules. Refer to the following note:

TABLE 6. HPE Compute Scale-up Server 3200 memory DIMM combination

Server Memory in GB	Appliance	TDI	4-socket Server	8-socket Server
2048 (2.0TB)	■	■	32 x 64GB	
4096 (4.0TB)	■	■	64 x 64GB or 32 x 128GB	64 x 64GB
8196 (8.0TB)	■	■	64 x 128GB	128 x 64GB or 64 x 128GB
16384 (16.0TB)	■	■		128 x 128GB

NOTE

- Each chassis supports up to 64 DIMMs. This breaks down to sixteen DIMMs per socket, 8 memory channels.
- Only homogenous symmetric population is allowed.
- Higher rank DIMM must be populated at White DIMM slots.
- Only DIMMs that HPE has qualified are supported.
- For best performance, the amount of memory on each chassis within the system should be the same.

Storage

Storage Controller – HPE SR 3258p-32i/e

The Adaptec SmartRAID Ultra 3258p-32i /e RAID adapter offers maximum performance with SAS/SATA/NVMe Tri-mode functionality with a x16 host interface that doubles bandwidth to 29.6 GB/s, enabling 4x higher-performance connectivity solutions for server OEM, storage systems, data center, and enterprise customers.

Built on Microchip's proven 5th generation SmartROC 3200 storage controller, the SmartRAID Ultra 3258p-32i /e, supports industry's highest 32 media facing port variants for internal Tri-mode connectivity. New technologies available with the SmartRAID 3200 family includes DirectPath, which integrates a PCIe switch for the industry's lowest latency and highest bandwidth NVMe solution and Microchip's Dynamic Channel Multiplexing (DCM) technology that aggregates expander attached SAS or SATA hard drives onto 24G SAS infrastructure with near 100% link efficiency for unparalleled through-put.

SmartRAID 3200 adapters include Microchip's Trusted Platform support which delivers a new level of compute and supply chain security based on a hardware root of trust that is aligned with the Open Compute Security Project. For additional layers of security, Microchip has now expanded

on its unique Adaptec maxCrypto Controller-Based Encryption (CBE) solution to support SAS, SATA, and now NVMe media, and supports Self-Encrypting Drive (SED) management software.

For SAP HANA Appliance implementations, to achieve optimal throughput and Input or Output operations per second (IOPS), the described configurations for controller and its implementations are based on the best practices defined by the HPE SAP HANA solutions team.

The properties of the controller are mentioned in Table 7.

TABLE 7. Storage Controller features

Feature	HPE SR 3258p-32i/e
Device Type	Storage controller (RAID) - plug-in card
Host Bus	PCIe 4.0 x16
Interface	SATA 6Gb/s; SAS 24Gb/s ; PCIe 4.0 (NVMe)
Data Transfer Rate	24 Gbit/s
Cache	8GB
Channel Qty	32
Max Storage Devices Qty	256
RAID	0, 1, 5, 6, 10, 50, 60
Host Tools (GUI & CLI)	StorCLI & MR Storage Administrator

Storage Drives and Sizing

To implement SAP HANA Appliances there is a need to fulfil the minimum storage requirement and the storage KPI defined by SAP in order to achieve the Appliance Certification. To achieve the SAP HANA Appliance Certification, the HPE Compute Scale-up Server 3200 has gone through this process, because of this process the drives and the sizing for SAP HANA persistent storage have been defined. This section talks about the storage implementation for SAP HANA Appliance using HPE Compute Scale-up Server 3200.

To implement an SAP HANA Appliance, the drives listed in the table below are allowed for use to carve out the SAP HANA persistent storage layout.

HPE 6.4TB NVMe Gen4 Mainstream Performance Mixed Use SFF BC U.3 SSD.

For various memory configurations the sizing for SAP HANA persistent storage varies. Table 8 and 9 show the minimum requirement of storage for Appliance using 6.4TB NVMe Drives for both 4 socket and 8 socket machine.

TABLE 8. SAP HANA Appliance Persistent Storage using 6.4TB NVMe MU Drives for 4 socket (All sizes in the table are in GB)

Memory	Nos of Drive	RAID	OS	Shared	Log	Data	usrsap	OS Backup
2048	4	5	320	2048	1536	6144	64	64
4096	5	5	320	4096	1536	12288	64	64
8192	10	50	320	8192	1536	24576	64	64

TABLE 9.SAP HANA Appliance Persistent Storage using 6.4TB NVMe MU Drives for 8 socket (All sizes in the table are in GB)

Memory	Nos of Drive	RAID	OS	Shared	Log	Data	usrsap	OS Backup
4096	6	5	320	4096	1536	12288	64	64
8192	10	5	320	8192	1536	24576	64	64
16384	14	5	320	16384	1536	49152	64	64

Storage Partitioning and Layout

This section is specifically briefing about the “HPE SR 3258p-32i/e Controller” implementation for SAP HANA Persistent Storage.

Figure 4 shows the partitioning layout for a 4 socket SLES OS, where all LD's created within the SmartRAID have 3 partitions: EFI, "system" volume group and "HANA" volume group. Both system and HANA volume groups have disk space available (space not configured as logical volume). This free space can be used to increase the size of the logical volumes or for 3rd party snapshots.

In the case of an 8-socket system the expansion chassis will have the first two partitions on /dev/sdX empty to provide the same partitioning scheme, independent from the system or boot device. The volume group vgHANA will have partitions like the base chassis and the logical volumes will be striped using LVM over both devices.

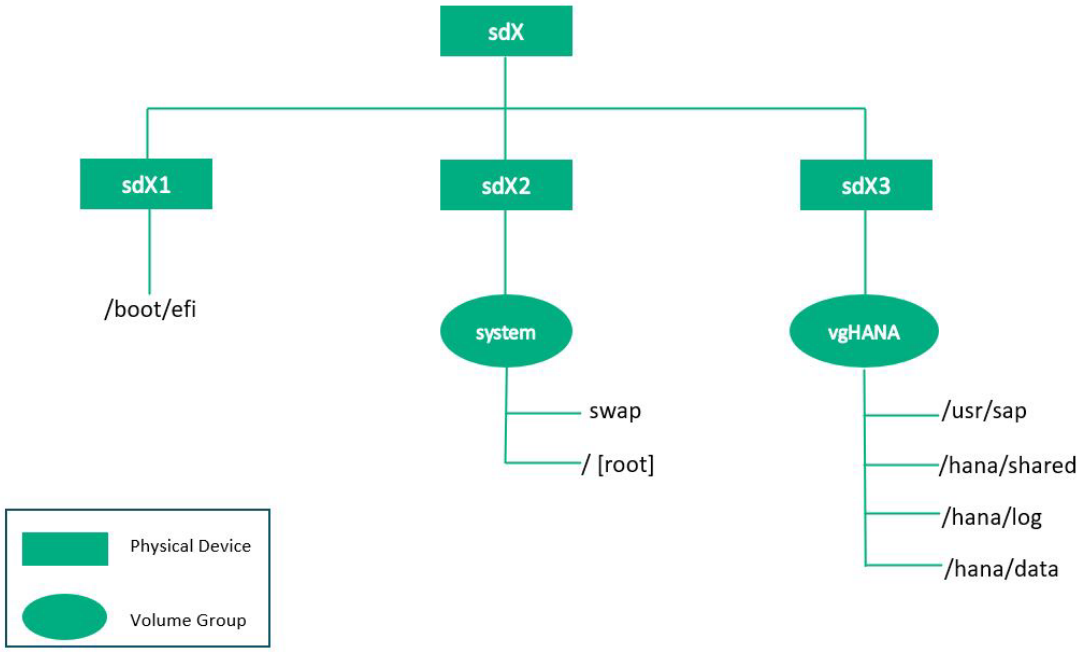

FIGURE 4. Partitioning layout for 4 socket for SLES OS.

Figure 5 shows the RHEL partitioning, where LD1 will have 4 partitions: EFI, boot, "system" volume group and "HANA" volume group.

The expansion chassis in the 8-socket system will have the first three partitions on /dev/sdX empty to provide the same partitioning scheme, independent from the system or boot device. The volume group vgHANA will have partitions like the base chassis and the logical volumes will be striped using LVM over both devices.

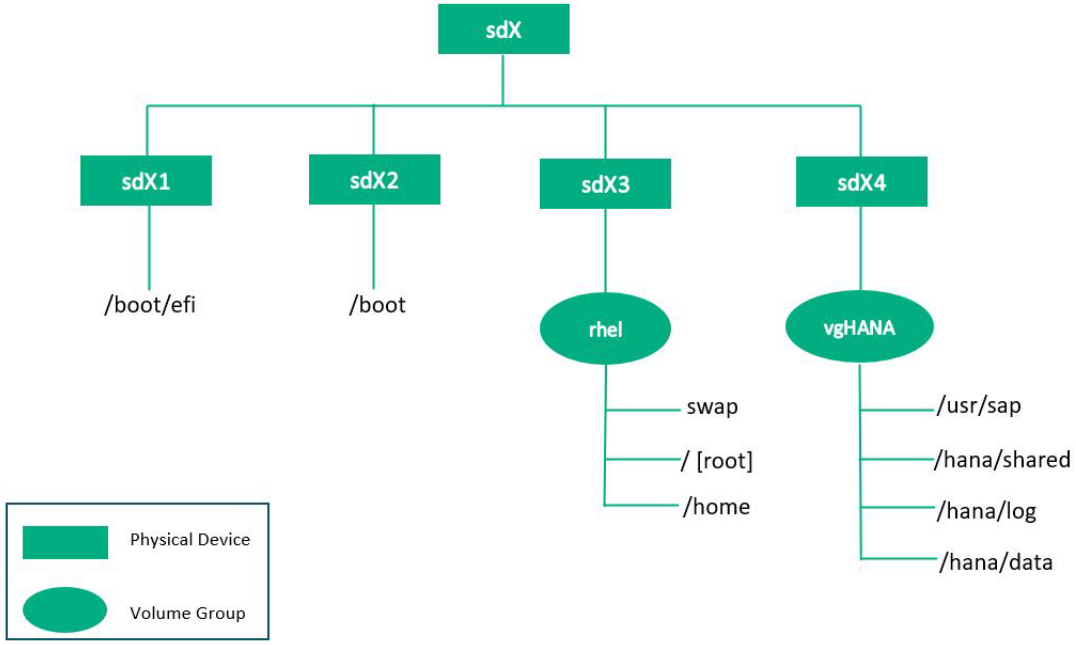

FIGURE 5. Partitioning layout for 4 socket for RHEL OS.

Dual-purpose non-production storage

Dual-purpose storage is available as an option utilizing the SR3254-16i/e external controller and a HPE D3710 disk enclosure.

HPE SR3254-16i/e External RAID Controller

Figure 6 shows the HPE SR3254-16i/e External RAID controller.

FIGURE 6. HPE SR3254-16i/e External RAID controller.

The properties of this controller are mentioned in Table 10.

TABLE 10. Storage Controller features

Feature	HPE SR3254-16i/e
Device Type	Storage controller (RAID) - plug-in card
Host Bus	PCIe 4.0 x16
Interface	SATA 6Gb/s; SAS 24Gb/s ; PCIe 4.0 (NVMe)
Data Transfer Rate	16 Gbit/s

Feature	HPE SR3254-16i/e
Cache	4GB
Bus System Interface	8 lane PCIe Gen 4
RAID	0, 1, 5, 6, 10, 50, 60
Host Tools (GUI & CLI)	StorCLI & MR Storage Administrator

HPE D3710 disk enclosure

The HPE D3710 offers flexible, modular solutions to simplify capacity expansion and tiered external storage system with up to twenty five (25) hot-pluggable SAS, SATA, and Solid-State Small Form Factor (SFF) drives. This allows you to purchase additional capacity as data storage needs grow after the initial deployment.

Each D3710 includes the standard components HPE D3710 base enclosure with redundant power supplies and fan modules Two (2) integrated 12Gb SAS IO Modules and HD Mini-SAS cables two (2) PDU interconnect cords. It is a 2U rack space with a sliding rail kit.

Figure 7 shows the front view of the HPE D3710.

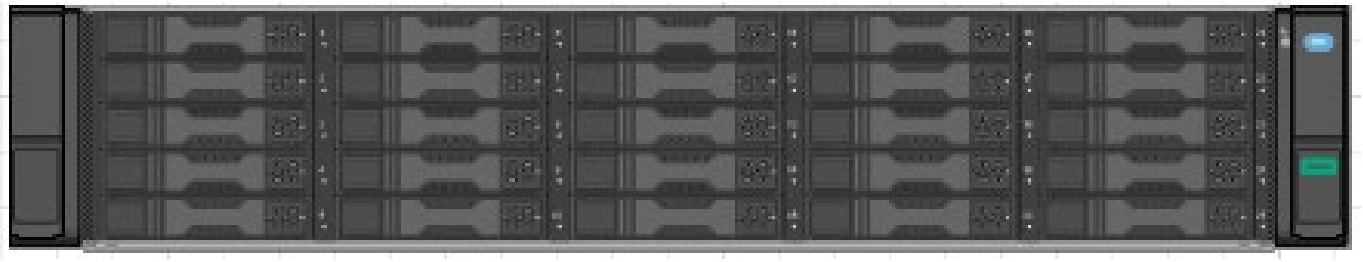

FIGURE 7. HPE D3710 front view

Following are a few highlights mentioned:

- Modular platform provides investment protection.
- Hassle-free expansion
- Hot-pluggable drives and power modules
- 12Gb SAS host connectivity enables higher data transfer.
- HPE SSD Smart Path feature
- HPE Secure Encryption is available.
- Redundant power and cooling provide increased reliability as a failure of a power supply or fans does not interrupt system functioning.
- Support for HPE 3.2TB SAS MU SFF SC DS SSD or HPE 6.4TB SAS MU SFF SC DS SSD or HPE 2.4TB SAS SFF SC DS HDD.

The following table 11 shows the number of 2.4TB HDDs, 3.2TB and 6.4TB SSDs needed for corresponding memory size for Dual Purpose storage. Note that the number of disk count is calculated keeping data disk size as 2.5x Data.

TABLE 11. Disks required for Dual Purpose with 2.4TB, 3.2TB and 6.4TB

Memory Size	Required disk space TiB	No. of HPE 2.4TB HDD	No. of HPE 3.2TB SSD	No. of HPE 6.4TB SSD
2.0TB	9	5	4	3
4.0TB	16	10	7	4
8.0TB	30	16	14	6

Memory Size	Required disk space TiB	No. of HPE 2.4TB HDD	No. of HPE 3.2TB SSD	No. of HPE 6.4TB SSD
16.0TB	58	N.A.	22	12

NETWORK REQUIREMENTS

As an in-memory database, the components of the SAP HANA landscape communicate via different network channels. It is recommended by SAP to have a well-defined network topology to control, limit, and isolate the network access and usage to only those communication channels required for the implementation scenarios.

The independent and secured network channels that we can use are as follows:

- Client Network Zone
  - SQL Client Communication
  - HTTP Client Communication
  - Management Network
- Internal Network Zone
- Internode Network
  - System Replication
  - Storage Replication
  - Backup Network
- Storage Network Zone
  - Shared/NFS Network
- Fiber Channel Network

For more information, see the SAP HANA Network Requirements Technical paper.

Network, Bond, and VLAN for SAP HANA

To provide high availability (HA), it is important to create bonds between more than one physical NIC. If there are options to use the high-speed Network Adapters, it is a better choice to use the VLAN configuration over the bonding network. It is also important to restrict the maximum utilization of each VLAN. For the list of supported network card details refer the Table 2.

4-socket Network design

By default, the 4-socket system is delivered with two PCI network cards (Mellanox or Intel) and one OCP card. Additionally, and if slots 5 and 6 are available, two more cards can be ordered. In this case, the additional network ports, p0 and p1, will become part of bond0 and bond1 respectively.

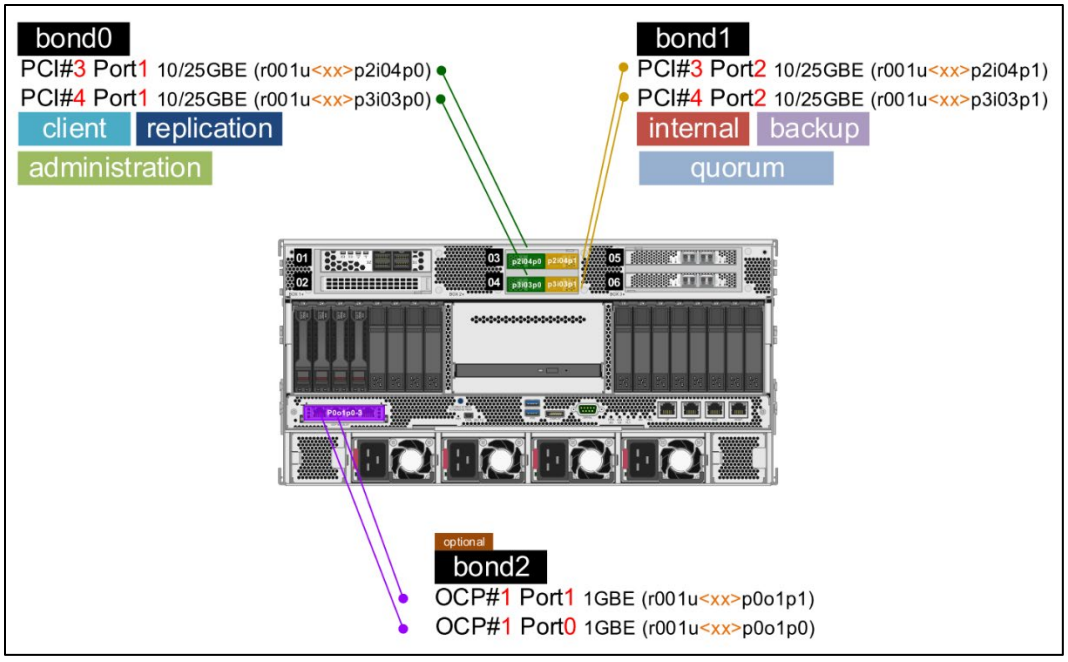

FIGURE 8. 4-socket Network design

8-socket Network design

The 8-socket system offers no further options to add additional network devices. The expansion chassis itself comes with two additional PCI network cards and one extra OCP card.

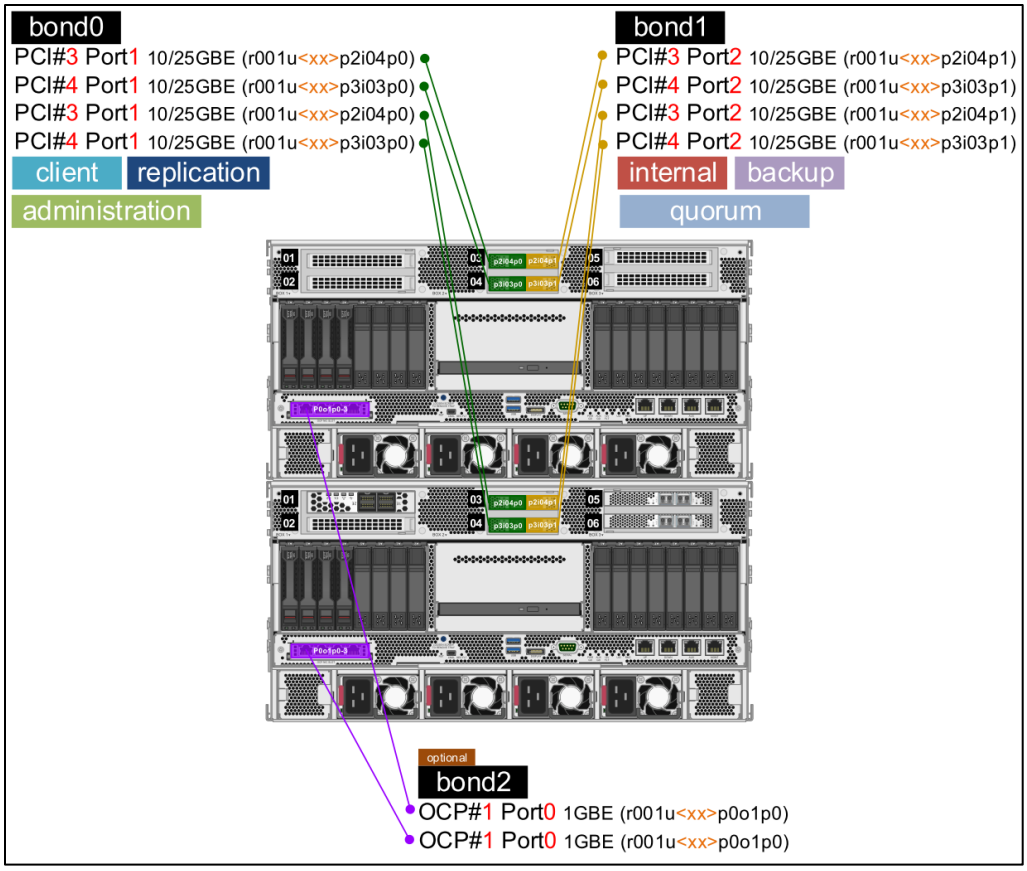

FIGURE 9. 8-socket Network design

Table 12 shows the Network zone, purpose, bond and VLAN for SAP HANA purposes for both 4 socket and 8 socket networks.

TABLE 12. Network bond and VLAN for SAP HANA purpose

Network Zone	Purpose	Bond	VLAN
HANA Client	Purposed for data traffic from other SAP applications. Generally, this network is connected to SAP application servers and other source systems, which are supposed to interact with the HANA landscape	bond0	6
HANA Replication	Network connections network two HANA Landscape to replicate the HANA Landscape from primary to secondary HANA system	bond0	8
HANA Backup	Dedicated backup link to take the backup of HANA landscape log, data, and shared volumes	bond1	9
HANA Internal	Connections used for SAP HANA internal communication within the database or, in a distributed scenario, for communication between hosts	bond1	11
HANA Administration	To connect to the landscape and handle the management task	bond0	12
HANA Quorum	Required if HPE Serviceguard is used to automate failover process across two systems, used to manage the failover and failback of HANA Landscape	bond1	13

SOFTWARE

Before deploying SAP HANA, the server must be certified by SAP and it must be listed in SAP Hardware Directory with information about supportability. During this process, the combination of certified hardware, Operating System, and compatible version of SAP HANA will be deployed. To ensure supportability the following software has been used during the SAP Certification Process.

Operating System

During the launch of the HPE Compute Scale-up Server 3200 for SAP HANA, the supported Operating Systems are:

- SuSE Linux® Enterprise Server SP5
- Red Hat® Enterprise Server 8.8

Refer to this link for the latest OS support matrix and the minimum supported OS version.

SAP HANA Hardware and Cloud Measurement Tools

SAP HANA hardware and cloud measurement tools (HCMT) are a new set of tools that can help the user to measure and analyze hardware or cloud systems performance parameters required before deploying SAP HANA. HCMT is the preferred tool to be used while applying for SAP HANA Certification for hardware.

The HCMT tools consist of the following components:

- SAP HANA hardware and cloud measurement tool
- SAP HANA hardware and cloud measurement analysis

For more details, see SAP Note: 2493172.

Tuning the SAP HANA Operating System

See the following SAP Notes to adhere to the requirement to install SAP HANA Database:

- For recommended OS settings for SLES 15, refer to the SAP Note: 2684254
- For recommended OS settings for RHEL 8, refer to the SAP Note: 2777782
- To optimize the Network Configuration on SAP HANA and OS Level, refer to the SAP Note: 2382421
- For the supported operating system, refer to the SAP Note: 2235581
- To prepare SLES for SAP environments, refer to the SAP Note: 1275776

SERVICE AND SUPPORT

Hewlett Packard Enterprise is the world's number one vendor for SAP HANA not just because of the sales of the server and the solutions provided but also for post-sales support. Post-sales, HPE provides world-class and expert service for SAP HANA installation, deployment, and integration. The services in lifecycle support through the dedicated team of experts in the solutions area around the SAP Software Stack. Service and support highlights are briefly outlined here. For more details, see the HPE Compute Scale-up Server 3200 Quickspecs.

- Installation, integration, and deployment services for SAP HANA
  - HPE Installation Service for HPE Installation and Startup Service
  - HPE Factory Express Integration Service for SAP HANA
  - HPE Rapid Deployment Services for SAP HANA
- HPE Pointnext Operational Services for SAP HANA
- HPE COE Service for SAP HANA
- HPE Service Credits (Lifecycle Service)

SUMMARY

Stay ahead of the competition by powering the mission-critical workloads with the reliable, scalable, and secure HPE Compute Scale-up Server 3200 powered by Intel, built on a technology foundation that delivers low latency and high bandwidth across every component – from processors, to memory, to I/O, to the fabric that connects each 4-socket chassis together.

This document has shown the SAP HANA landscape and HPE offerings surrounding the SAP HANA Database.

The solution highlighted in this Technical White Paper is economical, efficient, and flexible for short-term and long-term analytics. Using Hewlett Packard Enterprise's award-winning servers, storage, networking infrastructure, and support services, mission-critical applications will be functioning at their best while protecting them from the worst.

RESOURCES AND ADDITIONAL LINKS

HPE Compute Scale-up Server 3200

Quick specs

Certified and supported SAP HANA Hardware directory

SAP HANA certified hardware directory

HPE Reference Architectures

hpe.com/info/ra

HPE Servers

hpe.com/servers

HPE Storage

hpe.com/storage

HPE Networking

hpe.com/networking

HPE Technology Consulting Services

hpe.com/us/en/services/consulting.html

To help us improve our documents, please provide feedback at hpe.com/contact/feedback.

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