Hewlett Packard Enterprise

Technical White Paper

HPE Solution Architecture on HPE Superdome Flex Solutions for SAP HANA

Built with the Intel Xeon Scalable Processor (Intel Cascade Lake)

CONTENTS

EXECUTIVE SUMMARY

Hewlett Packard Enterprise is a market leader in SAP HANA[1] server deployment in scale-up and scale-out capacity[2] with a unique modular architecture, an unmatched combination of performance, flexibility, and availability for small to large enterprises with the optimum choice of deployment as an Appliance or Tailored Datacenter Integration (TDI), conventional on-premises or with cloud economics.

HPE Pointnext Services helps to diagnose and resolve infrastructure issues with comprehensive expert advice. HPE Pointnext has a collaborative support engagement with SAP.

HPE Superdome Flex solutions for SAP HANA® covers a wide range of small, medium, and large scale-up and scale-out configurations with HPE Primera 600 or HPE Alletra 9000 Storage which is purpose-built, optimized and designed to provide a highly available and resilient SAP HANA infrastructure, shipped with 4-32 socket solutions with different memory configurations ranging from 1.5TB to 24TB with exclusive DDR4 memory and additional expansion of memory with Persistent Memory (PMEM).

Hewlett Packard Enterprise offers multiple solutions for SAP HANA in the following delivery models:

- HPE Superdome Flex multi-rack scale-up and scale-out with HPE Primera 600 or HPE Alletra 9000 Storage
- HPE Superdome Flex single rack scale-up and scale-out with HPE Primera 600 or HPE Alletra 9000 Storage

Additional benefits include:

* Fully vetted hardware and software infrastructure designed by Hewlett Packard Enterprise to host SAP HANA databases and certified by SAP.

- Assembled and tested as a unit
- On-site installation and configuration
- Broad partner ecosystem

Document Purpose: This document describes the architectural design and overview of the solution components and also the hardware components used to build HPE Superdome Flex solutions for SAP HANA.

Target audience: This document is intended to assist chief information officers (CIOs), chief technology officers (CTOs), IT directors, data center managers, SAP solution architects, SAP HANA database and basis administrators, IT professionals, and customers wishing to learn more about the HPE Superdome Flex solutions for SAP HANA. This document assumes the reader has a basic understanding of the SAP HANA database, Linux® operating systems, and HPE solutions for SAP HANA.

INTRODUCTION

Hewlett Packard Enterprise defines the design to offer scale-up and scale-out solutions for SAP HANA, which are built with industry-leading, high-density, and highly scalable HPE Superdome Flex Server featuring the Intel® Xeon® Scalable processor (Cascade Lake) architecture for mission-critical applications.

Hewlett Packard Enterprise maintains its leadership position across the different choices of selections. HPE Superdome Flex comes in different variants with multiple variations in representing the SAP HANA solutions on HPE Primera 600 Storage models 650 and 670 which are supported with SAS SSD drives and HPE Alletra 9000 supports only Non-Volatile Memory Express (NVMe) drives while both storage series support drive sizes at 1.92TB/3.84TB/7.68TB/15.36TB to deliver high I/O performance.

[1] Gartner Report (June 2019)
[2] Currently certified from 4- to 32-sockets and from 1.5 TB to 24 TB of shared memory
Source:
https://www.hpe.com/us/en/pdfViewer.html?docId=a50000545&parentPage=/us/en/solutions/saphana&resourceTitle=Accelerate+your+SAP+HANA+and+S%2F4HANA+Transformation+Journey+with+HPE+infographic

WHAT'S NEW

VMware ESXi – Installation of VMware ESXi™ on HPE ProLiant DL360 server provides to install software components on virtual machines to manage HPE Superdome Flex solutions for SAP HANA within the infrastructure rack. Below is the list of software components:

- Virtual Central Management Server (vCMS) - used to manage entire HPE Superdome Flex solutions for SAP HANA.
- Virtual SAP HANA Cockpit Server (vHCS) - used for SAP HANA database administration.
- Virtual Recovery Manager Central (vRMC) - enables HPE Superdome Flex solutions for SAP HANA snapshot backup.
- Virtual Storage System Management Console (vSSMC) - used to manage HPE Primera 600 storage systems.
- Virtual Service Guard NFS (vSGNFS) - provides the shared file system in scale-out solutions.

Direct Attach Storage – HPE Primera 600 and HPE Alletra 9000 are offered as 2 or 4 node configurations per storage base equipped with FC Host Bus Adapter. This allows connecting the storage to the server host ports directly without SAN Switches in the HPE Superdome Flex solution for SAP HANA Scale-up configuration.

HPE Serviceguard NFS – HPE Serviceguard NFS is introduced into the solution stack to provide SAP HANA Shared volumes from storage subsystems as SAP HANA shared NFS to the hosts. HPE Superdome Flex solution for SAP HANA scale-out configurations (Mandatory) and in scale-up configurations (optional).

Key solution benefits include:

- New generation server, storage, and network components
- Highly expandable data center infrastructure for SAP HANA
- Cloud convertible data center infrastructure for SAP HANA
- Highly tuned for SAP HANA ecosystem products
- Field upgrades are supported as investment protection
- Redundancy is well built into the solutions
- Provides a full range of services such as factory integration, on-site installation, and proactive support with a single point of contact

SOLUTIONS OVERVIEW

Hewlett Packard Enterprise has divided its portfolio of solutions into two major categories. HPE Superdome Flex multi-rack and HPE Superdome Flex single rack with scale-up and scale-out offerings.

HPE Superdome Flex multi-rack scale-up and scale-out with HPE Primera 600 or HPE Alletra 9000 Storage is an accommodative solution best suited for a broad range of customers in this category which is flexible and easily upgradeable. The scale-up solution starts from 4 sockets and is easily upgradeable to 32 socket scale-up systems. The scale-out solution starts from 3 nodes and is easily upgradeable up to 96 nodes scale-out system is best suited for all kinds of mission-critical SAP HANA workloads.

Figure 1 shows the HPE Superdome Flex multi-rack solution for SAP HANA.

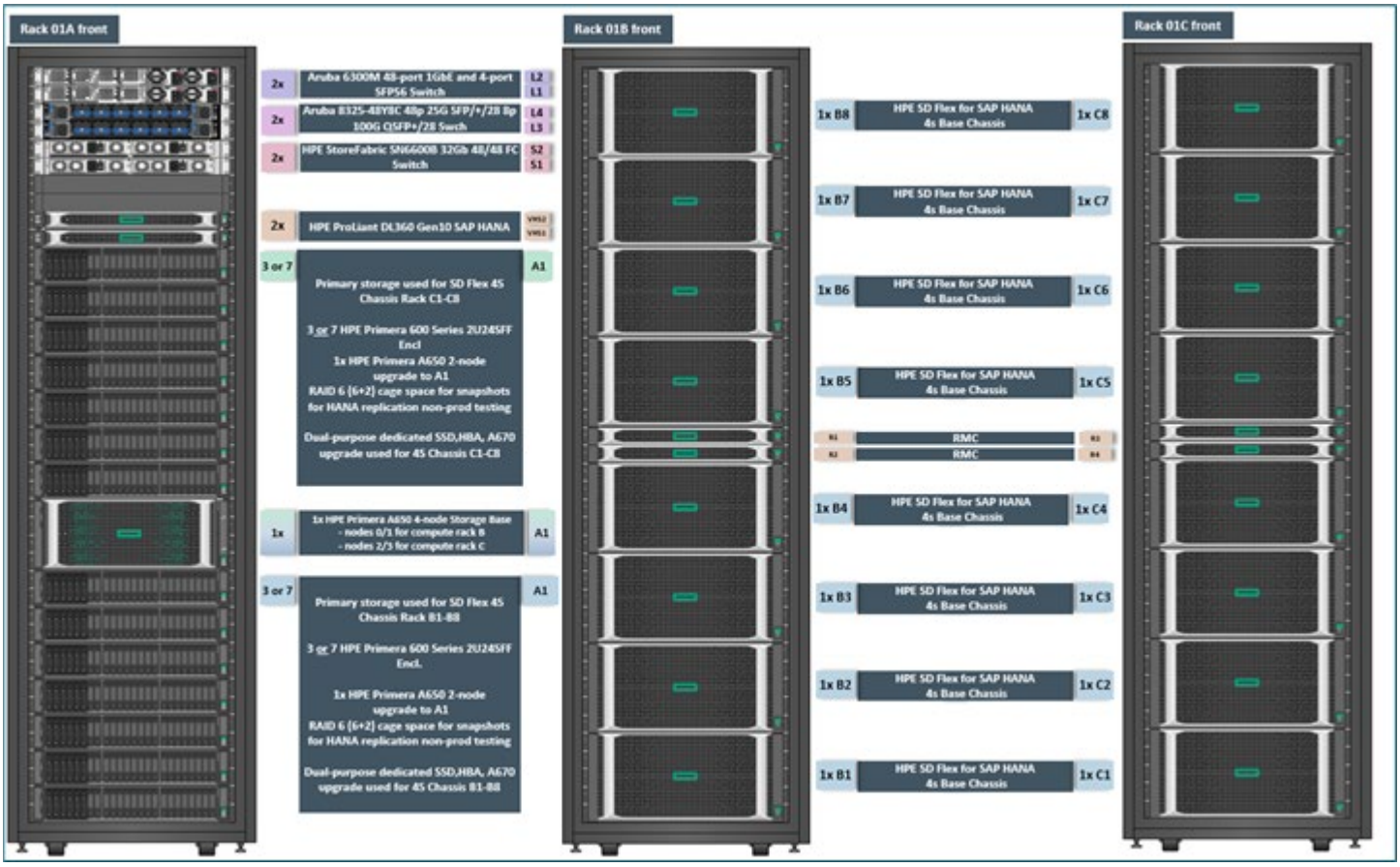

FIGURE 1. HPE Superdome Flex multi-rack solution for SAP HANA

HPE Superdome Flex single rack scale-up and scale-out with HPE Primera 600 or HPE Alletra 9000 Storage is an intermediate solution in this category, which is again simple, flexible, and easily upgradable. The solution ranges from 4- to 20-sockets for scale-up and also with limited scale-out offerings is the best suit for high density compute infrastructure for hosting SAP HANA workloads.

Figure 2 shows the HPE Superdome Flex single rack solution for SAP HANA which consist of HPE Aruba switches, HPE Superdome Flex, HPE ProLiant DL servers, and HPE storage systems.

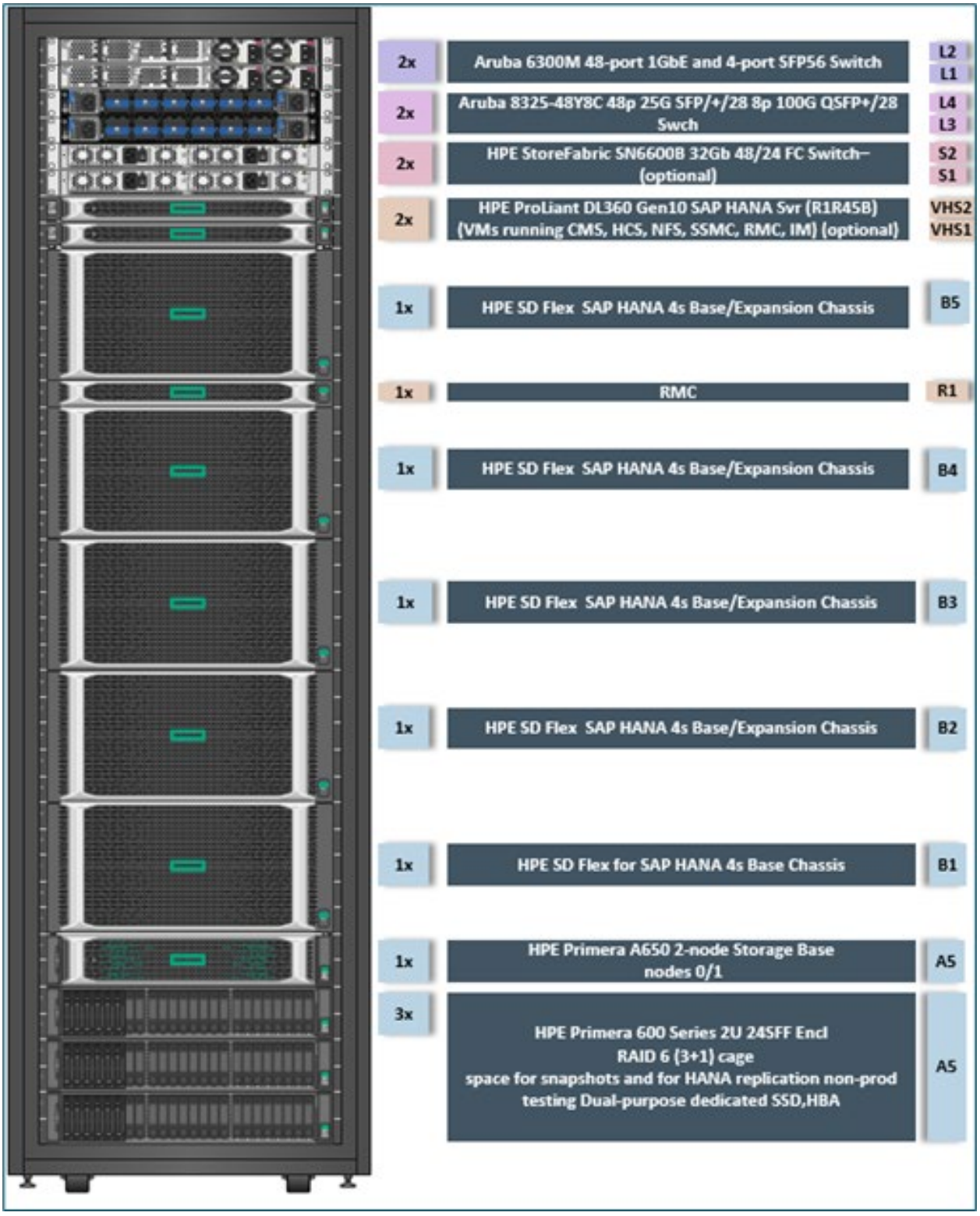

FIGURE 2. HPE Superdome Flex single rack solution for SAP HANA

NOTE
HPE Superdome Flex single/multi-rack solutions for SAP HANA use HPE Primera 600 or HPE Alletra 9000 as a storage component with 1.92TB/3.84TB/7.68TB/15.36 drives to deliver high I/O performance starting with 4 to 32 socket scale-up variants and 4/8/16/20 socket scale-out variants, supported with DDR4 and Persistent Memory Modules (PMEM) to cover broader memory configurations and is available on different supported versions of SLES/RHEL OS.

DESIGN CONSIDERATIONS

HPE Superdome Flex solutions for SAP HANA are designed for environments of all sizes and a range of memory sizes starting from 1.5TB and with an ability to go right up to 48TB. These solutions can be deployed for all kinds of SAP HANA workloads such as scale-up and scale-out configurations, because of the unique modular building block architecture of HPE Superdome Flex servers in mission-critical data centers.

HPE Superdome Flex is a custom-designed ASIC that interfaces directly to Intel® Xeon® Scalable processors and provides the system with the ability to connect up to eight HPE Superdome Flex chassis together and this configuration flexibility enables to maximize the performance.

HPE Superdome Flex single server scale-up configuration for SAP HANA with Direct Attach Storage (DAS) is a customer-centric solution for small and medium-sized businesses, to provide a simpler no SAN solution.

HPE Superdome Flex single server scale-up configuration starting from 4 to 32 socket solution for SAP HANA with HPE Primera 600 or HPE Alletra 9000 Storage is a customer-centric solution for large-sized businesses to host mission-critical applications in data centers.

HPE Superdome Flex server scale-out configurations starting from 3 nodes to 96 nodes solution for SAP HANA with HPE Primera 600 or HPE Alletra 9000 Storage for large and very large-sized businesses to host mission-critical applications in data centers.

Key features

Offering choices for Intel Xeon Scalable processors and with a choice of Gold or Platinum to power scale-up or scale-out SAP HANA workloads.

- Delivers new, faster DDR4 memory technology
- Supports persistent memory in combination with DDR4
- HPE Superdome Flex servers provide extreme reliability, to ensure the highest levels of availability for mission-critical SAP HANA workloads
- HPE Superdome Flex servers have superior RAS features, such as component redundancy, innovative Firmware first, auto self-healing, and advanced memory resilience technology
- HPE Aruba CX 6300 and 8325 Switch series are a modern and intelligent family of stackable/VSX switches offering flexibility, security, and scalability for data center infrastructure
- Industry-standard and high I/O performance HPE SAN Fabric for critical applications for SAP HANA Database
- High-performance HPE SAS SSD or NVMe drives in the size of 1.92TB/3.84TB/7.68TB/15.36TB are used to build the SAP HANA solution which meets stringent compliance regulations of Federal Information Processing (FIPS) Standards
- HPE Superdome Flex can be deployed with SAP HANA system replication and HPE Serviceguard for SAP HANA (SGeSAP) to deliver HA and DR to achieve optimal uptime

NOTE
SAP HANA database software is available on different supported versions of SLES/RHEL OS.

SOLUTION COMPONENTS

HPE Superdome Flex Server

The HPE Superdome Flex (SD-Flex) Server is a breakthrough and innovative compute to power mission-critical applications, running on SAP HANA to accelerate data analytics using in-memory technology as it handles multiple mission-critical workloads. It delivers an unmatched combination of flexibility, performance, and reliability for critical environments of any size.

Its unique modular architecture and unparalleled scale allow you to start small and scale up or scale out and grow at your own pace. It has unmatched and superior RAS and end-to-end security features, leveraging its in-memory design and groundbreaking performance. You can process and analyze the growing amounts of data moving through your business at extreme speed and safeguard your vital workloads.

Figure 3 shows the rear view of the HPE Superdome Flex server and visual components.

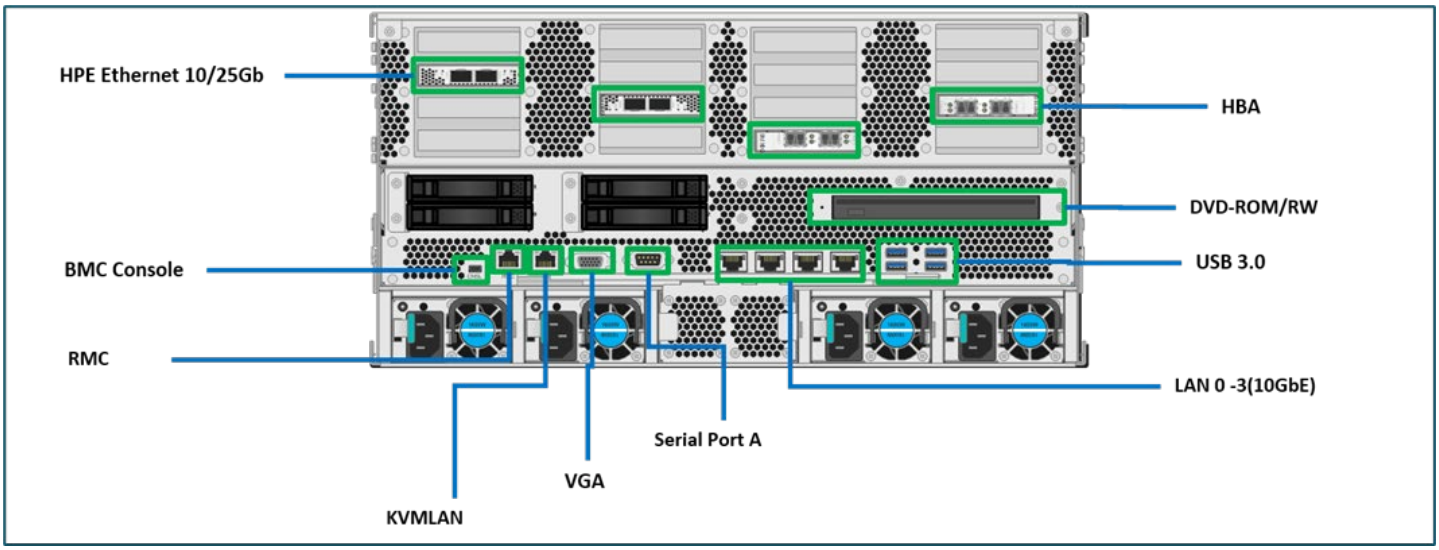

FIGURE 3. HPE Superdome Flex rear view

HPE Superdome Flex server is based on 4 sockets, Non-Uniform Memory Access (NUMA) systems. These NUMA systems connect using a proprietary communication fabric called the HPE Superdome Flex Grid which allows each chassis to be wired to another chassis in the rack. This communication grid allows all chassis to be configured as a single system up to 32 sockets running a single OS or a chassis can be partitioned.

TABLE 1. HPE Superdome Flex Chassis Components

Components	HPE Superdome Flex Single Chassis
Processors	4 x CPU
Processor Models	• 4 x Intel Xeon-Platinum 8276 (2.3GHz/28-core/165W) or • 4 x Intel Xeon-Platinum 8280 (2.7GHz/28-core/205W) or • 4 x Intel Xeon-Platinum 8280M (2.7GHz/28-core/205W) AEP option or 128GB DDR4 or • 4 x Intel Xeon-Platinum 8276M (2.3GHz/28-core/205W) AEP option or 128GB DDR4 or • 4 x Intel Xeon-Platinum 8280L (2.7GHz/28-core/205W) AEP option or 128GB DDR4 or • 4 x Intel Xeon-Platinum 8276L (2.3GHz/28-core/205W) AEP option or 128GB DDR4
Memory	• 24/48 x HPE SD Flex AH 64GB LRDIMS DIMM Kit or • 24/48 x HPE SD Flex AH 128GB LRDIMMS DIMM Kit
Network	• 2 x HPE Ethernet 10/25Gb 640SFP28 adapter • 4 x HPE 25Gb SFP28 SR
Drive	• 1 x HPE SD Flex DVD-RM Drive or • 1 x HPE SD Flex DVD-R Drive

Components	HPE Superdome Flex Single Chassis
Riser	1 x HPE SD Flex PCIe Low Profile 16-slot 4 Riser Config kit
HBA	• 2 x HPE SN1100Q 16Gb 2P FC HBA or • 2 x HPE SN1610Q 32Gb 2p FC HBA

HPE Rack Management Controller

HPE Rack Management Controller (RMC) is a self-contained 1U rack-mounted administrative component to manage the HPE Superdome Flex server. The HPE RMC includes one network port for administrative access to the system console, embedded RMC is called an eRMC.

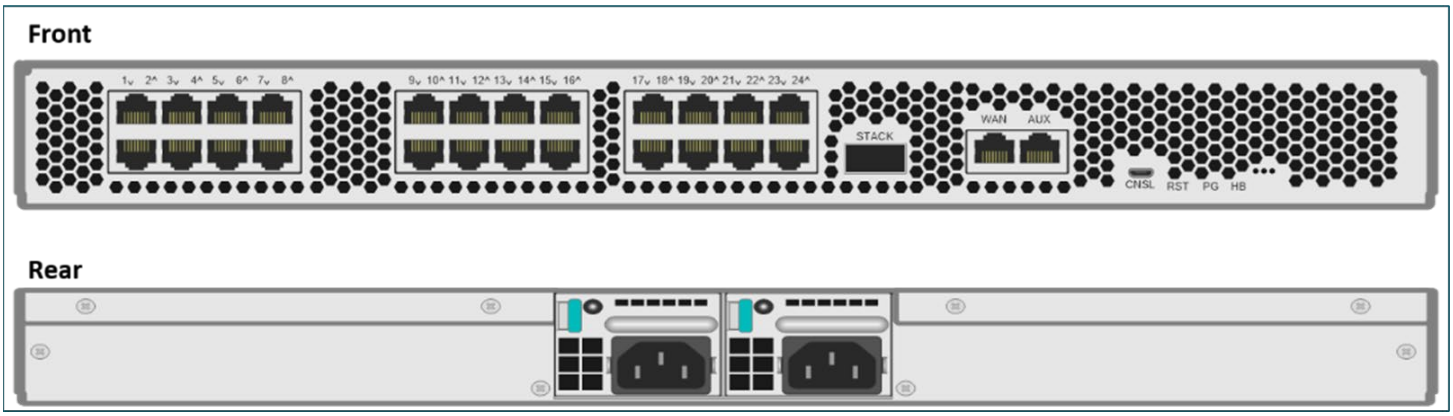

FIGURE 4. HPE Rack Management Controller (RMC)

Highlights

- RMC is optional for one or two HPE Superdome Flex chassis
- eRMC is required in a non-partitionable system to manage up to two chassis environment
- RMC is mandatory in the partitionable system regardless of the number of chassis

HPE Storage design overview

Data is critical for any organization in a data/information-centric world. The Enterprise business has more complex data and data volumes continue to grow exponentially. To determine the storage products, remember the reliability, performance, scalability, data compliance/security, and easy manageability.

Hewlett Packard Enterprise offers comprehensive and SAP-certified storage solutions for SAP HANA. HPE Primera A650 & A670 and HPE Alletra 9060 & 9080 storage systems provide outstanding performance, high availability, scalability, security, and easy management. HPE Superdome Flex solution for SAP HANA consists of any one of the storage models with two or four controllers.

HPE Primera 600 Storage

HPE Primera 600 storage is an enterprise storage solution that delivers extreme resiliency and performance of high-end storage with the agility of the cloud. Built upon proven resiliency and powered by the intelligence of HPE InfoSight. HPE InfoSight is embedded into HPE Primera with real-time intelligence to deliver instant insights and dynamic optimization. This enables the storage to act on its own by creating an end-to-end AI pipeline for self-managing storage.

HPE Superdome Flex solutions for SAP HANA use HPE Primera Storage 650 or 670 models used in a 4-way Storage Base to deliver instant access to data with storage that gets set up in minutes, upgrades transparently, and always-on storage for all mission-critical applications.

Each model is available as an all-flash version (A650 and A670) and HPE Primera 600 storage can be configured as an All-NVMe or as a SAS/NVMe flash array. Based on the I/O and storage requirements, an appropriate model will be configured for the SAP HANA solution.

Figure 5 shows the HPE Primera 600 Storage.

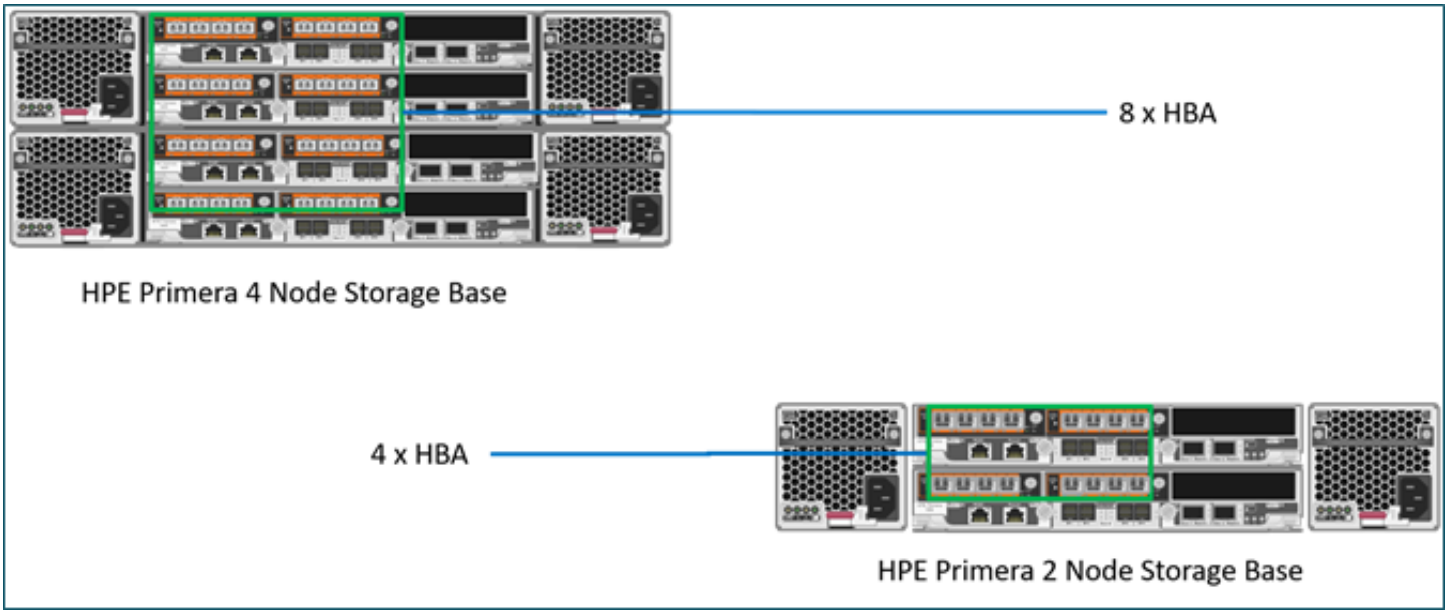

FIGURE 5. HPE Primera 600 Storage

The world's most intelligent storage for mission-critical applications comes with additional benefits such as:

- Service-Centric OS - Unique OS to reduce risk and management simplified
- All-Active architecture – Non-stop availability
- Timeless storage - Unique ownership experience
- 100% availability - No disruptions
- Extreme scalability - Multinode with transparent upgrade

TABLE 2. HPE Primera 600 Storage Components

HPE Primera model	No of controllers per node	16Gb/s or 32Gb/s FC HBA ports	IOPS (8K IO size,50% Read)	Maximum SAP HANA TDI hosts on thin-provisioned volumes
HPE Primera A650	2	0-24	98,207	30
HPE Primera A650	4	0-48	193,049	60
HPE Primera A670	2	0-24	140,538	36
HPE Primera A670	4	0-48	282,733	72

HPE Primera Drive Enclosure

Hewlett Packard Enterprise offers flexible modular solutions to simplify capacity expansion and a tiered storage system, Hot-pluggable SAS, SATA, and Solid-State Small Form Factor (SFF) for up to 24 drives. This allows you to buy what is needed today and purchase additional capacity as data storage needs grow.

FIGURE 6. HPE Primera 600 series disk enclosure

Each SFF drive enclosure includes 24 SAS SFF drive bays in 2U form with (2) IO modules, (2) power and cooling modules, (1) mounting rail kit, and power cables, disk enclosures can be ordered separately for installation in the field, or they can be factory integrated into a rack.

Highlights

- Modular platform provides investment protection
- Hassle-free expansion
- Drive enclosures to expand and add more drives to the configuration
- Maintain blank bays for proper airflow
- Hot-pluggable drives and power modules
- Redundant power and cooling provide increased reliability as a failure of a power supply or fans does not interrupt system functioning
- No. of drive enclosures are optional to HPE Primera 600 storage 2 or 4 node base controller
- HPE Primera 600 SFF (1.92TB /3.84TB /7.68TB /15.36TB) NVMe and SSD drives
- Achieve the highest availability in multi-enclosure configurations

TABLE 3. HPE Primera Drive Enclosure

Components	HPE Primera Drive Enclosure
Enclosure	• 3 x HPE Primera 600 2U 24d SFF Drive Encl or • 7 x HPE Primera 600 2U 24d SFF Drive Encl

HPE Alletra 9000 overview

The HPE Alletra 9000 offers Tier 0 cloud-native All-NVMe storage for massive consolidation of most demanding workloads, including SAP HANA. This product family can deliver up to 2.1 million IOPS at 55 GB/s throughput and less than 250-microsecond latencies.

Non-Volatile Memory Express (NVMe) is an industry-standard specification and interface for accessing and communicating with non-volatile storage media. NVMe offers better utilization of hardware and software to achieve higher levels of concurrency in I/O NVMe offers a large number of deep queues—specifically, up to 64K queue pairs with a queue depth of 64K. This results in much lower latencies as compared to the SAS interface. HPE Alletra 9000 only supports RAID 6.

HPE Alletra 9000 is compatible with most industry-standard 4-post EIA 19-inch racks with square mounting holes. A factory-integrated HPE Alletra 9000 is configured into the HPE Intelligent Series Rack with the appropriate power distribution Units (PDUs).

Scalability and sizing

HPE Alletra 9000 capacity sizing for SAP HANA should be based on the sizing rules given in the SAP HANA storage requirements from SAP. These sizing rules should be applied based on the memory needed for the SAP HANA database. SAP HANA host scaling for the various HPE Alletra 9000 models is described in Table 4.

TABLE 4. Storage scalability

HPE Alletra model	No of controllers per node	16Gb/s or 32Gb/s FC HBA ports	IOPS (8K IO size,50% Read)	Maximum SAP HANA hosts on thin-provisioned volumes
HPE Alletra 9060	2	0-24	109,610	34
HPE Alletra 9060	4	0-48	231,955	68
HPE Alletra 9080	2	0-24	158,469	48
HPE Alletra 9080	4	0-48	342,857	120

HPE Alletra 9000 controller supports adding three host bus modules/Adapters which can be any combination of FC modules or Ethernet modules.

Figure 7 shows the 4-way storage base with two and four controller nodes which is populated with HBA and Ethernet modules.

The most appropriate storage model with required HBA and Ethernet modules will be included in the SAP HANA solution based on the performance and scalability requirements.

FIGURE 7. HPE Alletra Controller

Figure 8 shows the HPE Alletra 9000 storage base with a 2 and 4 node controller with 32/16Gb FC and 25Gb Ethernet ports.

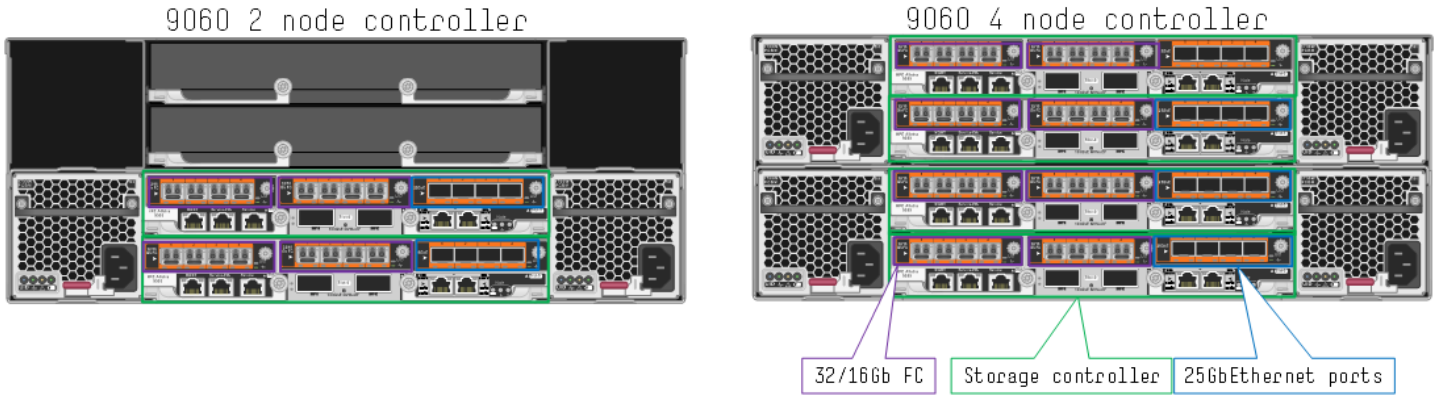

FIGURE 8. HPE Alletra 9000 Storage base

SAP HANA Fibre Channel storage API connector

The SAP HANA implementation with HPE Alletra 9000 storage uses the SAP HANA Fibre Channel storage API connector to access the SAP HANA persistence layer. This SAP HANA built-in Fibre Channel client provides direct Fibre Channel access to the SAP HANA data and log files for the SAP HANA nodes and enables high throughput and low-latency access to the SAP HANA database.

For scale-out scenarios, a highly available shared NFS service must be available for the SAP HANA configuration, log, and trace files to be stored.

Built-in high availability

The SAP HANA Fibre Channel client used with the HPE Alletra 9000 provides a highly available SAP HANA deployment. If one SAP HANA node fails, the defined standby node requests access to the data and log devices of the failed node. The standby node automatically recovers the SAP HANA persistence of the failed node to enable continued SAP HANA operations.

Multipath implementation

To access a block device from an SAP HANA physical Linux server, multipathing capabilities need to be installed and configured.

HPE Alletra 9000 storage virtual volume definition

For each SAP HANA server, data and a log virtual volume (VV) must be defined and exported to all SAP HANA servers. The first step is to create a common provisioning group (CPG). For example, a CPG named “HANA_data”:

After a CPG is created, the next step is to create the data and log volumes. These volumes should be thinly provisioned. Thinly provisioned volumes are known as TPVVs.

HPE Alletra drive enclosure

HPE Alletra 2240 is a drive enclosure that allows HPE Alletra 9000 to expand beyond 48 NVMe drives. Each drive enclosure includes 24 NVMe drive bays in 2U. Drive enclosures are optional because the Storage Base products include 24 NVMe drive bays. Two drive enclosures per node-pair are directly connected to the built-in 100GbE ports on the controllers with 100G QSFP28 cables.

FIGURE 9. HPE Alletra drive enclosure

Follow these rules while adding disks:

- The initial configuration must have all drives of the same capacity. Mixing drives of different capacities in the same array is allowed (but not recommended) for upgrades.
- The minimum supported quantity is eight (8) drives per node pair.
- The minimum upgrade quantity is two (2) drives per node pair.
- In a four-node configuration, each node pair must have the same number of drives.

- Drives must be loaded starting from the leftmost slot (slot 0) to the right, and leaving no empty slots between drives.

HPE Disk Drives

HPE Solid State Drives (SSDs) deliver higher performance, lower latency, and more power-efficient solutions when compared with traditional spinning disks, they support HPE Primera 600 series disk enclosures as a storage platform. They are generally available as Small Form Factor (SFF) hot plug devices, non-hot plug SFF devices, and SFF Quick Release devices, they fit seamlessly into the existing HPE server infrastructure.

FIGURE 10. HPE NVMe/PCIe SSD disk drive

HPE SSDs are available in three categories based on workload level: Read Intensive (RI), Mixed Use (MU), and Write Intensive (WI).
HPE Superdome Flex solutions for SAP HANA use the Mixed Use (MU) category of SSD drives. The categories indicate the number of drive writes per day (DWPD1) that you can expect from the drive. DWPD is the maximum number of 4K host writes to the entire drive capacity of the SSD per day over five years period.

NOTE

HPE Primera 600 series only supports RAID 6 for all drive types. All the drive enclosures (including the Storage Base) must contain an even number of drives with a minimum upgrade quantity is 2 drives per node pair or 2 drives per enclosure, whichever is larger.

TABLE 5. Supported disks

Storage	Disk drive description
HPE Primera 600	HPE Primera 600 1.92TB SAS SFF FE SSD
	HPE Primera 600 3.84TB SAS SFF FE SSD
	HPE Primera 600 7.68TB SAS SFF FE SSD
	HPE Primera 600 15.36TB SAS SFF FE SSD
HPE Alletra 9000	HPE Alletra 9000 1.92TB NVMe SFF SSD
	HPE Alletra 9000 3.84TB NVMe SFF SSD
	HPE Alletra 9000 7.68TB NVMe SFF SSD

Storage	Disk drive description
	HPE Alletra 9000 15.36TB NVMe SFF SSD

HPE ProLiant DL360 Server

HPE ProLiant DL360 Server is an excellent choice for SAP HANA management infrastructure being a compact 1U server with a secure, performance-driven dense server that can be deployed for virtualization and management VMs.

Figure 11 shows the HPE ProLiant DL360 Server front and rear views and its components.

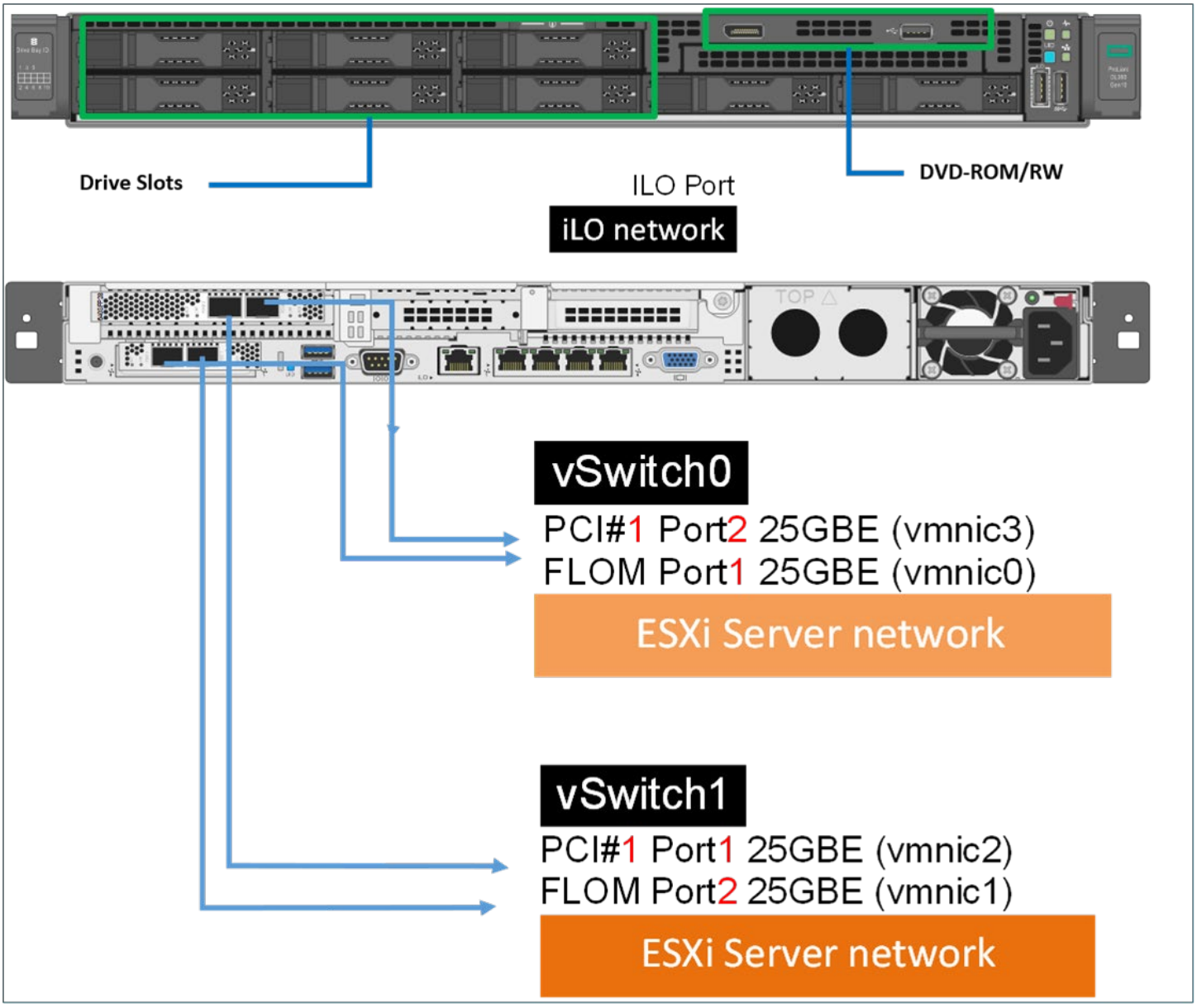

FIGURE 11. HPE ProLiant DL360 Server

NOTE
HPE ProLiant DL360 Server is an optional component for scale-up configuration and a mandatory component for scale-out configuration in the HPE Superdome Flex solutions for SAP HANA in both single/multi-rack systems, as this is used for VMware virtualized environment to set up all the management related components to be hosted on virtual machines.

TABLE 6. HPE ProLiant DL360 Server components

Components	HPE ProLiant DL360 Gen10 Server
Processors	1 x CPU
Processor Models	4208 (8 core, 2.1 GHz, 85W)
Memory	12 x HPE 16GB 2R 2933 MT/s
Network	• 1 x HPE Ethernet 10/25Gb 2-port 640FLR-SFP28 Adapter • 1 x HPE Ethernet 10/25Gb 2-port 640SFP28 Adapter
Drive	6 x HPE 1.8TB SAS 10K SFF SC 512e DS HDD
Riser	• 2 x HPE SN1100Q 16Gb 2p FC HBA or • 2 x HPE SN1610Q 32Gb 2p FC HBA

HPE SAN Fabric

The HPE SN6600B Fibre Channel Switch meets the demands of mission-critical SAP HANA database applications. It is a perfect fit for All-flash HPE Primera 600 Storage systems, as there is a clear demand for flash-based storage environments. It delivers 32Gbps per port with up to 64 ports in a 1U form factor.

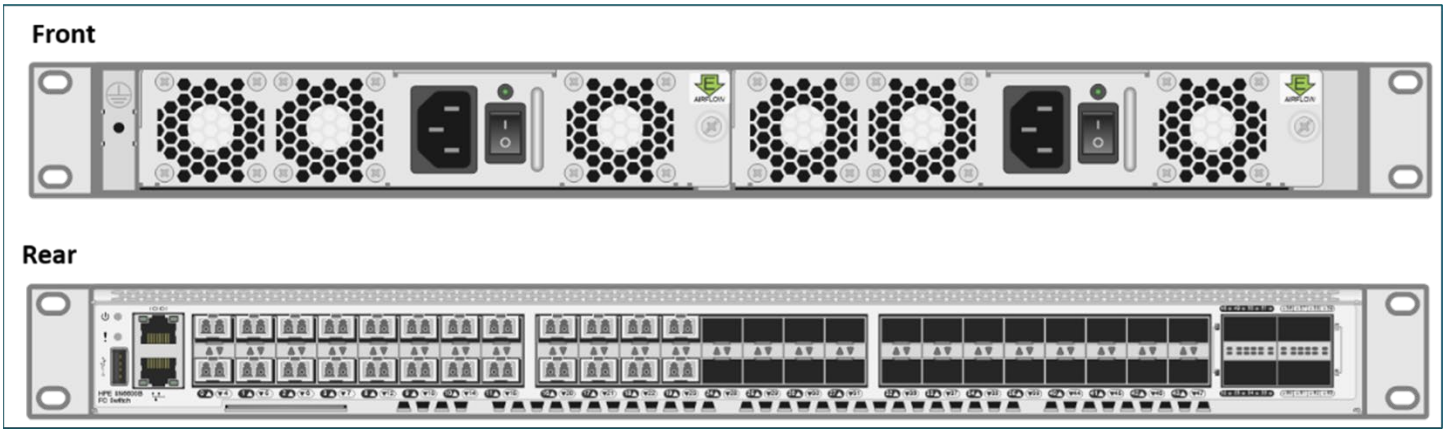

FIGURE 12. HPE Storage Fabric

Highlights

- HPE SN6600B is NVMe ready
- HPE SN6600B is a high-density building block
- Built for maximum flexibility

TABLE 7. HPE SAN Components

Components	HPE SAN Fabric
HPE SAN Switch	2 x HPE SN6600B 32Gb 48/48 FC Switch
SFPs	• 96 x HPE B-series 16Gb SFP+SW XCVR or • 96 x HPE B-series 32 Gb SFP+ SW 1-pack XCVR

HPE Aruba 6300M Switch

The Aruba CX 6300 Switch series is a modern, flexible, scalable, and intelligent family of stackable switches. Aruba 6300M (SKU#R9F63A) switch consists of 48 X 10/100/1000BaseT, 4x1/10/25/50G SFP ports with 2 field-replaceable, hot-swappable power supplies. The Aruba Virtual Stacking Framework (VSF) allows for the stacking of up to 10 switches. VSF simplifies management and configuration through single management IP for the entire stack. See quick specs for more details.

This pair of switches are mainly used for management purposes, all management ports from servers (iLO, MGMT, RMC), storage, network, and SAN switches MGMT/OOB ports are connected to these switches.

Figure 13 shows the HPE Aruba 6300M Switch.

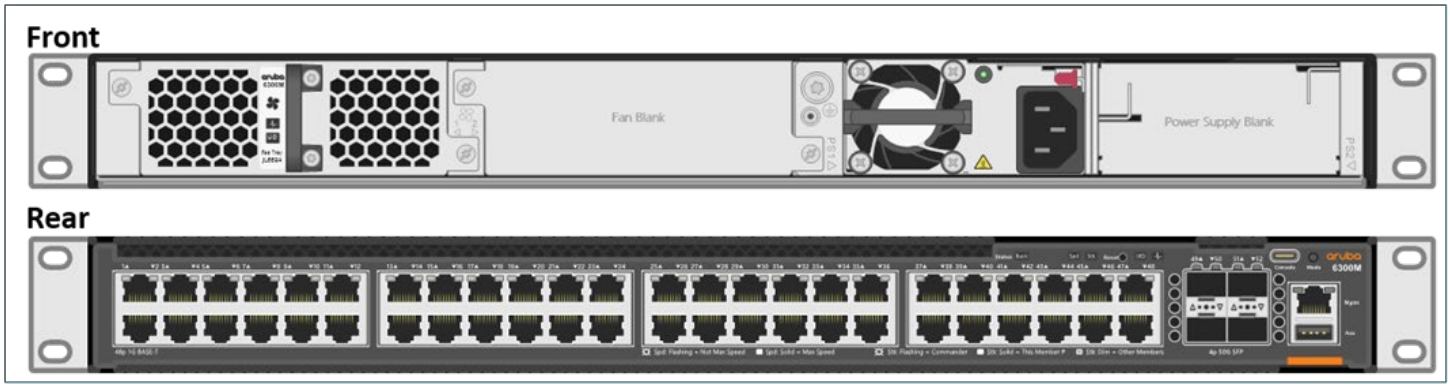

FIGURE 13. HPE Aruba 6300M Switch

TABLE 8. HPE Aruba Switch components

HPE Aruba 6300M Switch
2 x Aruba 6300M 48-port 1GbE and 4-port SFP56 Switch

HPE Aruba 8325-48Y8C

The Aruba 8325 Switch Series offers flexibility, security, and scalability demands of the mobile, cloud, Datacenter and IoT era. The Aruba 8325-48Y8C consist of line-rate ports 48x25GbE (SFP/SFP+/SFP28) and 8 x 40/100GbE (QSFP+/QSFP28) with connectivity in a compact 1U form factor with supported speed 48 ports of 1GbE/10GbE/25GbE (SFP/ SFP+/ SFP28) and 8 ports of 25G/ 40GbE/ 100GbE (SFP28/ QSFP+/ QSFP28).

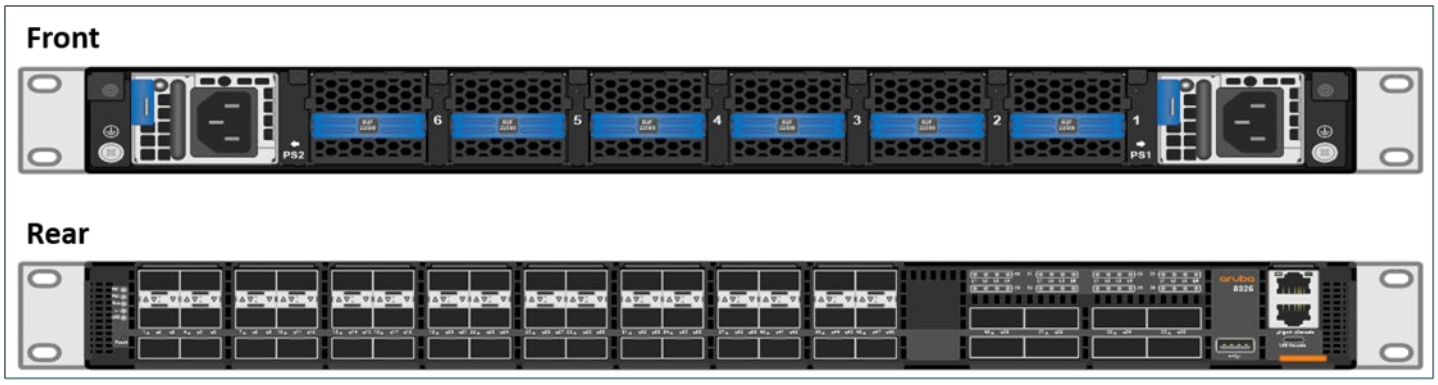

FIGURE 14. HPE Aruba 8325-48Y8C Switch

For more details, refer to https://www.arubanetworks.com/assets/ds/DS_8325Series.pdf.

The pair of Aruba 8325-48Y8C switches are mainly used for application networks, SAP HANA nodes, Data, and application traffic ports/NICs that are connected to these switches. Furthermore, Hypervisors (VMware ESXi) are connected to application switches to enable access to application networks. Hypervisors will host HPE Service Guard Network File Sharing (NFS), SAP HANA cockpit, and other management VMs.

TABLE 9. HPE Aruba Switch components

HPE Aruba 8325-48Y8C Switch
2 x Aruba 8325-48Y8C 48p 25G SFP/+/28 8p 100G QSFP+/28 Switch

HPE Aruba 8325-32C – Spine Switch

The Aruba 8325-32C consists of line-rate ports 32 x 40/100GbE (QSFP+/QSFP28) with connectivity in a compact 1U form factor. Provides over 6.4Tbps of capacity, with a line-rate speed of 40G/100G and with break-out cables 10Gbps, and 25Gbps.

For more details, refer to https://www.arubanetworks.com/assets/ds/DS_8325Series.pdf.

Aruba 8325-32C pair of switches is used as spine switches in the environment with more than two rack groups. Each rack group application switch has multiple connections to spine switches in Clos architecture.

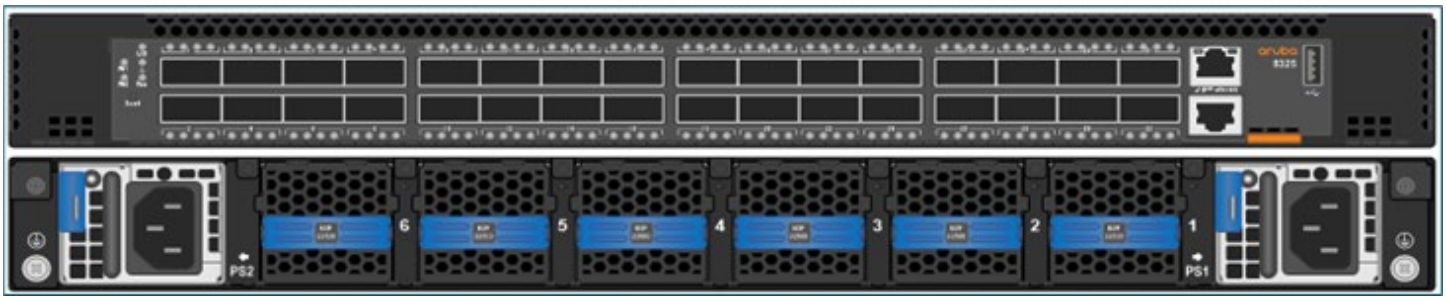

FIGURE 15. Aruba 8325-32C front and rear views

TABLE 10. HPE Aruba Switch components

HPE Aruba 8325-32C Switch
2 x Aruba 8325-32C 32-port 100G QSFP+/QSFP28

SOLUTION DETAILS

The architectural design of HPE Superdome Flex solutions for SAP HANA is built within the rack either in a single or multiple racks wherein all the solutions components such as HPE Superdome Flex servers, HPE Primera 600 storage, HPE LAN and SAN Fabrics, and HPE ProLiant DL360 servers are racked appropriately at defined U positions in a single rack or multi-rack environment.

HPE Superdome Flex solution for SAP HANA on a single rack solution is designed to reduce TCO and data center footprints for medium-size enterprise customers where all the infrastructure components and compute nodes are built in a single rack.

HPE Superdome Flex solution for SAP HANA on the multi-rack solution is designed to provide maximal flexibility and the ability to grow in the future for large enterprise customers. It has an Infrastructure rack (RACK A) and compute or server rack (RACK B and C), all the three racks put together are called a single rack group.

HPE Superdome Flex solutions for SAP HANA on multi-rack groups solution is designed to support the linear growth of large to very large customers to provide an easily expandable landscape by simply adding the Rack Groups to the existing solutions and it can support up to six rack groups.

Infrastructure rack

The infrastructure rack has HPE Aruba 6300M, HPE Aruba 8325-48Y8C LAN Fabrics, HPE Store Fabric SN6600B, HPE ProLiant DL360, and HPE Primera 600 Storage with appropriate drive enclosures as per the solution. Likewise, every rack group will have one Infrastructure rack with the defined list of components, but in six rack group environments. Rack group 3 will have extra pair of switches to connect further rack groups.

Rack naming convention

- RACK 0xA is named as infrastructure rack x is the rack group number example RACK 01A|02A|03A|04A|05A|06A
- RACK 0xB is named as compute rack x is the rack group number example RACK 01B|02B|03B|04B|05B|06B
- RACK 0xC is named as compute rack x is the rack group number example RACK 01C|02C|03C|04C|05C|06C

TABLE 11. Infrastructure Rack component for single rack and multi-rack

Solution components	Multi-rack	Single rack
HPE LAN Fabric for Management	2 x HPE Aruba 6300M 48 X 10/100/1000BaseT, 4x1/10/25/50G SFP	2 x HPE Aruba 6300M 48 X 10/100/1000BaseT, 4x1/10/25/50G SFP
HPE LAN Fabric for SAP HANA	2 x HPE Aruba 8325-48Y8C, 48x25GbE (SFP/SFP+/SFP28) and 8 x 40/100GbE (QSFP+/QSFP28)	2 x HPE Aruba 8325-48Y8C, 48x25GbE (SFP/SFP+/SFP28) and 8 x 40/100GbE (QSFP+/QSFP28)
HPE SAN Fabric[3]	2x HPE Store Fabric SN6600B 32Gb 48/48 FC	2x HPE Store Fabric SN6600B 32Gb 48/48 FC
HPE Management Server[4]	VMware ESXi	VMware ESXi
Dual-purpose storage	Primera A3 Dual-purpose storage (opt)	Primera A3 Dual-purpose storage (opt)
Primary storage	Primera A2 Primary storage for C1 – C8	Not Available
Primary Storage	Primera A1 Primary storage for B1 – B8	Primera A1 Primary storage for B1 – B5

[3] Applicable in Scale-out scenarios or as per the customer choice
[4] Mandatory in Scale-out scenarios

VMware ESXi on HPE ProLiant DL360 Server

Deploying VMware ESXi on HPE ProLiant DL360 Server provides shared resources of compute, network, and storage to host multiple virtual machines for installing Central Management Server, HANA Cockpit server, SSMC, and so on to manage the entire HPE Superdome Flex solution for SAP HANA landscape. The below section provides more detailed information on each software-based component.

Central Management Server (vCMS)

HPE Superdome Flex solution for SAP HANA comes with a Central Management Server (CMS), installed on the virtualized environment running Microsoft® Windows® 2019 and used to configure and manage the solution components such as LAN switches, SAN switches, Server nodes, and HPE Primera 600 storage.

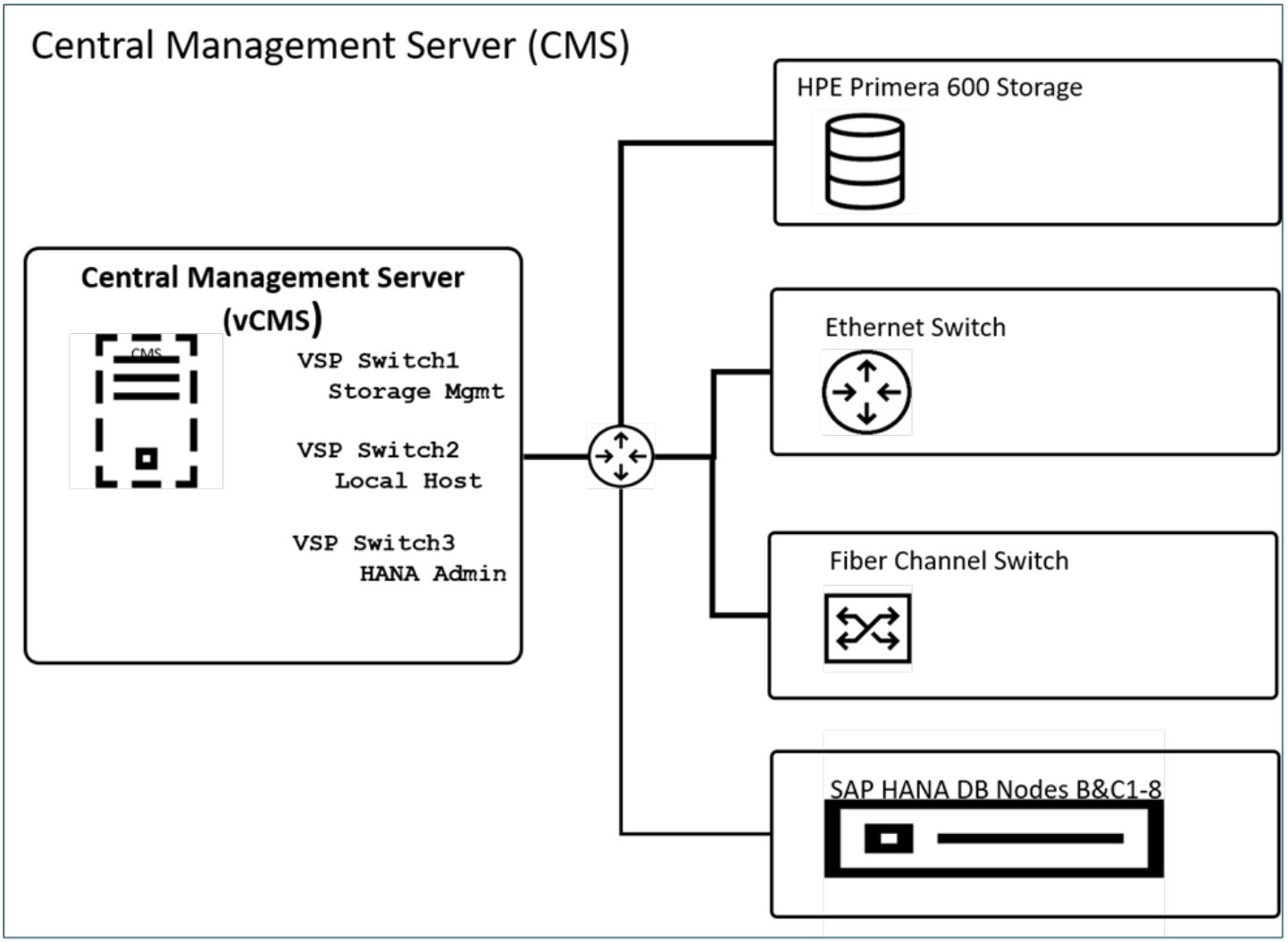

FIGURE 16. Virtual Central Management Server (vCMS)

Highlights

- Easy deployment using VMware
- User-friendly Windows operating system
- Provides the perfect staging server to download and update the HPE Superdome Flex complex firmware, SAN firmware, and LAN firmware
- Using virtual media on Windows to mount the ISO images for OS installation, I/O drivers update, etc.

HPE Serviceguard for NFS (vSGNFS)

HPE Serviceguard for Linux is a proven solution for high availability that is achieved by clustering software between two nodes running on Linux operating environments, running on BareMetal or virtual machines. HPE Superdome Flex solutions for SAP HANA use the HPE Serviceguard cluster on Linux nodes to export HANA shared filesystem as Network File Share (NFS), especially in scale-out solutions.

HPE Serviceguard NFS toolkit is deployed on virtual machines hosted on two different VMware ESXi servers.

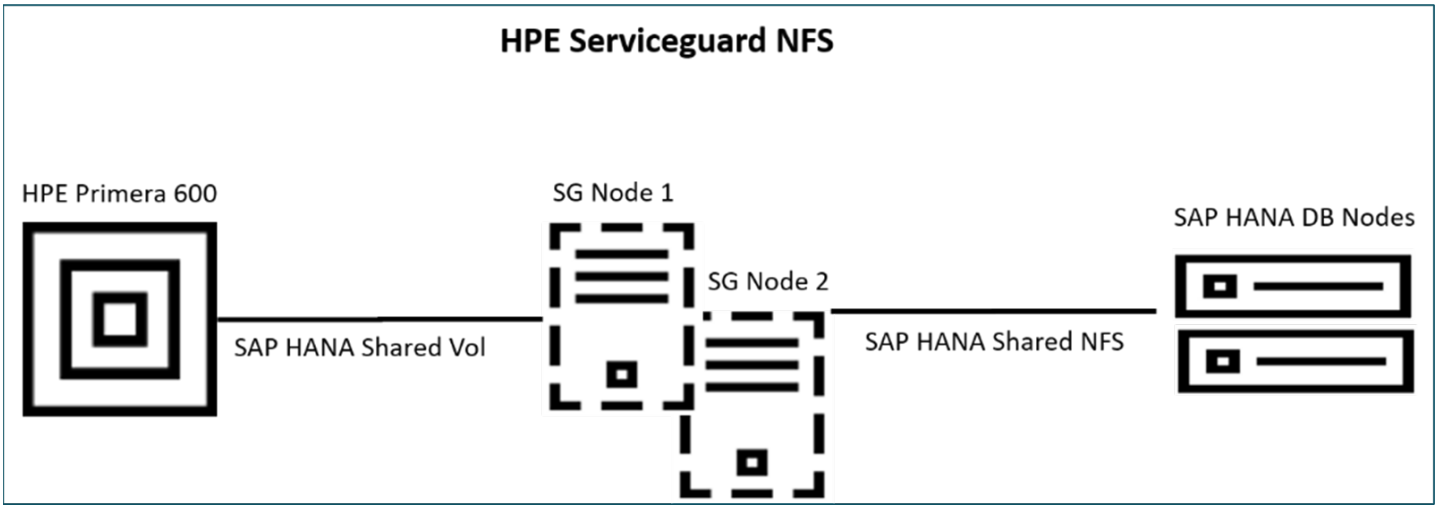

FIGURE 17. HPE Aruba LAN Switch

Highlights

- Enables to export NFS share to remote servers
- Provides high availability for the SAP HANA shared NFS
- Clustering provides failsafe SAP HANA shared NFS

HPE Recovery Manager Central (vRMC)

Hewlett Packard Enterprise has developed the HPE Recovery Manager Central (RMC) tool as a software solution that integrates HPE Primera Storage with HPE StoreOnce as a backup appliance for integrated snapshot-based backups of SAP HANA databases.

Figure 18 shows the HPE Recovery Manager Central (RMC) solution integration.

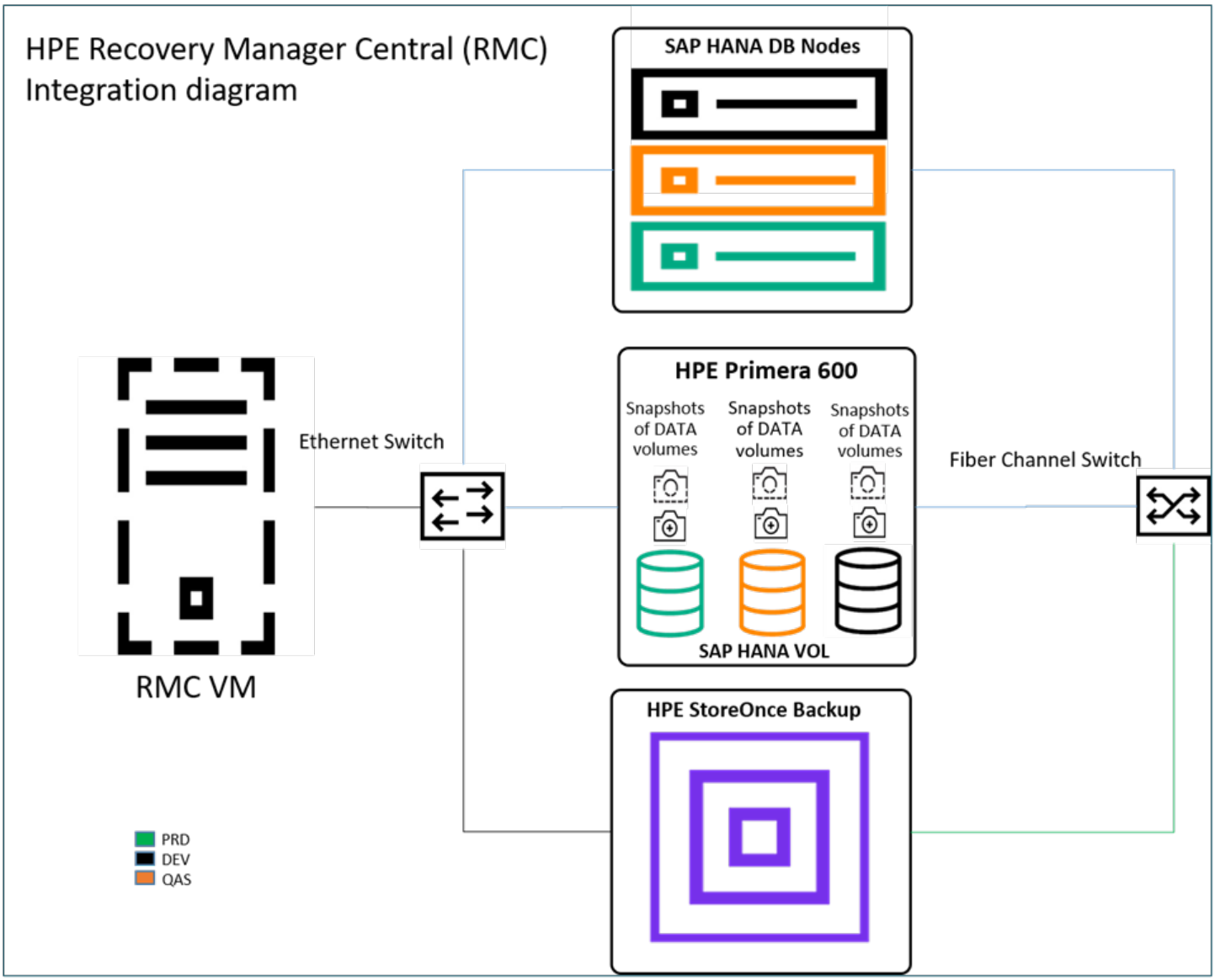

FIGURE 18. HPE Recovery Manager Central (RMC) solution integration

HPE Recovery Manager Central (RMC) has been integrated with HPE Superdome Flex solutions for SAP HANA. This enables the capability of maintaining a complex portfolio of snapshots and backups for the entire landscape of SAP HANA systems in a seamless fashion and accurately.

Highlights

- Easy deployment with simple and intuitive GUI for database administrators
- RMC facilitates policy-driven copy data management
- Automatic, application-consistent snapshots
- Express Protect additional protection for the existing snapshots

HPE StoreServe Management Console (vSSMC)

SSMC is a management and reporting tool for HPE Primera 600 storage systems. SSMC can be deployed as a Linux-based appliance. Supported operating systems to run the appliance on VMware ESXi are 6.5, 7.0, and 7.1. SSMC centralizes all the HPE Primera 600 storage systems under a single console for management and reporting for both file and block storage systems. It can be integrated with HPE InfoSight for performance and reporting analytics.

SSMC has three sizing options:

- Small - Small deployment option can be used to manage up to 8 arrays
- Medium - Medium deployment option can be used to manage up to 16 arrays
- Large - Large deployment option can be used to manage up to 32 arrays

SAP HANA Cockpit

The SAP HANA cockpit provides aggregate, system, and database administration features, such as database monitoring, user management, and data backup. You can use the SAP HANA cockpit to start and stop systems or services, manage backups, manage host-based system replication, monitor the system, configure system settings, and manage users and authorizations.

NOTE

The SAP HANA cockpit allows you to manage the SAP HANA options, and capabilities are only available if the option or capability has been installed. See SAP Help portal for more details.

HPE Superdome Flex multi-rack solution for SAP HANA

The multi-rack category will have a mandatory Infrastructure rack (RACK 0xA) and one or two compute racks (RACK 0xB/RACK 0xC) depending on the choice of configuration built based on customer needs.

Large Partitionable/Non-Partitionable systems can be built by adding chassis using the interconnect ports on the front of every chassis to other chassis connected by HPE Superdome Flex Grid cables. Likewise, we can expand a single system 4-socket (Single Chassis) to 32 sockets (Eight Chassis) system per compute rack.

Figure 19 shows three racks, RACK 01A (Infrastructure Rack), RACK 01B (Compute rack), and RACK 01C (Compute rack) altogether is called a single rack group.

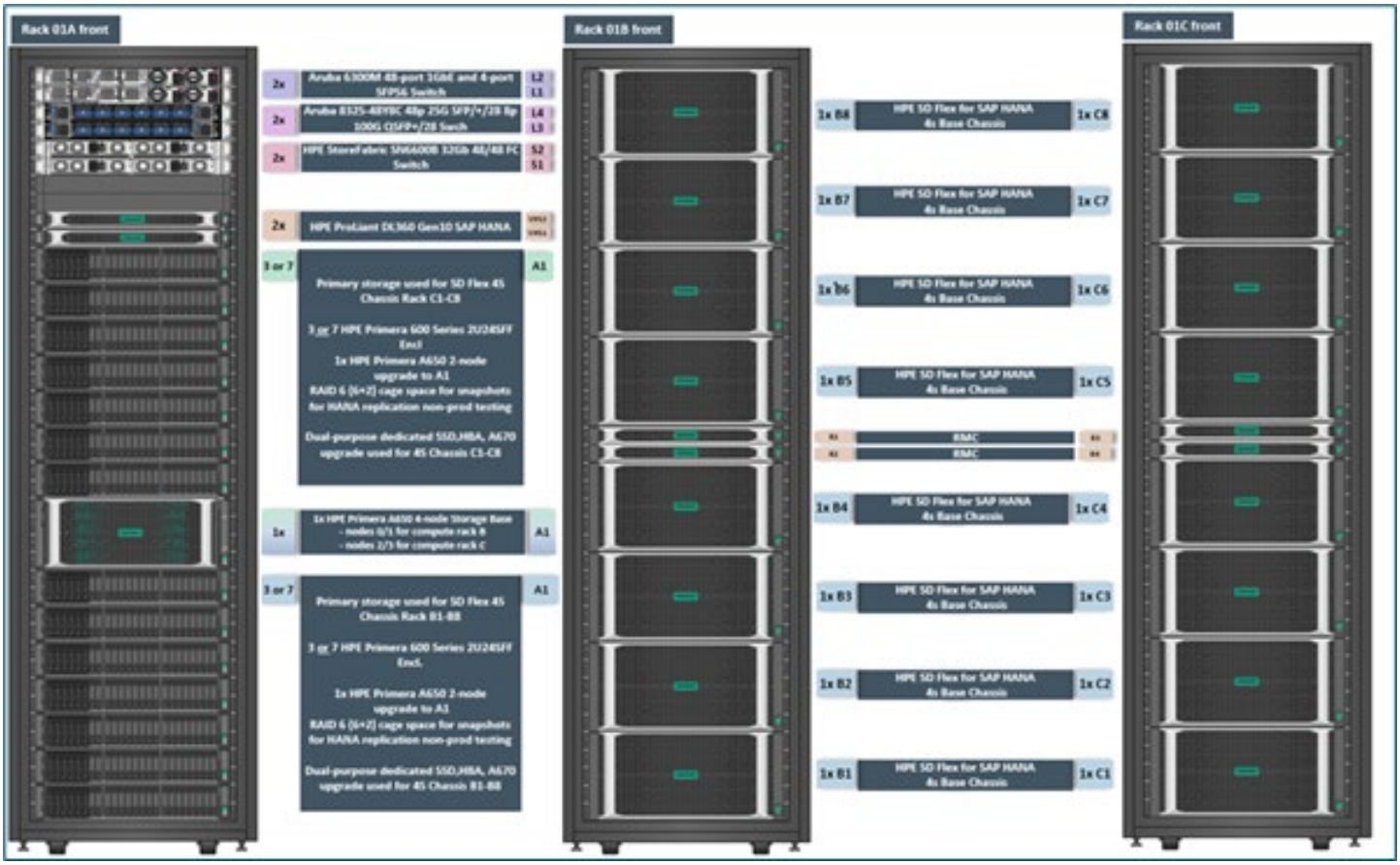

FIGURE 19. HPE Superdome Flex multi-rack solution for SAP HANA

RACK 01B and RACK 01C are named compute racks, both of them are populated similarly, as they consist of four compute nodes of 4 sockets each starting from the bottom and then going up to eight chassis per rack. Each rack can have up to two Rack Management Controllers (RMC) to manage the compute nodes, four compute nodes per Rack Management Controller (RMC).

HPE Superdome Flex multi-rack solutions for SAP HANA with HPE Primera 600 Storage are designed to support the solution based on socket and memory sizes starting from 4 sockets (1.5TB) to 32 sockets (24.0TB) Scale-up systems and Scale-out combinations starting from 4 sockets (1.5TB) to 16 sockets (12.0TB).

NOTE

Partitionable systems are built using the partitionable HPE Superdome Flex Grid cables.

Rack group (Extension)

HPE Superdome Flex extended rack groups will have the same set of racks with small variations in the Infrastructure racks without HPE ProLiant DL360 servers. The below figure represents the components setup for rack groups 2,4,5,6.

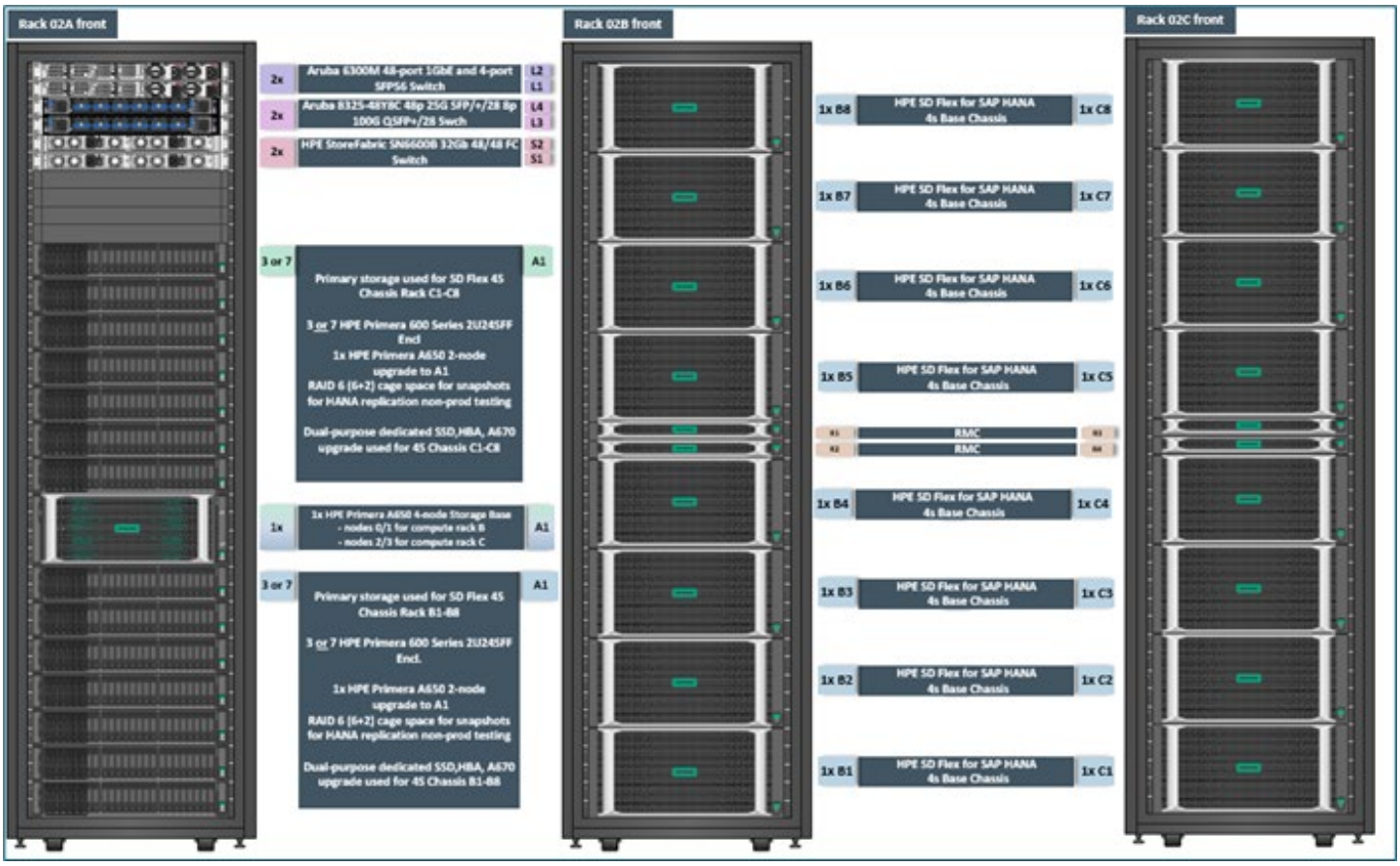

FIGURE 20. HPE Superdome Flex Extension Rack Group 2, 4, 5, 6

Figure 21 shows the HPE Superdome Flex Rack group 3 which includes additional pair of Aruba 8325-32C network switches as spine layer and SAN star switches.

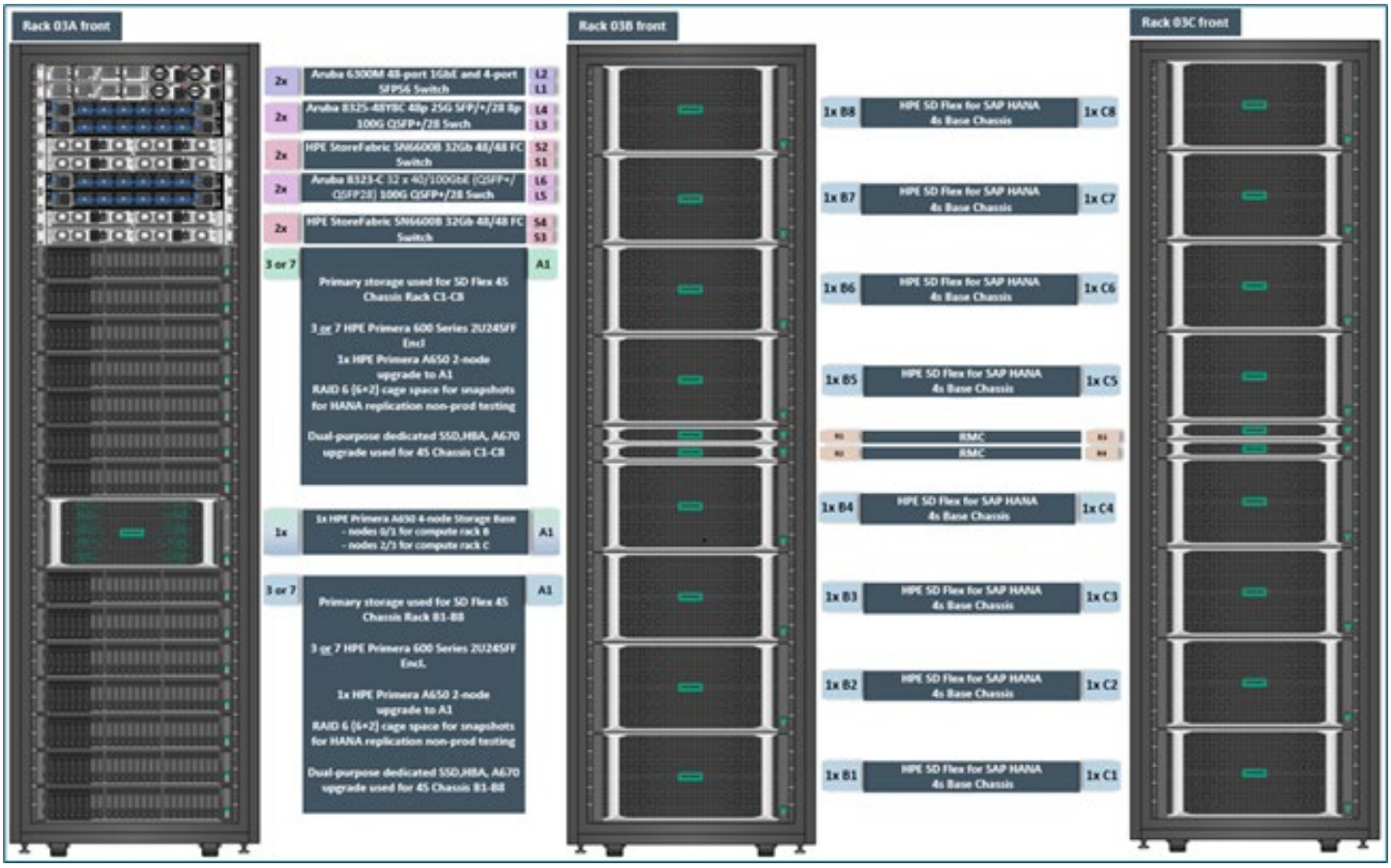

FIGURE 21. HPE Superdome Flex Rack group 3

Rack 0x[5]A as Infrastructure Rack

TABLE 12. Infrastructure Rack components multi-rack groups

Position	Device	Rack group
U41 - U42	2 x HPE Aruba 6300M 48 X 10/100/1000BaseT, 4x1/10/25/50G SFP	1,2,3,4,5,6
U39 – U40	2 x HPE Aruba 8325-48Y8C	1,2,3,4,5,6
U35-U36	2 x HPE Aruba 8325-32C (Spine)	3
U37 - U36	2x HPE Store Fabric SN6600B 32Gb 48/48 FC	1,2,3,4,5,6
U34-33	2x HPE Store Fabric SN6600B 32Gb 48/48 FC (Star switches)	3
U34	HPE ProLiant DL360 Gen10 VHS2	1
U33	HPE ProLiant DL360 Gen10 VHS1	1
U01 – U32	HPE storage (HPE Primera or Alletra)	1,2,3,4,5,6

[5] Replace with Rack group number [1,2,3,4,5,6]

Rack 0x B/C as Compute Rack

TABLE 13. Compute Rack components for multi-rack groups

Position	Device	Rack group
U38 – U42	SD Flex chassis B8 / C8	1,2,3,4,5,6
U33 – U37	SD Flex chassis B7 / C7	1,2,3,4,5,6
U28 – U32	SD Flex chassis B6 / C6	1,2,3,4,5,6
U23 – U27	SD Flex chassis B5 / C5	1,2,3,4,5,6
U22	RMC	1,2,3,4,5,6
U21	RMC	1,2,3,4,5,6
U16– U20	SD Flex chassis B4 / C4	1,2,3,4,5,6
U11 – U15	SD Flex chassis B3 / C3	1,2,3,4,5,6
U06 – U10	SD Flex chassis B2 / C2	1,2,3,4,5,6
U01 – U05	SD Flex chassis B1 / C1	1,2,3,4,5,6

Storage configuration

See possible storage options in the table below.

TABLE 14. Storage options for multi-rack layout

PRIMERA usage	Storage	#drive enclosure (including PRIMERA)	Disks	Raid level
HPE Primary storage used for SD Flex	HPE Primera 600 Storage or HPE Alletra 9000	3 or7	15.36 TB SSD 7.68 TB SSD 3.84 TB SSD 1.92 TB SSD	RAID 6 RAID 6 RAID 6 RAID 6
Dual-purpose storage			15.36 TB SSD 7.68 TB SSD 3.84 TB SSD 1.8 TB HDD	RAID 6 RAID 6 RAID 6 RAID 6

Memory and socket configurations

Table 15 shows possible supported memory configurations for 4 socket single chassis. Its emphasis is on the population of memory DIMM of different types and sizes, HPE SAP HANA solution portfolio supports DDR4 and Persistent Memory (PMEM) DIMMs of different sizes such as DDR4 64GB and 128GB, Persistent Memory (PMEM) 128GB, 256GB, and 512GB.

TABLE 15. Single Chassis DIMMS population

DIMMs per Chassis	Memory
24x 64GB RDIMM or LRDIMM	1.5 TB
48x 64GB RDIMM or LRDIMM	3.0 TB
24x 128GB LRDIMM	3.0 TB
24x 64GiB DRAM + 24x 128GiB DRAM	4.5 TB
24x 64GiB DRAM + 24x 128GiB PMEM	4.5 TB
48x 128GiB DRAM	6.0 TB
24x 128GiB DRAM + 24x 128GiB PMEM	6.5 TB
24x 64GiB DRAM + 24x 256GiB PMEM	7.5 TB
24x 128GiB DRAM + 24x 256GiB PMEM	9.0 TB
24x 128GiB DRAM + 24x 512GiB PMEM	15.0 TB

Table 16 shows possible supported sockets and number nodes in a multi-rack configuration. Its emphasis is on the possible number of nodes for Scale-up and Scale-out configuration for the entire six rack groups.

TABLE 16. HPE Superdome Flex multi-rack entire solution expansion max up to six rack groups

No of socket	No. of nodes	No of Drives
4 socket 1 x Base chassis	1 to 96 x scale-up nodes or 1 x 96 node scale-out	Varies as per memory size
8 socket 1 x Base chassis 1 x Expansion chassis	1 to 48 x scale-up nodes or 1 x 48 node scale-out	Varies as per memory size
12 socket 1 x Base chassis 2 x Expansion chassis	1 to 24 x scale-up node or 1 x 24 node scale-out	Varies as per memory size
16 socket 1 x Base chassis 3 x Expansion chassis	1 to 24 x scale-up node or 1 x 24 node scale-out	Varies as per memory size
20 socket 1 x Base chassis 4 x Expansion chassis	1 to 12 x scale-up node or 1 x 12 node scale-out	Varies as per memory size
24 socket 1 x Base chassis 5 x Expansion chassis	1 to 12 x scale-up node or 1 x 12 node scale-out	Varies as per memory size
28 socket 1 x Base chassis 6 x Expansion chassis	1 to 12 x scale-up node or 1 x 12 node scale-out	Varies as per memory size
32 socket 1 x Base chassis 7 x Expansion chassis	1 to 12 x scale-up node or 1 x 12 node scale-out	Varies as per memory size

HPE Superdome Flex single rack solution for SAP HANA

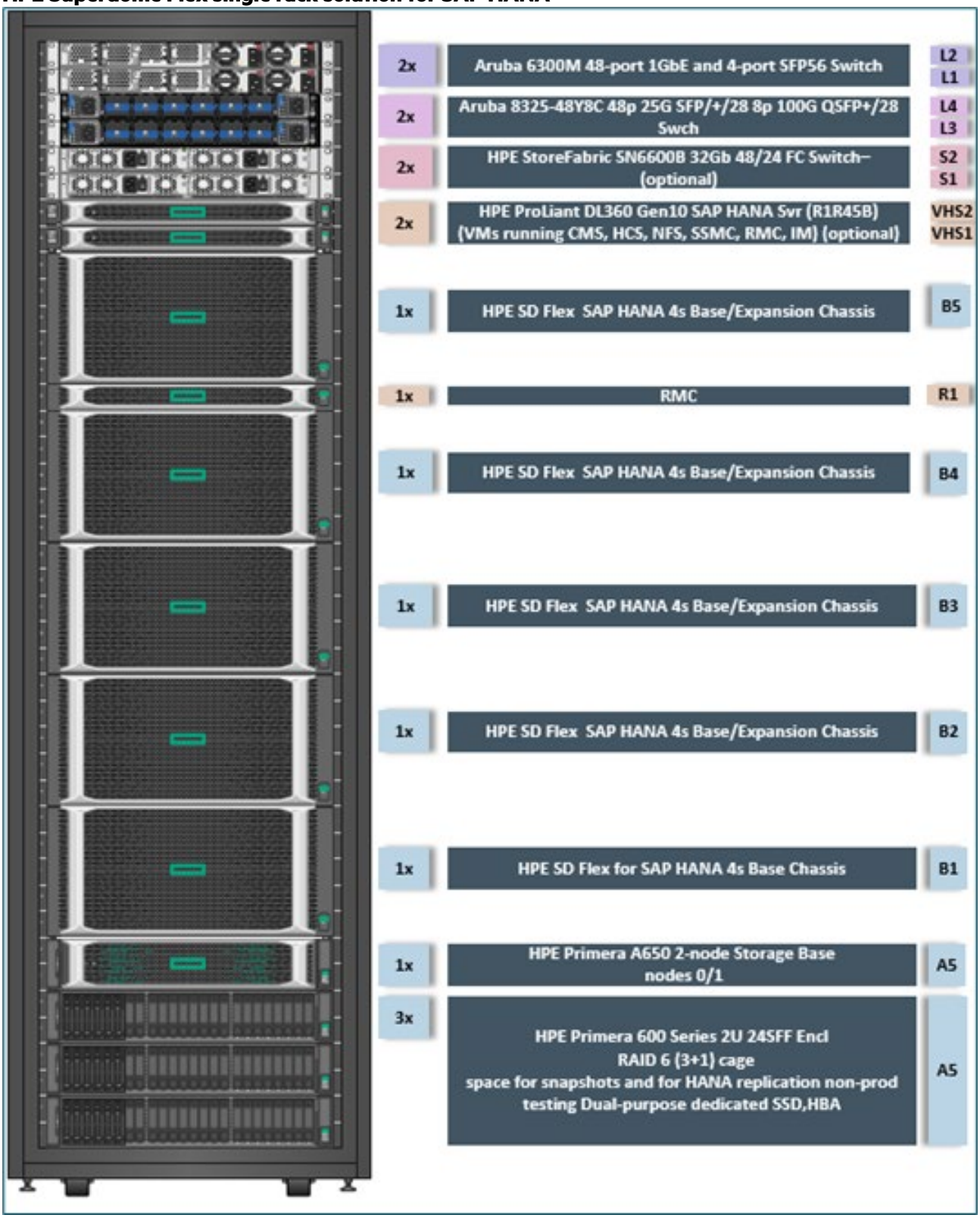

FIGURE 22. HPE Superdome Flex single rack solution for SAP HANA

HPE Superdome Flex single rack layout is an intermediate solution in this category, which is designed to provide a complete solution in a single rack for reducing the data center footprints, the ability to increase the size of the scale-up node, or adding additional scale-out nodes that are very much limited.

This single rack solution is again simple, flexible, and easily upgradable. The solution ranges from 4 to 20 socket scale-up and also with limited scale-out offerings for high-density compute infrastructure for hosting SAP HANA workloads.

HPE Superdome Flex single rack solution with HPE Primera 600 Storage comes in scale-up configurations starting from 4- to 20-sockets and 4 sockets 5 nodes and 8 sockets 2 nodes scale-out configurations.

Single rack as Infrastructure and compute

TABLE 17. HPE Superdome Flex single rack components

Position	Device
U41 - U42	2 x HPE Aruba 6300M
U39 – U40	2 x HPE Aruba 8325-48Y8C
U37 - U38	2x HPE StoreFabric SN6600B 32Gb 48/48 FC (optional)
U35	HPE ProLiant DL360 Gen10 VHS2
U36	HPE ProLiant DL360 Gen10 VHS1
U30 – U34	SD Flex chassis B5
U29	RMC
U24 – U28	SD Flex chassis B4
U19– U23	SD Flex chassis B3
U14 – U18	SD Flex chassis B2
U09 – U13	SD Flex chassis B1
U01 – U08	HPE Primera 600 with storage base and 3 x disk enclosures

Memory and socket configurations

Table 18 shows possible supported memory configurations for 4 socket single chassis. Its emphasis is on the population of memory DIMM of different types and sizes, HPE Superdome Flex solution for SAP HANA portfolio supports DDR4 and Persistent Memory (PMEM) DIMMs of different sizes such as DDR4 64GB & 128GB, Persistent Memory (PMEM) 128GB, 256GB, and 512GB.

TABLE 18. Single Chassis DIMMS population

DIMMs per Chassis	Memory
24x 64GB RDIMM or LRDIMM	1.5 TB
48x 64GB RDIMM or LRDIMM	3.0 TB
24x 128GB LRDIMM	3.0 TB
24x 64GiB DRAM + 24x 128GiB DRAM	4.5 TB
24x 64GiB DRAM + 24x 128GiB PMEM	4.5 TB
48x 128GiB DRAM	6.0 TB
24x 128GiB DRAM + 24x 128GiB PMEM	6.5 TB
24x 64GiB DRAM + 24x 256GiB PMEM	7.5 TB
24x 128GiB DRAM + 24x 256GiB PMEM	9.0 TB
24x 128GiB DRAM + 24x 512GiB PMEM	15.0 TB

Table 19 shows possible supported sockets and the number of nodes in single rack configurations. Its emphasis is on the possible number of nodes for scale-up and scale-out configuration for the entire single rack solution.

TABLE 19. HPE Superdome Flex single rack with HPE Primera 600 Storage supported socket, nodes configurations

No of sockets	No. of nodes	No of drives
4 socket 1 x Base chassis	1 to 5 x scale-up nodes or 1 x 4+1 node scale-out	Varies as per memory size
8 socket 1 x Base chassis 1 x Expansion chassis	1 to 2 x scale-up nodes or 1 x 2 node scale-out	Varies as per memory size
12 socket 1 x Base chassis 2 x Expansion chassis	1 x scale-up node	Varies as per memory size
16 socket 1 x Base chassis 3 x Expansion chassis	1 x scale-up node	Varies as per memory size
20 socket 1 x Base chassis 4 x Expansion chassis	1 x scale-up node	Varies as per memory size

Storage configuration

TABLE 20. Storage options for single rack layout

Primera usage	Storage	#drive enclosure (including PRIMERA)	Disks	Raid level
Primary storage used for SD Flex	HPE Primera 600 Storage 2 node storage base OR HPE Alletra 9000 2 node storage base	3	15.36 TB SSD 7.68 TB SSD 3.84 TB SSD 1.92 TB SSD	RAID 6 RAID 6 RAID 6 RAID 6
Dual Purpose storage			15.36 TB SSD 7.68 TB SSD 3.84 TB SSD 1.8 TB HDD	RAID 6 RAID 6 RAID 6 RAID 6

DATABASE SOFTWARE

SAP HANA version 2.0 SPS 04/SPS 05 or later

OPERATING SYSTEM

The HPE Superdome Flex with HPE Primera 600 Storage is SAP-certified for SAP HANA use cases with up to 24TB of memory. For the most current information on the certified operating systems, See SAP HANA certified hardware directory.

SLES

- SAP Note 1944799 - SAP HANA Guidelines for SLES Operating System installation.
- SAP Note 2205917 - SAP HANA DB: Recommended OS settings.

RHEL

- SAP Note 2777782 - SAP HANA DB: Recommended OS settings for RHEL 8.

HIGH AVAILABILITY SOFTWARE

HPE Serviceguard LX for SAP (SGeSAP) is a clustering software, which provides High Availability (HA) and Disaster Recovery (DR) capabilities for SAP HANA applications deployed in distributed environments. HPE Serviceguard provides enterprise HA and DR support to Linux operating systems. HPE Serviceguard product has customizations for SAP HANA to provide automated mechanisms to detect failures and initiate recovery procedures to ensure the continuous availability of SAP application services.

SUMMARY

Hewlett Packard Enterprise and SAP have teamed up to offer a wide range of certified SAP HANA solutions on Hewlett Packard Enterprise hardware platforms to meet performance, flexibility, and availability. This Solution Architecture document is a gateway to HPE Superdome Flex solutions for SAP HANA with HPE Primera Storage to give better insights into various configurations, components used in building the solution, and understanding of the ecosystem of deliverables to make thoughtful planning for integration, implementation, and further to lifecycle maintenance.

HPE POINTNEXT SERVICES

HPE Pointnext provides one-stop support for a full spectrum of advisory, integration, migration, and operational consulting services to help you to deploy and manage workloads. HPE Pointnext has strategically built a portfolio of support service packs that helps your business needs.

HPE solutions for SAP HANA

HPE deployment services for SAP HANA

- HPE Factory Express Deployment Service includes factory installation of the Linux operating system once the system components are built as per the solution definitions such as HPE Superdome Flex multi/single rack scale-up and scale-out with HPE Primera storage SAP HANA software as well as the onsite installation once the HPE solution infrastructure is shipped to customer location.

HPE supporting services for SAP HANA

- HPE Proactive Care provides access to the HPE Center of Excellence for SAP HANA for complete solution-level support, to get help with problem prevention, predictive analytics, and personalized analysis with recommendations and advice, paired with rapid access to technical experts to help rapidly resolve any problem.
- HPE Proactive Care Advanced builds on HPE Proactive Care with benefits such as an assigned account support manager to give you a personalized, high-touch support experience that keeps your HPE solution available and running at peak performance.
- HPE SAP HANA Remote Support Services complements HPE Proactive Care to provide end-to-end management, with full operational responsibility for the predefined solutions, Linux OS, and SAP HANA software and database.

HPE lifecycle services for SAP HANA

HPE provides a set of very specific lifecycle services are provided which are exclusive to SAP HANA customers to stay up to date and prevent issues that could cause downtime of business during regular operations, at the same time preplanned and known problem updates or upgrades can be mitigated. Following are the set of lifecycle service deliverables.

- HPE CSUR Update Service for HPE solutions for SAP HANA delivers tested drivers, firmware, and related software updates to HPE infrastructure for SAP HANA.
- HPE OS Patch Update Service for HPE solutions for SAP HANA implements a certified and pre-tested operating system patch bundle to HPE infrastructure so the customers can avoid the risk of security vulnerability patch updates and make the HPE infrastructure compliant.
- HPE OS Upgrade Service for HPE solutions for SAP HANA continues to run the business some of the operating systems which were shipped out of the factory needs upgrade within the major operating systems releases HPE provides well-thought guidance for these kinds of upgrades.
- HPE OS Re-Installation Service for HPE solutions for SAP HANA continues to move on the operating system lifecycles we get some operating system roadblocks, in this kind of situation OS re-installation is a must, HPE provides an excellent strategy to keep the system up and live without business disruption.
- HPE Serviceguard Update Service for HPE solutions for SAP HANA is a kind of update service for customers who are looking for high availability solutions for the predefined solutions post implementations, this service will be implemented on a need basis as the customer IT complexity increases with additional SAP HANA systems.

- HPE Health check Service for HPE solutions for SAP HANA falls under the monitoring function of the HPE infrastructure systems to check the health status of the components.

LICENSING CONSIDERATIONS

The following software requires licensing in this configuration:

- SAP HANA in-memory database
- SAP HANA Cockpit server
- HPE Superdome Flex Support (SPS)
- HPE ProLiant DL360 Support (SPP)
- SUSE Linux Enterprise Server (SLES)
- Red Hat Enterprise Linux (RHEL)
- HPE Serviceguard (SGeSAP)

NOTE
Every product from either Hewlett Packard Enterprise or SAP or other vendors is subjected to the respective end-user license agreement.

RESOURCES AND ADDITIONAL LINKS

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

SAP HANA certified hardware directory, Certified and Supported SAP HANA® Hardware Directory

HPE Superdome Flex, https://www.hpe.com/psnow/doc/a00026242enw

HPE Aruba 6300M, https://www.arubanetworks.com/assets/ds/DS_6300Series.pdf

HPE Aruba 8325-48Y8C, https://www.arubanetworks.com/assets/ds/DS_8325Series.pdf

HPE StoreFabric SN6600B, https://www.hpe.com/psnow/doc/c05269707

HPE ProLiant DL360 Gen10, https://www.hpe.com/psnow/doc/a00008159enw

HPE Primera Storage, https://www.hpe.com/psnow/doc/a00067738enw

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

a50003928enw, version 2.0, June 2024

Hewlett Packard Enterprise