

Hitachi Virtual Storage Platform One Block Solution for Oracle RAC Database 19c with VSP One Block High End and HA820 G3

Reference Architecture Guide

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Revision history

Changes	Date
Initial release	February 2026

Reference Architecture Guide

Use this reference architecture guide to understand how the Hitachi Virtual Storage Platform One Block solution for Oracle RAC Database provides a high-performance, low latency, integrated, converged solution using Hitachi Virtual Storage Platform One Block High End (VSP One BHE). The environment uses VSP One BHE, the dual socket Hitachi Advanced Server HA820 G3, and HA810 G3 with Sapphire Rapids Scalable Processors. With these products, you can design an Oracle converged infrastructure to meet your requirements and budget.

This solution uses the high-performing dual socket HA820 G3 to boost performance and lower I/O latency. The VSP One BHE storage system with NVMe SSDs is also used in this reference architecture to run a dedicated Oracle RAC Database 19c on the Oracle Linux 9.5 operating system. HA810 G3 is dedicated to management applications.

This document is intended for:

- Database administrators
- Storage administrators
- Database performance analyzers
- IT professionals responsible for planning and deploying an Oracle Database solution

To use this reference architecture guide, you must be familiar with the following:

- VSP One Block High End
- Hitachi Advanced Server HA820 G3
- Hitachi Advanced Server HA810 G3
- Storage area networks
- Oracle 19c RAC Database
- Oracle Automatic Storage Management (Oracle ASM)
- Oracle Linux



Note: This configuration was tested in a lab environment. Many factors affect production environments beyond prediction or duplication in a lab environment. Before deployment of this solution, 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 and workload.

Solution overview

The Hitachi Virtual Storage Platform One Block solution for Oracle RAC Database is engineered, pre-tested, and qualified to provide high performance and high reliability in demanding and dynamic Oracle environments.

This reference architecture implements the Hitachi Virtual Storage Platform One Block solution for Oracle RAC Database on two nodes using VSP One Block High End. It addresses the high availability, performance, and scalability requirements for OLTP and OLAP workloads. This solution was developed using Intel Sapphire Rapids Platform-based dual socket Hitachi Advanced Server HA820 G3 and HA810 G3 for the management server environment, and the VSP One Block High End storage system.

Business benefits

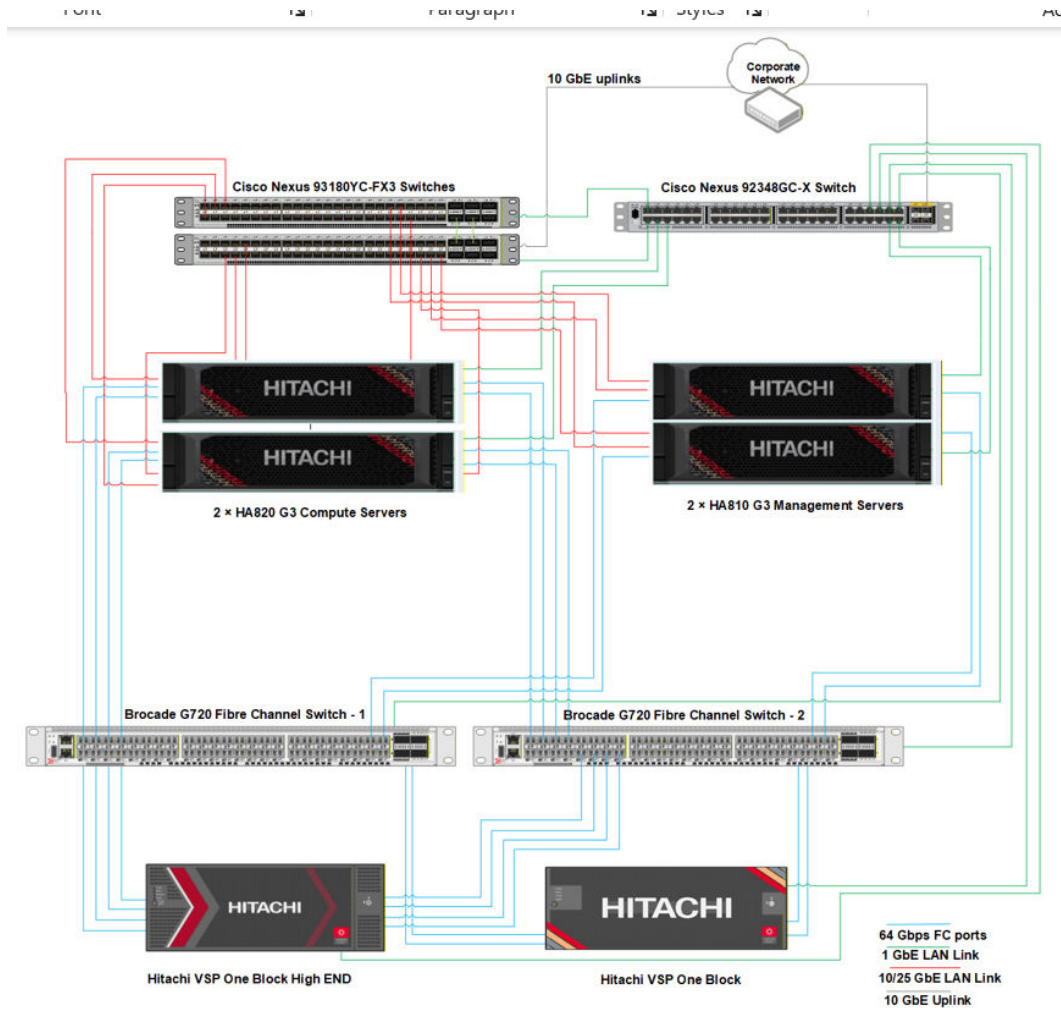
These are some of the benefits of this reference architecture:

- Achieves high Oracle Database performance with VSP One Block High End.
- Provides a solution for customers who are looking for very low I/O latency for an Oracle RAC database.

High level infrastructure

VSP One Block High End and HA820 G3 were configured with fully redundant hardware for dual fabric connectivity between hosts and storage.

Data volumes for the Hitachi VSP 360 management platform installed on a VMware vSphere ESXi host virtual machine were configured on a VSP One Block 28, which was shared across different management nodes. The VSP One Block 28 is not required in your environment. Data volumes can also be configured on the same VSP One Block High End or any other VSP storage system.



To avoid a performance impact on the production database, Hitachi Vantara recommends using a configuration with the following:

- A dedicated storage system for the production database.
- A dedicated storage system for data replication at a different site for business continuity, if needed.

Hitachi Vantara recommends using pairs of 25 Gbps NICs for the cluster interconnect network and public network.

Uplink speed to the corporate network depends on the customer environment and requirements. The Cisco Nexus 93180YC-FX3 switches can support uplink speeds of 40 GbE or 100 GbE if higher bandwidth is required.

Key solution components

The key components for this solution are listed in the following tables.

Hardware components

Vendor	Hardware	Detailed Description	Version	Quantity
Hitachi Vantara	VSP One Block High End	2 × CHB pairs 8 × 32 Gbps Fibre Channel ports 2048 GB cache memory 48 × 3.8 TB NVMe SSDs	A0-05-20-00/05	1
Hitachi Vantara	VSP One Block 28	2 × CHB pairs 24 × 32 Gbps Fibre Channel ports 1024 GB cache memory 24 × 3.8 TB NVMe SSDs	A3-04-20-40/ 05	1
Hitachi Vantara	HA820 G3	2 × Intel Xeon Platinum 8470 52C CPUs @ 2.00GHz 1024 GB (32 GB × 32) RDIMM DDR5 Synchronous Registered (buffered) 4800 MHz 2 × Dual Port 25 GbE NIC Intel E810 PCIe cards 2 × SN1610E 32 Gb 2p Fibre Channel HBAs	System ROM: U54 v2.48 (03/11/2025) iLO6: 1.67 Feb 27 2025 Driver: ice Driver version: 5.15 (inbox) Firmware: 4.60 Driver: lpfc Driver version: 14.4.0.2 Firmware: 14.4.473.14	2
Hitachi Vantara	HA810 G3	2 × Intel Xeon processors 4310, 12-core, 2.10 GHz, 120W	System ROM: U54 v2.48 (03/11/2025)	2

Vendor	Hardware	Detailed Description	Version	Quantity
		256 GB (32 GB × 8) DIMM DDR5-4800 Synchronous Registered (Buffered) 4800 MHz 1 × 480 GB NVMe disk NS204i-u Gen11 Boot Controller	iLO6: 1.67 Feb 27 2025	
		1 × Dual Port 25 GbE NIC Intel E810 PCIe card	Driver: ice Driver Version: 5.15 (inbox) Firmware: 4.60	
		2 × SN1610E 32Gb 2p Fibre Channel HBAs	Driver: lpfc Driver version: 14.4.0.2 Firmware: 14.4.473.14	
Brocade	G720 Fibre Channel switches	48 × 32 Gbps ports Fibre Channel switches 32 Gbps SFPs	Fabric OS: v9.1.1c	2
Cisco	Nexus 93180YC-FX3	48 × 10/25 GbE ports 6 × 40/100 Gbps Quad SFP (QSFP28) ports	NXOS: version 9.3.8	2
Cisco	Nexus 92348GC-X	48 × 1 GbE ports Ethernet switches	NXOS: version 9.3.8	1

*Customers can choose larger capacity SSDs to fit their business requirements.

Certain components are optional depending on the existing infrastructure and required interconnect topology. This might include the SAN, IP switches, and the management servers. However, this reference architecture documents the environment tested in the lab to support a full deployment of the architecture including supporting components.

Software components

Software	Version	Function
Oracle Linux	9.5	Operating system
Oracle Database	19.28.0.0.0	Database software

Software	Version	Function
Oracle Real Application Cluster	19.28.0.0.0	Cluster software
Oracle Grid Infrastructure	19.28.0.0.0	Volume management, file system software, and Oracle Automatic Storage Management (ASM)

Management node software components

Software	Version	Function
ESXi	7.0U3	Hypervisor for management server
vCenter Server	7.0U3	VMware cluster management server
Hitachi VSP 360	2025 Release	Hitachi infrastructure management software

Solution design

This section describes the reference architecture environments used to implement the Hitachi Virtual Storage Platform One Block solution for Oracle RAC Database. Each environment uses a single Hitachi Virtual Storage Platform One Block High End.

The infrastructure configuration includes the following:

- Oracle RAC Servers – There are two server nodes configured in an Oracle Real Application Cluster.
- Management Servers – Two servers are used in the management server cluster.
- Storage System – There are vVols mapped to each port that are presented to the servers as LUNs.
- SAN Connection – There are SAN connections to connect the Fibre Channel HBA ports to the storage through Brocade G720 switches.

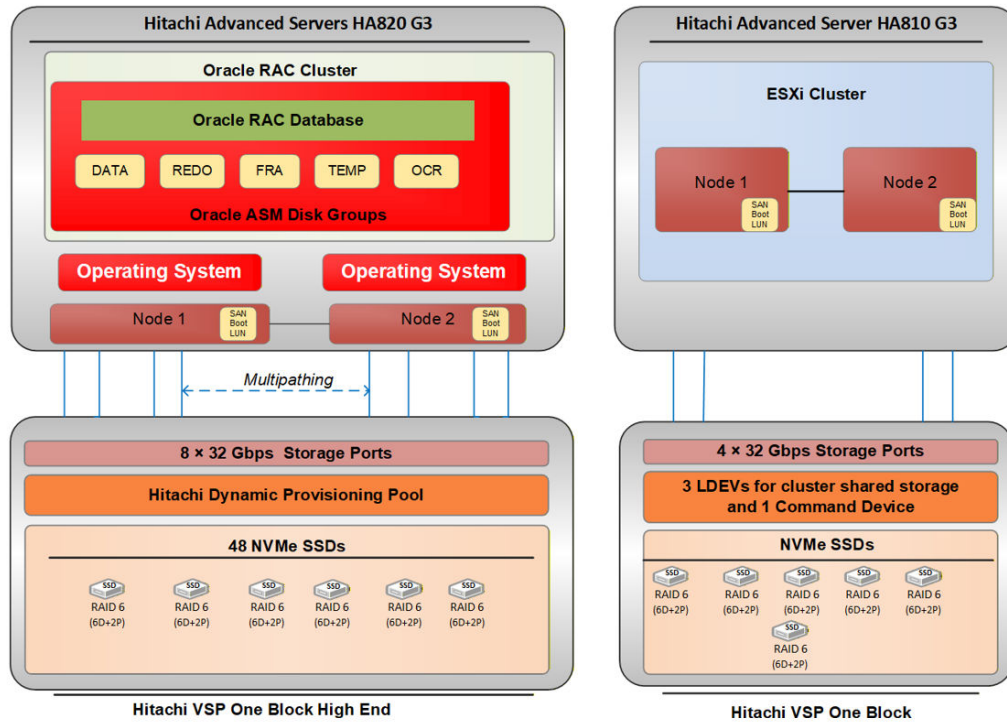
Storage architecture

This section describes the storage architecture for this solution.

Storage configuration

The storage configuration takes into consideration Hitachi Vantara and Oracle recommended best practices for the design and deployment of database storage.

The high-level storage configuration diagram for this solution is shown in following figure.



The following table lists the storage pool configuration used for this solution and lab verification.

Pool ID	Oracle(0)
Pool Type	Dynamic Provisioning Pool
RAID Group	1-1 to 1-6
RAID Protection Type	RAID 6 (6D+2P)
Drive Type/Capacity	3.8 TB NVMe SSD
Number of Drives	48
Number of LDEVs	48
LDEV Size	1.96 TB
Pool Capacity	73 TB

The following table lists the logical storage configuration used in this solution.

Item	Value/Description					
Total number of DPVols	128	3	10	4	11	2
DPVols size (GB)	200	15	20	200	200	380
ASM diskgroup	DATA	OCR	REDO	TEMP	FRA	N/A
Purpose	OLTP application tablespaces	Oracle Cluster Registry	Online redo Logs	Temp	Incremental backups Archived redo	SAN boot OS volumes
	System Sysaux Undo		Control files		Logs Control file Auto backups	
Storage Port	3A, 3B, 7A, 7B, 4A, 4B, 8A, 8B					

The following table lists the VSP One B28 management server configuration.

Item	Value/Description
Purpose	VMware Datastores CCI device
RAID level	RAID 6 (6D+2P)
Drive type	3.8 TB NVMe SSD
Number of drives	24
Number of Pool LDEVs	4
LDEV size	3 × 1000 GB
Number and size of CCI devices	1 × 100 MB
Storage port for management servers	7A, 7B, 8A, 8B

6 × RAID 6 groups consisting of 24 × 3.8 TB NVMe SSD drives configured as RAID 6 (6D+2P+1S) were used as shared storage for the management server cluster. A 3 TB LUN and a command device were mapped to four storage ports.

Additional LUNs can be mapped if necessary. The test environment was configured using a dedicated RAID group for the management cluster. You can also configure this solution using dedicated RAID groups, a dedicated HDP pool, or capacity on the HDP pool configured for the Oracle environment according to customer requirements.

Database layout

The database layout design recommends the best practices from Hitachi Vantara for Hitachi Virtual Storage Platform One Block High End for small random I/O traffic, such as OLTP transactions. The layout design also considers Oracle ASM best practice when using Hitachi storage.

The storage design for the database layout should be based on application-specific requirements. Design can vary greatly across implementations based on RAID configuration and number of drives allocated. The components in this solution have the flexibility to accommodate various deployment scenarios by providing the right balance between performance and ease of management.

Oracle configuration

- Data and Index Tablespaces - Assign an ASM diskgroup with external redundancy for data and index tablespaces.
- TEMP Tablespace - Place the TEMP tablespace in the TEMP ASM diskgroup.
- Undo Tablespace - Create an UNDO tablespace in the Oracle Data ASM diskgroup. Assign one UNDO tablespace for each node in the Oracle RAC environment.
- Online Redo Logs - Create an ASM diskgroup with external redundancy for Oracle online Redo logs.
- Oracle Cluster Registry and Voting Disk - Create an ASM diskgroup with normal redundancy to contain the OCR and voting disks and to protect against single disk failure and loss of cluster availability. Place each of these files in the OCR ASM diskgroups.

Oracle initial parameters

The following table lists Oracle ASM and database parameters.

Category	Item	Value
Oracle RAC option	RAC configuration	Yes
	ASM	Yes – to support Oracle RAC database
Oracle Database environment parameters	SGA_TARGET	512 GB
	PGA_AGGREGATE_TARGET	76 GB
	DB_CACHE_SIZE	0 GB
	DB_KEEP_CACHE_SIZE	0 GB
	DB_RECYCLE_CACHE_SIZE	20 GB

Category	Item	Value
	LOG_BUFFER	512 MB
	USE_LARGE_PAGES	TRUE
	FILESYSTEMIO_OPTIONS	SETALL
	DB_FILE_MULTIBLOCK_READ_COUNT	128
	DISK_ASYNC_IO	TRUE

Oracle ASM disk mappings

The following table lists volumes, LUNs, and ASM diskgroups.

ASM Diskgroup	ASM Disk	LUN Details	Purpose
OCR	OCR1- OCR3	3 × 15 GB	Oracle cluster registry and voting disk
REDO	REDO01- REDO10	10 × 20 GB	Online REDO log group
FRA	FRA01- FRA11	11 × 200 GB	Flash recovery area
TEMP	TEMP1– TEMP4	4 × 200 GB	Temp
DATA	DATA001 – DATA128	128 × 200 GB	Application data

Oracle server configuration

The following table lists the operating system configurations for Oracle servers.

Server Configuration	Server OS Setting Details
RPMsf or Oracle Database 19c	oracle-database-preinstall-19c
/etc/multipath.conf	user_friendly_names: yes find_multipaths: yes path_grouping_policy: multibus path_selector:"service-time 0"
Swap space	64 GB
udev rule	Used 99-oracle-asmdevices.rules file to define device persistency rules

Server Configuration	Server OS Setting Details
Parameter 'path_selector'	For OLTP Database, set "service-time 0" for path_selector in the /etc/multipath.conf file for the best performance.

Management server configuration

The following table lists the VSP One Block 28 configuration for the management server cluster.

Attribute	Value
Purpose	VMware shared datastores Command device
Number and size of LDEVs for datastores	3 × 1000 GB
Number and size of command devices	1 × 100 MB
Storage port for management servers	7A, 7B, 8A, 8B

Server and application architecture

This reference architecture uses two Hitachi Advanced Server HA820 G3 servers with 4th Generation Intel Xeon Scalable Processors (Sapphire Rapids) for each storage system architecture that was tested. Two Hitachi Advanced Server HA810 G3 servers were used for VMware ESXi management server configuration.

This provides the compute power for the Oracle RAC database to manage complex database queries and a large volume of transaction processing in parallel.

The following table lists the details of the Hitachi Advanced Server HA820 G3 and HA810 G3 server configurations for this solution.

Hitachi Advanced Server	Server	Host Name	Role	CPU Core	RAM
HA820G3	Oracle Server 1	sgrac01	Oracle RAC node 1	52 (2 × 52C)	1024 GB (32 GB × 32)
	Oracle Server 2	sgrac02	Oracle RAC	52 (2 × 52C)	1024GB (32 GB)
HA810G3	Management Server 1	VMware ESXi1	Management VM hosts	64 (2 × 32C)	256 GB (16 GB × 16)

Hitachi Advanced Server	Server	Host Name	Role	CPU Core	RAM
	Management Server 2	VMware ESXi2		64 (2 × 32C)	256 GB (16 GB × 16)

SAN architecture

Map the provisioned LDEVs to multiple ports on each Hitachi Virtual Storage Platform One Block High End (VSP One BHE). These LDEV port assignments provide multiple paths to the storage system from the host for high availability. This reference architecture uses two dual port Emulex HBAs for each single socket HA820 G3 server.

The SAN architecture includes the following:

- 8 SAN switch connections for VSP One BHE Fibre Channel ports.
- 8 SAN switch connections for server HBA ports.
- 4 SAN switch connections for VSP One Block 28 Fibre Channel ports.
- 4 SAN switch connections for management server HBA ports.

The following tables list the Fibre Channel switch connection configuration on the VSP One Block High End and database servers.

Server	HBA Ports	Storage Host Group	Switch Zone	Storage Port	Brocade G720 Switch
HA820 G3 Server 1	HBA1_1	HA820_G3_62_HBA1_1	HA820_G3_62_HBA1_1_VSP_BHE_33_3A	3A	SAN-switch1
	HBA1_2	HA820_G3_62_HBA1_2	HA820_G3_62_HBA1_2_VSP_BHE_33_4A	4A	SAN-switch2
	HBA2_1	HA820_G3_62_HBA2_1	HA820_G3_62_HBA2_1_VSP_BHE_33_3B	3B	SAN-switch1
	HBA2_2	HA820_G3_62_HBA2_2	HA820_G3_62_HBA2_2_VSP_BHE_33_4B	4B	SAN-switch2
HA820 G3 Server 2	HBA1_1	HA820_G3_64_HBA1_1	HA820_G3_64_HBA1_1_VSP_BHE_33_7A	7A	SAN-switch1
	HBA1_2	HA820_G3_64_HBA1_2	HA820_G3_64_HBA1_2_VSP_BHE_33_8A	8A	SAN-switch2
	HBA2_1	HA820_G3_64_HBA2_1	HA820_G3_64_HBA2_1_VSP_BHE_33_7B	7B	SAN-switch1

Server	HBA Ports	Storage Host Group	Switch Zone	Storage Port	Brocade G720 Switch
	HBA2_2	HA820_G3_64_HBA2_2	HA820_G3_64_H BA2_2_VSP_BHE_33_8B	8B	SAN-switch2
HA810 G3 Server 1	HBA1_1	HA810_G3_68HBA1_1	HA810_G3_68_H BA1_1_ASE32_50_7A	7A	SAN-switch1
	HBA1_2	HA810_G3_68_HBA1_2	HA810_G3_68_H BA1_2_ASE32_50_8A	8A	SAN-switch2
HA810 G3 Server 2	HBA1_1	HA810_G3_69_HBA1_1	HA810_G3_69_H BA1_1_ASE32_50_7B	7B	SAN-switch1
	HBA1_2	HA810_G3_69_HBA1_2	HA810_G3_69_H BA1_2_ASE32_50_8B	8B	SAN-switch2



Note: In a production environment, separate storage ports are recommended for the management servers to avoid impacting database performance. Shared storage ports can be used; however, port utilization should be monitored to avoid performance issues in high-performance environments.

Network architecture

This architecture uses the following separate networks:

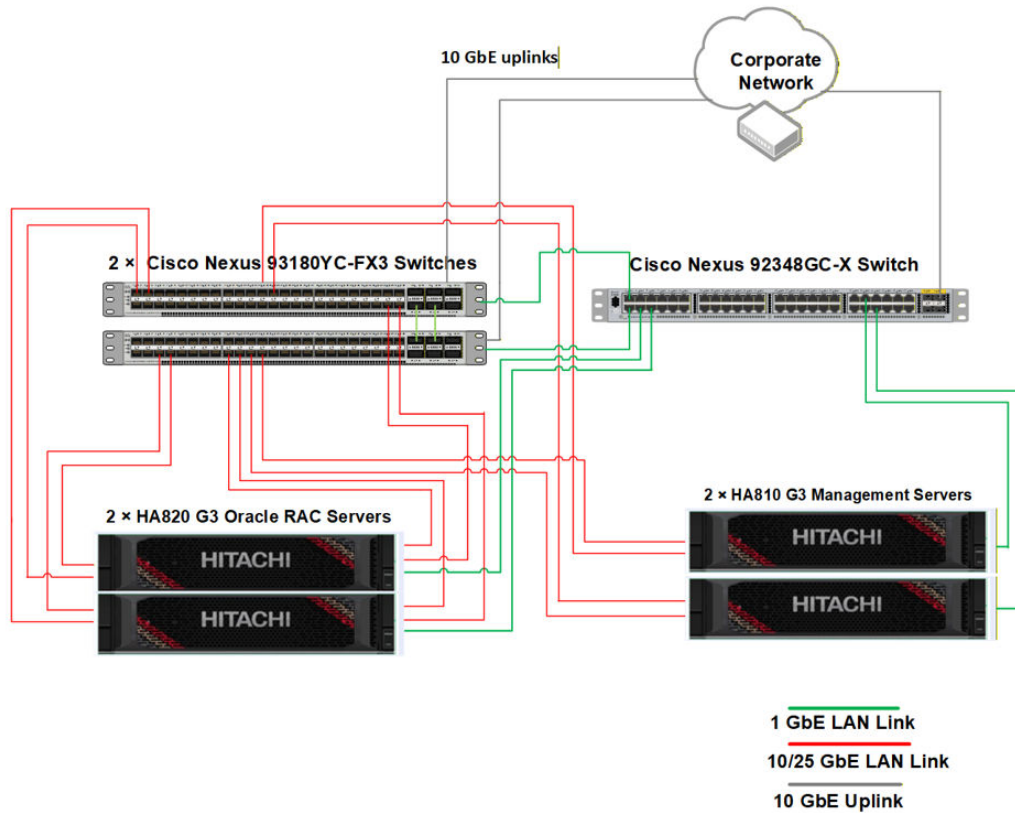
- Private Network (also called cluster interconnect) — This network must be scalable. In addition, it must meet the low latency needs of the network traffic generated by the cache synchronization of Oracle Real Application Clusters and inter-node communication among the nodes in the cluster.
- Public Oracle Network — This network provides client connections to Oracle Real Application Clusters and other applications.
- Management Network — This network is for hardware management console connections.

Note that Hitachi Vantara recommends using pairs of 25 Gbps NICs for the cluster interconnect network and public network.

Observe these guidelines when configuring private and public networks in your environment:

- For each server in the clusterware configuration, use at least two identical, high-bandwidth, low-latency NICs for the interconnection.
- Use NIC bonding to provide failover and load balancing of interconnections within a server.
- Set all NICs to full duplex mode.
- Use at least two public NICs for client connections to the application and the database.
- Use at least two private NICs for the cluster interconnect.

The following figure shows the IP network switch connection.



When creating NIC bonding pairs, paired ports should be on different cards to eliminate a single point of failure (SPoF).

The following table lists the test network configuration. Your values might be different.

Server	NIC Port	VLAN/ Subnet	NIC Bond	IP Address	NW	BW (Gbps)	Cisco Nexus 93180YC-FX3 Switch	
							Switch	Port
Oracle DB Server1	NIC1 PORT 1	208	Bond0	192.168.208.91	Private	25	1	31
	NIC2 PORT 1					25	2	
	NIC1 PORT 2	242	Bond1	192.168.242.91	Public Oracle	25	1	32

Server	NIC Port	VLAN/ Subnet	NIC Bond	IP Address	NW	BW (Gbps)	Cisco Nexus 93180YC-FX3 Switch	
							Switch	Port
	NIC2 PORT 2					25	2	
	iLo-Dedicated NIC	242	-	192.168.242.161	Mgmt	1	-	
Oracle DB Server2	NIC1 PORT 1	208	Bond0	192.168.208.92	Private	25	1	34
	NIC2 PORT 1					25	2	
	NIC1 PORT 2	242	Bond1	192.168.242.92	Public Oracle	25	1	35
	NIC2 PORT 2					25	2	
	iLo-Dedicated NIC	242	-	192.168.242.162	Mgmt	1	-	
Management Server1	iLo-Dedicated NIC	242	-	192.168.242.169	Mgmt	1	-	
	NIC1 PORT 1	244	-	192.168.244.101	Public Oracle	25	1	
Management Server2	iLo-Dedicated NIC	242	-	192.168.242.170	Mgmt	1	-	
	NIC1 PORT 1	244	-	192.168.244.102	Public Oracle	25	1	

The following table lists the virtual IP address and SCAN name configuration that was used when testing the environment.

Server	Virtual IP Address	ScanName pub-scan
Database Server 1	192.168.242.91	192.168.242.222
Database Server 2	192.168.242.92	192.168.242.223
		192.168.242.224

The following table lists the virtual machine configurations running on the management server cluster. Virtual machine configurations listed in this table were required for the versions used for testing in the lab. This ESXi VM for the VSP 360 platform provides default applications such as Fleet Management, Clear Sight, Clear Sight Advance and EverFlex Control for managing and monitoring AI-powered analytics of storage resources.

Virtual Machine	vCPU	Virtual Memory	Disk Capacity	IP Address
vCenter	2	10 GB	300 GB	192.168.242.102
VSP 360 VM	24	41 GB	290 GB	192.168.242.81
			740 GB	

Engineering validation

This section summarizes the key observations from the validation test for the Oracle RAC deployment with Hitachi Virtual Storage Platform One Block High End.

Test methodology

Oracle Orion and the peakmarks 10.2 benchmark software tools were used to validate this solution.

Orion

Oracle Orion is a tool for predicting the performance of an Oracle database without having to install Oracle or create a database. Unlike other I/O calibration tools, Oracle Orion is expressly designed for simulating Oracle database I/O workloads using the same I/O software stack as Oracle. Orion can also simulate the effect of striping performed by Oracle Automatic Storage Management.

For more information about Orion, see "I/O Configuration and Design" in the Oracle Database Performance Tuning Guide at <https://docs.oracle.com/en/database/oracle/oracle-database/12.2/tgdba/IO-configuration-and-design.html#GUID-B89C41F4-B12A-49E1-BFB9-5BF978E2D6B3>.

Peakmarks

Test results are demonstrated using peakmarks OLTP test cases.

Peakmarks is benchmark software for Oracle platforms. It is used in our tests for the purposes of:

- Performance verification (quality assurance).
- Evaluation of different infrastructure products, technologies, and solutions (price/performance comparison).
- Performance optimization (efficiency)

This provides transparency and comparability in price versus performance considerations for Oracle infrastructure solutions.

Database configuration

The following table lists parameter details for a two-node Oracle Real Application Clusters ASM database.

Oracle Database Parameter	Value
Compatible	19.28.0.0.0
cluster_database	TRUE
cluster_database_instances	2
Oracle Database size	16 TB
Database storage type	ASM

Test environment

The 2 Node Oracle RAC database using dual socket Hitachi Advanced Server HA820 G3 and Hitachi Virtual Storage Platform One Block High End storage was configured using the architecture mentioned in this document

We used 64 raw LUNs each of 200 GB for Orion testing. The peakmarks database was 16 TB consisting of 156 ASM disks as part of various diskgroups, and peakmarks test cases were executed for various workloads using this database.

The following table lists the test environment details.

Item	Description	Value
Operating system	-	OEL9.5
Workload type	-	OLTP/OLAP
Database size	-	16 TB

Item	Description	Value
Number of physical cores	CPU cores	208
Memory	Server memory	1024 GB per node
Network	Cluster interconnect	2 × 25 Gbps NIC bonding

Test results

We performed database and clusterware validation tests for this software and hardware stack using Hitachi Advanced Server HA820 G3 with Hitachi Virtual Storage Platform One Block High End and found that all the database functionalities for the Oracle database are running efficiently. We also validated database operations for various OLTP workloads using peakmarks tools and observed unparalleled performance with ultra-low IO latency for all types of workloads with this Integrated solution.

The Hitachi Virtual Storage Platform One Block solution for database using VSP One Block High End is a highly scalable solution that delivers the best database performance with unmatched data security features, enhanced data reduction ratio, 100% availability and improved capacity efficiency.

Product descriptions

The following products are used in this solution.

Hitachi Integrated Solutions

Hitachi Integrated Solutions is a high-performance, low-latency, integrated, converged solution using Hitachi Virtual Storage Platform One Block storage, and Hitachi Advanced Server HA 8x0 G3, HA 8x5 G3, HA810 G6, HA820 G6, DS120 G6, and DS220 G6 servers.

Hitachi Virtual Storage Platform One Block

The Hitachi Virtual Storage Platform One Block series simplifies system setup and management through Hitachi Clear Sight and VSP One Block Administrator. Dynamic Drive Protection reduces RAID complexity, and always-on compression and deduplication enhance simplicity. Virtual Storage Platform One Block with QLC (quad-level cell) delivers the industry's most reliable high density, cost optimized All-Flash Array for read-intensive workloads. It is a compelling infrastructure option for IT organizations that support hybrid cloud environments looking to balance performance, capacity and cost.

Dynamic Carbon Reduction optimizes energy usage by switching CPUs to ECO mode during low activity. Adaptive Data Reduction (ADR) is always on, enhancing efficiency and reducing the overall CO2 footprint.

Thin Image Advanced (TIA) integrates with major snapshot ecosystems, prioritizing security by defending against threats and ensuring data confidentiality. CyberArk Privileged Access Manager plugins enhance block storage system security by prioritizing data confidentiality, ensuring compliance, and actively defending against security threats.

[Hitachi Virtual Storage Platform One Block 20](#) includes 3 dedicated models that support both TLC and QLC NVMe SSD drives, as well as Fibre Channel, iSCSI, and NVMe TCP connectivity. The new capabilities remove complexity: data reduction is always on, Dynamic Drive Protection removes complicated RAID setup, and Dynamic Carbon Reduction delivers real world reduction in power consumption. In addition, the models are FIPS compliant.

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

In short, the Hitachi Virtual Storage Platform One Block series combines simplicity, sustainability, and robust security features to optimize system management, energy efficiency, and data protection.

Hitachi Virtual Storage Platform 360

Hitachi Virtual Storage Platform 360 (VSP 360) unified data management enables you to administer and optimize VSP One Block data services through integrated configuration, analytics, and automation workflows. These management capabilities help to efficiently control, observe, and govern your VSP One Block data infrastructures.

The capabilities offered through VSP 360 are built around three foundational pillars:

- **Control:** It delivers streamlined hybrid cloud infrastructure orchestration and unified fleet management across block, file, software-defined and object storage, empowering IT teams to quickly deploy and manage data across cloud and on-prem environments.
- **Observe:** It enables businesses to gain new visibility and predictive insights across their enterprise data through AIOps analytics—accessible via SaaS, mobile, or on-prem—delivering intelligent observability into system performance, capacity, security and health.
- **Govern:** It enhances data policy enforcement, compliance, and lifecycle management across hybrid environments, supporting workloads including AI, cybersecurity and personal identifiable information (PII) classification.

Hitachi Advanced Server HA820 G3

Hitachi Advanced Server HA820 G3 is a high-performance two-socket rackmount server designed for optimal performance and power efficiency. This allows owners to upgrade computing performance without overextending power consumption and offers non-latency support to environments that require the maximum memory capacity. Hitachi Advanced Server HA820 G3 provides flexible I/O scalability for today's diverse data center application requirements.

Optimized for performance, high density, and power efficiency in a dual-processor server, [HA820 G3](#) delivers a balance of compute and storage capacity. These rack mounted servers have the flexibility to power a wide range of solutions and applications.

The highly scalable memory supports up to 8 TB RAM using 32 slots of 2300 MHz DDR5 RDIMM. HA820 G3 is powered by the Intel Xeon Emerald Rapids scalable processor family for complex and demanding workloads. Flexible OCP and PCIe I/O expansion card options are available.

Hitachi Advanced Server HA810 G3

The compact 1U [Hitachi Advanced Server HA810 G3](#) delivers enhanced performance with the right balance of expandability and density. Designed for supreme versatility and resiliency while backed by a comprehensive warranty, the Hitachi Advanced Server HA810 G3 is ideal for IT infrastructure, either physical, virtual, or containerized.

The Hitachi Advanced Server HA810 G3 supports the 4th Generation Intel® Xeon® Scalable Processors with up to 60 cores, plus 4800 MT/s DDR5 Smart Memory up to 4.0 TB per socket. Introducing PCIe Gen5 and Intel® Software Guard Extensions (SGX) support on the dual-socket segment, the Hitachi Advanced Server HA810 G3 complements the Gen10 Plus reach by delivering premium compute, memory, networking communication, discrete graphic, I/O, and security capabilities for customers focused on performance at any cost.

HA810 G3 server is an excellent choice of daily business and workloads in General Compute, Database Management, Virtual Desktop Infrastructure, Content Delivery Network, Edge Acceleration, and Intelligent Video Analytics.

Oracle Database with Real Application Clusters Option

[Oracle Database](#) has a multi-tenant architecture used to consolidate many databases quickly and manage them as a cloud service. Oracle Database also includes in-memory data processing capabilities for analytical performance. Additional database innovations deliver efficiency, performance, security, and availability. Oracle Database comes in two editions: Enterprise Edition and Standard Edition 2.

[Oracle Real Application Clusters](#) (Oracle RAC) is a clustered version of Oracle Database. It is based on a comprehensive high-availability stack that can be used as the foundation of a database cloud system, as well as a shared infrastructure. This ensures high availability, scalability, and agility for any application.

[Oracle Automatic Storage Management](#) (Oracle ASM) is a volume manager and file system for Oracle database files. This supports both single-instance Oracle Database and Oracle Real Application Clusters configurations. Oracle ASM is the recommended storage management solution that provides an alternative to conventional volume managers, file systems, and raw devices.

VMware ESXi

[VMware ESXi](#) is a foundation for the virtual infrastructure used for the management applications in this architecture. This allows the environment to operate independently from any general-purpose operating system, offering security, reliability, and simplified management.

VMware vCenter Server Appliance

The [VMware vCenter Server Appliance](#) is a preconfigured Linux virtual machine, which is optimized for running VMware vCenter Server and the associated services on Linux.

vCenter Server Appliance is an Open Virtualization Format (OVF) template. The appliance is imported to an ESXi host and configured through the web-based interface. It comes pre-installed with all the components needed to run a vCenter Server. These include vCenter SSO (Single Sign-on), Inventory Service, vSphere Web Client, and the vCenter Server itself.

Brocade switches from Broadcom

Brocade and Hitachi Vantara have partnered to deliver storage networking and data center solutions. These solutions reduce complexity and cost, as well as enable virtualization and cloud computing to increase business agility.

Brocade Fibre Channel switches deliver industry-leading performance with seventh and eighth generation Fibre Channel interfaces, simplifying scale-out network architectures. Get the high-performance, availability, ease of management, and support for the next generation of Hitachi Virtual Storage Platform storage systems on a solid storage network foundation that can grow as your need grows.

See <https://www.broadcom.com/products/fibre-channel-networking/switches> for more information.

Cisco Nexus switches

The Cisco Nexus switch product line offers a range of solutions that simplify the connection and management of disparate data center resources through software-defined networking (SDN). Leveraging the Cisco Unified Fabric, which unifies storage, data, and networking (Ethernet/IP) services, the Nexus switches create an open, programmable network foundation built to support a virtualized data center environment.

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