TECHNICAL PAPER

Hitachi Unified Compute Platform for the SAP HANA® Platform on VMware vSphere 5.5 U2 in a Medium 1 TB Scale-Up Configuration Using Hitachi Compute Blade 2500 and Hitachi Virtual Storage Platform G400

Reference Architecture Guide

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Hitachi Data Systems

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Hitachi Unified Compute Platform for the SAP HANA Platform on VMware vSphere 5.5 U2 in a Medium 1 TB Scale-Up Configuration Using Hitachi Compute Blade 2500 and Hitachi Virtual Storage Platform G400

Reference Architecture Guide

This reference architecture guide describes how to deploy Hitachi Unified Compute Platform for the SAP HANA Platform on VMware vSphere 5.5 U2 in a medium 1 TB scale-up configuration solution using the following:

- Hitachi Compute Blade 2500 with 520X B2 server blades
- Hitachi Virtual Storage Platform G400
- SAP HANA 1.0

Unified Compute Platform for SAP HANA is a preconfigured analytical appliance, ready to plug into a network to provide real-time access to operational data for use in analytic models.

This appliance supports the configurations listed in Table 1.

Table 1. Supported Scale-Up Configuration Sizes

Description	4-Socket
Number of CPUs	4
Number of Server Blades	2
Memory	1 TB

This technical paper assumes that you have familiarity with the following:

- Storage area network (SAN)-based storage systems.
- General storage concepts.
- Common IT storage practices.
- SAP HANA platform.
- VMware vSphere 5.5 update 2

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

Solution Overview

This reference solution for a 1 TB scale-up environment for Hitachi Unified Compute Platform for the SAP HANA platform on VMware vSphere uses the following components:

- **Hitachi Compute Blade 2500 (CB 2500)** — An enterprise-class blade server platform

  This solution uses two 520X B2 server blades for the different sized solutions, as shown in Table 1 on page 1.

- **Virtual Storage Platform G400** — Storage virtualization system designed to manage storage assets more efficiently

  The persistent storage of the SAP HANA virtual machine and ESXi server resides on this storage device.

- **SAP HANA Platform** — A flexible, data source-agnostic, in-memory data platform that allows you to analyze large volumes of data in real time

- **VMware vSphere** -- A cloud computing virtualization operating system platform

Figure 1 shows the topology of this reference architecture.

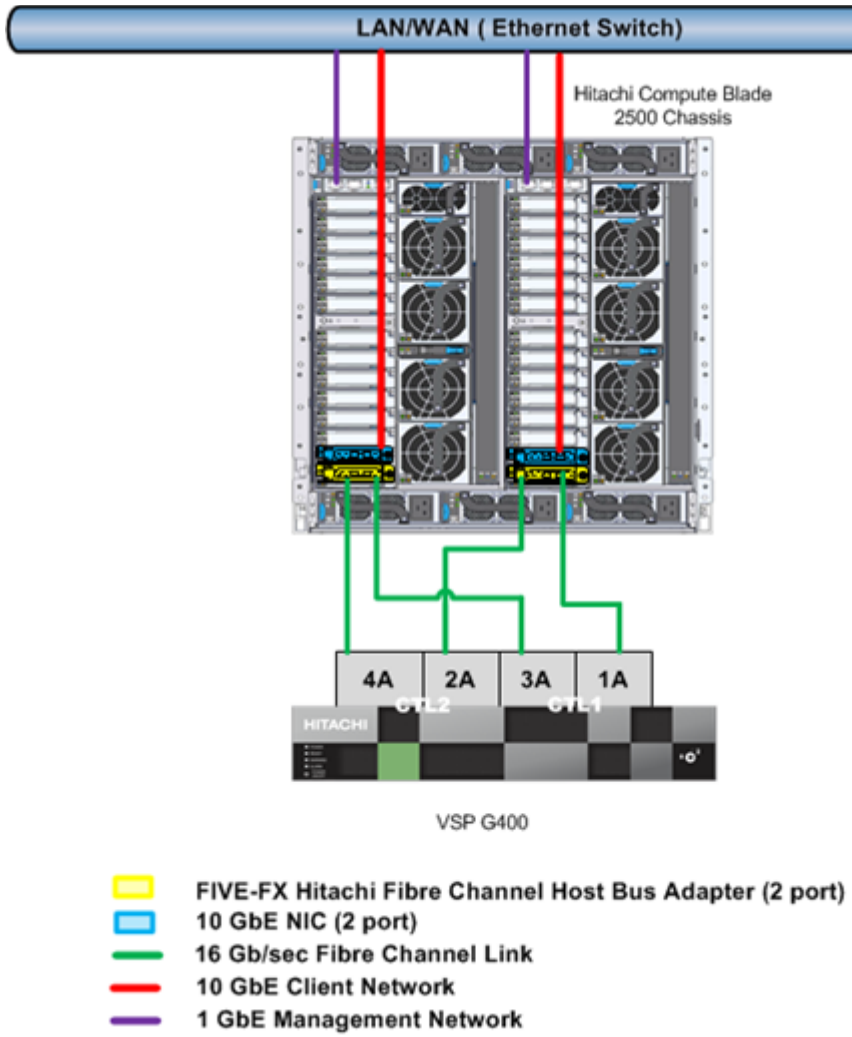

Figure 1

Key Solution Components

The following are the key hardware components and software components used in this reference architecture.

Hardware Components

Table 2 lists the hardware used to deploy this Hitachi Unified Compute Platform for the SAP HANA Platform in a 1 TB scale-up configuration on VMware vSphere 5.5.

Table 2. Hardware Components

Hardware		Quantity	Configuration (per unit)	Role
Hitachi Compute Blade 2500 chassis		1	■ 8-blade chassis ■ 2 management modules ■ 10 cooling fan modules ■ 3 power supply modules (PSM) ■ 4 I/O board modules ■ 2 × 10 GbE 2-port LAN PCIe adapter ■ 2 Hitachi 16 Gb/sec 2-port Fibre Channel adapters	Server blade chassis
520X B2 server blade	4-Socket	2	■ 2 × 18-core processors ■ 2 x 512 GB RAM ■ 1 × 2-port pass through mezzanine card on mezzanine slot 2 and mezzanine slot 4 of blade 1 and blade 3	ESXi server
SMP connection board for 520X server blade		1	■ 2-blade SMP connection board ■ SMP expansion module ■ SMP connector cover	SMP connector
Hitachi Virtual Storage Platform G400		1	■ Single frame	Block storage for ESXi node and SAP HANA Virtual Machine (VM)

Hitachi Compute Blade 2500

Hitachi Compute Blade 2500 delivers enterprise computing power and performance with unprecedented scalability and configuration flexibility. Lower your costs and protect your investment.

Flexible I/O architecture and logical partitioning allow configurations to match application needs exactly with Hitachi Compute Blade 2500. Multiple applications easily and securely co-exist in the same chassis.

Add server management and system monitoring at no cost with Hitachi Compute Systems Manager. Seamlessly integrate with Hitachi Command Suite in Hitachi storage environments.

The configuration uses two 520X B2 server blades in the Hitachi Compute Blade 2500 chassis, listed in Table 3.

Table 3. Server Blade Configuration

Feature	Medium (4-Socket) Configuration
Processors	4 Intel Xeon E7-8880 processors
Processor SKU	Intel Xeon E7-8880 v3
Processor frequency	2.3 GHz
Processor cores	18 cores
Number of server blades	2
Number of DIMMs per server blade	32 × 16 GB DIMMs for a total of 512 GB on each server blade
Network ports	2 × 2-port 10GBase-SR LAN PCIe adapter on two I/O board modules: ▪ IOBD 01B and IOBD 02B
Fibre Channel ports	2 × Hitachi 16 Gb/sec 2-port Fibre Channel adapters on two I/O board modules: ▪ IOBD 01A and IOBD 02A
Other interfaces	1 USB 3.0 port KVM connector (VGA, COM, USB2.0 port)

Figure 2 on page 5 shows the layout of the I/O board modules from the back of the Hitachi Compute Blade 2500 chassis.

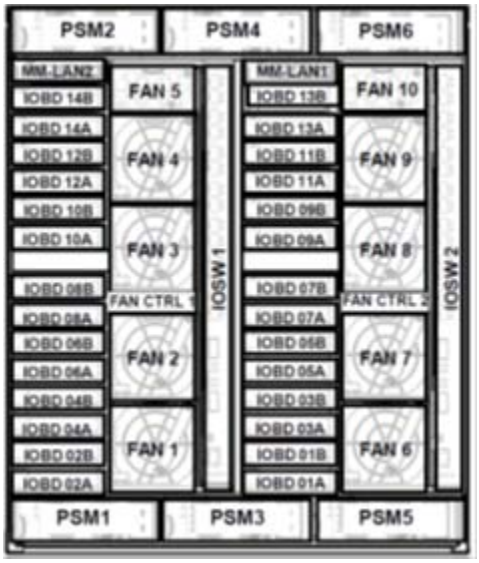

Figure 2

Symmetric Multiprocessing Connector

For multiple server blades, symmetric multiprocessing (SMP) technology is used to combine multiple server blade resources into a single server.

The 520X B2 server blades use SMP in one of two ways, depending on the size of the solution:

- Combine two server blades with a 2-blade SMP connection board for the 520X B2 server blade
- Combine four server blades with a 4-blade SMP connection board for the 520X B2 server blade

This solution uses the 2-blade SMP connection board for the 520X B2 server blade.

Hitachi Virtual Storage Platform Family Systems

The Hitachi Virtual Storage Platform family systems are based on industry-leading enterprise storage technology. With flash-optimized performance, these systems provide advanced capabilities previously available only in high-end storage arrays. With the Virtual Storage Platform family, you can build a high performance, software-defined infrastructure to transform data into valuable information.

Hitachi Storage Virtualization Operating System provides storage virtualization, high availability, superior performance, and advanced data protection for all models in the Virtual Storage Platform family. This proven, mature software provides common features to consolidate assets, reclaim space, extend life, and reduce migration effort. New management software improves ease of use to save time and reduce complexity. The infrastructure of Storage Virtualization Operating System creates a management framework for improved IT response to business demands.

This solution uses Hitachi Virtual Storage Platform G400. The following reside on this storage array:

- VMware vSphere ESXi operating system LUNs
- SAP HANA data
- Log LUNs
- Shared LUNs for the SAP HANA configuration files, binaries and traces

Software Components

Table 4 describes the software components used to deploy one active node of this solution.

Table 4. Software Elements

Software		Version
VMware vSphere		5.5 Update 2 build 2143827
Use either alternative	SUSE Linux Enterprise Server for SAP Applications	SLES11 SP3
	Red Hat Enterprise Linux	RHEL 6.6
SAP HANA		1.0 SPS9, Rev. 97 or later
Hitachi Storage Navigator		Microcode dependent
Hitachi Command Suite		8.1.2 or higher

SAP HANA

SAP HANA converges database and application platform capabilities in-memory to transform transactions, analytics, text analysis, predictive and spatial processing so businesses can operate in real-time. This combines database, data processing, and application platform capabilities in a single in-memory platform. Also, the platform provides libraries for predictive, planning, text processing, spatial, and business analytics — all on the same architecture.

By eliminating the divide between transactions and analytics, SAP HANA allows you to answer any business question anywhere in real time.

As a SAP customer, you can get more information on the SAP HANA platform at the SAP Service Marketplace and help.sap.com.

Operating System Options

Hitachi Unified Compute Platform for the SAP HANA platform in a 1 TB scale-up configuration on VMware vSphere 5.5 runs on either of the following:

- 64-bit SUSE Linux Enterprise Server (SLES) for SAP Applications 11 SP3
- 64-bit Red Hat Enterprise Linux (RHEL) 6.6

The initially delivered configuration of the operating system should persist. Do not make any modifications to the operating system, except as noted or approved by SAP.

For more details of the operating system changes, see “Updating and Patching the Operating System” in the SAP HANA Technical Operations Manual.

VMware vSphere 5.5

VMware vSphere 5.5 is a virtualization platform that provides a datacenter infrastructure. It features vSphere Distributed Resource Scheduler (DRS), high availability, and fault tolerance.

VMware vSphere 5.5 has the following components:

- **ESXi**

  VMware vSphere ESXi is a hypervisor that loads directly onto a physical server. It partitions one physical machine into many virtual machines that share hardware resources.

- **vCenter Server**

  VMware vCenter Server manages the vSphere environment through a single user interface. With vCenter, there are additional features available, such as Virtual Distributed Switch (VDS), vMotion, Storage vMotion, Storage Distributed Resource Scheduler, High Availability, and Fault Tolerance.

- **VMware vSphere**

  VMware vSphere is an enterprise virtualization solution to create a dynamic and flexible data center with integrated management and reporting capability for a high level of server, service, and client uptime.

The Unified Compute Platform for SAP HANA on VMware vSphere solution combines the benefits of a Unified Compute Platform for SAP HANA appliance with the flexibility and manageability of a VMware vSphere solution.

As a VMware vSphere customer, you can download more information about the ESXi Platform on VMware vSphere Documentation. See the vSphere Installation and Setup Guide in “ESXi and vCenter Server Product Documentation” in the ESXi documentation. In addition, you can download Performance Best Practices for VMware vSphere 5.5 (PDF).

For more information on HANA on VMware best practices, review the Best Practices and Recommendations for Scale-Up Deployments of SAP HANA on VMware vSphere documentation.

For more information on vMotion best practices, review the VMware vSphere vMotion Architecture, Performance and Best Practices in VMware vSphere 5 documentation.

Note — This solution assumes that a management server already exists in the landscape and is available for use with this solution. Make sure that the landscape has a VMware vCenter infrastructure set up and available.

Solution Design

This provides details for Hitachi Unified Compute Platform for the SAP HANA platform in a 1 TB scale-up configuration on VMware vSphere 5.5.

Hitachi Compute Blade 2500 Chassis Configuration

Figure 3 shows the front and back view of the Hitachi Compute Blade 2500 chassis for medium size configuration.

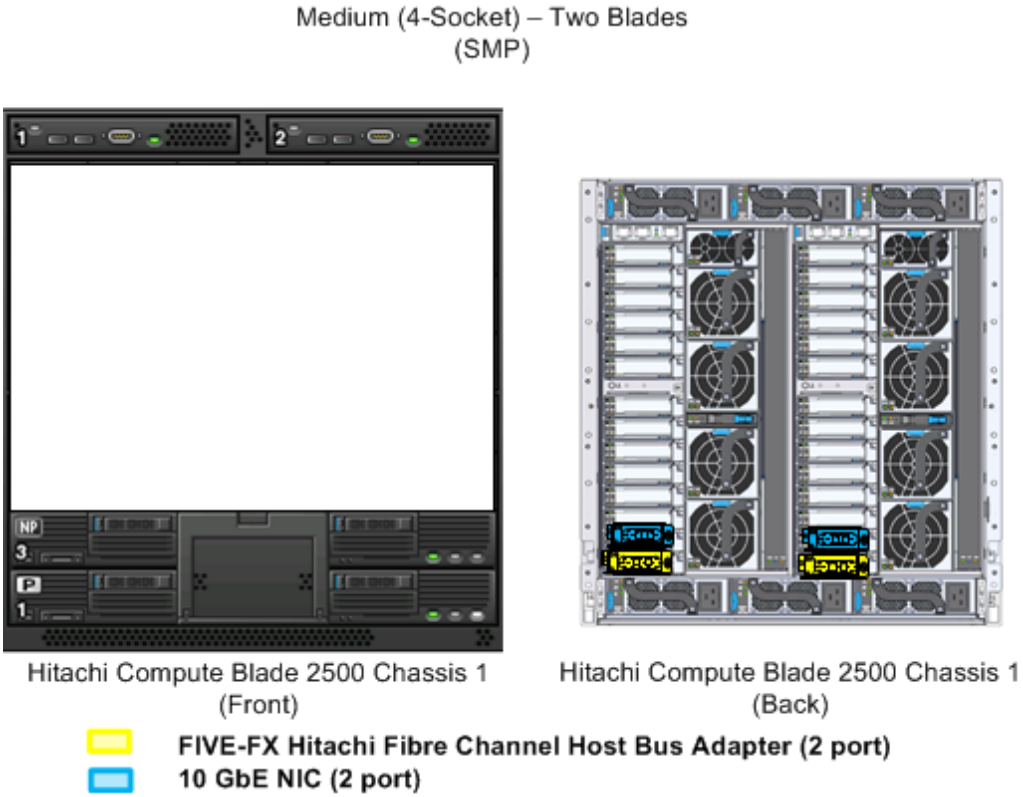

Figure 3

The solution uses one Hitachi Compute Blade 2500 chassis with the following components:

- Two 520X B2 server blades. One Hitachi Compute Blade 2500 chassis that can have a maximum of 8 full-width server blades.
- Two management modules on the Hitachi Compute Blade 2500 chassis to connect to the management network.
- A maximum of 28 I/O board modules (IOBD) mounted on the Hitachi Compute Blade 2500 chassis to serve the 8 full-width server blades. This solution only uses four I/O board modules.
  - FIVE-FX 16 Gb/sec 2-port Fibre channel PCIe adapters are installed on IOBD 01A and IOBD 02A.
  - 10GBase-SR 2-port network PCIe adapters are installed on IOBD 01B and IOBD 02B.

520X B2 Server Blade Architecture

This solution uses two full-width server blades and uses an SMP connection board to create a single four-socket SMP node with a total of 72 cores and 1 TB of memory.

Table 5 lists the server blade details for medium solution size configurations.

Table 5. Server Blade Configuration

	Medium (4-Socket)
Server Blades	Total of 2 server blades: ■ Blade 3 (non-primary) ■ Blade 1 (primary)
Total Number of CPU Cores	72
Total Memory size	1 TB

Fibre Channel Architecture

As shown in Table 6, the solution uses two Hitachi 16 Gb/sec 2-port Fibre Channel Adapters installed on the PCIe slot of the I/O board module of server blade 1. This solution uses four 16 Gb/sec Fibre Channel ports on the Hitachi Virtual Storage Platform G400 storage directly attached to the Hitachi Compute Blade 2500 server chassis using the Fibre Channel adapters.

Table 6. Fibre Channel Port Mapping

Server Blade Number	PCIe Slot Number	Port Number	Virtual Storage Platform G400 Port
Server Blade 1	IOBD 01A	0	1A
		1	2A
	IOBD 02A	0	3A
		1	4A

This configuration supports high availability by providing multiple paths from the host within the Hitachi Compute Blade 2500 chassis to multiple ports on the Hitachi Virtual Storage Platform G400 storage.

Figure 4 shows the direct-connect Fibre Channel architecture for this solution.

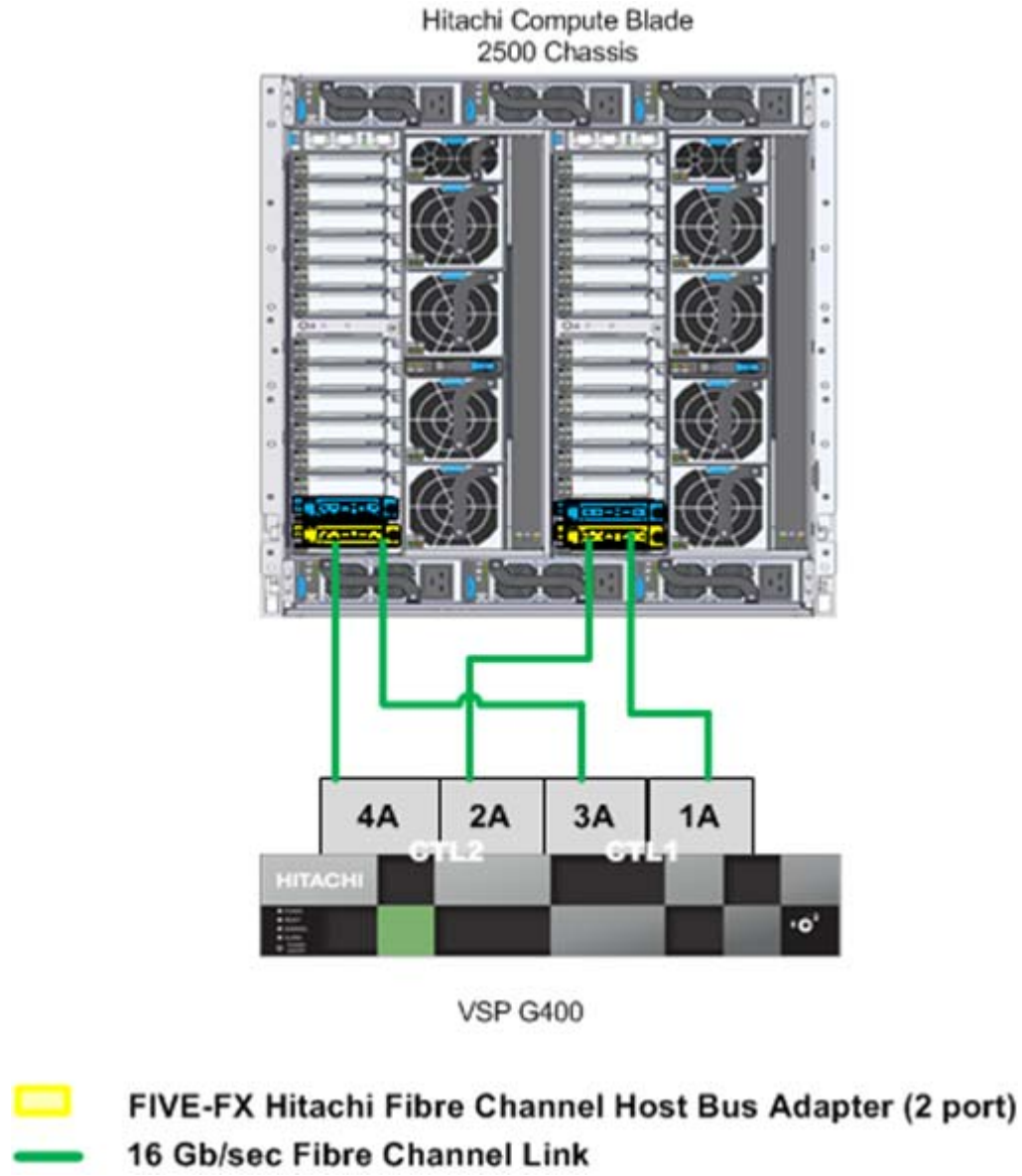

Figure 4

Set the port properties for the point-to-point connection between Hitachi Compute Blade 2500 and Hitachi Virtual Storage Platform G400 as shown in Table 7.

Table 7. Port Properties

Property	Value
Port Security	**Disabled**
Port Speed	**Auto (16 Gb/sec)**
Fabric	**ON**
Connection Type	**P-to-P**

Network Architecture

There are two 10GBase-SR 2-port LAN adapters installed on the PCIe slots of the I/O board module of server blade 1 of the Hitachi Compute Blade 2500 chassis. The solution uses two 10 GbE ports on the 10GBase-SR 2-port LAN adapters for connectivity with the 10 GbE external switches.

The management module on the Hitachi Compute Blade 2500 chassis is connected to an external switch for management connectivity.

Make the following network connections for the client network setup of the ESXi node as an uplink network setup:

- Connect the following to the external switches:
  - Port 0 of the I/O board module on PCIe slot IOBD 01B
  - Port 0 of the I/O board module on PCIe slot IOBD 02B
- Configure the corresponding two ports vmnic4 and vmnic6 at the ESXi level as uplinks in the virtual standard switch (VSS), and configure both vmnics as active. These two ports are used as the management network for the ESXi node as well as the network for the guest operating system.
- The field agent, after arriving at your site, will work with your VMware vCenter administrator to create virtual link aggregation groups (vlags). The agent will then convert, merge, and migrate the VSS to your existing or new virtual distributed switch. At this point, to speed up detecting corrupted connections, external switch ports need to be configured with a port channel set to active/active as well as for the LACP timeout value set to short.

The compute network setup uses the ports on the 10GBase-SR 2-port LAN adapters, as listed in Table 8.

Table 8. Network Setup Using 10GBase-SR 2-Port LAN Adapter

Server Blade	PCIe Slot Number	Switch Module Port	Network Description
Server Blade 1	IOBD 01B	0	Management network and client network for the SAP HANA node
		1	Free for use as uplink network or VMware vMotion
	IOBD 02B	0	Management network and client network for the SAP HANA node
		1	Free for use as uplink network or VMware vMotion

The Hitachi Compute Blade 2500 chassis has two management modules to secure fault tolerance as follows:

- Manage the power supply of each module and monitor the status of the system unit.
- Support the management functionality of the network within the system unit for server blades and various modules.
- Connect a management module and an external network through a management LAN module.

Figure 5 shows the standard network configuration used for the Hitachi Compute Blade 2500 chassis for this solution.

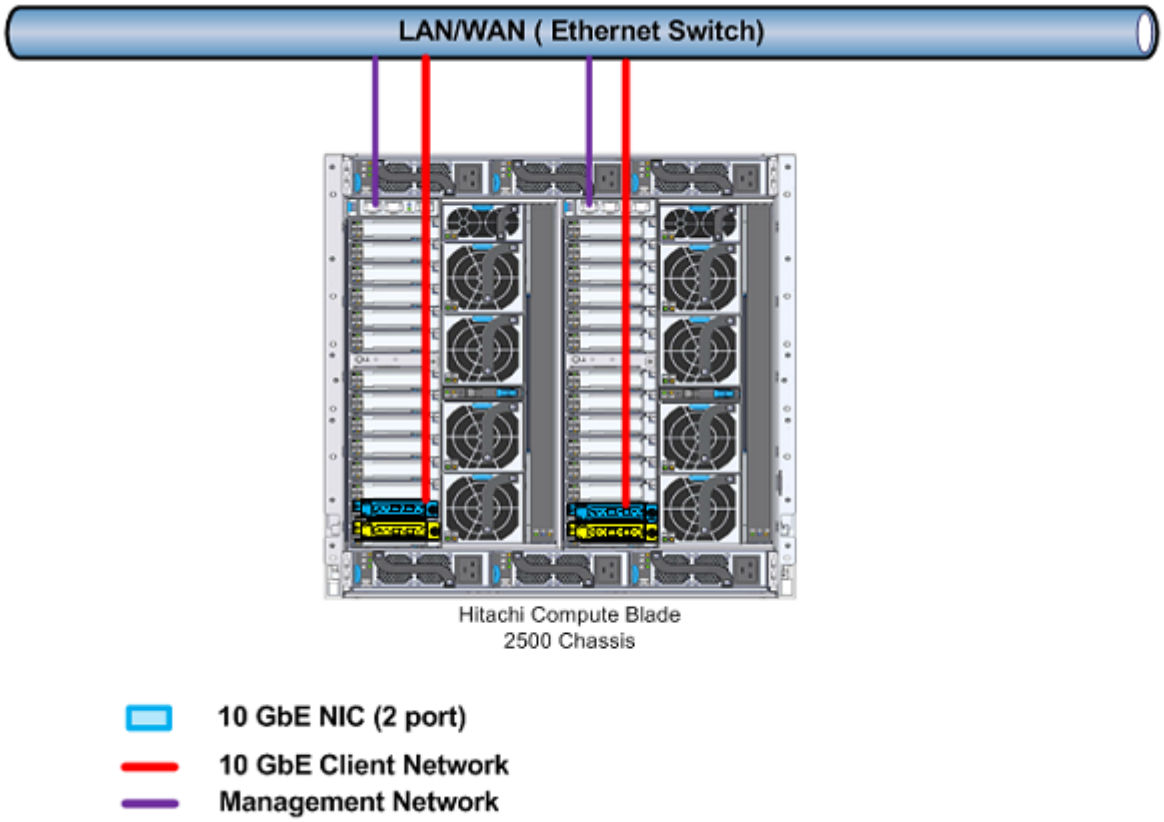

Figure 5

Note — The management network and client network can be on the same network switch or separate network switches, depending on the network environment.

Storage Architecture

Hitachi Virtual Storage Platform G400 is used for this solution. This documents the following:

- Sizing and configuring of storage including storage drive box trays (DBS)
- Spare drives
- Operating system boot volume (OS)
- SAP HANA shared volume (/hana/shared), log volume (/hana/log), and data volume (/hana/data)

Figure 6 shows the disk configuration of the storage subsystem for Hitachi Unified Compute Platform for the SAP HANA platform in a 1 TB scale-up configuration on VMware vSphere 5.5.

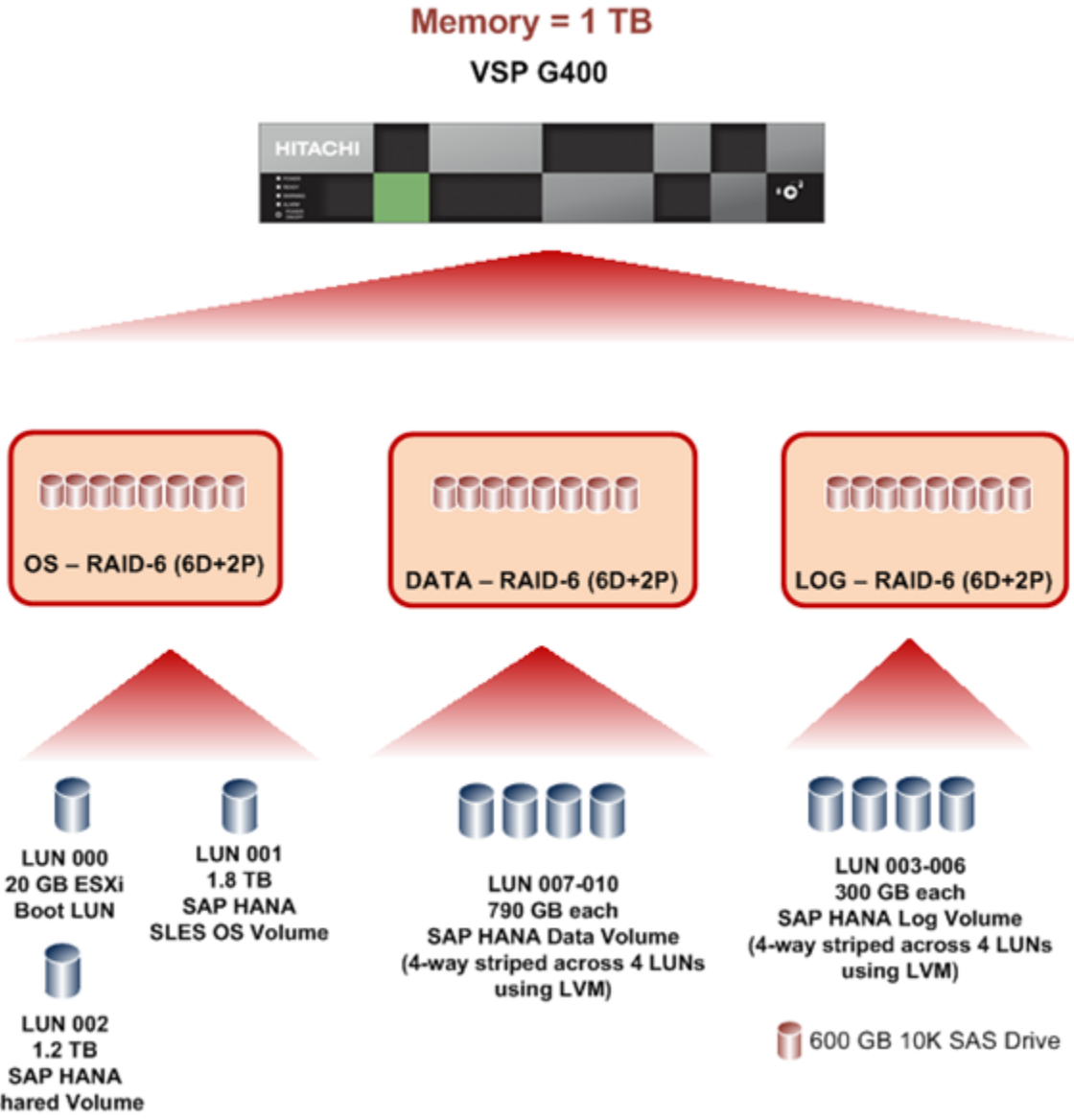

Figure 6

Table 9 lists the storage configuration for this solution.

Table 9. Storage Configuration

	Storage Configuration
DBS	■ 2
OS /hana/shared	■ 1 RAID-6 (6D+2P) ■ 8 × 600 GB HDD ■ ESXi OS: 20 GB ■ Guest OS 1.8 TB (SUSE Linux Enterprise Server, Red Hat Enterprise Linux, or combination of both) ■ /hana/shared: 1.2 TB
/hana/data	■ 1 RAID-6 (6D+2P) ■ 8 × 600 GB HDD ■ 4 × 790 GB LUNs
/hana/log	■ 1 RAID-6 (6D+2P) ■ 8 × 600 GB HDD ■ 4 × 300 GB LUNs
Spare drives	■ 2 × 600 GB HDD

Parity Group, RAID, and LUN Configuration

This reference architecture shows configurations of parity group, RAID level, and LUN on Hitachi Unified Compute Platform for the SAP HANA platform in a 1 TB scale-up configuration on VMware vSphere 5.5.

To achieve better performance, this solution uses two drive boxes (DBS 2.5HDD × 24) for each RAID-6 (6D+2P) parity group, with four drives selected from each drive box.

Table 10 shows the parity groups and LDEV assignment

Table 10. Parity Group and LDEV Assignment for Medium 1 TB HANA on VMware Solution

Parity Group	RAID Level and Disks	LDEV ID	LDEV Size	HOST ID	MPU ID	Description
1	RAID-6 (6D+2P) on 600 GB 10k RPM SAS drives	0:00:00	20 GB	000	MPU10	ESXi Operating system boot volume
		0:00:01	1.2 TB	002	MPU11	SAP HANA shared volume
		0:01:00	1.8 TB	001	MPU21	SAP HANA OS volume

Table 10. Parity Group and LDEV Assignment for Medium 1 TB HANA on VMware Solution (Continued)

Parity Group	RAID Level and Disks	LDEV ID	LDEV Size	HOST ID	MPU ID	Description
2	RAID-6 (6D+2P) on 600 GB 10k RPM SAS drives	0:02:00	300 GB	003	MPU20	SAP HANA log volume
		0:02:01	300 GB	004	MPU10	
		0:02:02	300 GB	005	MPU21	
		0:02:03	300 GB	006	MPU11	
3	RAID-6 (6D+2P) on 600 GB 10k RPM SAS drives	00:03:00	790 GB	007	MPU21	SAP HANA data volume
		00:03:01	790 GB	008	MPU11	
		00:03:02	790 GB	009	MPU20	
		00:03:03	790 GB	010	MPU10	

For LUN assignment, use the host IDs defined in Table 10 to configure host groups on Hitachi Virtual Storage Platform G400. To support high availability, each LUN has multiple paths from the host within Hitachi Compute Blade 2500 to multiple ports on Virtual Storage Platform G400 storage. Table 6 on page 9 lists the ports that are used.

There are four memory processing units (MPUs) used to distribute the workload for all LUNs needed for the solution.

VMware vSphere ESXi Configuration

This describes the VMware vSphere ESXi configuration.

SAN Operating System Boot Configuration

This two server blade configuration requires SAN boot. It uses one 20 GB LUN from Hitachi Virtual Storage Platform G400 as the operating system volume to host the hypervisor.

The Hitachi 16 GB FIVE-FX 2-port Fibre Channel adapters in Table 6 on page 9 have the 20 GB ESXi LUN configured as the primary boot device. Install VMware vSphere ESXi version 5.5 update 2 on this LUN.

Activate Round Robin Multipathing Policy

This reference architecture uses round robin multipathing policy, a component of the ESXi operating system.

Using the round robin multipathing policy allows the configuration of multiple I/O paths between the server blades and Hitachi Virtual Storage Platform G400. Round robin aggregates all physical I/O paths into a single logical path, and thus provides high availability and load balancing for the block devices. The LUNs are always available unless all four paths fail.

The round robin multipathing policy is used for the following I/O paths:

- ESXi operating system LUN
- SAP HANA server operating system LUN
- SAP HANA data volume LUN
- SAP HANA log volume LUN
- SAP HANA shared volume LUN

SAP HANA Configuration

This describes the SAP HANA configuration on this solution for Hitachi Unified Compute Platform for the SAP HANA platform in a 1 TB scale-up configuration on VMware 5.5.

Operating System Boot Configuration

This virtualized SAP HANA configuration requires SAN boot. Provision Hitachi Virtual Storage Platform G400 with a 1.8 TB LUN called HANA_OS_VMFS. VMware vSphere ESXi sees the LUN and creates a VMFS. From the VMFS, a 100 GB VMDK is carved out to be used for the SAP HANA operating system, including the */usr/sap/* **directory for SAP application related files**.

SAP HANA Volume Configuration

This SAP HANA virtual machine configuration uses the following LUNs on Hitachi Virtual Storage Platform G400:

- Four 790 GB SAP HANA data LUNs to create four 790 GB VMFSs for the SAP HANA data volumes.
- Four 300 GB SAP HANA log LUNs to create four 300 GB VMFSs for the SAP HANA log volumes.
- One 1.2 TB SAP HANA shared LUN to create one 1 TB VMFS for the SAP HANA shared volume.

The logical volume manager (LVM) configures the SAP HANA persistent storage volumes from virtual machines. With four VMDKs for the SAP HANA log, the LVM creates a single 4-way striped volume on which the XFS file system is created to store the SAP HANA log volumes. Similarly, this is also done for the SAP HANA data volumes.

For SAP HANA shared, an XFS file system is created to store SAP HANA binaries, configuration, and trace files.

SAP HANA Appliance Software Installation

After configuring the file system for the SAP HANA data volume and log volume, install the latest SAP HANA Datacenter Service Point (DSP) stack on the SAP HANA server, upgraded to the required HANA revision.

Install the following SAP HANA software components on the SAP HANA node for VMware vSphere server:

- SAP HANA database
- SAP HANA client
- SAP Host agent

Multiple Virtual Machine Configurations

Note — Multiple virtual machines are only applicable for non-production environments. The production environment only allows one SAP HANA virtual machine. For more information on controlled availability for Multi-virtual machine scenarios, see SAP Note 2024433.

For non-production environments used for development and quality assurance, these are the size configurations for multiple virtual machines in this 1 TB solution using SAP HANA in a VMware environment.

SAP and VMware require that the production 1 TB virtual machine only use 980 GB of RAM. ESXi processes use the remaining memory. To allocate memory evenly to all virtual machines and keep within the limitation of 980 GB of RAM for the production virtual machine, use the following sizes to be able to have the maximum number of virtual machines as show in Table 10 on page 14 for SAP HANA. This is a conservative approach:

- 1024 GB virtual machine uses 980 GB RAM
- 768 GB virtual machine uses 735 GB RAM
- 512 GB virtual machine uses 490 GB RAM
- 256 GB virtual machine uses 245 GB RAM
- 192 GB virtual machine uses 183 GB RAM
- 128 GB virtual machine uses 122 GB RAM
- 64 GB virtual machine uses 64 GB RAM

One RAID-6 (6D+2P) parity group for HANA data LUNs and one RAID-6 (6D+2P) parity group for HANA log LUNs should host only one virtual machine. Hitachi Data Systems recommends the following when running multi-virtual machine:

- Carve one virtual machine from the three RAID-6 (6D+2P) parity groups specified in Table 10 on page 14
- Each additional virtual machine added needs its own RAID-6 (6D+2P) parity group for DATA LUNs/VMFS. It can reuse the same LOG LUNs/VMFS.
- When the total virtual machines exceed four, the following is needed:
  - Add two new trays.
  - Add one new RAID-6 (6D+2P) parity group for LOG LUNs/VMFS for virtual machine number 5 and beyond.
  - Add one new RAID-6 (6D+2P) parity group for DATA LUNs/VMFS for each additional virtual machine added, totaling six virtual machines for Hitachi Virtual Storage Platform G400.

To create seven or eight virtual machines total, do the following:

- Reuse the same tray and map virtual machines to the same LOG LUNs/VMFS source as virtual machine number 5.
- Increase storage cache CLPR0 from 128 to the maximum of 256.
- Add one new RAID-6 (6D+2P) parity group for DATA LUNs/VMFS for each additional virtual machine added, totaling eight virtual machines for Hitachi Virtual Storage Platform G600.

To configure more than eight virtual machines, you need a second storage source. Apply the same building block structure above. For more information about multi-virtual machines, see SAP Note 2024433.

Table 11 is a sample table of virtual machines for SAP HANA that fit within the 980 GB limitation.

Table 11. Virtual Machine Allocation

Number of Virtual Machines	Virtual Machine Size							
	1st	2nd	3rd	4th	5th	6th	...	15th
2	735 GB	245 GB						
2	490 GB	490 GB						
3	490 GB	245 GB	245 GB					
4	490 GB	245 GB	122 GB	122 GB				
5	490 GB	245 GB	64 GB	64 GB	64 GB			
6	490 GB	122 GB	122 GB	122 GB	122 GB			
7	490 GB	122 GB	122 GB	64 GB	64 GB	64 GB		
15 (Max)	64 GB	64 GB	64 GB	64 GB	64 GB	64 GB	…	64 GB

Table 12 lists input of CPU, RAM, hard disk capacity for SAP HANA operating system, shared, data and log requirements for various virtual machine sizes to be deployed.

Table 12. Values for Different Size Virtual Machines

RAM (Size)	Core per Socket	CPU	RAM*	HANA_OS	HANA_Shared	HANA_Log**	HANA_Data***
64 GB	1	5	64 GB	100 GB	64 GB	4 × 16 GB	4 × 48 GB
128 GB	1	10	122 GB	100 GB	128 GB	4 × 32 GB	4 × 96 GB
256 GB	1	15	245 GB	100 GB	256 GB	4 × 64 GB	4 × 192 GB
512 GB	2	32	490 GB	100 GB	512 GB	4 × 128 GB	4 × 384 GB
768 GB	3	45	735 GB	100 GB	768 GB	4 × 128 GB	4 × 576 GB
1024 GB	4	64	980 GB	100 GB	1 TB	4 × 128 GB	4 × 768 GB

* Only 980 GB RAM in total can be allocated, regardless of how many virtual machines are to be created.

** 4 × <size> means assign <size> to each of 4 hard disks for log volume, totaling to 512 GB for systems greater than or equal to 512 GB, but one times the RAM for systems less than 512 GB.

*** 3 × <size> means assign <size> to each of 4 hard disks for data volume.

For More Information

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