vmware®

HITACHI
Inspire the Next

Integrate Hitachi Virtual Storage Platform with VMware Cloud Foundation

Reference Architecture Guide

By Hossein Heidarian

December 2019

Feedback

Hitachi Vantara welcomes your feedback. Please share your thoughts by sending an email message to SolutionLab@hitachivantara.com. To assist the routing of this message, use the paper number in the subject and the title of this white paper in the text.

Revision History

Revision	Changes	Date
MK-SL-181-00	Initial release	December 9, 2019

Table of Contents

Integrate Hitachi Virtual Storage Platform with VMware Cloud Foundation

Reference Architecture Guide

Use this reference architecture guide to design and configure your Hitachi Unified Compute Platform RS system, integrating the following:

- Hitachi Unified Compute Platform HC

- Hitachi Virtual Storage Platform (optional)

- VMware Cloud Foundation

As you demand ever-faster delivery of new business services, there is the complexity and cost of deploying and managing the technology resources to support them. Many IT departments spend almost a quarter of their time and resources evaluating and installing increasingly disparate hardware components. Furthermore, the lack of a unified management framework and the need for highly specialized individuals who can design, configure, optimize, test and manage each component increases your cost, complexity and risk.

Hitachi Vantara and VMware have collaborated to address these challenges by introducing Hitachi Unified Compute Platform RS (UCP RS) using VMware Cloud Foundation. This solution includes Hitachi Unified Compute Platform HC (UCP HC) powered by VMware vSAN to help you run all virtualized workloads and business applications. With its pre-validated building blocks of compute, storage, and networking, the architecture is guaranteed to work together and deliver a hybrid cloud environment with predictable high performance. It's a simple, low-risk, and reliable path to private cloud, as well as a first step for transforming a traditional datacenter into a modernized software-defined datacenter.

In addition, VMware Cloud Foundation, which provides the benefits of VMware vSAN software-defined storage, provides external storage support. Hitachi Vantara integrates Hitachi Virtual Storage Platform (VSP) with Hitachi Unified Compute Platform RS using Hitachi Unified Compute Platform HC nodes to provide the flexibility of using the right storage platform for deploying hybrid cloud for your business needs.

Hybrid cloud with a disaggregated hyperconverged storage architecture allows autonomy to resize your compute and storage independently to better serve your IT strategy. Hitachi Unified Compute Platform Advisor with VMware SDDC Manager automates provisioning, management, and life-cycle management of software and hardware on Hitachi Unified Compute Platform RS.

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

To simplify your hybrid cloud journey, Hitachi Unified Compute Platform RS provides a turnkey solution that reduces total cost of ownership (TCO) and improves security through VMware Cloud Foundation and Hitachi infrastructure.

VMware Cloud Foundation has the following core components:

- [VMware vSphere](#)

- [VMware vCenter Server](#)

- [VMware vSAN](#)

- [VMware SDDC Manager](#) (software-defined data center platform manager)

- [VMware NSX](#)

This integrated software stack combination provides automated lifecycle management and a single platform for on-premise or public cloud consumption.

The rack-scale Unified Compute Platform RS series combines the hyperconverged Hitachi Unified Compute Platform HC series systems, based on industry-leading VMware vSAN with NSX network virtualization and SDDC Manager. Hitachi Vantara's integrated hyperconverged infrastructure using by VMware vSAN, provides wide configuration options for vSphere private and public cloud deployment.

The Hitachi infrastructure in this solution are the following:

- Hitachi Unified Compute Platform HC

- Hitachi Virtual Storage Platform

- Hitachi Unified Compute Platform Advisor

- Hitachi Data Instance Director, the storage recovery adapter for VMware Site Recovery Manager

- VMware vRemote Operations, VMware vRealize Log Insight, VRO connector

Hitachi external Fibre Channel SAN storage is supported on Unified Compute Platform HC with VMware Cloud Foundation on a Unified Compute Platform RS solution. It can be used with VMware vSAN on Unified Compute Platform HC independently.

Map the LUNs to all the hosts under any workload domain to create SAN-based datastore to expand storage capacity.

Add Fibre Channel SAN storage datastore as secondary storage besides the vSAN datastore. Also, the Fibre Channel SAN-based datastore can be used as the principle datastore on any workload domain, except the management domain.

The following are the main use cases to have a Virtual Storage Platform datastore on this solution:

- For use as an additional capacity expansion, in case more capacity is required than available in the vSAN.

- In case of workload migration, where existing VMDK images containing operating systems or databases are moved from an older VMware vSphere infrastructure into a new VMware Cloud Foundation workload domain, minimizing any data migration impact.

- When you need a separated storage tier. For example, have the VMware vSAN datastore host the virtual machine's operating system VMDK disks for easier for patch and upgrade), while the Virtual Storage Platform host VMDKs on a VMFS datastore or P-RDMS for mission-critical application. This is when you have more trust on Virtual Storage Platform for either high performance or higher availability and resiliency.

- For use as a principle, reliable and high performance datastore for mission critical applications.

VMware Cloud Foundation requires VMware vSAN to be used for the management domain. For the workload domain, any of these storage options can be used in this Hitachi Unified Compute Platform RS solution:

- **Option 1** — VMware vSAN datastore

- **Option 2** — VMware vSAN datastore with secondary storage (Fibre Channel storage) available for any workload domain

- **Option 3** — Principle storage (Fibre Channel Datastore) available for any workload domain except the management domain

This solution also includes Hitachi Unified Compute Platform Advisor, which is comprehensive management and automation software that simplifies infrastructure management and operations. Seamless integration allows automated provisioning of the Unified Compute Platform systems, providing the following:

- Unified management

- Central oversight

- Smart life cycle management for firmware upgrade

- External storage provisioning

- Element visibility and troubleshooting.

Unified Compute Platform Advisor provides pertinent information, allowing you to manage operations for connected devices.

Solution Benefits

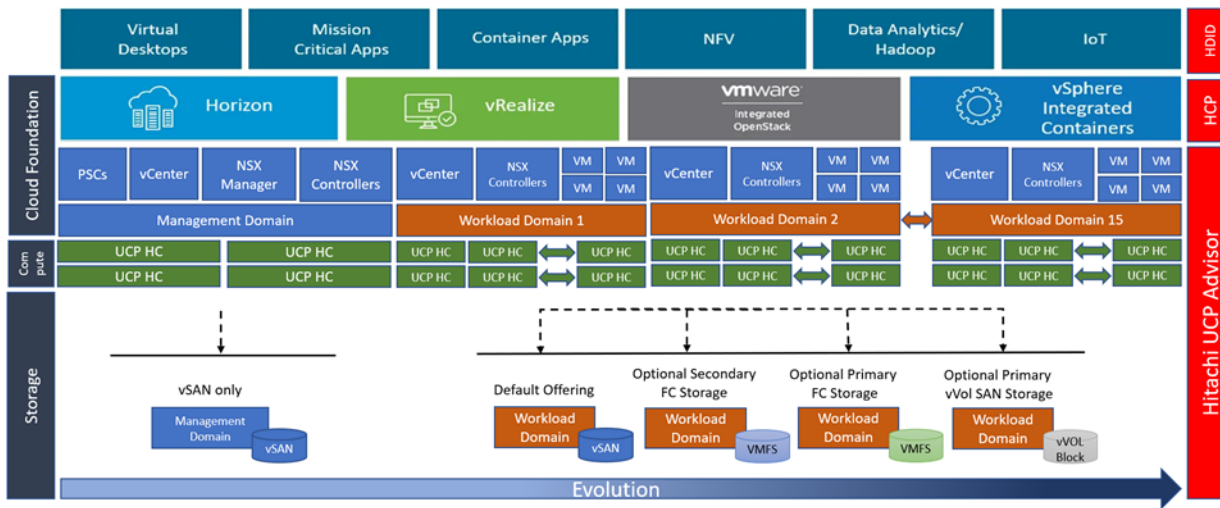Hitachi Unified Compute Platform RS provides the following advancements and benefits:

- Deploy private cloud on top of advanced Hitachi Vantara Unified Compute Platform HC as a key component, delivering and simplifying growth with a wide range of CPU and memory configurations to meet your workload needs.

- Automate software-defined storage deployment with VMware vSAN.

- Automate software-defined networking deployment with VMware NSX.

- Accelerate time to market.

- Lower total cost of ownership.

- Future-proof your infrastructure to run any application on virtualized; cloud native; or artificial intelligence or machine learning workloads.

- Support external SAN storage on Hitachi Virtual Storage Platform.

- Have complete end-to-end management, including compute nodes, storage, and networking, with Hitachi Unified Compute Platform Advisor.

- Optimize performance and eliminate over-provisioning costs with a highly configurable and integrated infrastructure.

- Support high availability and reliability with enterprise-class hardware components and preconfigured resilient architectures.

- Achieve [data resilience and scalability](#) using VMware vSAN and the industry-leading Hitachi Virtual Storage Platform with hybrid and all-flash arrays.

Hitachi Unified Compute Platform Advisor provides end to end management with the following benefits:

- Upgrade the compute BIOS and upgrade the BMC and component (NIC, HBA and controller) firmware by an automatic process.

- Provision compute nodes, storage, Ethernet, and Fibre Channel from a single, unified management interface for federated system management.

- Upgrade your switch configuration, management settings, and firmware.

- Integrate with VMware products, such as VMware vRealize Orchestration and VMware vRealize Log Insight, manage a multi-site VMware infrastructure, and link multiple VMware vCenter Server installations.

- Provision and manage external storage.

Figure 1 shows the combination of Hitachi Unified Compute Platform RS with VMware Cloud Foundation.

Figure 1

Solution Design

Hitachi Unified Compute Platform RS can start as a single rack but can be extended to support multi-rack scenarios. One of the advantages of Unified Compute Platform RS is that it has no hard limit as to how many racks and nodes can be supported, as long as it complies with VMware maximums.

Each rack can accommodate the following:

- Up to a maximum of 32 Hitachi Unified Compute Platform HC V120 systems as compute nodes

- 2 leaf switches to provide network connectivity for all the hosts on each rack.

- Spine switches to provide inter-rack connectivity and to connect the entire solution to your corporate network.

- A management network on each rack to handle all out-of-band traffic.

One benefit of Unified Compute Platform RS is flexibility. To cover all your requirements, it supports mixed and matched compute nodes. For example, to have separated clusters, which have more VMware vSAN capacity space besides high performance all-flash all-NVMe clusters, add a Unified Compute Platform HC hybrid system to this solution. You can leverage Hitachi Unified Compute Platform HC V225G for workload domains that require graphic resources into a Hitachi Unified Compute Platform RS solution which already contains all-flash and hybrid Hitachi Unified Compute Platform HC systems.

Another benefit of Unified Compute Platform RS is the ability to have SAN-based datastores on this solution. VMware Cloud Foundation offers VMware vSAN storage by default. By adding a HBA to Unified Compute Platform HC compute nodes, this solution seamlessly supports Hitachi Virtual Storage Platform, not only for extending storage space along with available vSAN capacity, but also offering separated storage tiers for different datastores. For example, use a vSAN datastore to keep the VMDK files contain operating systems, and use a Virtual Storage Platform datastore for mission-critical applications.

This SAN-based advantage helps you measure your storage requirements by type and size so that you have a variety of options for your underlying storage layer. You have more freedom to select the storage space you need based on the type of workload domains.

Hitachi Virtual Storage Platform offers all-NVMe, all-flash, and hybrid SAN-based datastore options to support a broad range of needs. The storage rack holds either a Virtual Storage Platform F or VSP G series system. Using Virtual Storage Platform in Hitachi Unified Compute Platform RS is optional.

From the networking perspective, two leaf switches provide network connectivity for hosts on the top of each rack. Spine switches in this solution provide inter-rack connectivity and connect the entire solution to your corporate network using uplink ports. Manage all out-of-band management traffic using a management switch on each rack.

For example, in a 4+1 rack scenario, there are four compute racks plus one rack with Hitachi Virtual Storage Platform:

- The maximum number of supported compute nodes in a 4+1 rack scenario is 128 (4 × 32).

- Add a required HBA to the Unified Compute Platform HC compute nodes to have access to the Fibre Channel external storage. They are connected to Virtual Storage Platform using Fibre Channel connections through two SAN switches to have redundancy.

- There are 8 leaf switches, 2 on the top of each rack, to provide network connectivity for all the hosts.

- There is a pair of spine switches to provide inter-rack connectivity plus connectivity to your corporate network.

In general, a Hitachi Unified Compute Platform RS solution is capable of adding more racks with more compute nodes. The only limitation is how many racks and nodes can be supported depends on VMware's specifications and maximums.

Figure 2 shows logical view of the Hitachi Unified Compute Platform RS hardware architecture.
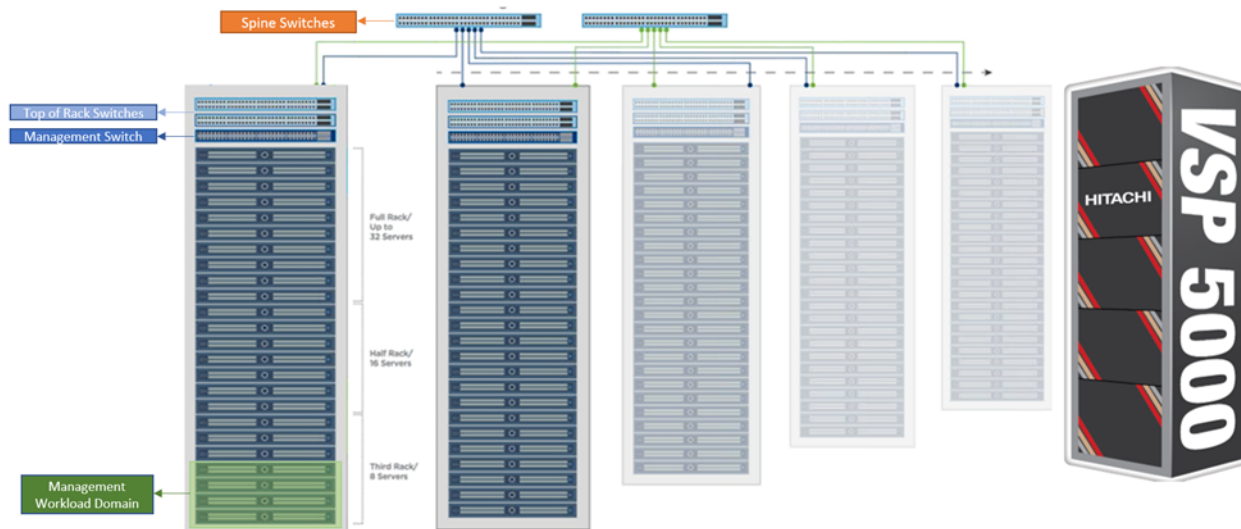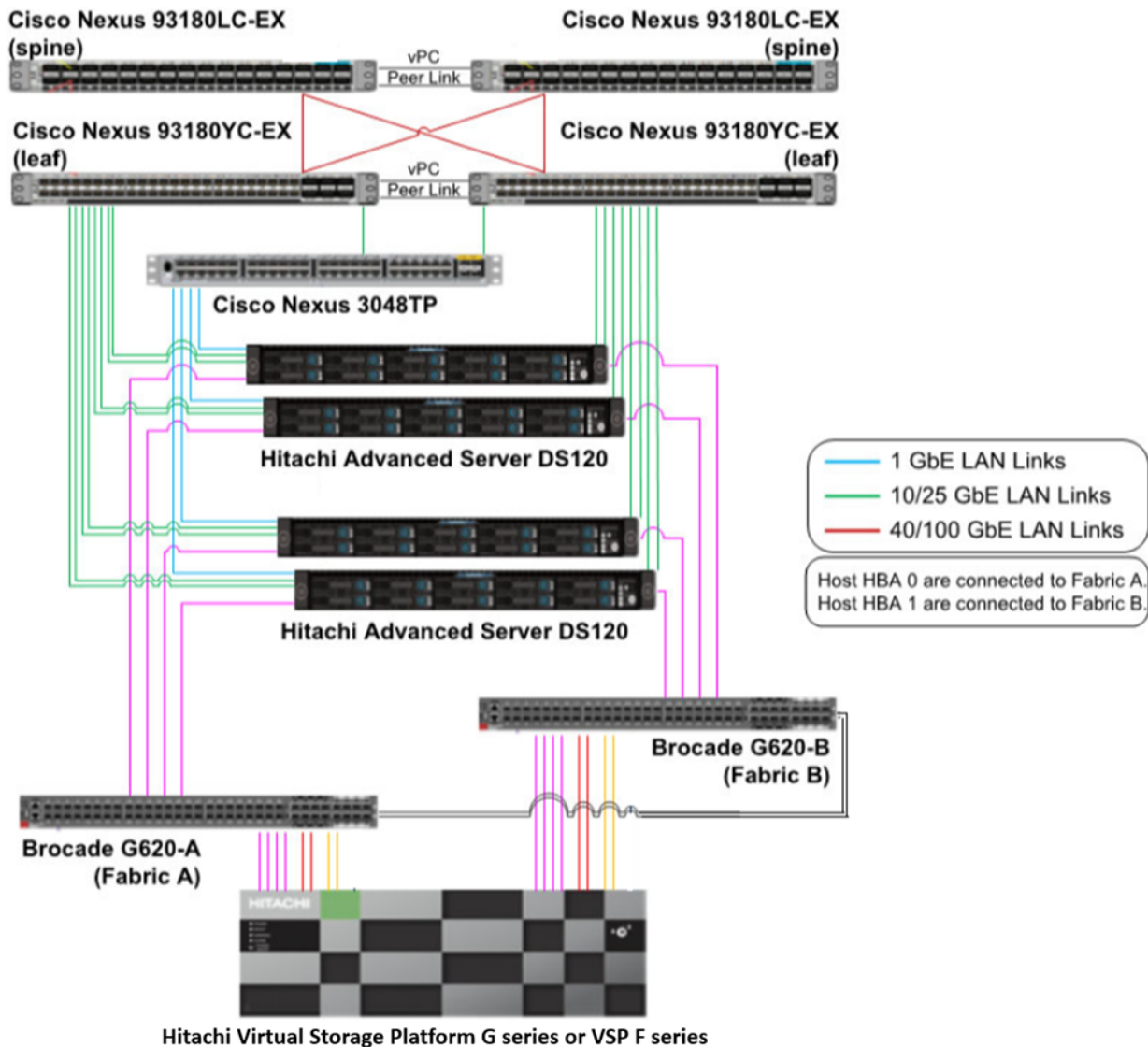
Figure 2

Figure 3 shows high availability and redundancy in a Hitachi Unified Compute Platform RS solution.

Figure 3

Fibre Channel Storage as Secondary Datastore

VMware Cloud Foundation supports Hitachi Virtual Storage Platform as external storage. In a Hitachi Unified Compute Platform RS solution, Fiber Channel storage can be used as the following:

▪ As secondary storage for any type of workload domain

▪ As principle storage for all types of workload domains except the management domain, where VMware Cloud Foundation requires VMware vSAN to be used

Add Fibre Channel Storage to Hitachi Unified Compute Platform HC

To have access to datastores residing on Hitachi Virtual Storage Platform, Hitachi Unified Compute Platform HC systems must be configured with Fibre Channel HBAs and connected to Virtual Storage Platform using Brocade Fibre Channel switches. Carve out suitable LUNs on Virtual Storage Platform and present those LUNs to the Hitachi Unified Compute Platform HC nodes.

Provision Fibre Channel Storage

After deploying VMware Cloud Foundation and creating the management domain, create a new workload domain. This new cluster will have a datastore on Hitachi Virtual Storage Platform.

To create a SAN-based datastore, configure Virtual Storage Platform in advance. Connect selected hosts to Virtual Storage Platform redundantly using SAN switches. Configure aliases and zoning on both SAN switches. Do all SAN switch configuration, storage provisioning, and management either using the Hitachi Unified Compute Platform Advisor central control panel or manually.

1. Add HBAs to Unified Compute Platform HC compute nodes.
2. Connect Unified Compute Platform HC compute nodes to SAN switches redundantly.
3. Configure SAN switches.
4. Create Fiber Channel zones for the workload domain.
5. Provision storage.

Configure SAN Switch and Storage

Table 1 lists the steps to be done on each SAN switch and Hitachi Virtual Storage Platform.

TABLE 1. STEPS ON EACH SAN SWITCH AND HITACHI VIRTUAL STORAGE PLATFORM

| Task	SAN Switch Level	Storage Level	VMware vSphere Level
1. Configure ports.	Yes	No	No
2. Create new aliases.	Yes	No	No
3. Create Zones and enable zone configuration.	Yes	No	No
4. Create host group.	No	Yes	No
5. Configure host mode option.	No	Yes	No
6. Create parity groups.	No	Yes	No
7. Create LDEVs.	No	Yes	No
8. Create dynamic provisioning pools.	No	Yes	No
9. Create virtual volumes.	No	Yes	No
10. Add LUN paths.	No	Yes	No

Configure Workload Domain

Complete these steps from the VMware SDDC Manager dashboard:

1. Commission designated hosts for new workload domain
2. Create a new workload domain from commissioned hosts

Figure 4 shows creating the workload domain from SDDC Manager dashboard.

Figure 4
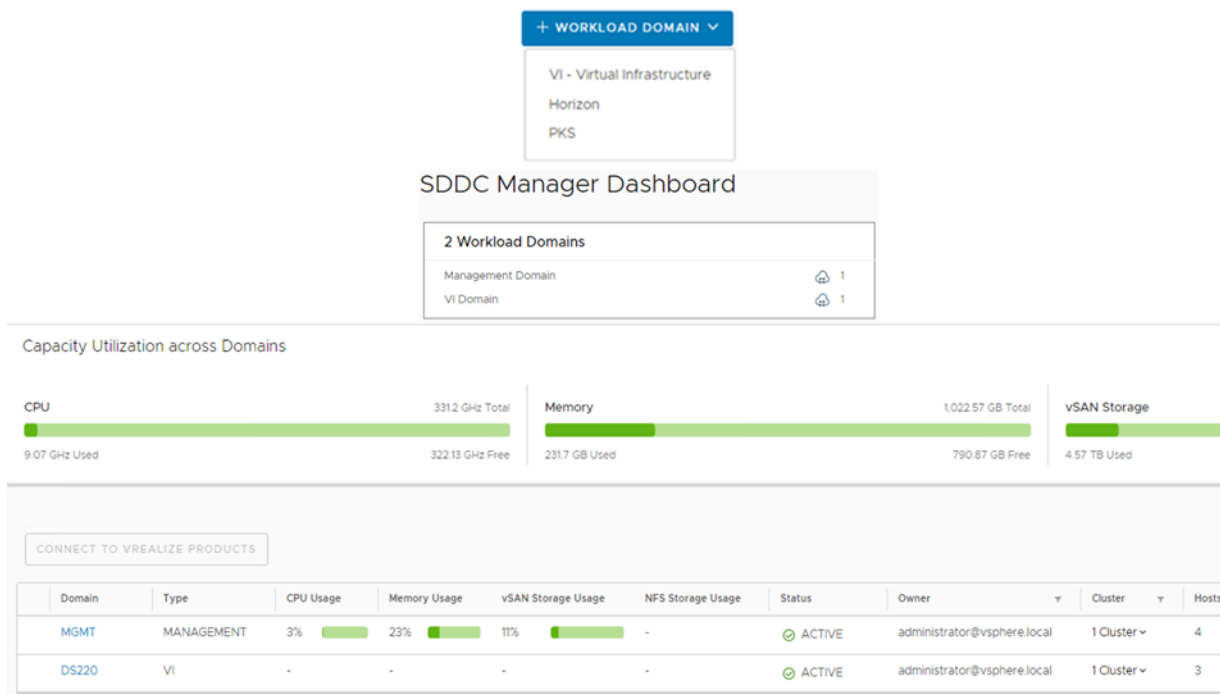
Configure Storage with VMware vCenter

Do this procedure from VMware vCenter on the cluster level.

To configure the storage, do the following.

1. Rescan storage on the cluster which belongs to newly created workload domain from vCenter to discover Hitachi Virtual Storage Platform storage as a connected device to vmhba.

    (1) Right-click the node on the compute node.

    (2) Click **Storage**.

    (3) Click **Rescan Storage**.

    You can also do this step on the cluster level.

   Figure 5 on page 10 shows rescanning for finding external storage connected to host via vCenter.

Figure 5
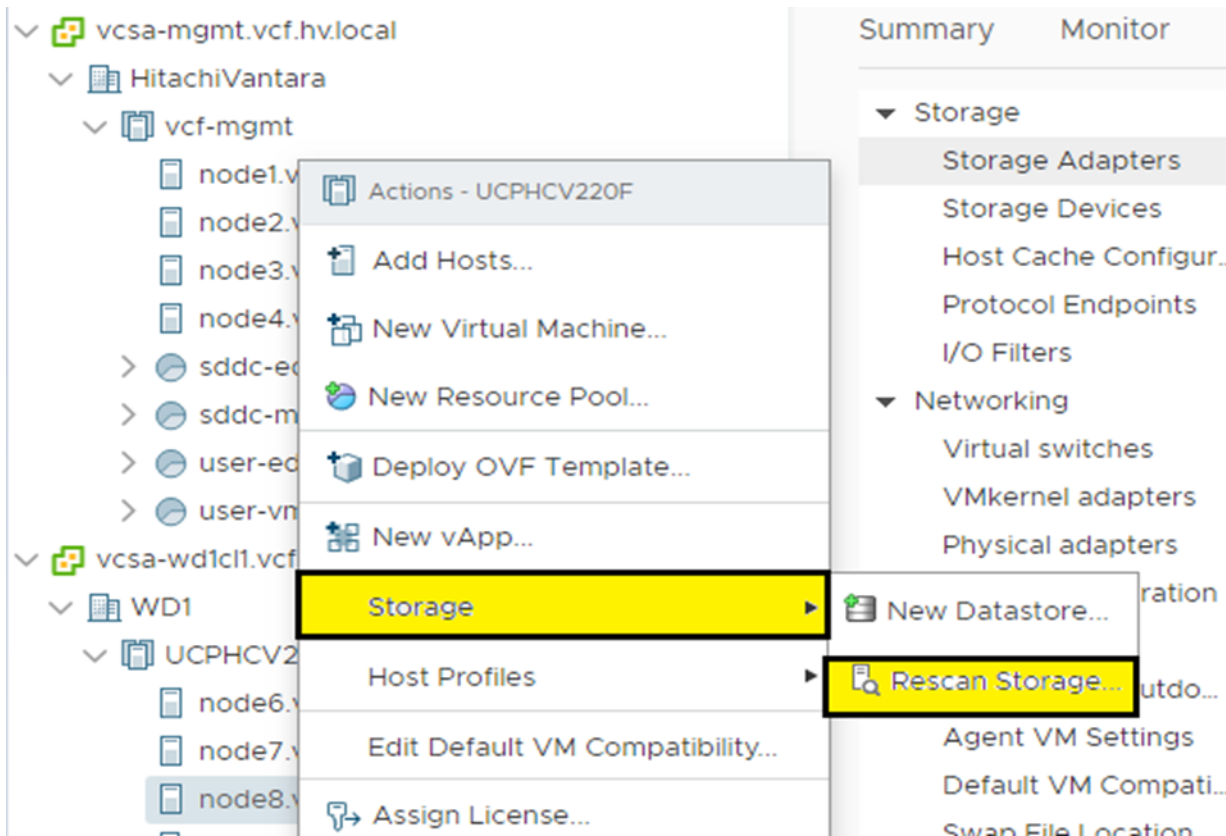
2.   Create a new VMFS datastore on Hitachi Virtual Storage Platform for the created workload domain.

   (1)   Right-click the node on Hitachi Unified Compute Platform.

   (2)   Click **Storage.**

   (3)   Click **New Datastore**.

   Figure 6 shows creating a new VMFS datastore using VMware vCenter.

Figure 6
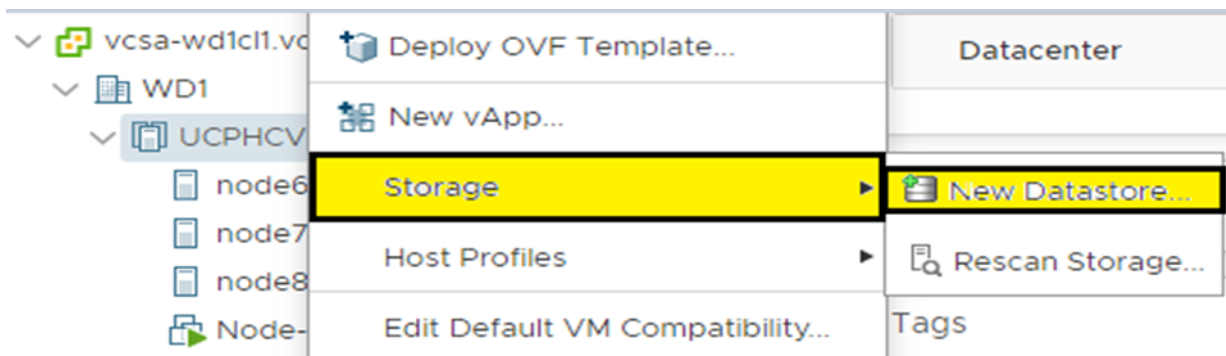
3. Control and change new VMFS datastore parameter

   (1) Check that the new VMFS datastore was created correctly.

   (2) You can change the multipathing polices matching with your environment.

   Figure 7 illustrates an external Fiber Channel storage on Virtual Storage Platform and both active paths

Figure 7

4. Select your multipathing policy.

Figure 8 shows the host having Hitachi Virtual Storage Platform datastore as secondary datastore next to a VMware vSAN datastore.

Figure 8
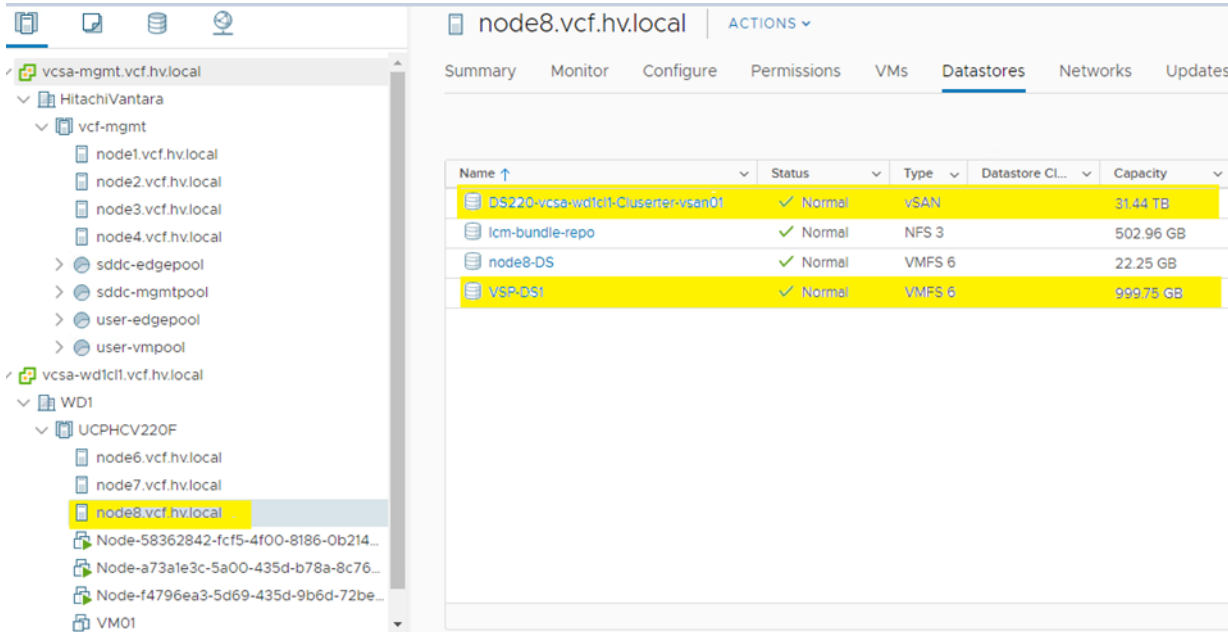
Manage Fibre Channel Storage

In contrast with VMware vSAN, which is managed from within VMware SDDC Manager, manage Fiber Channel storage and the SAN switch configuration independently outside of SDDC Manager. Do all Fiber Channel storage provisioning and management operations, plus SAN switch configuration, with Hitachi Unified Compute Platform Advisor:

- Configure Fibre Channel switches.

- Create aliases and zoning.

- Create a host group.

- Create dynamic provisioning pools and LDEVs.

- Create, map, un-map, and delete LUNs.

Unified Compute Platform Advisor provides a single control panel to manage these crucial tasks plus lots of other useful capabilities.

See "Provision Fibre Channel Storage" on page 8 for what can be done from the Unified Compute Platform Advisor control panel.

Refer to these documents for more information:

- The Hitachi Unified Compute Platform CI reference architecture guide

- Hitachi Storage best practices for VMware

- Hitachi Unified Compute Platform Advisor

Fibre Channel Storage as Principle Datastore

Hitachi Virtual Storage Platform can be used as the principle datastore for all the workload domains except the management domain. There is no VMware vSAN datastore on the workload domains that have Fibre Channel storage as principle storage.

All configurations and provisioning steps are like using Virtual Storage Platform as a secondary datastore. The only difference is there is an option to choose commissioning hosts not having a vSAN datastore instead having a VMFS datastore residing on Virtual Storage Platform.

Here is a summary of the steps to use Fiber Channel storage as the principle datastore:

- Add Fibre Channel Storage:
  - Add HBAs to Hitachi Unified Compute Platform HC compute nodes.
- Provision Fibre Channel Storage:
  (1) Connect Unified Compute Platform HC compute nodes to SAN switches redundantly.
  (2) Configure the SAN switch.
      i. Configure ports.
      ii. Create new aliases.
      iii. Create zones and enable zone-configurations.
  (3) Create Fiber Channel zones for the workload domain.
  (4) Provision storage.
      i. Create host group.
      ii. Configure host mode option.
      iii. Create parity groups.
      iv. Create LDEVs.
      v. Create dynamic provisioning pools.
      vi. Create virtual volumes.
      vii. Add LUN paths.

Configure Workload Domain

Configure a workload domain from the VMware SDDC Manager dashboard.

To configure a workload domain, do the following.

1. Create a network pool

   Figure 9 shows creating a network pool.

Figure 9

Network Settings

Network Pool

Create Network Pool

Ensure that all required networks are selected based on their usage for workload domains.

Network Pool Name	FC-networkpool
Network Type ⓘ	☐ vSAN ☐ NFS ☑ vMotion

vMotion Network Information

VLAN ID ⓘ	103
MTU ⓘ	9000
Network ⓘ	192.168.103.0
Subnet Mask ⓘ	255.255.255.0
Default Gateway ⓘ	192.168.103.1

Included IP Address Ranges

Once a network pool has been created, you are not able to edit or remove IP ranges from that pool.

192.168.103.122   To 192.168.103.124   REMOVE

2. Commission the hosts not having local drives instead having access to Hitachi Virtual Storage Platform (external Fibre Channel storage) for new workload domain.

    Figure 10 shows commissioning a host having principle datastore with no local drives.

Figure 10

Host Addition and Validation ⊙

∨ Add Hosts

You can either choose to add host one at a time or download JSON template and perform bulk commission.

● Add new   ○ Import

Host FQDN	node8.vcf.hv.local
Storage Type	○ VSAN ○ NFS ● VMFS on FC
Network Pool Name ⓘ	FC-networkpool
User Name	root
Password	············

ADD

3. Create a new workload domain access to Hitachi Virtual Storage Platform.

    Figure 11 shows creating principle datastore residing on Fibre Channel external storage for a VI workload domain

Figure 11

VI Configuration

1 Name

2 Compute

3 Networking

4 Storage

5 Host Selection

6 License

7 Object Names

8 Review

Storage ⊙

VMFS on FC Datastore

Datastore Name ⓘ   VSP-DS1

4.   Name the principle datastore (Figure 12).

Figure 12

Storage ⑦

VMFS on FC Datastore

Datastore Name ⓘ   VSP-DS1|

Figure 13 shows a cluster non vSAN cluster having FC storage as principle datastore

Figure 13
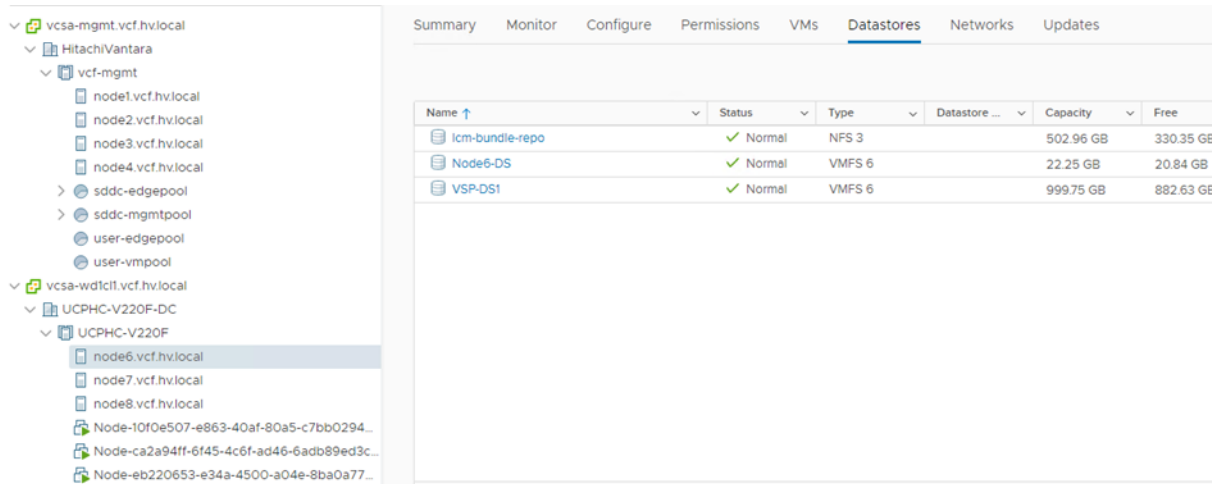
Hitachi Unified Compute Platform Advisor Requirements

Hitachi Unified Compute Platform Advisor has the following virtual machines, each with different resource requirements:

- **UCP Advisor controller virtual machine** — Table 2, "Hitachi Unified Compute Platform Advisor Controller Virtual Machine Requirements," on page 17 shows the controller virtual machine resource requirements.

- **UCP Advisor gateway virtual machine** — Table 3, "Hitachi Unified Compute Platform Advisor Gateway Virtual Machine Requirements," on page 17 shows the gateway virtual machine resource requirements.

TABLE 2. HITACHI UNIFIED COMPUTE PLATFORM ADVISOR CONTROLLER VIRTUAL MACHINE REQUIREMENTS

Resource	Minimum Requirement
Operating system	CentOS 7.6
RAM	6 GB
CPU	2 vCPU (default)
Disk	100 GB (thin provisioned disk)
Network	1 vNIC (connect to management VLAN VMXNET3)

TABLE 3. HITACHI UNIFIED COMPUTE PLATFORM ADVISOR GATEWAY VIRTUAL MACHINE REQUIREMENTS

Resource	Minimum requirement
Operating system	CentOS 7.6
RAM	2 GB (default)
CPU	2 vCPU (default)
Disk	40 GB (thin provisioned disk)
Network	1 vNIC (connect to management VLAN VMXNET3)

Hitachi Unified Compute Platform HC Configuration

Hitachi Unified Compute Platform HC is used as the building block for Hitachi Unified Compute Platform RS. Also, Unified Compute Platform HC offers a broad range of compute and storage components that can be scaled and configured independently to eliminate over-provisioning. Storage can be SSD, hybrid, all flash, or all NVMe. It supports GPUs.

Note — By default, Hitachi Unified Compute Platform HC does not come with an HBA. To have access to Hitachi Virtual Storage Platform as SAN storage in a certified feature supported by VMware, you must add a Fiber Channel HBA to Unified Compute Platform HC. This can come pre-configured or pre-packaged with Hitachi Virtual Storage Platform and Brocade Fibre Channel switches.

Table 4, "Hitachi Unified Compute Platform HC Local Drive Options," on page 18 reviews available local drive options on Hitachi Unified Compute Platform HC.

TABLE 4. HITACHI UNIFIED COMPUTE PLATFORM HC LOCAL DRIVE OPTIONS

Hitachi Unified Compute Platform HC Family	Chassis	Hitachi Unified Compute Platform HC Model	Cache	Capacity
Hitachi Unified Compute Platform HC V120 series	1U	UCP HC V120 (hybrid)	SATA SSD	SAS HDD
		UCP HC V120F (all flash)	NVMe	SATA SSD
		UCP HC V121F (all flash)	SATA SSD	SATA SSD
		UCP HC V123F (all flash)	Optane	SATA SSD
		UCP HC V124F (all flash)	Optane	SATA SSD
Hitachi Unified Compute Platform HC V220 series	2U	UCP HC V220 (hybrid)	SATA SSD	SAS III
		UCP HC V220F (all flash)	Optane	SAS SSD
Hitachi Unified Compute Platform HC V225G series	2U	UCP HC V225G (all flash + GPU)	SAS SSD	SAS SSD

Options for Hitachi Virtual Storage Platform Use

You can use Hitachi Virtual Storage Platform as a secondary storage option when you need more storage capacity on any workload domain besides VMware vSAN storage.

It can even go further, using Virtual Storage Platform as the principle datastore if the workload domain is not the same as the management domain. VMware Cloud Foundation mandates the use of VMware vSAN for the management domain.

To have datastores reside on SAN storage with Virtual Storage Platform, you must order an HBA with Hitachi Unified Compute Platform HC as a certified feature. You can then connect Hitachi Unified Compute Platform HC nodes to Hitachi Virtual Storage Platform using Brocade G620 Fibre Channel switches. When setting up your system, carve out the LUNs on Virtual Storage Platform and present those LUNs to the Hitachi Unified Compute Platform HC nodes.

While technically you can present the LUNs to all available hosts in the Hitachi Unified Compute Platform RS environment, Fibre Channel storage connectivity is not typical for the hosts in management domain. Access to Hitachi Virtual Storage Platform using Fibre Channel is the main use cases for virtual infrastructure workload domains and VMware Horizon virtual machines.

Table 5, "Supported Fibre Channel SAN Storage with Hitachi Virtual Storage Platform," on page 19 shows supported Fibre Channel SAN storage with Hitachi Virtual Storage Platform on Hitachi Unified Compute Platform RS.

TABLE 5. SUPPORTED FIBRE CHANNEL SAN STORAGE WITH HITACHI VIRTUAL STORAGE PLATFORM

Storage	Direct Connect	Dedicated	Shared	Sold With	Bolt-on
VSP G200	No	Yes	No	Yes	No
VSP G350, VSP F350	No	Yes	No	Yes	No
VSP G370, VSP F370	No	Yes	No	Yes	No
VSP G400, VSP F400	Yes	Yes	Yes	Yes	Yes
VSP G600, VSP F600	Yes	Yes	Yes	Yes	Yes
VSP G700, VSP F700	Yes	Yes	Yes	Yes	Yes
VSP G900, VSP F900	No	Yes	Yes	Yes	Yes
VSP G1000	No	Yes	Yes	No	Yes
VSP G1500, VSP F1500	No	Yes	Yes	Yes	Yes

Hitachi Unified Compute Platform Advisor Use

All Fibre Channel storage operations are done outside of VMware SDDC Manager, so are not integrated with SDDC Manager. Therefore, those LUNs are not managed by VMware Cloud Foundation. An advantage of a Hitachi Unified Compute Platform RS with Hitachi Virtual Storage Platform configuration is in provisioning and management using Hitachi Unified Compute Platform Advisor. This includes creating, presenting, and removing LUNs and the Fibre Channel or network switch configuration along with lots of other configuration and provisioning options using the Unified Compute Platform Advisor central panel.

Unified Compute Platform Advisor can unregister the LUNs when a host is decommissioned by VMware SDDC Manager. All LUNs presented to that host must to be removed when it decommissioned, either using the Unified Compute Platform Advisor central panel or manually.

When removing LUNs, the existing data is kept on Hitachi Virtual Storage Platform. It will not be deleted and will be accessible by commissioning new hosts and presenting those LUNs to those commissioned hosts.

Network Switches

All listed leaf, spine and management switches in this solution can be replaced by any other VMware vSphere-supported network switches from vendors such as Cisco, Arista, and Extreme.

This reference architecture design is not to maximum scale, but it is well-balanced for a typical enterprise-scale deployment. The choice of switch models in this paper is based on a scale of five racks, each containing 32 dual-ported 10 Gb/s NICs on Hitachi Unified Compute Platform HC. Network speed, inter-rack bandwidth, maximum node per rack, and maximum number of racks may differ with the leaf and spine switch models and the required port configuration.

You can select alternative switches to create a well-balanced building block like the following selection. Also, the building blocks can be expanded to more racks so there is more compute nodes by using larger spine switches with more ports and bandwidth. There is no limit as to how many racks you can have, nodes that can be supported from a hardware perspective. Hitachi Unified Compute Platform RS is limited by VMware maximum specifications.

Solution Components

These are the key software and hardware components used to implement the Hitachi Unified Compute Platform RS solution with VMware Cloud Foundation.

Key Software Components

These are the key software components used in this environment.

VMware Software Components

Use VMware Cloud Foundation to deploy and run a private cloud on top of Hitachi Unified Compute Platform HC with VMware vSAN. It provides an integrated cloud infrastructure (compute, storage, networking and security) and cloud management service to run enterprise applications in private and public cloud environments.

Learn more about VMware Cloud Foundation.

Table 6 shows the VMware Cloud Foundation software stack and versions.

TABLE 6. VMWARE CLOUD FOUNDATION SOFTWARE

Software Component	Version	Build Number
VMware Cloud Builder VM	2.2.00	14866160
VMware SDDC Manager	3.9	14866160
VMware vCenter Appliance	6.7U3	14367737
VMware ESXi	6.7U3	14320388
VMware vSAN	6.7U3	14263135
VMware NSX Data Center for vSphere	6.4.5	13282012
VMware NSX-T Data Center	2.5	14663974
VMware Enterprise PKS	1.5	14878150
VMware vRealize Suite Lifecycle Manager	2.1 Patch 2	14062628
VMware vRealize Log Insight	4.8	13036238
VMware vRealize Log Insight Content Pack for NSX for vSphere	3.9	n/a
VMware vRealize Log Insight Content Pack for Linux	1.0	n/a
VMware vRealize Log Insight Content Pack for vRealize Automation 7.3+	2.2	n/a
VMware vRealize Log Insight Content Pack for vRealize Orchestrator 7.0.1+	2.1	n/a
VMware vRealize Log Insight Content Pack for NSX-T	3.8	n/a
VMware vSAN content pack for Log Insight	2.1	n/a
VMware vRealize Operations Manager	7.5	13165949
VMware vRealize Automation	7.6	13027280
VMware Horizon	7.9.0	13956742

Hitachi Unified Compute Platform Advisor

Hitachi Unified Compute Platform Advisor (UCP Advisor) brings simplified IT administration to virtualized, converged, and hyperconverged systems from Hitachi. UCP Advisor supports guided life-cycle management to the server, network, and storage elements within supported Unified Compute Platform systems.

Figure 14 shows the Unified Compute Platform Advisor dashboard.

Figure 14
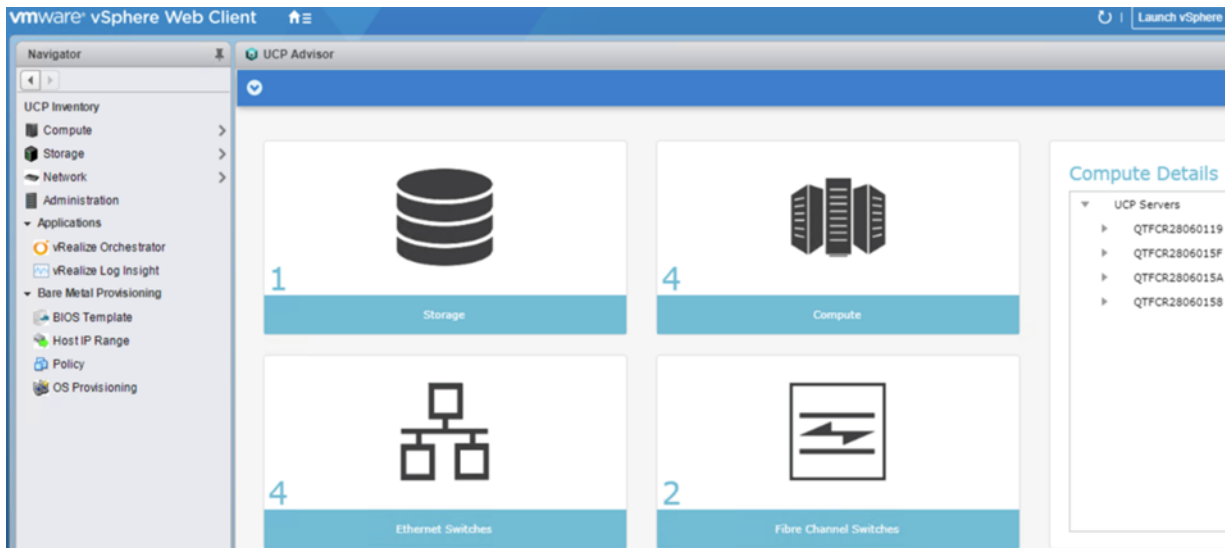
Single instances of Unified Compute Platform Advisor can support all VMware Cloud Foundation workload domains and respective underlying clusters, since Unified Compute Platform Advisor can communicate with multiple VMware vCenter instances.

- The key management and deployment benefits include the following:

- Provides a single management interface for all physical and virtual infrastructure resources.

- Provision and manage physical and virtual storage.

- Manage virtual networking, including synchronization to the physical network switch.

- Deploy and manage physical compute servers.

- Provision onboard storage, compute and network configuration, and import configuration using a single file.

- Automate datastore provisioning (volume creation on storage, zoning, and HBA rescanning).

- Accomplish complex IT operations and workflows, such as smart provisioning and data replication.

- Manage business continuity details with regards to backup and data replication scenarios.

- Ability to view and manage multisite VMware infrastructure and link multiple VMware vCenter Server instances in your Unified Compute Platform RS solution.

- Provides inventory of VMware vSAN, SAN, and local drive information for each compute node.

- Intelligently automate and orchestrate with Hitachi Ops Center Automator. Integration enables IT process automation and smart infrastructure provisioning capabilities. UCP Advisor leverages the available smart provisioning workflows and templates.

Figure 15 shows an example with a detected management domain and two VI workload domains by Hitachi Unified Compute Platform Advisor.

Figure 15
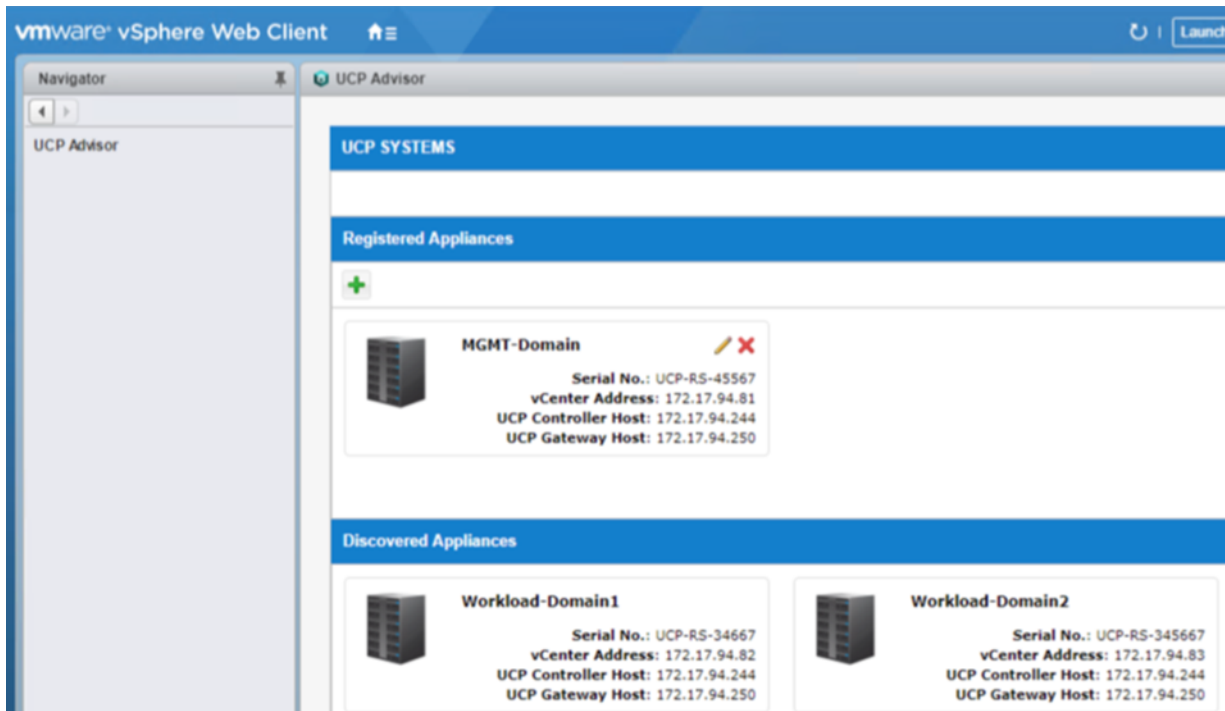
Hardware Components

These are the key hardware components that this solution uses.

- Compute
  - Hitachi Unified Compute Platform HC is an integrated, hyperconverged system for compute

    Hitachi Unified Compute Platform RS supports a mix and match with Hitachi Unified Platform HC.

- Networking
  - Nexus 3048 management switch
  - Cisco Nexus 93180YC-EX LAN switches as leaf switch
  - Cisco Nexus 93180LC-EX LAN switches as spine switch
  - Brocade G620 Fibre Channel SAN switches

- Optional Fibre Channel SAN Storage

  - One Hitachi Virtual Storage Platform G200, VSP G400, VSP F400, VSP G600, VSP F600, VSP G800, VSP F800, VSP G1500, VSP F1500, or VSP 5000

Hitachi Unified Compute Platform HC

Combining compute, storage, and virtualization into a hyperconverged infrastructure, Hitachi Unified Compute Platform HC (UCP HC) answers challenges of growing demands of faster delivery of business services while facing rising costs managing disparate technology resources. Using VMware Virtual SAN with software from Hitachi Vantara, this software-defined storage extends the agility and simplicity of the Hitachi Unified Compute Platform family.

You need minimal IT experience to deploy, configure, and manage Unified Compute Platform HC. Leveraging VMware's core products, your administrators can apply existing VMware knowledge, best practices, and processes.

Unified Compute Platform HC is used as the building block for Hitachi Unified Compute Platform RS. Also, Unified Compute Platform HC offers a broad range of compute and storage components that can be scaled and configured independently to eliminate over-provisioning. Storage can be SSD, hybrid, all flash, or all NVMe. It supports GPUs.

Hitachi Unified Compute Platform HC V120

Hitachi Unified Compute Platform HC V120 is a flexible, scalable, and integrated hyperconverged system that supports a 2-socket, 1U chassis, for software-defined datacenters.

Figure 16 shows Hitachi Unified Compute Platform HC V120 from a front and back view.

Figure 16

Hitachi Unified Compute Platform HC V220

Hitachi Unified Compute Platform HC V220 is a flexible, scalable, and integrated hyperconverged system that supports a 2-socket, 2U chassis.

Hitachi Unified Compute Platform HC V220 is a hybrid solution which has a 12-bay canister. Hitachi Unified Compute Platform HC V220F is 2U all-flash solution which can accommodate up to 24 SSD drives. Both solutions are designed for software-defined datacenters.

Figure 17 shows Hitachi Unified Compute Platform HC V220 from a front and back view.

Figure 17
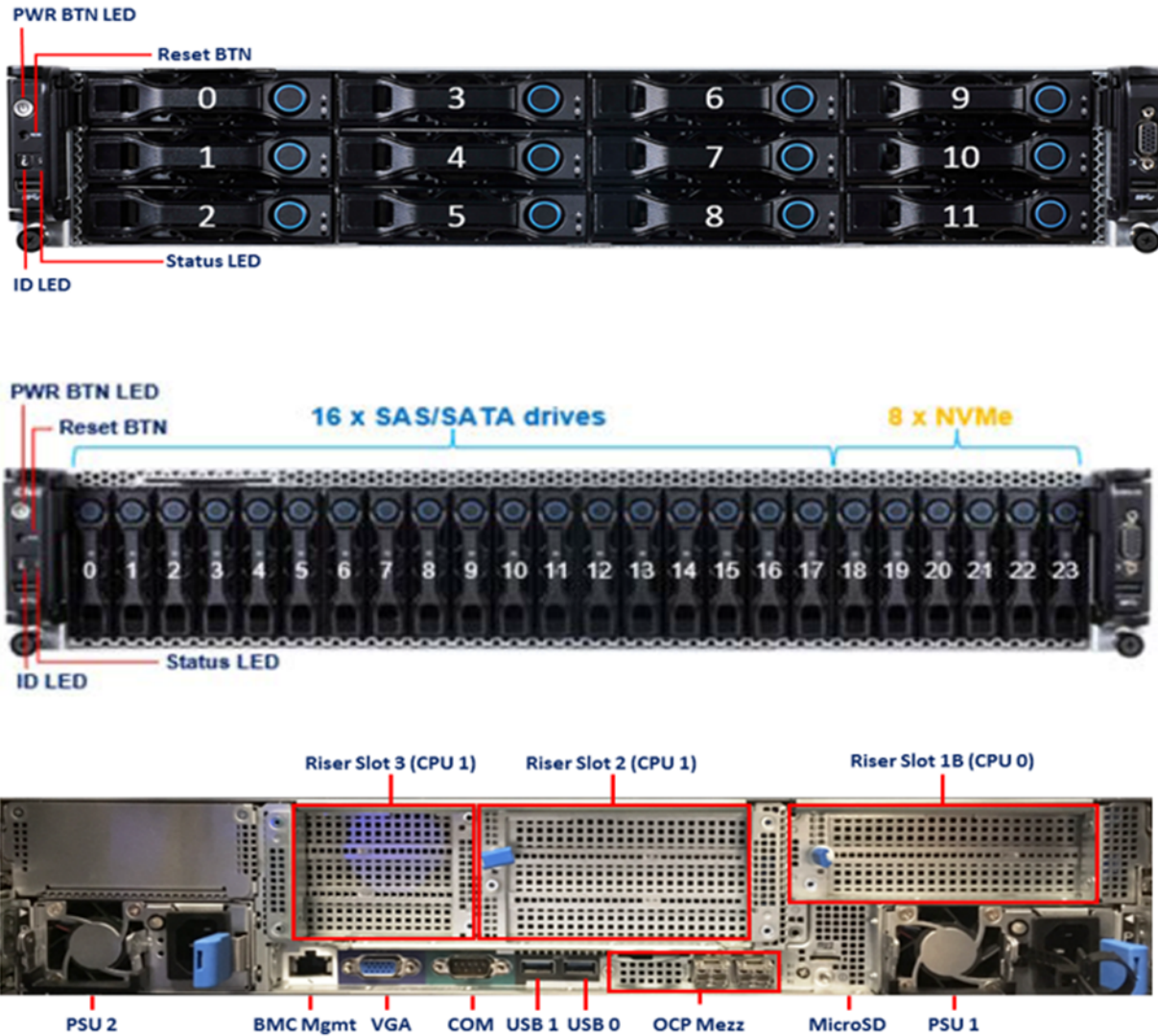
Hitachi Unified Compute Platform HC V225G Series

Hitachi Unified Compute Platform HC V225G is an integrated, hyperconverged system designated to support graphics processors.

You can used as one of the options for a compute node in a Hitachi Unified Compute Platform RS solution, as designed for software-defined datacenters.

Figure 18 shows Hitachi Unified Compute Platform HC V225G from a front and back view.

Figure 18
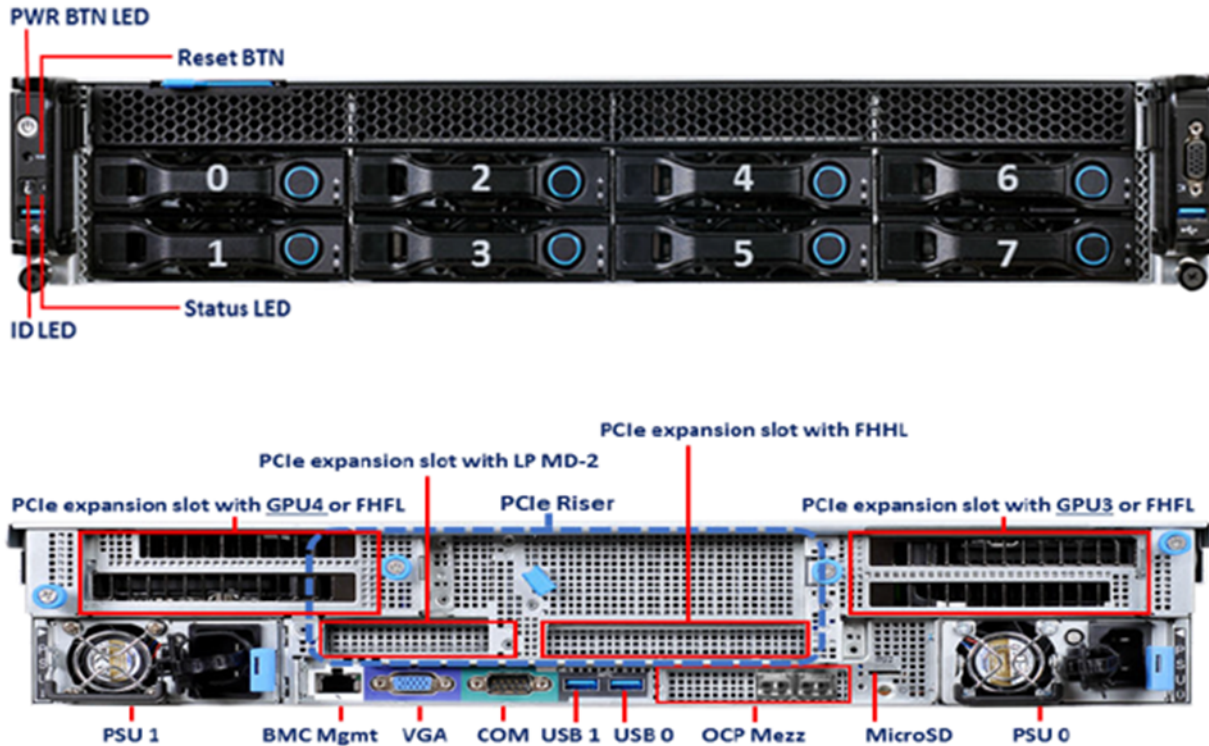
Hitachi Virtual Storage Platform (Optional)

Hitachi Virtual Storage Platform, supported by VMware Cloud Foundation on Hitachi Unified Compute Platform RS, provides more storage layer options if you need to have SAN-based datastores.

Hitachi Virtual Storage Platform F Series Family

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

Hitachi Storage Virtualization Operating System RF is at the heart of the Virtual Storage Platform F series family. It provides storage virtualization, high availability, flash optimized performance, quality of service controls, and advanced data protection. This proven, mature software provides common features, management, and interoperability across the Hitachi portfolio. This means you can reduce migration efforts, consolidate assets, reclaim space, and extend life.

Reduce risks and solve problems faster. Integrated power analytics and automation features bring artificial intelligence to your data center. Cloud-assessible monitoring tools give your product support experts access wherever they have an internet connection for fast troubleshooting and remediation.

Hitachi Virtual Storage Platform G Series Family

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

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

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

Figure 19 shows a Hitachi Virtual Storage Platform.

Figure 19

Network Switches

All listed leaf, spine and management switches in this solution can be replaced by any other VMware vSphere supported network switches from vendors such as Cisco, Arista, and Extreme.

Management Switch

This reference architecture uses [Cisco Nexus 3048TP](#) as its management switch. This is a 1U, 48-port, 1 GbE. It provides out-of-band management connectivity.

Figure 20 shows the Cisco 3048 management switch.

Figure 20

Leaf Switch

This reference architecture uses [Cisco Nexus 93180YC-EX](#) as its leaf switch. This is a 1U, 48-port, 10/25 GbE (downlink), and 6-port 40/100 GbE (uplink) top-of-rack or leaf switch. Use two Cisco Nexus 93180YC-EX switches as leaf switch in each rack.

Figure 21 shows the Cisco 93180YC-EX leaf switch.

Figure 21

Spine Switch

This reference architecture uses [Cisco Nexus 93180LC-EX](#) as its spine switch. This is a 1U with 14-port, 100 GbE (downlink) or 28-port 40 GbE (downlink), and six-port 100 GbE (uplink) spine switch for multiple-rack solutions. Two Cisco Nexus 93180LC-EX switches provide inter-rack connectivity.

Figure 22 shows the Cisco 93180LC-EX spine switch.

Figure 22

Solution Validation

The following VMware feature test cases were run to validate this Hitachi Unified Compute Platform RS solution:

- Create and delete virtual machines.

- Make and delete a clone and snapshot from virtual machines on SAN-based datastores.

- Clone a virtual machine that resides on a VMware vSAN datastore and save it on a Hitachi Virtual Storage Platform datastore.

- Clone a virtual machine residing on Virtual Storage Platform and save it on a VMware vSAN datastore.

- Use VMware vSphere storage vMotion to migrate virtual machines between vSAN datastore and Virtual Storage Platform datastore and reverse

Table 7, "Solution Validation Results," on page 28 shows the test scenarios completed to validate the solution.

TABLE 7. SOLUTION VALIDATION RESULTS

Test Scenarios	VMware vSAN Datastore	Virtual Storage Platform Datastore	Observed Behavior
Create and delete workload domain	Yes	Yes	Workload domain created, deleted successfully
Create and delete cluster	Yes	Yes	Cluster created, deleted successfully
Create and delete virtual machines	Yes	Yes	Virtual machines created, deleted on both datastores successfully
Make and delete clone and snapshot	Yes	Yes	Snapshots created, deleted on both datastores successfully
Clone a virtual machine from a VMware vSAN datastore to Hitachi Virtual Storage Platform datastore	Yes	Yes	Done successfully
Clone a virtual machine from a Virtual Storage Platform datastore to vSAN datastore	Yes	Yes	Done successfully
Migrate virtual machines located on vSAN datastore to Virtual Storage Platform datastore using Storage vMotion	Yes	Yes	Virtual machines migrated from vSAN datastore to Virtual Storage Platform datastore successfully
Migrate virtual machines located on Virtual Storage Platform datastore to vSAN datastore using Storage vMotion	Yes	Yes	Virtual machines migrated from Virtual Storage Platform datastore to vSAN datastore successfully

For More Information

Hitachi Vantara Global Services offers experienced storage consultants, proven methodologies and a comprehensive services portfolio to assist you in implementing Hitachi products and solutions in your environment. For more information, see the [Services](#) website.

Demonstrations and other resources are available for many Hitachi products. To schedule a live demonstration, contact a sales representative or partner. To view on-line informational resources, see the [Resources](#) website.

Hitachi Academy is your education destination to acquire valuable knowledge and skills on Hitachi products and solutions. Our Hitachi Certified Professional program establishes your credibility and increases your value in the IT marketplace. For more information, see the Hitachi Vantana [Training and Certification](#) website.

For more information about Hitachi products and services, contact your sales representative, partner, or visit the [Hitachi Vantara](#) website.

Hitachi Vantara

Corporate Headquarters
2845 Lafayette Street
Santa Clara, CA 95054 USA
www.HitachiVantara.com | community.HitachiVantara.com

Regional Contact Information
USA: 1-800-446-0744
Global: 1-858-547-4526
HitachiVantara.com/contact

MK-SL-181-00. December 2019.