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Hitachi Integrated Systems Solution with VMware Cloud Foundation – A Turnkey Private Cloud Solution Powered by VCF and Hitachi Virtual Storage Platform

Reference Architecture Design and Configuration Guide

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Revision history

Changes	Date
▪ Support for Hitachi Virtual Storage Platform One Block High End. ▪ Support for VCF 9. ▪ Support for UCP Advisor 4.8.	November 2025
▪ Initial release.	August 2025

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Executive summary

The Hitachi Integrated Systems solution with VMware Cloud Foundation (VCF), is an engineered solution by Hitachi Vantara that delivers a turnkey out-of-box on-prem cloud experience, combining the scale and agility of public cloud with the security, resiliency, and performance of private cloud, across any workload types and their respective SLAs. The entire stack, including compute and storage components, is certified on the Broadcom Compatibility Guide to support the latest and greatest version of VCF and its sub-components, such as vSphere, thanks to our elaborate involvement and commitment in the Technology Alliance Partner (TAP) program.

Use this design and configuration guide to bring up your Hitachi Integrated Systems solution with VCF, which includes the following:

- Hitachi Integrated Systems

- VMware Cloud Foundation

- Hitachi UCP Advisor

- Hitachi Virtual Storage Platform One Block

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. While moving some workloads to the public cloud is common practice, enterprise workloads, including business-critical and mission-critical applications, are untouchable and reign supreme on-premises. 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 has addressed these on-premises challenges by introducing an engineered solution for VMware Cloud Foundation (VCF). The purpose of this engineered solution is to bring value to our mutual customers through reduced time-to-value (TTV), reduced total cost of ownership (TCO), increased agility, and enterprise-grade security and compliance. This is achieved by aligning the Hitachi Integrated Systems design with VCF best practices according to VMware Validated Solutions (VVS) specifications, delivering Hitachi and VMware firmware and software updates in a unified approach while streamlining the lifecycle management experience for updating critical components, providing monitoring of these critical components across the full stack, and automating key operational tasks to maximize consistency and increase IT agility.

Our solution helps you run all virtualized workloads and business applications. Ordered as a single quote with the full hardware BOM (plus UCP Advisor software), and with its pre-validated, pre-built, and pre-assembled stack of compute, storage, and networking components, the solution delivers a hybrid cloud environment with predictable high performance, resiliency, and reliability. Customers provide their own VMware Cloud Foundation subscription entitlements.

Coupled with a tightly integrated software architecture that enables full-stack deployment, operations, management, orchestration, monitoring, diagnostics, support, and lifecycle management, Hitachi Integrated Systems solution with VCF is the simplest and most reliable path to private cloud, transforming a traditional data center into a modernized software-defined data center without the pain of dealing with long project delays and cost overruns.

In addition, VCF 9.0.1 introduces native first class support for Fibre Channel-based VMFS storage, allowing organizations to do the following:

- Leverage existing SAN investments.

- Avoid rearchitecting storage for vSAN.

- Achieve high throughput and low latency (earlier VCF implementations only leverage VMware vSAN as the sole software-defined storage option).

Hitachi Vantara has optimized its VCF solution by natively integrating its enterprise-grade Virtual Storage Platform (VSP) SAN storage into the management framework and across the data plane to achieve the highest level of performance and availability, and the most efficient capacity utilization. This unique differentiator provides the flexibility of using the right storage platform for each individual workload being deployed in your hybrid cloud, to meet your business needs and service level objectives (SLOs).

Finally, our Global Support and Services team provides comprehensive support for Full Stack software and hardware under the umbrella of One Support.

Solution overview

Gone are the days of just having DIY private clouds with multi-tier Lego blocks plagued with inconsistencies and project delays. Hitachi Integrated Systems solution with VMware Cloud Foundation is a true turnkey on-prem cloud solution, delivering an unprecedented out-of-box cloud experience, combining the scale and agility of public cloud with the security, resiliency, and performance of private cloud.

This solution integrates VMware Cloud Foundation (VCF) with Hitachi infrastructure and Hitachi software. At the heart lies Hitachi UCP Advisor, which provides unified and federated management of compute, network, and storage devices. Hitachi UCP Advisor seamlessly integrates software and hardware infrastructure life cycle automation and observability.

UCP Advisor with VMware SDDC Manager automates provisioning, management, and lifecycle management of software and hardware across Intel/AMD compute, Broadcom/Cisco networking, NVIDIA GPUs and supported Hitachi Virtual Storage Platform (VSP) models, on Hitachi Integrated Systems solution with VMware Cloud Foundation, and existing/legacy platforms (such as UCP RS). Provisioning new VMFS datastores from VSP is done as easily and as quickly as using a vSAN datastore, because UCP Advisor can manage Fibre Channel fabrics and host groups, as well as the VSP storage resources.

When dealing with large scale automation, this solution manages vSphere and Kubernetes clusters reliably within workload domains hosting thousands of virtual machines, and containers powering current and modern workloads. This is achieved through the UCP Advisor REST API, the SDDC Manager API, and the use of the VMware APIs for Storage Awareness (VASA, with supported VSP models. Hitachi Storage (VASA) Provider for VMware vCenter, or Hitachi VASA Provider, enables software-defined storage integration into the VMware Storage Policy-Based Management (SPBM) framework, to automate VM storage placement. Starting with VCF 9.0.1, SDDC Manager no longer supports vVol datastore creation during workload domain deployment. Instead, storage provisioning and VM placement are streamlined through VMFS and vSAN integrations, ensuring a consistent experience across Fibre Channel and hyperconverged environments.

Hitachi Integrated Systems solution with VMware Cloud Foundation

The Hitachi Integrated Systems solution with VCF has automation that enables the deployment of an entire cloud infrastructure in hours, not weeks or months, accelerating the time to value with a rapid and repeatable deployment process across all of your datacenter sites. After it is deployed, the integrated management plane provides the following automated, policy-based IT operations:

- Move your workload across data centers to meet changing business needs.

- Manage your applications across private and public cloud from a common toolset to simplify operations.

- Scale your data center without increasing IT headcount.

- Automate your data center with policies to run IT at the speed of your business.

- Automate software-defined storage deployment with both VMware vSAN and VSP One Block.

- Automate software-defined networking deployment with VMware NSX.

The following figure shows the combination of the Hitachi Integrated Systems platform with the VMware Cloud Foundation stack.
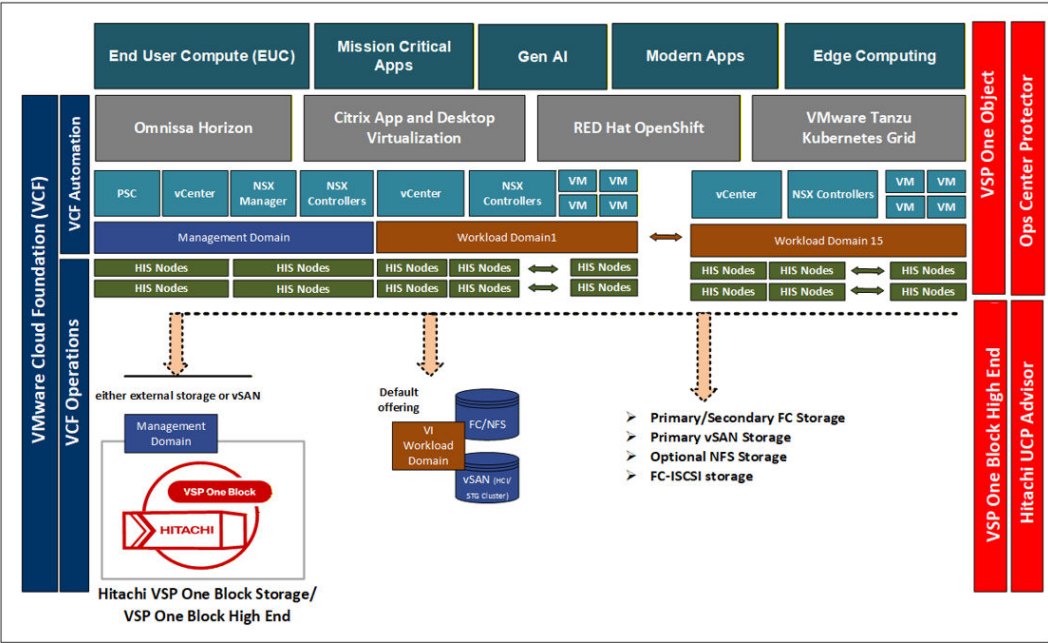
Solution benefits

Hitachi Integrated Systems solution with VMware Cloud Foundation provides the following advancements and benefits:

- Deploy private cloud on top of Hitachi Integrated Systems, available with a wide range of CPU, memory, and drive configurations to meet your workload needs, provide flexibility, and simplify growth.

- Accelerate time to market.

- Lower total cost of ownership.

- Increased security with tight integration into vSphere Lifecycle Manager (vLCM) to ensure that the latest firmware for EFI and IO Cards are consistently applied, alongside latest drivers and ESXi patch binaries, to reduce the risk of cyberattacks.

- Enhanced Data Protection capabilities using VMware Live Site Recovery (VLSR) with Universal Replicator (UR)/TrueCopy® (TC) on VSP storage, enabling disaster recovery automation between two sites with a Recovery Point Objective (RPO) below 5 minutes (VLSR Protected VM add-on subscription required).

- Enhanced High Availability (HA) with VSP global-active device for enterprise-grade stretched clusters between two metropolitan-spanned datacenters running Hitachi Integrated Systems.

- Optimal Multiple Availability Domain (HA) topology via 3-datacenter (3DC) multi-site protection when combining global-active device across a pair of metro-clustered sites with UR/TC on a third site.

- Enhanced Ransomware Recovery with VSP immutable snapshots and Thin Image Advanced (available on VSP One Block storage options), and using VLSR Ransomware Recovery and Cloud Disaster Recovery features (VLSR Capacity add-on subscription required).

- 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 UCP 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 Virtual Storage Platform with hybrid and all-flash arrays.

Hitachi UCP 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 switches 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.

Solution components

These are the key hardware and software components used in this solution.

Hardware components

These are the key hardware components that this solution uses.

Compute

Hitachi Server Model	Chassis	Cache	Capacity
Hitachi Advanced Server HA805 G3	1U	SAS	SATA
Hitachi Advanced Server HA810 G3	1U	SAS, SATA, NVME	SAS, SATA, NVME
Hitachi Advanced Server HA815 G3	1U	NVME	NVME
Hitachi Advanced Server HA820 G3	2U	SAS, SATA, NVME	SAS, SATA, NVME
Hitachi Advanced Server HA825 G3	2U	NVME	NVME

See the following links for the latest node details.

- Broadcom Compatibility Guide - vsanosa

- Broadcom Compatibility Guide - vsanesa

Available Fibre Channel SAN storage options

- Hitachi Virtual Storage Platform One Block (VSP One Block 24, VSP One Block 26, VSP One Block 28), Hitachi Virtual Storage Platform One Block High End (VSP One Block High End)

- Hitachi Virtual Storage Platform 5000 series

- Hitachi Virtual Storage Platform E1090

Hitachi Virtual Storage Platform

Hitachi Virtual Storage Platform is a highly scalable, true enterprise-class storage system that can virtualize external storage and provide virtual partitioning and quality of service for diverse workload consolidation. With the industry's only 100 percent data availability guarantee, Virtual Storage Platform delivers the highest uptime and flexibility for your block-level storage needs.

Hitachi Virtual Storage Platform can be integrated with VMware Cloud Foundation with the following options:

- Management Workload Domain + (VCF 9.0.1 introduces native support for Fibre Channel-based VMFS storage, allowing organizations to leverage existing SAN investments, avoid rearchitecting storage for vSAN, and achieve high throughput and low latency).

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- VI Workload Domain + Hitachi offered storage (using Fibre Channel, iSCSI, FC-NVMe, NFS)/vSAN.

> 📄 **Note:** For more information about configuring storage for iSCSI and FC-NVMe, see and .

It can even go further, using Virtual Storage Platform as the principal 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.

Hitachi Integrated Systems solution with VMware Cloud Foundation is the only Technical Alliance Partner (TAP) engineered solution that supports native Fibre Channel, iSCSI, and NVMeoFC SAN storage with the built-in Virtual Storage Platform (VSP), thanks to our tight integration into the VMware Cloud Foundation (VCF) management and operations layer, Storage Policy-based Management (SPBM), vSphere Lifecycle Manager (vLCM), VMware Live Site Recovery (VLSR) , and vCenter. Notably, UCP Advisor greatly simplifies storage operations tasks by automating the workflows to connect vSphere cluster nodes from a given VCF Workload Domain to VSP storage (such as a VMFS-FC datastore), while also managing Brocade G620/720 Fibre Channel switch configuration tasks such as FC Zoning to ensure proper data path isolation from other workload domains and ensure best practices for IO multi-pathing! UCP Advisor will guide you in the process to carve out the LUNs from the VSP and present them to the correct compute nodes (grouped as vSphere DRS cluster) in the respective workload domain.

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

The following table shows supported Fibre Channel SAN storage with Hitachi Virtual Storage Platform on the Hitachi Integrated Systems solution with VMware Cloud Foundation.

Storage	Direct Connect	Dedicated	Sold With Hitachi Integrated Systems
Hitachi Virtual Storage Platform One Block High End	Yes	Yes	Yes
Hitachi Virtual Storage Platform One Block	Yes	Yes	Yes
Hitachi Virtual Storage Platform 5000 series	Yes	Yes	Yes
Hitachi Virtual Storage Platform E1090	Yes	Yes	Yes

Hitachi Virtual Storage Platform One Block High End

Hitachi Virtual Storage Platform One Block High End (VSP One Block High End) all-flash NVMe block storage systems deliver ultra-fast, highly reliable, and scalable data access for the most demanding enterprise applications.

Powered by Hitachi-engineered technology, they offer eight nines of availability, next generation connectivity, comprehensive easy-to-use managemen, and seamless workload consolidation across open systems and mainframes. With end-to-end NVMe and best-in-class data reduction, VSP One Block High End greatly enhances performance, scale and resilience in a simple, secure, sustainable way.

VSP One Block High End supports 2, 4, or 6-node configurations, with 4 controllers per system.

It has eight nines of system uptime and supports 32G, 64G (a maximum of 64 Fibre Channel ports), 100G NVMe/TCP (a maximum of 32 ports). It also supports DDP, RAID6, RAID5, and RAID1 configurations with a 100% data guarantee.

Hitachi Virtual Storage Platform One Block

Hitachi Virtual Storage Platform One Block is a high-performance storage solution designed for enterprises. It combines robust features with scalability and reliability. Hitachi Virtual Storage Platform One Block streamlines data management, reduces carbon emissions, and makes everything clear. It simplifies data in the cloud era. Hitachi Virtual Storage Platform One Block exclusively combines a common data plane, a common control plane and now a common data fabric for applications to consume on one platform.

The legendary reliability of Hitachi Vantara products for mission-critical, enterprise-class workloads is made possible by patented technologies, including global-active device for active-active clustering across storage in two distant locations, ensuring continuous data availability even during catastrophic events.

Hitachi Virtual Storage Platform Thin Image Advanced snapshots create instant point-in-time copies for data protection, application testing, and data mining. Thin Image Advanced snapshots store only the changed data, so the storage capacity required for each snapshot copy is significantly reduced. Thin Image Advanced eliminates threat exposure with always-available copies of production data and actively defends structured data against ransomware.

Hitachi Virtual Storage Platform supports Adaptive Data Reduction (ADR), which increases effective capacity without slowing storage performance. VSP One Block continuously analyzes data during writes and selects and switches between real-time and deferred processing for data reduction.

Hitachi Virtual Storage Platform 5000 Series

Hitachi Virtual Storage Platform 5000 series provides high performance, high availability, and reliability for enterprise-class data centers and features the industry's most comprehensive suite of local and remote data protection capabilities, including true active-active metro-clustering. When combined with server virtualization, storage virtualization supports applications at cloud scale while reducing complexity.

Hitachi Virtual Storage Platform 5000 series is the first storage in the industry to offer a mixed NVMe, SCM solid-state disk (SSD), serial-attached SCSI (SAS) SSD, and HDD environment that can not only scale up in capacity but also scale out for performance. Hitachi Virtual Storage Platform 5000 series models include the industry leading Hitachi Virtual Storage Platform 5100 and Hitachi Virtual Storage Platform 5500 models and the newest Hitachi Virtual Storage Platform 5200 and Hitachi Virtual Storage Platform 5600 models.

Hitachi Virtual Storage Platform E1090 series

The Hitachi Virtual Storage Platform E1090 (VSP E1090) storage system is a high-performance, large-capacity data storage system. The VSP E1090 all-flash arrays (AFAs) support NVMe and SAS solid-state drives (SSDs). The VSP E1090H hybrid models can be configured with both SSDs and hard disk drives (HDDs).

The hybrid architecture allows for greater scalability and provides data-in-place migration support. The storage systems offer superior performance, resiliency, and agility, featuring response times as low as 41μ, all backed up with the industry's first and most comprehensive 100% data availability guarantee.

The Hitachi Virtual Storage Platform E series innovative active-active controller architecture protects your business against local faults while mitigating performance issues as well as providing all enterprise features of the VSP 5000 series in a lower cost form factor to satisfy midrange customer needs and business requirements.

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 design guide is not to maximum scale, but it is well-balanced for a typical enterprise-scale deployment. The choice of switch models is based on a scale of five racks, each containing 32 dual-ported 10 Gbps NICs. 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 switches to create a well-balanced building block. Also, the building blocks can be expanded to more racks so there are more compute nodes by using larger spine switches with more ports and bandwidth. There is no limit to how many racks you can have and nodes that can be supported from a hardware perspective. The solution is only limited by VMware maximum specifications. See https://docs.vmware.com/en/VMware-Cloud-Foundation/index.html to learn more about VMware Cloud Foundation.

- Cisco Nexus switches

  The Cisco Nexus switch product line provides a series of solutions that make it easier to connect and manage disparate data center resources with 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.
  The following network switches are used in this solution:

  - Nexus 92348GC (1 G Mgmt) management switch

  - Cisco Nexus 93180YC-FX (10/25G) leaf switch

  - Cisco Nexus 9332C (100G) Spine Switch

  - Cisco Nexus 93180YC-FX3 (10/25G) leaf switch

  - Cisco Nexus 93600GC (100G) spine switch

  - Cisco Nexus 93600CD-GX (100G) spine 10/25G or leaf 100G switch

  - Cisco Nexus 9316D-GX (400G) spine switch

  - Cisco Nexus 93180YC-FX3H (10/25G) leaf switch

  - Cisco Nexus92348GC-FX3 management switch

- 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 generation 64 Gbps 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 needs grow.
  The following storage network switches are used in this solution:

  - Brocade G620 Fibre Channel SAN switches

  - Brocade G720 Fibre Channel SAN switches

Software components

These are the key software components used in this environment.

Use VMware Cloud Foundation to deploy and run a private cloud on top of Hitachi Integrated Systems solution with VMware Cloud Foundation. 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.

See https://docs.vmware.com/en/VMware-Cloud-Foundation/index.html to learn more about VMware Cloud Foundation.

The following table shows the software stack and versions including VCF and UCP Advisor.

Software Component	Version	Build Number
VCF Installer*	9.0.1.0	24962180
VMware ESX	9.0.1.0	24957456
VMware vCenter	9.0.1.0	24957454
VMware vSAN ESA Witness	9.0.1.0	24957987
VMware vSAN File Services	9.0.1.0	24957456
VMware vSAN OSA Witness	9.0.1.0	24957988
VMware NSX	9.0.1.0	24952111
SDDC Manager	9.0.1.0	24962180
VMware Cloud Foundation Operations	9.0.1.0	24960351
VMware Cloud Foundation Operations orchestrator	9.0.1.0	24923009
VMware Cloud Foundation Operations collector	9.0.1.0	24960349
VMware Cloud Foundation Operations fleet management	9.0.1.0	24960371
VMware Cloud Foundation Operations for logs	9.0.1.0	24960345
VMware Cloud Foundation Operations for networks	9.0.1.0	24950933
VMware Cloud Foundation Operations HCX	9.0.1.0	24972592
VMware Cloud Foundation Automation	9.0.1.0	24965341
VMware vSphere Supervisor	9.0.1.0	24953340
Hitachi Unified Compute Advisor	4.8.0	NA

See the following for the latest software and hardware versions.
Hitachi_Integrated_Systems_for_Broadcom (VMware)_Interoperability_Matrix

VMware Cloud Foundation

VCF 9.0: VCF delivers a fully integrated software-defined data center (SDDC) platform that includes core infrastructure virtualization components—VMware vSphere, vSAN, and NSXalongside centralized lifecycle management with SDDC Manager. It also integrates with VCF Automation, VCF Operations, and VCF Operations for logs, enabling consistent hybrid cloud infrastructure across private and public environments.

VMware Cloud Foundation components

- VMware Cloud Foundation (VCF) Installer: The VMware Cloud Foundation (VCF) Installer is a purpose-built tool designed to automate the deployment of the management domain in a VCF environment. It simplifies the initial setup by validating hardware and network configurations, installing core infrastructure components such as ESXi, vCenter Server, NSX, and configuring SDDC Manager. The installer uses a predefined JSON configuration file and can be run from a jump host via a graphical or command-line interface. By streamlining these critical steps, the VCF Installer ensures a consistent and reliable foundation for managing workload domains and lifecycle operations across the software-defined data center.

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- SDDC Manager: SDDC Manager is the centralized automation and orchestration engine for VMware Cloud Foundation. It manages the deployment, configuration, and lifecycle operations of core infrastructure components such as vCenter Server, NSX, and the VMware Cloud Foundation management and operations.. It enables the creation and management of multiple Workload Domains, each representing a distinct set of clusters with dedicated resources and policies.

- vSphere: vSphere uses virtualization to transform individual data centers into aggregated computing infrastructures that include CPU, storage, and networking resources. VMware vSphere manages these infrastructures as a unified operating environment and provides you with the tools to administer the data centers that participate in that environment.

- vSAN: Aggregates local data storage devices to create a shared storage pool across all hosts in the vSAN cluster, simplifying storage configuration and virtual machine provisioning. Using vSAN removes the need for external shared storage and simplifies storage configuration and virtual machine provisioning.

- vSAN Witness Appliance (ESA and OSA): The vSAN Witness Appliance functions as a dedicated witness host for vSAN stretched and two-node clusters. Unlike a general-purpose ESXi host, it does not run virtual machines. Its primary role is to maintain cluster quorum by storing metadata and acting as a tiebreaker during site or node failures, ensuring data integrity and availability across geographically distributed environments.

- NSX: NSX is focused on providing networking, security, automation, and operational simplicity for emerging application frameworks and architectures.

- VCF Operations: VMware Cloud Foundation (VCF) operations in version 9.0 are centered around delivering consistent, automated, and secure lifecycle management across the entire software-defined data center stack. Using SDDC Manager, administrators can deploy, configure, patch, and upgrade core components such as vSphere, vSAN, NSX, and the VMware Cloud Foundation management and operations. with minimal manual intervention. VCF operations also support workload domain management, monitoring, and policy enforcement, enabling scalable multi-domain environments. With integrated tools for automation, observability, and log analytics, VCF 9.0 ensures streamlined operations across private and hybrid cloud infrastructures, reducing complexity and improving operational efficiency.

- VCF Automation: VMware Cloud Foundation (VCF) Automation in version 9.0 is designed to simplify and accelerate the deployment and management of software-defined data center infrastructure. At the core of this automation is SDDC Manager, which orchestrates the provisioning, configuration, and lifecycle management of vSphere, vSAN, NSX, and VMware VMware Cloud Foundation management and operations components. VCF automation enables consistent creation of workload domains, policy-based governance, and seamless integration with tools such as VMware Cloud Foundation management and operations for infrastructure-as-code and self-service provisioning. This unified automation framework helps reduce operational overhead, enforce best practices, and deliver scalable hybrid cloud environments with minimal manual intervention.

See the [VMware Cloud Foundation 9.0 Release Notes](#) for a list of relevant components and additional information.

vSAN Express Storage Architecture (ESA) in VMware Cloud Foundation

vSAN ESA is an advanced, optional architecture within VMware vSAN, introduced to deliver breakthrough levels of performance, scalability, and operational efficiency. Optimized for modern hardware, ESA leverages certified high-performance NVMe devices and eliminates traditional disk group constructs, resulting in simplified management and smaller failure domains. With storage policy-based compression, ESA achieves up to 4x better compression ratios per 4KB block compared to the Original Storage Architecture (OSA). Integrated into VCF 9.0, vSAN ESA enhances the storage layer by unlocking new capabilities and delivering superior performance for demanding workloads across hybrid cloud environments.
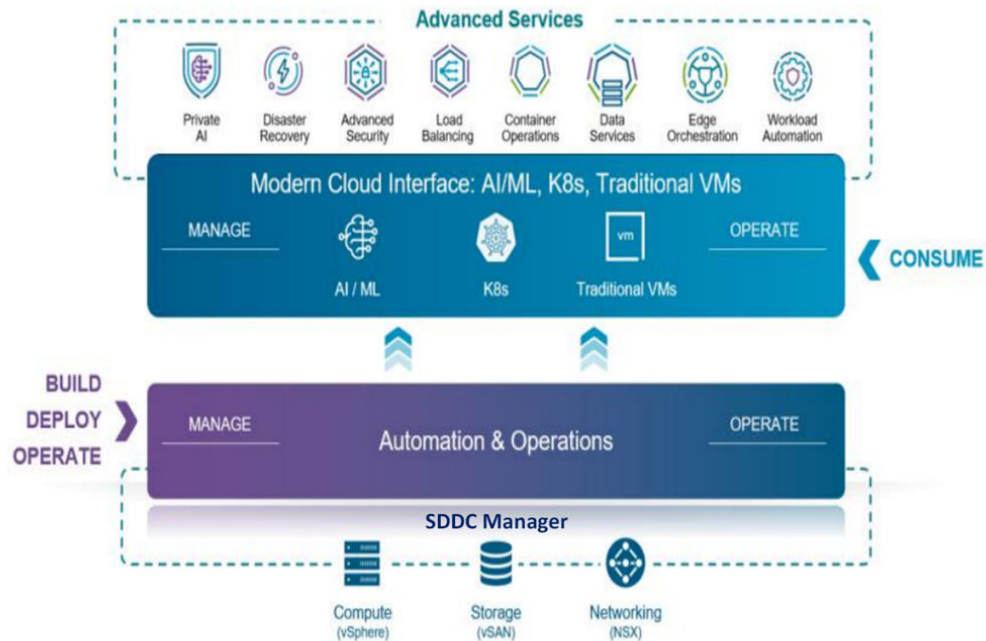
VMware Cloud Foundation Workload Domains

VMware Cloud Foundation organizes compute, storage, and network resources into logical units called Workload Domains. These include the Management Workload Domain, which hosts core infrastructure services such as vCenter Server, NSX, SDDC Manager, and VMware Cloud Foundation management and operations components, and Virtual Infrastructure (VI) Workload Domains, which are dedicated to running user workloads.

Management and VI Workload Domains are isolated to ensure security, operational flexibility, and fault containment. Each VI Workload Domain includes its own vCenter Server instance and can be configured with various storage options including vSAN (ESA or OSA), NFS, VMFS on Fibre Channel. VI Workload Domains now support enhanced deployment flexibility using vLCM images, which offer declarative lifecycle management, or traditional baselines, depending on operational requirements.

NSX deployment within VI Workload Domains can either reuse an existing NSX Manager cluster from the management domain or deploy a dedicated NSX instance per domain. This modular approach allows organizations to scale infrastructure while maintaining consistent governance and isolation across domains.

The following figure shows the standard architecture of VMware Cloud Foundation.

The following figures show the storage options for VMware Cloud Foundation Workload Domains.
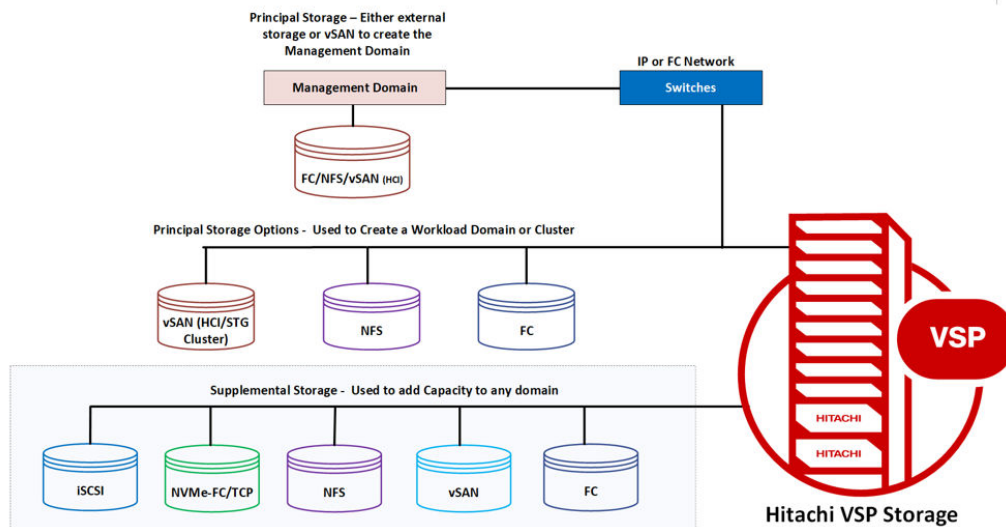
Hitachi UCP Advisor and VMware Cloud Foundation

Hitachi UCP Advisor is a comprehensive cloud infrastructure management and automation software. It enables IT agility and simplifies Day 0-N operations for edge, core, and cloud environments. Specifically, UCP Advisor integrates with VMware vSphere Lifecycle Manager (vLCM), serving as infrastructure automation and management software for all Hitachi Converged, Hyperconverged (HCI), and Integrated Systems. This integration streamlines operations and enhances visibility across your hybrid and private cloud infrastructure.

The centralized management plane enables remote, federated management for the entire portfolio of converged, hyperconverged, and storage data center infrastructure solutions to improve operational efficiency and reduce management complexity. Its intelligent automation services accelerate infrastructure deployment and configuration, significantly minimizing deployment risk and reducing provisioning time and complexity, automating hundreds of mandatory tasks.

UCP Advisor improves predictability with guided lifecycle management capabilities for the complete data center infrastructure stack, including servers and switches from Arista, Brocade, and Cisco, and non-disruptively patches and upgrades infrastructure. It provides deep integration with VMware management software, improving administrator productivity with intuitive and intelligent operations and automation. It complements VMware Cloud Foundation management and operations to further streamline the administration and automation of software-defined data center (SDDC).

Automated workflows enhance IT agility through UCP Advisor REST APIs integrated with VMware Cloud Foundation Operations for Logs and VMware Cloud Foundation Operations for Compute. When combined with VMware Cloud Foundation management and operations, these workflows enable self-service provisioning across multi-cloud environments. This integration provides comprehensive observability and monitoring of the infrastructure, offering unified insights into system health and operational efficiency. The solution automates network configuration tasks, system monitoring, and compliance reporting, streamlining operations. Customers gain direct access to all SDDC component management using VMware Cloud Foundation management and operations, including Automation Config, Operations for Networks, and VMware Cloud Foundation (VCF) management and operations layer. UCP Advisor integration with VMware Cloud Foundation Operations delivers advanced log analytics and auditability, enabling deep visibility into infrastructure performance and supporting proactive resource planning.

Hitachi UCP Advisor provides a single control panel to manage crucial tasks and many other useful capabilities.

The following figure shows the architecture diagram of Hitachi UCP Advisor.
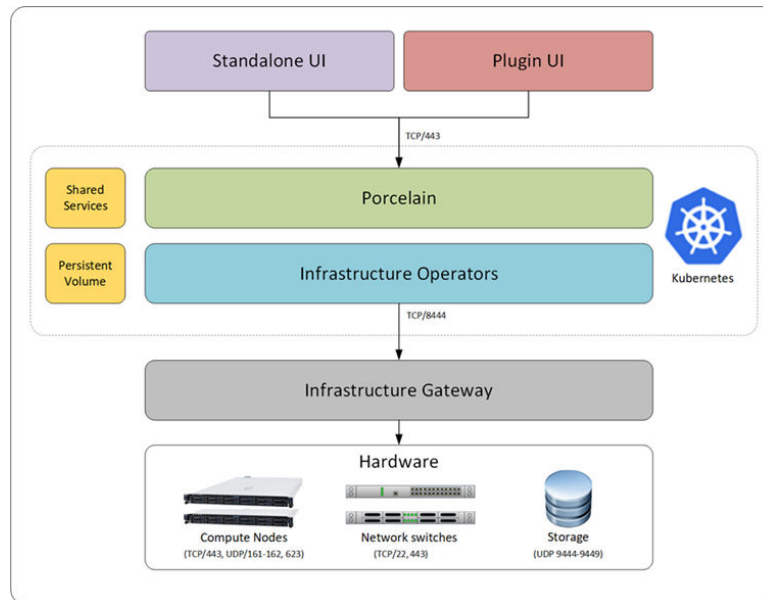
Single instances of UCP Advisor can support all VMware Cloud Foundation Workload Domains and respective underlying clusters because UCP Advisor can communicate with multiple VMware vCenter instances.

The key management and deployment benefits include the following:

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

- Provisions and manages physical and virtual storage.

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

- Deploys and manages physical compute servers.

- Provisions onboard storage, compute and network configuration, and imports configurations using a single file.

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

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

- Manages business continuity details regarding backup and data replication scenarios.

- Enables the ability to view and manage multisite VMware infrastructure and link multiple VMware vCenter Server instances in the solution.

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

- Intelligently automates and orchestrates provisioning 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.

UCP Advisor deployment and configuration

UCP Advisor uses the following remote gateway virtual machine. The following table lists the virtual machine resource requirements.

Resource	Minimum requirement
Operating system	Oracle Linux 8.10
RAM	Minimum: 16 GB Recommended: 24 GB
CPU	Physical CPU Minimum: 8 cores Recommended: 12 cores
Disk	Minimum 250 GB (thin-provisioned disk) Verify that `/directory` has 110 GB or more of free space and that `/var` has 100 GB of free space or more.
Network	1 vNIC (connect to Management VLAN VMXNET3)
Supported virtualization host	ESXi 7.0.2 or later

UCP Advisor VM deployment

The following table lists UCP Advisor resource requirements.

| Resource	Minimum Requirements
Operating system	Oracle Linux 8.10
RAM	32 GB or more
CPU	Minimum: 8 cores Recommended: 16 cores
Disk	Two thin-provisioned disks of 700 GB and 200 GB respectively. Create the following partitions on the 700 GB disk: ▪ `/boot` with 2 GB ▪ `/boot/efi` with 1 GB ▪ `/root` with 656 GB

Resource	Minimum Requirements
	▪ `/home` with 40 GB ▪ `swap` with 1 GB 📄 **Note:** Verify that the `/boot`, `/root`, and `/home` partitions use the `xfs` file system.
Free Disk Space	▪ 400 GB under the / (root) directory ▪ 300 GB under the `/var` directory ▪ 200 GB to create LVM snapshots.
Network	1 vNIC (connect to Management VLAN VMXNET3)
Supported virtualization host	ESXi 7.0.2 or later

Use this procedure to deploy UCP Advisor VMs in vCenter under the management cluster of a VMware Cloud Foundation Management Domain.

Procedure

1. Deploy the UCP Advisor ova.
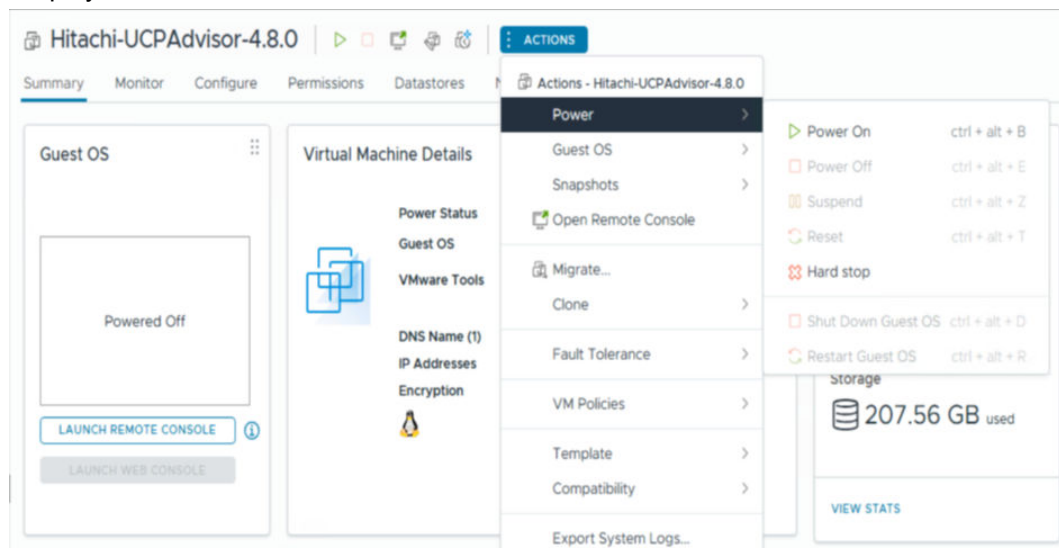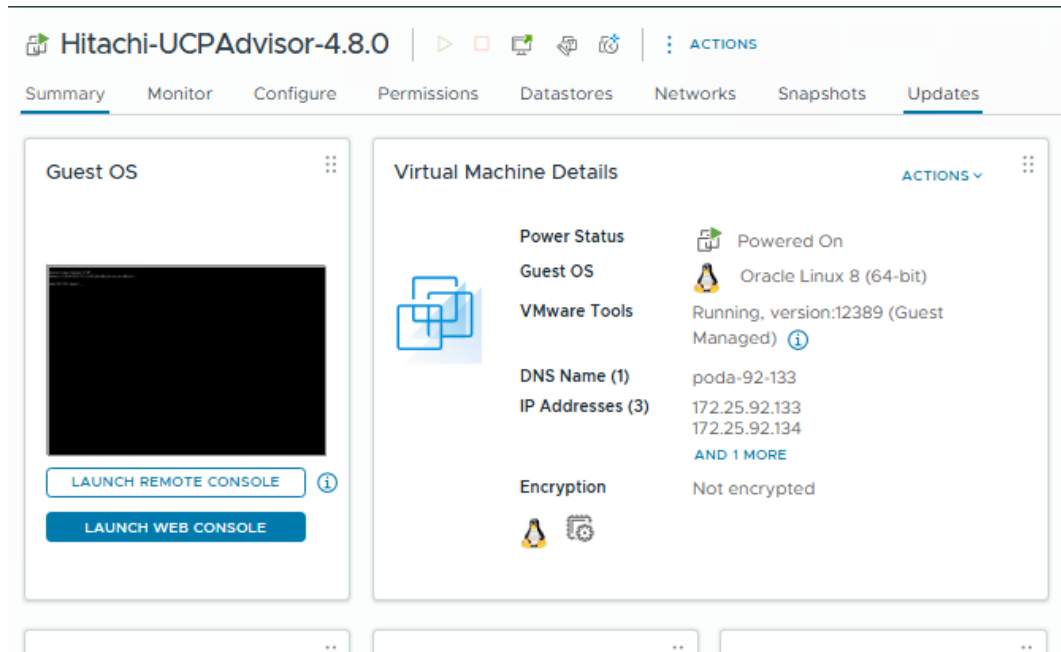
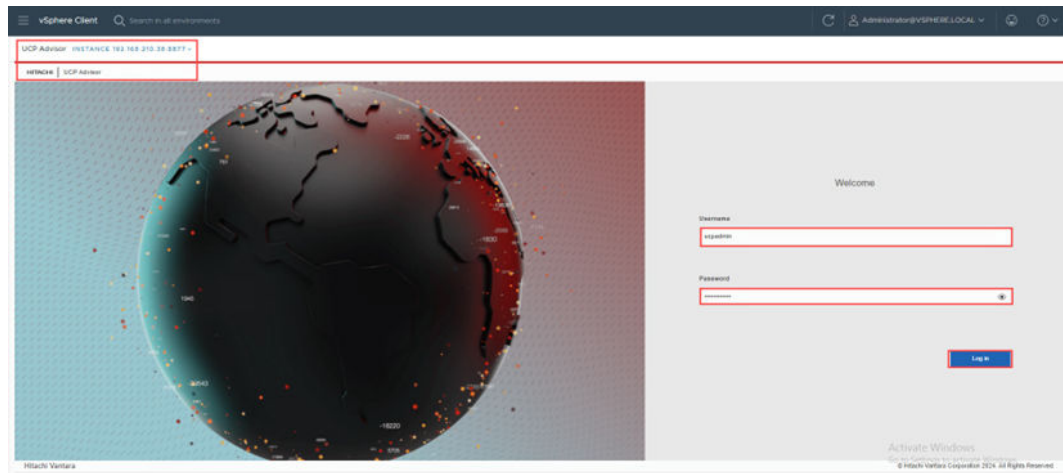2. After the UCP Advisor VM is deployed, log in to the VM and run the installer with the specified command.

The following illustration shows the UCP Advisor dashboard.
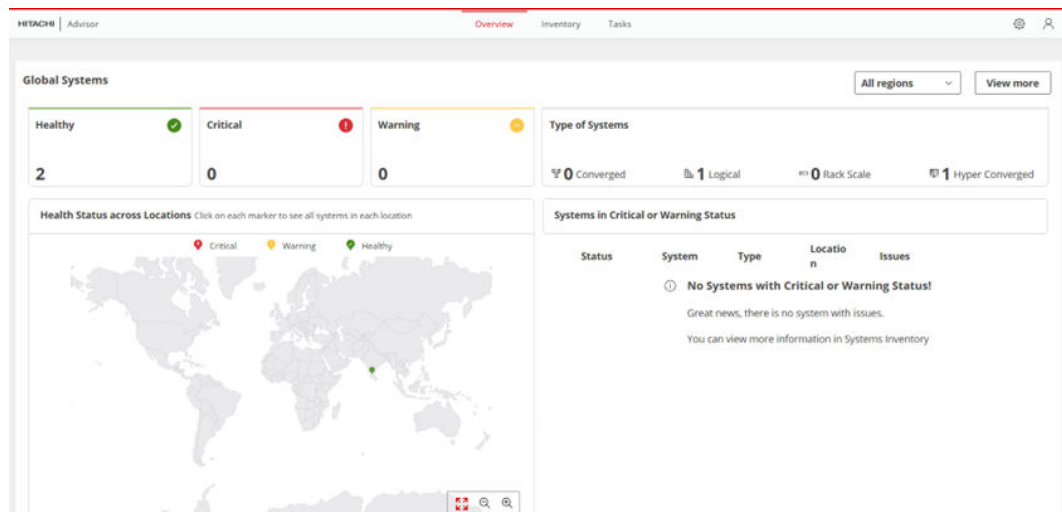
The following illustration shows how to log in to UCP Advisor from vCenter.
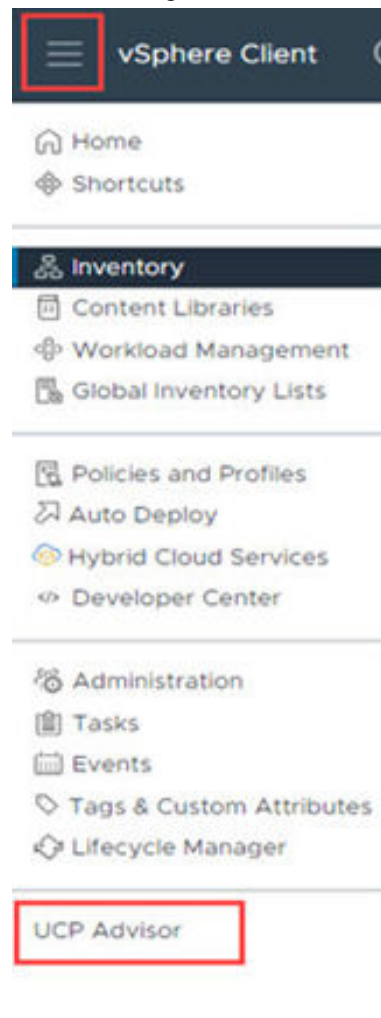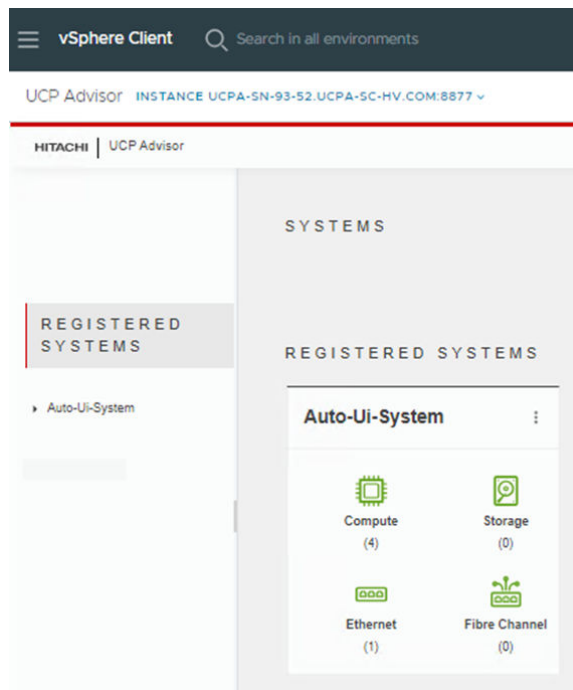
Deploy a UCP Advisor Gateway VM

Use this procedure to deploy a UCP Advisor Gateway VM.

Procedure

1. Deploy the Hitachi UCP Advisor Gateway VM using the ova file from the bundle `Hitachi-UCP-Advisor-Gateway-9.6.0.ova.`

2. Provide all the details to deploy the remote UCP Advisor Gateway VM.
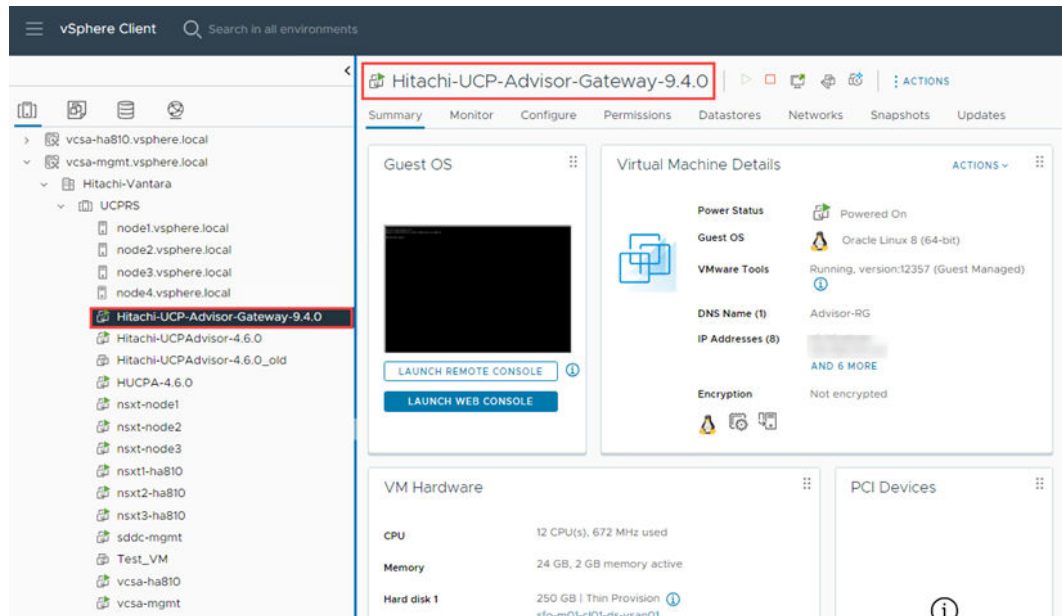
3. After the UCP Advisor Gateway VM is deployed, copy the air gapped file `ucpadvisor-cpuma-air-gapped-v4.6.0.dev-666.tar.gz` provided with the bundle.

4. Untar the file and run the installer with specified command as shown.

This is a lightweight ova compared to the UCP Advisor ova (the UCP Advisor ova is `k8s` and the UCP Advisor Gateway VM is `k3s`).

Manage systems with UCP Advisor

Overview and definition of a Hitachi integrated system

A Hitachi integrated system in UCP Advisor is a logical construct that maps physical hardware infrastructure to a given VCF Workload Domain, in order to group and simplify vSphere DRS cluster-level management of networking vLAN, FC SAN Zoning, FC Host Group Mapping, SW+HW Lifecycle Management, and storage provisioning tasks, ensuring complete data path and communication path isolation against other VCF Workload Domains. This provides another layer of security and privacy, that can be further augmented by also leveraging the VMware vDefend Firewall add-on or the VMware vDefend Firewall with Advanced Threat Prevention add-on for VCF, which enable granular micro-segmentation policies of complex modern applications.

Create a new system and add the compute nodes for creating a VCF Workload Domain

After UCP Advisor is installed, you can add Hitachi integrated systems and onboard compute devices, storage devices, Ethernet switches, and Fibre Channel switches.

You must have *ucpAdminRole* permissions to perform this operation.

Log in to Hitachi as an administrator.

> 📄 **Note:** If you are unable to log in, your username must be added to a user group that has been assigned a Hitachi role.

Create a system in UCP Advisor

1. From the Dashboard, click Systems > Create System.

2. Enter the following:

   - System Name: Enter a common name used to refer to the system that you want to add.

   - Model: Select a system model.

   - Serial Number: Enter the serial number or descriptor ID for the system.

■ Infrastructure Gateway Address: Enter the IP address or host name for the UCP Advisor VM.

> 📄 **Note:** If you are deploying Hitachi in multiple sites, then enter the IP address or host name for the Hitachi Gateway VM.

■ Region: Select the region where the system is physically located.

■ Country: Select the country where the system is physically located.

■ Zip Code: Enter the postal zip code where the system is physically located.

3. Click Submit. You can monitor the status of the task on the Task console.

4. Configure the Infrastructure Gateway host credentials for the new system.

   a. Open the system you just created.

   b. On the Summary tab, click the Infrastructure Gateway Edit icon, and then enter the Infrastructure Gateway host credentials.

   > 📄 **Note:** For a multisite deployment, enter the ucpadmin credentials for the external Gateway VM.
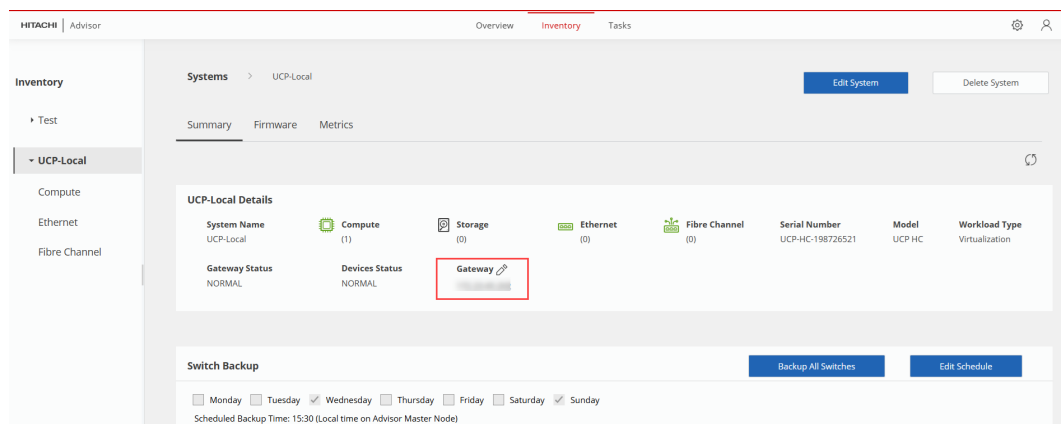
   c. Click Submit.

Add compute, storage and network devices to the new system

Users with `ucpAdminRole` permissions, such as ucpadmin, can use an onboarding worksheet (CSV file) to automatically add compute nodes, storage systems, Ethernet switches, and Fibre Channel switches.

> 📄 **Note:** Verify that you have `ucpAdminRole` permissions for the devices that you want to add.
>
> Prepare an onboarding worksheet that specifies the configuration details for the devices and labels that you want to onboard.

In most cases, an onboarding worksheet was prepared for you during the installation process, but you can edit it or create a new one to add devices and labels, or to change the configuration. If you create your own onboarding worksheet, then ensure that the number of columns in your worksheet matches the number of columns in the sample onboarding worksheet that is included in the installation media kit.

Manually enter the connection information for the devices, and then save the worksheet as a CSV file. Verify that the device usernames have the appropriate administrator-level role and that the passwords contain only allowed characters

1. From the main menu, click Onboarding.
2. Select the system where you want to add the devices.
3. Upload the onboarding worksheet with the devices that you want to add.

    a. Click Choose File, and then do one of the following:

        ▪ Drag-and-drop the onboarding CSV file onto the Upload Files box.

        ▪ Click the Upload Files box, and then browse to the onboarding worksheet.

    b. Click Upload.

4. Review the onboarding worksheet information, and then click Submit.

The devices are added to the system. The storage devices and the network switches are assigned to the partner. You can verify the details in the Tasks tab.

Manually add devices

You can manually add storage systems, compute nodes, and Ethernet and Fibre Channel switches, as needed.

To manually add a compute node:

▪ Verify that the device user credentials are assigned administrator role: *Administrator*.

▪ Verify that the IPv4 or FQDN address of the BMC and ESXi belong to the same compute node.

▪ Verify that the compute node firmware is the supported version.

▪ For Hitachi HA800 G3 series server models, verify that the IPMI/DCMI over LAN field under the Network section in Security - Access Settings is enabled. For additional information, see your server's user documentation.

1. Browse to the system where you want to add a compute node.
2. Select Compute > Add Compute Device
3. Enter the following:

    ▪ BMC Address: Enter the BMC IPv4 or FQDN address for the compute device.

    ▪ BMC Username: Enter the BMC username for the compute device.

    ▪ BMC Password: Enter the BMC password for the compute device.

    ▪ ESXi Address: (Optional) Enter the ESXi host IPv4 or FQDN address for the compute device.

    ▪ ESXi Username: (Optional) Enter the ESXi host username for the compute device.

    ▪ ESXi Password: (Optional) Enter the ESXi host password for the compute device.

    ▪ Management Server: (Optional) Select the Management Server option to identify the node type as *Management*. Leave it unselected to identify it as *Compute*.

4. Click Submit.

The designated compute nodes are added to the system in UCP Advisor. These compute nodes are ready to onboard the VCF environment to create new workload domains using SDDC Manager.

Add a storage system

You can manually add a storage system.

Verify that the device user credentials are assigned administrator role: *Administrator User Group*.

1. Browse to the system where you want to add a storage system.
2. Select Storage > Add Storage Device
3. Enter the following:

   - Management Address: Enter the SVP address for the storage system.

   - Serial: Enter the serial number for the storage system.

   - Username: Enter the username identifying the user adding the storage system. The user must belong to a user group that has administrator privileges to create user accounts.

   - Password: Enter the password for the user adding the storage system. The password can have alphanumeric characters and the following symbols: hyphen (-), period (.), at mark (@), underscore (_), backslash (\), and comma (,).

4. Click Submit.

Add an Ethernet switch

You can manually add an Ethernet switch.

For multitenancy, the new Ethernet switch is assigned to a partner. See Multitenancy for more information.

- Verify that the device user credentials are assigned administrator role: *network-admin*.

- For Cisco switches, verify that HTTPS protocol is enabled. See Enabling the HTTPS protocol on Cisco switches.

1. Browse to the system where you want to add an Ethernet switch.
2. Select Ethernet > Add Ethernet Switch.
3. Enter the following:

   - Address: Enter the IP address for the Ethernet switch.

   - Username: Enter the username identifying the user adding the Ethernet switch. The user must belong to a user group that has administrator privileges.

   - Password: Enter the password for the user adding the Ethernet switch.

   - Management Ethernet: (Optional) Select this option if the switch you are adding is a management Ethernet switch.

   - Rack Label: (Optional) Enter a rack label for the switch.

4. Click Submit.

Add a Fibre Channel switch

You can manually add a Fibre Channel switch.

For multitenancy, the new Fibre Channel switch is assigned to a partner. See Multitenancy for more information.

Verify that the device user credentials are assigned the administrator role: *network-admin*.

1. Browse to the system where you want to add a Fibre Channel switch.
2. Select Fibre Channel > Add Fibre Channel Switch
3. Enter the following:

   ▪ Management Address: Enter the IP address for the Fibre Channel switch being added.

   ▪ Username: Enter the username identifying the user adding the Fibre Channel switch. The user must belong to a user group that has administrator privileges.

   ▪ Password: Enter the password for the user adding the Fibre Channel switch.

4. Click Submit.

Onboard Hitachi Virtual Storage Platform One Block to UCP Advisor

Procedure

1. Log in to UCP Advisor and navigate to **Storage** from the dashboard.
2. Click **Add Storage Device**.
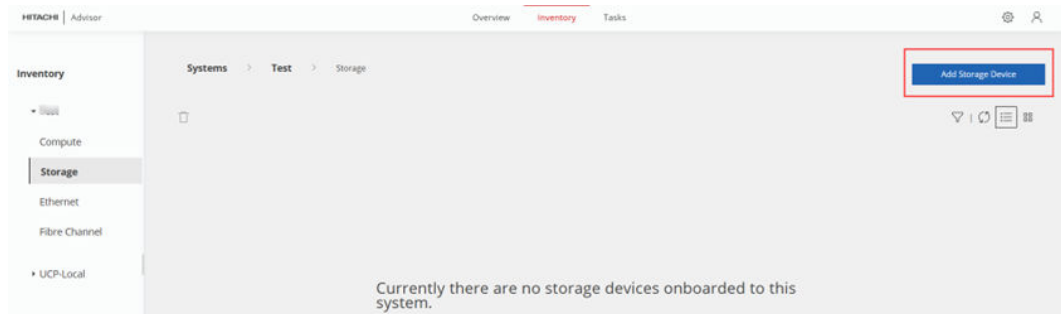
3. Provide the storage device serial number and click **Add**.

   The storage device will be listed as shown.
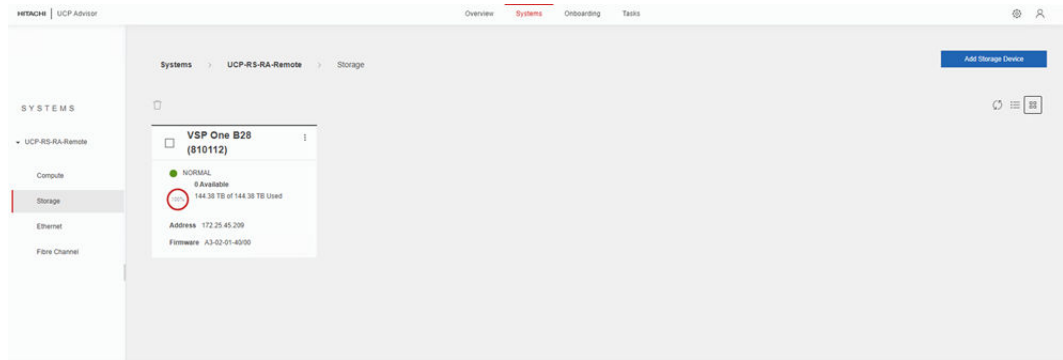
See the latest version of the following UCP Advisor documents for more information:

Unified Compute Platform UCP Advisor Software Installation Guide • Reader • Hitachi Vantara Documentation Portal

Unified Compute Platform UCP Advisor Administration Guide • Reader • Hitachi Vantara Documentation Portal

Unified Compute Platform UCP Advisor Release Notes • Viewer • Hitachi Vantara Documentation Portal

Manage VLANs on an Ethernet switch using UCP Advisor

The currently active VLANs are shown in the VLANs list. The list is ordered by VLAN ID. You can view VLAN information, including name, status, type, and associated ports. You must manually refresh the VLAN list after adding, editing, or deleting a VLAN.

Add a VLAN to an Ethernet switch

You can add a VLAN to a Leaf-Spine switches. If you want the new VLAN to be configured on all spine and leaf switches, then you must perform the task twice by selecting one spine switch or one leaf switch at a time and check the Update Paired Switch option.

1. Browse to the **Manage** tab on the Ethernet switch where you want to add a VLAN.
2. Click **Add**, and then enter the following:

   - **Name:** (Optional) Enter a name for the VLAN.

   - **VLAN ID:** Enter the VLAN ID.

   - **Update Paired Switch:** Specify if the paired switch is to be updated.

   - **Ports:** (Optional) Select the ports to be associated with the VLAN.

   > **Note:** Ports that belong to a port channel are disabled.

3. Click **Submit**.

It might take up to five minutes for the VLAN to be added. You can monitor the status of the task on the Tasks console.

Edit a VLAN on an Ethernet switch

You can add or remove ports to or from a VLAN by editing a VLAN.

1. Browse to the **Manage** tab on the Ethernet switch where you want to edit a VLAN.
2. Click the **Actions** menu for the VLAN that you want to edit.
3. Select **Edit**.
4. Add the following options, as needed:

   ▪ **Update Paired Switch:** Specify if the paired switch is to be updated.

   ▪ **Ports:** (Optional) Select/deselect the ports to be added or removed to or from the VLAN.

5. Click **Submit**.

> 📄 **Note:** Ports that belong to a port channel are disabled.

Delete a VLAN from an Ethernet switch

1. Browse to the **Manage** tab on the Ethernet switch where you want to delete a VLAN
2. Click the **Actions** menu for the VLAN that you want to delete.
3. Select **Delete**.
4. Specify whether or not you want to delete the paired VLAN. The default selection is Yes.
5. Click **Submit**.

Set a native VLAN

You can set a VLAN as the native VLAN on Ethernet switch ports.

> 📄 **Note:** Setting and removing a native VLAN is not supported on VLAN ports belonging to a port channel. That is, this operation will ignore VLAN ports belonging to a port channel.

1. Browse to the **Manage** tab on the Ethernet switch.
2. Click the **Actions** menu for the VLAN that you want to set as native.
3. Select **Set Native VLAN**.
4. Set the **Is Native** option to Yes.
5. Click **Submit**.

Remove a native VLAN

You can remove a native VLAN on Ethernet switch ports.

> 📄 **Note:** Setting and removing a native VLAN is not supported on VLAN ports belonging to a port channel. That is, this operation will ignore VLAN ports belonging to a port channel.

1. Browse to the **Manage** tab on the Ethernet switch.
2. Click the **Actions** menu for the VLAN that you want to unset as native.
3. Click **Set Native VLAN**.

4. Set the **Is Native** option to No.

5. Click **Submit**.

6. Click the **Refresh VLAN** icon to manually refresh the VLAN list.

Tag a VLAN to a subscriber

You can tag a VLAN to a subscriber.

Before you begin: The subscriber must be registered in UCP Advisor.

1. Browse to the **Manage** tab on the Ethernet switch where you want to tag a VLAN to a subscriber.

2. From the **Actions** menu for the VLAN that you want to tag, click **Tag Subscriber to VLAN**.

3. Select the subscriber from the **Subscriber** list and click **Submit**.

> 📄 **Note:** You cannot tag a reserved VLAN to a subscriber.

Untag a VLAN from a subscriber

You can untag a VLAN from a subscriber.

1. Browse to the **Manage** tab on the Ethernet switch where you want to untag a VLAN from a subscriber.

2. From the **Actions** menu for the VLAN that you want to untag, click **Untag VLAN from Subscriber**.

3. Enter Untag, and click **Submit**.

Manage VLAN policies

You can create, edit, apply, and delete VLAN configuration policies for Ethernet switches.

> 📄 **Note:** VLAN policy management requires the Advanced Edition license.

Solution design

The system can start as a single rack but can be extended to support multi-rack scenarios. One of the advantages of Hitachi Integrated Systems is that it has no 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 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 this solution 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 hybrid system to this solution.

Another benefit is the ability to have SAN-based datastores on this solution. VMware Cloud Foundation offers VMware vSAN storage by default. By adding an HBA to 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 containing 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.

From a 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 HBA to the compute nodes to have access to the Fibre Channel external storage. They are connected to the Virtual Storage Platform using Fibre Channel connections through two SAN switches for 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.

The system has single rack and multi-rack designs that scale from four compute nodes in one rack to 128 compute nodes spread across four racks that are inter-connected using top-of rack switching. The following figures show rack layout examples for single rack and multi-rack solutions. In the following single rack high-level configuration, the maximum number of supported 1U vSAN-ready nodes is 19, four of which can be configured as management nodes. Within the management/computing region, both 1U and 2U vSAN-ready nodes can be intermixed, but not to exceed 19 total RU.

In general, a multi-rack high-level configuration uses Brocade G620/G720 Fibre Channel switches, and HBAs are optional components to connect the customer's SAN storage to the system environment. The maximum number of supported 1U vSAN-ready nodes is 128, four of which can be configured as management nodes. Within the management/computing region, both 1U and 2U VSAN-ready nodes can be intermixed, but not to exceed 32 total RU per rack.

The following figure shows the single rack design.

Single Rack Layout
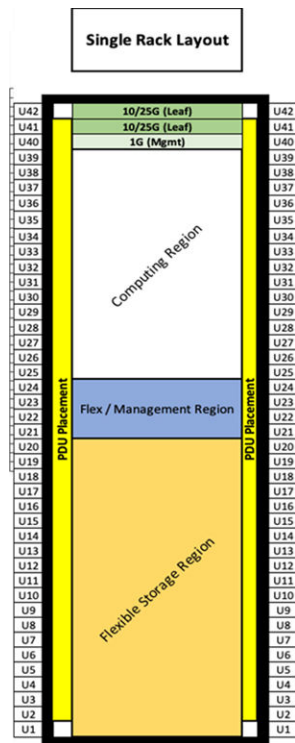
The following figure shows the multi-rack design.
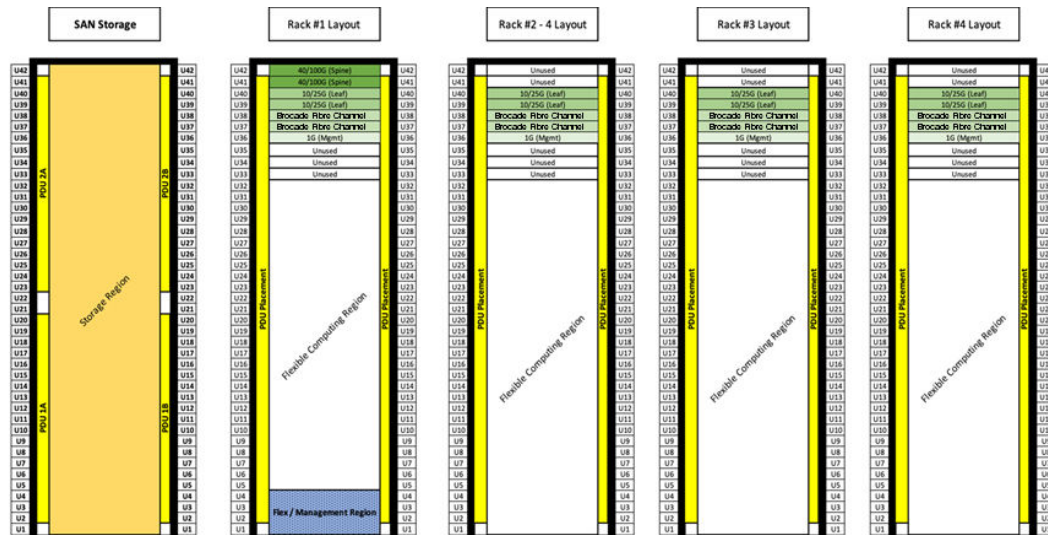
The following illustration shows the complete architecture of the solution (VCF, VSP, and UCP Advisor.
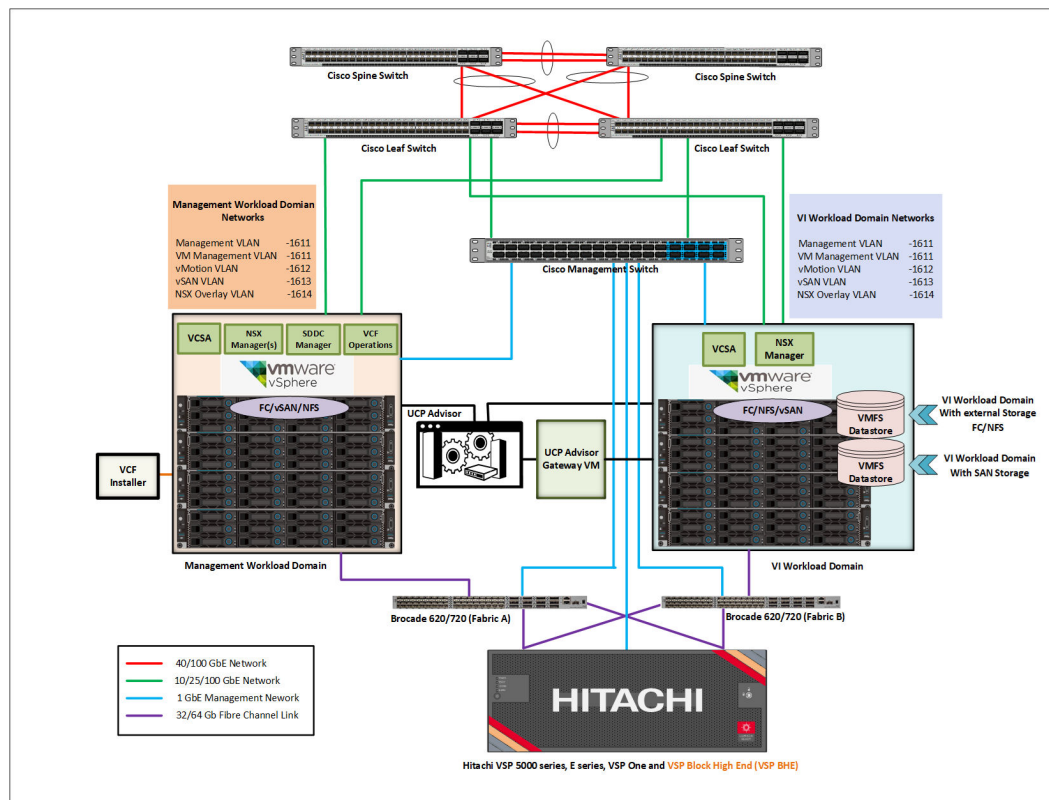
Solution deployment

This deployment demonstrates the process of Hitachi Virtual Storage Platform One Block integration with Hitachi Integrated Systems nodes and VMware Cloud Foundation using Hitachi UCP Advisor. With the current release of VMware Cloud Foundation, VMware vSAN is required for the Management Workload Domain.

For the workload domains, the following storage options can be used in this solution.

- Option 1 — Management domain and VI workload domain (Any workload domain) using external storage as primary and secondary storage

- Option 2 — Option 2 — Management and VI Workload Domain using a VMware vSAN datastore as primary and secondary storage.

The following sections cover the deployment of VMware Cloud Foundation Management Workload Domain and the other storage options with VI Workload Domain:

Management Workload Domain with VSP storage (Fibre Channel) as a principal datastore

VCF 9.0 introduces a more flexible and robust installer experience compared to earlier versions. Deploying the VCF Installer (also known as the VCF-SDDC-Manager-Appliance OVA) on the same ESXi host as the future SDDC Manager is common and supported, it is not mandatory.

Before you begin

- A minimum of 2 ESXi hosts for the Management Domain are installed with ESXi 9.0.1 that are compatible with the VCF 9.0.1 bundle (4 ESXi nodes are recommended).

- Fibre Channel zoning and LUN masking are configured for all ESXi hosts.

- A Fibre Channel SAN with pre-created VMFS datastores is configured.

- Download VCF 9.0.1 full stack software bundles.

- Management, vMotion, and VM networks are configured.

- DNS, NTP, and IP address reservations are made for all components.

Procedure

1. Log in to VCF Installer with admin@local credentials.
2. Click **Depot settings** and **Binary Management** and download the binaries using a download token from Broadcom support portal.
3. In the Deployment Wizard select **VMware Cloud Foundation** in the **Deploy** section for fleet configuration of the deployment parameters. You can also use a json file by selecting **DEPLOY USING JSON SPEC** and uploading the json file to deploy the VCF stack.
4. Select **Deploy a new VCF fleet** and click **Next**.

5. Do not select anything in the **Existing Components** section, and fill out the following information.

   a. Select VCF version 9.x and provide the VCF Instance name. Ensure the name has 3 or more characters.

   b. For Deployment Model select **High Availability** or **Simple** based on your requirements.

   c. Provide DNS and NTP information.

   d. Choose to auto-generate passwords if you do not want to provide custom passwords.

6. For VCF Operations - Appliance Size Medium:

   a. Provide the inputs under **VCF Operations Appliance**.

   b. **Load Balancer** - don't provide any input.

   c. Provide all the required inputs under **Fleet Management Appliance**.

   d. Check the box for **Use same password as VCF Operations**.

7. Check the box **Connect a VCF Automation instance later** or else provide all the required inputs.

8. Provide the necessary details and Select Appliance size Small.

9. Provide the necessary details and Select Appliance size Medium.

10. In the Storage step: Select FC and Provide the Datastore name – This we need to use for VSP stretched storage using global-active device.

11. Provide host details and confirm host fingerprint.

12. Provide vMotion and VM Management network details. Use the ESX Management network as VM Management network.

13. Choose a default switch configuration profile and provide the details.

14. Provide the SDC Manager Credentials.

15. Review the configuration details and click **Next**.

16. Validate & Deploy (acknowledge any warnings).
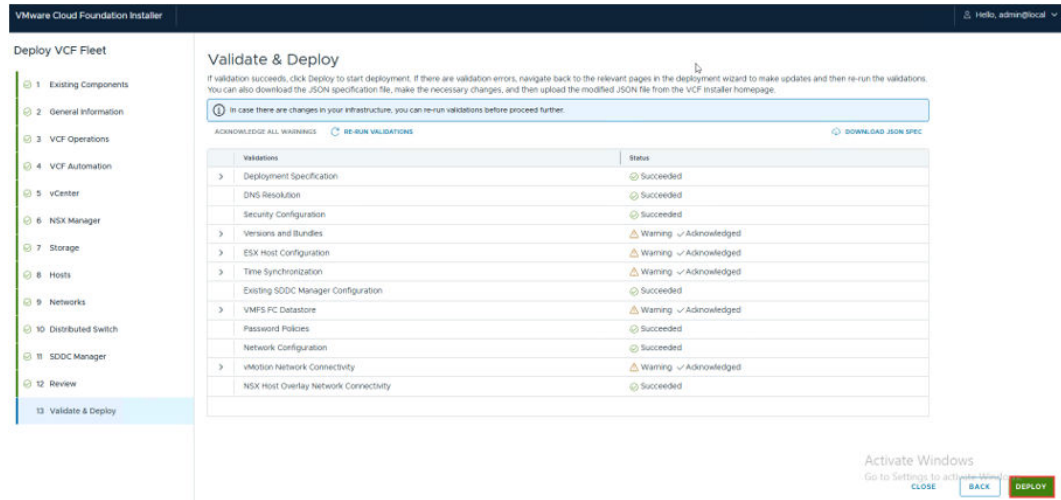
Result

The VCF 9.0.1 environment is deployed.
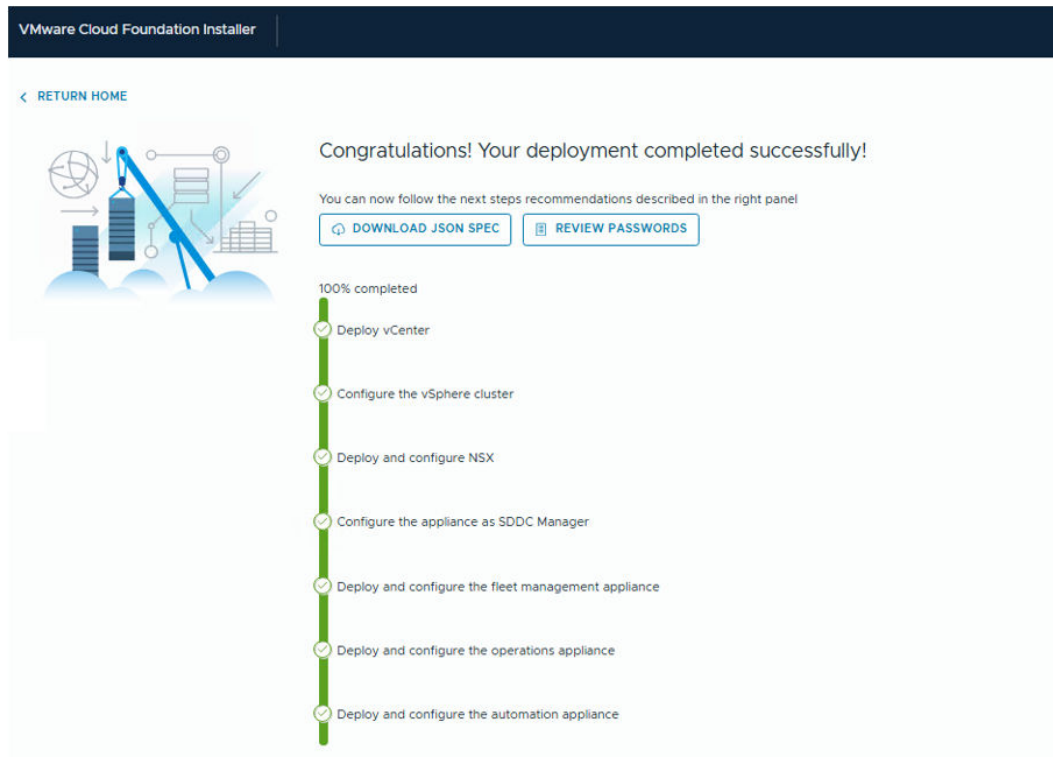
Next steps

Log in to the VCF Operations and validate that the VCF instance is deployed.

Management Workload Domain with vSAN storage

Follow the same procedure as Management Workload Domain with VSP storage (Fibre Channel) as a principal datastore (on page 39) and select ESA or OSA as principal storage for the management domain.

VI Workload Domain using VSP storage (Fibre Channel) as a principal datastore

Before you begin

Before creating the Workload Domain, make sure that compute nodes, storage, and networks are already onboarded to UCP Advisor for management and additional configuration steps because the system will have the same compute nodes which that will be part of workload domain as well. This will help make the VCF workload environment identical and manageable from a single panel of the UCP Advisor central UI.

In this deployment the workload domain and the management domain both use Fibre Channel datastores. The network pool can be created, or you can use the existing network pool because it uses the same storage option. Before creating the workload domain you need to complete the management domain as described previously.

There are two methods for deploying a VI Workload Domain: SDDC Manager or VCF Operations.

Procedure

1.

Deploy using SDDC Manager

Use the following procedure to commission the new or designated hosts and create the network pool for new a VI Workload Domain using SDDC Manager.

Before you begin

Before creating the new VI Workload Domain, the Management Domain should be created. To create a management workload domain, see Management Workload Domain with vSAN storage (on page 42).

Procedure

1. Create a network pool for the new VI Workload Domain.
   a. Log in to SDDC Manager and click **CREATE NETWORK POOL** under the **Network Settings** tab.
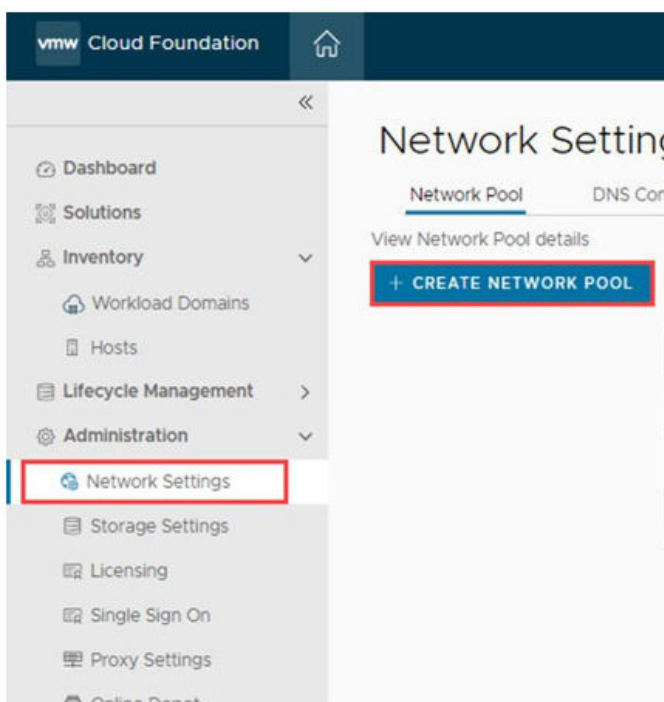
b. Provide the Network Pool Name, select vMotion and iSCSI, and fill in the Network
    Information and IP Address ranges.

c. Click **Add**.

d. Click **Save**.

The network pool has been created.
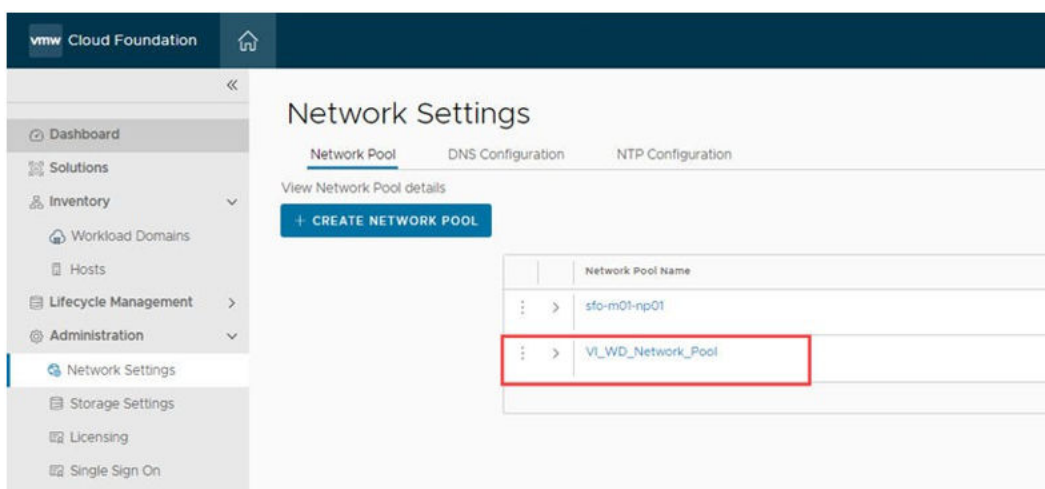
2. Commission the compute nodes.

   a. Commission hosts that have access to Hitachi Virtual Storage Platform (external Fibre Channel storage) for the new workload domain.

   b. Log in to SDDC Manger, select **Hosts** and click **COMMISSION HOSTS**.

   c. Select **VMFS on FC** as the Storage Type.
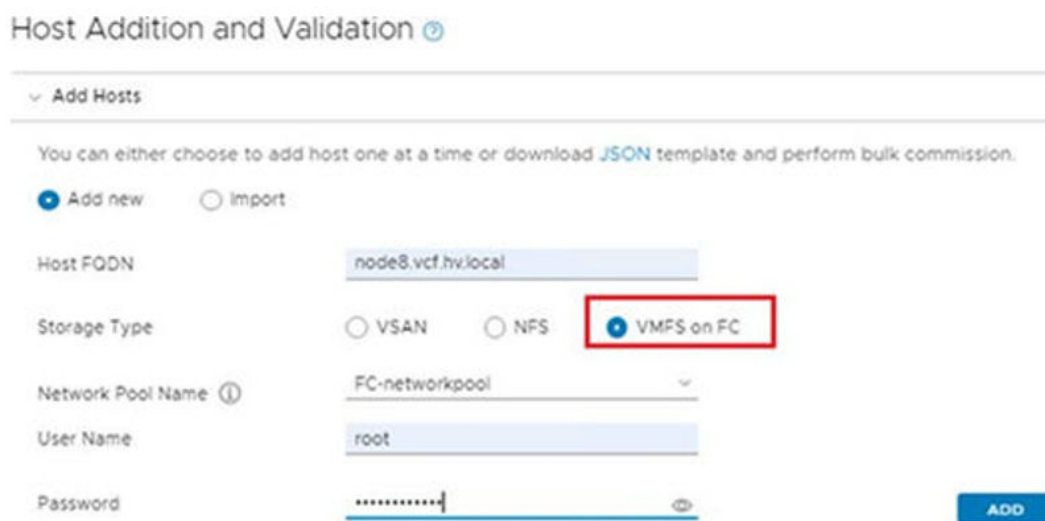
   In contrast with VMware vSAN, which is managed from within VMware SDDC Manager, manage Fibre Channel storage and the SAN switch configuration independently outside of SDDC Manager. Complete all Fibre Channel storage provisioning and management operations, plus SAN switch configuration using Hitachi Unified Compute Platform (UCP) Advisor as follows:

   ▪ Add Fibre Channel storage by adding HBAs to compute nodes.

   ▪ Configure Fibre Channel switches.

- Create aliases and zoning.

- Create provisioning pools and LDEVs.

- Create VMFS datastores.

> **Note:** The SDDC Manager UI is being deprecated and will be removed in a future release. Use the VCF Operations console to perform all Day-N activities.

Deploy using VCF Operations

Procedure

1. Configure FC-based storage.
2. Commission the candidate hosts for VI Workload domain.
3. Create a VI Workload domain by logging in to VCF Operations.
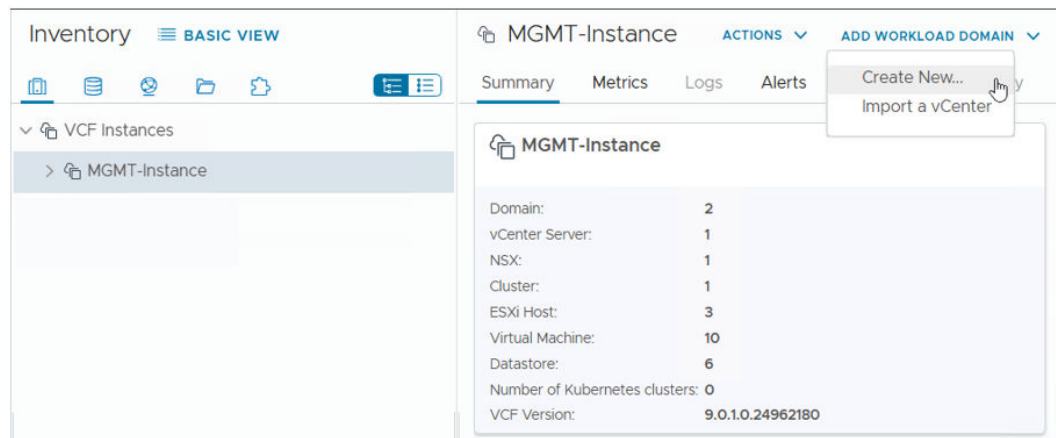
4. Provide the necessary details for vCenter, NSX, and FC-Storage, and then click **Finish**.

VI Workload Domain using a vSAN datastore

Follow the procedure in , and select the Storage Type as vSAN instead of VMFS on FC in Host Addition and Validation.

Manage VSP One Block storage (Fibre Channel) as a secondary datastore and vSAN datastore using UCP Advisor

In VMware Cloud Foundation (VCF) 9.0, VMware vSAN, VMFS on Fibre Channel, and NFS are supported as principal datastores for the management domain. External storage platforms such as Hitachi Virtual Storage Platform (VSP) can also be used as principal storage using Fibre Channel or NFS. Fibre Channel storage is no longer limited to secondary use — it is supported as both principal and supplemental storage for management and workload domains.
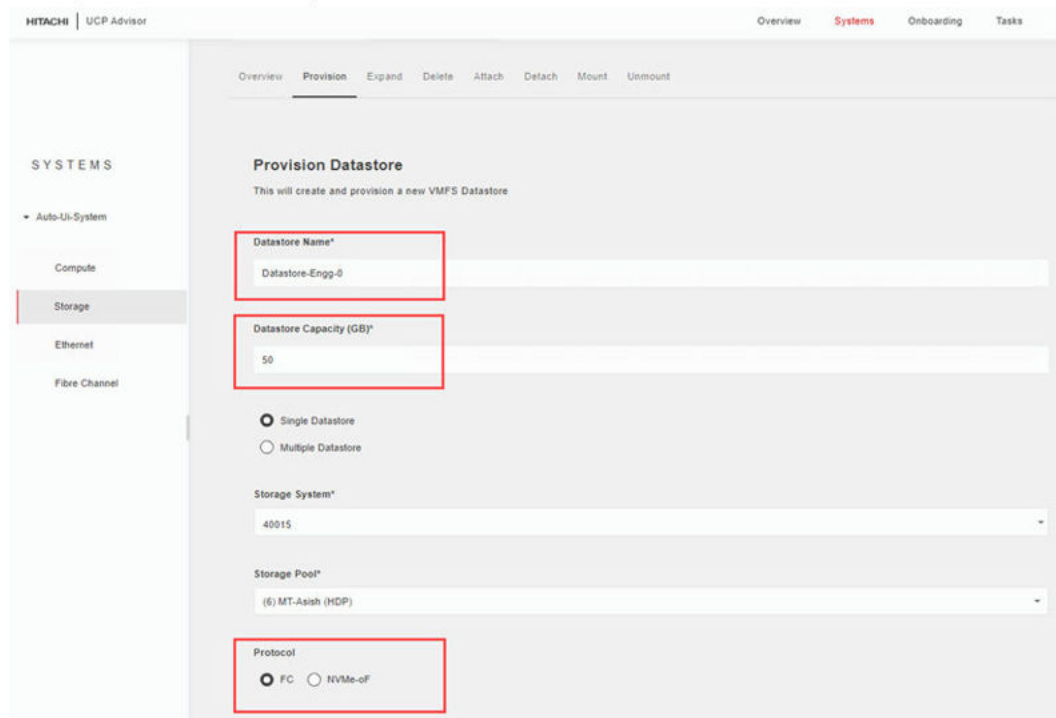
Before you begin

Before configuring Fibre Channel storage, the Management Domain and at least one VI Workload Domain must be created. In VCF 9.0, the Management Domain can be deployed using vSAN, VMFS on Fibre Channel, or NFS as the principal datastore (not limited to vSAN anymore).

A VI Workload Domain can also be created using vSAN, VMFS on Fibre Channel, or NFS as its principal datastore. Fibre Channel storage can therefore be used as principal storage for both management and workload domains, or added later as supplemental storage.

Procedure

1. Configure VSP storage and create a Fibre Channel datastore using UCP Advisor. To create a SAN-based datastore, configure Virtual Storage Platform in UCP Advisor. Connect selected hosts to Virtual Storage Platform redundantly using SAN switches. Configure aliases and zoning on both SAN switches from UCP Advisor. Complete all SAN switch configuration, storage provisioning, and management using the Hitachi UCP Advisor central control panel as follows:

   a. Add HBAs to compute nodes.

   b. Connect compute nodes to SAN switches with redundancy.

   c. Configure SAN switches.

   d. Create Fibre Channel zones.

2. Create a Fibre Channel datastore.

   a. From UCP Advisor use the **Provision Datastore** option to create the Fibre Channel storage for the datastore.

   b. After the Fibre Channel datastore provisioning is complete, it is visible under the **Datastores** section.
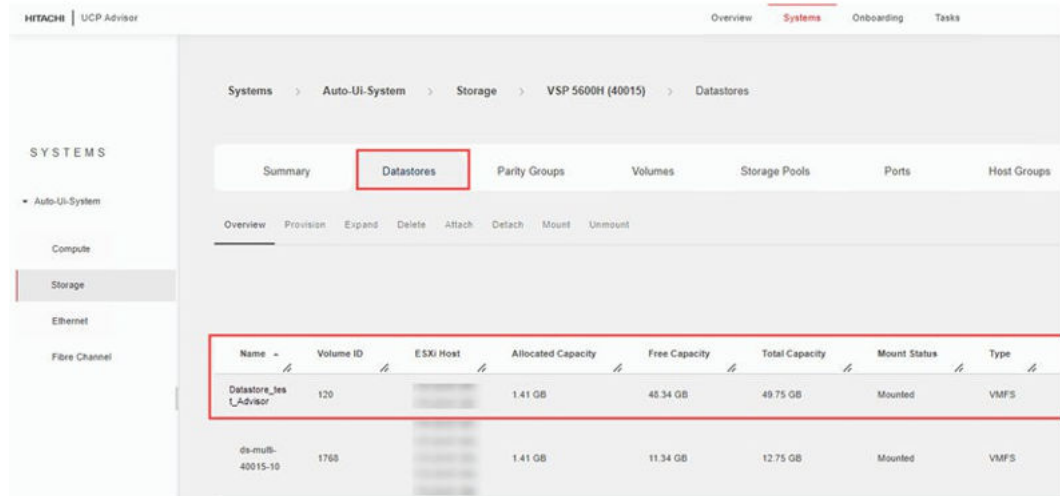
Result

After the datastore is created using UCP Advisor, two datastores are available for workload domains where one is a principal datastore and the other datastore is secondary both (Fibre Channel) from Hitachi Virtual Storage Platform storage.

Delete VCF Workload Domains and respective systems with UCP Advisor

Use these procedures to remove VCF Workload Domains and integrated systems in UCP Advisor.

Delete a Workload Domain and decommission compute nodes

Use this procedure to delete a VI Workload Domain from the SDDC Manager UI.

Before you begin

If a (FC/NFS/vSAN) datastore is attached to the workload domain, migrate all workload/VMs to another datastore and unmount the datastore from the vCenter.

Procedure

1. In the navigation pane, click Inventory > Workload Domains.
2. Click the vertical ellipsis (three dots) next to the VI workload domain you want to delete and click **Delete Domain**.
3. Select **Delete Domain** and click **Delete Workload Domain**.

Result

After the workload domain is deleted, the clusters within that workload domain are deleted and the hosts are returned to the free pool with a need cleanup host state.

Deleting a VI workload domain also removes the components associated with the VI workload domain from the management domain. This includes the vCenter Server instance and the NSX Manager cluster instances.

> 📄 **Note:** If the NSX Manager cluster is shared with any other VI Workload Domains, it will not be deleted.
>
> The network pools used by the workload domain are not deleted as part of the VI Workload Domain deletion process and must be deleted separately.

Decommission compute nodes

Procedure

1. In the navigation pane, click **Inventory** > **Hosts** .
2. Click **Unassigned Hosts**.
3. Select the hosts you want to decommission.
4. Click **Decommission Selected Hosts**.
5. Click **Confirm**.

Remove Fibre Channel storage from the system

Remove connected storage from a workload domain before proceeding to remove it from the system.

You can delete a datastore to remove it from an cluster in a workload domain.

> 📄 **Note:** You cannot delete datastores that are part of a replication pair (for example, global-active device from within UCP Advisor.

Procedure

1. Complete all the vCenter-related tasks.
2. Verify that a vCenter is registered and attached to the system.
3. Browse to the storage system where you want to delete a datastore.
4. Select **Datastores** > **Delete**.
5. Enter the following:

   - Storage System: The storage system where you want to delete the datastore.
   - Datastore: The datastore name of the datastore you want to delete.
   - Delete Volume: Select the "Delete Volume" option to delete the volume along with the datastore.

6. Click **Submit**.

Remove compute nodes from the system

You can remove a compute device from active management and place it in the spare pool.

Before you begin

If you have tagged a subscriber to the compute device, untag the subscriber from the compute device.

Procedure

1. Browse to the system where you want to remove a compute device, and then click **Compute**.
2. Locate the compute device that you want to remove, and then select its activation checkbox.
3. Click the **Remove Compute Device** icon.
4. Verify that the compute device that you want to remove is listed as the item being removed.
5. Enter **Remove**, and then click **Submit**.

Result

The device is removed from the system and placed in the spare pool.

Delete a system

You can delete a system from the inventory managed by UCP Advisor.

Before you begin

If you have tagged a subscriber to a compute device or other device resources, you must untag the subscriber before deleting the system.

Procedure

1. Browse to the system that you want to delete.
2. Click **Delete System**.
3. Verify that the system you want to delete is listed as the item being deleted.
4. Enter **Delete**, and then click **Submit**.

Hitachi Storage Provider (VASA) for VMware vCenter

Hitachi Storage Provider for VMware Cloud Foundation (VASA Provider) is a virtual appliance that enables organizations to enable software-defined storage solutions for VMware vSphere Virtual Volumes (vVols) on Hitachi Virtual Storage Platform (VSP) systems and provides storage policy-based provisioning for both VMFS and vVols datastores.

Note that vVols have officially been deprecated as of vSphere and VCF v9.0, and will no longer be supported starting from vSphere and VCF v9.1 – As a result, VASA provider and vVols should only be used on vSphere 8.0 U3 and VCF 5.2.x, and you should reference the Hitachi Storage and Hitachi Integrated Systems Solutions in VMware vSphere Environments Best Practices Guide for vVol migration/mitigation best practices before upgrading to vSphere and VCF 9.0.x.

Hitachi Storage Provider for VMware Cloud Foundation also allows VMware APIs for Storage Awareness (VASA) features to be used with Hitachi storage systems. VASA Provider allows policies to be made by making the storage attribute information available to be seen in vSphere.

Hitachi VASA Provider supports the following:

- VMware vSphere Virtual Volumes (vVols) - This function constitutes the VASA Provider (VP) component of VMware Virtual Volumes (vVols), which allows vVols to be used with supported Hitachi storage systems in a 1:1 mapping enabling greater insight into virtual machine performance. See the previous notes regarding end-of-life of vVols – vVols should NOT be used with VCF 9.0, and Broadcom will not provide support for it unless an RPQ exception request is approved.

- VMware Virtual Machine File System (VMFS) - VASA allows storage capability information and alert notifications related to VMFS file systems to be generated automatically and displayed in vCenter Server. While VASA is fully supported on vCenter 8.0 U3 and VCF 5.2.x, its functionality is restricted and deprecated in VCF 9.0 due to Broadcom ending the vVols certification program (also impacting all VASA certifications).

- VMware Storage Policy Based Management (SPBM) tags for devices backing VMFS file systems are provided, which associate the VMFS file systems with storage profiles and capabilities. These profiles allow storage policies to be configured in vSphere for VMFS file systems in addition to VMware vVols based on underlying storage capabilities. For example, in vCenter, a datastore can be assigned tags, such as "Encryption: Yes" which indicates the underlying storage system can provision vVols or LDEVs with encryption capabilities. Even without the automatic tagging (system-defined capabilities) of VMFS Datastore provided by the VASA Provider, the vCenter Administrator can continue to enjoy SPBM via User Tags.

> **Note:** vVol does not require UCP Advisor because it is tightly integrated into the VMware SPBM framework from the VASA Provider for supported VSP storage models.

Hitachi UCP Advisor integration with vSphere Lifecycle Manager (vLCM) and Hardware Support Manager (HSM)

vSphere Lifecycle Manager (vLCM)

vSphere Lifecycle Manager vLCM simplifies lifecycle management in VMware vSphere by ensuring consistency across ESXi hosts within a cluster. It achieves this through a declarative model that enforces a desired state for ESXi hosts, including target ESXi versions, firmware versions, and driver versions. vLCM collaborates with hardware vendors to manage firmware and driver updates. These updates are accessed via the HSM.

These are some of the benefits of vLCM:

- Efficient upgrades

- Improved reliability

- Simplified maintenance

The following figure shows the features of vLCM.

A cluster image consists of the following components:

- ESXi version: A Cluster base Image supports vSphere ESXi 7.0 or later.

- Vendor Add on (Optional): Vendor add-ons are additional components or extensions provided by hardware vendors to enhance vLCM functionality. These add-ons typically include vendor-specific drivers, firmware, and management tools. They allow vLCM to seamlessly integrate with specific hardware platforms.

- Firmware Integration (optional): Firmware integration refers to the seamless management of full-stack firmware updates for host devices within vLCM. These host devices include PCIe components (such as storage controllers and NICs), BIOS, and out-of-band management tools.

Hardware Support Manager (HSM)

Hardware Support Manager (HSM) is part of vLCM. It allows different server vendors to integrate with vLCM, supporting hardware firmware and driver upgrades. It includes a plug-in that registers itself as a vCenter Server extension.

The following figure shows the standard architecture of vLCM.
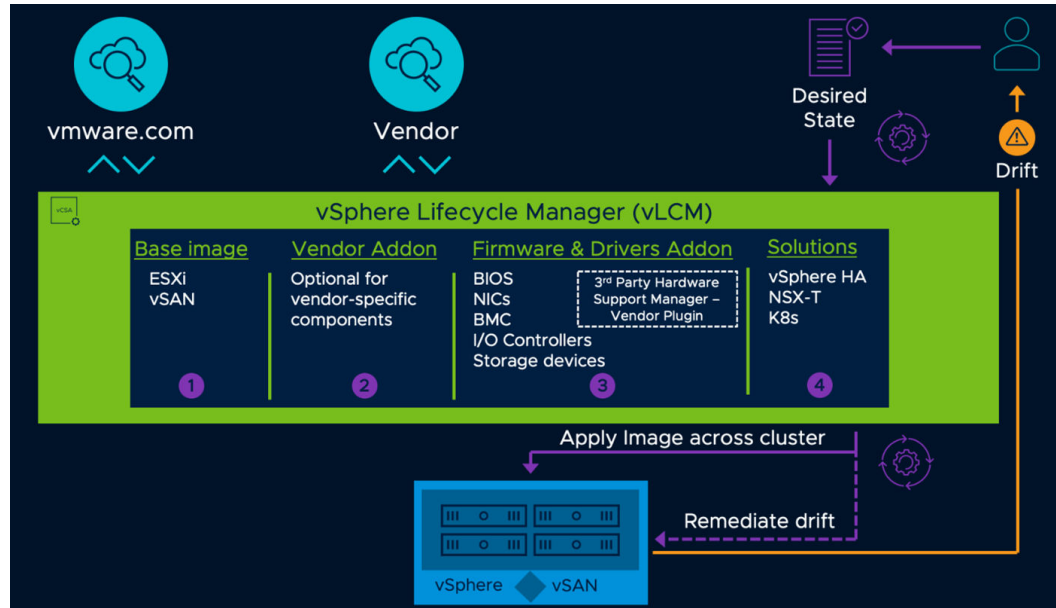
Upgrade firmware using vLCM and HSM

Hitachi UCP Advisor integrates into vSphere as an Hardware Support Manager (HSM) for vLCM, enhancing firmware and driver management. When you enable an HSM, vLCM gains awareness of the vendor's hardware components. This integration allows vLCM to manage firmware updates specific to that vendor's hardware.

Register UCP Advisor as HSM provider in vCenter

1. Log in to Hitachi UCP Advisor, navigate to VMware Integration, and select vCenter.
2. Click Register vCenter.
3. Provide the vCenter details and click Register.

The vCenter is registered successfully.
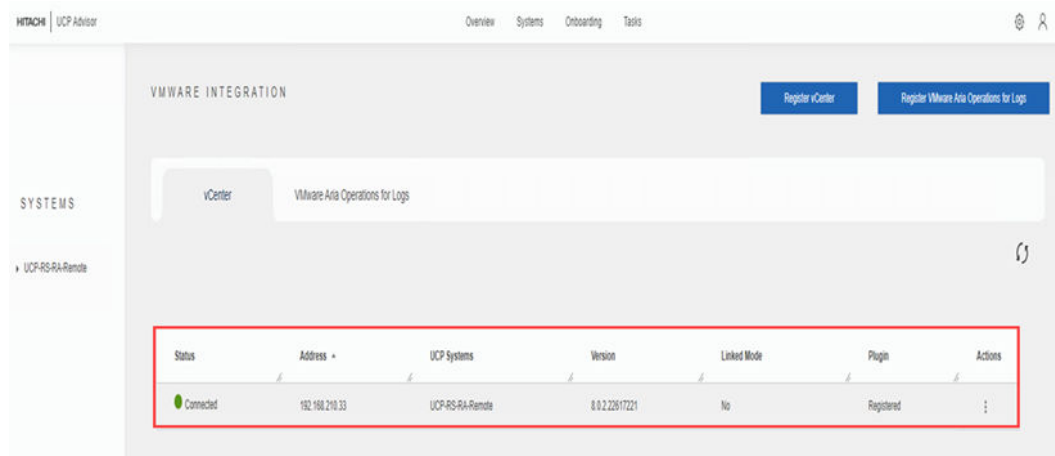
The following illustration shows the integration of Hitachi UCP Advisor Plug In.

The cluster image should be visible under Vendor Addon in vCenter.

Solution validation
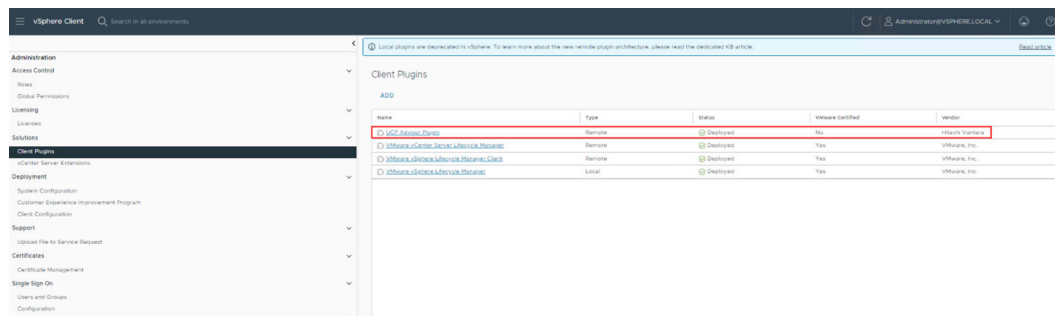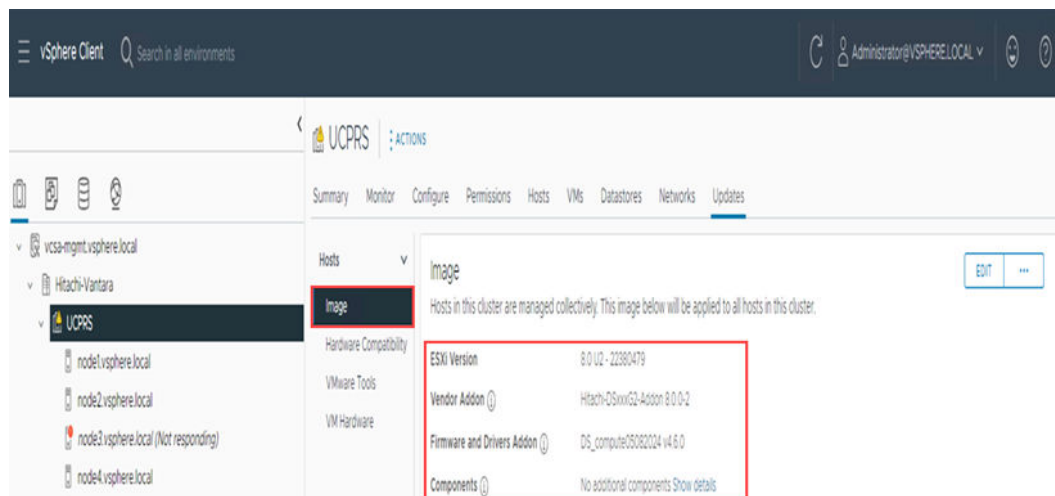
The following table lists the test scenarios completed to validate the solution.

📄 **Note:** Testing of this configuration was in a lab environment. Many factors 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.

Test Scenarios	VMware vSAN Datastore	VSP One Block	Observed Behavior
Created a Management Domain with HitachiVSP One storage as Principal datastore using UCP Advisor.	Yes	Yes	Managed all storage-related operations using UCP Advisor.
Created a Workload Domain with HitachiVSP One storage as Principal datastore using UCP Advisor.	Yes	Yes	Managed all storage-related operations using UCP Advisor.
Created a Workload Domain with vSAN as Principal and VSP One storage as Secondary datastore using UCP Advisor.	Yes	Yes	Managed all storage-related operations using UCP Advisor.
Created a Workload Domain with VSP One storage as Principal and vSAN as Secondary datastores using UCP Advisor.	Yes	Yes	Managed all storage-related operations using UCP Advisor.
Created a Workload Domain with vSAN as Principal storage.	Yes	No	Deployed successfully.
Onboarded Hitachi VSP Storage and compute (DS/HA server platform) with UCP Advisor.	No	Yes	Onboarded successfully.
Updated Firmware version of compute (DS/HA server platform) BMC/BIOS/IO components using UCP Advisor.	NA	NA	Updated successfully.
Register UCP Advisor Plug-in on Workload Domain associated vCenter.	NA	NA	Done successfully.
Integrated vLCM and HSM with UCP Advisor.	NA	NA	Done successfully.

Test Scenarios	VMware vSAN Datastore	VSP One Block	Observed Behavior
Clone a virtual machine from a VMware vSAN datastore to a 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 a vSAN datastore to a Virtual Storage Platform datastore using Storage vMotion.	Yes	Yes	Virtual machines migrated from a vSAN datastore to a Virtual Storage Platform datastore successfully.
Commission and decommission additional hosts to Workload Domains.	Yes	Yes	Prepare the additional node for commission and add to the cluster through SDDC Manager and decommission post validation checks.

References

See the following documents for more information:

- [VMware vSphere Virtual Volumes (vVols) with Hitachi Virtual Storage Platform Quick Start Guide](#)
- [VMware Compatibility Guide - VSAN OSA](#)
- [VMware Compatibility Guide - VSAN ESA](#)
- [VMware Cloud Foundation 5.1 Release Notes](#)
- [UCP Advisor Administration Guide](#)

Appendix A: Configure iSCSI

Use this procedure to create a dedicated iSCSI fabric. If using existing networks, ensure proper segmentation and Quality of Service (QoS) settings. Consider redundancy and failover mechanisms.

Procedure

1. iSCSI Initiators and Targets:

   - Configure iSCSI initiators (usually on servers) to connect to iSCSI targets (storage systems).

   - Obtain the iSCSI target IP addresses or DNS names.

2. Configure iSCSI Initiators:

   - On each server, install the iSCSI initiator software (for example, Microsoft iSCSI Initiator for Windows).

   - Add the iSCSI target IP addresses or DNS names to the initiator configuration.

   - Set up authentication (CHAP or mutual CHAP) if required.

3. Configure iSCSI Targets:

   - Access your storage system management interface (for example, Hitachi Vantara management console).

   - Create iSCSI target LUNs (Logical Unit Numbers) and assign them to specific servers.

   - Set access permissions (read-only or read-write) for each LUN.

4. Zoning and Security:

   - If using existing Fibre Channel switches, configure zoning to allow iSCSI traffic.

   - Ensure security measures (firewalls, ACLs) to protect iSCSI traffic.

5. Network Configuration:

   - Configure network interfaces on servers to connect to the iSCSI fabric.

   - Set the MTU (Maximum Transmission Unit) size for jumbo frames if needed.

6. Testing and Validation:

   - Verify connectivity between initiators and targets.

Appendix B: Configure NVMe over Fabrics in a Fibre Channel environment

NVMe over Fabrics (NVMe-oF) is an extended protocol that enables communication over a Fibre Channel fabric or an Ethernet fabric with NVMe. Note that in VCF 9.0.x, NVMe-oF is only supported as Supplemental Storage. In a Fibre Channel environment, NVMe-oF technology supports the NVMe-oF communication protocol on Fibre Channel storage area networks (Fibre Channel-SAN) using existing Fibre Channel network devices.

To configure a system consisting of an open host and a storage system using the NVMe-oF communication protocol, register a logical volume of the storage system as a namespace on the NVM subsystem, and then configure a data I/O route from the host to the logical volume.

Conventional Fibre Channel and iSCSI require an LU mapping for a port to manage an access route between the host and the logical volume.

NVMe-oF, on the other hand, requires the following system components to be configured on the storage system between the host and the logical volume:

- NVM subsystem — A flash memory storage control system that supports the NVMe-oF communication protocol with one or more namespaces, and one or more communication ports (NVM subsystem ports).

- Namespace — A flash memory space formatted into a logical block.

- NVM subsystem port — A Fibre Channel port set to NVMe mode.

- Host identification (host NQN): Host name qualifier.

- Host-namespace path — Access permission to the namespace for each host NQN.

- Registered on the NVM subsystem.

Hitachi Vantara