HPE Reference Architecture for HPE Morpheus VM Essentials Software 8.0.7

HPE Synergy 480 Gen11 Compute Module and HPE Alletra Storage MP B10000-iSCSI

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Executive summary

HPE Morpheus VM Essentials is a unique software offering which provides highly available HPE Morpheus VM Essentials hypervisor (HVM) clusters based on KVM, while also providing the ability to connect to existing VMware vCenter clusters for unified management of VM workloads. The solution provides per-socket pricing, brownfield VMware vCenter®, and a simple VM-as-a-service provisioning interface into both HPE Morpheus VM Essentials and VMware® hosts. Available as standalone software or as an embedded option within HPE Private Cloud offerings, this enterprise-grade solution is supported by HPE's global support organization.

Built on the same KVM foundation that powers the world's leading hyperscale clouds, the HPE VM Essentials hypervisor extends its capabilities with advanced cluster management features such as intelligent resource-based workload placement, host-to-host live migration, high availability, hot resize and reconfiguration, security hardening, and integrated data protection. In the event of a host failure within an HPE VM Essentials (HVM) cluster, virtual machines are automatically restarted on another available host, ensuring continuous availability and minimal service disruption.

To enable flexibility for those continuing to use Broadcom's vSphere based clusters, HPE VM Essentials manager software will also connect to existing VMware vSphere® clusters for customers who want to simplify management and provisioning of instances into both VMware ESXi™ and HPE VM Essentials hosts (HVM hosts) from one unified solution. In addition to a simple VM provisioning catalog, HPE VM Essentials manager also includes integration into external IPAM and DNS solutions, secure key management, automation execution, built-in data protection, and basic VMware ESXi-to-HPE VM Essentials image format conversion.

When deployed on HPE Synergy, the solution gains the power of composable infrastructure, allowing software-defined, on-demand allocation of compute, storage, and fabric resources across HVM clusters. Leveraging HPE OneView and HPE Morpheus integration, customers benefit from hardware-level automation, dynamic workload mobility, and faster provisioning, translating into greater resource efficiency, faster time-to-value, and reduced operational complexity.

Lastly, HPE Morpheus VM Essentials software offers an upgrade path to the full HPE Morpheus Enterprise software platform for expanded hybrid cloud management including connectivity into dozens of on-prem and public clouds, Kubernetes cluster management, governance policy enforcement, and FinOps capabilities for optimization, metering, and reporting.

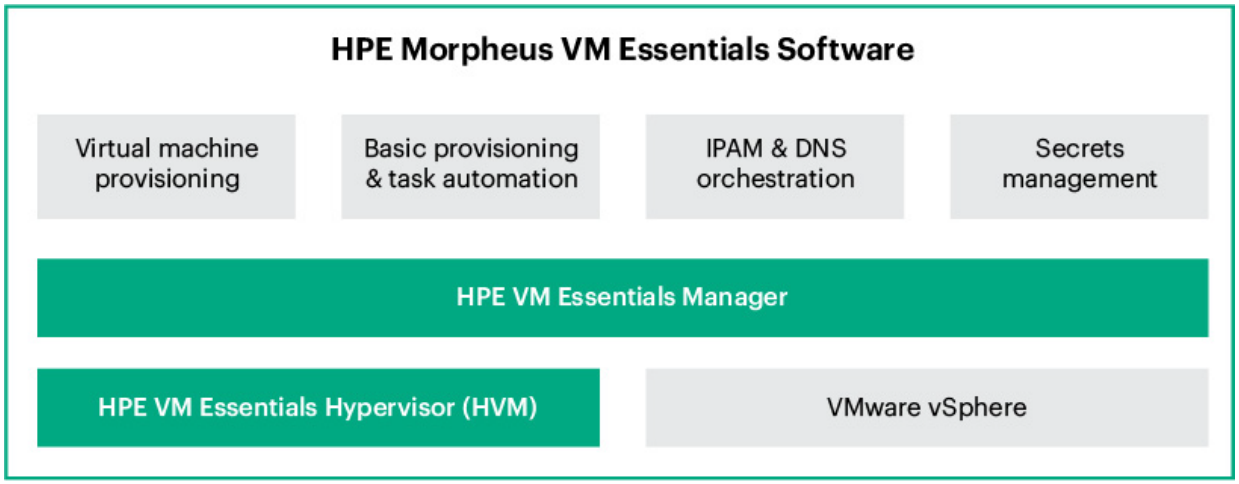


Figure 1. HPE Morpheus VM Essentials capability diagram

HPE VM Essentials hypervisor features

- **HPE Validated Hardware:** The HPE VM Essentials hypervisor (HVM hypervisor) has been validated on HPE ProLiant Gen10 Plus, Gen11, Gen12 and HPE Synergy 480 Gen11 Compute Module to deliver optimal experience and provide hardware compatibility assurance. Currently, only HPE hardware is supported but support for third-party hardware is planned for the future. All validated hardware and latest compatibility matrix is listed here, Compatibility Matrix for HPE Morpheus VM Essentials Software.
- **VM Live Migration:** Migrate a running VM Essentials virtual machine from one host to another within the same cluster with zero downtime.
- **VM High Availability:** Automatically restart VM Essentials virtual machines on another host in the same cluster in the event of an unexpected host failure within the cluster.
- **Dynamic Workload Scheduler:** Dynamically schedule the placement of VM Essentials virtual machines within a cluster based upon optimal workload distribution across the cluster.
- **Storage Migration:** Migrate the virtual disk(s) of a running VM Essentials virtual machine from one storage datastore to another with zero downtime.
- **VMware VM Conversion:** Convert existing VMware virtual machines to the HVM hypervisor using the native conversion feature within the VM Essentials solution.
- **Native Data Protection:** Backup and restore VM Essentials virtual machines using the solution's native data protection feature.
- **Virtual Machine Snapshots:** Create, revert and delete snapshots for VMware and VM Essentials virtual machines.
- **External Storage Support:** The HVM hypervisor supports running virtual machines on external storage via iSCSI, NFS, and Fibre Channel. For this release of the Reference Architecture, external storage with iSCSI has been validated.

Key features of HPE Morpheus VM Essentials software for VMware and VM Essentials

- **Multi-Hypervisor Support:** VM Essentials enables simple provisioning and management of VM Essentials virtual machines as well as VMware virtual machines.
- **Centralized Identity & Single Sign-On (SSO):** Enable external user authentication using Active Directory (AD) or LDAP. Enable single sign-on with Okta, OneLogin, Azure AD, or SAML.
- **IPAM Integration:** Integrate with external IPAM providers (Infoblox, phpIPAM, BlueCat, SolarWinds) to automate the reservation of an IP address for the virtual machine during the provisioning process.
- **DNS Integration:** Integrate with external DNS providers (Infoblox, Microsoft DNS, BlueCat, SolarWinds) to automate the creation of DNS records for a virtual machine during the provisioning process.
- **Provisioning Automation:** Execute Bash or PowerShell scripts during virtual machine provisioning to automate system bootstrapping operations.
- **Day 2 Automation:** VM Essentials supports the execution of Bash and PowerShell scripts on provisioned and discovered virtual machines.
- **Secrets Management:** Securely store and retrieve secrets from Cypher, the native secrets manager for use with the embedded Bash and PowerShell task automation feature.
- **HTML 5 Virtual Machine Console:** Access the console of VM Essentials virtual machines and VMware virtual machines via the HTML5 VM console.

Target audience: This document is intended for IT decision makers as well as architects, system engineers, partners, and system administrators who want to understand the capabilities of enterprise-ready VMaaS solutions using the HPE Synergy 480 Gen11 Compute Modules and HPE Morpheus VM Essentials software. The reader should be well-versed with virtualization, enterprise networking, storage, and HPE Synergy 480 Gen11 Compute Modules. For assistance with the deployment of HPE Synergy 480 Gen11 Compute Modules with VM Essentials, contact your Hewlett Packard Enterprise Representative or channel partner.

Document purpose: The purpose of this document is to demonstrate the capabilities of HPE Morpheus VM Essentials Software as an enterprise-ready hybrid cloud solution by leveraging the combined value of VM Essentials, HPE Synergy servers, and the HPE Alletra Storage MP B10000. This integrated stack provides a flexible, scalable, and easy-to-deploy infrastructure suitable for both general-purpose and mission-critical workloads. It offers guidance and best practices for deploying VM Essentials on HPE Synergy 480 Gen11 Compute Modules with the HPE Alletra Storage MP B10000 iSCSI array in a greenfield environment. While this document provides a recommended deployment approach, it is not intended to represent the only supported scenario or address all possible customer use cases and environments. This Reference Architecture describes solution testing performed in August 2025.

Introduction

Organizations are increasingly seeking ways to simplify virtualization management, reduce costs, and futureproof their IT infrastructure as they move towards hybrid cloud operating models. Traditional hypervisors like VMware have long dominated the virtualization landscape but come with rising costs and limited flexibility in hybrid environments. There is a growing need for a modern, cost-effective, and integrated platform that can manage existing VMware environments while enabling a seamless transition to open, cloud-ready architectures.

HPE Morpheus VM Essentials Software is designed to address these needs by offering a unified solution that supports both VMware and HPE's native KVM-based virtualization stack. It provides enterprises with a simplified, flexible, and enterprise-grade foundation to manage and scale their virtual workloads—on-premises or across hybrid cloud environments.

VM Essentials empowers organizations to efficiently manage and modernize their virtual infrastructure through four core pillars:

Integrated management of VMware and HPE native KVM workloads

With VM Essentials, customers can continue managing existing VMware workloads while gradually re-platforming to HPE's native KVM-based hypervisor. This dual-stack approach provides a consistent and intuitive management experience, enabling VM provisioning, lifecycle management, and automation across both VMware ESXi and HPE KVM environments—all from a unified interface.

Cost optimization with a built-in KVM hypervisor

VM Essentials includes a powerful, built-in KVM-based hypervisor that delivers essential enterprise-grade features such as:

- Support for Ceph, NFS, iSCSI, and Fibre Channel storage
- Distributed workload placement
- VM high availability and live migration
- Integrated data protection
- Image conversion from VMware to KVM

This helps customers significantly reduce licensing costs while maintaining the performance, scalability, and resiliency required for production workloads.

Futureproof architecture with flexible deployment options and Enterprise-Grade support

HPE Morpheus VM Essentials Software is offered as both a standalone software solution and as part of HPE Private Cloud offerings, starting with HPE Private Cloud Business Edition. It also provides a seamless upgrade path to the HPE Morpheus Enterprise Software, enabling advanced hybrid cloud management, governance, and FinOps capabilities. By enabling a progressive transition strategy, customers can modernize at their own pace while avoiding vendor lock-in. This flexibility allows customers to scale and evolve their virtualization strategy as their business evolves.

Lower risk with Enterprise-Grade support and ecosystem integration

Built on a proven KVM foundation, VM Essentials is backed by HPE enterprise-class global support to ensure consistent performance and reduce operational risk. HPE is also working closely with its ecosystem of Independent Software Vendors (ISVs) to expand certification and compatibility for key enterprise workloads such as Data Protection, Virtual Desktop Infrastructure (VDI), Enterprise Resource Planning (ERP) systems, and more ensuring a reliable and supported platform across a wide range of applications. Existing Independent Software Vendors (ISVs) support matrix can be found in the compatibility matrix support.hpe.com/hpesc/public/VME_Compatibility_Matrix.

HPE Morpheus VM Essentials solution overview

This Reference Architecture demonstrates best practices and typical deployment to support customers building a cloud solution in an enterprise data center and deploying applications in an automated manner. The solution design is based on HPE VM Essentials on HPE Synergy 480 Gen11 Compute Modules connected to HPE Alletra Storage MP B10000 iSCSI storage. HPE VM Essentials, comprising of HPE VM Essentials (HVM) hypervisor and HPE VM Essentials manager, provides a unified platform for managing both HPE VM Essentials (HVM) cluster and VMware-based environments.

This Reference Architecture demonstrates the following supported components for HPE VM Essentials Software:

- **HPE Servers** - HPE Synergy 480 Gen11 Compute Modules listed in the compatibility matrix support.hpe.com/hpesc/public/VME_Compatibility_Matrix.
- **HPE Storage** –The HPE Alletra Storage MP B10000 is configured as principal block storage for the HPE Synergy 480 Gen11 Compute Modules over iSCSI.
- **HPE Networking** – HPE Aruba 8325 (Top of Rack) connects the HPE Synergy servers and HPE Alletra Storage MP B10000. Aruba 6300 (Out of Band Management) switches provide management network connectivity for HPE Synergy composer, HPE Alletra Storage MP B10000, and Aruba 8325 switches.
- **HPE VM Essentials Manager** - Enables the HPE VM Essentials administrator to easily manage array storage, datastores, and virtual machines.

Figure 2 shows the HPE VM Essentials solution stack validated by Hewlett Packard Enterprise.

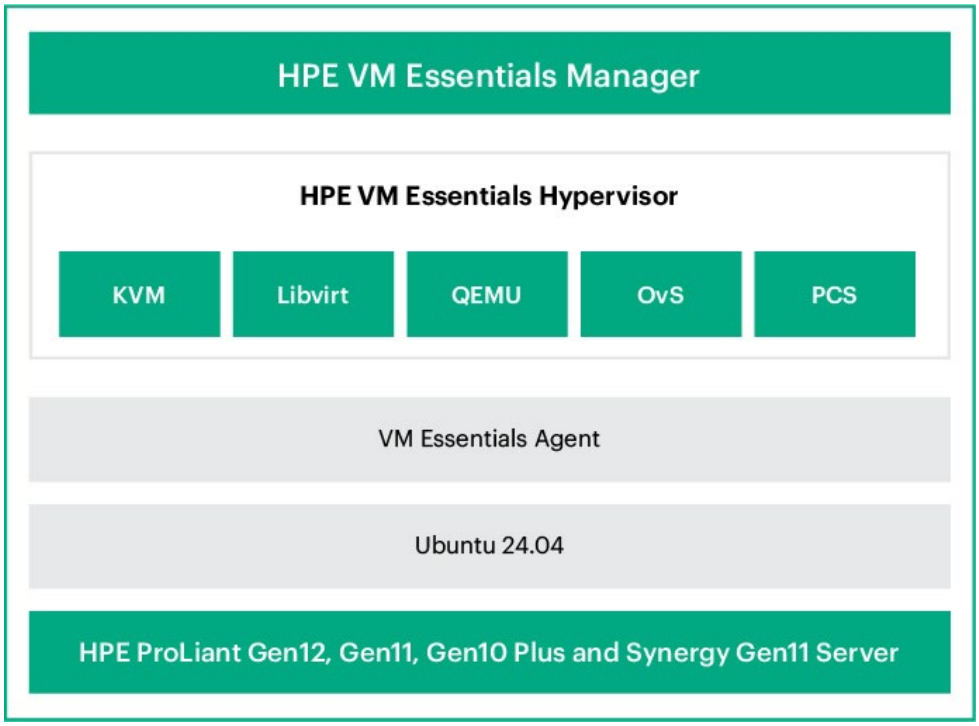


Figure 2. Diagram layout showcasing the HPE VM Essentials solution stack

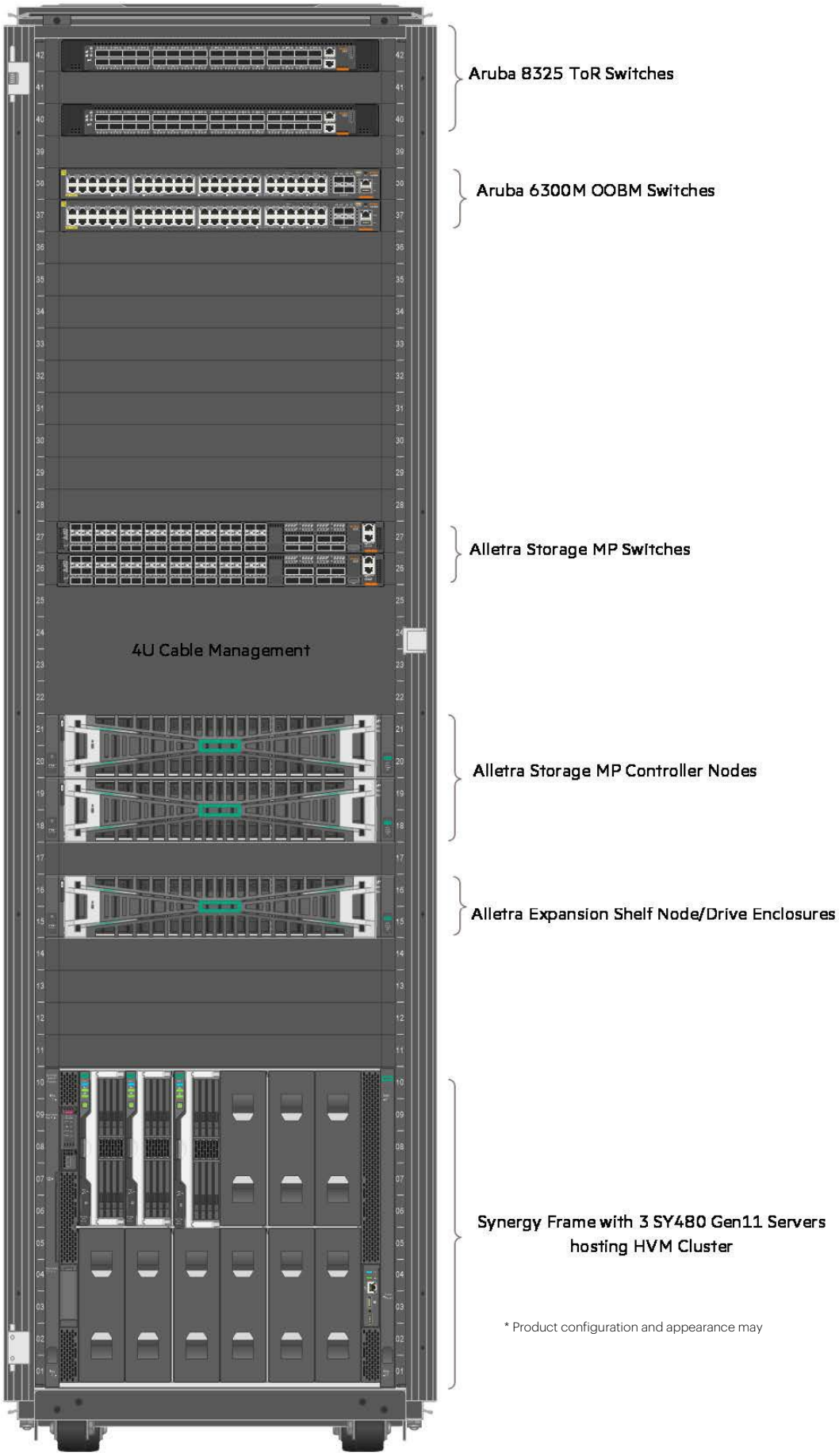


Figure 3. Overview of Hewlett Packard Enterprise VM Essentials Rack

HPE Morpheus VM Essentials software solution components

HPE VM Essentials and HPE Virtualization hypervisor (HVM hypervisor) is validated on the HPE Synergy 480 Gen11 Compute Modules and is tested with the hardware and software components listed in the following sections:

Collateral documentation can be found at hpe.com/us/en/hpe-vm-essentials.html.

Software

The logical architecture of the validated VM Essentials stack comprises the following components:

HPE VM Essentials Manager

The VM Essentials Manager provides KVM clustering, identity management, virtual machine provisioning, monitoring, and logging. The HPE VM Essentials Manager will be downloaded from the HPE Software center and installed as a pre-packaged virtual appliance. It is installed as a KVM-based virtual machine on any single host which will be part of the cluster. The manager itself is running on an Ubuntu 24.04 HVM host and can be installed in one of three pre-defined sizes as follows:

- **Small**: 2 vCPUs and 12 GB RAM (Manages a maximum of 1 HPE VM Essentials (HVM) cluster)
- **Medium**: 4 vCPUs and 16 GB RAM (Manages a maximum of 3 HVM clusters)
- **Large**: 4 vCPUs and 32 GB RAM (Manages a maximum of 10 HVM clusters)

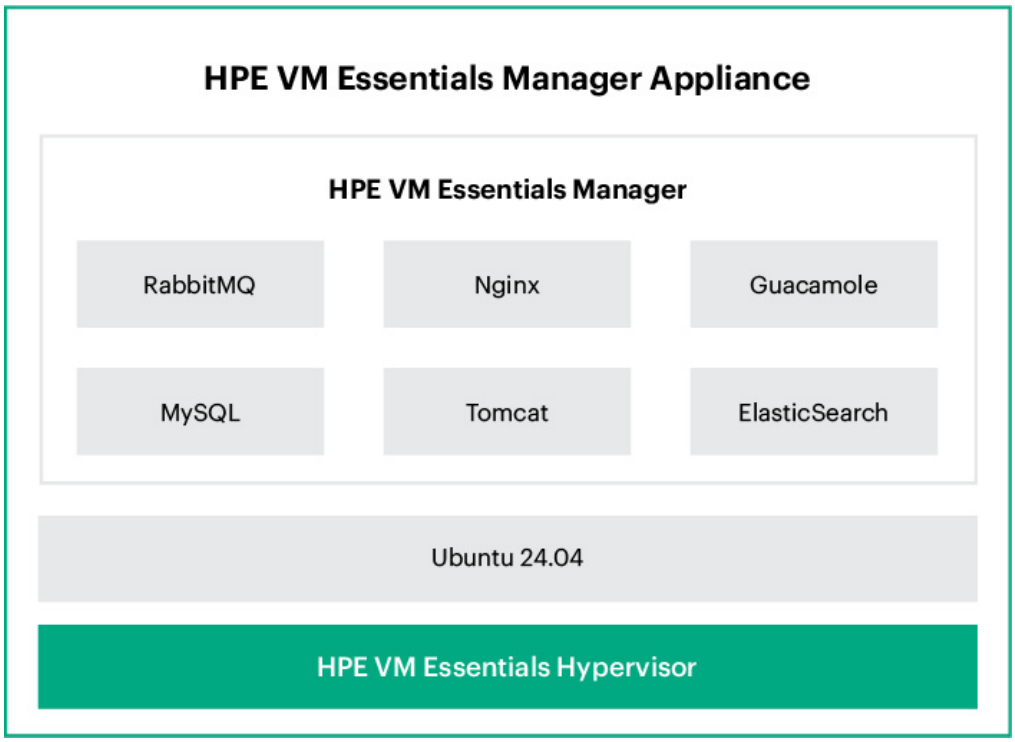


Figure 4. HPE VM Essentials Manager layout diagram

HPE VM Essentials Hypervisor

HVM hypervisor is a KVM-based hypervisor hosting virtual machines being managed by the VM Essentials Manager.

- **CPU**: One or more 64-bit x86 CPUs, 1.5 GHz minimum with Intel® VT or AMD-V enabled.
- **Memory**: 8 GB minimum.
- **Disk Space**: For the Ubuntu 24.04 operating system, a minimum of 50 GB disk space is required, with at least 15 GB specifically allocated to the OS partition. The virtual image datastore must maintain at least 20% usable free space to avoid automatic deletion of older images. Clusters can be configured with external storage options

such as iSCSI, Fibre Channel, or NFS. In deployments where Ceph is used as a storage solution using internal drives - a minimum of 500 GB is required for the data disk during testing, with larger capacities recommended for production environments.

– **Network Connectivity**: HVM Hypervisor hosts must be assigned static IP addresses. They also need DNS resolution for VM Essentials Manager and Internet access to download and install system packages for VM Essentials dependencies, such as KVM, Open vSwitch (OVS), and more.

– A minimum of three hypervisor hosts are required to create an HVM cluster.

The following network ports are being used for communication in the VM Essentials solution between components.

Table 1. HPE VM Essentials Software Network Communication Ports

Description	Source	Destination	Port	Protocol
Morpheus Agent communication with the Morpheus appliance	HPE VM Essentials Hypervisor Host	HPE VM Essentials Manager	443	TCP
HPE VM Essentials Hypervisor host configuration and management	HPE VM Essentials Manager	HPE VM Essentials Hypervisor Host	22, 5900	TCP
HPE VM Essentials Hypervisor interhost communication for clustered deployment	HPE VM Essentials Hypervisor Host	HPE VM Essentials Hypervisor Host	22, 2224,3121, 5403, 5404, 9929, 21064	TCP
HPE VM Essentials Hypervisor interhost communication for clustered deployment	HPE VM Essentials Hypervisor Host	HPE VM Essentials Hypervisor Host	5405, 9929	TCP
Morpheus server SSH access for deployed virtual machines	HPE VM Essentials Manager	HPE VM Essentials Hypervisor-hosted virtual machines	22	TCP
Morpheus server/ WinRM (HTTP) access for deployed virtual machines	HPE VM Essentials Manager	HPE VM Essentials Hypervisor-hosted virtual machines	5985	TCP
Morpheus server WinRM (HTTPS) access for deployed virtual machines	HPE VM Essentials Manager	HPE VM Essentials Hypervisor-hosted virtual machines	5986	TCP

Morpheus Agent

The software that runs on each HVM hypervisor host and collects system stats, logs, and executes operations received from the VM Essentials Manager.

Ubuntu 24.04

The installation of the base Ubuntu 24.04 operating system is a prerequisite for deploying the HVM hypervisor. Ubuntu 24.04 can be installed either on local disks in the HPE Synergy 480 Gen11 Compute Modules or via boot from SAN using the HPE Alletra Storage MP B10000. A minimum of 50 GB disk space is required for the installation. During the Ubuntu 24.04 installation with LVM (Logical Volume Manager), the installer does not automatically allocate all available disk space. Ensure that the full disk space is manually allocated during the OS disk partitioning step.

HPE Synergy Service Pack

The HPE Synergy Service Pack (SSP) is a collection of software, firmware, and drivers for HPE Synergy Compute Modules. It's delivered as an ISO image that can be used to update the firmware and systems software on HPE Synergy compute modules.

Hardware

This section will discuss the hardware components used in the Reference Architecture.

- **HPE Synergy Servers** - HPE Synergy 480 Gen11 Compute Module with 2-port 6820C 25/50Gb Converged Network Adapter in Mezzanine slot 3.
- **HPE Storage** – The HPE Alletra Storage MP B10000 is configured as principal block storage for the HPE Synergy 480 Gen11 Compute Modules over iSCSI.
- **HPE Networking** – HPE Aruba 8325 switches connect to HPE Synergy interconnect modules to transmit production traffic from HPE HPE Synergy 480 Compute Modules and to HPE Alletra Storage MP B10000 ethernet ports. HPE Aruba 6300M switches connect to HPE Synergy Frame Link Modules and HPE Alletra iLO interfaces to transmit management traffic.
- **HPE Aruba MP Switches** - With the HPE Alletra Storage MP B10000, HPE Aruba MP switches serve as the high-performance storage fabric backbone, enabling robust connectivity between HPE servers and storage controller nodes, as well as between controller nodes and disk enclosures. For smaller deployments or limited node scalability, the HPE Alletra Storage MP B10000 also supports switchless configurations through direct-attached connections, making it suitable for test environments or small-scale production setups.

HPE Synergy 12000 Frame

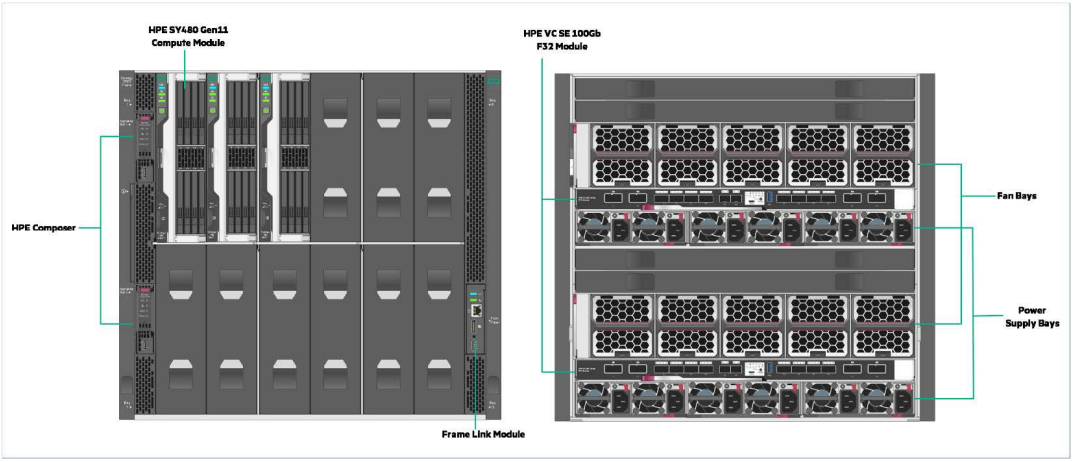
The HPE Synergy 12000 Frame is a base infrastructure of compute, storage, network fabric, and power into a scalable solution that addresses and scales various customer workloads. The HPE Synergy 12000 Frame reduces complexity in the IT infrastructure by unifying all these resources into a common bus, and with the myriad of available network and storage interconnects, which allow the frame to interoperate with any other IT environment.

In this solution, each HPE Synergy Frame has the following components:

- Three half-height compute modules with two Intel® Xeon® Platinum 8480 (4 GHz/56 cores), fully populated DIMMs, and HPE NS204i-d Gen11 Boot Controller with two 480 GB SSDs.
- Frame link module for in-band and out-of-band management
- Supports up to six power bays, each capable of housing two HPE Flexible Slot power supplies ranging from 1800W to 2200W, when used with the HPE Synergy Dual Slot Power Supply Adapter
- Ten fan bays
- Two HPE Synergy VC SE 100Gb F32 interconnect

The HPE Synergy 12000 Frame features a fully automated and managed composer module using HPE OneView, contained within the HPE Synergy Composer module. HPE OneView handles all the setup, provisioning, and management both at physical and logical levels.

Figure 5 shows the front and rear views of the HPE Synergy 12000 Frame with 3 SY480 Gen11 compute modules in Bay 1 to 3.



* Product configuration and appearance may

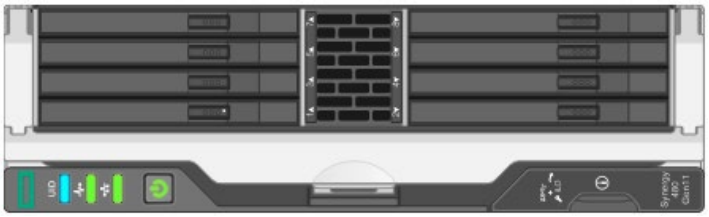
Figure 5. HPE Synergy Frame Front and Rear View

HPE Synergy 480 Gen11 8EDSFF Compute Module

The HPE Synergy 480 Gen11 Compute Module delivers superior capacity, efficiency, and flexibility in a two-socket, half-height, single-wide form factor to support demanding workloads. Powered by the latest 4th and 5th Generation Intel® Xeon® Scalable Processors upto 64 cores and featuring support for up to 4TB of HPE DDR5 SmartMemory, flexible storage controller options, multiple I/O connectors, and designed to create a pool of flexible compute capacity within a composable infrastructure, the HPE Synergy 480 Gen11 Compute Module is an ideal platform for general-purpose enterprise workload performance now and in the future.

The solution as presented in this Reference Architecture contains one (1) HPE Synergy 12000 Frame consisting of three (3) HPE HPE Synergy 480 Gen11 Compute Modules.

Figure 6 shows the HPE HPE Synergy 480 Gen11 8EDSFF Compute Module.



* Product configuration and appearance may

Figure 6. HPE Synergy 480 Gen11 8EDSFF Compute Module

HPE Virtual Connect SE 100Gb F32 Module

The HPE Virtual Connect SE 100Gb F32 Module, the master module based on HPE Synergy composable fabric is designed for composable infrastructure. The disaggregated, rack-scale design uses a master/satellite architecture to consolidate data center network connections, reduce hardware, and scale network bandwidth across multiple HPE Synergy 12000 Frames. The master module contains intelligent networking capabilities that extend connectivity to satellite frames through Interconnect Link Modules. This decreases top of rack switch needs and substantially reduces costs. The components reduction simplifies fabric management at scale although consuming fewer ports at the data center aggregation layer.

The HPE Virtual Connect SE 100Gb F32 Module for HPE Synergy eliminates network sprawl at the edge with one device that converges traffic inside the HPE Synergy 12000 Frames and directly connects to external LANs.

Figure 7 shows the HPE Virtual Connect SE 100Gb F32 Module.

* Product configuration and appearance may

Figure 7. HPE Virtual Connect SE 100Gb F32 Module

HPE Synergy 6820C 25/50Gb Converged Network Adapter

The HPE Synergy 6820C 25/50Gb Converged Network Adapter is a key element in HPE Synergy composable fabric connecting pools of compute resources to networks with reliable, high-performing converged Ethernet connectivity up to 50Gb. The HPE Synergy 6820C 25/50Gb Ethernet Adapter provides more than two times the bandwidth compared to 10/20Gb adapters. Therefore, it simplifies hardware implementation by reducing the number of adapters, associated switches, and compute modules required to achieve higher bandwidth.

HPE Aruba 8325 Top of Rack Switches

The HPE Aruba 8325 Switches offers a flexible and innovative approach to addressing the application security and scalability demands of the mobile, cloud, and IoT era. These switches serve the needs of the next-generation core and aggregation layer, as well as emerging data center requirements at the Top of Rack (ToR) and End of Row (EoR). The Aruba 8325 series include industry leading line rate ports 1/10/25GbE (SFP/SFP+/SFP28) and 40/100GbE (QSFP+/QSFP28) with connectivity in a compact 1U form factor.

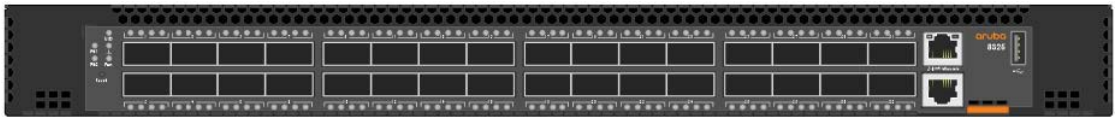


Figure 8. Aruba 8325 32Y8C Switch

* Product configuration and appearance may

HPE Aruba 6300M Out of Band Management Switches

The HPE Aruba CX 6300 Switch Series is a modern, flexible, and intelligent family of stackable switches ideal for enterprise network access, aggregation, core, and data center top of rack (ToR) deployments. Created for game-changing operational efficiency with built-in security and resiliency, the Aruba 6300 switches provide the foundation for high-performance networks supporting IoT, mobile, and cloud applications.

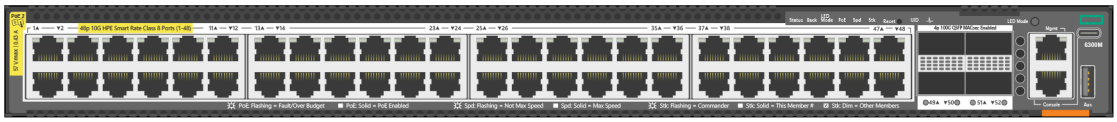


Figure 9. Aruba 6300M Switch

* Product configuration and appearance may

HPE Alletra Storage MP B10230

HPE Alletra Storage MP B10230 provides mission-critical storage at midrange economics with the industry's first disaggregated, scale-out block storage with a 100% data availability guarantee. It provides simplified deployment, operations, and reduces on-premises storage complexity across the lifecycle—from installation to upgrade.

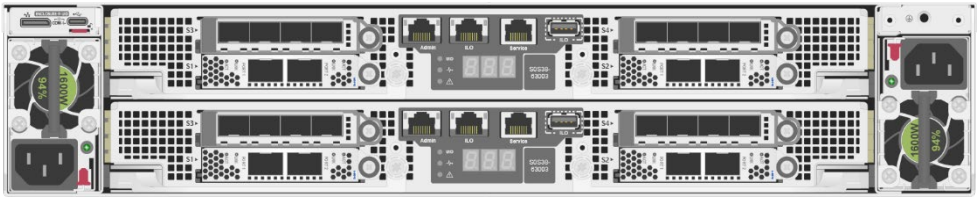


Figure 10. HPE Alletra Storage MP B10230

* Product configuration and appearance may

HPE Alletra Storage MP Drive Enclosure

HPE Alletra Storage MP Drive Enclosures help extend the storage capacity of the storage array. Each enclosure contains multiple slots for either small or large form factor drives. Drive enclosures also contain Input/Output modules (cards), and a pair of PCMs (power-cooling modules) for redundant power and cooling of the enclosure.

Front View

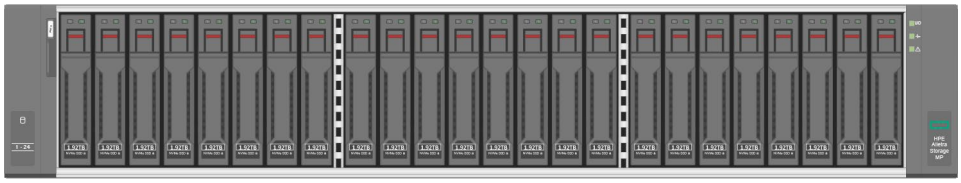


Figure 11. Front View-HPE Alletra Storage MP

* Product configuration and appearance may

Rear View

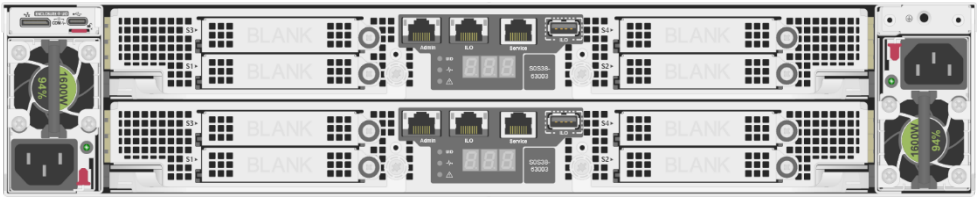
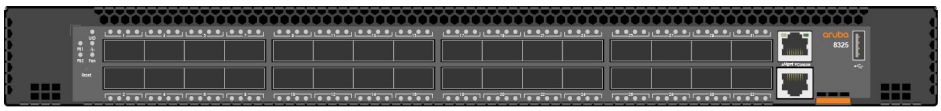


Figure 12. Rear view –HPE Alletra Storage MP

* Product configuration and appearance may

HPE Alletra Storage MP Aruba 8325 Switches

HPE Alletra Storage MP array comes with HPE Aruba 8325 switches included. These switches are used to connect HPE Alletra Storage MP controller nodes with disk enclosures and help with easy expansion of the storage capacity.



* Product configuration and appearance may

Figure 13. HPE Alletra Storage MP Aruba 8325 Switches

Software and firmware compatibility matrix

The following table outlines the software and firmware components used in the solution. While it provides a reference matrix, it does not represent the only supported versions. The goal of the Reference Architecture is to utilize the latest firmware and operating system versions available at the time of building the solution.

Additionally, the HPE Morpheus VM Essentials Software Compatibility matrix can be found here support.hpe.com/hpesc/public/docDisplay?docId=sd00006472en_us&page=GUID-EA7C0803-E66B-4B17-B994-30D4025A258F.html.

Table 2. Software and firmware version of components used in the solution

Component	Version
HPE Morpheus VM Essentials Software	8.0.7
SSP for HPE VM Essentials nodes	HPE Synergy_Service_Pack_SSP_2025.05.01_Z7550-97975.iso
Ubuntu OS	24.04.2
Aruba CX 8325 Switch (R9F67A)	10.13.1090 {ArubaOS-CX_8325_10.13.1090}
Aruba 6300M Switch (R9F63A)	10.13.1090 {ArubaOS-CX_6400-6300_10.13.1090}
HPE Synergy Composer 2	10.0
Aruba Fabric Composer (AFC)	7.1.1 {ArubaFabricComposer-7} Note: Aruba Fabric Composer orchestrates a discrete set of switches as a single entity called a fabric which significantly simplifies operations and troubleshooting
HPE Alletra Storage MP B10000 OS	10.4.5

Network architecture and requirements

This section outlines the network architecture for the VM Essentials solution deployed on HPE Synergy and HPE Alletra iSCSI.

HPE Aruba 6300M switches are used as out of band management switches and HPE Aruba 8325 switches are used as production switches for the HPE VM Essentials cluster. All the out of band management networks i.e., frame link modules on HPE Synergy frame, HPE Aruba 8325 management interfaces, and HPE Alletra iLO management ports connect to 6300M switches with 1G speed. VM Essentials Host management and compute networks connect to both Aruba 8325 switches.

iSCSI A network from HPE Synergy frame ICM3 and HPE Alletra Storage MP connect to Aruba switch A and iSCSI B network from HPE Synergy frame ICM6 and HPE Alletra Storage MP connect to HPE Aruba switch B as shown in the following figure.

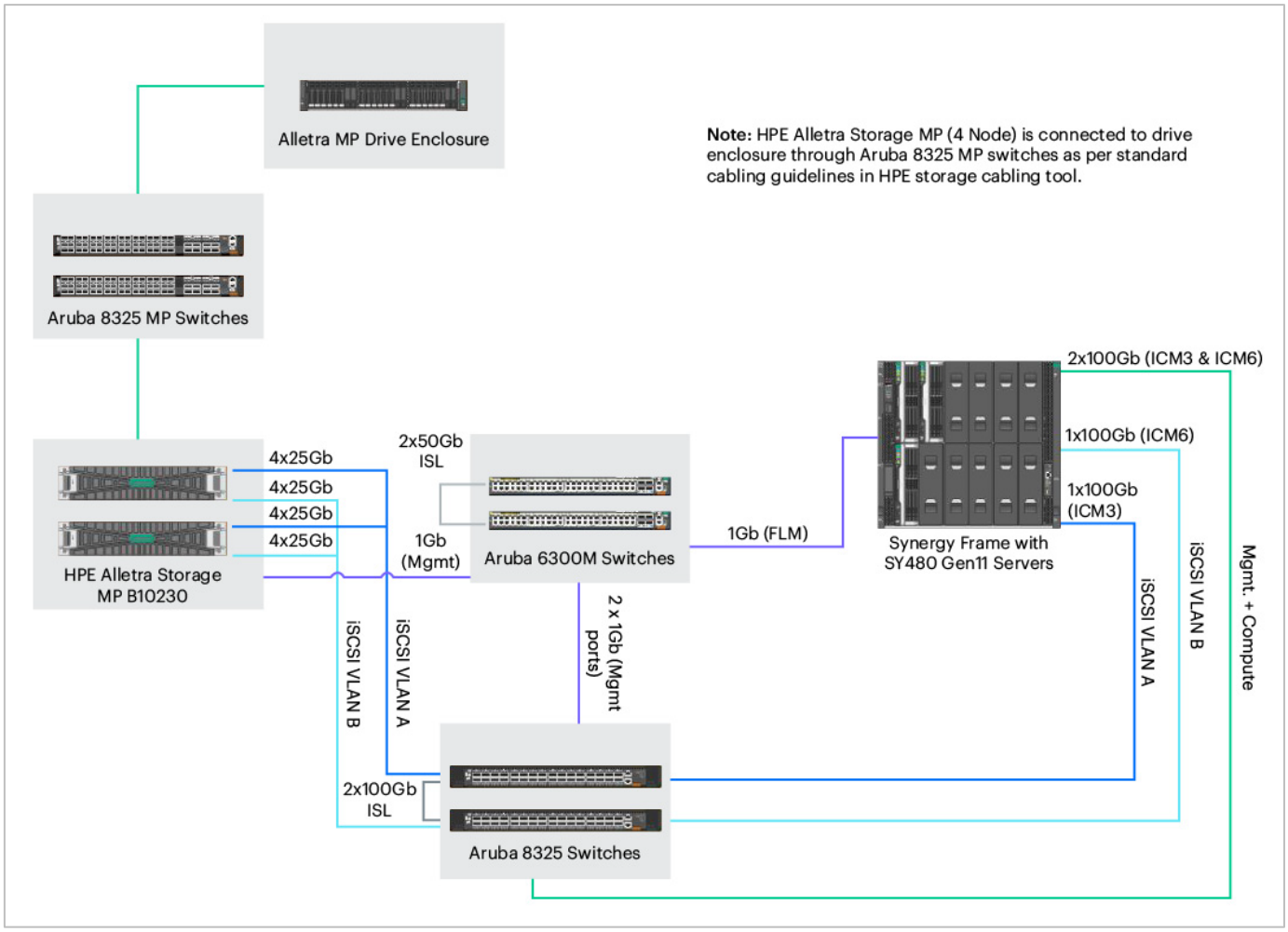


Figure 14. Network Layout with Aruba Switches and HPE Alletra iSCSI

Management and compute VLANs are sent over a single uplink set connecting to ports in both ICM 3 and ICM 6. Whereas iSCSI A and iSCSI B are kept separate with iSCSI A uplink set from HPE Synergy ICM 3 connecting to Aruba Switch A and iSCSI B uplink set from HPE Synergy ICM 6 connecting to Aruba Switch B to ensure performance and redundancy on storage networks. The separation of two iSCSI networks helps avoid any issues related to broadcast storms or loops on one network that might inadvertently effect storage network performance.

In this solution, Q1 ports on both interconnect modules connect to Aruba Switch A and Aruba Switch B respectively through Mgmt. and compute uplink set. This uplink set is configured to transmit host management and compute traffic for HVM cluster. Q2 port on interconnect module 3 connect to Aruba Switch A through iSCSI A uplink set and Q2 port on interconnect module 6 connect to Aruba Switch B through iSCSI B uplink set.

The following figure shows how server profiles hosting VM Essentials servers with iSCSI connect to HPE Synergy interconnects and Aruba switches. Ports Q7 and Q8 on ICM 3 and ICM 6 are connected to each to form stacking links.

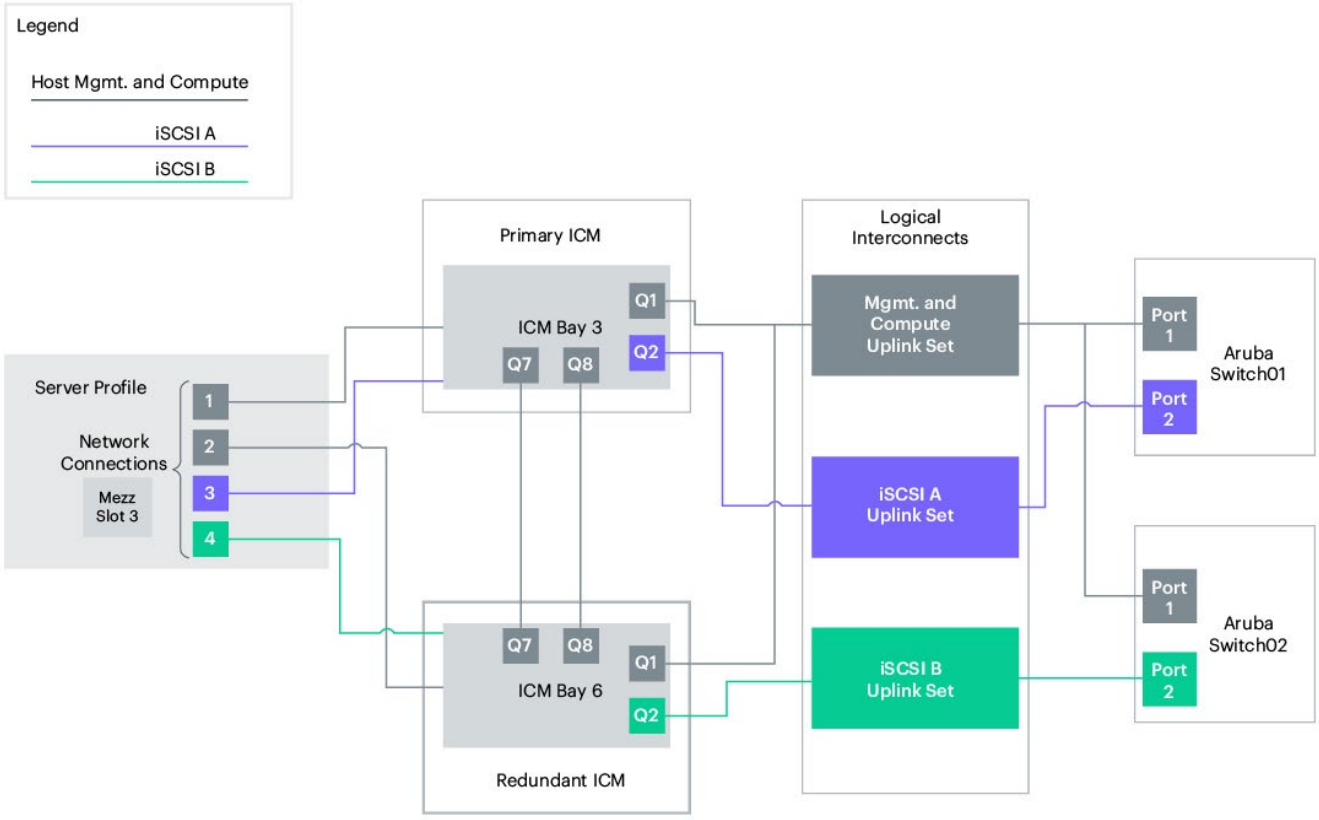


Figure 15. Connectivity from Server Profiles to HPE Synergy Interconnect Modules to Aruba Switches

Storage architecture and requirements

HPE Alletra Storage MP B10000 is a disaggregated, scale-out block storage solution designed to deliver 100% data availability while ensuring mission-critical storage at midrange economics. It is built on the HPE Alletra Storage MP hardware platform and is managed via GreenLake cloud, bringing cloud agility, performance, and resiliency to mission-critical workloads.

Architecture overview

Disaggregated, Scale-Out Design: The architecture allows for independent scaling of performance and capacity, enabling organizations to tailor their storage infrastructure to specific workload requirements.

Composable Building Blocks: The system is built using a chassis that can house compute nodes and storage media. For instance, Just a Bunch of Flash (JBOF) expansion shelf includes storage media and two controllers, each equipped with an operating system RAM, and CPU. This design ensures flexibility in configuring storage solutions.

Multi-Protocol Support:
The HPE Alletra Storage MP B10000 offers broad support for multiple storage protocols, making it ideal for a wide range of application environments.

Switch-Based Deployment (Enterprise-Scale):
- Leverages ethernet or Fibre Channel switches to enable high scalability and redundancy.
- Hosts connect through a redundant switch fabric to ensure high availability and fault tolerance.
- Ideal for large-scale, mission-critical enterprise workloads requiring maximum uptime and flexibility.

Direct-Attached Deployment (Switchless):

- Storage nodes are connected directly to hosts using NVMe, iSCSI, or Fibre Channel interfaces.
- Simplified architecture with reduced cost and setup complexity.
- Best suited for edge deployments, test environments, or smaller-scale production use cases with limited scalability requirements.

Note

For this Reference Architecture switched storage array was used which are supported by HPE Alletra Storage MP Switches. These switches are used to connect HPE Alletra Storage MP B10000 controller nodes with disk enclosures and help with easy expansion of the storage capacity.

Configuration guidance for the solution

Prerequisites

HPE Synergy 480 Gen11 Compute Modules

Qualified HPE Synergy servers are listed in the HPE VM Essentials Software Compatibility Matrix hpe.com/support/VME-Compatibility-Matrix.

Network

- **Out of Band Management Switch**: A pair of Aruba 6300M OOBM switches to support management traffic.
- **Top of Rack Switch**: A pair of Aruba 8325 Top of Rack switches to support production or compute traffic.
- **Management VLAN**: One dedicated network (VLAN) created on OOBM and ToR switches to manage components of HPE Synergy frame such as SY480 compute modules and interconnects through HPE Synergy composer and also hosts(ubuntu) of HPE VM Essentials cluster.
- **Compute VLAN**: One network (VLAN) created on ToR switches for workload traffic. If the user needs isolation for workloads, more compute VLANs can be created as required.
- **iSCSI VLANs**: iSCSI VLANs created on ToR switches, one for iSCSI VLAN A created on Aruba 8325 A and another for iSCSI VLAN B created on Aruba 8325 B.

Software

HPE Gen11 SSP: HPE SY480 Gen 11 SSP (HPE Synergy_Service_Pack_SSP_2025.05.01_Z7550-97975) available at HPE Synergy Service Pack. Active contract is required to download the HPE HPE Synergy Service Pack (SSP).

Ubuntu Server: Ubuntu Server version 24.04 available at releases.ubuntu.com/jammy/.

HPE Morpheus VM Essentials Software and HPE VM Essentials Manager: VM Essentials software version 8.0.7 and VM Essentials Manager comes bundled in a single package file named HPE_VM_Essentials_SW_image_8.0.7_S5Q83-11017.iso. For customer or partner's access to VM Essentials software, contact your Hewlett Packard Enterprise Sales Representative.

Storage

The storage provisioning process requires that physical connectivity is properly established between the HPE VM Essentials nodes, the HPE Alletra Storage MP B10000 storage array, and the associated HPE network switches. Additionally, the storage array must be initialized and accessible via the HPE Data Services Cloud Console (DSCC) to enable configuration management, monitoring, and lifecycle operations.

License

License is priced per CPU socket for HPE VM Essentials hypervisor nodes and service is made available in 1, 3 and 5 years terms. For licensing questions and trial licenses contact your Hewlett Packard Enterprise Sales Representative.

Server BIOS

Boot drives present on HPE Synergy 480 Gen11 Compute Modules need to be configured in **RAID 1** mode. Workload profile in HPE Synergy 480 Gen11 Compute Module BIOS should be set to **Virtualization – Max Performance**.

Other requirements

- Internet Connectivity is required on the management network to download and install the required packages and dependencies on HPE VM Essentials servers.
- NTP server to enable time sync on all Ubuntu HPE VM Essentials servers.
- HPE Alletra Storage MP B10000 array should have been activated and ready to be consumed and the scope of this Reference Architecture does not cover Cloud enablement, discovery setup and initialization.

Workflow

The following figure describes the high-level workflow for the HPE VM Essentials deployment. It is assumed that the configuration of HPE Synergy (Composer, logical interconnects, and server profiles) and HPE Alletra has been completed prior to initiating this workflow.

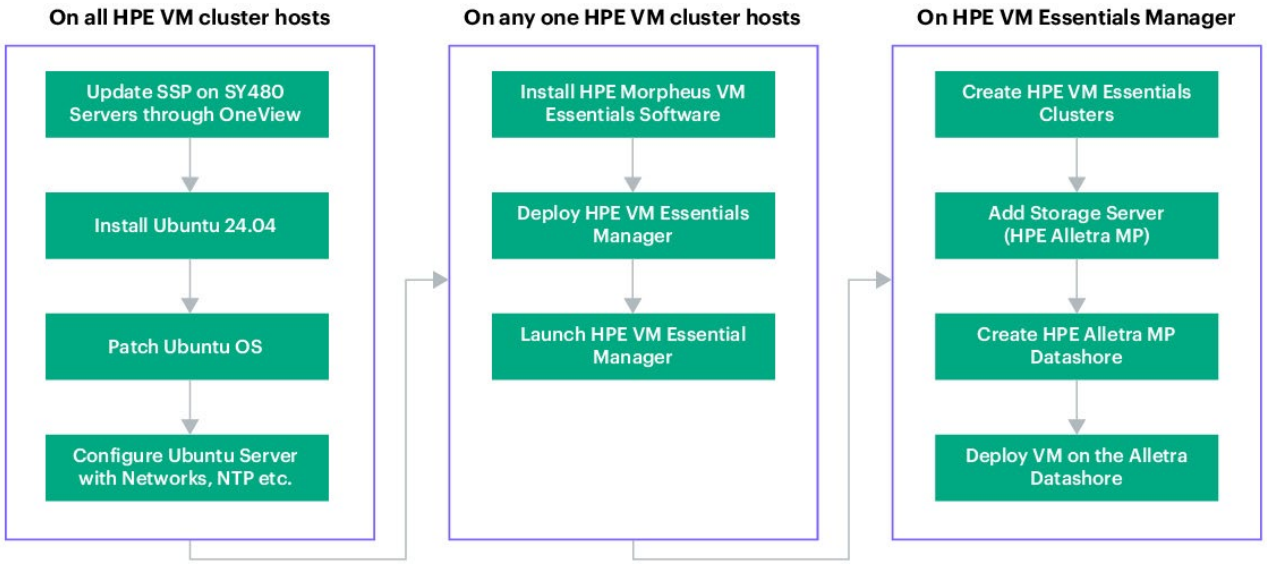


Figure 16. Workflow

Setup HPE Synergy frame

This section describes setting up of HPE Synergy frame with server profiles and networks required for VM Essentials cluster deployment. To begin with, networks required for VM Essentials cluster was created on HPE Aruba 8325 Top of Rack switches and HPE Synergy composer was upgraded to latest firmware version.

Logical Interconnects

Networks required for VM Essentials cluster deployment were created under the network section of HPE Synergy Composer (listed in Table 3) and added to ethernet logical interconnects (Interconnect Module 3 and Interconnect Module 6) with separate uplink sets created for Host management and compute, iSCSI A, and iSCSI B. A network set was created to include Host management and compute networks.

Note

iSCSI A and iSCSI B networks are created as untagged networks.

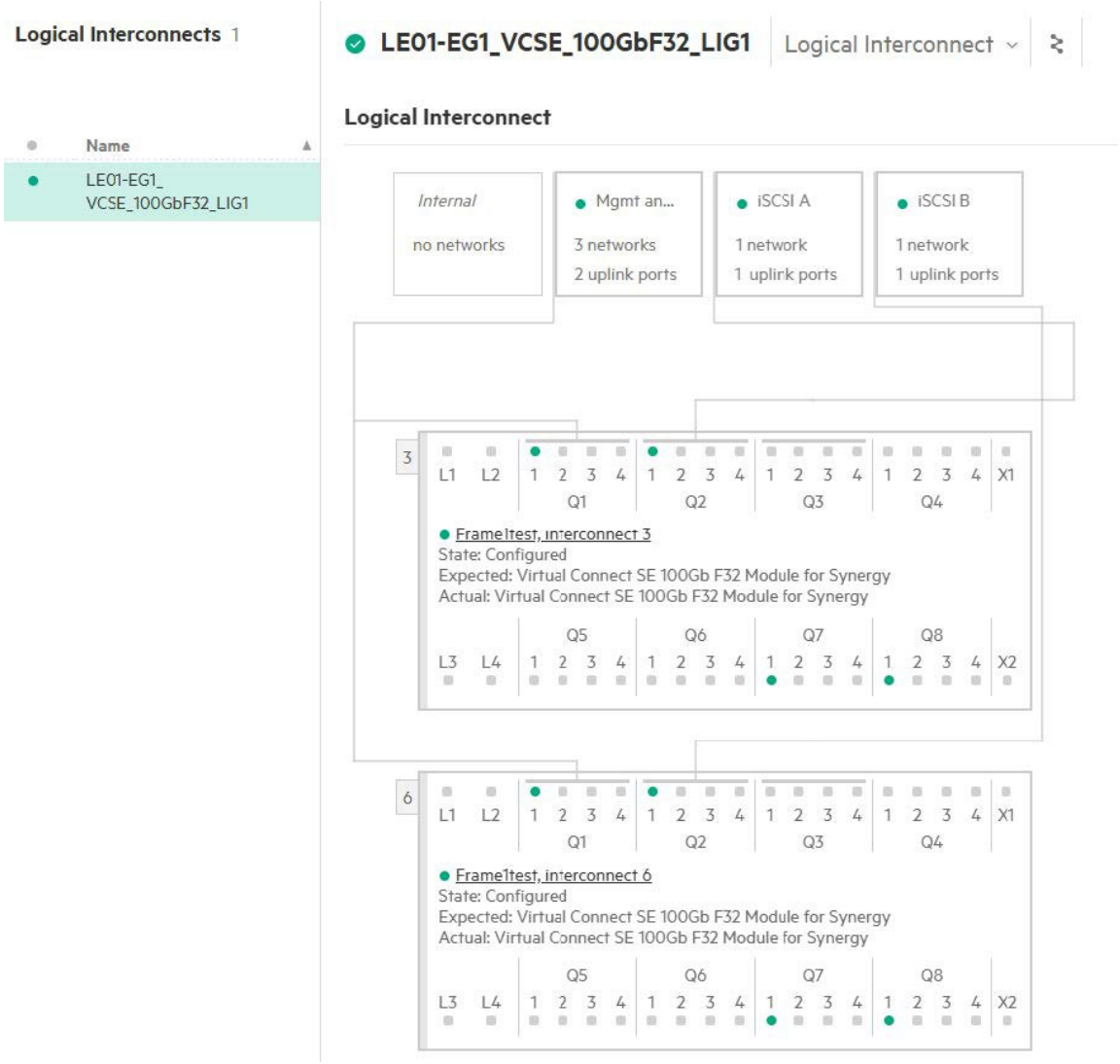


Figure 17. HPE Synergy Logical Interconnects

Network connections in server profiles

A server profile template was created containing all configuration elements required for VM Essentials server deployment, including firmware baseline, network connections, and boot settings. This server profile template serves as a blueprint for creating individual server profiles for the VM Essentials hosts. By inheriting the template's configuration, these server profiles ensure consistent deployment and simplify the management of multiple servers.

For VM Essentials hosts, four network connections were created on server profile as shown in Figure 18. First two network connections are the network set that includes host management and compute networks. Third network connection is iSCSI A network, and fourth network connection is iSCSI B network.

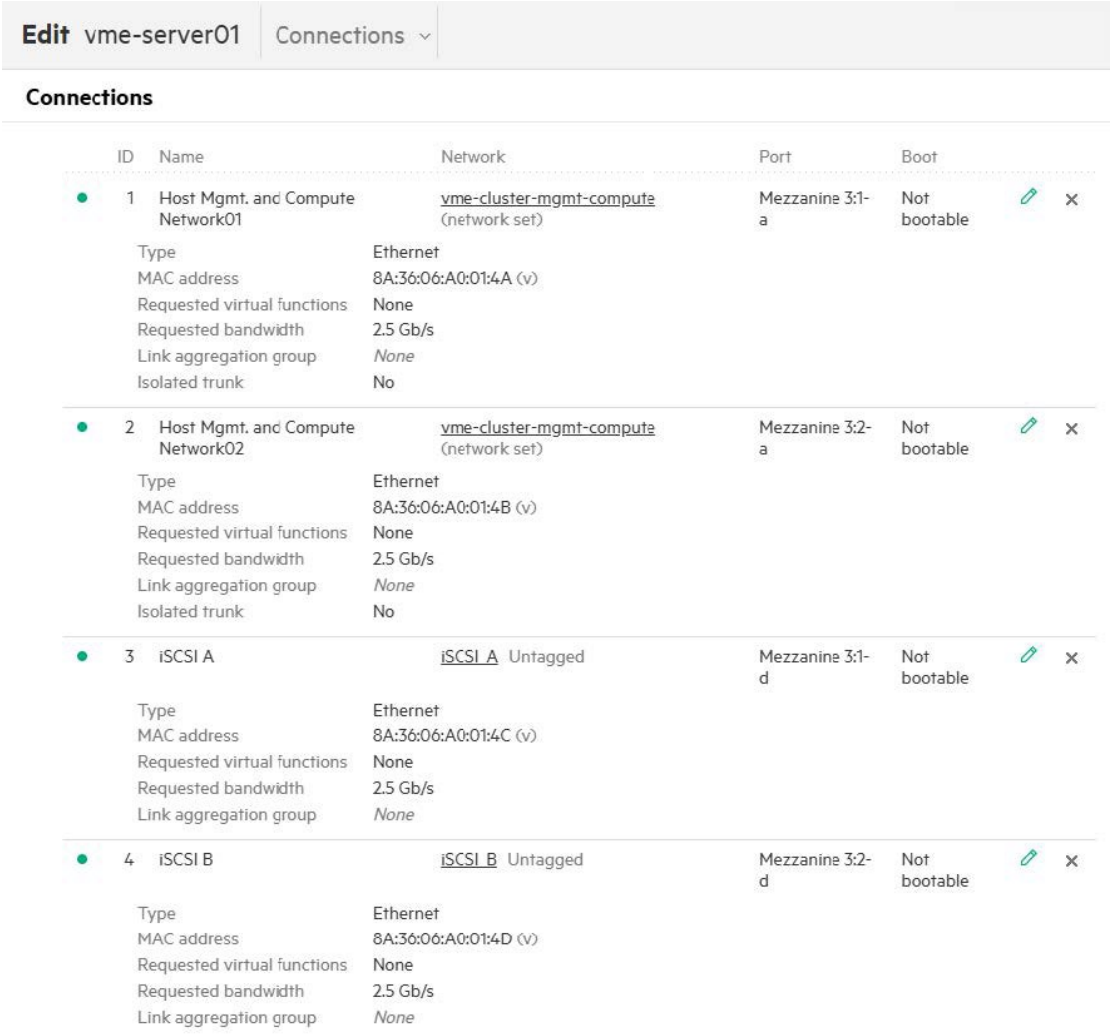


Figure 18. Network Connections in Server Profile

Note

HPE Synergy 4820C/6820C CNA modules support Ethernet only, with no hardware offload for iSCSI or FCoE. iSCSI connectivity is still possible using software iSCSI over Ethernet by setting the server profile network connection "Function Type" to Ethernet.

Advisory - support.hpe.com/hpesc/public/docDisplay?docId=emr_na-a00129603en_us

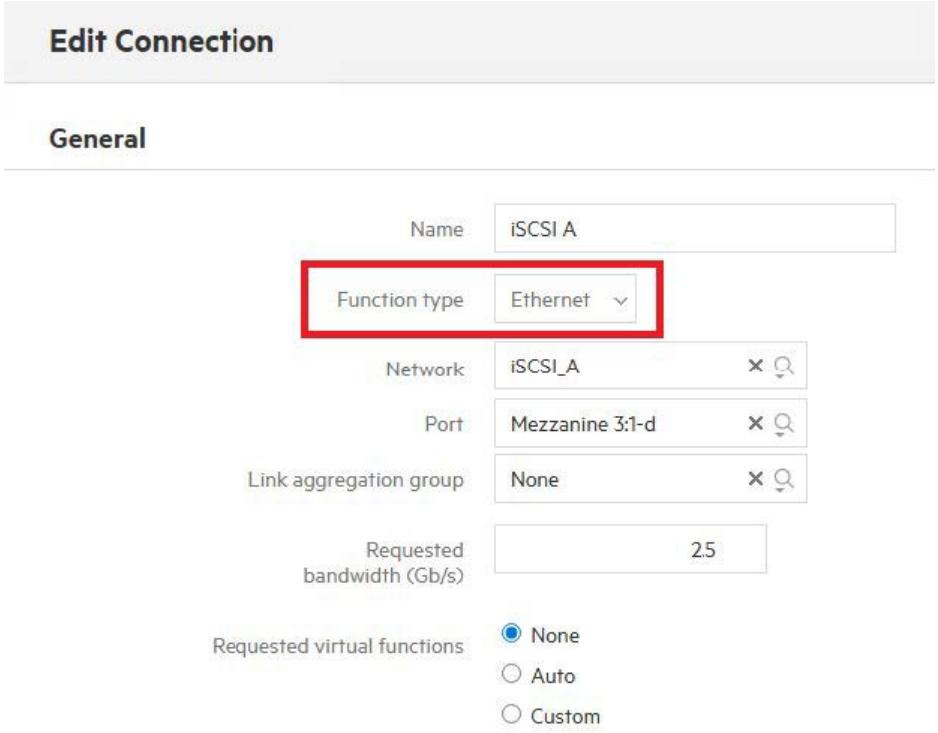


Figure 19. Ethernet as the Function Type for iSCSI Network Connections on Server Profile

To know more about setting up HPE Synergy Frame using HPE Synergy composer, see support.hpe.com/hpesc/public/docDisplay?docId=sd00006050en_us&docLocale=en_US.

Install and configure Ubuntu 24.04

This section discusses installation and configuration of Ubuntu 24.04 on HPE Synergy 480 Gen11 Compute Modules.

To install Ubuntu on the HPE Synergy 480 Gen11 Compute Module, perform the following steps:

1. Log into the iLO of the server and launch the iLO console.
2. Click **Virtual Media** and select Local *.iso file under option CD/DVD.
3. Select the downloaded Ubuntu Server 24.04.2 image.
4. Under **Menu**, select **Reset server**.
5. Select **F11** (Boot Menu) during reset and click 'iLO Virtual USB: iLO Virtual CD/DVD' option to start the installation.
6. Under GRUB GNU screen, select **Try and install Ubuntu**.
7. Select the type of installation as Ubuntu Server.

Ubuntu network setup

During the networking setup portion of the Ubuntu installation, bonding must be created for management and compute traffic.

1. Select the first two ethernet network adapters on the VM Essentials hosts to create a bond (Ex: bond0) with default load balancing algorithm. The following are the sample VLANs used in this solution validation.

Table 3. Sample VLANs

VLANs	Subnets	Purpose
101	172.28.1.0/24	HPE iLO, HPE Alletra Mgmt, and HPE VM Essentials Node Mgmt.
102	172.28.2.0/24	Compute (workloads)
103	172.28.3.0/24	iSCSI A
104	172.28.4.0/24	iSCSI B

2. After the bond is created, add a VLAN tag with management VLAN (Ex: 101) to create management virtual network adapter.
3. Add another VLAN tag with compute VLAN (Ex: 102) to create compute virtual network adapter.
4. Select the virtual adapter named bond0.<mgmt.-vlan-id> (Ex: bond0.101), choose **Edit** to activate the management network by selecting IPV4 Method as Manual and add the static IP address, DNS server, and DNS search domain for management network.
5. Select the virtual adapters named bond0.<compute-vlan-id> (Ex: bond0.102), choose **Edit** to activate the compute network by selecting IPV4 Method as Manual and add the static IP address for the compute network.
6. Select the third network adapter (this is the 3rd network under network connections in server profile) and configure it as the iSCSI A network.
7. Select the fourth network adapter (this is the 4th network under network connections in server profile) and configure it as the iSCSI B network.

The following figure shows the bonding created for management and compute networks.

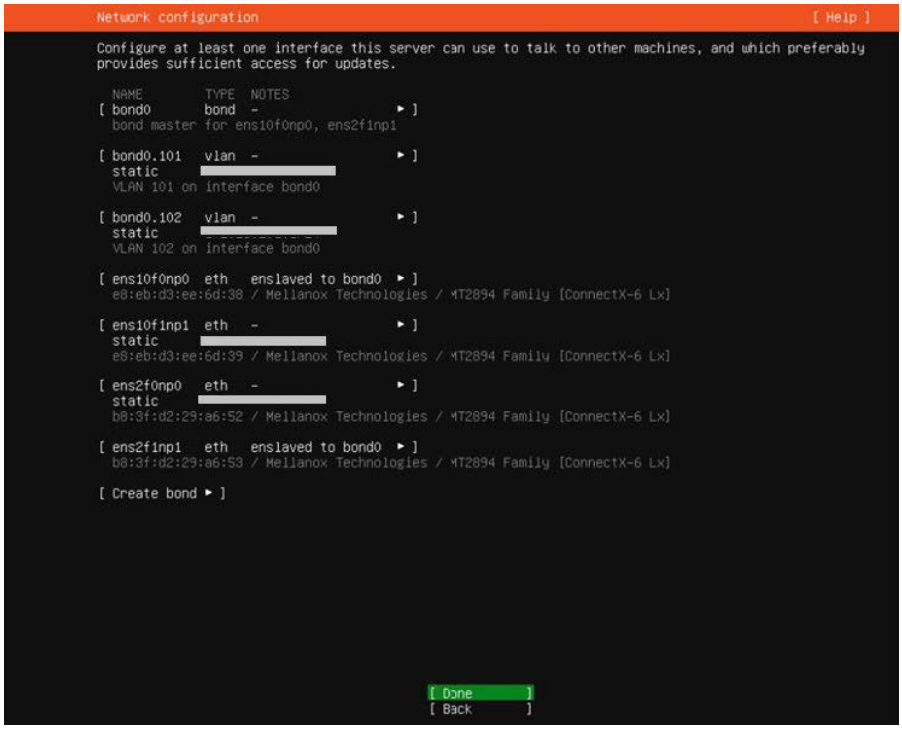


Figure 20. Ubuntu Network Setup

Ubuntu partition setup

During the storage setup portion of the Ubuntu installation, select 'use an entire disk' option and select the Gen11 boot drive that is configured in RAID1 mode. Then select **Set up this disk as an LVM group** option and optionally this LVM group can be encrypted with a passphrase.

After the disk is selected and LVM group is created, file system summary with mount points (for boot and root) will be shown to the end user. The entire boot disk is not utilized by default when creating a root logical volume. It is recommended to increase the root logical volume size to consume the entire size of the boot disk. This helps avoid the hassle of expanding the root disk later if more storage is required. The following figure shows the boot partition and root volume created on the Ubuntu OS using all available space on Gen11 boot drives in RAID1 mode.

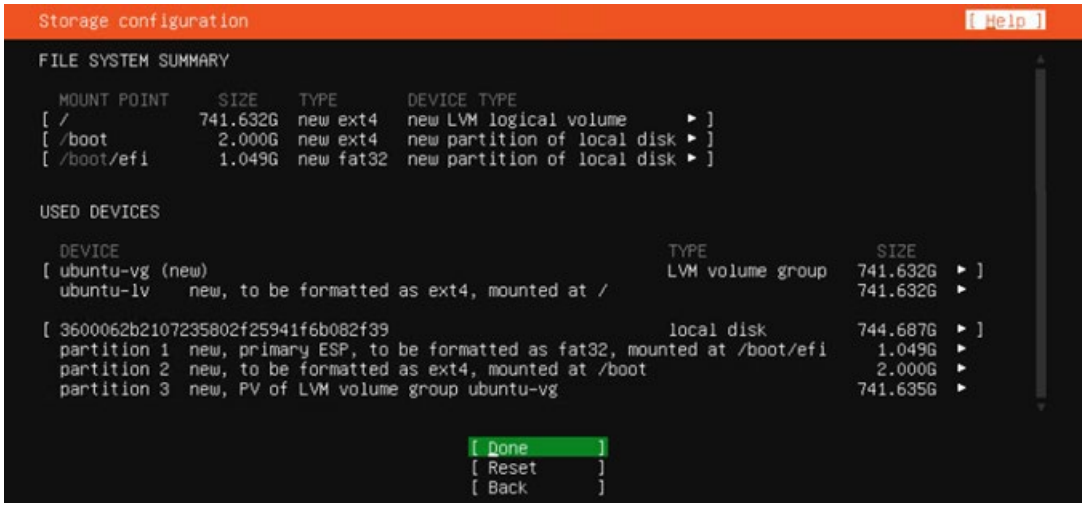


Figure 21. Ubuntu OS Partition Setup

Configure NTP

1. To configure NTP on the Ubuntu server, open the /etc/systemd/timesyncd.conf file on each Ubuntu node and uncomment the following mentioned parameters to assign the IP address of the NTP server.

   ```
   NTP=<ntp server ip>
   FallbackNTP=<ntp server ip>
   ```

2. Restart the NTP service by running the following command on each Ubuntu node.

   ```
   #sudo systemctl restart systemd-timesyncd.service
   ```

3. Run the following command to check the status of NTP configuration. The output shows the sample output for the NTP server successfully set.

   ```
   #timedatectl timesync-status
   Server: <<ntp-server-ip-address>>
   Poll interval: 4min 16s (min: 32s; max 34min 8s)
   Leap: normal
   Version: 4
   Stratum: 2
   Reference: D8753B5D
   Precision: 1us (-24)
   Root distance: 6.805ms (max: 5s)
   Offset: +86us
   ```

```
Delay: 25.201ms
Jitter: 719us
Packet count: 4
Frequency: -6.761ppm
```

Patch Ubuntu

1. It is recommended to keep all the packages and its dependencies up to date on the Ubuntu nodes. Update the Ubuntu node by executing the following command:

   ```
   #sudo apt-get update
   ```

2. To ensure all installed packages are brought up to their latest available versions, run the following command:

   ```
   #sudo apt-get upgrade
   ```

   This upgrades the current packages without removing or installing any new dependencies.

Install HPE Morpheus VM Essentials Software

VM Essentials Software is a lightweight Debian package that enables virtualization capabilities on cluster hosts by installing components such as KVM, OVS, and other necessary dependencies. This package should be installed on a single Ubuntu node that will be part of the HVM cluster.

Note
The VM Essentials Manager must be installed on the same node where the Debian package was deployed. Virtualization capabilities on the remaining Ubuntu nodes in the cluster will be automatically configured during the cluster provisioning process. As part of this automated setup, the Manager installs all required packages—including KVM, OVS, and Libvirt—across the remaining hosts.

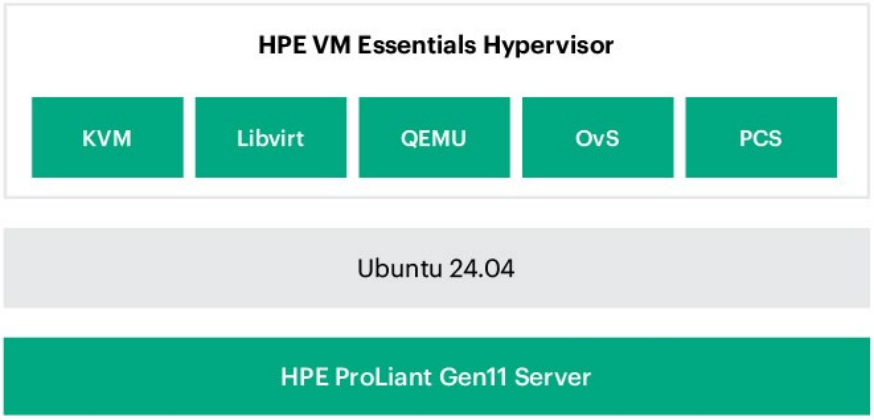


Figure 22. Install HPE VM Essential Software

1. Copy the downloaded HPE VM Essentials software to any one of the ubuntu server. The software can be transferred to Ubuntu server using any of the file transfer utility such as WINSCP.

   ```
   #ls -l *iso
   -rw-r--r--. 1 root root 7.6G May 6 05:13 HPE_VM_Essentials_SW_image_8.0.7_S5Q83-11017.iso
   ```

2. Create a mount point named /mnt/iso and mount the HPE VM Essentials software. After the software is successfully mounted, two files (One HPE VM Essentials software and another HPE VM Essentials Manager) will be available for installation.

Note
Only HPE VM Essentials will be installed at this time. The next section will cover the deployment of HPE VM Essentials Manager.

```
#mkdir /mnt/iso
#mount -o ro HPE_VM_Essentials_SW_image_8.0.7_S5Q83-11017.iso /mnt/iso
#cd /mnt/iso
#ls -l
-r--r--r--. 1 root root 34467240 Jul 8 12:17 hpe-vm_1.0.9-1_amd64.deb
-r--r--r--. 1 root root 7688285577 Jul 8 19:41 hpe-vm-essentials-8.0.7-3.qcow2.gz
```

Note
hpe-vm_1.0.9-1_amd64.deb enables VM Essentials virtualization capability on Ubuntu hosts while the hpe-vm-essentials-8.0.7-3.qcow2.gz installs VM Essentials Manager.

3. Install the HPE VM Essentials software by executing the following command. When prompted to install all the packages provided, confirm your selection and wait for the installation to be finished. This process installs all the necessary packages on the host to set up a virtualization server, including KVM, Libvirt, Ceph, and more.

   ```
   #sudo apt install -f ./ hpe-vm_1.0.9-1_amd64.deb
   ```

4. To launch the hpe-vm console, switch to the root user by running sudo -i.
5. Enter the hpe-vm console by running the following command:

   ```
   #hpe-vm
   ```

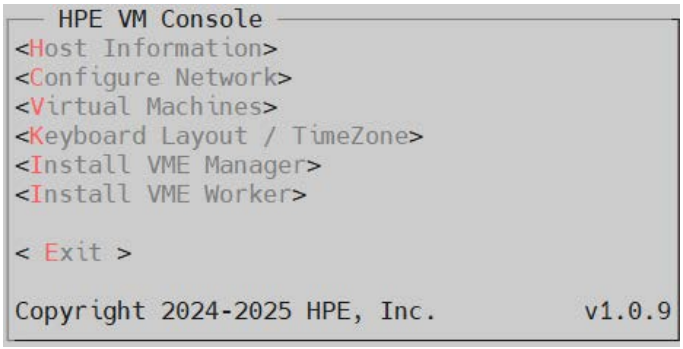


Figure 23. HPE-VM console

6. First, enter the section for keyboard layouts and time zone. Set the time zone and make any changes to the keyboard layout, if needed.
7. Next, enter the section named configure network to set the MTU to 9000 for all network interfaces. Setting the MTU to 9000 improves efficiency and reduces latency.
8. From the Device Type drop-down list, select vlan and select the virtual network adapters configured for management and compute traffic. Select the checkbox next to mtu and enter 9000 in the resulting box. Finally, save changes.

Note
Make sure the respective VLAN interfaces and physical interfaces on Aruba 8325 switches are also enabled for jumbo frames i.e., MTU 9000

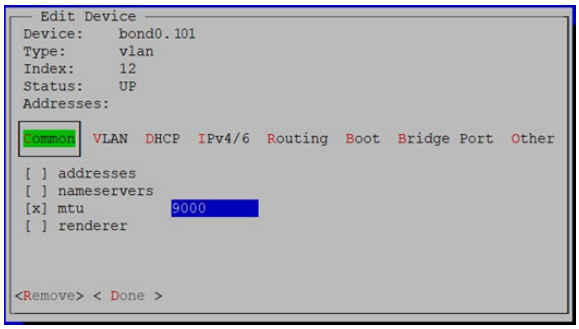


Figure 24. Update MTU on Device

Deploy HPE VM Essentials manager

HPE VM Essentials manager serves as the control plane for the HPE VM Essentials servers in addition to providing a provisioning engine, automation functionality, monitoring, secrets management etc. The HPE VM Essentials Manager must be installed on the same node where the Debian package was deployed. Virtualization capabilities on the remaining Ubuntu nodes in the cluster will be automatically configured during the cluster provisioning process. As part of this automated setup, the Manager installs all required packages—including KVM, OVS, and Libvirt—across the remaining hosts.

HPE VM Essentials Manager software will be available on the Ubuntu host at the mount directory of HPE VM Essentials software.

```
#cd /mnt/iso

#ls -l *gz

-r--r--r-- 1 root root 7688285577 Jul 8 19:41 hpe-vm-essentials-8.0.7-3.qcow2.gz
```

The following information should be readily available to deploy the HPE VM Essentials Manager:

- IP address for the HPE VM Essentials manager
- IP address for the DNS Server
- URL for the web server
- DNS resolution for the URL (points the URL to the manager IP address)
- Management interface name
- The absolute path of HPE VM Essentials Manager software on the Ubuntu host.

Installing HPE VM Essentials manager

1. To install the manager, run the command hpe-vm.
2. Select an option labelled Install VM Essentials Manager.

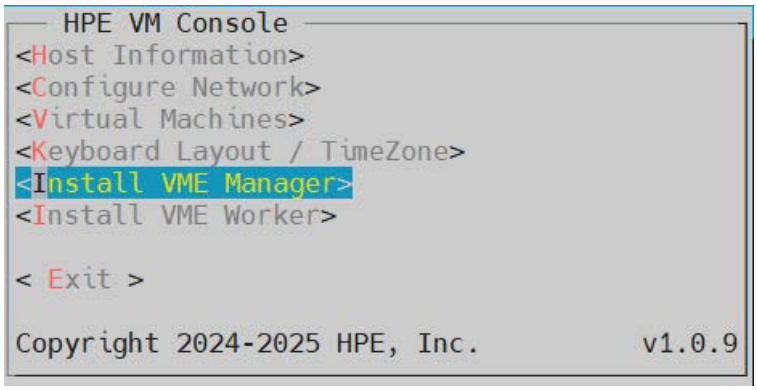


Figure 25. HPE-VM console

3. Enter the following configuration values:
    a. IP Address
    b. Subnet Mask
    c. Gateway
    d. DNS Server
4. **Appliance URL** (Enter the HTTPS URL using which the appliance administrator and VM Essentials Manager agents will connect to)
5. **Hostname** (same as Appliance URL without the FQDN)
6. **Image URI:** Since the path begins with a leading /, the final value will look like: file:///mnt/iso/ hpe-vm-essentials-8.0.7-3.qcow2.gz
7. Enter an admin username and password for an SSH user that can access the VM Essentials manager.
8. If necessary, configure proxy details.
9. Specify the size of the HPE VM Essentials Manager appliance vm to install. Defaults to Small:
    a. **Small:** 2 vCPUs / 12 GB RAM (POC, Lab, test or small environments)
    b. **Medium:** 4 vCPUs / 16 GB RAM (Production with moderate workloads)
    c. **Large:** 4 vCPUs / 32 GB RAM (recommended for production environments with high workload)
10. Specify the following:
    a. Management interface
    b. Compute interface (optional)
    c. Compute VLAN tag (optional)

Note

At this stage, configuring the **compute interface** and **VLAN** is optional. These settings can be specified later during cluster creation through the **HPE VM Essentials Manager**. Click **Install** to begin the installation process.

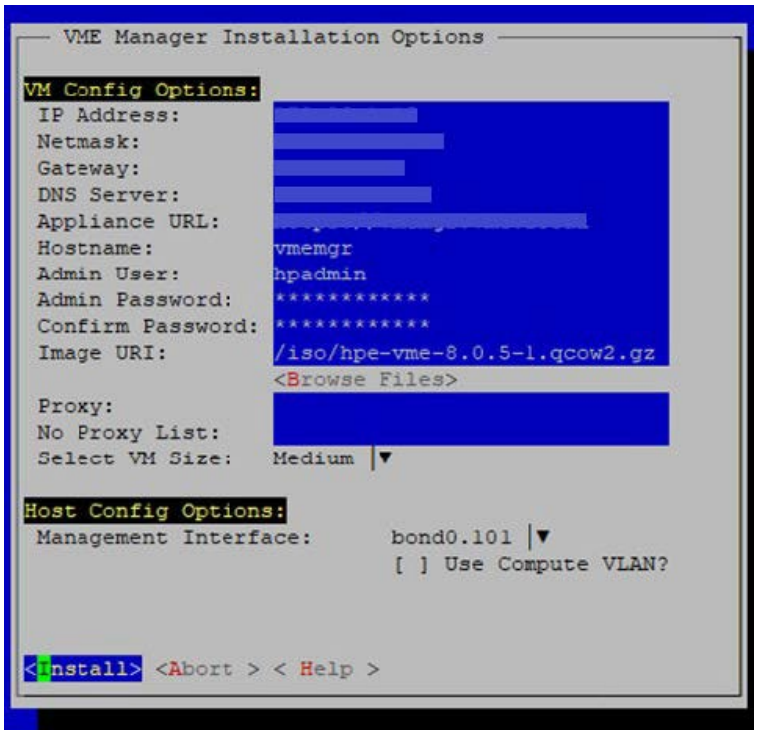


Figure 26. HPE VM Essentials Manager Setup

Monitor HPE VM Essentials manager installation progress

1. During installation, the message: **Starting Morpheus Services... appears in the installation progress bar.**
2. Navigate to the **Appliance URL** in a browser. If a page loads or displays a loading message, services are active.
3. After the message **"Starting Morpheus Services..."** appears in the installation progress bar, launch a web browser and navigate to the **Appliance URL**. A response from the browser—regardless of whether it indicates that the appliance is still initializing—confirms that the web server component is active and functioning. After full initialization, you will be redirected to the setup page.

HPE VM Essentials manager initialization

After the HPE VM Essentials Manager successfully deployed, access the UI by navigating to the **Appliance URL** in a web browser. You will be directed to the registration screen as shown in the following figure.

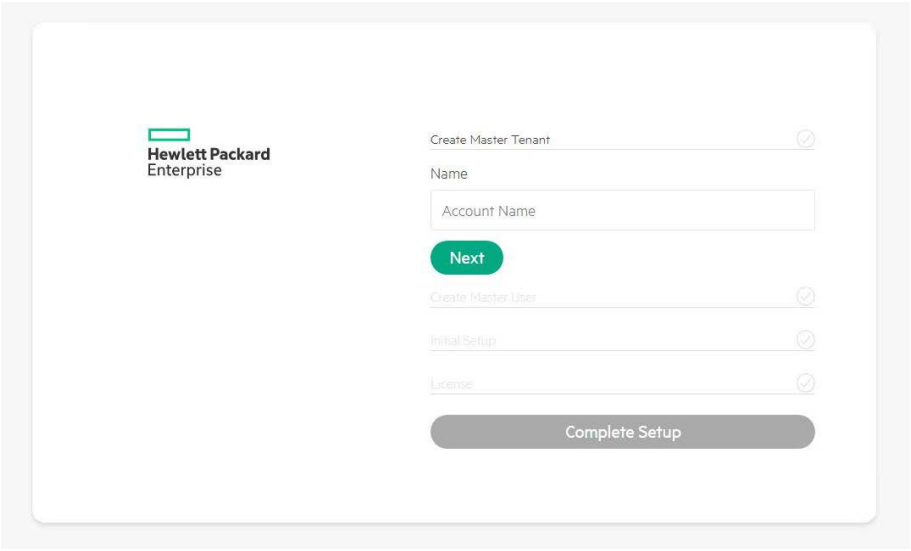


Figure 27. VM Essentials Manager Setup

To continue the setup, a valid license key is required as listed in prerequisites:

Perform the following:

1. Define the **account name** for the manager.
2. Provide credentials for the **initial administrator user**.
3. Assign a **name** to the appliance.
4. Confirm the **Appliance URL** is accurate.
5. Select from available global features such as **Backups, Monitoring**, and **Logs based on requirements**.
6. After configuring these settings, paste in the license key when prompted and click **Complete Setup**.

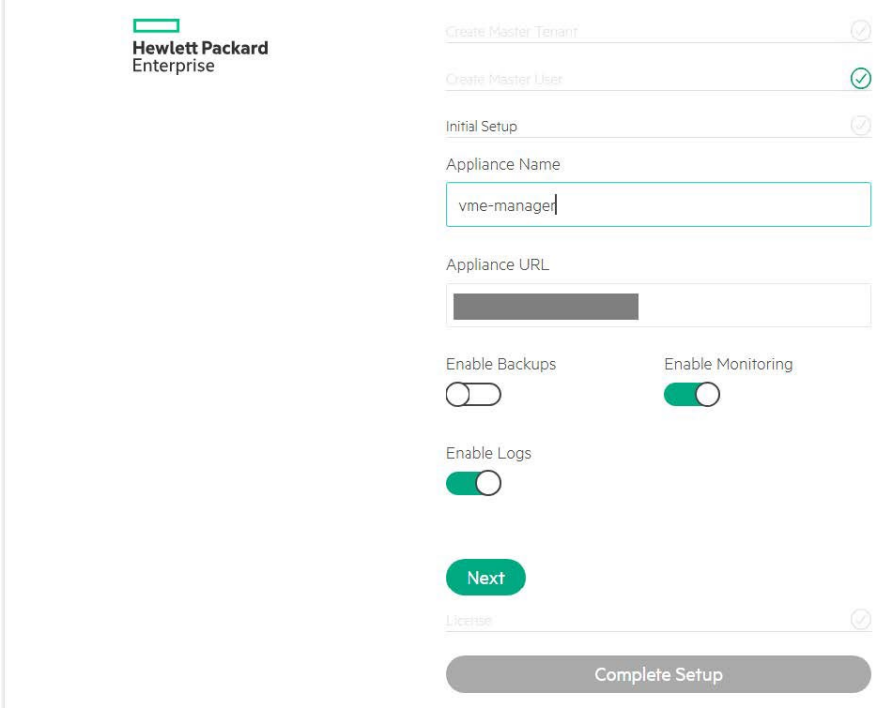


Figure 28. Complete setup

7. Upon completion, you will be redirected to the HPE VM Essentials Manager dashboard. At this point, installation is complete.

Create HPE VM Essentials cluster

Perform the following steps to create a HPE VM Essentials cluster:

1. Log into the VM Essentials Manager using admin username and password.
2. Navigate to the Infrastructure tab.
3. Create a Group.
   a. Go to **Infrastructure > Groups**.
   b. Click **+ CREATE**
   c. Provide the required details to create the group.

4. Create a Cloud:
   a. Navigate to **Infrastructure > Clouds**.
   b. Click + ADD **Select Morpheus**
5. Click **Next** and provide the required details.

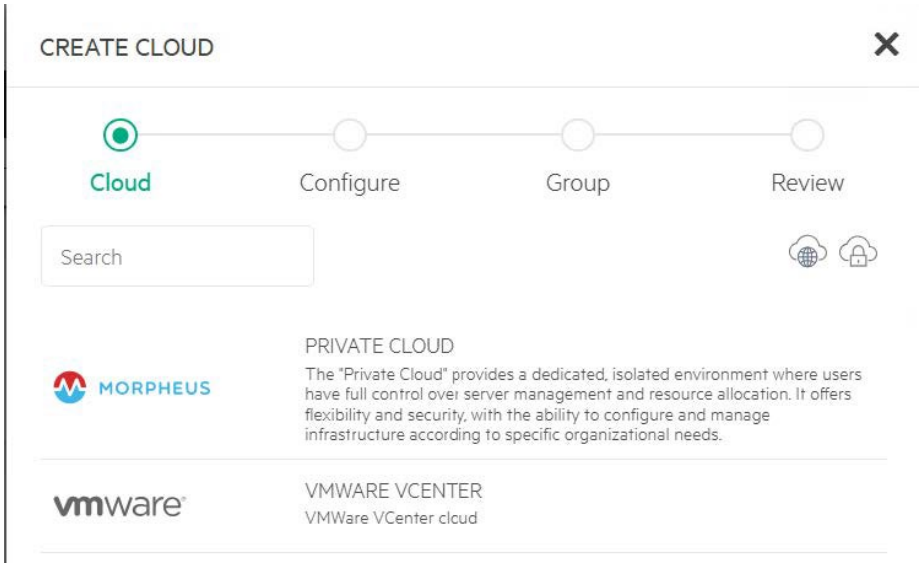


Figure 29. Create Cloud

Create an HPE VM Essentials Cluster

1. Navigate to **Infrastructure > Clusters**.
2. Click + **ADD CLUSTER**. Currently, the only available cluster type is **"HVM"**.
3. Select the **HPE VM** as the cluster type and click **NEXT**. On the Group tab, select the group created earlier and click **Next**.
4. On the **Name** tab, select the cloud created earlier and enter a name for the cluster. Click **Next**.

Figure 30. Create Cluster

5. Under Configuration Options, select the layout "HPE VM 1.2 cluster on Existing Ubuntu 24.04". Provide the required Ubuntu host details including FQDN, IP address, SSH username and password, the management interface (a bonded interface with the management VLAN tag, e.g., bond0.<mgmt-vlan-id>), and the compute interface (a bonded interface with the compute VLAN tag, e.g., bond0.<compute-vlan-id>). Click **Next** to proceed with the creation of the HPE VM Essentials cluster.

Note

This reference architecture does not cover the "HPE VM cluster 1.2 HCI Ceph Cluster on Existing Ubuntu 24.04" layout option, which leverages Ceph-based storage.

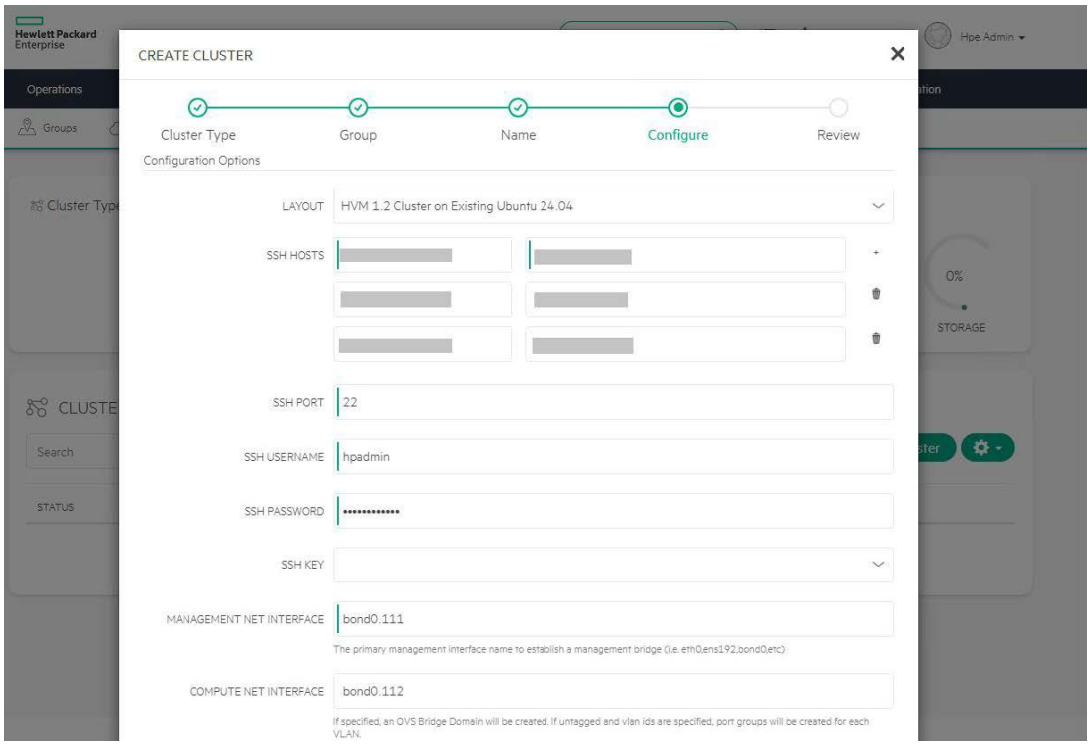


Figure 31. Configure Cluster

6. After the cluster is deployed, all VM Essentials hosts will show the Green Status as shown in the following figure:

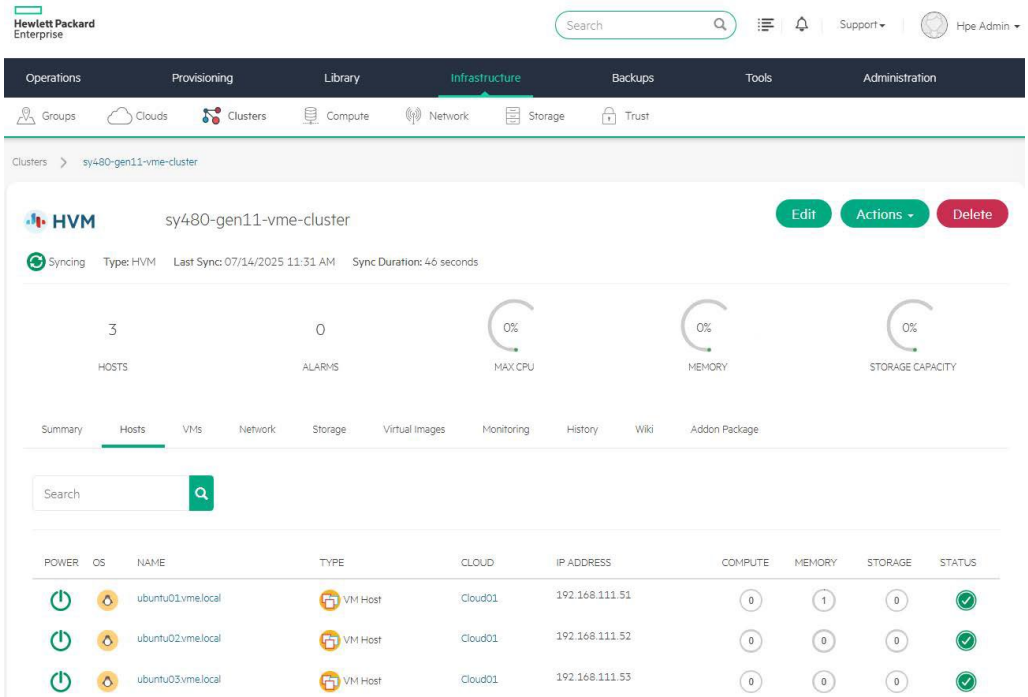


Figure 32. HPE VM Essentials Cluster

Storage Provisioning

– In HPE Virtual Machine Essentials, storage can be provisioned using two supported methods:

- GFS2 over iSCSI: GFS2 (Global File System 2) is a clustered file system that enables shared access to datastores across multiple nodes in the HPE VM Essentials cluster. In this setup, storage is provisioned from HPE Alletra Storage MP B10000 and accessed over iSCSI. This approach provides high availability and consistent access, making it suitable for clustered workloads.
- HPE Alletra Storage MP Plugin: The HPE Alletra Storage MP plugin for HPE VM Essentials enables seamless integration between HPE VM Essentials and HPE Alletra Storage MP arrays allowing users to provision and manage storage volumes directly from the VM Essentials Manager UI. This integration enables the creation of virtual machines with virtual disks (vDisks) backed by HPE Alletra provisioned volumes. Each virtual machine is mapped to a dedicated volume enabling simplified storage management.

Note

As listed in the prerequisites the storage provisioning process requires that physical connectivity is properly established between the HPE VM Essentials nodes, the HPE Alletra Storage MP B10000 array, and the associated HPE network switches. Additionally, the storage array must be initialized and accessible via the HPE Data Services Cloud Console (DSCC) to enable configuration management, monitoring, and lifecycle operations

iSCSI target configuration on HPE VM Essentials cluster hosts

As part of the storage provisioning process, adding all iSCSI targets is a mandatory prerequisite—regardless of whether the datastore is created using GFS2 or the plugin. In this reference architecture, the build includes a total of eight iSCSI targets: four from the controller nodes and four from the disk enclosure nodes.

As illustrated in the following steps, ensure that all iSCSI A and iSCSI B targets are added accordingly.

1. Log into the HPE VM Essentials Manager.
2. Navigate to the Infrastructure section and select Cluster.
3. Next, select the Storage option, then choose iSCSI.
4. Click **Add**, provide the target IP addresses for iSCSI A and iSCSI B, along with port (3260), and then click **Save Changes**.

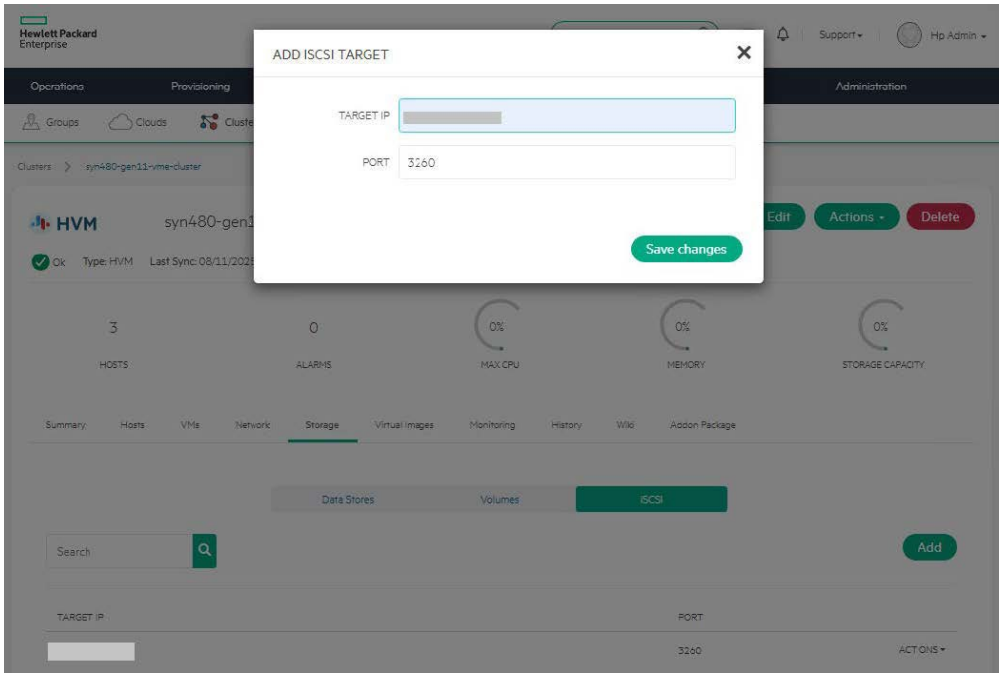


Figure 33. Add iSCSI Target IP address

Provisioning datastore via HPE Alletra Storage MP Plug-in

The HPE Alletra Storage MP Plugin enables integration between HPE Alletra Storage MP and HPE VM Essentials. With the help of this plugin included in VM Essentials Manager, customers can create virtual machines with their virtual disks backed by volumes provisioned on HPE Alletra Storage MP.

1. Ensure all the iSCSI ports are reachable from each of the cluster hosts and the values are set as shown in the following sample for every HPE VM Essentials node:

   Defaults

   {

   find_multipaths yes

   user_friendly_names no

   }

2. Restart the multipath service if values are changed:

   #sudo systemctl restart multipathd

Add Storage Server

1. Log into the HPE VM Essentials Manager UI.
2. Navigate to **Infrastructure > Storage**.
3. Select **Server** tab.
4. Click **ADD**.
5. On the **ADD STORAGE SERVER** screen, provide a Name, select Type as HPE Alletra Storage MP, enter the URL (HPE Alletra management IP), and input the HPE Alletra username and password. Then, click **Save changes.**

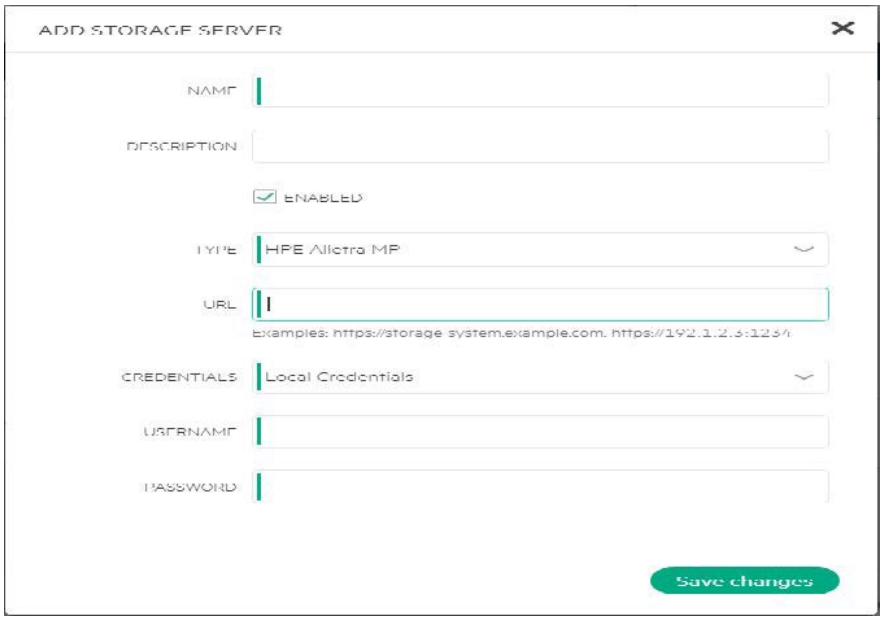


Figure 34. HPE Alletra Storage MP plug-in

Create HPE Alletra Datastore

1. In HPE VM Essentials Manager UI, Navigate to **Infrastructure > Clusters.**
2. Click the name of HPE VM Essentials cluster.
3. Select **Storage** tab.
4. On the Data Stores option, click **ADD**.
5. On the **Add Data Store** screen, provide a **Name**, select **Type** as **HPE Alletra Storage MP** and choose the previously created **Storage Server** name. Then, click **Save**.

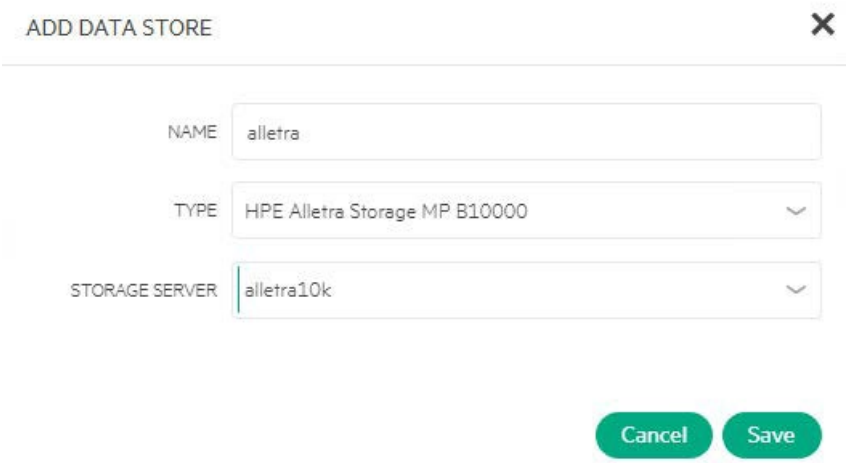


Figure 35. HPE Alletra Storage MP datastore

6. The datastore will be added and displayed under the **Datastore** tab. Check the status of the newly created datastore in the HPE VM Essentials Manager. The status should accurately display the datastore's capacity and indicate that it is online.

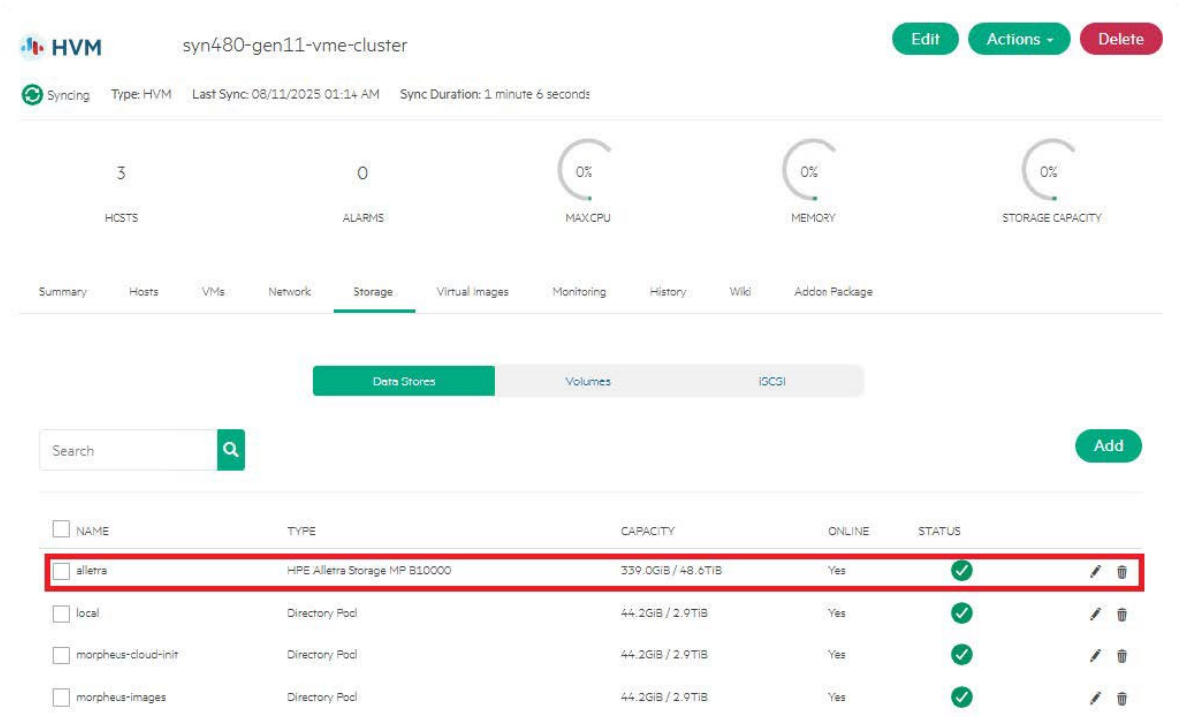


Figure 36. HPE Alletra Storage MP datastore created on VM Essentials Cluster

Deploy a VM on HPE VM Essentials cluster

Before the VM is provisioned, operating system image needs to be made available to the HPE VM Essentials Manager.

Upload operating system Images to HPE VM Essentials Manager

1. Log into the VM Essentials Manager.
2. Navigate to **Library > Virtual Images**.
3. Click **Add+** and provide the name of the virtual image.
4. Select the operating system of the virtual image and the required memory.

Note
The supported formats of the virtual images are ISO, QCOW2, RAW and VMware (vmdk/ovf/ova).

5. Click **Add File** to upload the operating system image and then click **Save changes**. The following figure shows the virtual images uploaded to HPE VM Essentials Manager.

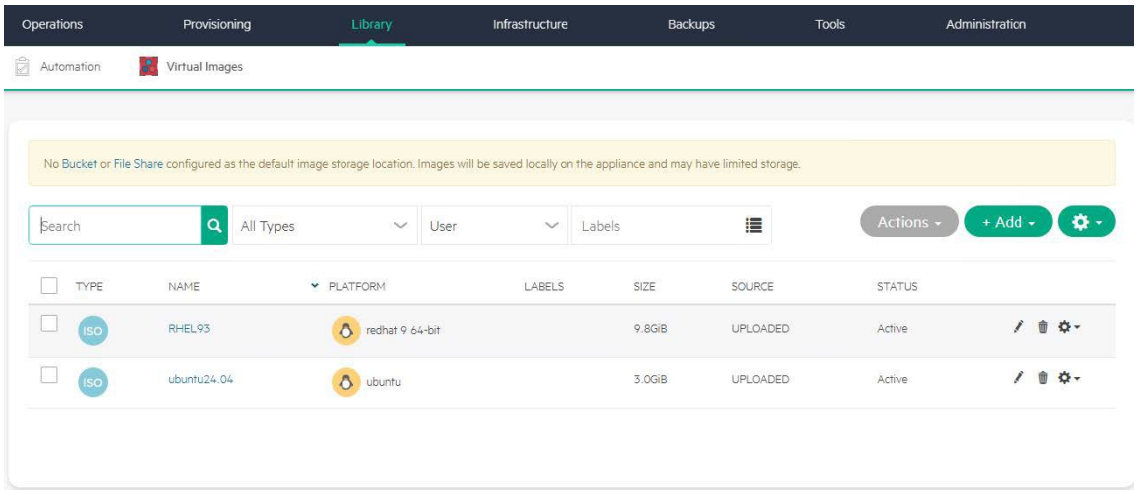


Figure 37. Virtual images

Deploy a VM on HPE VM Essentials cluster

Provision Instances

1. Navigate to **Provisioning > Instances.**
2. Click **+Add** and select HPE-VM as the instance type. Click **Next.**

Note
Only HPE-VM is the supported instance type on HPE VM Essentials Manager for now.

3. Choose the required **Group, Cloud**, and **Environment** for the instance. Provide the Instance name.
4. Under **Configuration Options**, choose the CPU, Memory, cluster, volume, network, Host, and the VM's image.

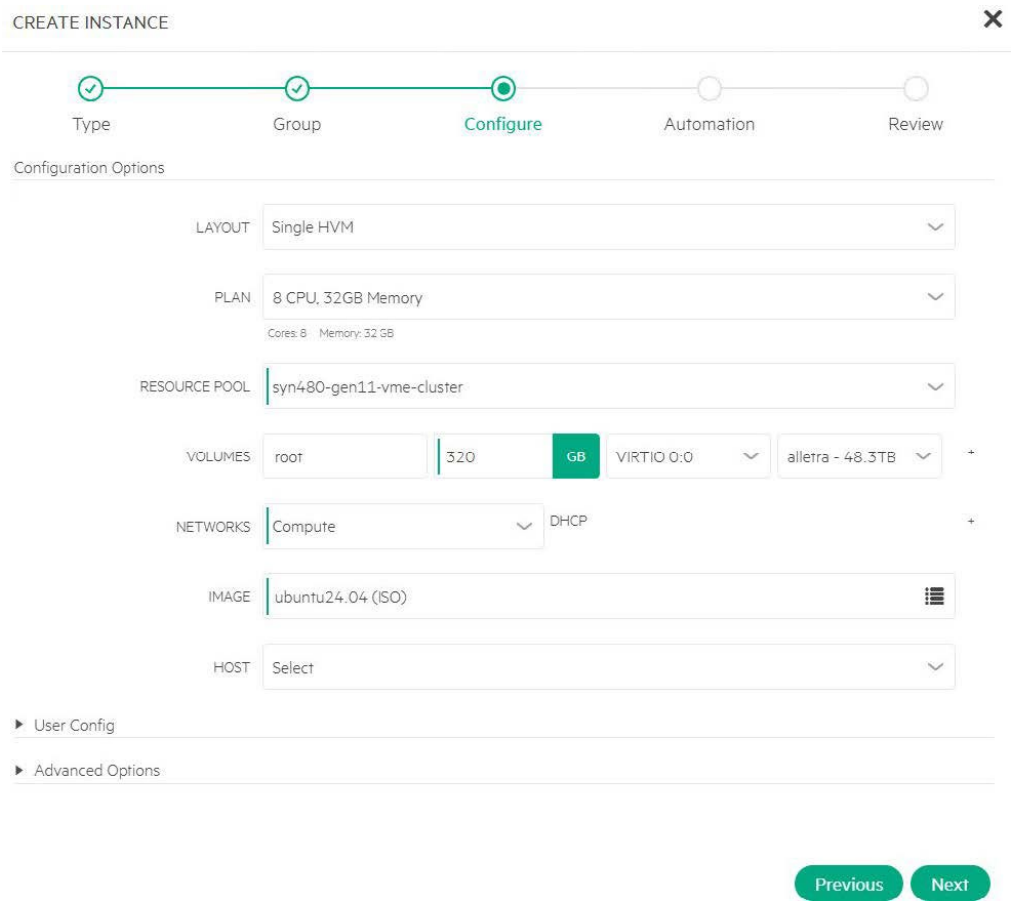


Figure 38. Create Instances

5. Click **Next** and click **Complete**.
6. After the VM gets **provisioned**, click the **VM**.
7. Under **Actions**, select **Open Console** to start the deployment of the VM. The following figure shows the sample Ubuntu VM deployed on the HPE VM Essentials cluster.

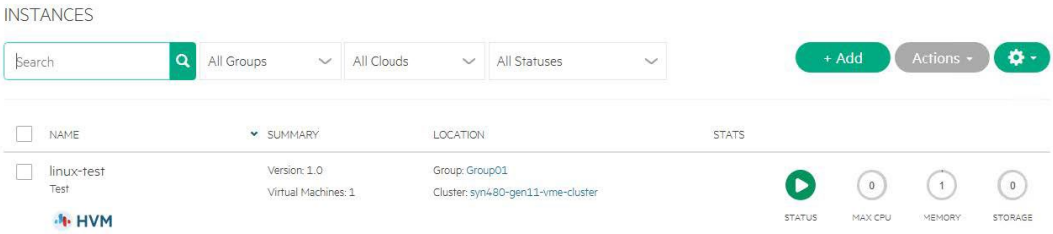


Figure 39. Verify Virtual machine deployed

Verify Provisioned Volumes on hosts of HPE VM Essentials Cluster

1. Display the FC disks on the hosts using the command:

   ```
   #lsblk
   ```

2. Display the multipath target devices using the following command. Expected sample output is also shown here. The following data in the output shows the virtual machine disk successfully provisioned from HPE Alletra Storage MP.

   a. 3PARdata,VV – The volume comes from an HPE Alletra Storage MP B10000 array and is a virtual volume (VV)

   b. size=10.0T – indicates 10.0 TB has been provisioned

```
#multipath -ll
360002ac0000000000000000620002c335 dm-2 3PARdata,VV
size=10.0T features='1 queue_if_no_path' hwhandler='1 alua' wp=rw
|-+- policy='service-time 0' prio=50 status=active
| |- 2:0:0:1 sdk 8:160 active ready running
| |- 3:0:0:1 sdl 8:176 active ready running
| |- 6:0:0:1 sdo 8:224 active ready running
| `- 7:0:0:1 sdp 8:240 active ready running
`-+- policy='service-time 0' prio=10 status=enabled
|- 4:0:0:1 sdm 8:192 active ready running
|- 5:0:0:1 sdn 8:208 active ready running
|- 8:0:0:1 sdq 65:0 active ready running
`- 9:0:0:1 sdr 65:16 active ready running
```

Summary

HPE Morpheus VM Essentials Software is a modern, enterprise-ready virtualization solution built on a KVM-based hypervisor with a unified management platform. It enables organizations to manage both HPE-native and existing VMware environments through a single, streamlined interface. Designed to lower licensing costs and simplify operations, it delivers live migration, high availability, and integrated data protection, providing a strong foundation for hybrid infrastructure modernization.

When deployed on HPE Synergy composable infrastructure, the solution gains the ability to dynamically allocate compute, storage, and fabric resources on demand. Integration with HPE OneView and HPE Morpheus automation streamlines provisioning, accelerates workload deployment, and optimizes resource utilization, enabling faster time-to-value and simplified lifecycle management at scale.

The solution offers a clear upgrade path to HPE Morpheus Enterprise Software, extending beyond virtualization into full-stack orchestration, automation, governance, FinOps, and integration with a broad partner ecosystem. This flexibility supports diverse customer needs, from development and testing to mission-critical production workloads.

In 2025, HPE continues to expand performance validation and solution engineering to deliver targeted reference architectures and best practices for a wide range of operational scenarios. Leveraging the extensible Morpheus integration framework, HPE VM Essentials seamlessly interoperates with ecosystem partners such as Cohesity, Commvault, and Veeam for enterprise-grade data protection and backup.

HPE VM Essentials is available as a term-based subscription, competitively priced per CPU socket. Managing existing VMware clusters incurs no additional licensing costs, making it a compelling choice for organizations seeking to reduce virtualization expenses while preserving flexibility and compatibility.

This Reference Architecture demonstrates:

– Deployment of the HPE VM Essentials hypervisor with centralized management through HPE VM Essentials Manager.

– Building an HPE VM Essentials environment using HPE Synergy 480 Gen11 Compute Modules with HPE Alletra Storage MP B10000 as the primary iSCSI storage platform.

Appendix

Appendix A: Terminology

Table A1. Terminology

Name	Description
Ubuntu 24.04	The base operating system for the HPE VM Essentials hypervisor is Ubuntu 24.04. The installation of the base Ubuntu operating system is a requirement for deployment of the hypervisor
HPE VM Essentials manager	The management server that provides KVM clustering, identity, virtual machine provisioning, monitoring, logging, and more
HPE Morpheus VM Essentials software	The solution software that provides a platform for running virtual machine workloads
HPE Morpheus Enterprise Software	The full solution software that adds orchestration, governance, finops, in addition to virtualization
Morpheus Agent	The software that runs on each hypervisor host that collects system stats, logs, and executes operations received from the management server
Kernel Virtual Machine (KVM)	KVM is the underlying virtualization technology used in the HPE Virtualization solution
QEMU	A generic machine emulator and virtualizer for running Windows and Linux® operating systems
Libvirt	A hypervisor independent API for managing platform virtualization
Open vSwitch (OvS)	OvS is the underlying virtual networking technology used in the HPE Virtualization solution
PCS	Pacemaker/Corosync – Service that provides high availability feature for cluster resources and services.

Table A2. Terminology

Name	Description
Hypervisor network	The virtual network synced or created from VMware vSphere and HPE VM Essentials hypervisor
HPE VM Essentials network	The logical construct in HPE VM Essentials used to tie together the IPAM, DNS, and the hypervisor network
Network pool	The IP address pool used to assign IP addresses to the provisioned virtual machines Native: HPE VM Essentials includes a native IP pools capability to provide a lightweight IPAM solution IPAM Integration: HPE VM Essentials supports integrating with third party IPAM solutions such as SolarWinds, BlueCat, Infoblox, and more
Domain	The network domain used to manage the DNS records for the provisioned virtual machines – DNS Integration – HPE VM Essentials supports integrating with third party DNS solutions such as BlueCat, MS DNS, Infoblox, and more.

Table A2. Terminology (continued)

Name	Description
Management network	Used for managing the VM environment, including access to the HPE-VM Essentials console and hypervisor management
Compute network	Used for VM traffic between compute nodes. This network carries data traffic generated by virtual machines
Storage network	Handles traffic for accessing storage systems like Ceph, NFS, or iSCSI
Aggregated network	A network model where all traffic types - management, compute and storage (iSCSI) are carried over a set of physical ethernet adapters without traffic segregation
Converged network	A network model where management and compute traffic share bonded adapters (using LACP), while iSCSI traffic is isolated over two dedicated physical ethernet adapters and Fibre Channel traffic is isolated over FC HBA's
Diverged Connectivity	A model where each traffic type management, compute, and storage use its own dedicated physical adapters.
Virtual Machine network Interface	The network interface attached to the virtual machine that is "visible" from within the virtual machine
Tap interface	The virtual connection used to connect the virtual machine to the Open vSwitch Bridge
Open vSwitch port	The virtual port on the Open vSwitch bridge that a network interface connects to
Open vSwitch Bridge	A virtual switch used to connect virtual machines and the physical network
Bonded Network Interface	A "virtual" network interface used to aggregate multiple physical network interfaces into a single "virtual" interface Physical network
Physical network interface	The physical network interface that connects to the physical network. Cloud Module instances use CX6 cards
Round Robin	Transmit packets are load balanced in sequential order across the bonded physical network interfaces.
Active-Backup	Only one physical network interface is active at a time while the other network interfaces are only used in the event of a failure.
Balance XOR	Transmit packets are load balanced across the bonded physical network interfaces based upon a hashing algorithm
802.3ad	Dynamic link aggregation mode that transmits and receives on all members in the active aggregator. Requires switch configuration and 802.3ad compliant switches
Balance-TLB (Transmit Load Balancing)	Transmit packets are load balanced across the bonded physical network interfaces based upon the transmit load.
Balance-ALB (Active Load Balancing)	Transmit and receive packets are load balanced across the bonded physical network interfaces

Appendix B: Bill of materials

Note
Part numbers are at time of publication/testing and subject to change. The bill of materials does not include complete support options or other rack and power requirements. If you have questions regarding ordering, please consult with your Hewlett Packard Enterprise Reseller or Hewlett Packard Enterprise Sales Representative for more details. hpe.com/us/en/services/consulting.html.

Table B1. Bill of materials

Product	Qty	Product description
		Rack and power
P9K40A	1	HPE 42U 600mmx1200mm G2 Enterprise Shock Rack
P9K40A 001	1	HPE Factory Express Base Racking Service
H6J85A	1	HPE Rack Hardware Kit
120672-B21	1	HPE Rack Ballast Kit
BW932A	1	HPE 600mm Rack Stabilizer Kit
BW932A#B01	1	HPE 600mm Rack include with Complete System Stabilizer Kit
P59411-B21	2	Enlogic by nVent G3 Metered 3-phase 8.6kVA/Outlets (30) C13 (6) Combo C13/C19 PDU for HPE
P9L12A	1	HPE G2 Rack Baying Kit
P9L12A B01	1	HPE G2 Rack Baying Kit
P9L16A	1	HPE G2 Rack 42U 1200mm Side Panel Kit
P9T01A	1	HPE G2 PDU Environmental Temperature and Humidity Sensor
P9T02A	1	HPE G2 PDU Environmental 3 Temperature and 1 Humidity Sensor
P9T03A	1	HPE G2 PDU Open Door Sensor
		Aruba Switches
R9F63A	2	Aruba 6300M 48-port 1GbE and 4-port SFP56 Power-to-Port 2 Fan Trays 1 PSU Bundle
R9F63A B2B	2	Aruba 6300M 48G Pwr2Prt 2F 1PS Bdl US en
R9F84A	4	Aruba 10G SFP+ to SFP+ 3m Direct Attach Copper Cable
R9G06A	2	Aruba 50G SFP56 to SFP56 0.65m Direct Attach Copper Cable
R9F57A	2	Aruba X414 1U Universal 4-post Rack Mount Kit
R9F67A	2	Aruba 8325-32C 32-port 100G QSFP+/QSFP28 Back-to-Front 6 Fans and 2 Power Supply Bundle

Table B1. Bill of materials (continued)

Product	Qty	Product description
R9F67A B2B	2	Aruba 8325-32C 32-port 100G QSFP+/QSFP28 Back-to-Front 6 Fans and 2 Power Supply Bundle US en
845416-B21	4	HPE 100Gb QSFP28 to 4x25Gb SFP28 3m Direct Attach Copper Cable
R9F77A	3	Aruba 100G QSFP28 to QSFP28 1m Direct Attach Copper Cable
R9F78A	4	Aruba 100G QSFP28 to QSFP28 5m Direct Attach Copper Cable
R9F59A	2	Aruba X474 4-post Rack Kit
		HPE Synergy Frames
P51174-B21	1	HPE Synergy 12000 Configure-to-order Frame
804938-B21	1	HPE Synergy Frame Rack Rail Kit
804943-B21	1	HPE Synergy Frame 4x Lift Handles
P39531-B21	3	HPE Synergy 480 Gen11 Configure-to-order Compute Module
P49607-B21	6	Intel Xeon-Platinum 8480+ 2.0 GHz 56-core 350 W Processor for HPE
P39587-B21	3	HPE Synergy 480 Gen11 CPU Front Heat Sink Kit
P39589-B21	3	HPE Synergy 480 Gen11 CPU Rear Heat Sink Kit
P66675-B21	48	HPE 96GB (1x96GB) Dual Rank x4 DDR5-4800 CAS-46-45-45 EC8 Registered SmartMemory Kit
P39594-B21	3	HPE Synergy 480 Gen11 without Drive Front Cage Kit
876852-B21	2	HPE Synergy 4-port Frame Link Module
872957-B21	2	HPE Synergy Composer2 Management Appliance
867796-B21	2	HPE Virtual Connect SE 100Gb F32 Module for HPE Synergy
P44712-B21	12	HPE 1800W-2200W Flex Slot Titanium Hot Plug Power Supply Kit
P44074-B21	6	HPE Synergy Dual Slot Power Supply Adapter
P51175-B21	10	HPE Synergy 12000 High-Capacity Fan Kit
P39568-B21	3	HPE NS204i-d Gen11 Boot Controller
P02054-B21	3	HPE Synergy 6820C 25/50Gb Converged Network Adapter
845406-B21	2	HPE 100Gb QSFP28 to QSFP28 3m Direct-Attach Copper Cable
845410-B21	4	HPE 100Gb QSFP28 to QSFP28 7m Active Optical Cable
AF590A	6	HPE C20 - C13 WW 250V 15Amp 2.0m Jumper Cord
		HPE Alletra Storage MP B10200
S1R06A	1	HPE Alletra Storage MP B10200 Base Configuration

Table B1. Bill of materials (continued)

Product	Qty	Product description
R7C75A	1	HPE Alletra Storage MP 10000 2U Chassis
R7D02A	2	HPE Alletra Storage MP B10230 Controller Node
R7C82A	4	HPE Alletra Storage MP 10/25GbE 4-port Host Bus Adapter
Q2P64B	8	HPE 25Gb SFP28 Short Wave Extended Temperature 1-pack Pull Tab Optical Transceiver
S2A68A	4	HPE Alletra Storage MP 100GbE 2-port OCP Host Bus Adapter
R7C76A	2	HPE Alletra Storage MP C14 1600W AC Power Supply
R9R52A	1	HPE C13 - C14 250V 10Amp Black 1.4m WW Power Cord
R9S00A	1	HPE C13 - C14 250V 10Amp Gray 1.4m WW Power Cord
S1J10A	1	HPE Alletra Storage MP 10001 NVMe Configure-to-order Expansion Shelf
S1R28A	2	HPE Alletra Storage MP 10010 Expansion Shelf Node
S2A68A	2	HPE Alletra Storage MP 100GbE 2-port OCP Host Bus Adapter
R9H67A	12	HPE Alletra Storage MP 3.84TB NVMe SFF Self-encrypting SSD
R9R52A	1	HPE C13 - C14 250V 10Amp Black 1.4m WW Power Cord
R9S00A	1	HPE C13 - C14 250V 10Amp Gray 1.4m WW Power Cord
S1R08A	2	HPE Alletra Storage MP 32-port 100GbE Switch Bundle
S3L68A	2	HPE C13 - C14 250V 10Amp Black 2m WW Power Cord
S3L69A	2	HPE C13 - C14 250V 10Amp Gray 2m WW Power Cord
S0A95A	1	HPE Switch Pair Installation Kit with 4U Cable Tray
R9F76A	12	HPE Aruba Networking 100G QSFP28 to QSFP28 2m Active Optical Cable
R9F76A B01	12	HPE Aruba Networking 100G QSFP28 to QSFP28 2m Active Optical Cable
S3Q35A	1	HPE GreenLake for Block Storage MP Tracking
C7533A	3	HPE 1.2m/4ft CAT5 RJ45 M/M Ethernet Cable
C7535A	15	HPE RJ45 to RJ45 Cat5e Black M/M 7.6ft 1-pack Data Cable
C7536A	4	HPE 4.3m/14ft CAT5 RJ45 M/M Ethernet Cable
R9J32A	1	HPE Aruba Networking USB-A reversible to USB-C PC-to-Switch 3m Cable
JL448A	1	HPE Aruba Networking X2C2 RJ45 to DB9 Console Cable
142257-002	4	HPE C13 - C14 WW 250V 10Amp 2.5m Jumper Cord

Resources and additional links

HPE Reference Architectures, hpe.com/info/ra

HPE Servers, hpe.com/servers

HPE Storage, hpe.com/storage

HPE Networking, hpe.com/networking

HPE Morpheus VM Essentials Software Compatibility matrix, support.hpe.com/hpesc/public/docDisplay?docId=sd00006472en_us&page=GUID-EA7C0803-E66B-4B17-B994-30D4025A258F.html

HPE Alletra Storage MP Cabling Tool-infosight.hpe.com/welcomecenter/cabling/?family=hfblock

HPE Alletra Storage MP B10000 quick specs-hpe.com/psnow/doc/a50006985enw.pdf?jumpid=in_pdp-psnow-qs

GreenLake Advisory and Professional Services, hpe.com/us/en/services/consulting.html

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