Hewlett Packard Enterprise

HPE Helion

HPE Helion CloudSystem 10.0 Technical Overview

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Technical overview

Introduction

HPE Helion CloudSystem 10.0 is a comprehensive hardware and software solution for private and hybrid clouds, delivering hosting, automation, and orchestration of traditional and cloud native workloads. HPE Helion CloudSystem 10.0 is the most recent release of the solution. This whitepaper describes the technical features of CloudSystem 10.0 and provides insight into how the product operates.

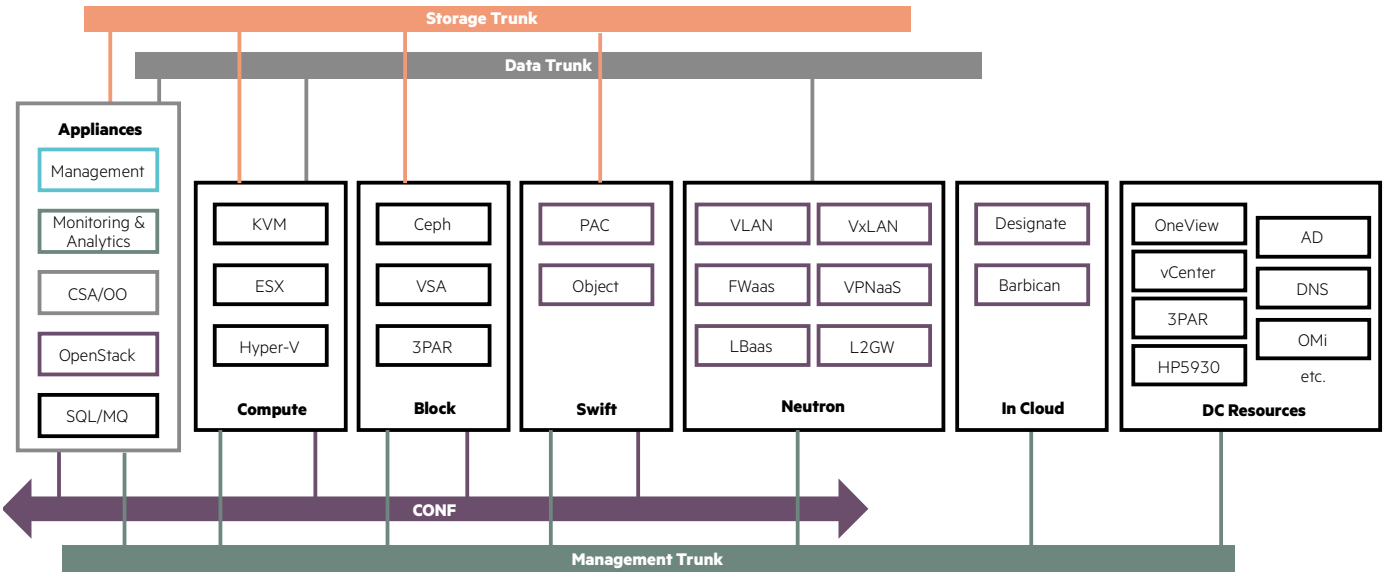
HPE Helion CloudSystem software is delivered in two editions:

1. HPE Helion CloudSystem Foundation targets simple private cloud scenarios, delivering Infrastructure as a Service (IaaS, from HPE Helion OpenStack) and Platform as a Service (PaaS, from HPE Helion Stackato) on integrated hardware.
2. Helion CloudSystem Enterprise enables a broader range of hybrid cloud scenarios, delivering Infrastructure as a Service (from HPE Helion OpenStack), Platform as a Service (from HPE Helion Stackato), and multi-IaaS management (from HPE Cloud Service Automation and HPE Operations Orchestration) on integrated hardware.

What's new in HPE Helion CloudSystem 10.0 (September 2016)

HPE Helion CloudSystem 10.0 is a major release that includes these new or improved functional capabilities:

- Updated and integrated support for HPE Helion OpenStack 3.0 (HOS), which delivers the Liberty OpenStack release.
- Continued support for HPE Matrix Operating Environment through HPE Helion CloudSystem Enterprise.
- New support for HPE Linux KVM compute hypervisors, joining the existing support for VMware ESXi, Red Hat KVM and Microsoft Hyper-V compute hypervisors.
- Improvements to the installation and lifecycle management procedures, including the ability to stand up a Helion CloudSystem Enterprise-only configuration.
- Enhancements to the highly available management plane configuration.
- Advanced cloud features such as infrastructure and application services for multi-tier architectures.
- Enhanced support and expanded configurations for networking and storage (including Ceph).
- Updates to the HPE Cloud Service Automation (CSA) 4.6 and HPE Operations Orchestration (OO) 10.5 components of Helion CloudSystem Enterprise.
- Integration with HPE OneView 3.0 (when available) for automated VMware ESXi cluster provisioning and host aggregate resource placement.
- Development environment provided through granted rights for 20 GB of Stackato 4.0 usage (when available) per managed CloudSystem environment.



Core Capabilities

HPE Helion CloudSystem 10.0 offers new features for next generation computing. Let's start with a high level understanding of the components that make up Helion CloudSystem, then we will dive into more of the technical details in further sections.

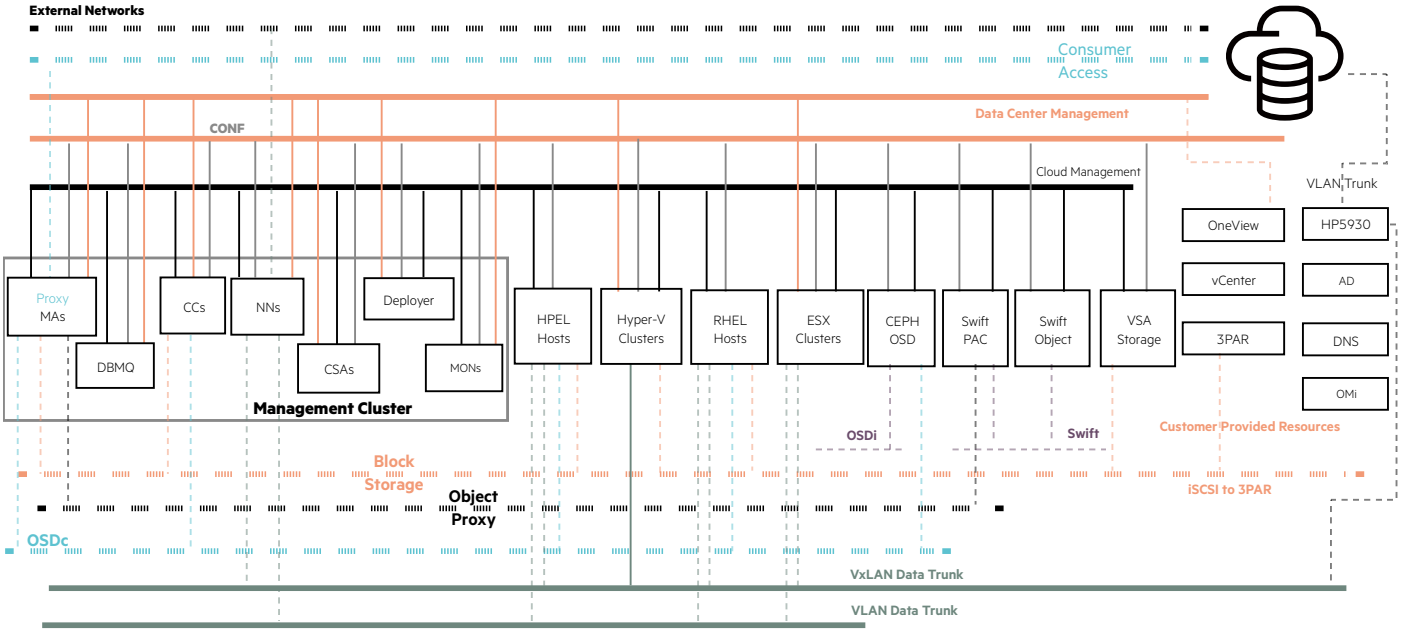
- HPE Helion OpenStack (HOS) 3.0, containing the OpenStack Liberty release, provides the OpenStack software in an easy to install, secured and highly available environment. This feature allows consumers to deploy and manage VM instances, attach/detach storage volumes, and define security groups and networks.
- HPE Helion Stackato 4.0 enables cloud native applications to be developed and deployed within the cloud.
- HPE Cloud Service Automation (CSA) 4.6 provides the ability to design services comprised of VMs, storage, and networking on OpenStack, Azure, VMware, Amazon Web Services, and other cloud offerings. The architect can compose a design with both on-premises and off-premises cloud resources. These designs can then be offered to consumers in the form of a subscription for which the necessary resources will be allocated by the various providers, constructing a hybrid cloud service implementation. HPE Operations Orchestration is used to fulfill the subscriptions requested by CSA.
- Manageability features are wrapped around the above tools, providing features for installation, operations management, endpoint management, high availability, monitoring, and centralized logging for the system.
- HPE OneView 3.0 and HPE Insight Control server provisioning (ICsp) 7.5.1 offerings can be integrated into HPE Helion CloudSystem to automate configuring, provisioning, and deploying HPE hardware into the cloud.

Feature	HPE Helion CloudSystem 10.0 Foundation	HPE Helion CloudSystem 10.0 Enterprise
INCLUDED IAAS	HPE Helion OpenStack 3.0	HPE Helion OpenStack 3.0
INCLUDED PAAS	HPE Helion Stackato 4.0* (20 GB per CS)	HPE Helion Stackato 4.0* (20 GB per CS)
MULTI-IAAS MANAGEMENT	N/A	• HPE Cloud Service Automation 4.6 • HPE Operations Orchestration 10.5
HYPERVISOR SUPPORT	• Compute: VMware ESXi, Microsoft Hyper-V, Red Hat KVM, HPE Linux KVM • Virtual management plane: ESXi, Red Hat KVM	• Compute: VMware ESXi, Microsoft Hyper-V, Red Hat KVM, HPE Linux KVM • Virtual management plane: ESXi, Red Hat KVM
INFRASTRUCTURE MANAGEMENT	Operations Console (integrated with HPE OneView 3.0), Horizon-based UI	Operations Console (integrated with HPE OneView 3.0), HPE CSA admin console
SCALABILITY	10K VMs on 200 compute hosts	20K VMs on 400 compute hosts
DEPLOYMENT	CLI, UI—virtual appliance	CLI, UI—virtual appliance

Understanding HPE Helion CloudSystem at a deeper level

Before we dig into more details on each individual component, let's first dive deeper into how the components come together as a system of services in the environment. Helion CloudSystem appliances deploy into a virtualized environment known as the Management Cluster that is running VMware ESXi or Red Hat KVM. HPE Helion CloudSystem uses network separation to keep your operations environment secure from a network viewpoint. However, the security levels of the product go much deeper. Each application in HPE Helion CloudSystem goes through extensive security audits to deliver the highest levels of security.

The following shows a typical HPE Helion CloudSystem deployment model:



- **Consumer access network (CAN)** connects consumers to the cloud. This network hosts the public APIs for the cloud secured by TLS on a single endpoint hosted by the management appliance.
- **Data center management (DCM) network** connects administrators to the cloud. These users should be limited to those that are owners/managers of the cloud.
- **External networks** connect the VMs in the cloud to the external world. One or more external networks can be defined in the environment based on customer needs.
- **Cloud management network** is the private network used for all internal cloud communications. This network does not have external access.
- **CONF network** is a configuration network that runs untagged to allow the installation and deployment of the VMs that comprise the HPE Helion CloudSystem.
- **VLAN/VxLAN data trunk networks** are used to define consumer-specific networks to connect consumer VMs to one another.

Other optional networks can be added to connect storage devices to your cloud compute hosts.

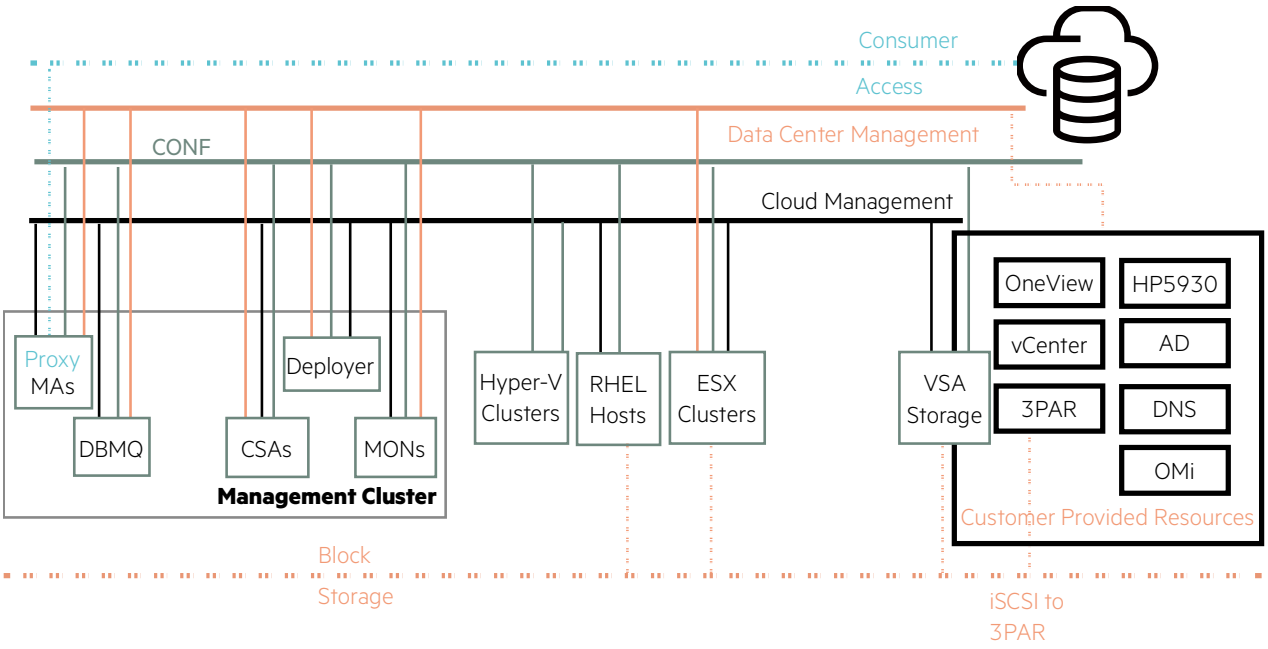
A fully collapsed networking model is supported through the Command Line Interface (CLI) for development and testing and POC use cases. When combining the networks in this fashion, the overhead of IP addresses is reduced, with the increased risk that more traffic can be seen by eavesdroppers on the combined network. It is highly recommend that the CLM, DCM, and CAN networks be implemented with different VLANs on the same trunk when combining the networks.

To initialize the environment, the CONF network needs to be configured on the management host(s) which is used to host the management cluster. During installation, the other networks will be orchestrated by the installation process. Routing choices between Central Virtualized Routing (CVR) and Distributed Virtual Routing (DVR) can be specified during the installation.

HPE Helion CloudSystem virtual appliances that are defined in the management cluster support the HOS, Manageability, and HPE CSA/HPE OO components within HPE Helion CloudSystem. These appliances can be installed as HA active-active trios in the environment (with the exception of the Deployer node).

- The **deployer node** is the first appliance that is started during a deployment and is used to manage the installation and configuration process.
- The **management appliance** is the primary manageability component which hosts the public endpoints for all of the services which are deployed. It is the one termination point for TLS certificates. It hosts the Operations Console which is used for day-to-day operations of the cloud administrators.
- The **DbMsg appliance** is a centralized database and message queue node.
- The **monitoring appliance runs** the centralized logging and monitoring of the environment. This appliance collects the data across the environment and provides appliance, compute host, and VM metrics.
- The **cloud controller network** nodes host Helion OpenStack 3.0. These components are now optional in a Helion CloudSystem installation, which reduces the load for customers not using the HOS 3.0 features but driving other cloud providers with HPE CSA.
- The **enterprise appliance** runs HPE CSA and OO instances for the CloudSystem Enterprise component.
- In addition to the management cluster components, there are **compute hosts/clusters** that can be provisioned and activated in HPE Helion CloudSystem 10.0. HPE Helion CloudSystem 10.0 includes HPE Linux compute hosts, which provide lower cost compute capabilities.
- **Storage nodes** for HPE StoreVirtual VSA (Virtual SAN Appliance), Swift, and Ceph can also be added into the network.

The flexible installation in HPE Helion CloudSystem 10.0 allows for a new high-availability Enterprise-only deployment for customers wanting to directly manage clusters with CSA or external cloud resources in a hybrid cloud environment. This environment reduces the load and resources required by HOS when an OpenStack solution is not desired. Other CSA providers may be used in this solution to directly manage the clusters or external cloud resources.



In HPE Helion CloudSystem 10.0, flexible networking allows many of the networks to be combined. HPE Helion CloudSystem 10.0 provides an extensible, secure, and flexible network configuration that can support your business and security needs.

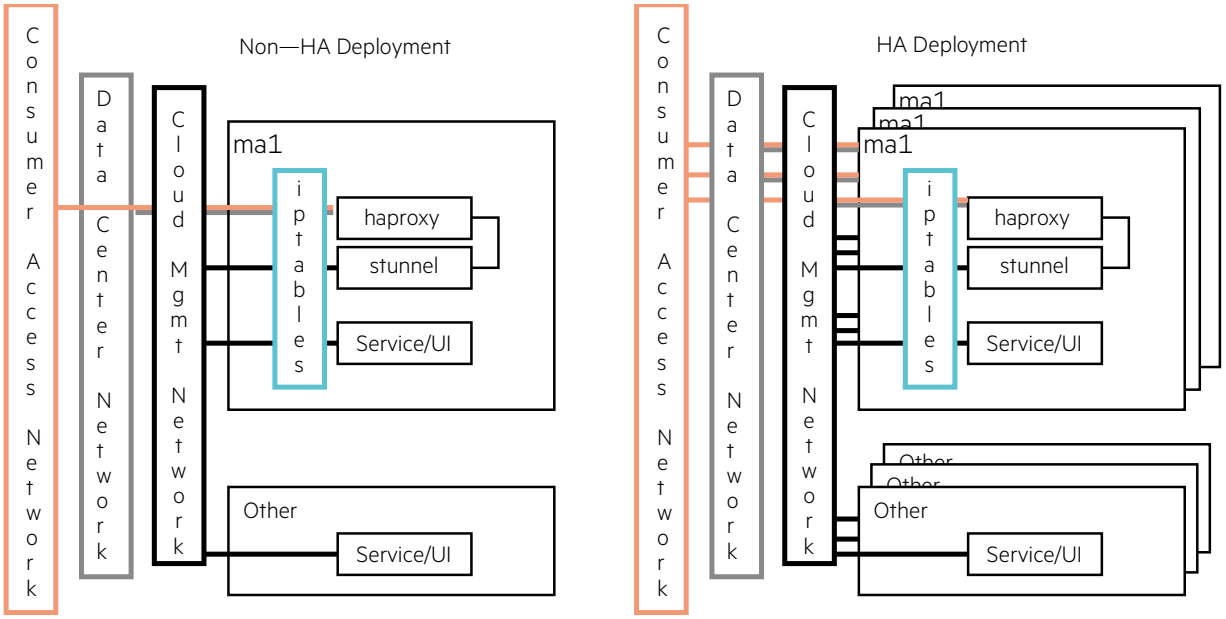
Consult the **HPE Helion CloudSystem 10.0 Network Planning Guide** at hpe.com/info/cloudsystem/docs for additional details.

HPE Helion CloudSystem manageability

The Manageability component is an important part of HPE Helion CloudSystem. This component is composed of the Deployer appliance, Management appliance, Monitoring appliance, and Database and Message Queue appliances. This component is at the heart of HPE Helion CloudSystem, integrating the hardware with OpenStack and performing much of the orchestration required to add/extend compute capacity and add storage capabilities to the cloud. This also allows user to monitor the cloud services and address health issues in the cloud.

The Deployer appliance is the hub for deployment centric activities. The Deployer appliance supports the Helion Lifecycle Manager, with ease of use tools that make the cloud easier to configure, deploy and extend.

The **csdeploy CLI and UI (port 3000)** allow for the easy specification of the cloud environment, which translates into HLM input models used to deploy and maintain HPE Helion CloudSystem using ansible-based scripting and configuration. These tools allow for the optional deployment of Helion CloudSystem Enterprise and Foundation components, as well as the flexible network configuration. These tools support deployments with and without High Availability trios, allowing for small scale or less critical deployments, as well as an enterprise grade deployment.



The Helion CloudSystem High Availability (HA) configuration adds three instances of the appliance that use **haproxy** to load balance the traffic from the CAN and DCM networks to the three appliances in an active/active configuration. All API/UIs are available from the haproxy running on the Management appliance. Haproxy will forward requests to **stunnel** to terminate https connections. Then traffic is forwarded to the individual services on the same device or other devices over the Cloud Management Network.

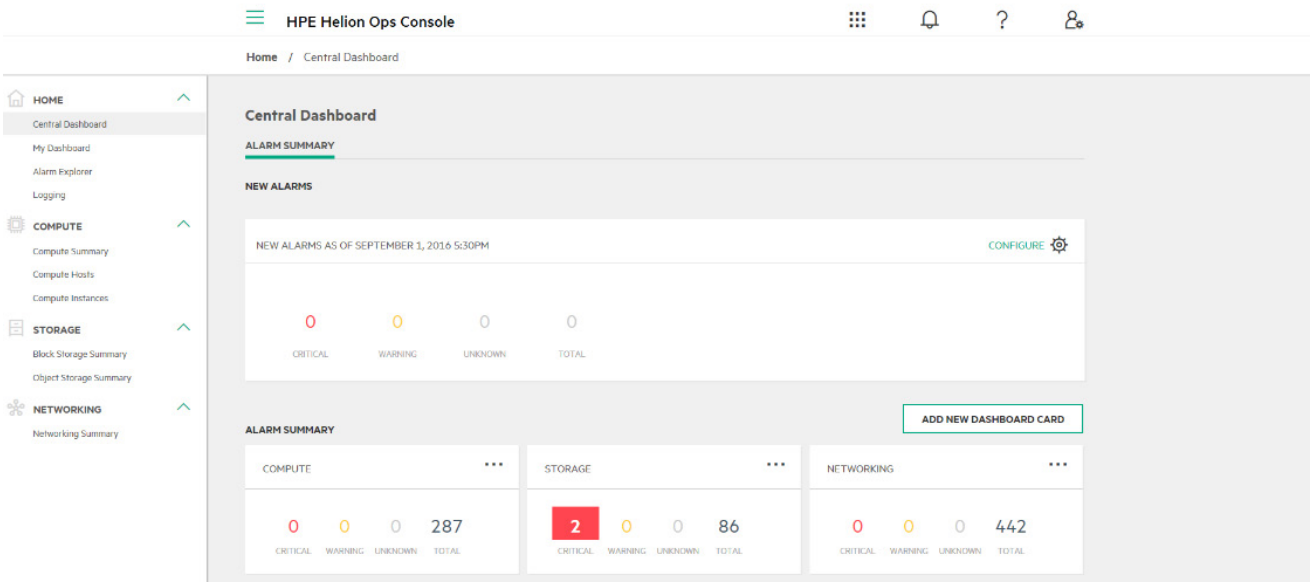
The new **csoperate CLI** allows for graceful start and shutdown of cloud appliances and services. It also acts as an update mechanism for making adjustments to the network configuration once Helion CloudSystem has been deployed. For networking, you can add IP address ranges, expand the segment ranges to expand the number of virtual networks support, and adjust NTP and DNS server configurations.

Operations Console

The Management Appliance hosts the **Operations Console**, which allows the administrator to maintain and monitor HPE Helion CloudSystem. This UI allows for storage and compute nodes to be monitored and additional resources to be added. The console has been enhanced with a customizable alarms dashboard, which gives a breakdown of the alarms that can give an operator confidence that the cloud is running properly. Alarms can be drilled in on, giving additional details about the cause of the alarms.

The Management appliance also serves as a single UI and API endpoint, giving a single integration point in the network. TLS endpoints are configured on this device, and it gates the access to the Helion CloudSystem internal components.

The Monitoring appliance hosts the **Monasca (Monitoring at Scale)** services, as well as the centralized logging services provided by **Elastic Search**, **LogStash**, and **Kibana**. All appliance monitoring and logging data are forwarded to this appliance and are made visible to the administrator in the Operation Console.



Hardware integration

HPE Helion CloudSystem is integrated with HPE OneView to provide richer experiences when deploying on Hewlett Packard Enterprise servers. HPE Helion CloudSystem can discover and list the available hardware in HPE OneView and make that hardware available for provisioning of storage and compute hosts, allowing admins to quickly introduce new hardware into the environment.

These discovered hardware nodes may be selected and provisioned into ESXi compute clusters in a single action from the Operations Console. This action will also extract metadata from HPE OneView and configure the data onto host aggregates and associate them with the compute hosts so that these metadata attributes can be used in flavors and images to select the appropriate hosts that can run the workload.

HPE Helion CloudSystem 10 extends the **Activate** workflow for compute hosts, which configures nodes as compute resources for OpenStack. Additional tasks can configure and deploy operating systems onto a bare metal node. The workflows support deploying HPE Enterprise Linux for a low cost Linux option. Alternatively, RHEL KVM can be provisioned onto the node if the customer provides the Red Hat installation ISO.

HPE Helion CloudSystem storage

HPE Helion CloudSystem provides multiple choices for block storage and object storage.

Storage	Type	Description	Compute Host Type
VMWARE VMFS	Block Storage	HPE Helion CloudSystem works with VMware VMFS to provide boot from volume functionality for ESXi compute hosts.	ESXi
HPE 3PAR FIBRE CHANNEL	Block Storage	HPE Helion CloudSystem works with 3PAR StoreServ Fibre Channel to provide instance data storage for KVM compute hosts.	KVM
HPE 3PAR ISCSI	Block Storage	HPE Helion CloudSystem works with 3PAR StoreServ iSCSI to provide boot and instance data storage for KVM and Hyper-V compute hosts.	KVM and Hyper-V
STORE VIRTUAL VSA	Block Storage	VSA is deployed on a separate pool of bare-metal resource nodes.	KVM and Hyper-V
SWIFT	Object Storage	Swift is an open source, scalable, software-defined storage (SDS) platform that provides object storage with unified management. Scale-out object storage is provided by a cluster of dedicated bare-metal nodes running Swift Proxy, Account and Container services and a separate pool of bare-metal resource nodes will have Swift Object service deployed.	Any
CEPH	Block and Object Storage	Ceph, new in HPE Helion CloudSystem 10, is an open source, scalable, software-defined storage (SDS) platform that provides block and object storage with unified management. The Cloud controller trio hosts the ceph-monitor service. A separate pool of bare-metal resource nodes have ceph-osd service deployed, and a separate cluster of dedicated bare-metal nodes run the Rados Gateway service for object storage integration. Ceph provides virtual storage for instances on KVM HPE Linux and RHEL compute hosts.	Any

Learn more at

hpe.com/helion/cloudsystem

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