Helion OpenStack Deep Dive

Chief Cloud Technologist & Chief Architect
Sam, Chen

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Helion Portfolio

Enterprise class products, solutions, and services for hybrid IT

**Integrated Cloud Solutions**
- HP CloudSystem Enterprise
- HP CloudSystem Foundation
- HP Helion Content Depot

**OpenStack Software**
- HP Helion OpenStack
- HP Helion OpenStack Community
- HP Helion Development Platform
- HP Helion Development Platform Community

**Cloud Software & Infrastructure**
- HP Automation & Orchestration
- HP Hybrid Cloud Management
- HP Converged Infrastructure

**Managed Services**
- HP Helion Managed Virtual Private Cloud & Managed Private Cloud
- HP Helion Managed & Workplace Applications

**Public Cloud & SaaS**
- HP Helion Public Cloud
- HP SaaS applications

**Professional Services**
- Advisory
- Apps transform
- Implementation
- Design
- Strategy
- Support
- Education

**PartnerOne for Cloud** Cloud builders • Cloud resellers • Cloud service providers
## Objectives

### HP Helion OpenStack Technical Overview

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<th>• Architecture (Block, Deployment, HA, Interfaces)</th>
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<td>• Identity, Metering, Monitoring, and DNS</td>
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HOS Architecture
HP Helion OpenStack

Deployment service
- Inventory management
- Deployment modeling
- Provisioning engine
- Artifacts
  - Provisioning images
  - Machine images
  - Deployment templates
- Operational plug-ins

Operational services
- Deployment dashboard
- Deployment content distribution services
- Admin dashboard/designer
- Cloud content distribution services
- Identity/key management services
- Account integration services
- Metering/billing integration services
- Metadata services
- Provisioning services
- Template repository
- Services framework
- Base services
- Admin dashboard
- Identity services
- Network services
- Compute services
- Image library services
- Object storage services
- Metering services
- Orchestration services
- Metering/billing integration services
- Block storage services
- Key management
- Data replication / cluster management
- Centralized logging
- Infrastructure monitoring
- Service metering
- Host Linux
- Physical infrastructure
HP Helion OpenStack 1.0

**Operations environment**

- Deployment content distribution services
- Deployment service
  - Inventory management
- TripleO (Ironic)
- Artifacts
  - Provisioning images
  - Machine images
  - Deployment templates
- Operational plug-ins

**Execution environment**

- Base services
  - Cloud content distribution services
- Kernel services
  - Horizon
  - Keystone
  - Neutron
  - Nova
  - Glance
  - Swift
  - Ceilometer
  - Heat
  - Key management
- Sub systems
  - RabbitMQ
  - MySQL
  - ElasticSearch
  - Logstash
  - Icinga

**Host Linux**

**Physical infrastructure**
HP Helion OpenStack 1.0

Operations environment

Execution environment

Integration services

TripleO (Ironic)

Identity Services - Keystone

- AD
- LDAP
- MySQL

Operational services

- Deployment content distribution services
- Inventory management
- Artifacts
  - Provisioning images
  - Machine images
  - Deployment templates
- Operational plug-ins

OpenStack

HP Helion OpenStack

ElasticSearch

Logstash

Icinga

Key management

Operational services

- Keystone
- Identity Services
- AD
- LDAP
- MySQL

Cloud content distribution services

Base services

- Inventory management
- Cloud content distribution services
- Identity Services

Physical infrastructure

Host Linux
**HP Helion OpenStack 1.0**

**Operations environment**

- Deployment service
  - Inventory management
- TripleO (Ironic)
- Artifacts
  - Provisioning images
  - Machine images
  - Deployment templates
- Operational plug-ins

**Execution environment**

- Compute Services - Nova
  - KVM
  - ESX

**Physical infrastructure**

- Host Linux
- OpenStack
- HP Helion OpenStack

**Operational services**

- Kernel services
  - Keystone
  - Neutron
  - Cinder
  - Nova
  - Glance
  - Swift
  - Heat
  - Ceilometer
  - ElasticSearch
  - Logstash
  - Icinga
  - Horizon

**Distribution services**

- Cloud content distribution services
- Key management

**Execution environment services**

- RabbitMQ
HP Helion OpenStack 1.0

**Operations environment**
- Deployment content distribution services
- Deployment service
  - Inventory management
- TripleO (Ironic)
- Artifacts
  - Provisioning images
  - Machine images
  - Deployment templates
- Operational plug-ins

**Execution environment**
- Network Services - Neutron
  - DVR
  - OVSvAPP
- Host Linux
- Physical infrastructure
- OpenStack
- HP Helion OpenStack

**Kernel services**
- Keystone
- Neutron
- Cinder
- Nova
- Glance
- Swift
- Ceilometer
- Heat
- Icinga
- RabbitMQ
- MySQL
- ElasticSearch
- Logstash
- OVSvAPP
HP Helion OpenStack 1.0

**Operations environment**

- **Deployment service**
  - Inventory management
- **TripleO (Ironic)**
- **Artifacts**
  - Provisioning images
  - Machine images
  - Deployment templates
- **Operational plug-ins**

**Execution environment**

- **Block Storage Services - Cinder**
  - HP StoreVirtual VSA
  - HP 3PAR
  - HP StoreVirtual P4000
  - Ceph

**Operational services**

- **Kernel services**
  - Keystone
  - Neutron
  - Cinder
  - Nova
  - Glance
  - Swift
  - Ceilometer
  - Heat
- **Base services**
  - Inventory management
- **Cloud content distribution services**
- **Key management**
- **Block Storage Services**
  - Cinder
- **HP StoreVirtual VSA**
- **HP 3PAR**
- **HP StoreVirtual P4000**
- **Ceph**

**Physical infrastructure**

- Host Linux
- Physical infrastructure

- **HP Helion OpenStack**
- OpenStack

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HP Helion OpenStack 1.0

Deployment service
- Inventory management
- TripleO (Ironic)
- Artifacts
  - Provisioning images
  - Machine images
  - Deployment templates
- Operational plug-ins

Object Storage Services
- Swift
- Ceph

Operations environment
- Host Linux
- Physical infrastructure

Execution environment
- OpenStack
- HP Helion OpenStack

Distribution services
- Elasticsearch
- Logstash
- Icinga

Base services
- Keystone
- Neutron
- Cinder
- Nova
- Glance
- Swift
- Ceilometer
- Heat
- Key management
- Object Storage Services
HP Helion OpenStack 1.0

Operations environment

Execution environment

Deployment content distribution services

Deployment service

Inventory management

Triple0 (Ironic)

Artifacts
  - Provisioning images
  - Machine images
  - Deployment templates

Operational plug-ins

Image Services - Glance

Swift

Operations environment

Execution environment

Host Linux

Physical infrastructure

OpenStack

HP Helion OpenStack

ElasticSearch

Logstash

Icinga

Horizon

Kernel services

Keystone

Neutron

Cinder

Nova

Glance

Swift

Ceilometer

Heat

Key management

Image Services

Glance

Swift
Deployment Architecture
HP Helion OpenStack deployment configuration

KVM deployment

Seed VM
Seed Host

1 X
Undercloud

2 X
Overcloud Controller

1 X
Overcloud Mgmt Controller

2 X
Overcloud (Swift)

Object Storage

Block storage options

3 X
- HP StoreVirtual VSA
- HP 3PAR StoreServ
- HP P4000

N...
- Compute
- Scale-out Swift
- Block/Object Storage (Ceph)
HP Helion OpenStack deployment architecture

Sever hosting Seed Cloud VM

Server hosting Seed VM

Backup/Restore Scripts

Seed Cloud VM

Keystone
Nova
Ironic

Keystone
Glance
Heat

Rabbit MQ

MySQL

Neutron
Glance
Ironic

Nova
Ironic
Neutron
HP Helion OpenStack deployment architecture

Undercloud

Undercloud Server

- Keystone
- Nova
- Ironic
- Neutron
- Glance
- Heat

- Horizon
  - Sherpa
  - EON
  - Sirius

- Rabbit MQ
  - Nova
  - EON
  - Neutron
  - Ironic

- MySQL
  - Keystone
  - Nova
  - Glance
  - Neutron
  - Sirius
  - Ironic
HP Helion OpenStack deployment architecture

Management Servers

Overcloud Controller

x2

Overcloud Controller

Nova
Neutron
Cinder
Horizon
Keystone
Glance
Heat

HAproxy

Rabbit MQ
Nova
Neutron
Cinder
Heat

SSL Proxy

MySQL
Nova
Neutron
Cinder
Heat

Glance
Keystone
Ceilometer
HP Helion OpenStack deployment architecture

Management Servers

Overcloud Management Controller

- Nova
- Neutron
- Cinder
- Sherpa
- HAproxy
- Rabbit MQ

Overcloud Management Controller

- Horizon
- Keystone
- Glance
- Heat
- Ceilometer
- SSL Proxy

MySQL

- Nova
- Glance
- Keystone
- Cinder
- Heat
- Ceilometer
HP Helion OpenStack deployment architecture

Overcloud Swift

Swift Server

Overcloud Swift

x2

Swift - Account
Swift - Proxy
Swift - Container
Swift - Object
HP Helion OpenStack deployment architecture

Compute Servers

Overcloud Compute

- Neutron-OVS-Agent
- Neutron-L3-Agent
- Nova-Compute (KVM)
- KVM Hypervisor

n…
Deployment Architecture - KVM

Helion Control Plane v1 - KVM

Seed and Under Cloud nodes assert traffic on IPMI by routing through management network.

Seed and Under Cloud nodes assert traffic on IPMI by routing through management network.

Keystone, Glance, Heat, Horizon, Swift, Sherpa, Kibana, Icinga, Nova, Cinder, Neutron

Block Storage nodes are used only by VSA plugin, 3PAR storage is external.

Fiber channel is a different type of network used for connecting to 3PAR.

Networks:
- external – tagged VLAN
- management – untagged VLAN
- ipmi – ether
- service – tagged VLAN
- fiber channel - fiber

Plugins:
- KVM
- VSA and/or 3PAR
- ML2 with DVR

External Customer Routing
Internal Customer Routing
Customer Firewall
operator access
3PAR array
Deployment Architecture - ESX

Helion Control Plane v1 - ESX

Keystone, Glance, Heat, Horizon, Swift, Sherpa, Kibana, Icinga, Nova, Cinder, Neutron

vCenter Proxy exists for every vCenter. It runs in a cluster with HA enabled, while customer VMs run in a different cluster.

esx network is setup by customer. It may be subnet or have its own VLAN.

VM traffic targeted outside of cloud is routed through Cloud Controller.

Seed and Under Cloud nodes assert traffic on IPMI by routing through management network.

Networks:
- external - tagged VLAN
- management - untagged VLAN
- ipmi - ether
- esxtenant - tagged VLAN range

HA enabled for this cluster

OVSvApp is VM that runs on every ESX Host
High Availability Architecture
HP Helion OpenStack high availability

OS Client

controller0
eth0
HostIP0
192.0.2.21
ExtVIP
192.0.2.26
keepalived
haproxy
master
IntVIP:8774
IntVIP:3306
ExtVIP:8774
ExtVIP:3306
HostIP1:8774
HostIP1:8776
nova-api
cinder-api

controller1
eth0
HostIP0
192.0.2.22
ExtVIP
192.0.2.26
keepalived
haproxy
slave
IntVIP:8774
IntVIP:3306
ExtVIP:8774
ExtVIP:3306
HostIP1:8774
HostIP1:8776
nova-api
cinder-api

mgmt controller
eth0
HostIP0
192.0.2.23
ExtVIP
192.0.2.26
keepalived
haproxy
slave
IntVIP:8774
IntVIP:3306
ExtVIP:8774
ExtVIP:3306
HostIP1:8774
HostIP1:8776
nova-api
cinder-api

Percona MySQL Galera Cluster

ExtVIP:3306
IntVIP:8774
IntVIP:3306
ExtVIP:8774
ExtVIP:8776
IntVIP:8774
IntVIP:8776
haproxy
slave
master

RabbitMQ Cluster with Mirrored Queues

ExtVIP:3306
IntVIP:8774
IntVIP:8776
ExtVIP:8774
ExtVIP:8776
IntVIP:8774
IntVIP:8776
haproxy
slave
master
HP Helion OpenStack high availability

Controller 0
- eth0
- HostIP 0: 192.0.2.21
- HostIP 1: 192.0.2.26
- ExtVIP: 8774
- IntVIP: 8774
- nova-api
- cinder-api
- keepalived

Controller 1
- eth0
- HostIP 0: 192.0.2.22
- HostIP 1: 192.0.2.22
- ExtVIP: 8774
- IntVIP: 8774
- nova-api
- cinder-api
- keepalived

Management Controller
- eth0
- HostIP 0: 192.0.2.23
- ExtVIP: 8774
- IntVIP: 8774
- nova-api
- cinder-api
- keepalived

Percona MySQL Galera Cluster
- HostIP 0: 192.0.2.26
- HostIP 1: 192.0.2.26
- ExtVIP: 3306
- IntVIP: 8774

RabbitMQ Cluster with Mirrored Queues
- HostIP 0: 192.0.2.22
- HostIP 1: 192.0.2.22
- ExtVIP: 8774
- IntVIP: 8774
- ExtVIP: 8776
- IntVIP: 8776

VRRP
- Multicast VRRP
HP Helion OpenStack high availability

- **OS Client**
- **Controller 0**
  - **HostIP0**: 192.0.2.21
  - **ExtIP**: 192.0.2.21
  - **eth0**: Keepalived
  - **IntIP**: Keepalived
  - **ExtVIP**: 8774
  - **IntVIP**: 8774
  - **nova-api**: HostIP1:8774
  - **cinder-api**: HostIP1:8776
  - **haproxy**: Master
- **Controller 1**
  - **HostIP0**: 192.0.2.22
  - **ExtIP**: 192.0.2.22
  - **eth0**: Keepalived
  - **IntIP**: Keepalived
  - **ExtVIP**: 8774
  - **IntVIP**: 8774
  - **nova-api**: HostIP1:8774
  - **cinder-api**: HostIP1:8776
  - **haproxy**: Slave
- **Management Controller**
  - **HostIP0**: 192.0.2.23
  - **ExtIP**: 192.0.2.23
  - **eth0**: Keepalived
  - **IntIP**: Keepalived
  - **ExtVIP**: 8774
  - **IntVIP**: 8774
  - **nova-api**: HostIP1:8774
  - **cinder-api**: HostIP1:8776
  - **sherpa**: HostIP1:21131
  - **ceilometer**: HostIP1:8778

**Percona MySQL Galera Cluster**
- **HostIP**: 192.0.2.21
  - **ExtIP**: 192.0.2.21
  - **IntIP**: 192.0.2.21
  - **MySQL**: HostIP1:3306
  - **RabbitMQ**: HostIP1:5672

**RabbitMQ Cluster with Mirrored Queues**
- **HostIP**: 192.0.2.21
  - **ExtIP**: 192.0.2.21
  - **IntIP**: 192.0.2.21
  - **RabbitMQ**: HostIP1:5672
HP Helion OpenStack high availability
HP Helion OpenStack high availability

- **OS Client**
  - **controller0**
    - eth0
    - HostIP: 192.0.2.21
  - **controller1**
    - eth0
    - HostIP: 192.0.2.22
  - **mgmt controller**
    - eth0
    - HostIP: 192.0.2.23

- **HAProxy**
  - **controller0**
    - ExtVIP: 8774
    - IntVIP: 8774
    - HostIP: 192.0.2.21
  - **controller1**
    - ExtVIP: 8774
    - IntVIP: 8774
    - HostIP: 192.0.2.22

- **MySQL**
  - **controller0**
    - HostIP: 192.0.2.21
  - **controller1**
    - HostIP: 192.0.2.22
  - **mgmt controller**
    - HostIP: 192.0.2.23

- **RabbitMQ**
  - **controller0**
    - HostIP: 192.0.2.21
  - **controller1**
    - HostIP: 192.0.2.22
  - **mgmt controller**
    - HostIP: 192.0.2.23

- **Keepalived**
  - Multicast VRRP
  - ExtVIP: 8774
  - IntVIP: 8774

- **Sherpa**
  - HostIP: 21131

- **Ceilometer**
  - HostIP: 8778

- **Percona MySQL Galera Cluster**
  - HostIP: 3306

- **RabbitMQ Cluster with Mirrored Queues**
  - HostIP: 5672
HP Helion OpenStack high availability

Controller 0
- eth0
- HostIP0: 192.0.2.21
- ExtVIP: 8774
- IntVIP: 8774
- nova-api
- cinder-api
- keepalived
- haproxy master
- RabbitMQ
- MySQL

Controller 1
- eth0
- HostIP0: 192.0.2.22
- ExtVIP: 8774
- IntVIP: 8774
- nova-api
- cinder-api
- keepalived
- haproxy master
- RabbitMQ
- MySQL

Management Controller
- eth0
- HostIP0: 192.0.2.23
- ExtVIP: 8774
- IntVIP: 8774
- nova-api
- cinder-api
- keepalived
- haproxy slave
- RabbitMQ
- MySQL

Percona MySQL Galera Cluster

haproxy master
ExtVIP: 8774
IntVIP: 8774
RabbitMQ Cluster with Mirrored Queues
HP Helion OpenStack high availability

OS Client

controller0
controller1
mgmt controller

- keepalived
- Multicast VRRP
- ExtVIP
- IntVIP
- RabbitMQ
- nova-api
- cinder-api
- MySQL
- Percona MySQL Galera Cluster
- RabbitMQ Cluster with Mirrored Queues

HostIP0: 192.0.2.21
HostIP0: ExtVIP 192.0.2.22
ExtVIP: 8774
IntVIP: 8774
ExtVIP: 3306
IntVIP: 3306
haproxy
slave

HostIP1: ExtVIP 192.0.2.26
ExtVIP: 8774
IntVIP: 8774
ExtVIP: 8776
IntVIP: 8776
haproxy
master

- keepalived
- Multicast VRRP
- ExtVIP
- IntVIP
- RabbitMQ
- nova-api
- cinder-api
- MySQL
- Percona MySQL Galera Cluster
- RabbitMQ Cluster with Mirrored Queues

HostIP0: 192.0.2.23
HostIP0: ExtVIP 192.0.2.26
ExtVIP: 8774
IntVIP: 8774
ExtVIP: 3306
IntVIP: 3306
haproxy
slave

HostIP1: ExtVIP 21131
ExtVIP: 8774
IntVIP: 8774
ExtVIP: 8778
IntVIP: 8778
ceilometer

ExtVIP: 8774
ExtVIP: 8774
ExtVIP: 8776
IntVIP: 8774
IntVIP: 8776
IntVIP: 8774
IntVIP: 8776
haproxy
master
haproxy
slave

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## Objectives

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Block Storage with HP StoreVirtual VSA
HP StoreVirtual VSA

OpenStack API

Compute

Networking

Storage

HP Helion OpenStack
Block storage drivers

OpenStack / Cinder

iSCSI

StoreVirtual
iSCSI Driver

HP StoreVirtual
Installation

**Automated Installation**
- Spins VM for StoreVirtual VSA/hosts
- Installs StoreVirtual VSA image
- Configures internal disk
- Provisions Volume to VM hosts
Deployment architecture
Highly available infrastructure

Clustering Storage system

Ethernet Fabric

Cinder/Store Virtual VSA features

- OpenStack / Cinder
- iSCSI
- StoreVirtual iSCSI Driver

Highly Available Storage

- Network RAID mirrors data
- One node fails, other node takes over
- No downtime & application disruption
Highly scalable platform

- Low cost highly scalable cloud solution
- Add compute, storage network resources on demand
- Automate compute, storage and network installation on-demand
Device deployment

Cinder/Store Virtual VSA features

- Volume create/delete
- Volume attach/detach
- Snapshot Create/Delete
- Create Volume from Snapshot
- Get Volume Stats
- Copy Image to Volume
- Copy Volume to Image
- Clone Volume
- Extend Volume
- Volume retype
- Volume Migration (backend assists)

StoreVirtual\LeftHand Volume Type Settings

- Network RAID
- Thin Provisioning
Helion free download

https://helion.hpwsportal.com/catalog.html#/Home/Show