StackHPC/OCF G Cloud 15

Service Definition Document

Summary of Offer

StackHPC develops OpenStack (including Ceph) and Kubernetes capabilities for Research Computing use cases, using extensive experience in high-performance cloud infrastructure. We specialise in designing, planning, building, deploying and upgrading as well as supporting OpenStack-based platforms.

Professional Services Specialisms

- Complete on-premises Cloud and HPC software solutions.
- Private Cloud, design, architecture, consultancy, training, and deployment.
- Hyperconverged and highly available infrastructure backed by OpenStack and Ceph.
- Strong open source ethos, hardware agnostic and free of vendor lock-in.
- Significant contributor to the most widely deployed open source cloud software in the world.
- Level 3 support, upgrade, and maintenance services available on a continuous basis.
- Expertise in various complex use cases, including AI, HPC, and trusted computing.
- Enabling managed Kubernetes environments.
- Operator training for OpenStack, GitOps/DevOps, HPC, SDN, and more.
- LOKI - Linux OpenStack Kubernetes Infrastructure.
- Software defined Cloud - Modern pipeline driven Infrastructure as Code, IaC.
- Scalable solutions for environments from half rack to geographically diverse multi-data centre.
- High performance optimisation of infrastructure for AI and HPC.
- Cloud migration and repatriation

Offering

Our Simplified OpenStack Cloud offering provides a self-contained cloud based on industry-tested open source software, expertly built and deployed following standards and best practices, resulting in a system that is ready for production while protecting the customer from vendor lock-in.

The strength of relying on the joint OpenStack expertise of OCF and StackHPC for design and deployment extends to support and training, both recommended add-ons to get the most out of your cloud platform.

Simplified OpenStack Cloud specifications and uses

The OpenStack Cloud includes the following core services:

- compute (Nova),
- software-defined networking (Neutron with OVN),
- identity, authentication and secret management (Keystone and Barbican),
- object storage (Ceph S3),
- block storage (Cinder),
- software images (Glance),
- orchestration (Heat),
- web interface (Horizon),

as well as a distributed file system as storage backend, using Ceph.

It is configured for monitoring (Prometheus, ElasticSearch, Grafana) and deployed following industry best practices (Kolla-Ansible) and StackHPC expertise (Kayobe).

This results in the Simplified OpenStack Cloud providing customers with infrastructure, which can be used in a variety of scenarios:

- Replacement of proprietary virtualisation solutions
- Removing the complexity of bringing up an OpenStack cloud, for testing, training or for production use
- Testing & Validating system for customers with existing OpenStack deployments

In its simplest form, the offer provides an OpenStack cloud based on three physical servers supporting the internal control plane infrastructure with three dedicated hypervisor (or compute) nodes.. An additional server is required to act as a bootstrap device and Ansible host.

The following extensions to this base are available :

- Up to 9 extra physical nodes, for a total of 12 compute nodes.
- For each extra compute node, the option to also add extra storage.

Advanced services, such as shared file systems as a service (Manila), load balancing for cloud applications (Octavia) or management of container orchestration engines such as Kubernetes (Magnum) may be purchased in addition to the core services.

The base system has an estimated lead time of 30 days, subject to customer enterprise networking and end-user security constraints, with an expectation of a day of joint design with the customer.
Level-3 support is offered for a year. Support is required for upgrades of the platform.
The full training package is a 4-day session, for up to 5 attendees. More attendees can be added at a cost.

Constraints

Simplified Specification	Criteria
Predominant server vendor	E.g. Dell
Predominant network switch vendor	E.g. Dell OS10
OpenStack controllers	3
Dedicated hypervisor count	3
Baremetal compute node count	0
Ceph server count	Included in OpenStack Controllers
Network switch count	0
Infrastructure Support	
Infrastructure Design Workshop	✔
Greenfield / not brownfield	✔
Implement custom theme logo and banner message for Horizon	✔
Support for external OIDC identity provider	×
Mappings for users, groups and projects for OIDC authentication	×
Support for external LDAP identity provider	✔
Multi-region OpenStack deployment	×
Configuration of port 443 only for HAProxy	✔
Pilot / Test system	
Separate dev/test/staging environment	×
Hardware test system specified	×
Virtual test system specified	✔
Baremetal for test system seed hypervisor	×
Control plane management services	
Baremetal for Seed Hypervisor	✔
Bifrost service enabled	✔
Enrollment via discovery / not via external inventory	✔
Hardware burn-in phase required	×
Control plane host OS provisioned to SW RAID	×
Physical networking managed by Kayobe	✔
Physical network is EVPN fabric	×
Provisioning to LOM NIC / not bonded NIC pair	✔
Whitelisting for internet package downloads	×
Server BMC IP addressing pre-assigned	✔

Server BIOS firmware upgrade required	×
Server BIOS configuration managed by Kayobe	✔
Release Train software management	✔
Security baseline features	
Security baseline enabled	✔
Ansible lockdown hardening	✔
Wazuh SIEM	✔
Control plane internal & back-end TLS	✔
Firewall rules for internal control plane networks	✔
Encrypted root device support required	×
GPU cloud functionality	
GPUs using PCI Passthrough	×
GPU cloud functionality - VGPU and MIG	×
Nvidia Virtual GPU support	×
HPC cloud functionality	
HPC cloud functionality	×
SRIOV, VF-LAG and ASAP2	×
Ethernet RoCE RDMA networking support	×
Support for Infiniband networking	×
HPC benchmarks for acceptance test	×
High-performance virtualisation configuration - NUMA, hugepages	✔
Storage performance benchmarking	×
Infra for Platform Workloads - Kubernetes, Slurm, etc.	
Magnum service enabled	×
Octavia service enabled with OVN driver	×
Octavia add Amphora driver	×
Barbican service enabled	×
Barbican uses Hashicorp Vault backend	✔
Blazar service enabled	×
Support for reservation of custom resource classes (GPUs)	×
Ceph Storage	
Ceph Storage enabled	✔
Ceph managed by Kayobe CephAdm	✔
Ceph deployed converged with OpenStack controllers	✔

Encryption at rest for Ceph OSD devices	×
Dedicated hardware for Ceph Monitors	×
Dedicated hardware for Ceph OSDs	×
Cinder service enabled	✔
Manila service enabled	×
Multiple Ceph storage tiers	×
Support for non-Ceph Cinder backend	×
Support for Cinder volume encryption	×
Support for non-Ceph Manila backend	×
High-speed network and routing for Manila	×
Monitoring and Alerting	
Alerts to Slack, Mattermost, RocketChat or Matrix Element	✔
Alerts to MS Teams	×
Channel for alerts from Wazuh	✔
Redfish BMC monitoring	✔
Energy monitoring	×
Resource Accounting	
CloudKitty service enabled	×
Custom usage tariffs for CloudKitty	×
Ironic and Bare metal	
Ironic service enabled	×
Ironic uses multi-tenant networking with NGS	×
Ironic compute nodes have multiple physnets	×
Ironic uses trait-driven BIOS reconfiguration	×
Support for baremetal hypervisor conversion	×
Support for node cleaning	×
Support for trait-driven BIOS reconfiguration	×
Support for bonding in multi-tenant Ethernet	×
Support for multi-tenant network isolation	×
Tempest test suite compliance test	×
Setup of project management infrastructure: task backlog	✔
Setup of project management infrastructure: shared channel	✔
Setup of project management infrastructure: documents	✔
DNS and Designate	

Designate service enabled	×
Designate integration with external DNS	E.g BIND9
Designate using BIND9 servers	×
Designate integration with external DNS providers	×
Neutron internal DNS support	✔
CI/CD	
CI/CD via Github or Gitlab	✔
Implementation of Kayobe config CI/CD	E.g Github
Full set of pipelines	✔
Implement Tempest test as CI workflow	×
Implement CI testing using hardware staging system	×
OpenStack-config Ansible repos for post-deploy configuration	×
Definition of compute flavors according to reference design	×
Define and build OS images according to reference design	×
Azimuth Cloud Portal	
Azimuth	×
Azimuth Design Workshop	×
Platform localisations and customisations	×
Development of custom compute platforms	×
StackHPC Slurm Appliance	
Slurm Appliance	×
Slurm with GPU support	×
Training and Workshops	
OpenStack Operations Workshop	✔
OpenStack Applications Workshop	×

Unknowns

Customer minimum competence level
Proof of concept systems and the risk of operator self-injury
“Appliance” level deployment TRL