

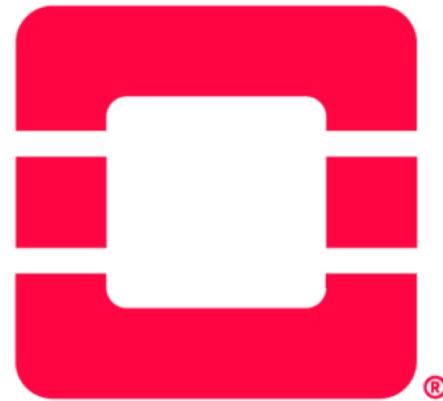
Infrastructure

5th High Performance Container Workshop - ISC19

Scope and Introduction

This segment focuses on **INFRASTRUCTURE** aspects.

It is meant to make sure we all agree that Container Runtimes and Orchestration needs to run on top of something...



OpenStack, Containers and Supporting Technologies

Martial Michel
Data Machines Corp.

OpenStack Kolla-Ansible

Containers for deploying/operating OpenStack clouds

<https://wiki.openstack.org/wiki/Kolla>

- Kolla-Ansible provides Docker containers + Ansible playbooks to deploy OpenStack services and infrastructure components in Docker containers on baremetal or VM

```
allinone@oska:~$ docker ps -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED
STATUS	PORTS NAMES		
80712c44e063 single-c"	kolla/centos-binary-horizon:queens	"dumb-init --	horizon
bc4da43738c1 single-c"	kolla/centos-binary-heat-engine:queens	"dumb-init --	heat_engine
9e18eb2c7dd9 single-c"	kolla/centos-binary-heat-api-cfn:queens	"dumb-init --	heat_api_cfn
fcacf74fc697 single-c"	kolla/centos-binary-heat-api:queens	"dumb-init --	heat_api
c535293e7eb2 single-c"	kolla/centos-binary-neutron-metadata-agent:queens	"dumb-init --	neutron_metadata_agent
088f00a0ca48 single-c"	kolla/centos-binary-neutron-l3-agent:queens	"dumb-init --	neutron_l3_agent
3626e51e4608 single-c"	kolla/centos-binary-neutron-dhcp-agent:queens	"dumb-init --	neutron_dhcp_agent
44e32416f91b single-c"	kolla/centos-binary-neutron-openvswitch-agent:queens	"dumb-init --	neutron_openvswitch_agent
e62fcf00417f single-c"	kolla/centos-binary-neutron-server:queens	"dumb-init --	neutron_server
[...]			



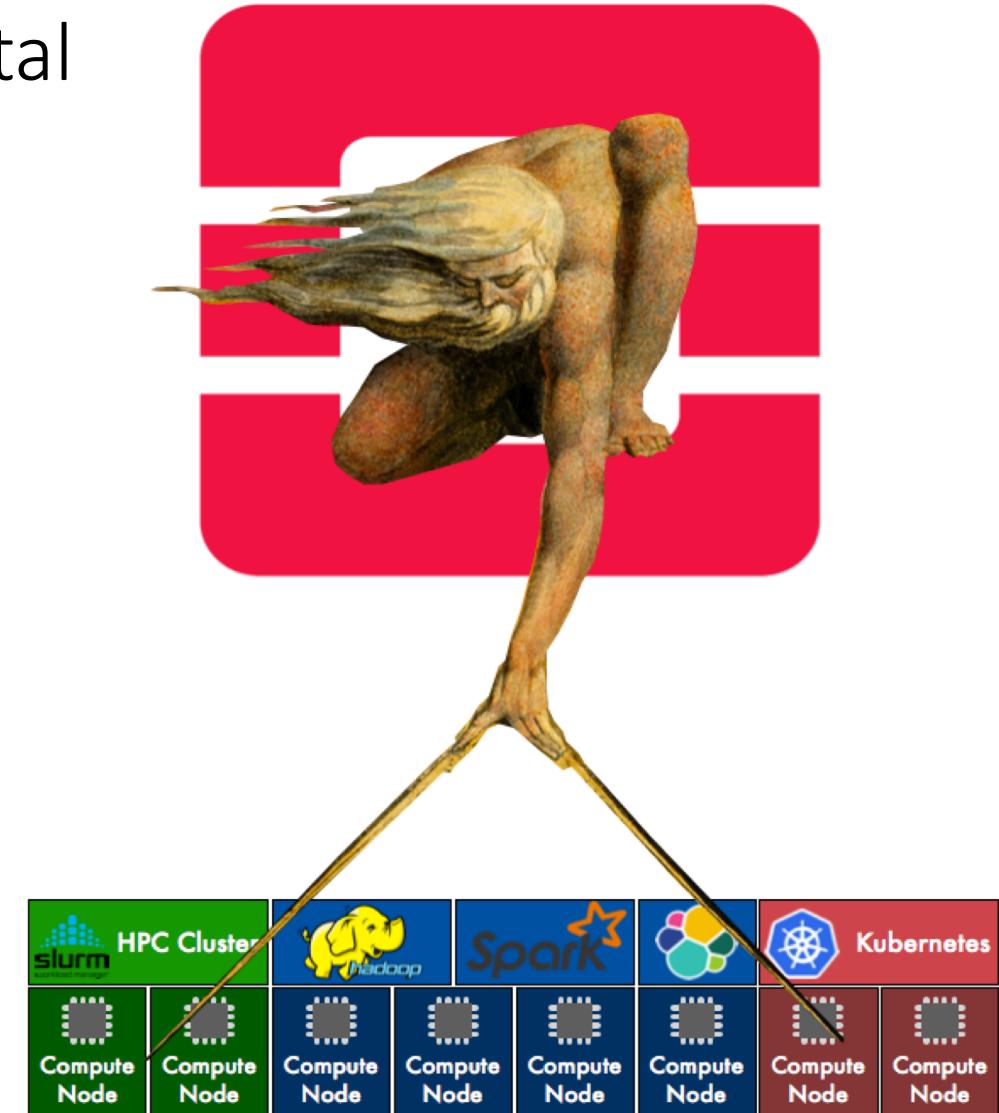
<https://www.openstack.org/videos/denver-2019/kolla-project-update-3>

OpenStack Kayobe

Containerized OpenStack on bare metal

<https://kayobe.readthedocs.io/en/latest/>

- Extends Kolla-Ansible
 - Bifrost (deploy base image onto a set of known hardware using ironic) discovers and provisions the cloud
 - Kolla builds container images for OpenStack services
 - Kolla-Ansible delivers painless deployment and upgrade of containerized OpenStack services
 - + Configuration of cloud host OS & flexible networking
 - + Management of physical network devices
- Bare metal deployment of control plane
- Bare metal compute node management
- Configuration of control plane host OS
- Infrastructure-as-Code



<https://www.stackhpc.com/kayobe-5.html>

<https://github.com/openstack/kayobe>

Magnum

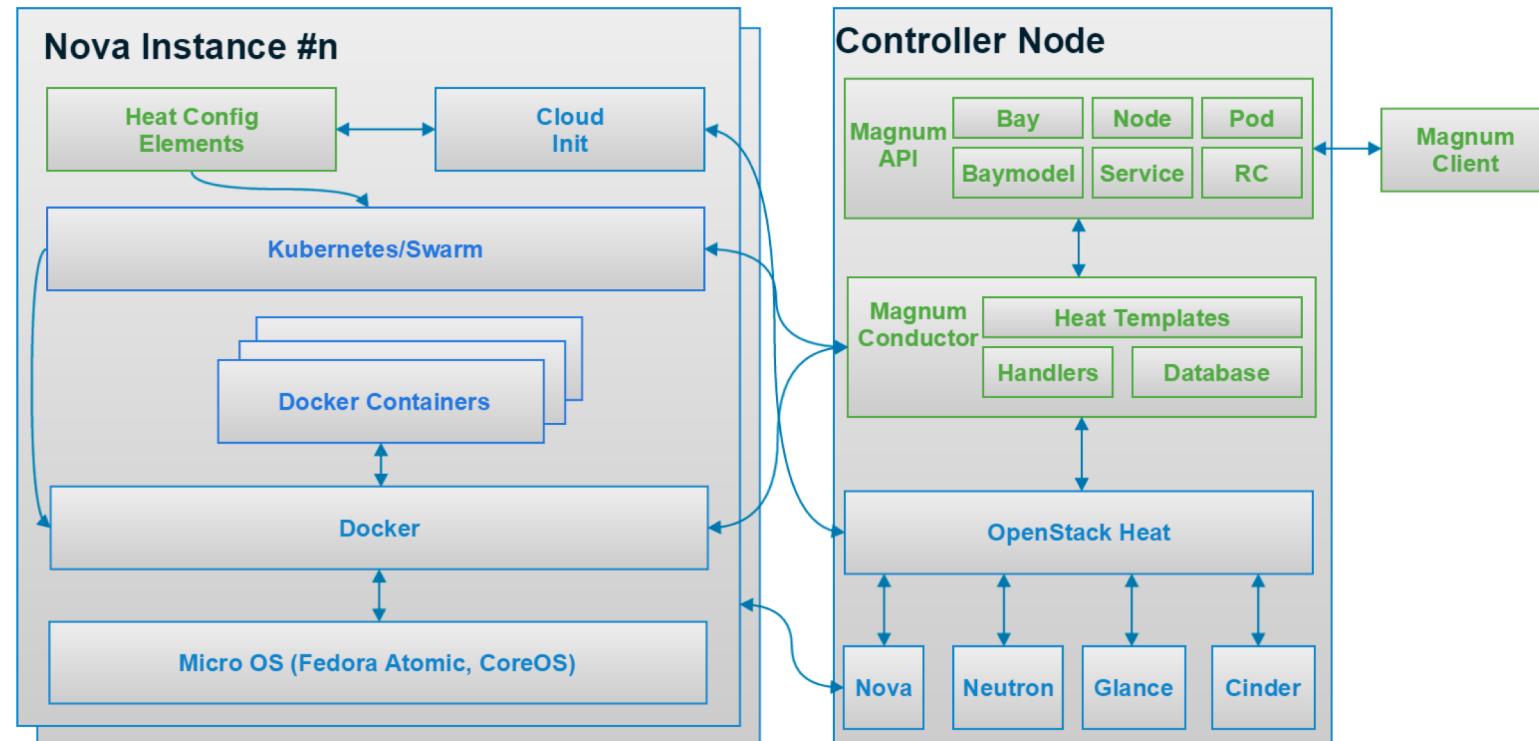
Container Service for OpenStack

<https://wiki.openstack.org/wiki/Magnum>



MAGNUM
an OpenStack Community Project

- Uses Heat to orchestrate an OpenStack image with Docker and Container Orchestration Engine (COE)
 - Docker Swarm, Kubernetes, Apache Mesos
- Runs image in VM or bare metal in a cluster configuration



<https://www.openstack.org/videos/denver-2019/magnum-project-update-2>

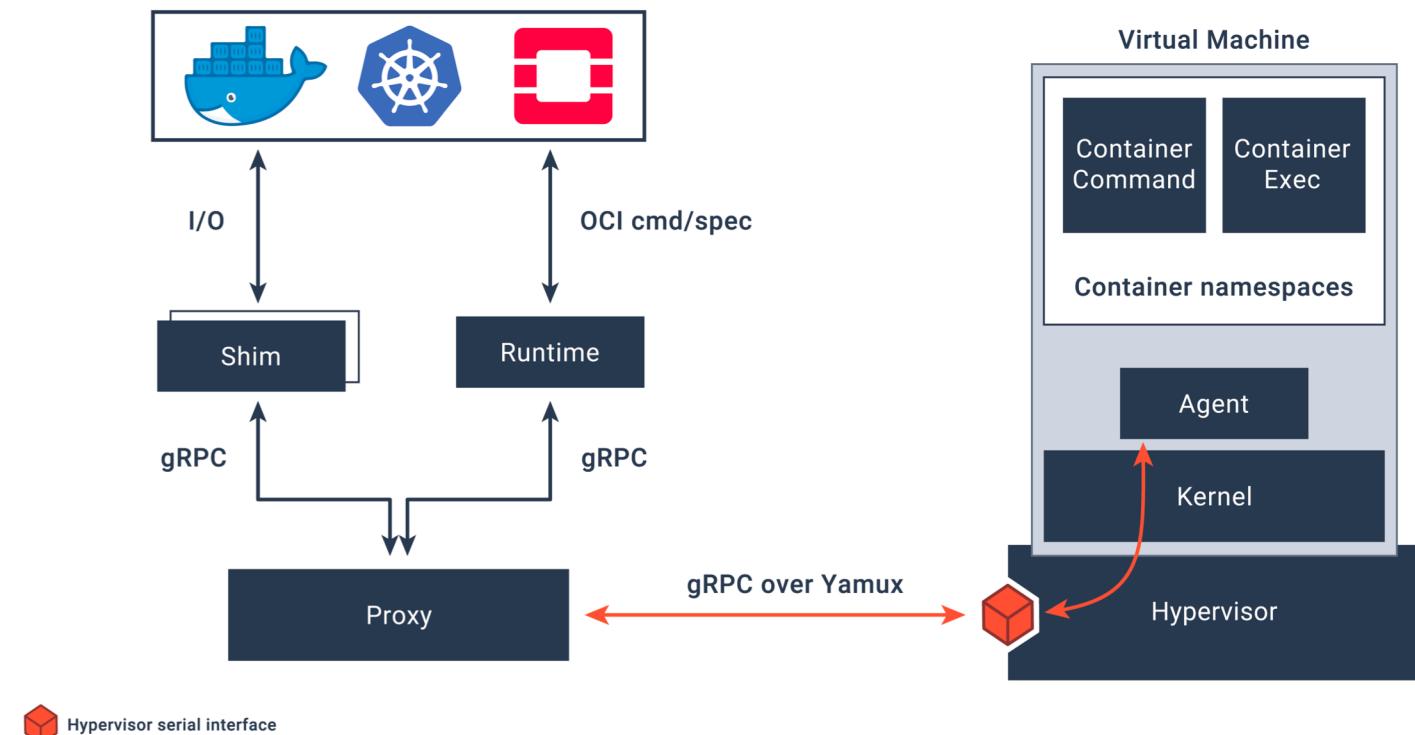


Kata Containers

Container runtime building lightweight VM

<https://katacontainers.io/>

- secure container runtime with lightweight virtual machines that feel and perform like containers, but provide stronger workload isolation using hardware virtualization technology
 - Open Container Initiative (OCI) compliant
- 1.5.0 introduces support for the Firecracker hypervisor
<https://firecracker-microvm.github.io/>



<https://www.openstack.org/videos/denver-2019/kata-containers-project-updates>

AirShip

Framework for defining/managing open infrastructure

<https://www.airshipit.org/>

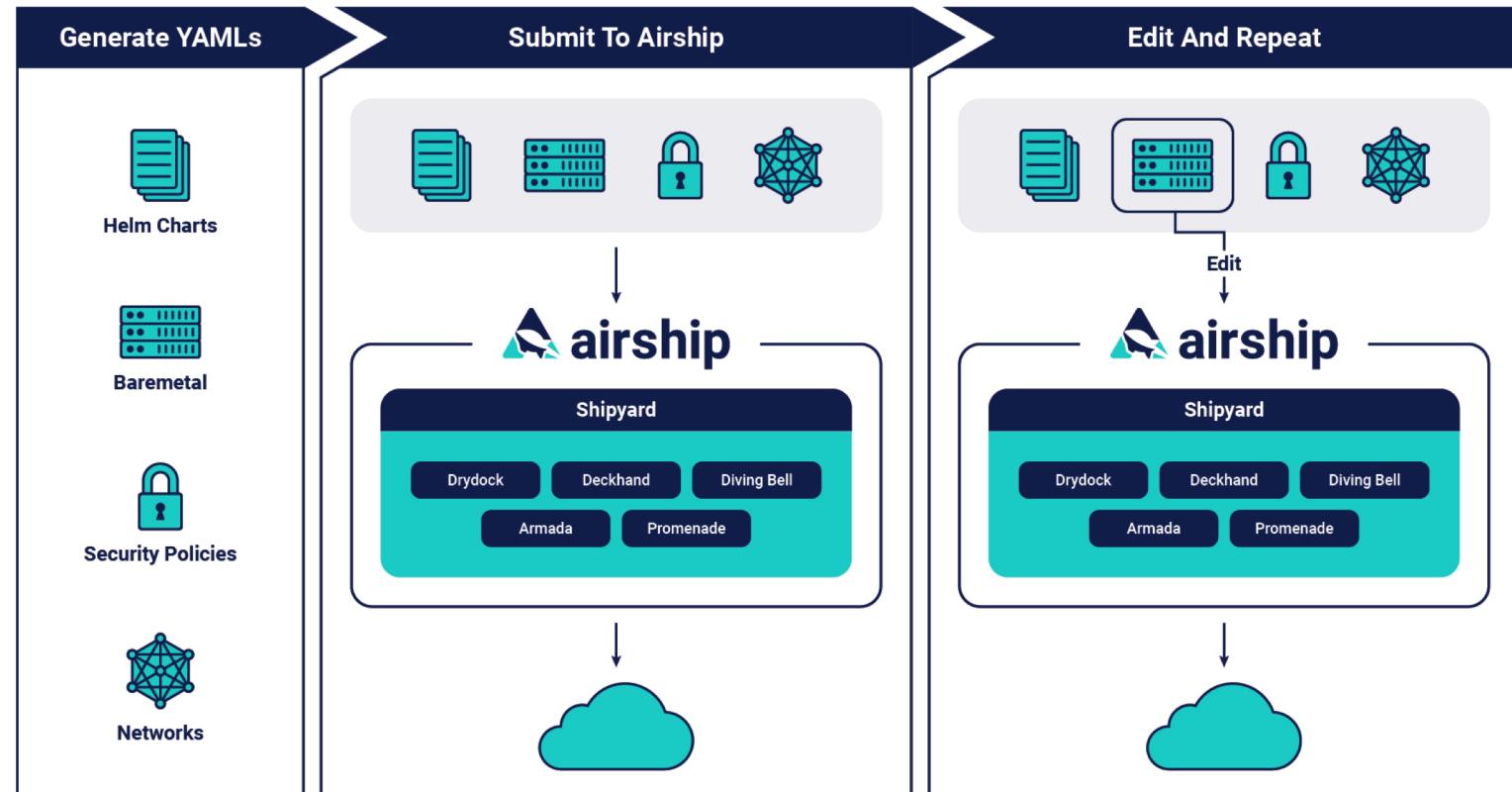


- Loosely-coupled interoperable open source tools to automate cloud provisioning

- Tools: OpenStack (VM), Kubernetes (container orchestration), MaaS (bare metal)

- Containers as an unit of infrastructure delivery at scale

- deliver a production-grade Kubernetes cluster with Helm deployed artifacts, including OpenStack-Helm



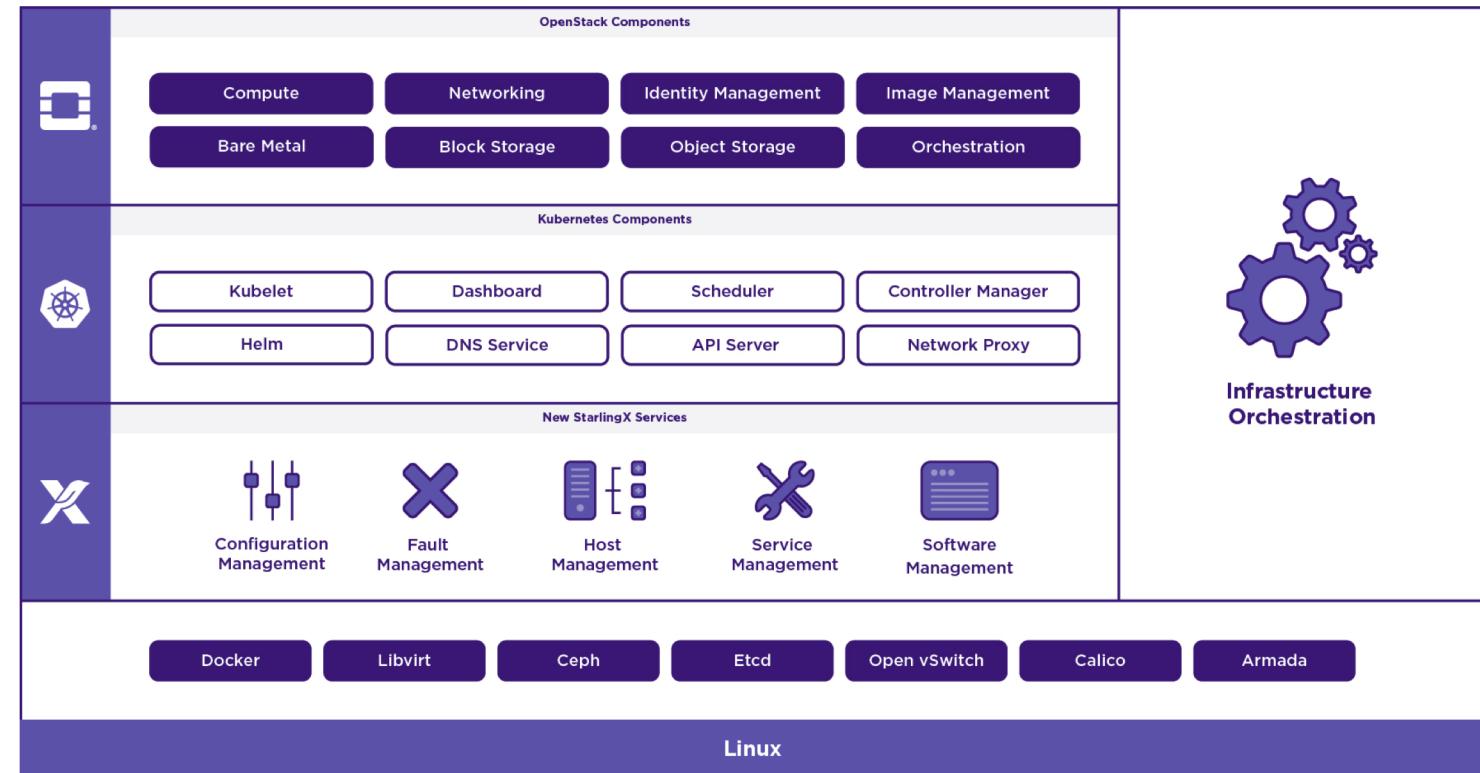
<https://www.openstack.org/videos/denver-2019/airship-project-update-1>

StarlingX

Cloud for the distributed edge

<https://www.starlingx.io/>

- Cloud infrastructure software stack for the edge
 - Deploys a K8s to run an OS at the edge
 - Integrates a number of upstream projects: CentOS, OvS-DPDK, Ceph, Kubernetes, OpenStack
- Edge-tuned/optimized
- Management of Host, Service, Software, Fault



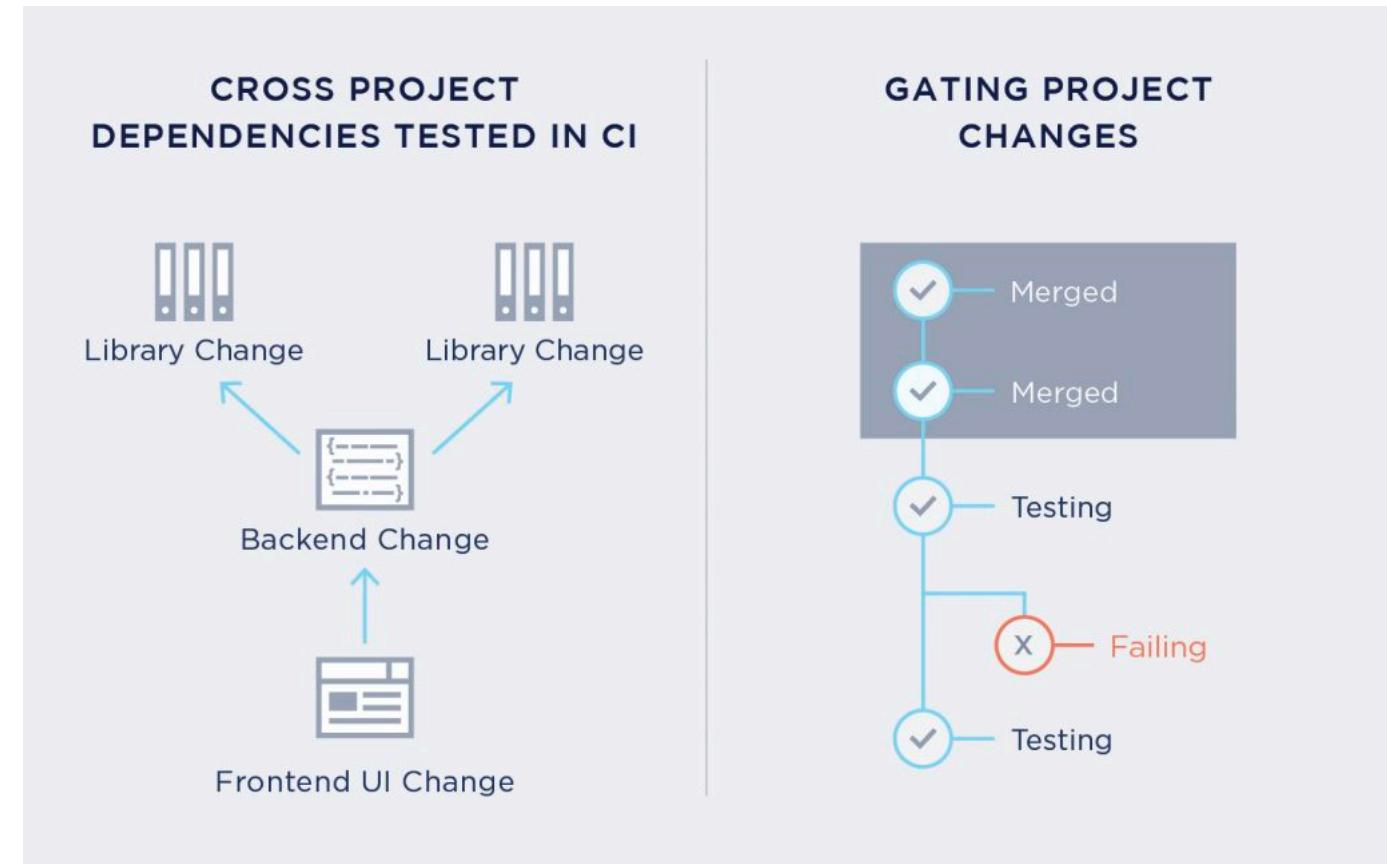
<https://www.openstack.org/videos/denver-2019/starlingx-project-update>

Zuul

Project Gating System

<https://zuul-ci.org/docs/zuul/>

- continuous integration, delivery, and deployment systems
 - focus on project gating and interrelated projects.
- Facilitates running tests and automated tasks in response to Code Review events
 - Tests cross-project changes in parallel so users can easily validate changes to multiple systems together before landing a single patch.



<https://www.openstack.org/videos/denver-2019/zuul-project-update-1>

Container Safe

Container Security Scanner

<https://www.containersafe.io/>

- Quickly Scan the layers within the container, performing analysis of:
 - Malware
 - Common Vulnerabilities and Exposures (CVE)
- Currently in limited access testing phase

Container URL:
Image Url *
`nginx` Scan

Created	2019-02-06T08:11:09.870Z
Size	104.14 MB
Labels	<code>"maintainer":"NGINX Docker Maintainers <docker-maint@nginx.com>"</code>
Analysis status	Completed
Analysis result	Pass with warning

of vulnerable packages: ▲ 3

▼ vulnerabilities:

▼ 0:

▼ CVE-2017-5932:

```
cveid: "CVE-2017-5932"
cvss_access_complexity: "Low"
cvss_access_vector: "Local access"
cvss_authentication: "None required"
cvss_availability_impact: "Partial"
cvss_base: 4.6
cvss_confidentiality_impact: "Partial"
cvss_exploit: 3.9
cvss_impact: 6.4
cvss_integrity_impact: "Partial"
```

▼ cvss_vector:

```
0: "AV:L"
1: "AC:L"
2: "Au:N"
3: "C:P"
4: "I:P"
5: "A:P"
cweid: "CWE-20"
mod_date: "31-03-2017"
pub_date: "27-03-2017"
summary: "The path completion feature in Bash 4.4 allows local users to gain privileges via a crafted filename starting with a " (double quote) character and a command substitution metacharacter."
```



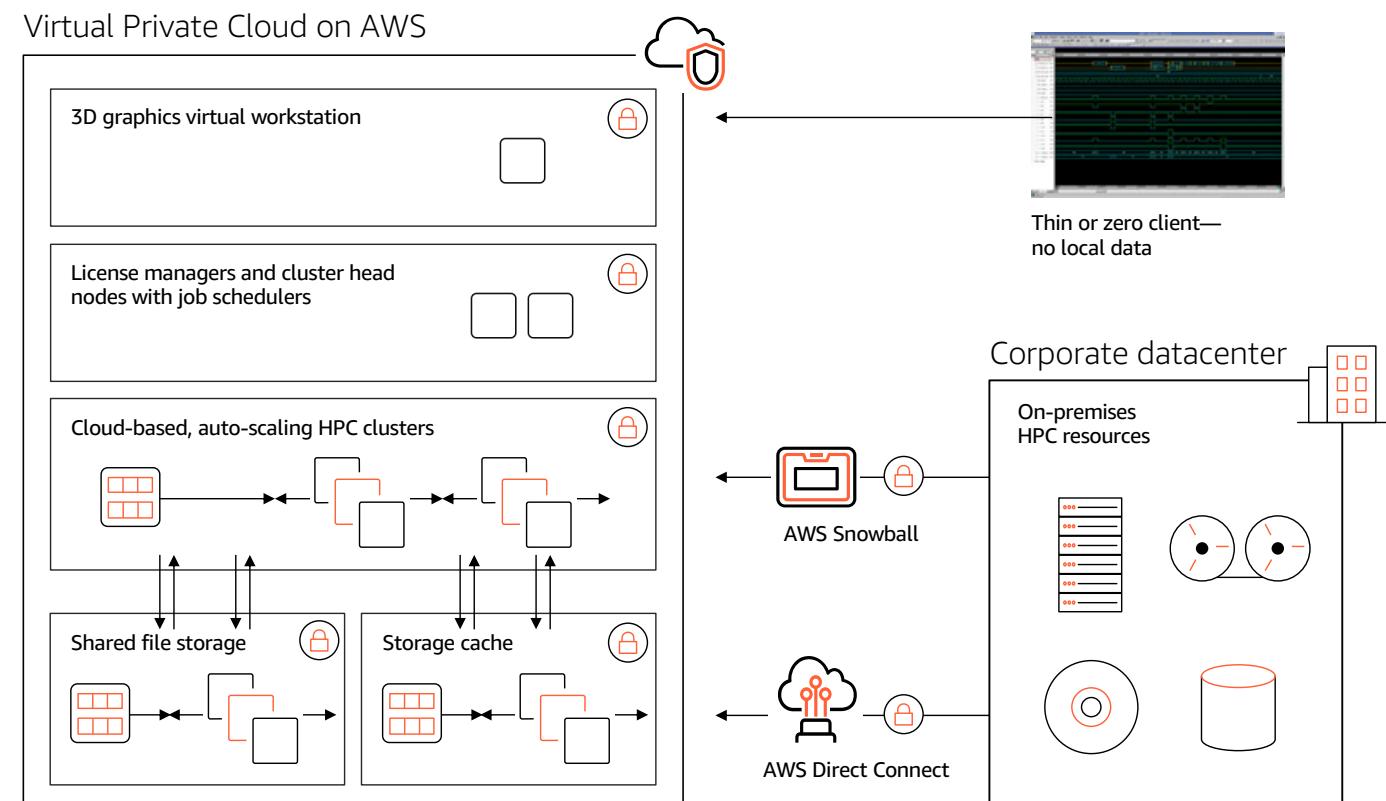
datamachines.io

Contact containersafe@datamachines.io for access

High Performance Computing (HPC) on AWS

On AWS, secure and well-optimized HPC clusters can be automatically created, operated, and torn down in just minutes

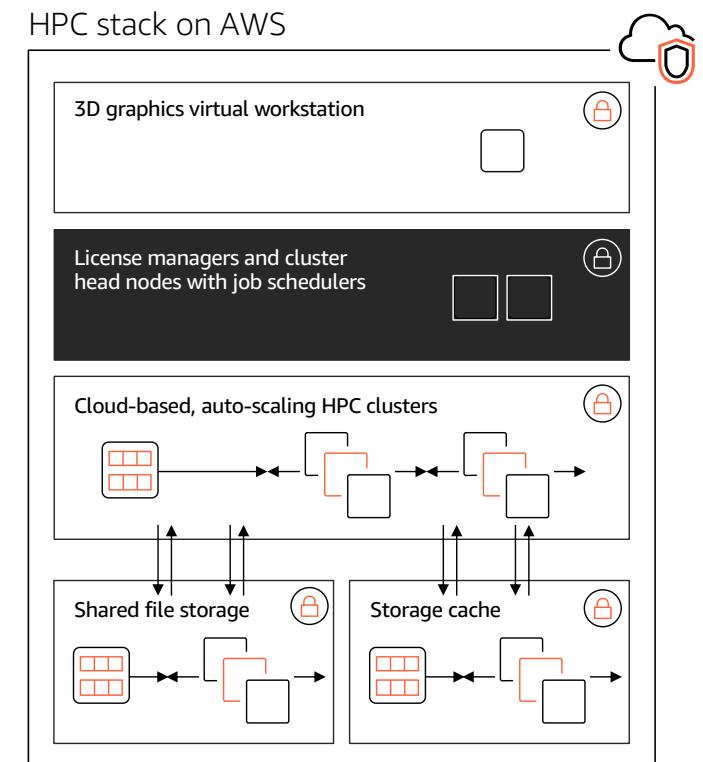
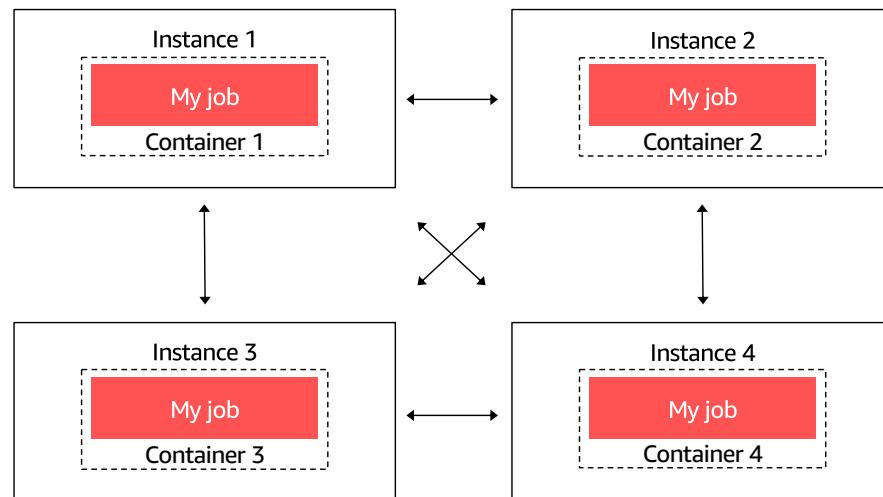
- Machine learning and analytics
- Amazon S3 and Amazon Glacier
- Third-party IP providers and collaborators



Innovations in HPC infrastructure

Efficient job scheduling: Multi-node parallel job support on AWS Batch

Simplify your compute clusters and scale jobs across multiple instances with AWS Batch support for Multi-node Parallel (MNP) jobs



Innovations in HPC infrastructure

Easy cluster management: AWS ParallelCluster

Create and manage HPC clusters

- Simplifies deployment of HPC in the cloud, including integrating with popular HPC schedulers
- Built on AWS CloudFormation, easy to modify to meet specific application or project requirements
- Now integrated with AWS Batch

