OpenShift Basics

What is OpenShift?

Container Orchestration and Platform as a Service Solution

Automates the deployment and management of containers

Why OpenShift?

- Based on Kubernetes
- Fastest growing community
- One of the top GitHub projects
- Basically an K8S distribution with more features
- Proven install path and supported by RedHat
- Has Platform as a Service features

Why container orchestration?

- Managing applications is hard
- Packaging applications is even harder
- Deploying applications is cumbersome

Automation is key!

What does OpenShift offer?

- Pods based on immutable Docker images
- Deployments managing application updates
- Application Lifecycle managment
- Persistent Storage
- DNS Resolution for Services
- Secret Management
- Config Management
- Container Registry

All of this via a "simple" REST API!

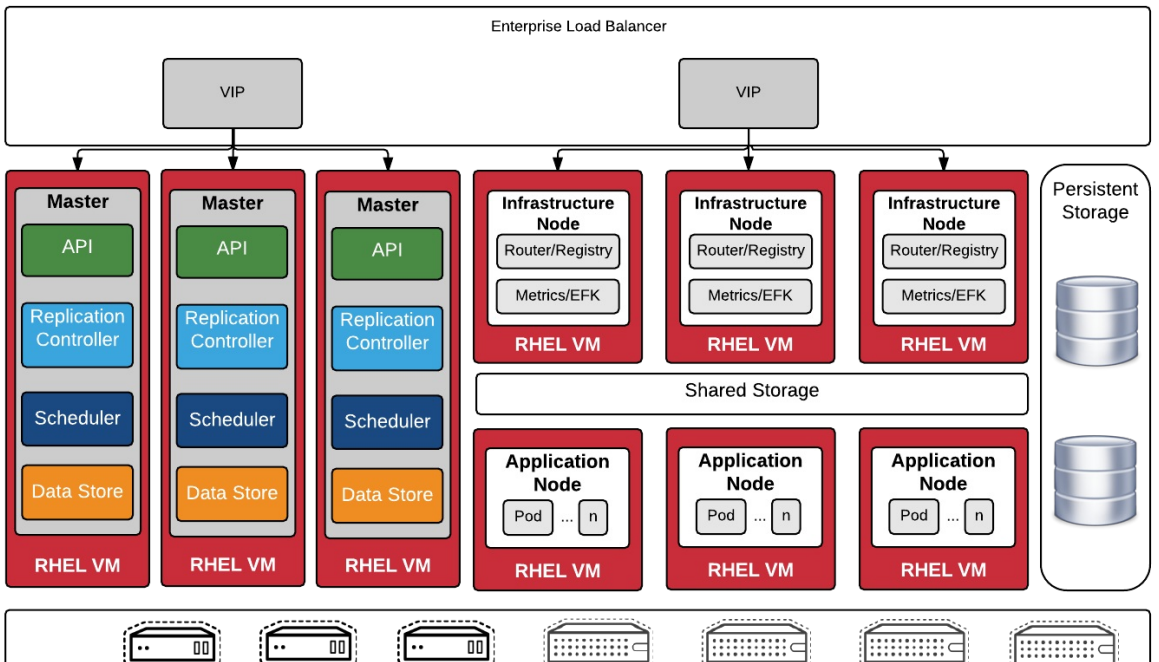
What is k8s handling for us?

- Scheduling
- Networking
- Storage
- Rolling Update

- Docker Images

- Autoscaling

OpenShift Architecture


Enterprise Load Balancer
VIP
VIP
Master
API
Replication Controller
Scheduler
Data Store
RHEL VM
Master
API
Replication Controller
Scheduler
Data Store
RHEL VM
Master
API
Replication Controller
Scheduler
Data Store
RHEL VM
Infrastructure Node
Router/Registry
Metrics/EFK
RHEL VM
Infrastructure Node
Router/Registry
Metrics/EFK
RHEL VM
Infrastructure Node
Router/Registry
Metrics/EFK
RHEL VM
Shared Storage
Application Node
Pod ... n
RHEL VM
Application Node
Pod ... n
RHEL VM
Application Node
Pod ... n
RHEL VM
Persistent Storage

OpenShift Terminology

Pods and Container

Pod is the smallest unit in OpenShift & Kubernetes

- Pod can consist of multiple containers
- All containers of a pod run on the same node
- Containers in a pod can communicate via localhost
- Containers in a pod share a kernel namespace

Service

Services abstract access to Pods

- Selection of Pods via Labels
- Typically only cluster internal access

Routes

Ingress allows external access to Services

- Hostname
- URL
- HTTPS possible

```yaml
apiVersion: v1
kind: Route
metadata:
  name: example-route-prod
spec:
  host: www.example.com
  to:
    kind: Service
    name: example-service-prod
```

Deployment

Manages a set of Pods

- De facto standard for deploying applications

- Manages multiple iterations of an application
- Creates a ReplicaSets for each release
- Allows rollback to a previous release when desired
- Automatic deployment via triggers

OpenShift also has DeploymentConfigs which are discouraged to use by 2019.

Persistent Volume Claim

Requests for persistent Storage

- Automatic provisioning in some Providers (eg. Azure, AWS, NetApp)
- Different requirements via StorageClass

Builds

Transform input parameters or source code into a runnable image

Possible sources:

- Image, Source, Binary, ...
- Builds are written in Image Stream

Images & ImageStreams

Abstraction of Docker Images in OpenShift

- different sources via one API

Projects

Separation of consumers/environments

- Resource Quotas
- All resources are attached to a namespace
- RBAC makes sharing of namespaces possible (with some NetworkPlugins)

Common CLI commands

OC

- CLI for **everything**
- Short for OpenShift control

oc create

Create resources in Kubernetes

- Definition in YAML or JSON
- Validation in `oc` client

```
oc create -f pod.yaml
oc create -f http://example.com/pod.yaml
cat pod.yaml | oc create -f -
oc create -R -f dir/
```

oc get

List OpenShift resources

- Different output formats
- Filtering via labels possible

```
oc get all
oc get pods
oc get dc
oc get pods -o wide
oc get all -l env=production
oc get po/nodejs-ex -o yaml
```

oc edit

Edit resource definitions

- Validation in `oc` client
- Suitable for debugging

```
oc edit dc/nodejs-ex
```

oc delete

Deletion of resources

```
oc delete rc/nodejs-ex
```

oc adm

Administrative OpenShift tasks

- Manage cluster nodes
- Manage Permissions
- Manage Groups/User