

1. Overview Session on OpenShift

Red Hat® OpenShift® Container Platform

<ul style="list-style-type: none">• Container orchestration platform based on Kubernetes• Benefits both operations and development• Provides developers and IT organizations with cloud application platform<ul style="list-style-type: none">◦ Used for deploying applications on secure, scalable resources◦ Minimal configuration and management overhead• Supports Java™, Python, Ruby, Node.js, Perl, PHP, .NET, and more• OpenShift Container Platform's Control Plane is only available to deploy on Red Hat Enterprise Linux® CoreOS (RHCOS)	<ul style="list-style-type: none">• OpenShift Container Platform workloads may be deployed on RHCOS or Red Hat Enterprise Linux® (RHEL)<ul style="list-style-type: none">◦ RHCOS available only for OpenShift deployments, not for general use◦ RHCOS codifies operational expertise for OpenShift with new purpose-built tooling◦ RHCOS is FIPS-compliant• Brings Kubernetes platform to customer data centers and cloud<ul style="list-style-type: none">◦ Meets security, privacy, compliance, and governance requirements
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1.1. OpenShift Installation

IPI	UPI
Fully or partially Automated	User Provisioned Scripts will Spin-up the Infrastructure.
Cloud Agnostics	Cloud Agnostics
Partially Customisable	Fully Customisable
OS Support - RHEL CoreOS	RHEL CoreOS + RHEL 7,8
Node Provisioning/Autoscaling - IPI Scripts handle it	MachineSet API Support.
Hardware/VM Provisioning - IPI Scripts	UPI Scripts.
Generate Ignition Config File - IPI Scripts	UPI Scripts.

1.2. Disconnected Install AirGapped Installation.

1. This is a complex installation which involves multiple steps as sequenced in the below diagram.

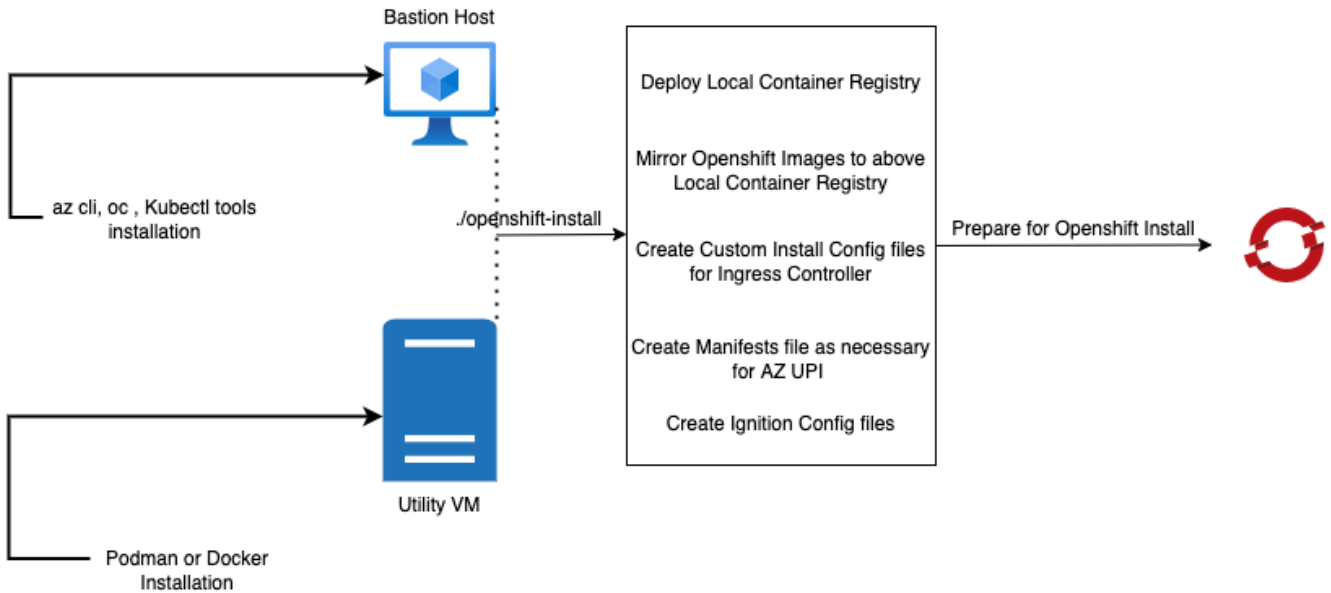


Figure 1. sequencediagram

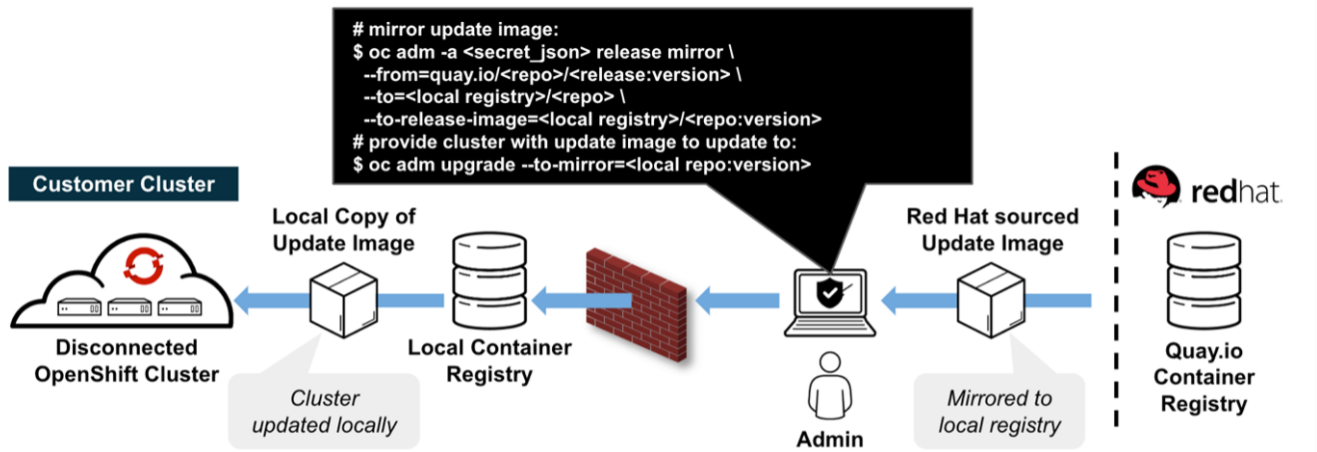


Figure 2. Final Outcome.

1.3. Importance of IaaC here.

1. OpenShift Installation is an immutable Infrastructure and a big installation, Hence it is recommended to implement in deployments of Applications.
2. Terraform plays a crucial role in spinning up of OpenShift Cluster and managing this immutable Infrastructure.
3. Ansible is recommended to setup the project and user level governance model like `clusterQuota` and `limits and requests`.

2. OpenShift Cli tools and Useful Commands.

```
$ oc whoami --show-console

$ oc adm policy add-cluster-role-to-group cluster-admin ocsadmin

$ oc auth can-i create pods --all-namespaces

$ oc auth can-i delete node
```

3. OpenShift AuthProvider using Htpasswd Providers.

[Live demo](#)

4. Difference between OpenShift and Kubernetes.

Kubernetes	OpenShift
CaaS	PaaS
No Built-in CICD tools	CICD tools & OpenShift Pipeline, Internal Registry, ImageStream, Build tools.
Web Console - Need to Install & With Limited Operations	Manage End-End Monitoring, Logging, Pipelines & Builds.
Kubectrl	oc 'also supports kubectrl'
Workflow Automation - No Built-in tools, Manual and Other tools	S2I, OpenShift Pipelines, Image Building, ImageStream, Internal Registry
Cloud Agnostics	Cloud Agnostics
Supporting Operating Systems - CentOS, RHEL, Ubuntu, Debian, Fedora	RHEL, RHCOS, Fedora, CentOS
Cluster Installation - Kubeadm, kubespray, kops, User to Provision Infrastructure, Public Clouds	UPI & IPI, Public Clouds
Development environment - minikube	CRC, Developer Sandbox environment
Managing Container Images - No Container Registry, External/Private, Images	Internal Registry, Internal, Private, External, ImageStream
Security - Flexible	Very Strict, Strict Security Policies, More secure
Networking - CNI, ThirdParty Plugins	OpenShiftSDN, OVNKubernetes
Ingress & Routes - Ingress, SSL, Load Balancing, Virtual Hosting	Routes, Split traffic, sticky sessions.

Kubernetes	OpenShift
Enterprise Support - Vendor Managed Support & Community Support	RedHat

5. Operator Hub

OperatorHub is the web console interface in OpenShift Container Platform that cluster administrators use to discover and install Operators. With one click, an Operator can be pulled from its off-cluster source, installed and subscribed on the cluster, and made ready for engineering teams to self-service manage the product across deployment environments using Operator Lifecycle Manager (OLM).

Cluster administrators can choose from catalogs grouped into the following categories:

Category	Description
Red Hat Operators	Red Hat products packaged and shipped by Red Hat. Supported by Red Hat.
Certified Operators	Products from leading independent software vendors (ISVs). Red Hat partners with ISVs to package and ship. Supported by the ISV.
Red Hat Marketplace	Certified software that can be purchased from Red Hat Marketplace.
Community Operators	Optionally-visible software maintained by relevant representatives in the operator-framework/community-operators GitHub repository. No official support.
Custom Operators	Operators you add to the cluster yourself. If you have not added any custom Operators, the Custom category does not appear in the web console on your OperatorHub.

6. OpenShift Networking.

Cluster Administrators have several options for exposing applications that run inside a cluster to external traffic and securing network connections:

1. Service types, such as node ports or load balancers
2. API resources, such as Ingress and Route

6.1. Networking Operators Overview.

OpenShift Container Platform supports multiple types of networking Operators. You can manage the cluster networking using these networking Operators.

6.1.1. Cluster Network Operator

The Cluster Network Operator (CNO) deploys and manages the cluster network components in an OpenShift Container Platform cluster. This includes deployment of the Container Network Interface (CNI) default network provider plug-in selected for the cluster during installation.

```
$ oc get -n openshift-network-operator deployment/network-operator
```

```
$ oc get clusteroperator/network
```

```
$ oc describe network.config/cluster
```

6.1.2. DNS Operator

The DNS Operator deploys and manages CoreDNS to provide a name resolution service to pods. This enables DNS-based Kubernetes Service discovery in OpenShift Container Platform. For more information, see DNS Operator in OpenShift Container Platform.

6.1.3. Ingress Operator

When you create your OpenShift Container Platform cluster, pods and services running on the cluster are each allocated IP addresses. The IP addresses are accessible to other pods and services running nearby but are not accessible to external clients. The Ingress Operator implements the Ingress Controller API and is responsible for enabling external access to OpenShift Container Platform cluster services.

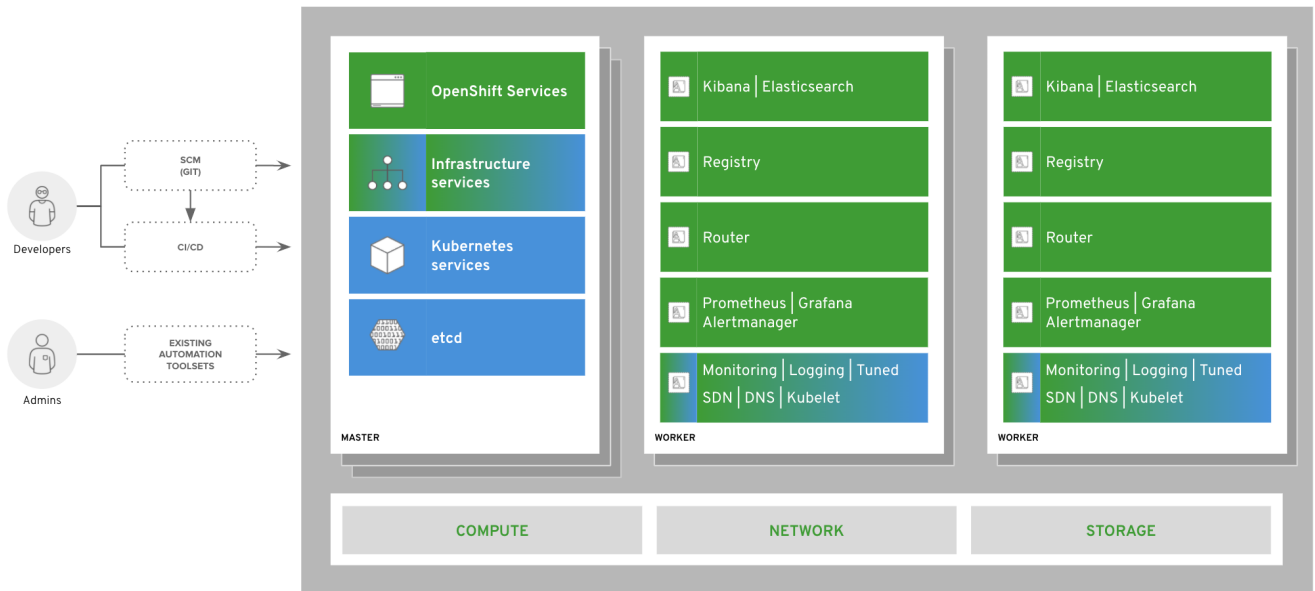
6.1.4. External DNS Operator

The External DNS Operator deploys and manages ExternalDNS to provide the name resolution for services and routes from the external DNS provider to OpenShift Container Platform.

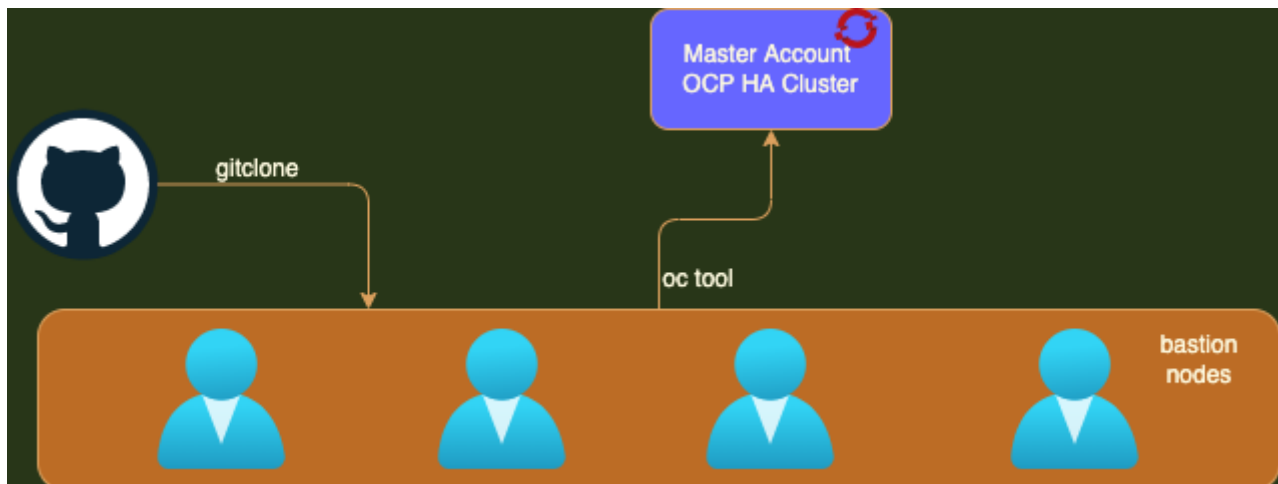
7. HighLevel Architecture.

- OpenShift runs on RHCOS and RHEL
- OpenShift has two types of nodes:
 - Workers
 - Masters
- Nodes are instances of RHEL or RHCOS with OpenShift installed
 - Workers are where end-user applications run.
 - Masters manage the cluster.

Masters make up the OpenShift Control Plane.



8. How to access OpenShift Cluster?



9. conclusions

1. This will cover the OpenShift Advanced Deployments day 1 session.

10. Q & A

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