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OpenShift e Container Storage

KUBERNETES ENTERPRISE PER LE GRANDI IDEE

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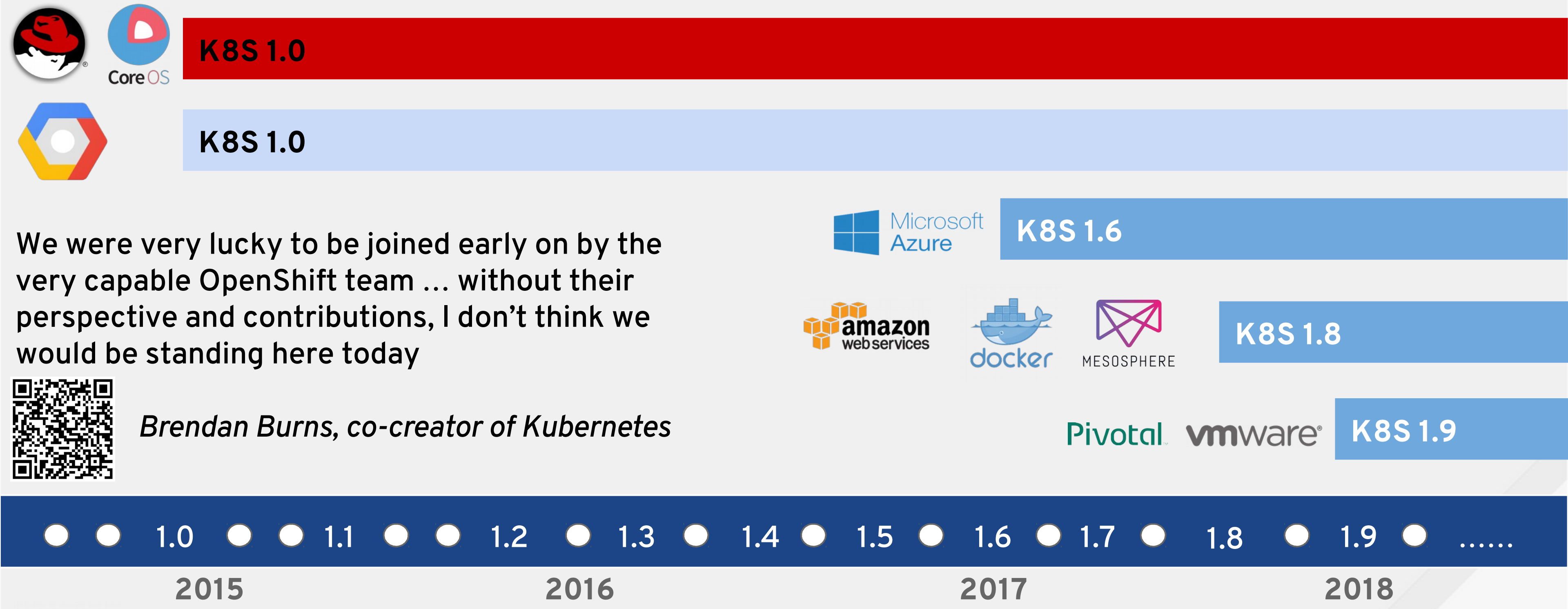
#RedHatOSD

… so you want to do containers and Kubernetes?

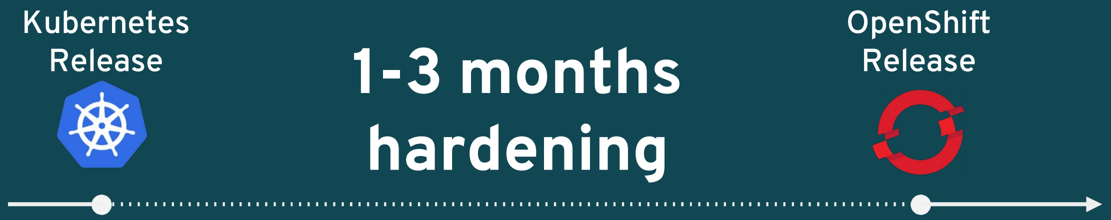
RED HAT HAS BEEN A KUBERNETES LEADER SINCE DAY 1



We were very lucky to be joined early on by the very capable OpenShift team ... without their perspective and contributions, I don't think we would be standing here today

Brendan Burns, co-creator of Kubernetes

OPENSHIFT IS KUBERNETES FOR THE ENTERPRISE



Security fixes
100s of defect and performance fixes
200+ validated integrations
Middleware integrations
(container images, storage, networking, cloud services, etc)
9 year enterprise lifecycle management
Certified Kubernetes

redhat.

Kubernetes Workloads

MANAGE YOUR APPLICATIONS

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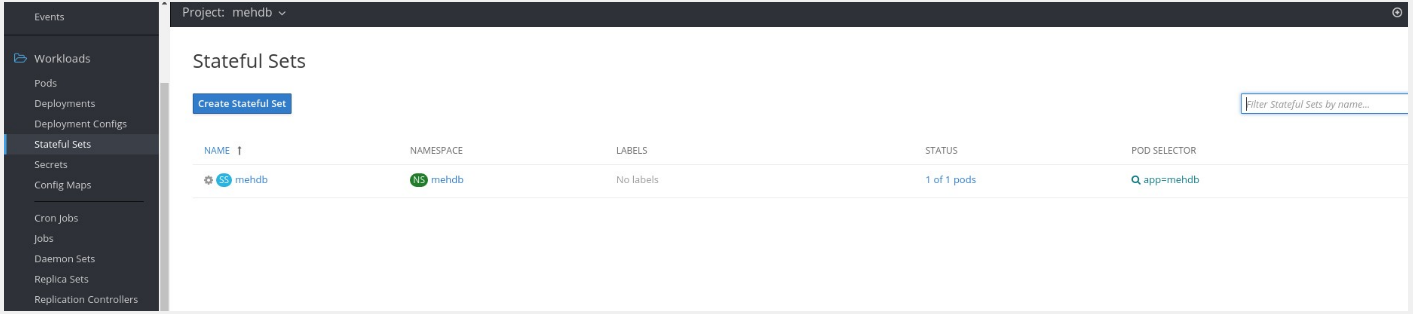
CONTROLLERS MATTERS!

Different types of applications (stateful, stateless, batch, agent, ...) require different orchestrator behaviors



Events
Workloads
Pods
Deployments
Deployment Configs
Stateful Sets
Secrets
Config Maps
Cron Jobs
Jobs
Daemon Sets
Replica Sets
Replication Controllers

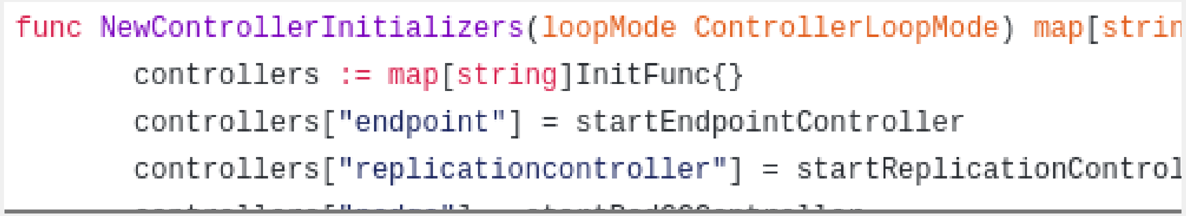
Project: mehdb

Stateful Sets

Create Stateful Set

Filter Stateful Sets by name...

NAME	NAMESPACE	LABELS	STATUS	POD SELECTOR
SS mehdb	NS mehdb	No labels	1 of 1 pods	app=mehdb



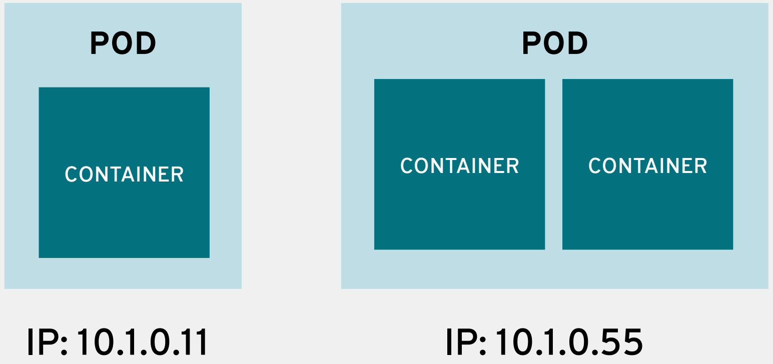
```
func NewControllerInitializers(loopMode ControllerLoopMode) map[strin
        controllers := map[string]InitFunc{}
        controllers["endpoint"] = startEndpointController
        controllers["replicationcontroller"] = startReplicationControl
```

Main controller types:

- Replica Sets
- Stateful Sets
- Daemon Sets
- Jobs (OneTime, Cron)

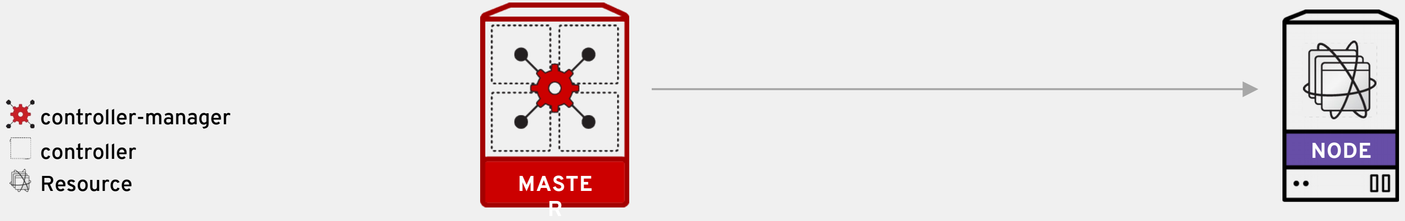
WHAT IS A POD?

CONTAINERS ARE WRAPPED IN PODS WHICH ARE UNITS OF DEPLOYMENT AND MANAGEMENT



CONTROLLER & CONTROLLER-MANAGER

- The **controller-manager** is the Master’s component that manage the controllers
- A **controller** is a loop that governs the status of kubernetes resources (such as pods) in order to bring it from the current state to the desired state
- Controllers react to **kubernetes events** and define **how resources should be orchestrated**



CONTROLLER & CONTROLLER-MANAGER

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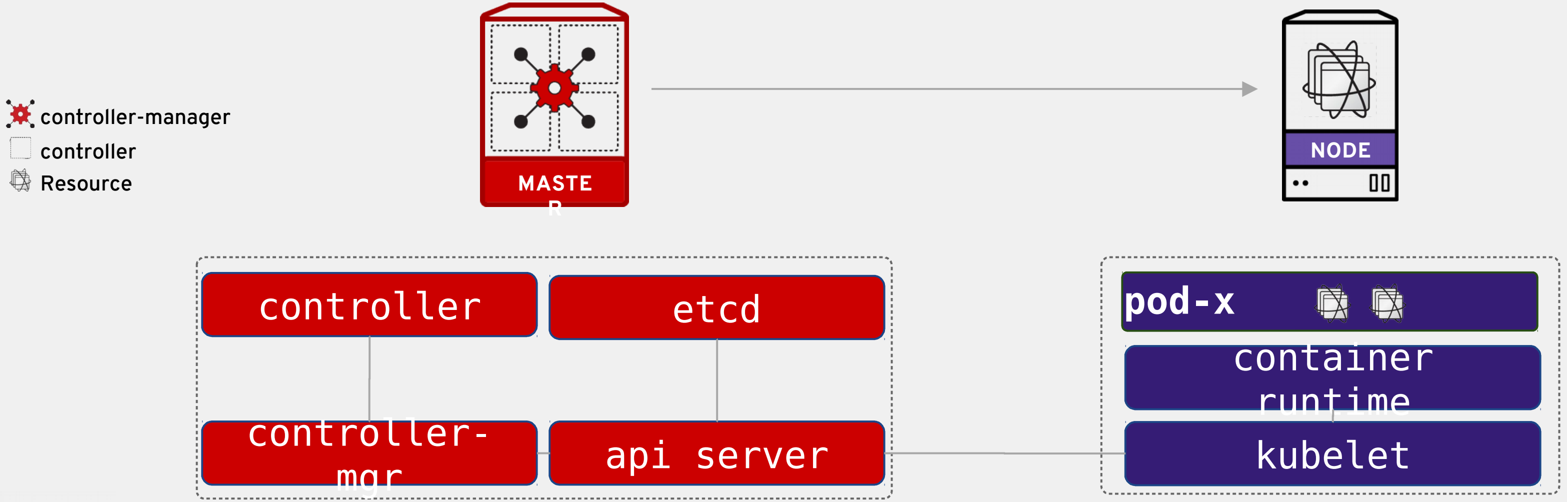
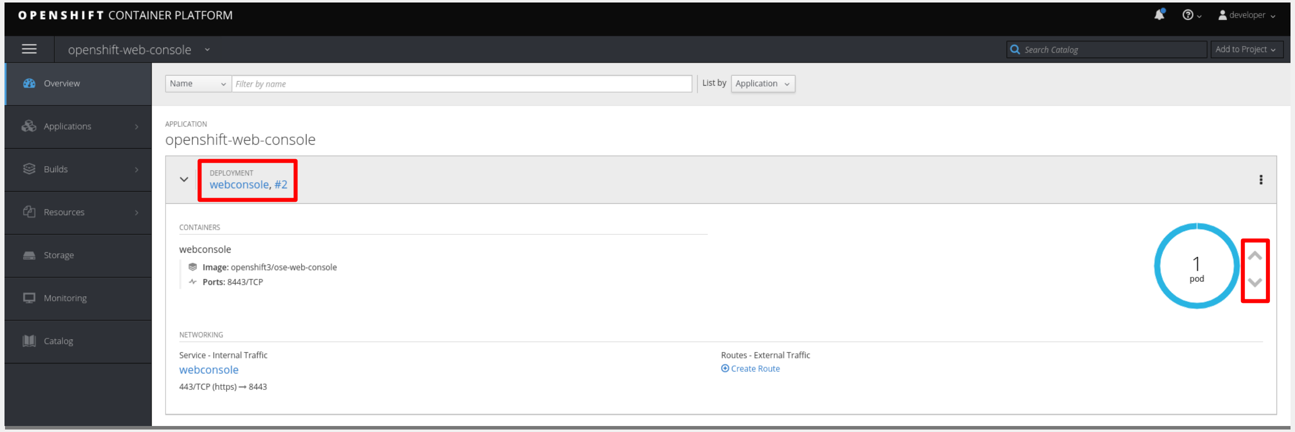


DEPLOYMENT AND REPLICASET

- A Deployment controller provides declarative updates for Pods and ReplicaSets
- ReplicaSet controller ensures that a specified number of pod replicas are running at any given time
- Recommended to run stateless application



APPLICATION
openshift-web-console

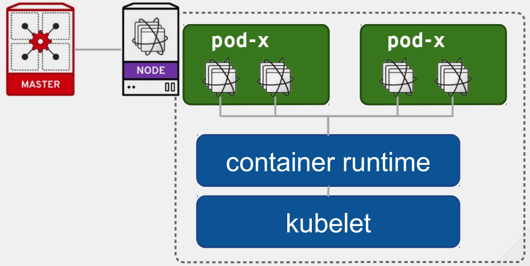
DEPLOYMENT
webconsole, #2

CONTAINERS
webconsole
Image: openshift3/ose-web-console
Ports: 8443/TCP

1 pod

NETWORKING
Service - Internal Traffic
webconsole
443/TCP (https) → 8443

Routes - External Traffic
Create Route

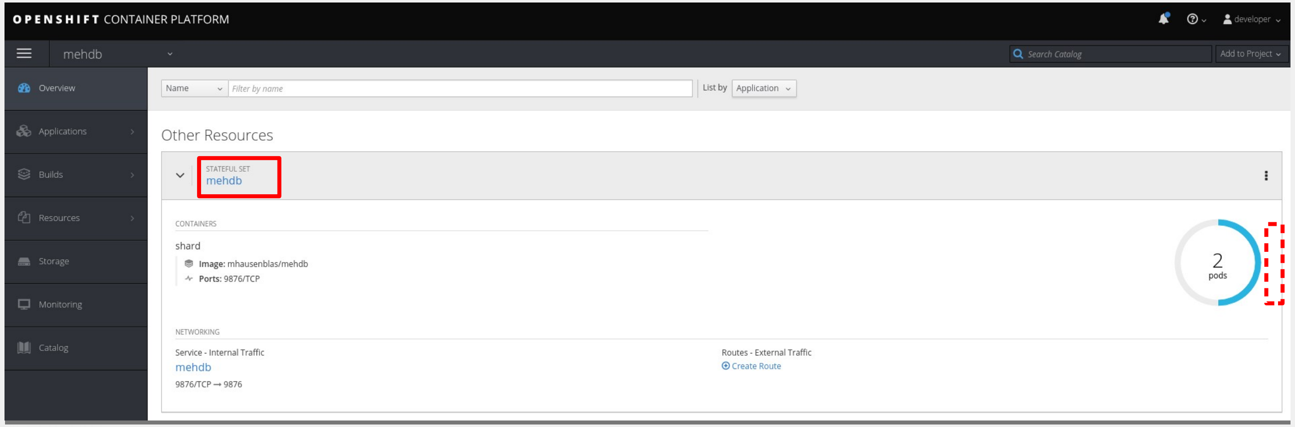


* x= rand seed

STATEFULSET

- A stateful set ensure
  - stabile resource allocation such as name and storage
  - ordered, graceful deployment, scaling up and termination

- ideal for highly available workloads in a “clustered mode”



Other Resources

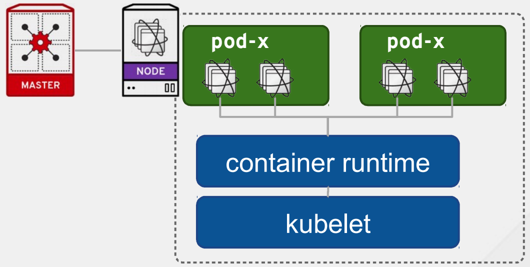
STATEFUL SET
mehdb

CONTAINERS
shard
Image: mhausenblas/mehdb
Ports: 9876/TCP

2
pods

NETWORKING
Service - Internal Traffic
mehdb
9876/TCP → 9876

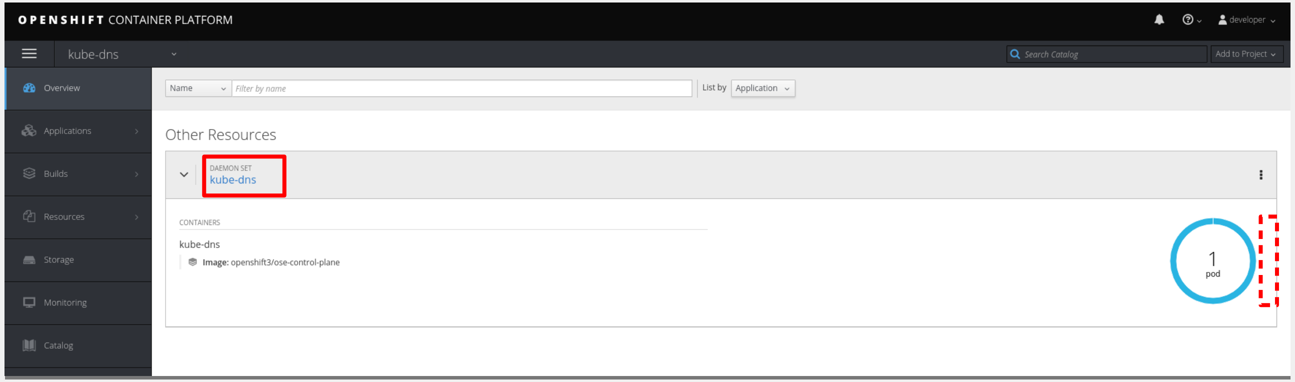
Routes - External Traffic
Create Route



* x= index

DAEMONSET

- A daemon set ensure to have **just 1 copy** of a pod on every node
- Daemon set is useful for: Logging Aggregators, Monitoring, Load Balancers / Reverse Proxies / API Gateways, single host batch...

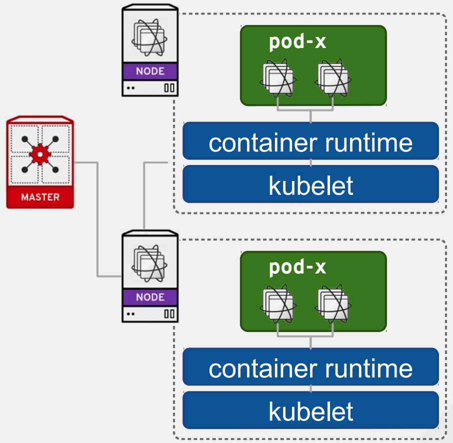


Other Resources

DAEMON SET
kube-dns

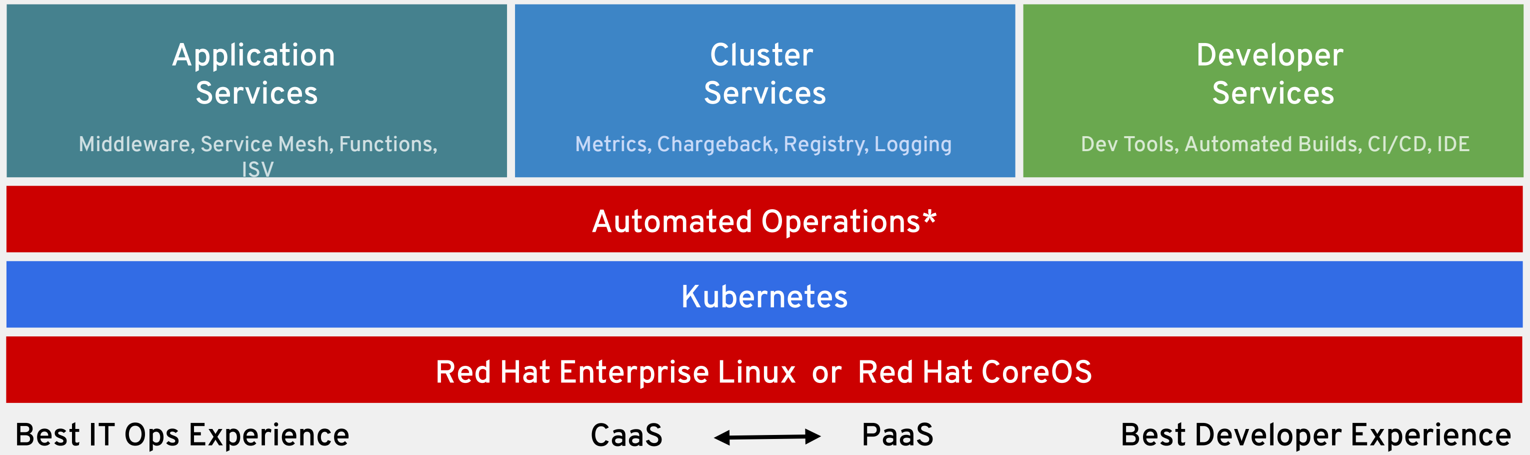
CONTAINERS
kube-dns
Image: openshift3/ose-control-plane

1
pod



* x= available node count

REFERENCE ARCHITECTURE FOR ENTERPRISE KUBERNETES


Application Services
Middleware, Service Mesh, Functions, ISV
Cluster Services
Metrics, Chargeback, Registry, Logging
Developer Services
Dev Tools, Automated Builds, CI/CD, IDE
Automated Operations*
Kubernetes
Red Hat Enterprise Linux or Red Hat CoreOS
Best IT Ops Experience
CaaS
PaaS
Best Developer Experience

*coming soon with OCP 4.0
(targeted for GA Dec 2018)

Istio Service Mesh

FOR SERVICE-TO-SERVICE COMMUNICATIONS

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#RedHatOSD

OPENSHIFT SERVICE MESH: ISTIO*

Istio makes it easy to create a network of deployed services with load balancing, service-to-service authentication, monitoring, and more, helping to avoid operational nightmares.

POLICY	Grants the ability to write policy that applies to all applications and is not language specific
ROUTING	Allows for the control of routing flows
TELEMETRY	Provides the observability needed to manage microservices, such as how services are invoked, communication flows, and points of latency

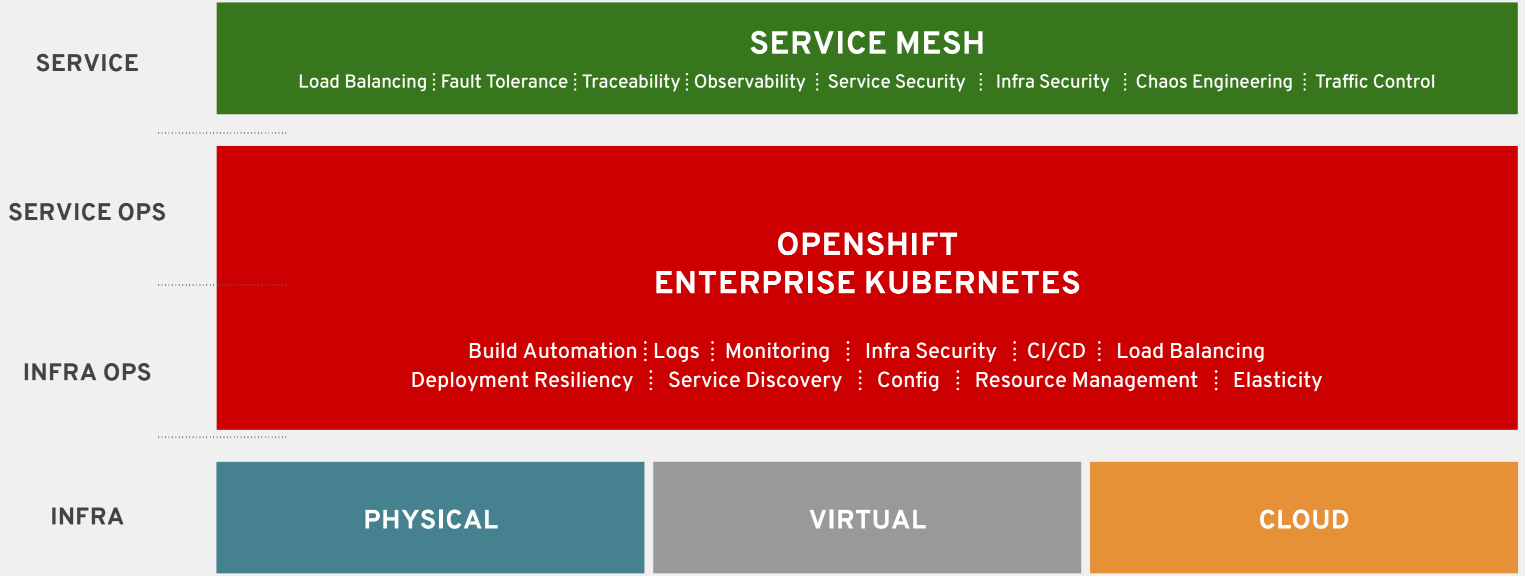
* Technology Preview

ISTIO COMPANION: KIALI & JAEGER

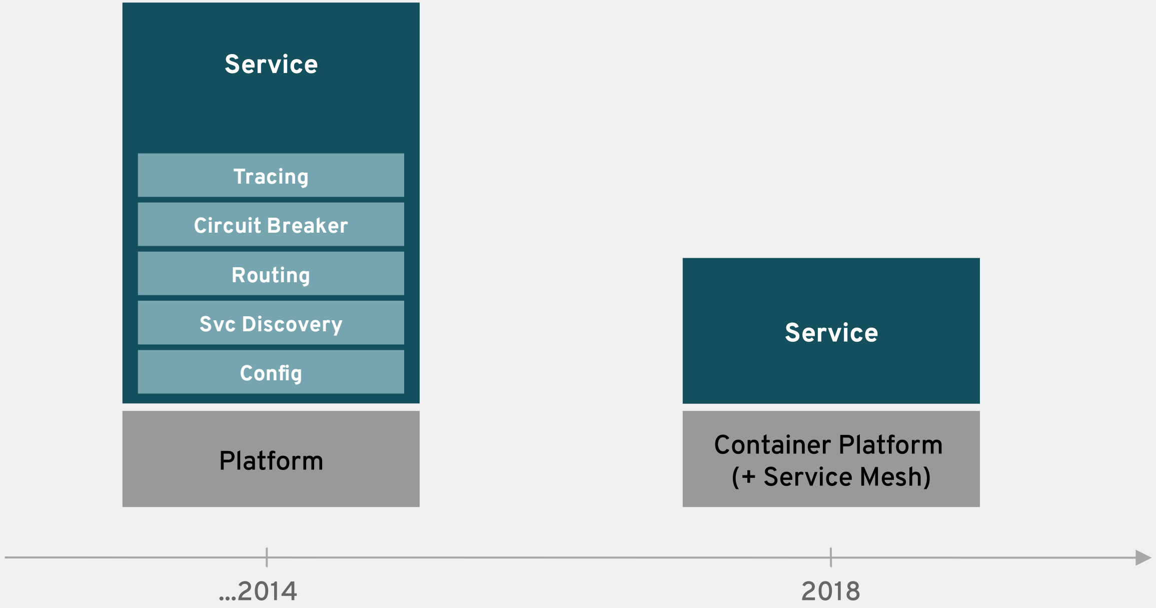
Kiali and Jaeger make the perfect companion for Istio Service Mesh

VISUALIZATION	**Kiali** works with Istio to visualize the service mesh topology, features like circuit breakers or request rates.
TRACING	Kiali includes **Jaeger** Tracing, which provides distributed tracing out of the box.

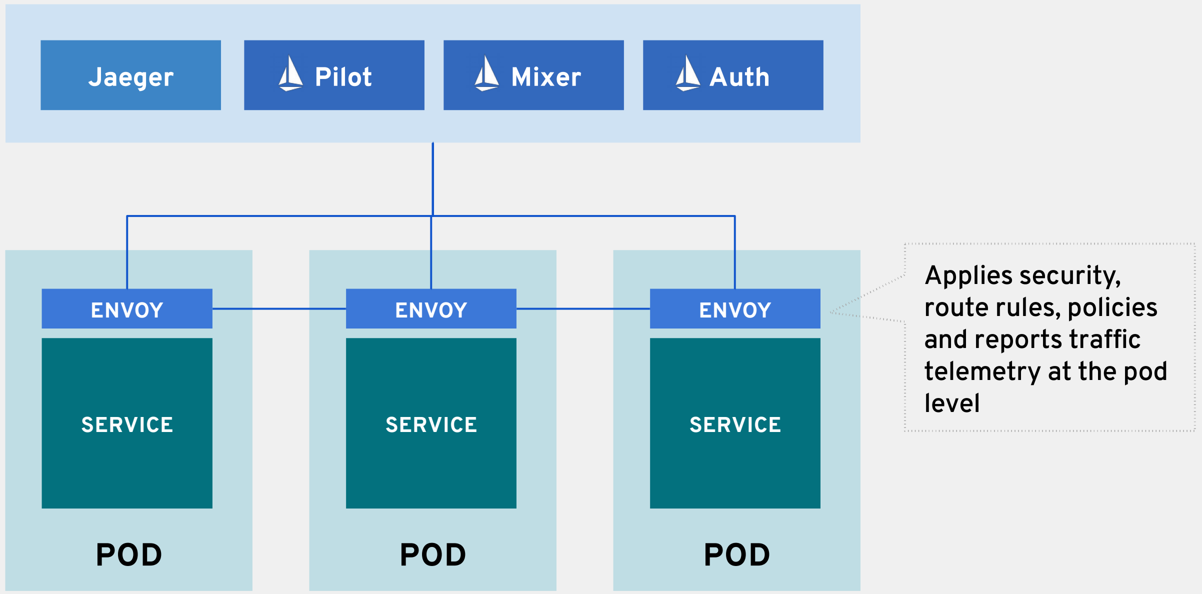
SERVICE MESH ARCHITECTURE


SERVICE
SERVICE MESH
Load Balancing ⋮ Fault Tolerance ⋮ Traceability ⋮ Observability ⋮ Service Security ⋮ Infra Security ⋮ Chaos Engineering ⋮ Traffic Control
SERVICE OPS
OPENSHIFT
ENTERPRISE KUBERNETES
Build Automation ⋮ Logs ⋮ Monitoring ⋮ Infra Security ⋮ CI/CD ⋮ Load Balancing
Deployment Resiliency ⋮ Service Discovery ⋮ Config ⋮ Resource Management ⋮ Elasticity
INFRA OPS
INFRA
PHYSICAL
VIRTUAL
CLOUD

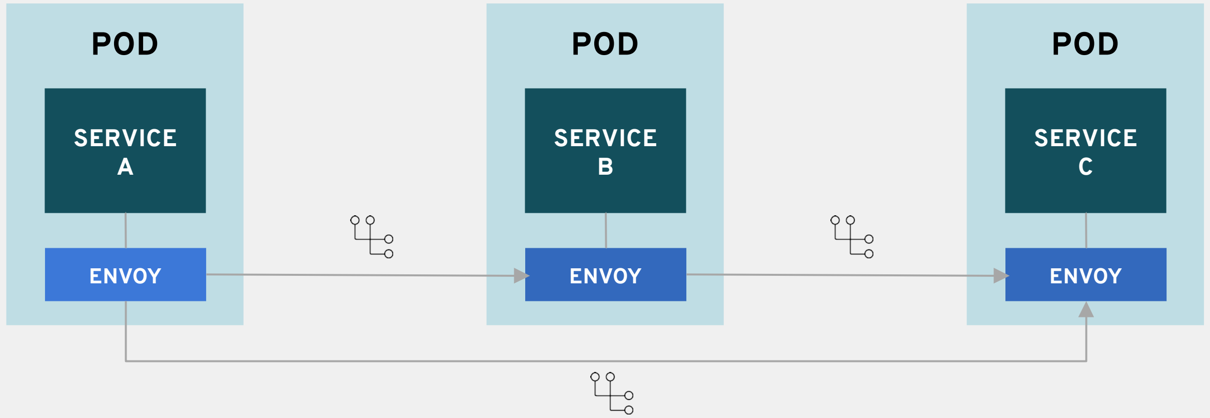
MICROSERVICES EVOLUTION



SERVICE MESH ARCHITECTURE

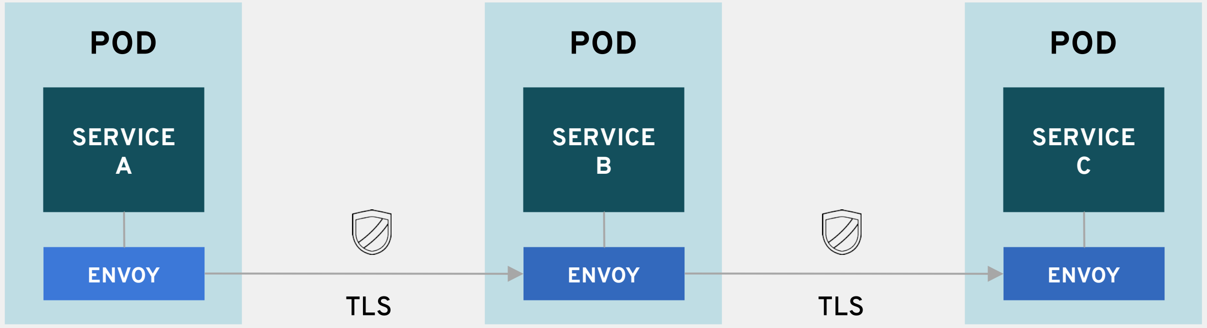

Jaeger
Pilot
Mixer
Auth
ENVOY
SERVICE
POD
ENVOY
SERVICE
POD
ENVOY
SERVICE
POD
Applies security, route rules, policies and reports traffic telemetry at the pod level

CIRCUIT BREAKERS WITH ISTIO



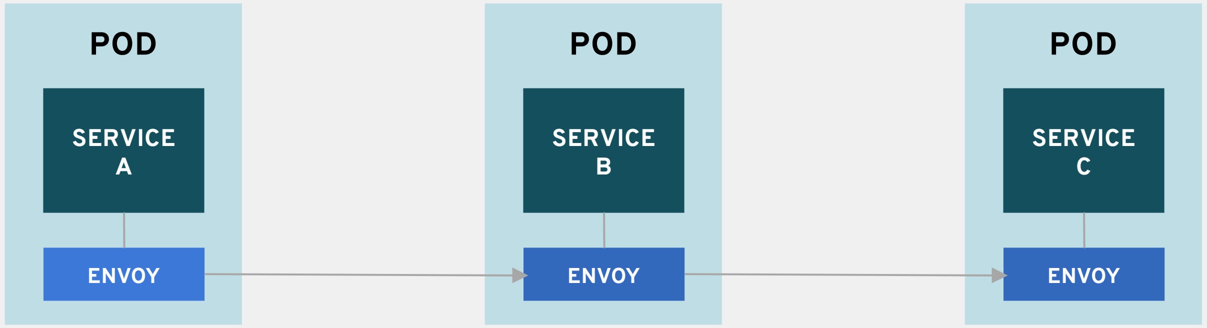
transparent to the services

SECURE COMMUNICATION WITH ISTIO

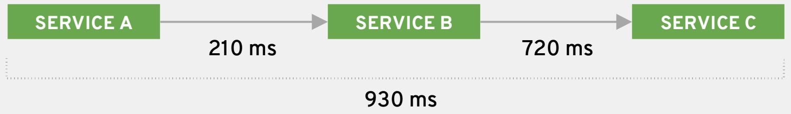


mutual TLS authentication, transparent to the services

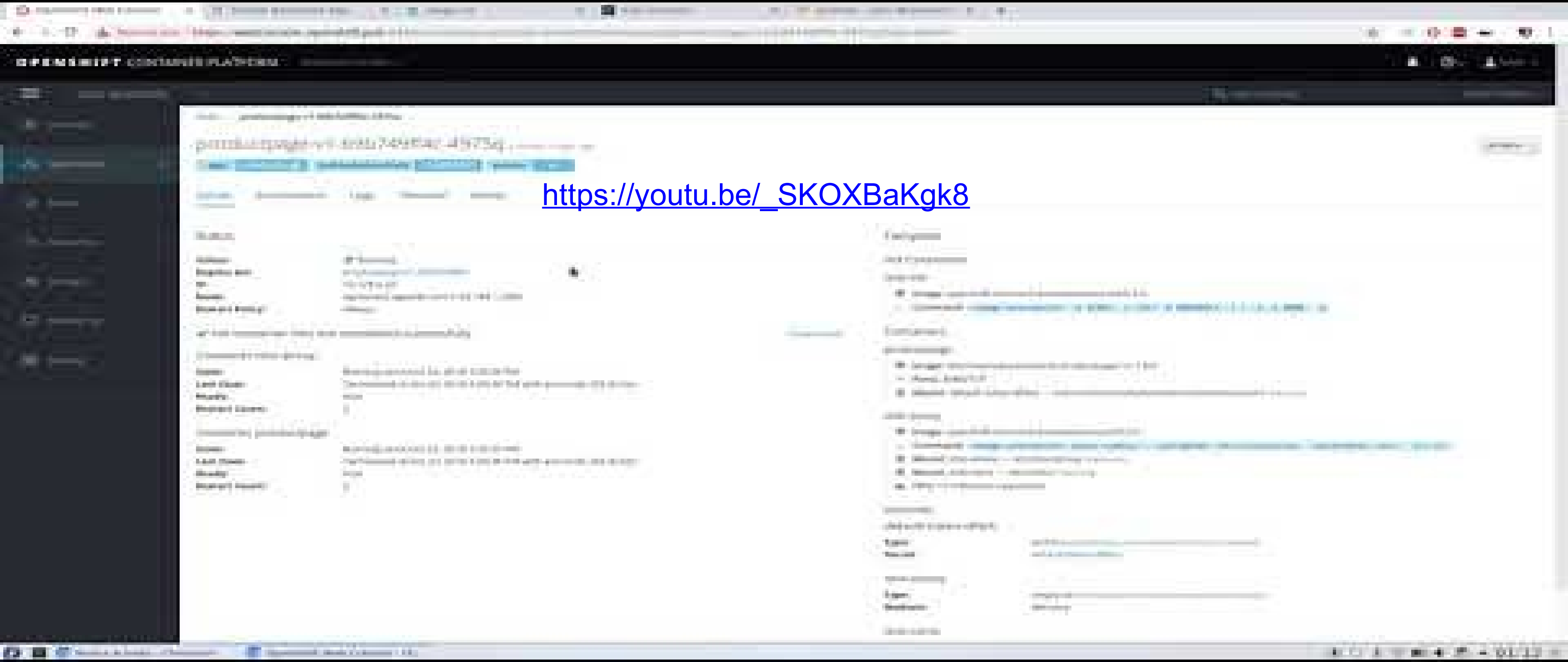
DISTRIBUTED TRACING WITH ISTIO & JAEGER



discovers service relationships and process times, transparent to the services



DEMO TIME:
Istio Internals



https://youtu.be/_SKOXBaKgk8

Prometheus Cluster Monitoring

PROVIDING ALERTS ALSO FOR OPENSHIFT CONTAINER STORAGE

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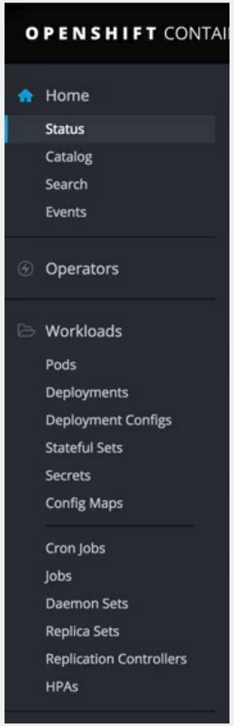
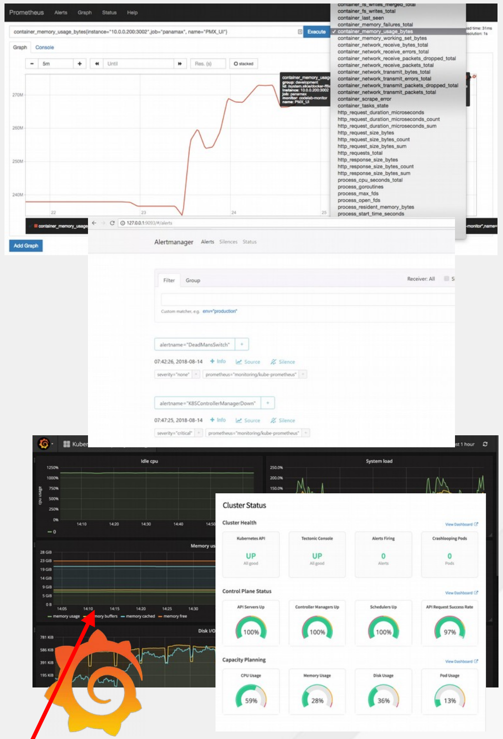
COMPREHENSIVE MONITORING SUITE

The stack includes three distinct UIs:

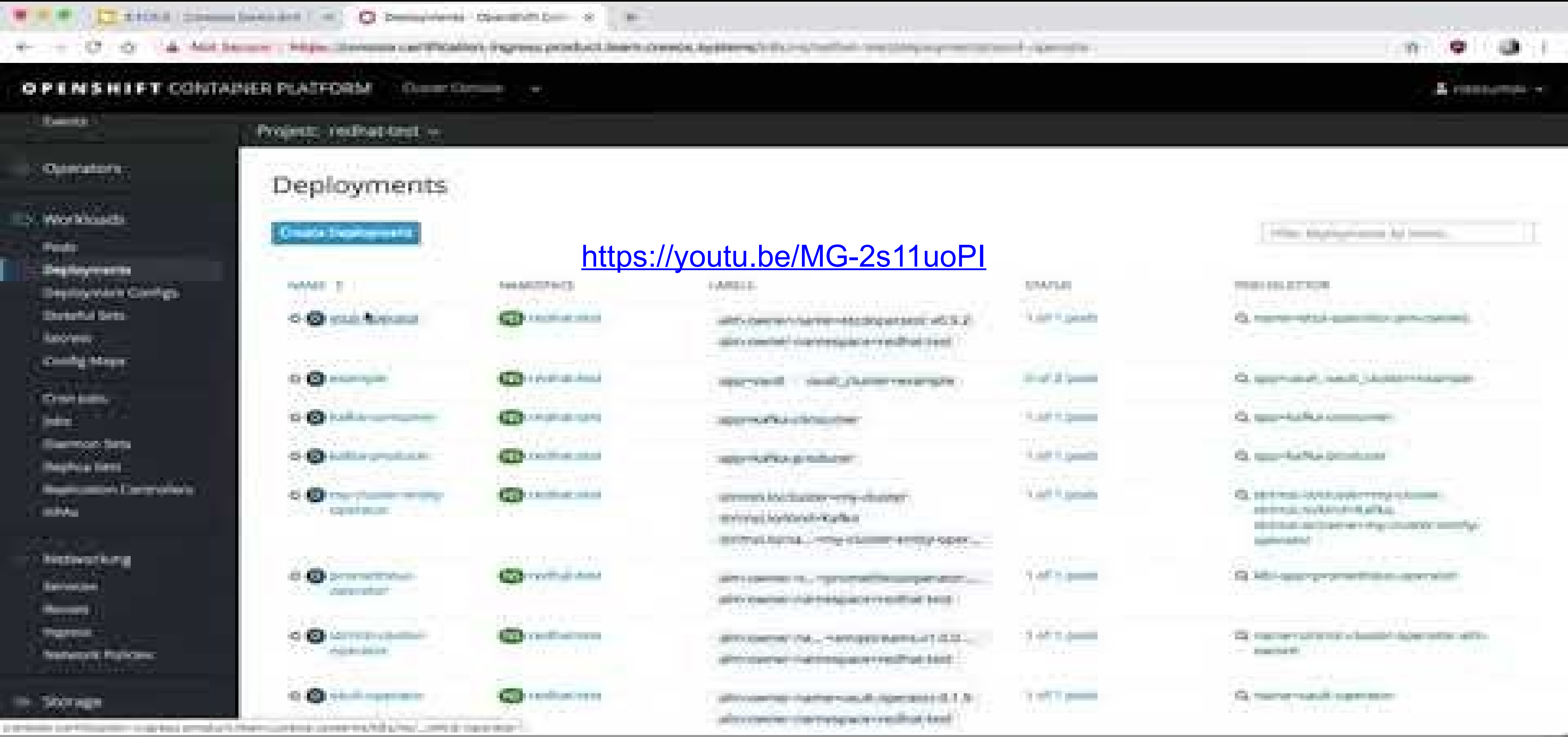
- **Alertmanager** UI to manage alerts which have been fired
- **Prometheus** UI for querying and plotting any metrics
- **Grafana** to browse cluster-level dashboards

All UIs are accessible directly via the new admin console under the “Monitoring” menu.





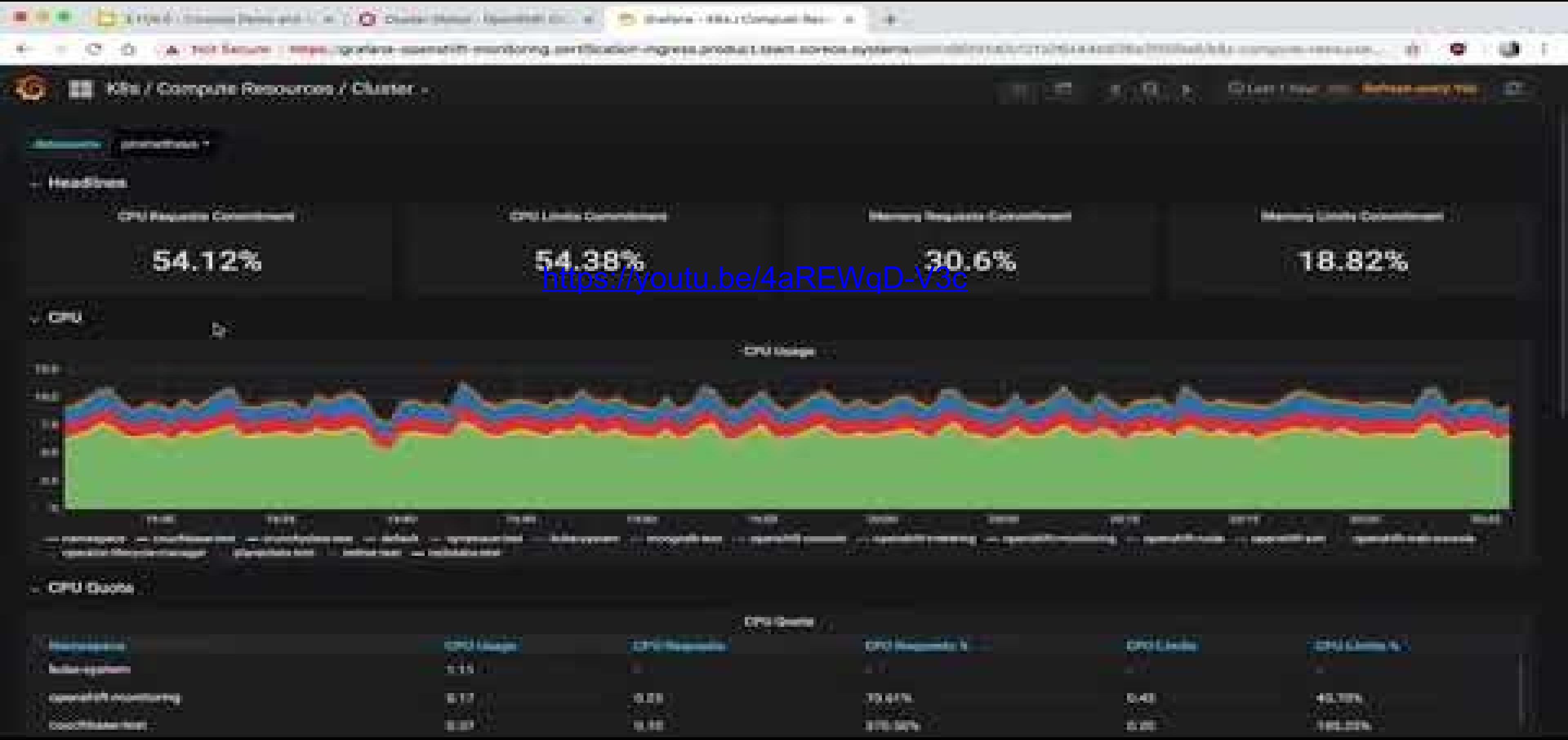
DEMO TIME:
Cluster Console - EventFeed



Deployments

https://youtu.be/MG-2s11uoPI

DEMO TIME:
Cluster Console - Monitoring



54.12% | 54.38% | 30.6% | 18.82%

https://youtu.be/4aREWqD-V3c

CPU Quota

Namespace	CPU Usage	CPU Requests	CPU Requests %	CPU Limits	CPU Limits %
kube-system	1.15	[illegible]	[illegible]	[illegible]	[illegible]
openshift-monitoring	0.17	0.25	70.41%	0.42	40.70%
couchbase-test	0.37	0.10	370.50%	0.20	185.25%

OpenShift Container Storage

SOFTWARE DEFINED STORAGE FOR YOUR KUBERNETES

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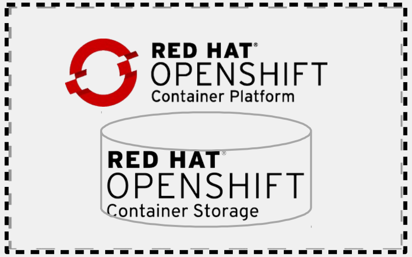
#RedHatOSD

RED HAT OPENSHIFT CONTAINER STORAGE

Flexible deployment with the same user experience and features

Converged = in containers

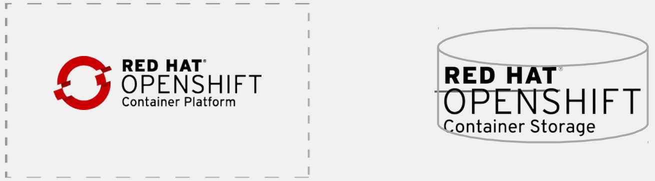
Persona: DevOps, App Architects


RED HAT OPENSHIFT Container Platform
RED HAT OPENSHIFT Container Storage

- Highly scalable, scale app+storage, start small and scale fast
- Storage life cycle managed by OCP

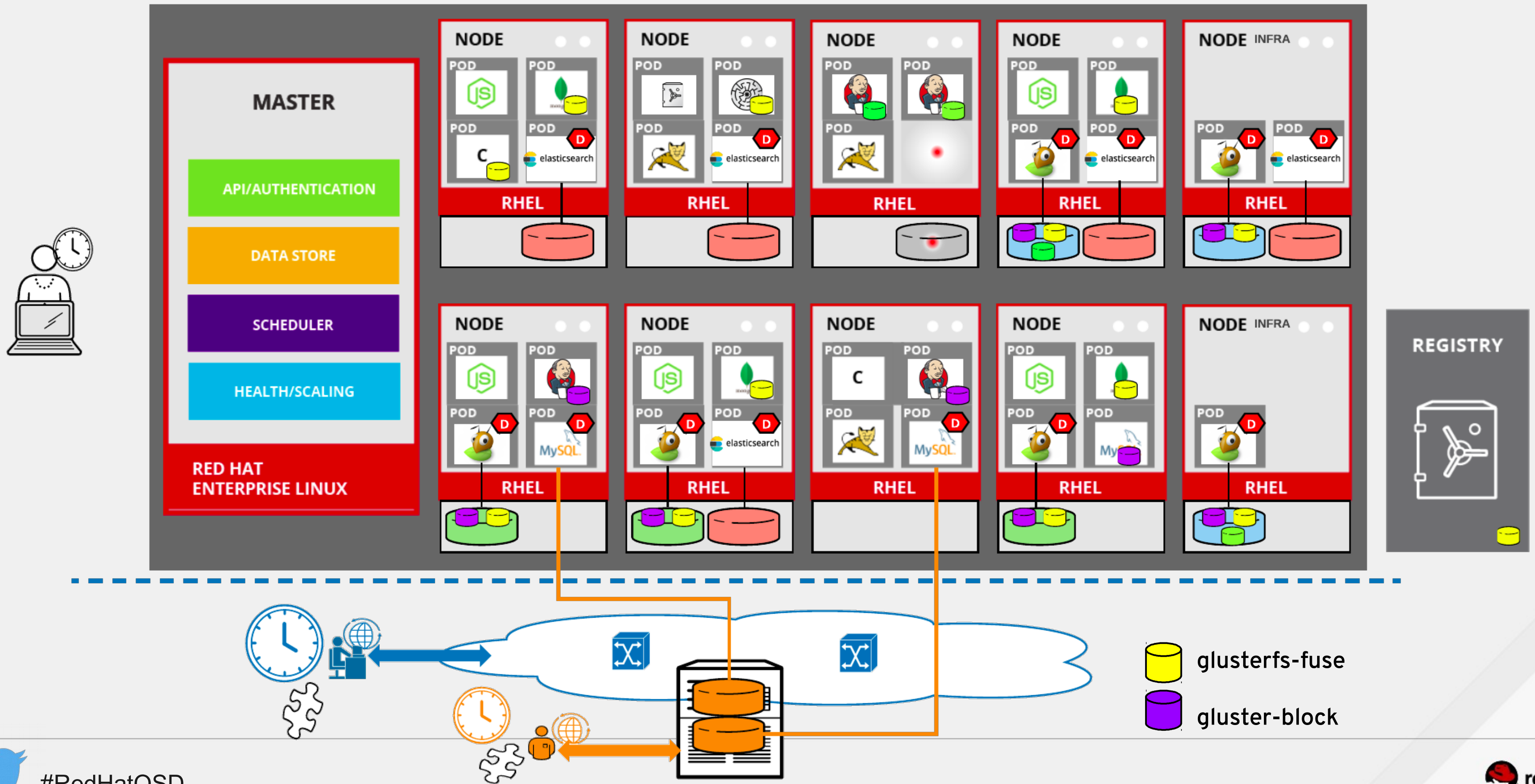
Independent = for containers

Persona: Storage Admins, Infrastructure Admins

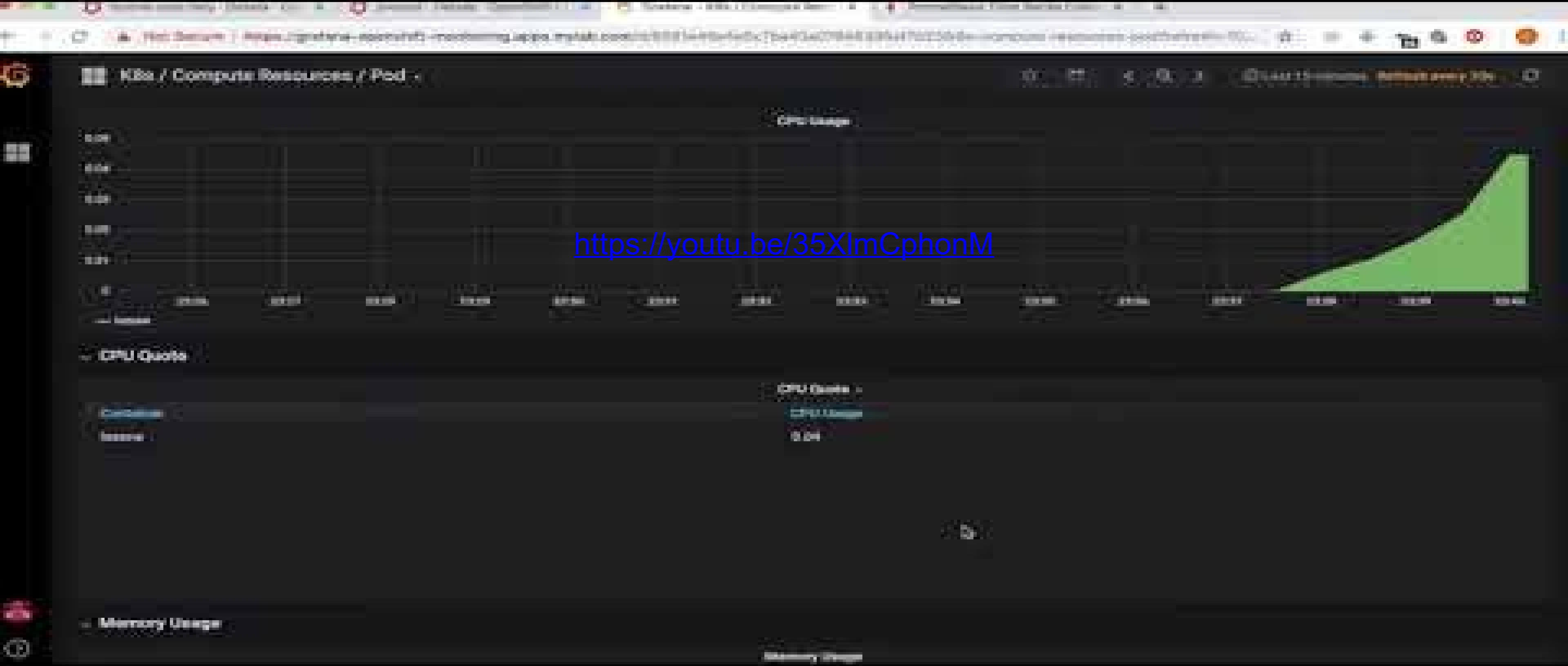

RED HAT OPENSHIFT Container Platform
RED HAT OPENSHIFT Container Storage

- Highly scalable, independent scalability from OCP platform
- Adaptative to in-place BC/DR strategies

OPENSHIFT FULL INTEGRATION



DEMO TIME:
Monitoring - OpenShift Container Storage



https://youtu.be/35XlmCphonM

RHOCS: ANSIBLE ADVANCED DEPLOYMENT

Converged playbooks already available

Deployment workflow	Registry	Metrics	Logging	Applications
Deploying Red Hat Openshift Container Storage in Converged Mode				✔
Deploying Red Hat Openshift Container Storage in Converged Mode with Registry	✔			
Deploying Red Hat Openshift Container Storage in Converged Mode with Logging and Metrics		✔	✔	
Deploying Red Hat Openshift Container Storage in Converged mode for Applications with Registry, Logging, and Metrics	✔	✔	✔	✔

https://red.ht/2DaKPzg

Openshift Ansible Service Broker

And the road to Kubernetes Operators!

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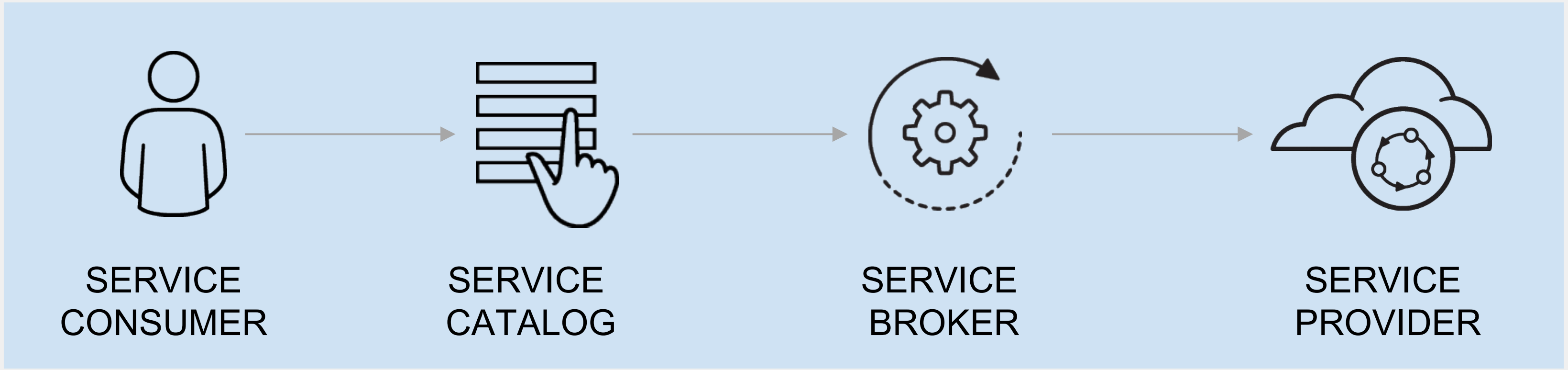
#RedHatOSD

WHAT IS A SERVICE BROKERAGE?



Automated, Standard and Consistent

OPEN SERVICE BROKER API™

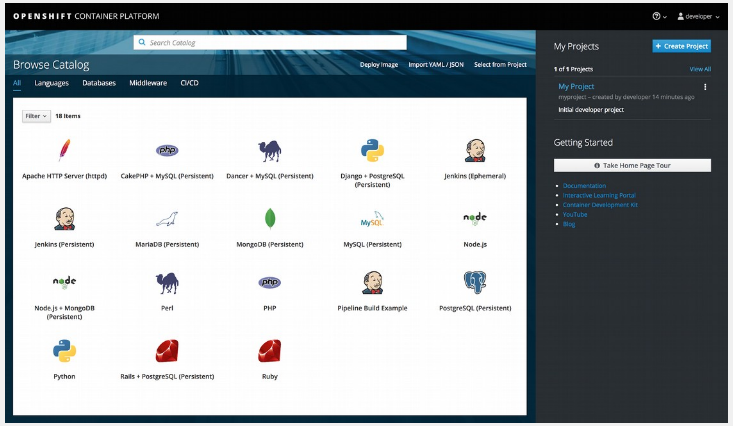
A multi-vendor project to standardize how services are consumed on cloud-native platforms across service providers

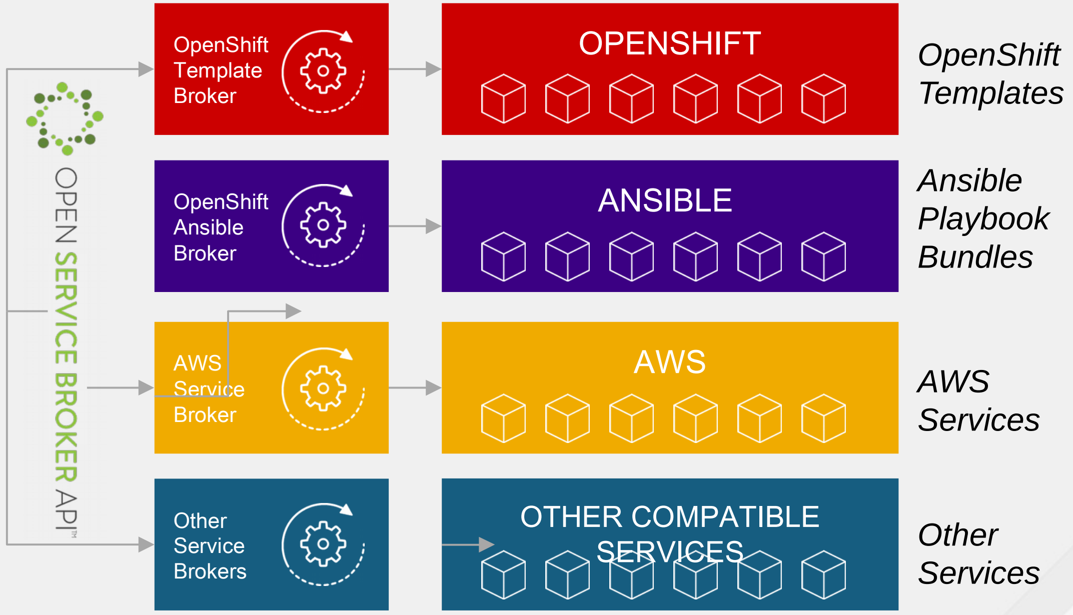
FUJITSU
Pivotal
IBM
redhat
Google
SAP

BROKERAGE WITH OPENSHIFT

SERVICE CATALOG

Broker **Service**





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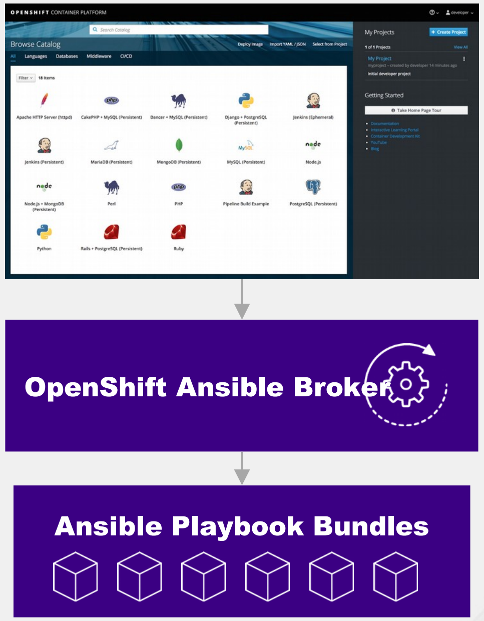
OPENSHIFT ANSIBLE BROKER

Anything you can do with Ansible, you can do with the Ansible Broker

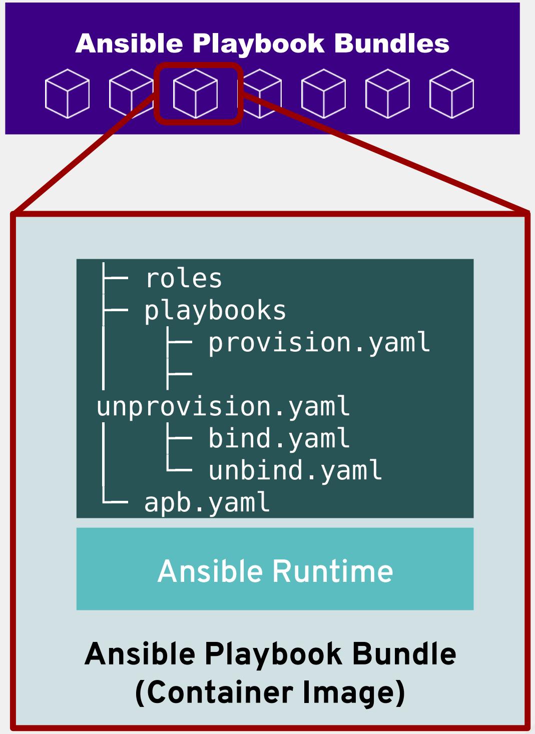
- Use Ansible on OpenShift to
  - Deploy containerized applications
  - Manage external components (e.g. Oracle database)
  - Provision cloud services (e.g. AWS RDS)
  - Orchestrate multi-service solutions
  - Manage dependencies or other logics on deployments (e.g. database initialization)



TP available from version 3.6
GA from 3.7

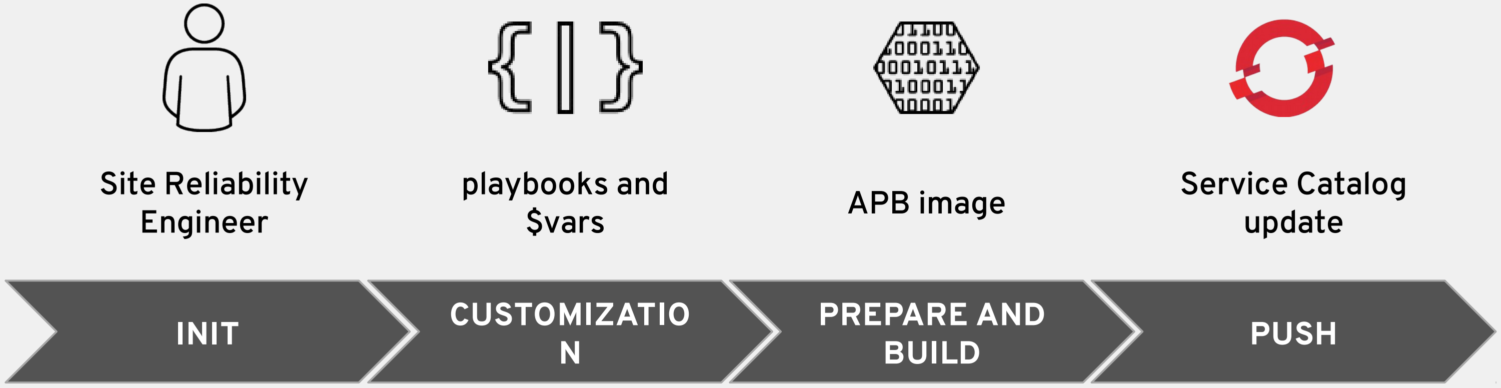
ANSIBLE PLAYBOOK BUNDLES (APB)

- Packaged as a container image
- Embed Ansible runtime
- Use named playbooks for actions
- Fulfill Service Catalog dynamically with services and parameters
- Provide a command line tool to manage APBs



```
├─ roles
├─ playbooks
│     ├─ provision.yaml
│     ├─
unprovision.yaml
│     ├─ bind.yaml
│     └─ unbind.yaml
└─ apb.yaml
```

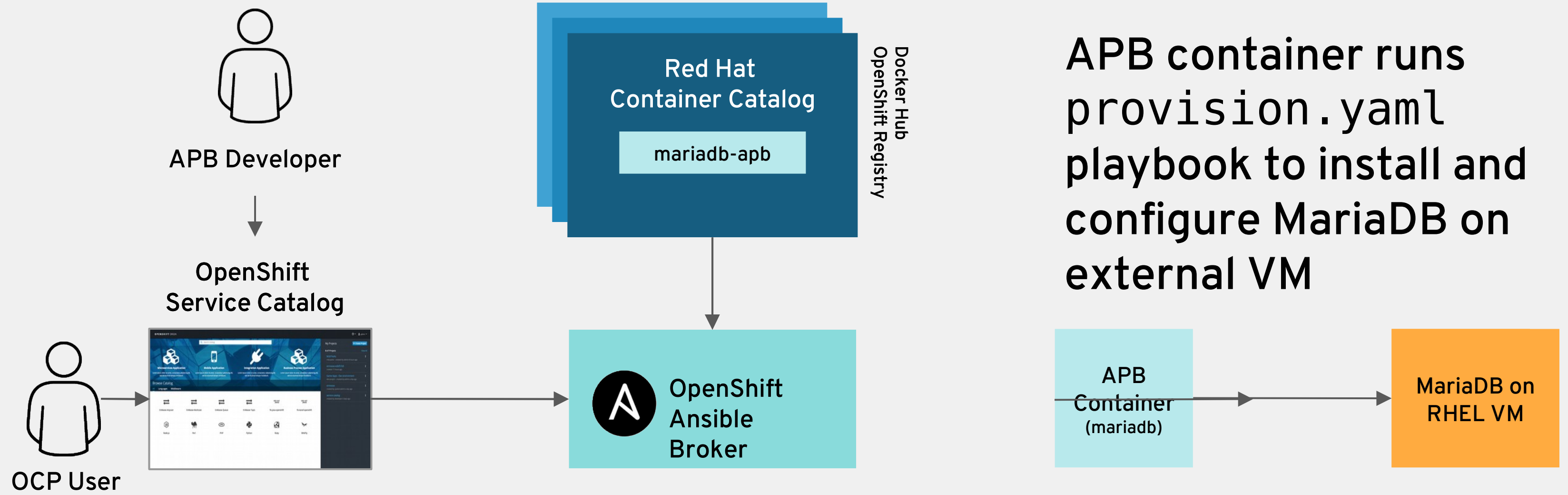
APB CREATION WORKFLOW



https://developers.redhat.com/blog/2018/05/23/customizing-an-openshift-ansible-playbook-bundle/

DEMO TIME:
MariaDB Provisioning on Remote RHEL

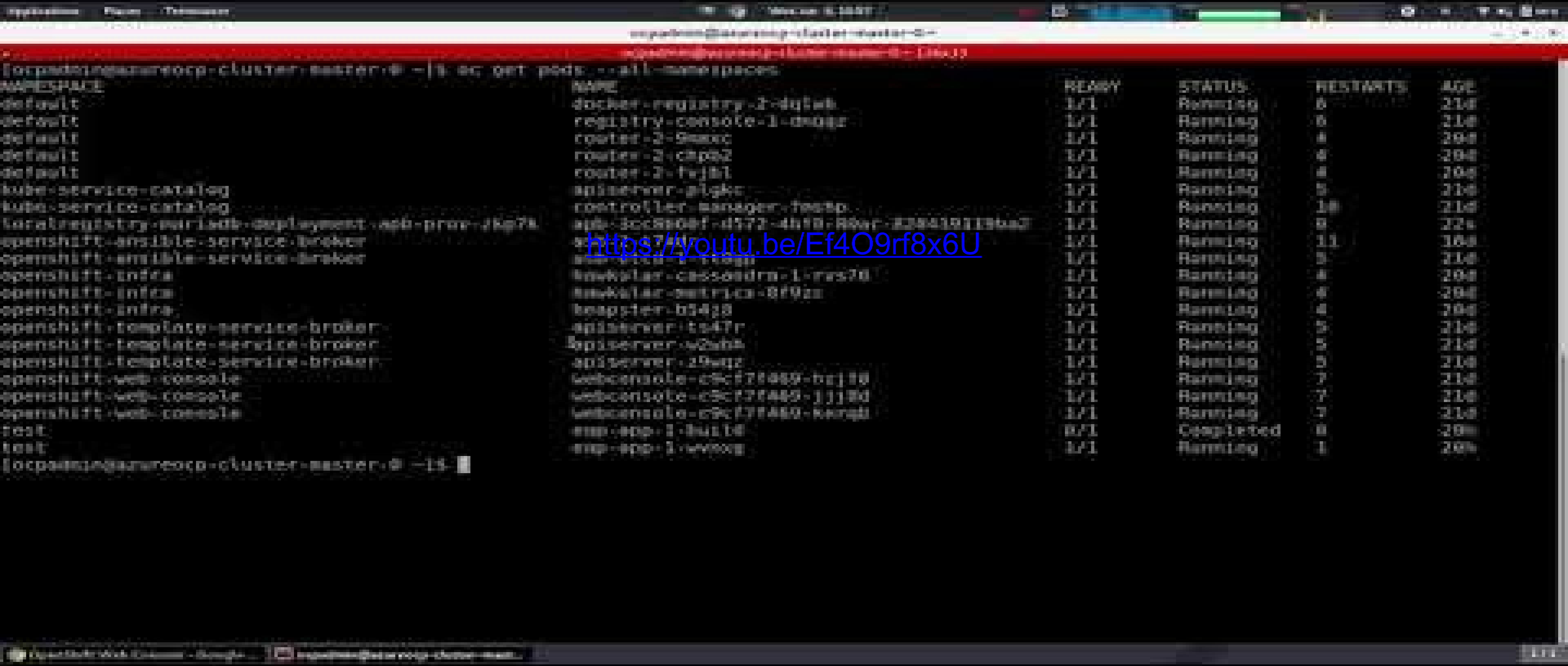
OPENSHIFT APB MARIADB REMOTE PROVISIONING



APB container runs `provision.yaml` playbook to install and configure MariaDB on external VM

```
oc run mariadb-apb provision $vars
```

```
ansible-playbook provision.yaml $vars
```



```
[ocpadmin@azureocp-cluster-master-0 ~]$ oc get pods --all-namespaces
NAMESPACE                                         NAME                                             READY     STATUS      RESTARTS   AGE
default                                           docker-registry-2-dqlwb                          1/1       Running     6          21d
default                                           registry-console-1-dnqgz                         1/1       Running     6          21d
default                                           router-2-9mmxc                                   1/1       Running     4          20d
default                                           router-2-c8pb2                                   1/1       Running     4          20d
default                                           router-2-fxj8l                                   1/1       Running     4          20d
kube-service-catalog                              apiserver-plgkc                                  1/1       Running     5          21d
kube-service-catalog                              controller-manager-fmmmp                         1/1       Running     10         21d
localregistry-mariadb-deployment-apb-prov-jkp7k   apb-3cc8808f-d572-4bf8-80ac-8284191196a2         1/1       Running     0          22s
openshift-ansible-service-broker                  [illegible]                                      1/1       Running     11         18d
openshift-ansible-service-broker                  [illegible]                                      1/1       Running     5          21d
openshift-infra                                   hawkular-cassandra-1-rrs70                       1/1       Running     4          20d
openshift-infra                                   hawkular-metrics-0f9zs                           1/1       Running     4          20d
openshift-infra                                   heapster-b54j8                                   1/1       Running     4          20d
openshift-template-service-broker                 apiserver-ts47r                                  1/1       Running     5          21d
openshift-template-service-broker                 apiserver-w2wb4                                  1/1       Running     5          21d
openshift-template-service-broker                 apiserver-z9wqz                                  1/1       Running     5          21d
openshift-web-console                             webconsole-c9cf7f489-bzj70                       1/1       Running     7          21d
openshift-web-console                             webconsole-c9cf7f489-jjj8d                       1/1       Running     7          21d
openshift-web-console                             webconsole-c9cf7f489-kxnqb                       1/1       Running     7          21d
test                                              emp-app-1-build                                  0/1       Completed   0          20m
test                                              emp-app-1-wvxcg                                  1/1       Running     1          20m
[ocpadmin@azureocp-cluster-master-0 ~]$
```

https://youtu.be/Ef4O9rf8x6U

APB INTEGRATION WITH ANSIBLE GALAXY

Support discovering/running APB sources published to Ansible Galaxy from the OpenShift Ansible Service Broker.

How it works:

- APB's can be now be created right from `mazer` command line tool using the init command and then pushed to Ansible Galaxy.
- Broker should now be able to discover and provision APB-based services published to Ansible Galaxy and also make them available in the service catalog.

What’s Next?
Operators!

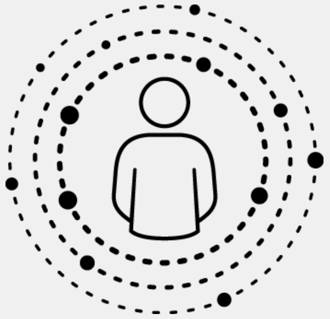
KUBERNETES OPERATORS

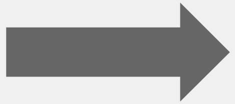
THE EASE OF THE CLOUD EVERYWHERE

OPERATOR

- encode human operational knowledge
- **automatically patch, upgrade, recover, and tune apps and services**
- Kubernetes-native
- Purpose-built for a specific application or service

ENCODING AND AUTOMATING OPS KNOWLEDGE WITH OPERATORS





kubernetes
OPERATOR
Prometheus

WITHOUT OPERATORS
REACTIVE

- Continually checks for anomalies
- Alert humans for response
- Requires manual change to fix

WITH OPERATORS
PROACTIVE

- Continually adjusts to optimal state
- Automatically acts in milliseconds

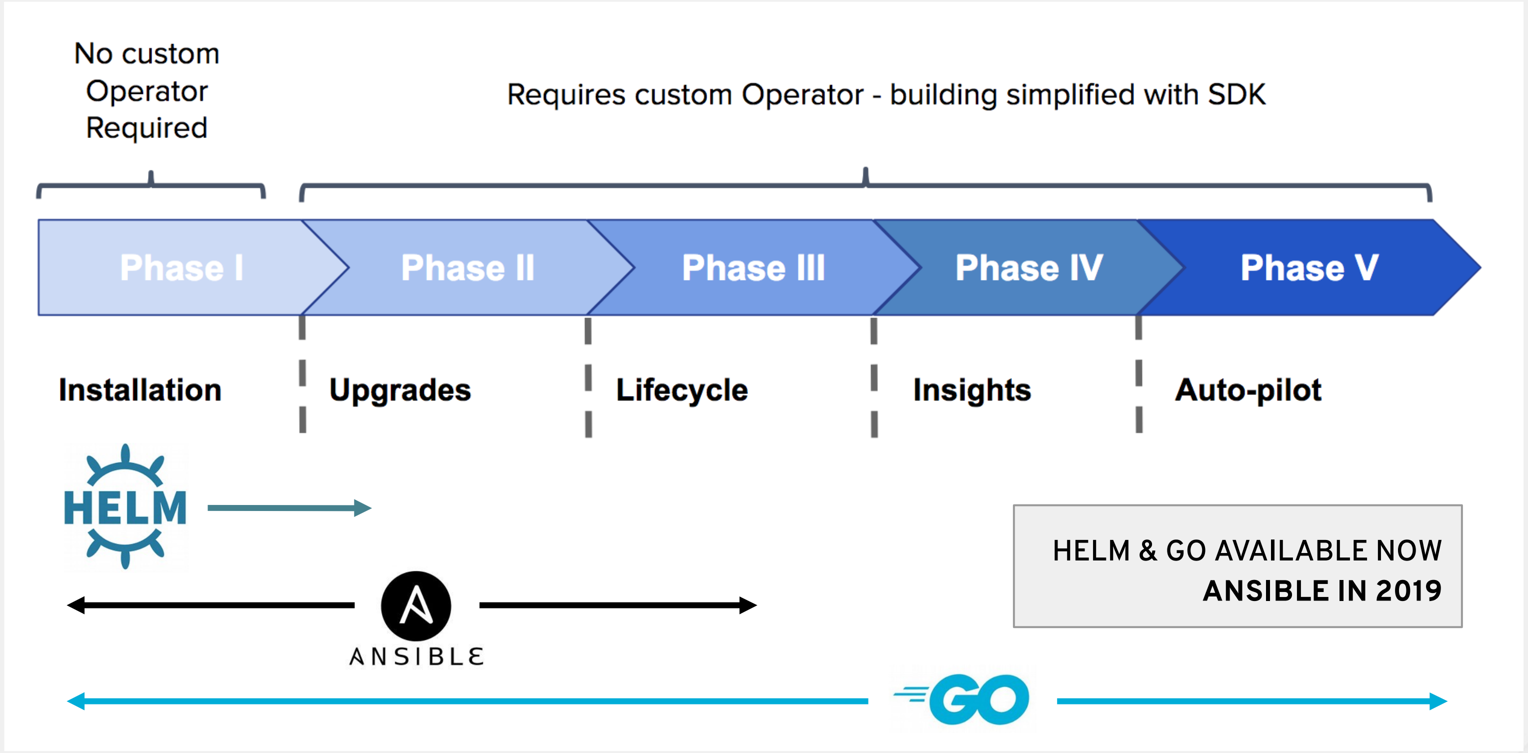
OPERATOR FRAMEWORK

An open source toolkit to manage application instances on Kubernetes in an automated, scalable way

OPERATOR SDK	OPERATOR LIFECYCLE MANAGER	OPERATOR METERING
Build Operators without specialized knowledge of the Kubernetes API	Install, update, and manage Operators and their dependencies	Enable usage reporting for Operators

https://github.com/operator-framework

OPERATOR IMPLEMENTATION PATHS



HELM & GO AVAILABLE NOW
ANSIBLE IN 2019

OPERATORS IN PREVIEW IN OCP 3.11

APPLICATION OPERATORS
DEVELOPER PREVIEW

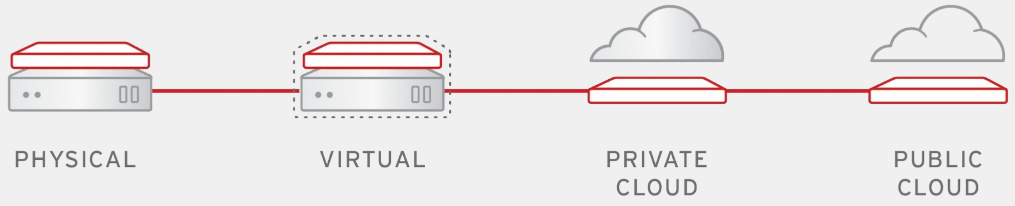
etcd | AMQ Streams | mongoDB | dynatrace | Couchbase

OPERATOR LIFECYCLE MANAGER (OLM)
TECH PREVIEW

Install, manage, and upgrade Operators and their dependencies

RED HAT OPENSHIFT

Portable application services across any infrastructure



PORTABLE HYBRID CLOUD SERVICES WITH ISV OPERATORS

AVI Networks	DATADOG	BLACKDUCK	BOLT	Aporeto	BANZAICLOUD	6fusion	mist.io	HTBASE	lucep	GuardiCore
aqua	PrimeKey	nearForm	NetApp	NETSCOUT	NeuVector	ScaleOut Software	ROCKET.CHAT	redislabs home of redis	PURESTORAGE	ZABBIX
Nagios	New Relic	NUODB	OpenIAM	OUTCOLD SOLUTIONS	portworx	INSTANA	InterSystems IRIS Data Platform	KAAZING	Layered Insight	LINBIT
Avocado Systems	DeployHub	COSCALE	Couchbase	WhiteSource	f5	influxdata	hazelcast	Hedvig	FINTECHeando	snapt
CYBERARK	CRUNCHY Enterprise PostgreSQL	COLLABNET VERSIONONE	Cockroach DB	dsapps distributed smart apps	dynatrace	entando	EXFO	ca technologies	Virtuozzo	YumaWorks Automating the Internet
Twistlock	SL RTView	Solution-Soft	Sonatype	storware	Sysdig	TREMOLO SECURITY	turbonomic	INFINIDAT	UNIVA	XebiaLabs Enterprise DevOps

60+ Certified ISV Operators in Red Hat Early Access Program

redhat.

Container-native Virtualization

THE FUTURE OF VIRTUALIZATION!

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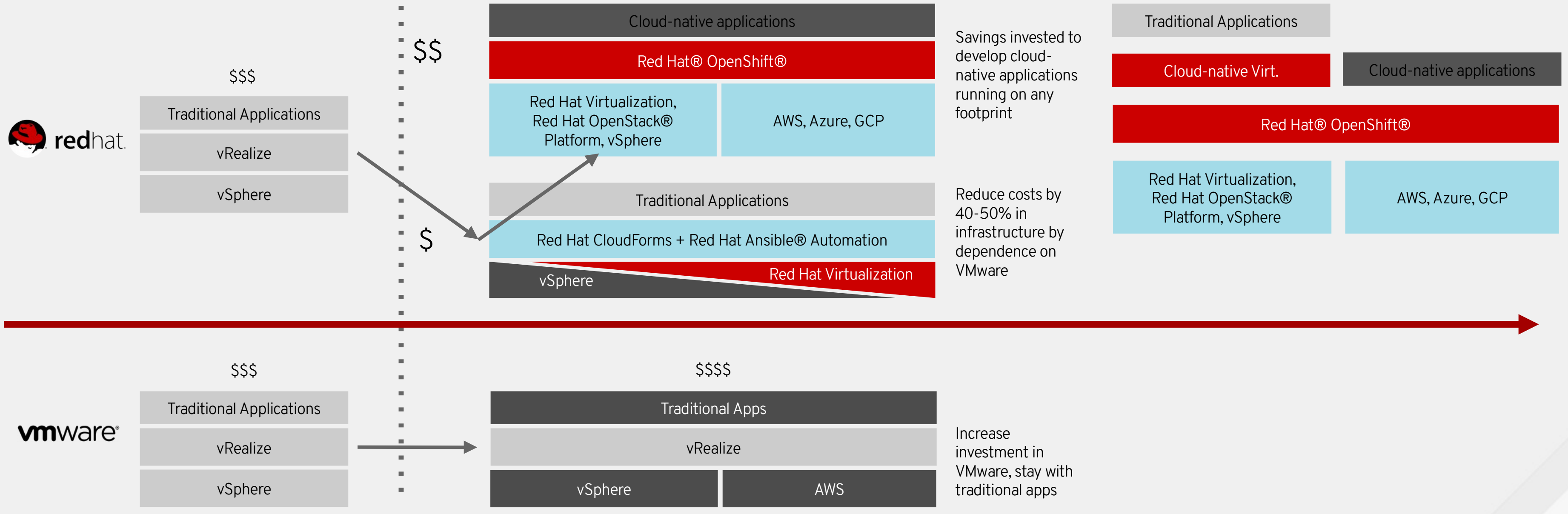
PRESENT STATE

TRANSFORMATION

FUTURE OF VIRTUALIZATION



Savings invested to develop cloud-native applications running on any footprint

Reduce costs by 40-50% in infrastructure by dependence on VMware

Increase investment in VMware, stay with traditional apps

CONTAINERS AND VIRTUAL MACHINES

CONTAINER INFRASTRUCTURE AND ORCHESTRATION

Containerized applications and Kubernetes container orchestration as provided by OpenShift are becoming **the** standard for new applications.

VIRTUALIZED WORKLOADS

Virtualized workloads are not going anywhere fast! Business reasons (cost, time to market) and technical reasons (different or older operating system)

BARE-METAL RESURGENCE

Increasingly customers are pursuing bare-metal clusters for net new business functionality being built in containers.

As the technology mix changes, you will reach a tipping point where containers are the default but some workloads are still more suited to run as VMs

COMPONENTS OF CNV

- **KubeVirt**
  The virtual machine operator
  https://github.com/kubevirt/kubevirt/

- **Containerized Data Importer (CDI)**
  Importing disks
  https://github.com/kubevirt/containerized-data-importer

- **OpenShift Web Console**
  With UI extensions
  https://github.com/openshift/origin-web-console

- **Containerized Virt-v2v**
  Importing a whole virtual machine
  https://github.com/kubevirt/v2v-job

Leverages tried and trusted RHEL & RHV (KVM) virtualization capabilities.

Container-native Virtualization Demo

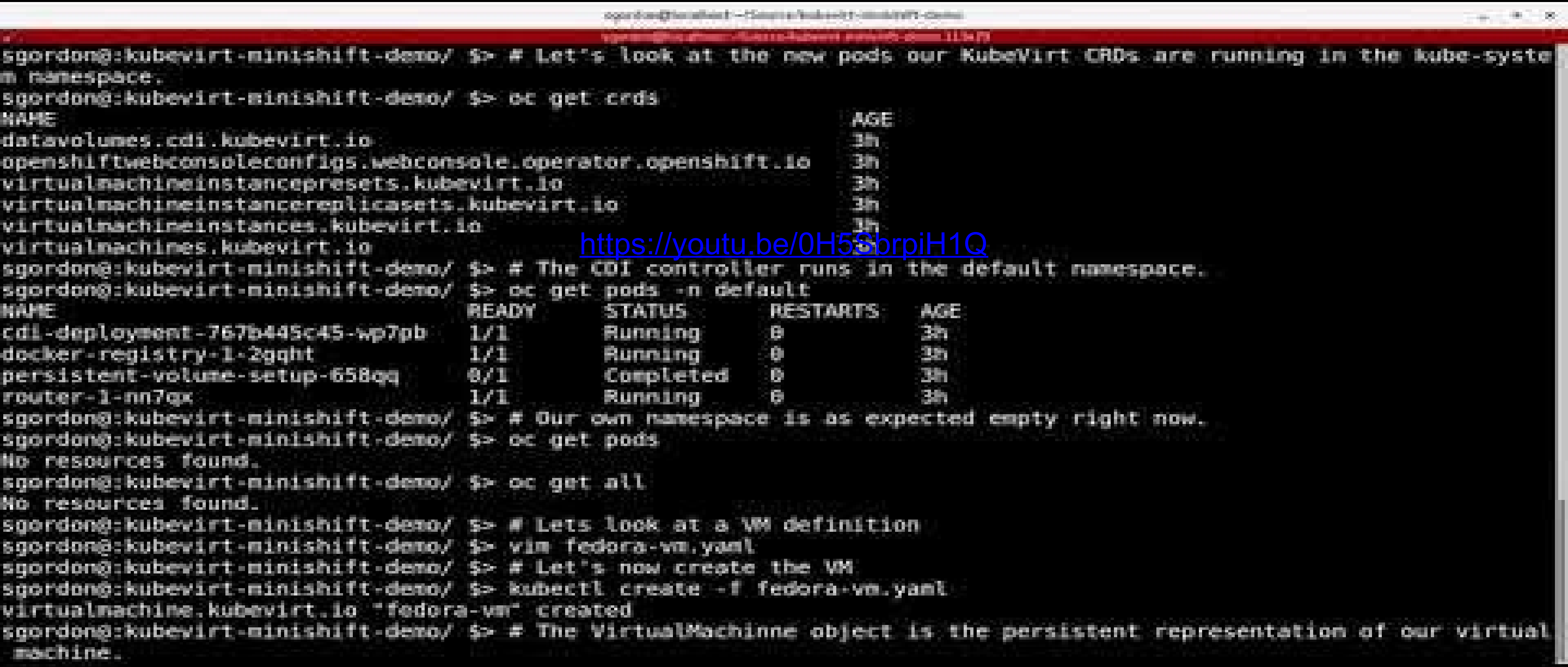
http://kubevirt.io/get_kubevirt/

Pre-requisites:

- kubectl
- minikube/minishift

Notes:

- Yes, we’re running nested virt here - fine for getting started!
- Using upstream bits, for now, in product preview coming!



```
sgordon@:kubevirt-minishift-demo/ $> # Let's look at the new pods our KubeVirt CRDs are running in the kube-syste
m namespace.
sgordon@:kubevirt-minishift-demo/ $> oc get crds
NAME                                                          AGE
datavolumes.cdi.kubevirt.io                                   3h
openshiftwebconsoleconfigs.webconsole.operator.openshift.io   3h
virtualmachineinstancepresets.kubevirt.io                     3h
virtualmachineinstancereplicasets.kubevirt.io                 3h
virtualmachineinstances.kubevirt.io                           3h
virtualmachines.kubevirt.io                                   3h
sgordon@:kubevirt-minishift-demo/ $> # The CDI controller runs in the default namespace.
sgordon@:kubevirt-minishift-demo/ $> oc get pods -n default
NAME                              READY     STATUS      RESTARTS   AGE
cdi-deployment-767b445c45-wp7pb   1/1       Running     0          3h
docker-registry-1-2gqht           1/1       Running     0          3h
persistent-volume-setup-658qq     0/1       Completed   0          3h
router-1-nn7qx                    1/1       Running     0          3h
sgordon@:kubevirt-minishift-demo/ $> # Our own namespace is as expected empty right now.
sgordon@:kubevirt-minishift-demo/ $> oc get pods
No resources found.
sgordon@:kubevirt-minishift-demo/ $> oc get all
No resources found.
sgordon@:kubevirt-minishift-demo/ $> # Lets look at a VM definition
sgordon@:kubevirt-minishift-demo/ $> vim fedora-vm.yaml
sgordon@:kubevirt-minishift-demo/ $> # Let's now create the VM
sgordon@:kubevirt-minishift-demo/ $> kubectl create -f fedora-vm.yaml
virtualmachine.kubevirt.io "fedora-vm" created
sgordon@:kubevirt-minishift-demo/ $> # The VirtualMachinne object is the persistent representation of our virtual
 machine.
```

https://youtu.be/0H5SbrpiH1Q

ROADMAP THEMES

(What's missing today?)

Supportability

- Simplify upgrade process
- Debug tooling support (sosreports, Insights)
- Broad provider support

Production Workloads

- Layer-2 Networking
- Live Migration
- Upload image as Template
- Guest agent introspection

Embrace the Platform

- Operators for all
- Integrated VM management
- Metrics and monitoring

Container-native Virtualization is **not** a drop-in replacement for traditional virtualization today.

Technology Preview access in an upcoming release of OpenShift.

OpenShift Container Platform 3.11

WHAT’S NEW?

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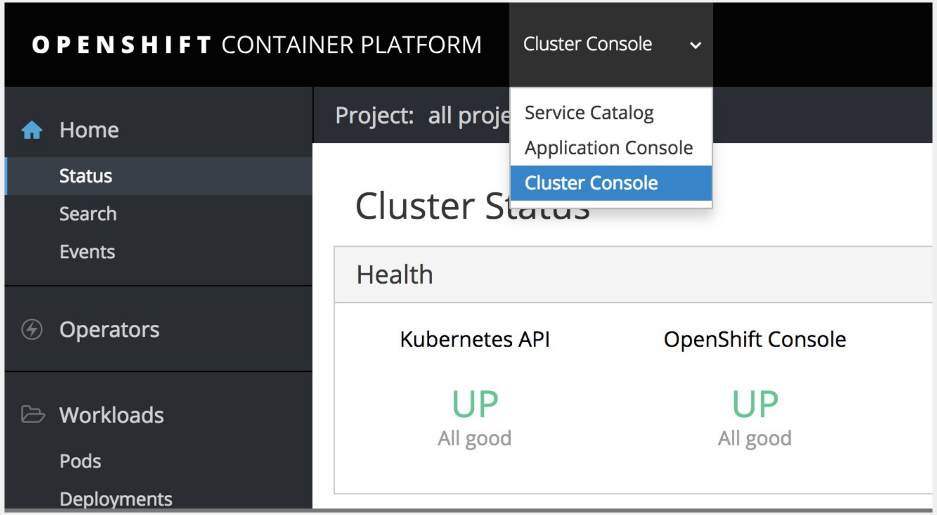
NEW ADMIN-FOCUSED CONSOLE

Users have a choice of experience based on their role or technical abilities

- Admin/CaaS experience with heavy exposure to Kubernetes
- AppDev/PaaS experience with standard OpenShift UX
- Sessions are not shared across the Consoles but credentials are
- Both hosted on cluster, in `openshift-console` and `openshift-webconsole` namespaces

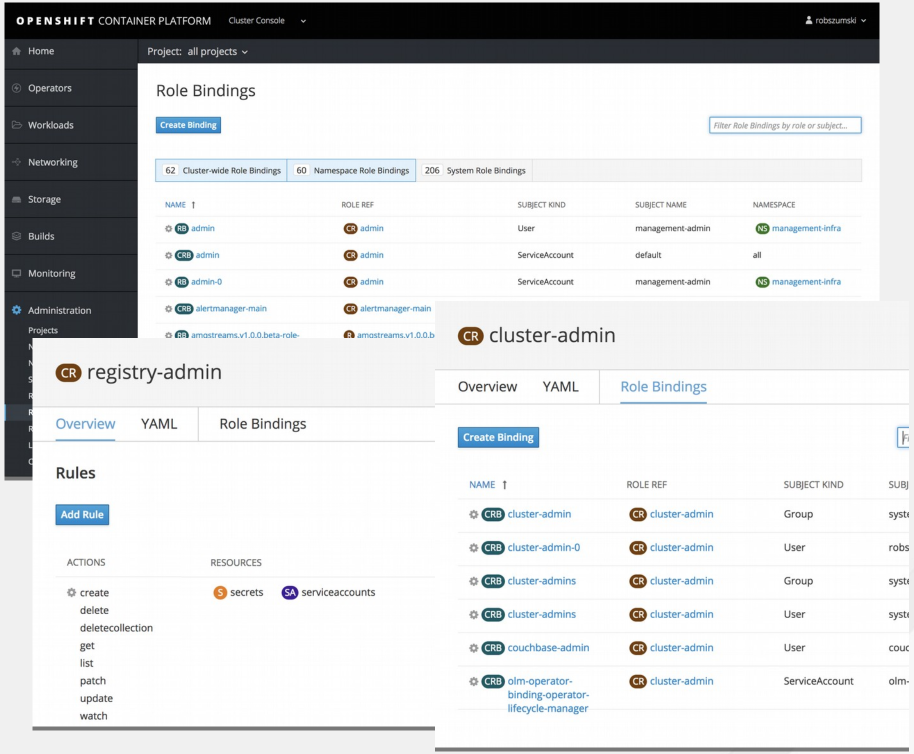


ACCESS CONTROL MANAGEMENT

Visual management of the cluster's RBAC Roles and RoleBindings

- Track down users and service accounts with a specific Role
- View cluster-wide or namespaced bindings
- Visually audit a Role's verbs and objects

Project admins can self-manage roles and bindings scoped to their namespace



Role Bindings

62 Cluster-wide Role Bindings | 60 Namespace Role Bindings | 206 System Role Bindings

NAME	ROLE REF	SUBJECT KIND	SUBJECT NAME	NAMESPACE
RB admin	CR admin	User	management-admin	NS management-infra
CRB admin	CR admin	ServiceAccount	default	all
RB admin-0	CR admin	ServiceAccount	management-admin	NS management-infra
CRB alertmanager-main	CR alertmanager-main			
RB amqstreams.v1.0.0.beta-role-	R amqstreams.v1.0.0.b			

CR registry-admin

Overview | YAML | Role Bindings

Rules

Add Rule

ACTIONS	RESOURCES
create delete deletecollection get list patch update watch	S secrets SA serviceaccounts

CR cluster-admin

Overview | YAML | Role Bindings

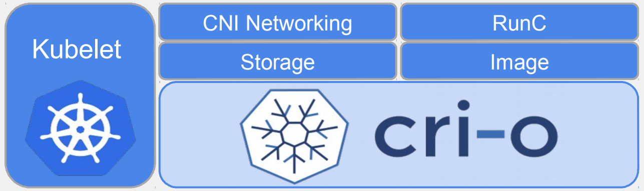
Create Binding

NAME	ROLE REF	SUBJECT KIND	SUBJ
CRB cluster-admin	CR cluster-admin	Group	syste
CRB cluster-admin-0	CR cluster-admin	User	robs
CRB cluster-admins	CR cluster-admin	Group	syste
CRB cluster-admins	CR cluster-admin	User	syste
CRB couchbase-admin	CR cluster-admin	User	couc
CRB olm-operator-binding-operator-lifecycle-manager	CR cluster-admin	ServiceAccount	olm-

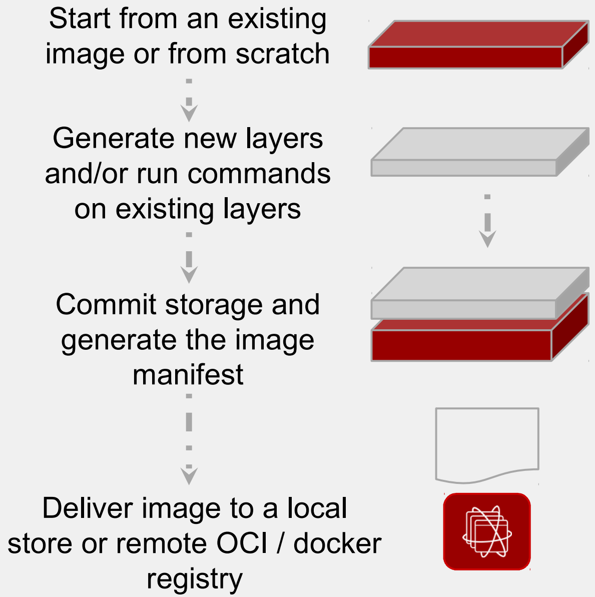
CRI-O / BUILDAH / PODMAN

cri-o

- Becoming the default for partners
- Crictl for node debugging and troubleshooting
- Podman for image tagging & management
- Continues to mature with OpenShift online, customer, and community deployments



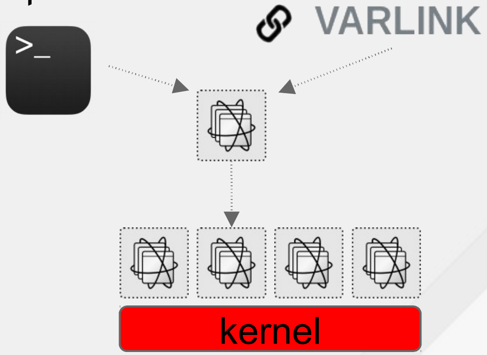
buildah


Start from an existing image or from scratch
Generate new layers and/or run commands on existing layers
Commit storage and generate the image manifest
Deliver image to a local store or remote OCI / docker registry

podman

Podman is planned to GA with RHEL 7.6.

A daemon-less CLI/API for running, managing, and debugging OCI containers and pods



REFERENCE ARCHITECTURE GUIDES

Release: ocpsupplemental-3.11 (in 4-6 weeks after 3.11 GA)

Since 3.10, Reference Architecture Implementation guides are now part of the OpenShift product documentation (https://docs.openshift.com).

Documentation for deploying OCP 3.11 on: *(not live yet)*

- OpenShift 3.11 on Red Hat OpenStack Platform (RHOSP)
- OpenShift 3.11 on Amazon Web Services (AWS)
- OpenShift 3.11 on Microsoft Azure
- OpenShift 3.11 on VMware vSphere
- OpenShift 3.11 on Google Cloud Platform (GCP)
- OpenShift 3.9 on Red Hat Virtualization 4 (RHV) *(update in progress)*

LOCAL DEVELOPMENT

CDK 3.6

- OpenShift Container Platform v3.10.45 (and update to 3.11)
- Based on Minishift 1.24

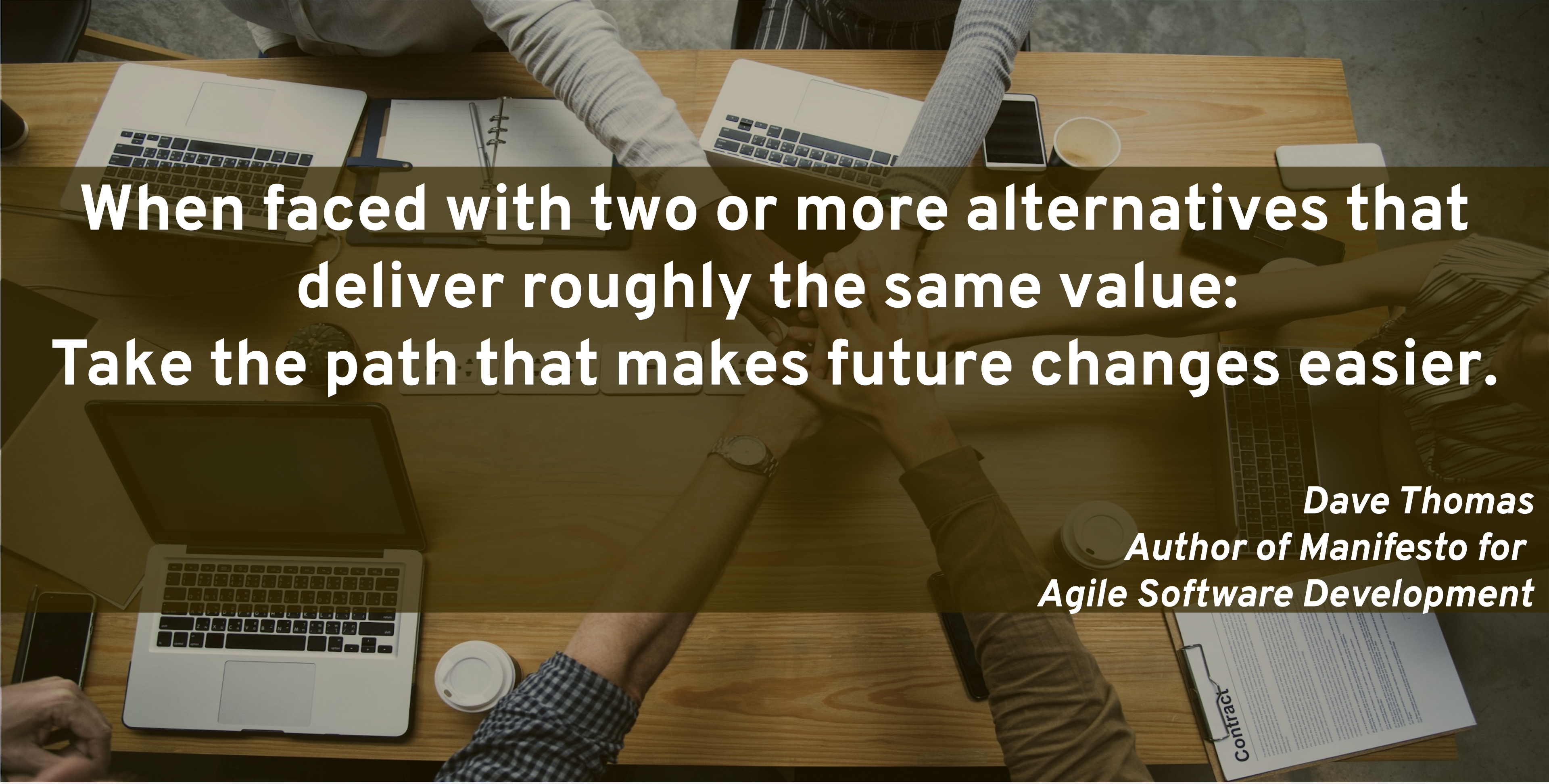
Minishift 1.24

- Configuration used to start a profile is not saved
- Provide a way to modify the kube-apiserver config same as openshift-apiserver.
- Do not apply templates in xpaas addon one by one
- Local proxy server to handle proxy issues. (technology preview)

kubectl

- We always shipped kubectl for Linux on the master's file system, but now we will offer it in the oc client downloads

… so you want to do containers and Kubernetes?



When faced with two or more alternatives that deliver roughly the same value:
Take the path that makes future changes easier.

Dave Thomas
Author of Manifesto for
Agile Software Development

GRAZIE PER L'ATTENZIONE

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