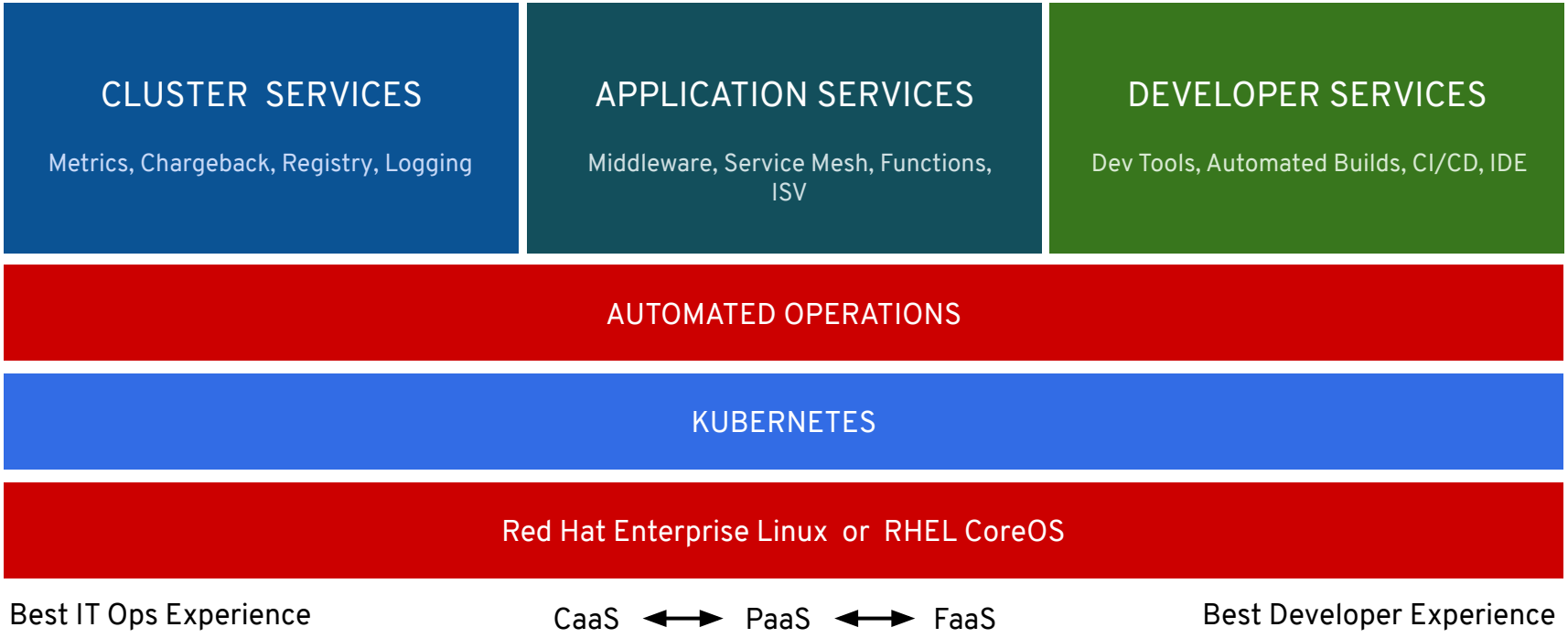
Red Hat OpenShift

What's New in OpenShift 4.1

OpenShift Product Management

Red Hat

OpenShift 4 Platform



Red Hat

2019 Roadmap

Q2 CY2019
OpenShift 4.1

DEV
- OpenShift Serverless (Knative) - DP
- OpenShift Pipelines (Tekton) Dev Preview
- CodeReady Workspaces
- CodeReady Containers Alpha
- Developer CLI (odo) Beta

APP
- OperatorHub
- Operator Lifecycle Manager
- Service Mesh (~2 month after)

PLATFORM
- Kubernetes 1.13 with CRI-O runtime
- RHEL CoreOS, RHEL7
- Automated Installer for AWS
- Pre-existing Infra Installer for Bare Metal, VMware, AWS
- Automated, one-click updates
- Multus (Kubernetes multi-network)
- Quay v3

HOSTED
- cloud.redhat.com - Multi-Cluster Mgmt
- OCP Cluster Subscription Management
- Azure Red Hat OpenShift
- OpenShift Dedicated consumption pricing

Q3 CY2019
OpenShift 4.2

DEV
- Developer Console GA
- OpenShift Serverless (Knative) - TP
- OpenShift Pipelines (Tekton) Tech Preview
- CodeReady Containers GA
- Developer CLI (odo) GA

APP
- GPU metering
- OperatorHub Enhancements
- Operator Deployment Field Forms
- Application Binding with Operators
- Application Migration Console

PLATFORM
- Kubernetes 1.14 w/ CRI-O runtime
- Disconnected Install and Update
- Automated Installer for Azure, OSP, GCP
- OVN Tech Preview
- FIPS
- Federation Workload API
- Automated App cert rotation
- OpenShift Container Storage 4.2

HOSTED
- cloud.redhat.com - Multi-Cluster Deployment
- Proactive Support Operator

Q4 CY19/Q1 CY20
OpenShift 4.3

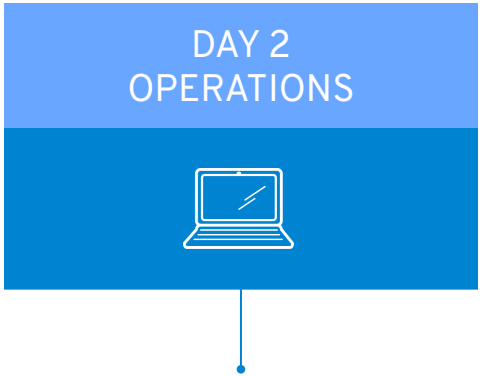
DEV
- OpenShift Serverless (Knative) - GA
- OpenShift Pipelines (Tekton) GA

APP
- Metering for Services
- Windows Containers

PLATFORM
- Kubernetes 1.15 w/ CRI-O runtime
- Automated Installer for IBM Cloud, Alibaba, RHV, Bare Metal Hardware Appliance
- Pre-existing Infra Installer for Azure, OSP, GCP
- OVN GA w/ Windows Networking Integration

HOSTED
- cloud.redhat.com - Subscription Mgmt Consumption Improvements

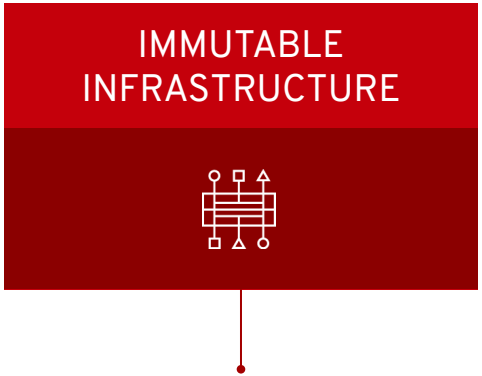
OpenShift 4.1 Workstreams Lifecycle



AWS Installer + bootstrapping

Autoscale out of the box

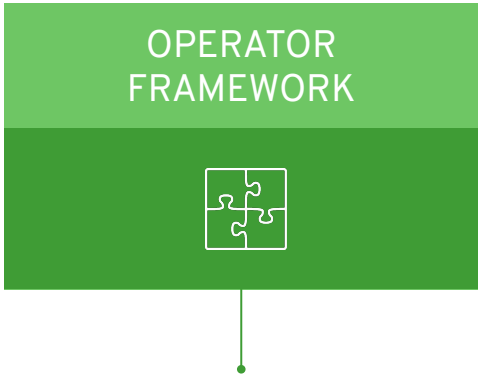
MachineSet node pools



Red Hat Enterprise Linux CoreOS

Discourage SSH/node mutation

Ignition for Machine config



SDK & testing tools

OperatorHub for discovery

OLM delivers upper stack services

The New Platform Boundary

OpenShift 4 is aware of the entire infrastructure and brings the Operating System under management

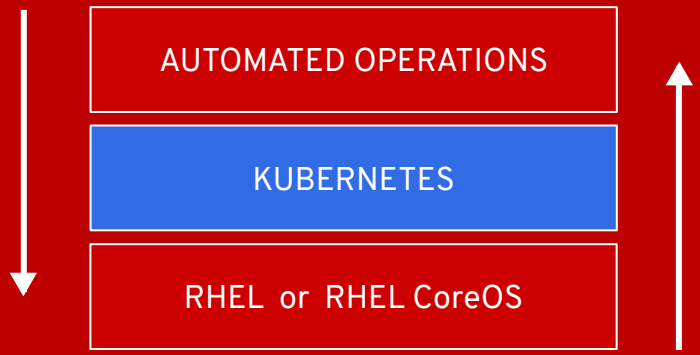
OpenShift & Kubernetes

certificates & security settings

container runtime config

allowed maintenance windows

software defined networking



kernel modules

device drivers

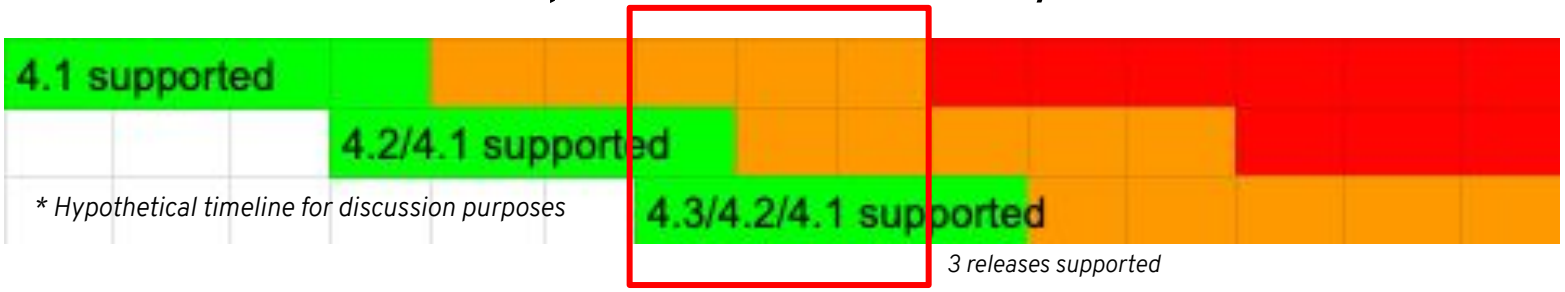
network interfaces

security groups

Nodes & Operating System

Red Hat

OpenShift 4 Lifecycle



- Release driven. Moved away from declaring dates and will now be based on releases (ie N-2)
- The 4.x Major release will be supported for 3 years.
  - Min of 2 years full support and 1 year maintenance wherein the 2 year full support is has a non declared end (will run longer) and the maintenance cycle starts when full support ends
- Current Release (N) offers full support (All bug fixes, all security fixes). Once a new minor version is released, that full support for the old release will continue for 1 month on the overlap
- After that month, we will offer 5 months of critical bug and critical security fixes for the older release
- At any given time there will be 3 releases supported
- OTA Upgrade will work up to 2 releases in a serial manner. If you fall more than 2 releases behind, you must use the application migration tooling to move to a new cluster
- Red Hat will release EUS updates that are supported for 14 months of critical bug and critical security fixes instead of the normal 5 months. If you stay on the EUS for its entire life, you must use the application migration tooling to move to a new cluster

Installation Experiences

OPENSHIFT CONTAINER PLATFORM

Full Stack Automated

Simplified opinionated "Best Practices" for cluster provisioning

Fully automated installation and updates including host container OS.

Red Hat Enterprise Linux CoreOS

Pre-existing Infrastructure

Customer managed resources & infrastructure provisioning

Plug into existing DNS and security boundaries

Red Hat Enterprise Linux CoreOS

Red Hat Enterprise Linux

HOSTED OPENSHIFT

Azure Red Hat OpenShift

Deploy directly from the Azure console. Jointly managed by Red Hat and Microsoft Azure engineers.

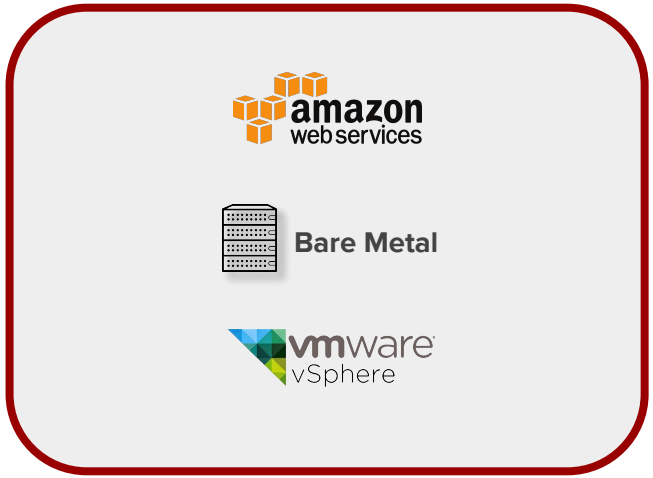
OpenShift Dedicated

Get a powerful cluster, fully Managed by Red Hat engineers and support.

4.1 Supported Providers*

Full Stack Automated

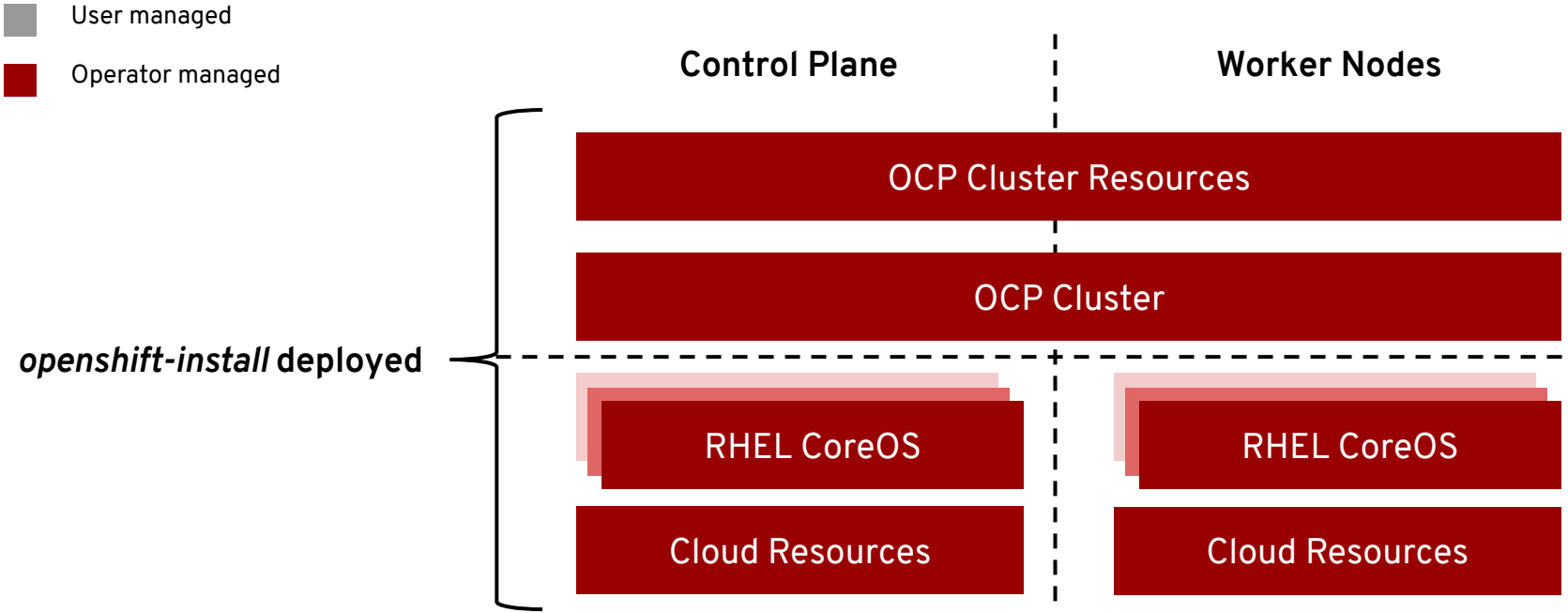
Pre-existing Infrastructure



** Requires Internet connectivity; support for cluster-wide proxy & disconnected installation/updating tentatively planned for 4.2*

Full Stack Automated Deployments

Day 1: openshift-install - Day 2: Operators



Full Stack Automated Deployments

Simplified Cluster Creation

Designed to easily provision a “best practices” OpenShift cluster

- New CLI-based installer with interactive guided workflow that allows for customization at each step
- Installer takes care of provisioning the underlying Infrastructure significantly reducing deployment complexity
- Leverages RHEL CoreOS for all node types enabling full stack automation of installation and updates of both platform and host OS content

Faster Install

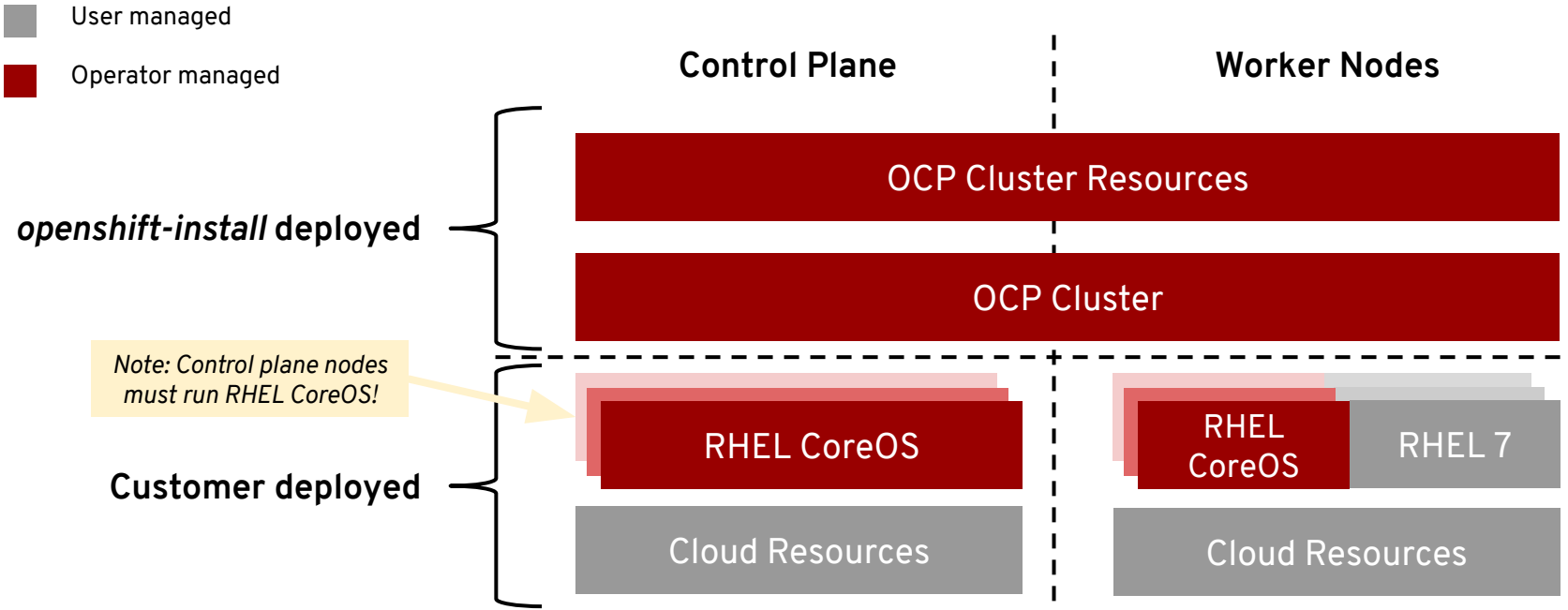
The installer typically finishes within 30 minutes

- Only minimal user input needed with all non-essential install config options now handled by component operator CRD’s
- 4.1 provides support for AWS deployments with additional provider support planned in future releases
- See the OpenShift documentation for more details

```
$ ./openshift-install --dir ./demo create cluster
? SSH Public Key /Users/demo/.ssh/id_rsa.pub
? Platform aws
? Region us-west-2
? Base Domain example.com
? Cluster Name demo
? Pull Secret [? for help]
************************************************************
INFO Creating cluster...
INFO Waiting up to 30m0s for the Kubernetes API...
INFO API v1.11.0+c69f926354 up
INFO Waiting up to 30m0s for the bootstrap-complete event...
INFO Destroying the bootstrap resources...
INFO Waiting up to 10m0s for the openshift-console route to be created...
INFO Install complete!
INFO Run 'export KUBECONFIG=<your working directory>/auth/kubeconfig' to
manage the cluster with 'oc', the OpenShift CLI.
INFO The cluster is ready when 'oc login -u kubeadmin -p <provided>'
succeeds (wait a few minutes).
INFO Access the OpenShift web-console here:
https://console-openshift-console.apps.demo.example.com
INFO Login to the console with user: kubeadmin, password: <provided>
```

Deploying to Pre-existing Infrastructure

Day 1: openshift-install - Day 2: Operators + Customer Managed Infra & Workers



Deploying to Pre-existing Infrastructure

Customized OpenShift Deployments

Enables OpenShift to be deployed to user managed resources and pre-existing infrastructure.

- Customers are responsible for provisioning all infrastructure objects including networks, load balancers, DNS, hardware/VMs and performing host OS installation
- Deployments can be performed both on-premise and to the public cloud
- OpenShift installer handles generating cluster assets (such as node ignition configs and kubeconfig) and aids with cluster bring-up by monitoring for bootstrap-complete and cluster-ready events
- While RHEL CoreOS is mandatory for the control plane, either RHEL CoreOS or RHEL 7 can be used for the worker/infra nodes
- Node auto-scaling can be setup for providers with OpenShift Machine API support
- See the OpenShift documentation for more details

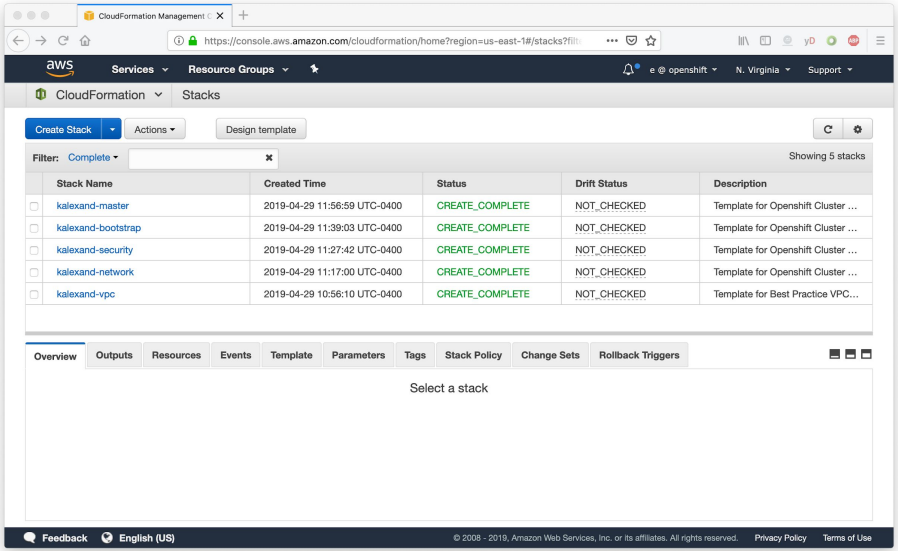
```
$ cat ./demo/install-config.yaml
apiVersion: v1
baseDomain: example.com
compute:
- name: worker
  replicas: 0
controlPlane:
  name: master
...

$ ./openshift-install --dir ./demo create ignition-config
INFO Consuming "Install Config" from target directory

$ ./openshift-install --dir ./demo wait-for bootstrap-complete
INFO Waiting up to 30m0s for the Kubernetes API at
https://api.demo.example.com:6443...
INFO API v1.11.0+c69f926354 up
INFO Waiting up to 30m0s for the bootstrap-complete event...
$ ./openshift-install --dir ./demo wait-for cluster-ready

INFO Waiting up to 30m0s for the cluster at
https://api.demo.example.com:6443 to initialize...
INFO Install complete!
```

AWS: Deploying to Pre-existing Infrastructure

Deploy OpenShift on customized AWS infrastructure

Install OpenShift clusters on user-managed AWS infrastructure.

- Customers are responsible for provisioning:
  - VPC/Subnets, Route53 Zone & DNS entries, Load Balancers & listeners, Security groups, IAM roles, S3 bucket, and EC2 instances for Bootstrap, Master, and Worker nodes
  - Public hosted zone in Route53 in the same account as your cluster; ensure the zone is "authoritative" for the domain
- To make AWS infrastructure provisioning easier, example AWS CloudFormation templates have been included as a guide for how to prepare your environment for OpenShift deployments
  - While templates are only intended to provide basic functionality, they can be further enhanced based on your operation needs or even automated using orchestration technologies like Ansible
- Additionally, you will likely need to review and increase the service limits of your AWS account
- See the OpenShift documentation for more details



OpenShift Bootstrap Process: Self-Managed Kubernetes

How to boot a self-managed cluster:

- OpenShift 4 is unique in that management extends all the way down to the operating system
- Every machine boots with a configuration that references resources hosted in the cluster it joins enabling cluster to manage itself
- Downside is that every machine looking to join the cluster is waiting on the cluster to be created
- Dependency loop is broken using a bootstrap machine, which acts as a temporary control plane whose sole purpose is bringing up the permanent control plane nodes
- Permanent control plane nodes get booted and join the cluster leveraging the control plane on the bootstrap machine
- Once the pivot to the permanent control plane takes place, the remaining worker nodes can be booted and join the cluster

Bootstrapping process step by step:

1. Bootstrap machine boots and starts hosting the remote resources required for master machines to boot.
2. Master machines fetch the remote resources from the bootstrap machine and finish booting.
3. Master machines use the bootstrap node to form an etcd cluster.
4. Bootstrap node starts a temporary Kubernetes control plane using the newly-created etcd cluster.
5. Temporary control plane schedules the production control plane to the master machines.
6. Temporary control plane shuts down, yielding to the production control plane.
7. Bootstrap node injects OpenShift-specific components into the newly formed control plane.
8. Installer then tears down the bootstrap node or if user-provisioned, this needs to be performed by the administrator.

Comparison between deployments methods

	Full Stack Automation	Pre-existing Infrastructure
Build Network	Installer	User
Setup Load Balancers	Installer	User
Configure DNS	Installer	User
Hardware/VM Provisioning	Installer	User
OS Installation	Installer	User
Generate Ignition Configs	Installer	Installer
OS Support	Installer: RHEL CoreOS	User: RHEL CoreOS + RHEL 7
Node Provisioning / Autoscaling	Yes	Only for providers with OpenShift Machine API support
Customization & Provider Support	Best Practices: AWS	Yes: AWS, Bare Metal, & VMware

RHEL 7 Worker/Infra Nodes

Add RHEL 7.6 machines with Ansible

Use openshift-ansible to prepare, configure and join your RHEL 7 nodes to the cluster. After you have a functional control plane, nodes can be added to the cluster with the `scaleup` playbook.

- Pending certificates signing request (CSRs) for each RHEL machine must be approved before joining cluster
- See the OpenShift documentation for more details

Mixed clusters of RHEL 7 and RHEL CoreOS are ok

RHEL CoreOS is mandatory for the control plane, but mixed clusters of RHEL 7.6 and RHEL CoreOS are supported for any other node pools.

RHEL 8 is not yet supported for worker/infra nodes

Support will come in a later 4.x release

Upgrading OpenShift node components

With the `upgrade` playbook, RHEL 7 OpenShift components can be upgraded. Optionally, pre/post hooks are also available for performing custom tasks.

RHEL admins are responsible for:

Keeping host inventory up to date

Refresh your list of hosts before an upgrade, to make sure no machines are missed

Defining Ansible hooks

Run playbooks that will cordon/uncordon machines, along with any pre/post upgrade actions

Updating RHEL RPM content

Security, performance and regular updates from Red Hat

Partitioning disks

Configure, maintain and health check your disks

Configuring network interfaces

Configure, secure and maintain settings within your data center's specifications

Adding & Updating RHEL 7 Worker Nodes

System Requirements

- OpenShift 4 cluster deployed to pre-existing infrastructure (not supported on installer provisioned clusters)
- Latest release of RHEL 7 Server installed on every machine joining the cluster
  - Ansible >= 2.7.8, OpenShift Client (oc)
  - Necessary entitlements and YUM repo access pre-configured for every machine

Create an Ansible Inventory

- Inventory file with the appropriate groups and variables defined
  - An example inventory can be found in inventory/hosts.example
- Required variables include:
  - `openshift_kubeconfig_path:` Path to the kubeconfig for the cluster
  - `openshift_pull_secret_path:` Path to the pull secret to the image registry

Run RHEL 7 node 'scaleup' playbook

```
$ cd openshift-ansible; ansible-playbook -i inventory/hosts playbooks/scaleup.yml
```

- Pending certificates signing request (CSRs) for each RHEL machine must be approved before joining cluster

```
$ oc adm certificate approve <csr_name>
```

Upgrading RHEL 7 OpenShift node components

- Leverages upgrade section of Ansible Inventory to specify nodes
- Custom tasks can be performed during upgrades at different stages of the upgrade; refer to 'hooks' in the documentation for more information.

```
$ cd openshift-ansible; ansible-playbook -i inventory/hosts playbooks/upgrade.yml
```

Red Hat Enterprise Linux

	RED HAT® ENTERPRISE LINUX®	RED HAT® ENTERPRISE LINUX CoreOS
	General Purpose OS	**Immutable container host**
BENEFITS	• 10+ year enterprise life cycle • Industry standard security • High performance on any infrastructure • Customizable and compatible with wide ecosystem of partner solutions	• Self-managing, over-the-air updates • Immutable and tightly integrated with OpenShift • Host isolation is enforced via Containers • Optimized performance on popular infrastructure
WHEN TO USE	When customization and integration with additional solutions is required	When cloud-native, hands-free operations are a top priority

Red Hat Enterprise Linux CoreOS

4.1 Image Availability:

- Amazon: AMIs
- vSphere: OVA
- Bare Metal: UEFI & BIOS

Installation Requirements:

- RHCOS image + ignition config (installer generated)

Bare Metal Installer (ISO or PXE):

```
coreos.inst=yes
coreos.inst.install_dev=sda
coreos.inst.image_url=http://10.10.10.1/rhcos-metal-uefi.raw.gz
coreos.inst.ignition_url=http://10.10.10.1/master.ign
```

RHCOS Details

- RHEL 8 bits (4.18 kernel)
- Includes all packages required for OpenShift
- Over-The-Air updates encompass OCP & RHCOS
- Transactional host updates
- Read-only OS binaries
- Preconfigured for most environments

Immutable Operating System

Red Hat Enterprise Linux CoreOS is versioned with OpenShift

CoreOS is tested and shipped in conjunction with the platform. Red Hat runs thousands of tests against these configurations.

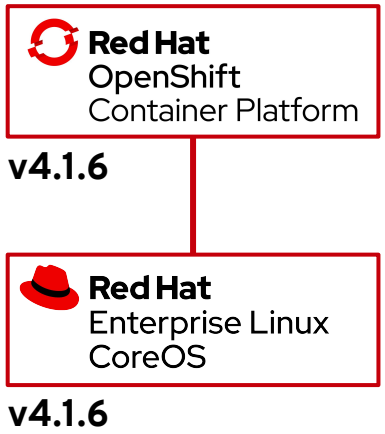
RHEL CoreOS admins are responsible for:

Nothing. 😀🙌

Red Hat Enterprise Linux CoreOS is managed by the cluster

The Operating system is operated as part of the cluster, with the config for components managed by Machine Config Operator:

- CRI-O config
- Kubelet config
- Authorized registries
- SSH config



CRI-O Support in OpenShift

CRI-O tracks and versions identical to Kubernetes, simplifying support permutations

CRI-O 1.12  Kubernetes 1.12  OpenShift 4.0 

CRI-O 1.13  Kubernetes 1.13  OpenShift 4.1 

CRI-O 1.14  Kubernetes 1.14  OpenShift 4.2 

Machine Config Operator (MCO)

Example with CRI-O:

- Simplified management across entire cluster
- Container Runtime Config (CRC) is specialized Machine Config (MC) for CRI-O
- Container Runtime Config for CRI-O exposes configuration knobs

```
apiVersion: machineconfiguration.openshift.io/v1
kind: ContainerRuntimeConfig
metadata:
  name: set-log-and-pid
spec:
  machineConfigPoolSelector:
    matchLabels:
      debug-crio: config-log-and-pid
  containerRuntimeConfig:
    pidsLimit: 2048
    logLevel: debug
```

Leverages

- Custom Resource Definitions
- Machine Config Pools
- Machine Config Pool Selector
- Machine Configs
- Container Runtime Config (specialized MC)

```
$ oc get ContainerRuntimeConfig

NAME              AGE
set-log-and-pid   22h
```

Discovering Configuration Options

Cluster config objects are the human/machine APIs

These can be discovered with the commands to the right.

Configuration set via this mechanism will be carried forward through cluster updates.

Configuration Resources

Apiserver	Authentication
Build	Clusterversion
Console	Dns
Featuregate	Image
Infrastructure	Ingress
Network	Oauth
Project	Scheduler

```
$ oc api-resources --api-group config.openshift.io -o name
| cut -d . -f 1
apiservers
authentications
…
scheduler
```

```
$ oc explain --api-version=config.openshift.io/v1
scheduler.spec
KIND:     Scheduler
VERSION:  config.openshift.io/v1

FIELDS:
   defaultNodeSelector    <string>
     defaultNodeSelector helps set the cluster-wide default
     node selector to restrict pod placement to specific...

   policy    <Object>
```

```
$ oc explain --api-version=config.openshift.io/v1
scheduler.spec.policy
```

Graphical Re-configuration

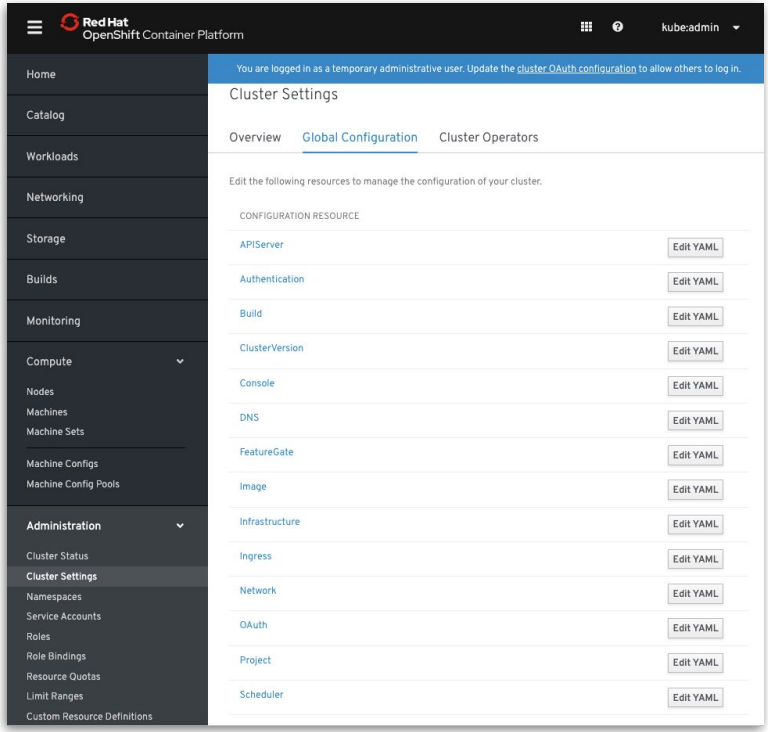
Global Configuration
You complete most of the cluster configuration and customization after you deploy your OpenShift Container Platform cluster.

Change via Cluster Settings screen

Once you have discovered your desired settings (prev. slide), changes can be made via Console or CLI.

Operators apply these updates

One or more Operators are responsible for propagating these settings through the infrastructure



Network Configuration

Example #1: Operator-Assisted Ingress Ctrlr “Sharding”

In 4.1, the way you create a router to work with a shard is different (API call versus ‘oc adm’ command). A simple config (example to right) acted upon by the ingress operator automatically integrates sharding with the external (front-end) DNS/LB configured at install-time,.

```
apiVersion: operator.openshift.io/v1
kind: IngressController
metadata:
  namespace: openshift-ingress-operator
  name: internal-apps
spec:
  domain: internal-apps.dmace.devcluster.openshift.com
  routeSelector:
    matchLabels:
      environment: internal
```

Example #2: Create a Second Router

Ingress controller configuration is now a first-class object, meaning additional Ingress controllers can be created by making multiple Ingress objects. This is the preferred method for giving teams their own subdomains, replacing the ‘oc adm’ method (see right).

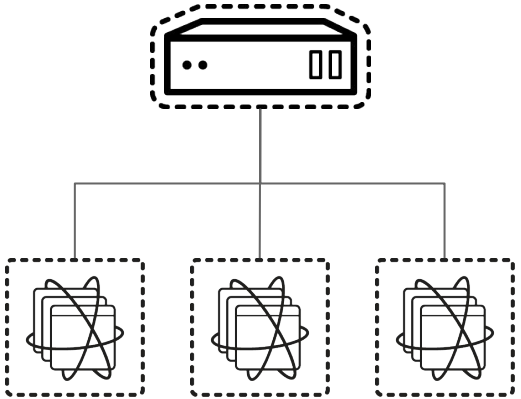
```
$ cat <<EOF | oc create -f -
apiVersion: operator.openshift.io/v1
kind: IngressController
metadata:
  namespace: openshift-ingress-operator
  name: finance-apps
spec:
  domain: finance-apps.openshift.example.com
EOF
```

HAProxy Optimization

HAProxy Large Performance Increase

OCP 4.1 deploys 2 router replicas by default (improving the observed performance ~2x), and sets 4 router threads by default (also improving observed performance another ~2x).

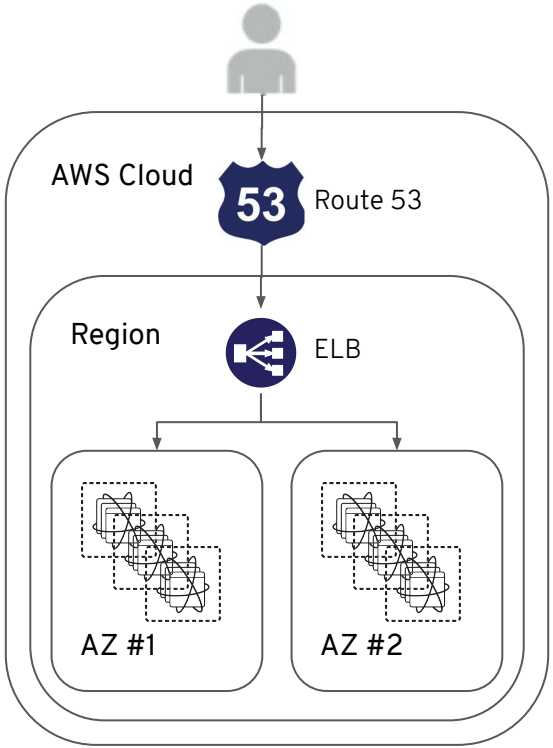
We increased these defaults for HAProxy so that the cluster can serve more routes.



Platform-Integrated Networking

Installer Provisioned Networking Infrastructure

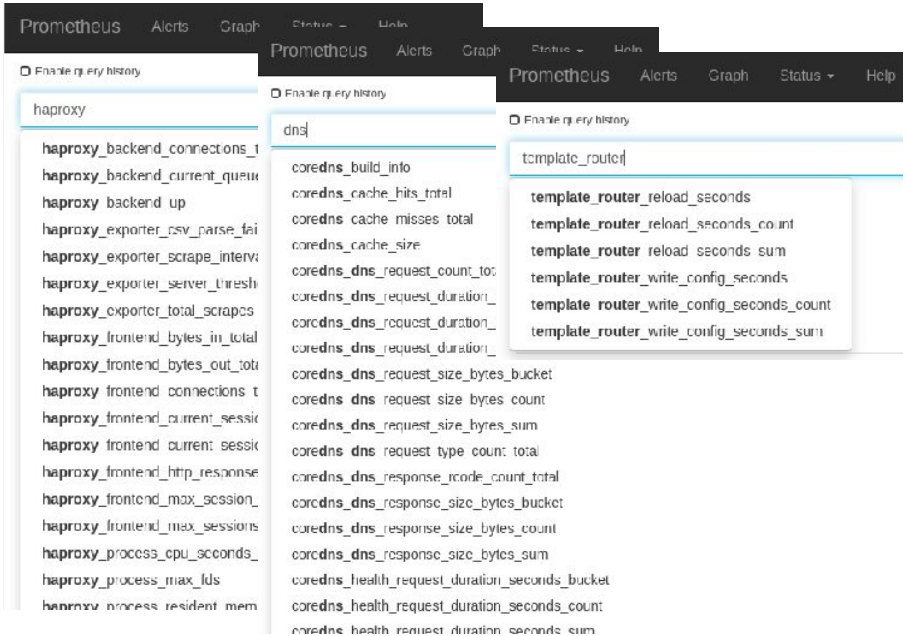
The OCP 4.1 installer takes full advantage of the provider networking infrastructure, including automatic integration with the provider's external DNS and Load Balancing.



Networking Metrics

Networking Metrics Visibility in Prometheus

Networking metrics (HAproxy/Router, CoreDNS, etc.) for consumption by Prometheus are GA at 4.1.



Networking Re-configuration

Networking Advanced Settings

These are the OpenShift SDN settings that can be tweaked at install-time:

- Mode: NetworkPolicy, Multitenant, Subnet
- VXLAN Port Number
- MTU (autodetected, once)
- External OpenVSwitch

[How to Modify Advanced Network Configuration Parameters]

```
spec:
  defaultNetwork:
    type: OpenShiftSDN
    openshiftSDNConfig:
      mode: NetworkPolicy
      vxlanPort: 4789
      mtu: 1450
      useExternalOpenvswitch: false
```

NOTE: *Most network settings cannot be changed safely and affect the entire cluster.* The operator will prevent unsafe changes. If you need to force a change to a *non-production* cluster, see the operator README for the command, but a cluster re-install is likely to be the better choice.

kube-proxy Re-configuration

kube-proxy Advanced Settings

These are the kube-proxy settings that can be tweaked at install-time:

- iptablesSyncPeriod
- bindAddress
- proxyArguments (a list of kube-proxy command-line flags)

[How to Modify Advanced Network Configuration Parameters]

```
spec:
kubeProxyConfig:
   iptablesSyncPeriod: 30s
   bindAddress: 0.0.0.0
   proxyArguments:
     iptables-min-sync-period: ["30s"]
```

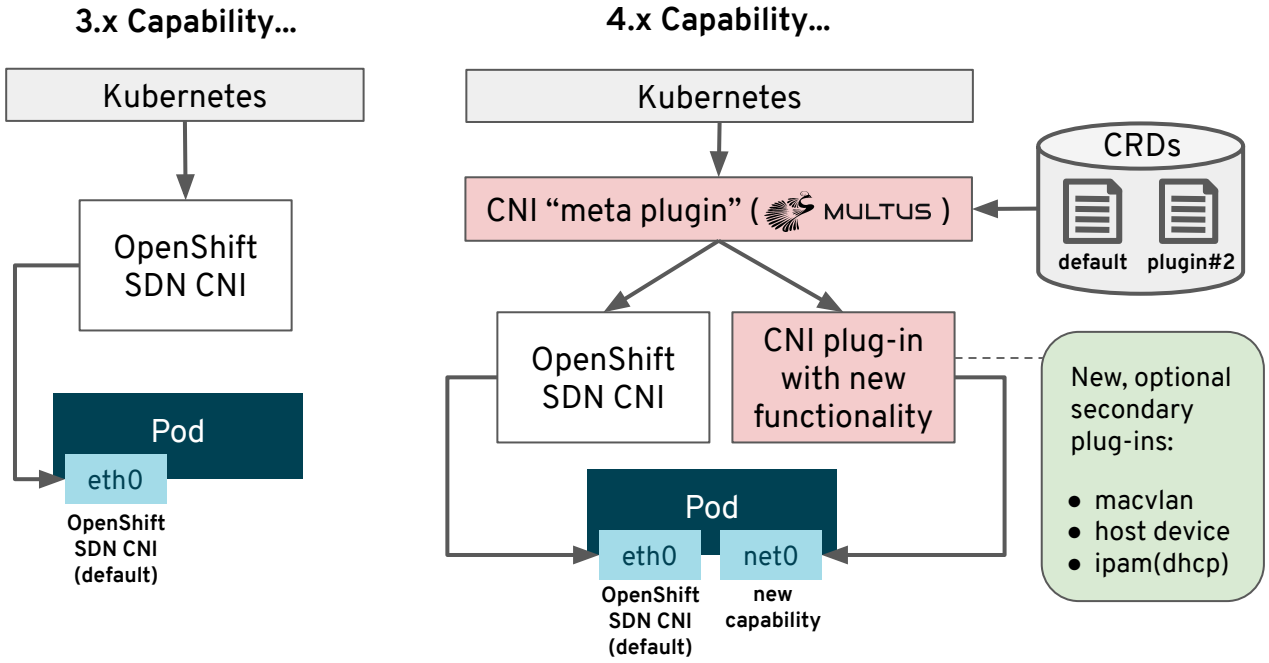
NOTE: *Most network settings cannot be changed safely and affect the entire cluster.* The operator will prevent unsafe changes. If you need to force a change to a *non-production* cluster, see the operator README for the command, but a cluster re-install is likely to be the better choice.

Networking Plug-ins

Multus Enables Multiple Networks & New Functionality to Existing Networking

The Multus CNI “meta plugin” for Kubernetes enables one to create multiple network interfaces per pod, and assign a CNI plugin to each interface created.

1. Create pod annotation(s) to call out a list of intended network attachments…
2. …each pointing to CNI network configurations packed inside CRD objects

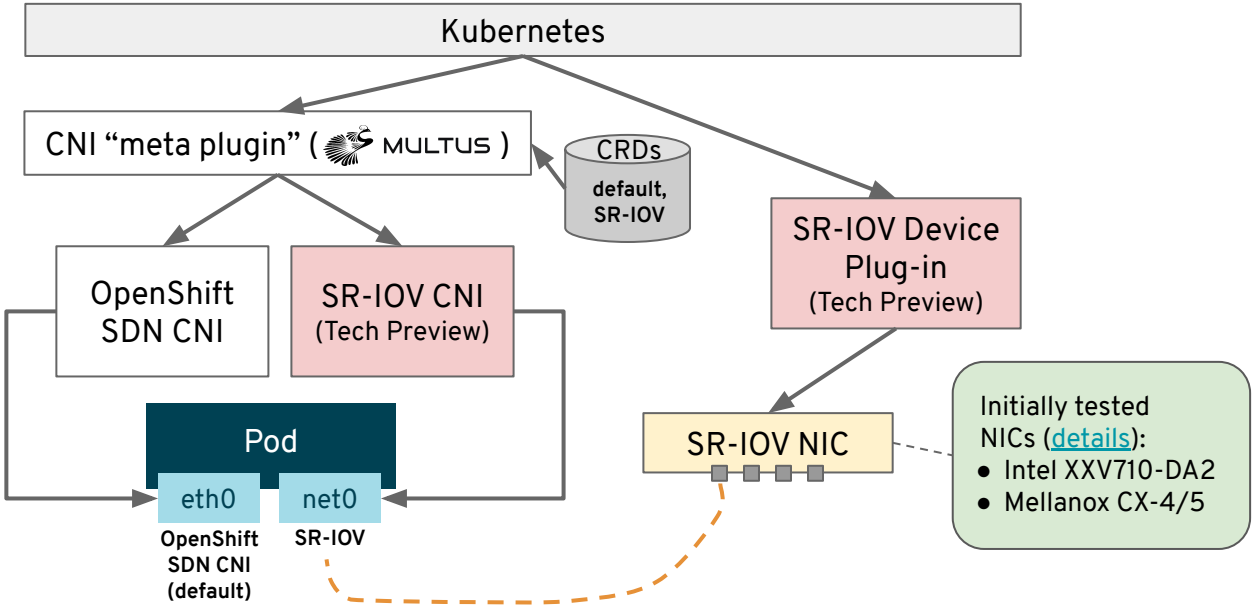


High-Performance Networking (Tech Preview)

Approach Line-Rate Performance to the Pod

OCP 4.1 includes the capability to use specific SR-IOV hardware on cluster nodes to brings near-line rate network performance to cluster pods.

Configuring SR-IOV



Storage

Storage Focus

- Cluster Storage Operator
  - Sets up the default storage class
  - Looks through cloud provider and sets up the correct storage class
- Drivers themselves remain in-tree for now
- Focus has been on RHEL7 and RHCOS8 validating:
  - AWS EBS
  - vSphere Default Storage Class

Supported	Dev Preview
NFS	Snapshot*
iSCSI	EFS*
AWS EBS	Local Volume*
VMware vSphere	Raw Block

* via external provisioner

PROVIDER ROADMAP FOR OPENSHIFT CONTAINER STORAGE 4

	Full Stack Automation	Pre-existing Infrastructure
OPENSHIFT by Red Hat 4.1	–	–
OPENSHIFT by Red Hat 4.2	amazon web services	amazon web services, vmware vSphere, RED HAT OPENSHIFT Container Storage
OPENSHIFT by Red Hat 4.3*	Microsoft Azure, Google Cloud Platform, Baremetal, IBM Cloud	Baremetal, Microsoft Azure, Google Cloud Platform, RED HAT OPENSHIFT Container Storage

*4.3 planning is still in progress , content Still TBD

Configuring an Identity Provider

The Cluster Authentication Operator

- Use the ***cluster-authentication-operator*** to configure an Identity Provider. The configuration is stored in the *oauth/cluster* custom resource object inside the cluster.
- Once that's done, you may choose to remove kubeadmin (warning: there's no way to add it back).
- All the identity providers supported in 3.11 are supported in 4.1: LDAP, GitHub, GitHub Enterprise, GitLab, Google; OpenID Connect, HTTP request headers (for SSO), Keystone, Basic authentication.
- For more information:
  Understanding identity provider configuration
  cluster-authentication-operator

Sample identity provider CR

```
apiVersion: config.openshift.io/v1
kind: OAuth
metadata:
  name: cluster
spec:
  identityProviders:
  - name: my_identity_provider 1
    mappingMethod: claim 2
    type: HTPasswd
    htpasswd:
      fileData:
        name: htpass-secret 3
```

1. This provider name is prefixed to provider user names to form an identity name.
2. Controls how mappings are established between this provider's identities and user objects.
3. An existing secret containing a file generated using `htpasswd`.

Service Certificates and the Service CA

The Service CA Operator

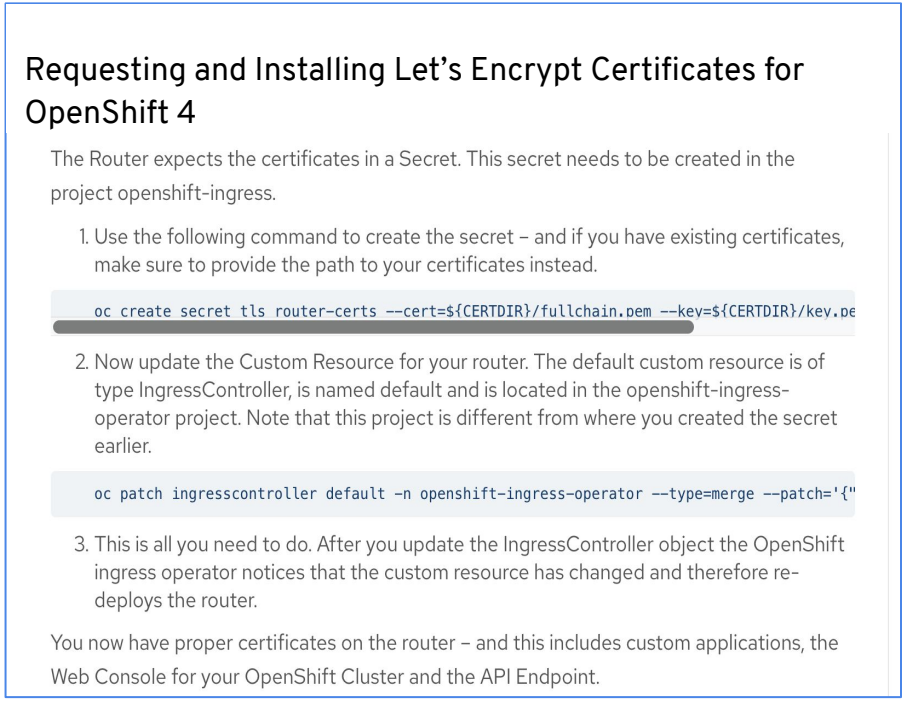
- The Service Certificate Authority (CA) can sign server certificates for services running in the OpenShift cluster.
- The **service-ca operator** manages 3 controllers:
  service-ca controller
  configmap-cabundle-injector controller
  apiservice-cabundle-injector controller
- The Service CA is valid for one year after installation. Manual steps to refresh the Service CA are documented. Automation is targeted for 4.2.
- For more information:
  Service Serving Certificate Secrets
  openshift-service-ca-operator

```
$ oc create configmap foobar --from-literal=key1=foo
configmap/foobar created
$ oc get configmap/foobar -o yaml
apiVersion: v1
data:
  key1: foo
kind: ConfigMap
metadata:
  creationTimestamp: 2018-09-11T23:44:56Z
  name: foobar
  namespace: myproject
  resourceVersion: "56490"
  selfLink: /api/v1/namespaces/myproject/configmaps/foobar
  uid: afee501b-b61c-11e8-833b-c85b762603b0
$ oc annotate configmap foobar service.beta.openshift.io/inject-cabundle="true"
configmap/foobar annotated
$ oc get configmap/foobar -o yaml
apiVersion: v1
data:
  key1: foo
  service-ca.crt: |
    -----BEGIN CERTIFICATE-----
    MIIDCjCCAfKgAwIBAgIBATANBgkqhkiG9w0BAQsFADA2MTQwMgYDVQQDDCtvcGVu
    c2hpZnQtc2VydmljZS1zZXJ2aW5nLXNpZ25lckAxNTM2Njk1NTIxMB4XDTE4MDkx
    MTE5NTIwMVoXDTIzMDkxMDE5NTIwMlowNjE0MDIGA1UEAwwrb3BlbnNoaWZ0LXNl
    cnZpY2Utc2VydmluZy1zaWduZXJAMTUzNjY5NTUyMTCCASIwDQYJKoZIhvcNAQEB
    BQADggEPADCCAQoCggEBANP9Asc657SkWVPOohmMlrXQirl7taaarmM5l3/pNgeo
```

Custom Certificates for External Endpoints

Custom certificates for Ingress Controllers

- In OpenShift 4 adding custom certificates for external endpoints is a post-installation task.
- Cluster ingress is managed by the Ingress Operator which configures Ingress Controllers to route traffic as specified by OpenShift Route and Kubernetes Ingress resources.
- Updating the certificate for the ingress controller(s) covers the Web console, the API endpoint, the internal Registry and custom applications. For the Registry, you can choose to define a separate route with certificate.
- For example: Requesting and Installing Let's Encrypt Certificates for OpenShift 4



Requesting and Installing Let's Encrypt Certificates for OpenShift 4

The Router expects the certificates in a Secret. This secret needs to be created in the project openshift-ingress.

1. Use the following command to create the secret – and if you have existing certificates, make sure to provide the path to your certificates instead.

```
oc create secret tls router-certs --cert=${CERTDIR}/fullchain.pem --key=${CERTDIR}/key.pe
```

2. Now update the Custom Resource for your router. The default custom resource is of type IngressController, is named default and is located in the openshift-ingress-operator project. Note that this project is different from where you created the secret earlier.

```
oc patch ingresscontroller default -n openshift-ingress-operator --type=merge --patch='{"
```

3. This is all you need to do. After you update the IngressController object the OpenShift ingress operator notices that the custom resource has changed and therefore re-deploys the router.

You now have proper certificates on the router – and this includes custom applications, the Web Console for your OpenShift Cluster and the API Endpoint.

Registry Configuration

Image Registry Operator Configuration Parameters
Several parameters support changing the registry configuration. Those are defined in the **configs.imageregistry.operator.openshift.io** resource

Additional configuration by ConfigMap and Secret resources located within the **openshift-image-registry** namespace

Documentation:
https://docs.openshift.com/container-platform/4.1/registry/configuring-registry-operator.html#registry-operator-configuration-resource-overview_configuring-registry-operator

Image Registry Operator configuration parameters

The `configs.imageregistry.operator.openshift.io` resource offers the following configuration parameters.

Parameter	Description
`ManagementState`	`Managed`: The Operator updates the registry as configuration resources are updated. `Unmanaged`: The Operator ignores changes to the configuration resources.
`Removed`	The Operator removes the registry instance and tear down any storage that the Operator provisioned.
`Logging`	Sets `loglevel` of the registry instance.
`HTTPSecret`	Value needed by the registry to secure uploads, generated by default.
`Proxy`	Defines the Proxy to be used when calling master API and upstream registries.
`Storage`	`Storagetype`: Details for configuring registry storage, for example S3 bucket coordinates. Normally configured by default.
`Requests`	API Request Limit details. Controls how many parallel requests a given registry instance will handle before queuing additional requests.
`DefaultRoute`	Determines whether or not an external route is defined using the default hostname. If enabled, the route uses re-encrypt encryption. Defaults to false.
`Routes`	Array of additional routes to create. You provide the hostname and certificate for the route.
`Replicas`	Replica count for the registry.

Red Hat Quay v3

Quay v3 Key Features

- Full support for Docker Registry API v2_s2
- Multi-arch (manifest) and Windows images
- Rebranded and rebased (RHEL)
- New config UI to save & upload Quay config
- Parallel upgrade (2x 5min downtime only)

Red Hat Quay and OpenShift

Red Hat Quay and OpenShift are working well together already today. This includes both running Quay **on** and using Quay **with** OpenShift. Documentation and UX improvements for both coming soon.

- Customer facing blog post: https://red.ht/2GOViSc
- RH Internal blog post: https://red.ht/2XXtFMF
- Quay Mojo Group: https://mojo.redhat.com/groups/quay

Moving components to dedicated Node pools

Create a new Node pool

First, make a new MachineSet with a template that contains a custom label, like `role=logging`. Optionally customize the resources or security groups on this set of Nodes.

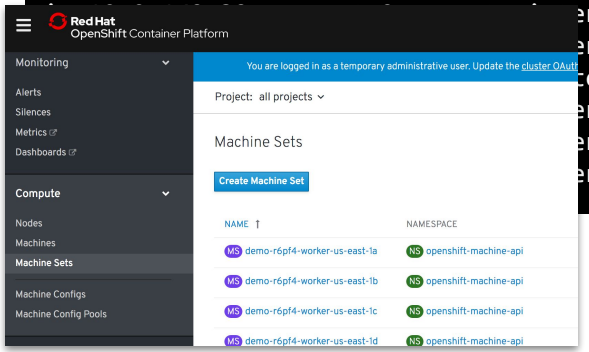
Documentation: Roles in OpenShift

Update Node selectors

Change the node selectors to your new Node pool labels. This process uses different CRDs based on the component:

- Cluster Monitoring (docs)
- Router (lab)
- Registry (lab)
- Logging (docs)

```
# new Node pools added
$ oc get nodes
NAME                                         ROLES
ip-10-0-132-151.us-east-2.compute.internal   worker
Ip-10-0-137-86.us-east-2.compute.internal    worker
ip-10-0-138-38.us-east-2.compute.internal    worker
ip-10-0-139-204.us-east-2.compute.internal   worker
ip-10-0-139-249.us-east-2.compute.internal   master
ip-10-0-144-70.us-east-2.compute.internal    master
ip-10-0-145-199.us-east-2.compute.internal   master
                                             ernal    logging
                                             ernal    logging
                                             ternal   monitoring
                                             ernal    monitoring
                                             ernal    router
                                             ernal    router
```



Additional Build Configurations

Default build configurations for buildconfigs

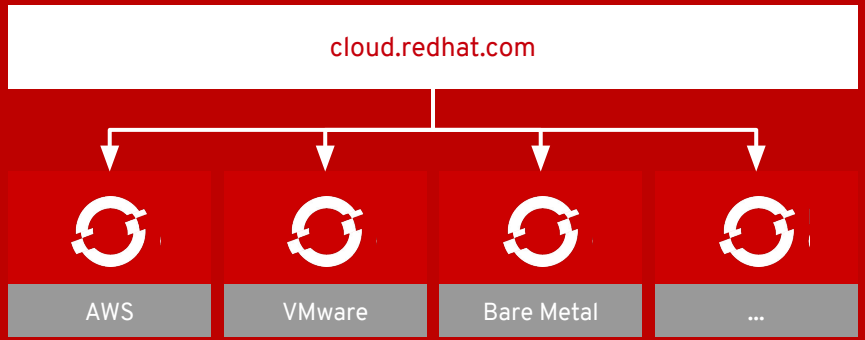
- Additional CAs to be trusted for image pull/push
- Proxy setting for image pull/push and source download
- Proxy settings for git commands
- Environment variables to set on all builds
- Docker labels to apply to resulting images
- Build resource requirements
- Default values to override on builds even if user has provided values on the buildconfig

```yaml
apiVersion: config.openshift.io/v1
kind: Build
metadata:
 name: cluster
spec:
 additionalTrustedCA:
   name: trustedCAsConfigMap
 buildDefaults:
   defaultProxy: # http, https and no proxy
   gitProxy: # http, https and no proxy
   env: # key-values
   imageLabels:
   resources:
     limits: # cpu, memory
     requests: # cpu, memory
 buildOverrides:
   imageLabels:
   nodeSelector:
   tolerations:
```

```
oc edit build.config.openshift.io/cluster
```

Cloud-like Simplicity, Everywhere

Full-stack automated operations across any on-premises, cloud, or hybrid infrastructure



Red Hat

OpenShift Cluster Manager on cloud.redhat.com

Automatic registration of OpenShift clusters

View cluster versions and capacity in one place, no matter what infrastructure you are running on. Integrated with RHSM.

OpenShift Dedicated cluster management

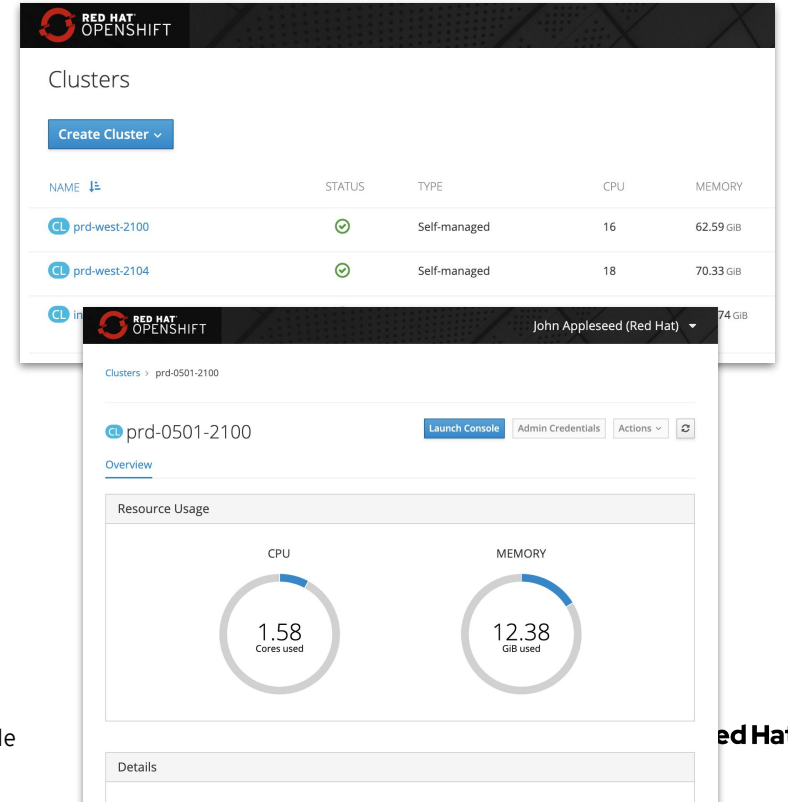
Self-service cluster deployment, scaling, and management for OpenShift Dedicated coming soon.

Azure Red Hat OpenShift

Information about these clusters will be coming at a later date.

Hosted in the United States

Other geographies may come later. You can opt-out too.



OpenShift Subscription Management

Moves from node management to cluster management

Entitle clusters and not nodes. Nodes too dynamic. We do not block on usage. Requires telemeter Opt-In.

Dynamically adds and removes nodes

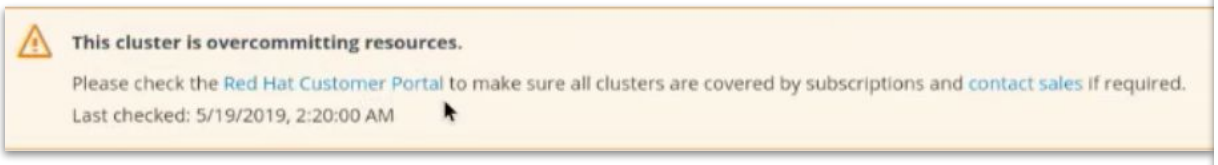
UHC will dynamically add and remove nodes from your subscription allocations to the cluster in 24 hour intervals. This will move to instantaneous across the next several releases.

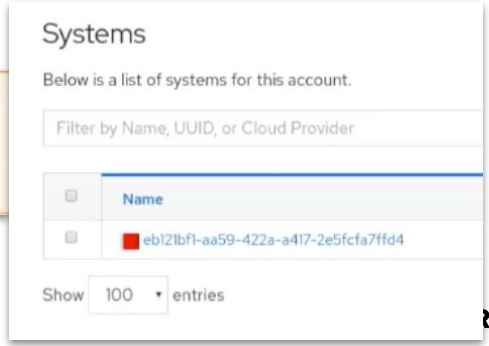
Connected to the same backend as Subscription Portal and Satellite

Allocation numbers you see at cloud.redhat.com for OCP can be also seen on the subscription portal at access.redhat.com

Removes OCP Infrastructure from the count

UHC will figure out which pods are your OCP infra pods and subtract out their usage from your core count so you are not charged.





Generally Available

Automated Container Operations

Fully automated day-1 and day-2 operations

INSTALL	DEPLOY	HARDEN	OPERATE
AUTOMATED OPERATIONS			
Infra provisioning	Full-stack deployment	Secure defaults	Multi-cluster aware
Embedded OS	On-premises and cloud	Network isolation	Monitoring and alerts
	Unified experience	Audit and logs	Full-stack patch & upgrade
		Signing and policies	Zero downtime upgrades
			Vulnerability scanning

Smarter Software Updates

No downtime for well behaving apps

Applications with multiple replicas, using liveness probes, health checks and taints/tolerations

Node Pools with more than one worker and slack resources

Maintenance window for entire cluster

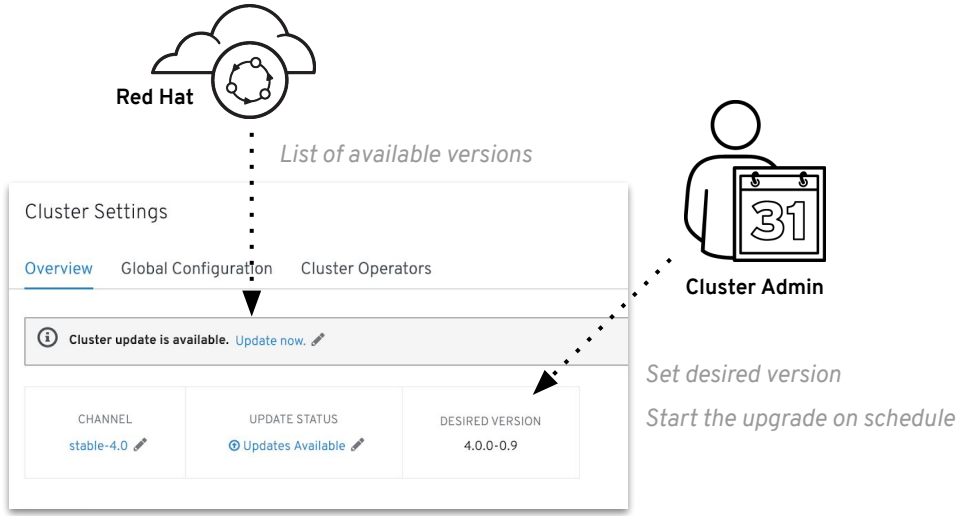
No need for separate windows for each component

Upgrade runs completely on the cluster

No more long running processes on a workstation

Constant health checking from each Operator

Operators are constantly looking for incompatibilities and issues that might arise



Rolling Machine Updates

Single-click updates

- RHEL CoreOS version & config
- Kubernetes core components
- OpenShift cluster components

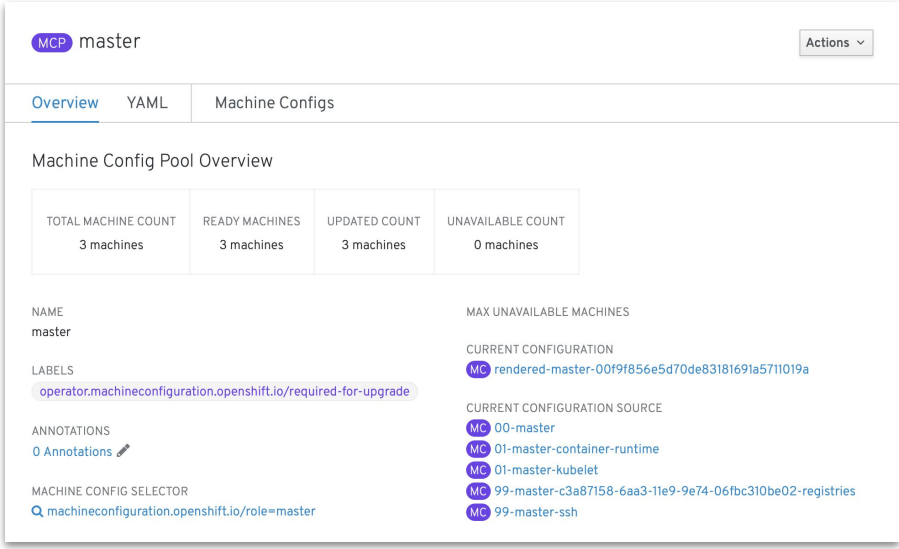
Configure how many machines can be unavailable

Set the “maxUnavailable” setting in the MachineConfigPool to maintain high availability while rolling out updates.

The default is 1.

Machine Config Operator (MCO) controls updates

This is a DaemonSet that runs on all Nodes in the cluster. When you upgrade with `oc adm upgrade`, the MCO executes these changes.



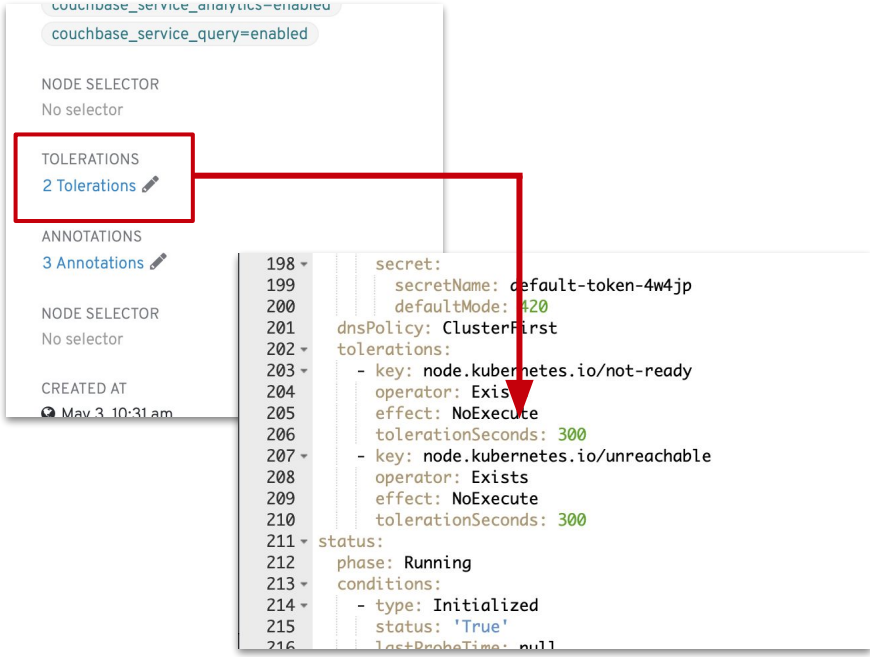
Pod Eviction Behavior

Eviction has been moved from Node Conditions to Taints

A new `DefaultTolerationSeconds` mutating admission plugin will add a 5 min eviction timeout unless specifically set by the Pod. This gives users more control vs the previous cluster-wide setting.

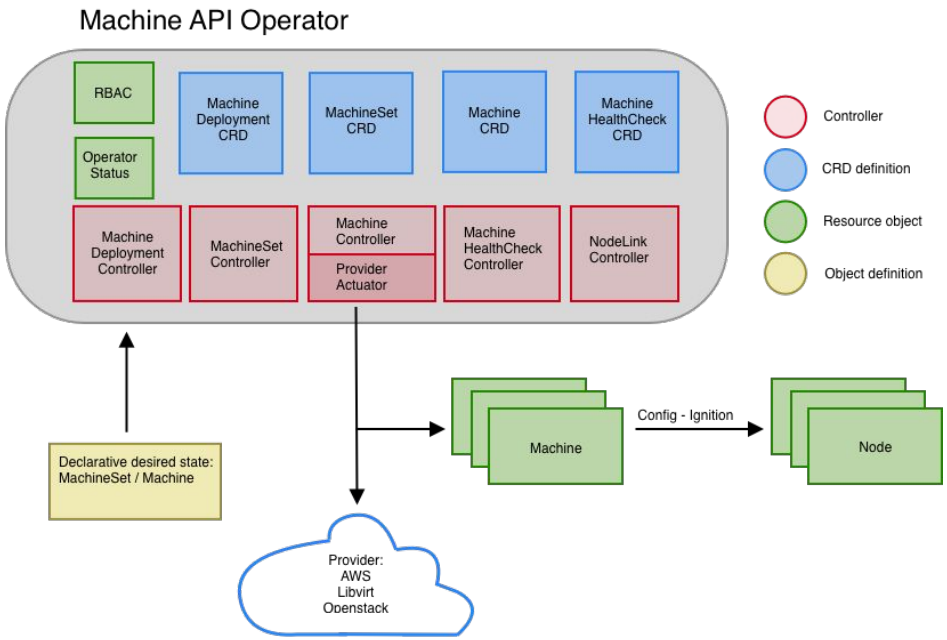
Don't tolerate the node.kubernetes.io/unreachable taint

This taint is used by the cluster to evict and reschedule Nodes. If your Pod tolerates this, it will not be rescheduled on Node failure.



Cloud API

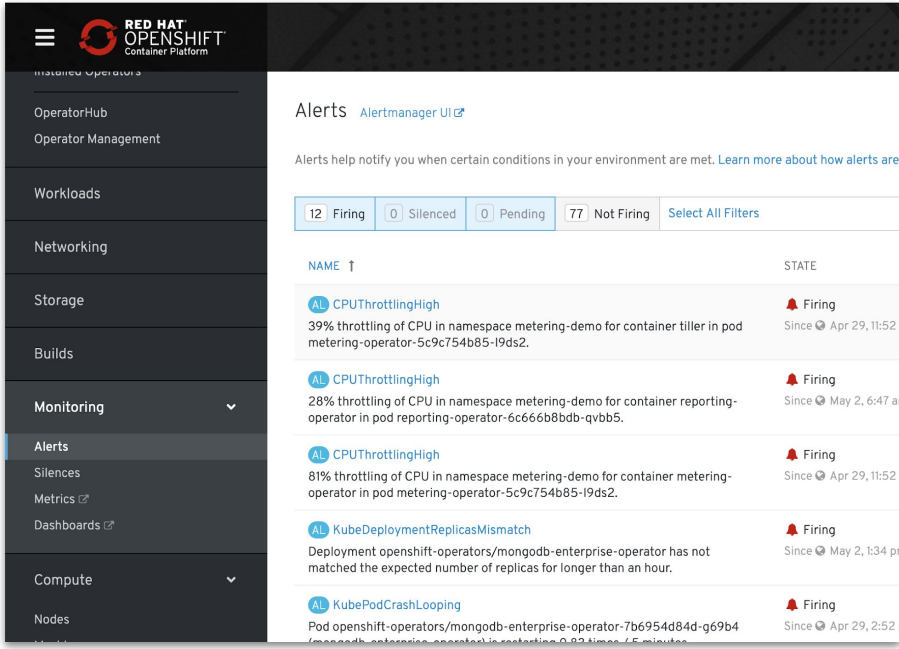
- Provide a single view and control across multiple cluster types
- *Machine API:*
  - Set up definitions via CRDs
  - Machine: a node
  - MachineSet: think ReplicaSet
  - Actuators roll definitions across clusters
  - Nodes are drained before deletion
- *Cluster Autoscaler:* provide/remove additional nodes on demand
- AWS (4.1), Azure/GCP (target 4.2), VMWare (Future)



Cluster Monitoring

Cluster monitoring is installed by default

- Exposes resource metrics for Horizontal Pod Autoscaling (HPA) by default
  - HPA based on custom metric is tech preview
- No manual etcd monitoring configuration anymore
- New screens for managing Alerts & Silences
- More metrics available for troubleshooting purposes (e.g. HAproxy)
- Configuration via ConfigMaps and Secrets



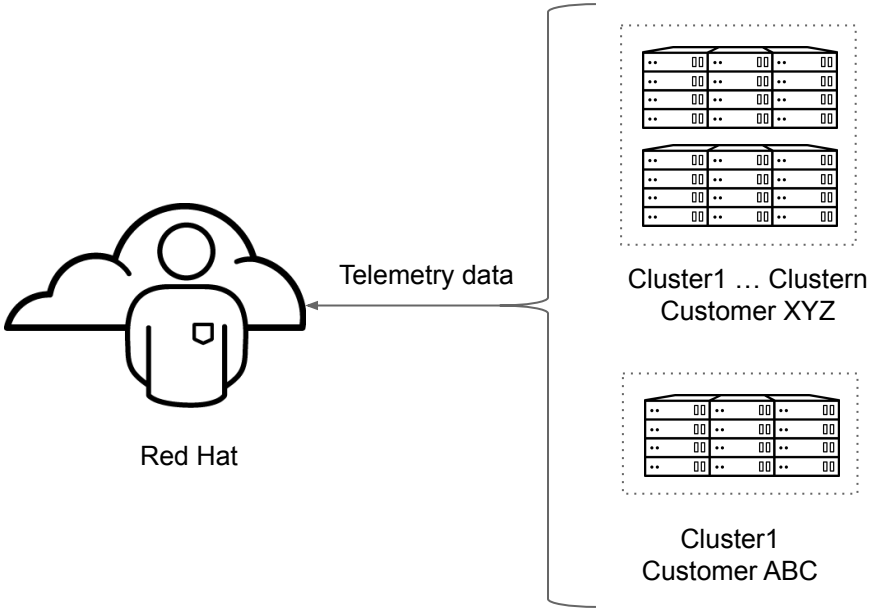
Telemetry

Collects anonymized data from any OpenShift 4 cluster deployment

- Red Hat gains quality assurance with anonymous data reporting faults encountered during upgrade
- Show utilization of all your clusters at cloud.redhat.com
- Perform subscription management at cloud.redhat.com

Opt-out is only available for self-managed OpenShift clusters but we strongly discourage that as you will lose all of the features described above.

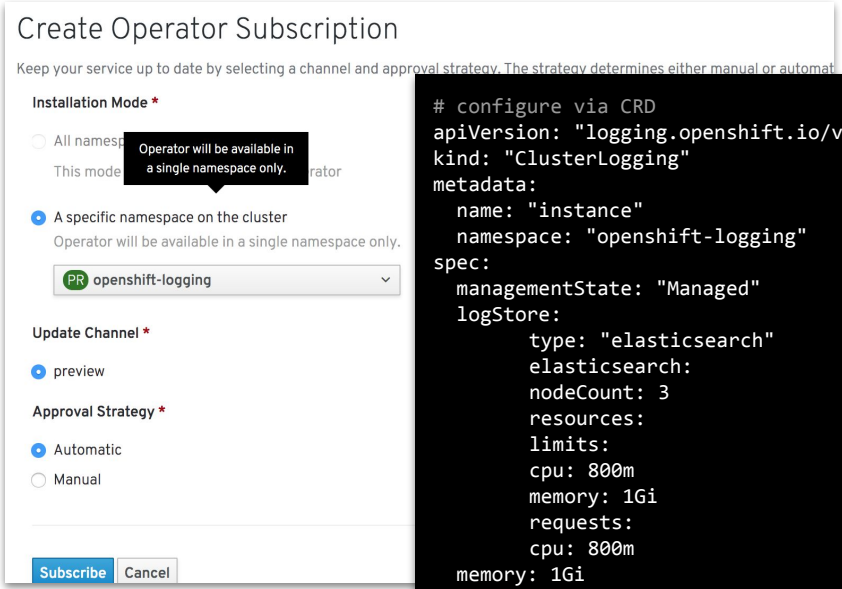
[Complete list of collected metrics]



Cluster Logging

Cluster Logging is lifecycle managed via Operator Lifecycle Management

- Install the Elasticsearch and Cluster Logging Operators from OperatorHub
- Create an instance of Cluster Logging. fluentd, Elasticsearch and Kibana (with Operators) are created
- Changing the out-of-box configuration:
  - CPU, memory requests and limits, PVC sizes etc can be changed by editing the Cluster Logging Operator YAML
- Direct Elasticsearch and Kibana Deployments to dedicated Nodes (recommended for production usage)

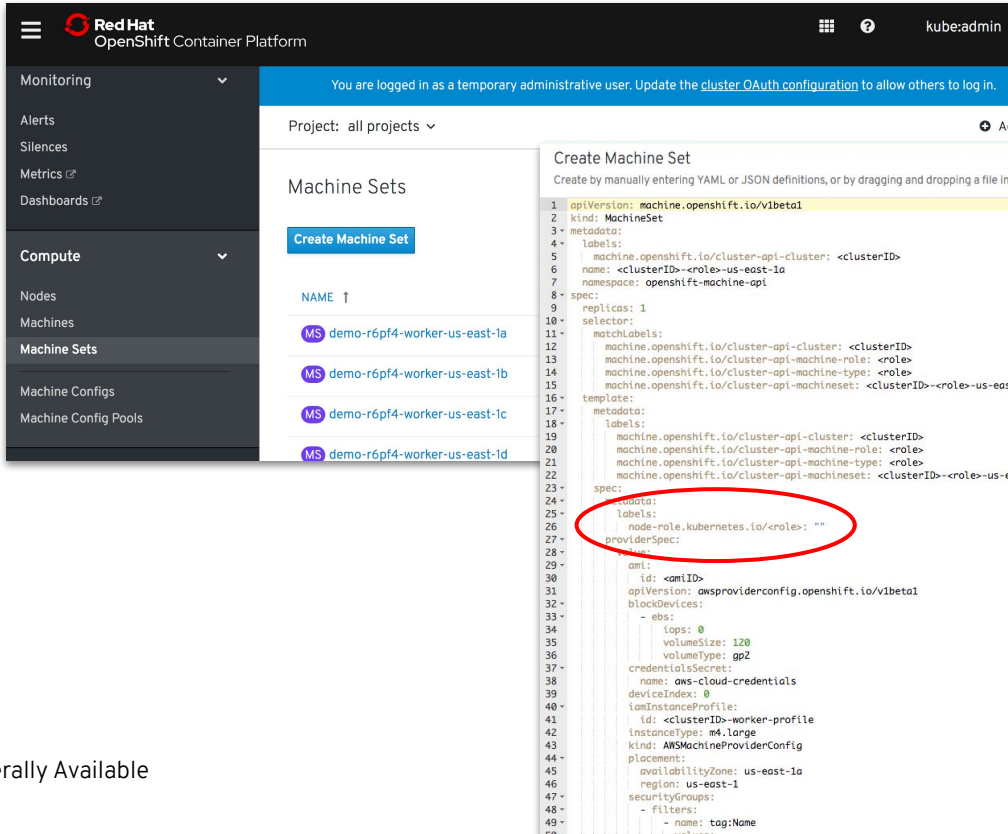



```
# configure via CRD
apiVersion: "logging.openshift.io/v1"
kind: "ClusterLogging"
metadata:
  name: "instance"
  namespace: "openshift-logging"
spec:
  managementState: "Managed"
  logStore:
        type: "elasticsearch"
        elasticsearch:
        nodeCount: 3
        resources:
        limits:
        cpu: 800m
        memory: 1Gi
        requests:
        cpu: 800m
  memory: 1Gi
  storage:
        storageClassName: gp2
        size: 100G
        redundancyPolicy: "SingleRedunda
  visualization:
        type: "kibana"
        kibana:
        replicas: 1
```

Infrastructure MachineSets

MachineSets that are purpose built for Infrastructure Services

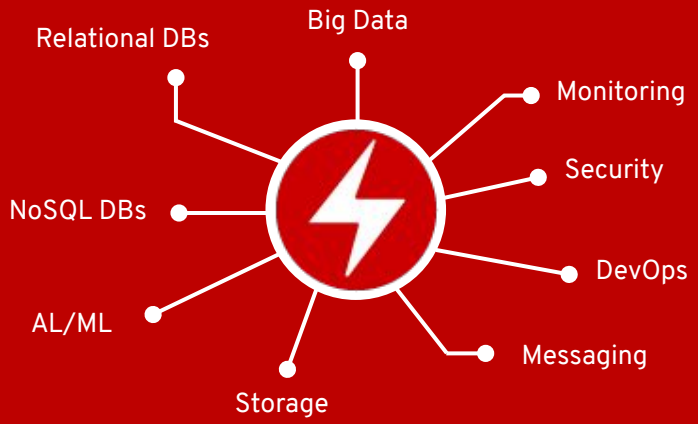
- Elasticsearch, Prometheus, Router, Registry
- Out-of-box installer does not create a MachineSets dedicated for Infra services
- Create a MachineSet via console or cli and label them with desired roles
- Redeploy Infra Services with nodeSelector set to the designated role



[Documentation: Creating Infrastructure MachineSets]

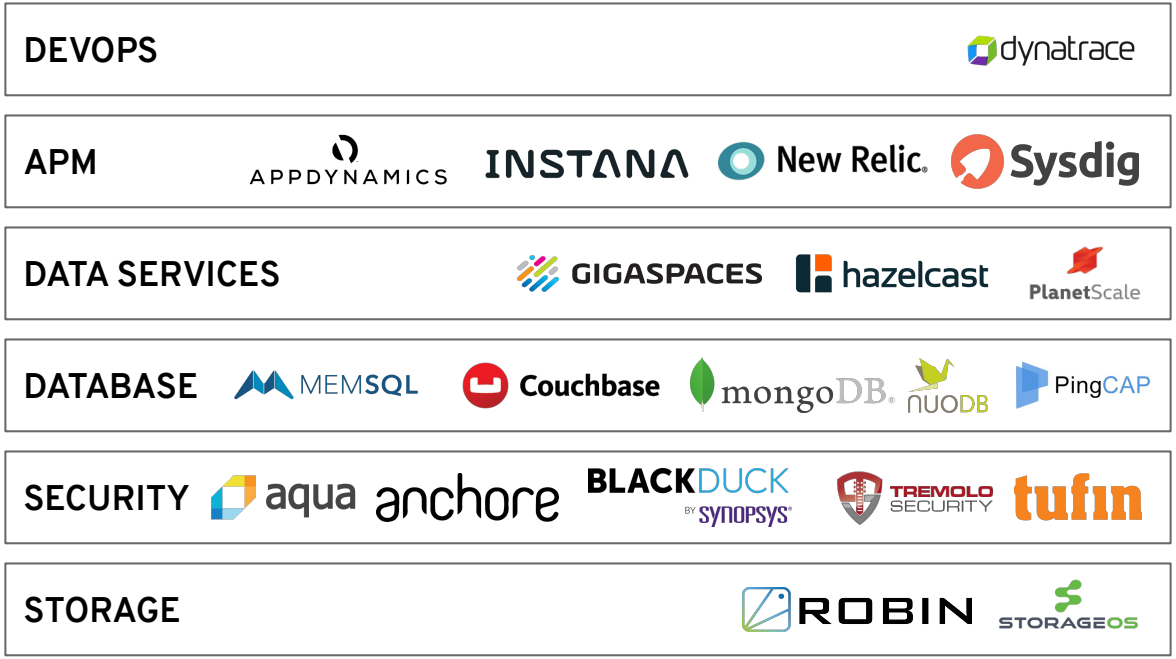
A broad ecosystem of workloads

Operator-backed services allow for a
SaaS experience on your own infrastructure



Red Hat

Red Hat Certified Operators



OperatorHub data sources

Requires an online cluster

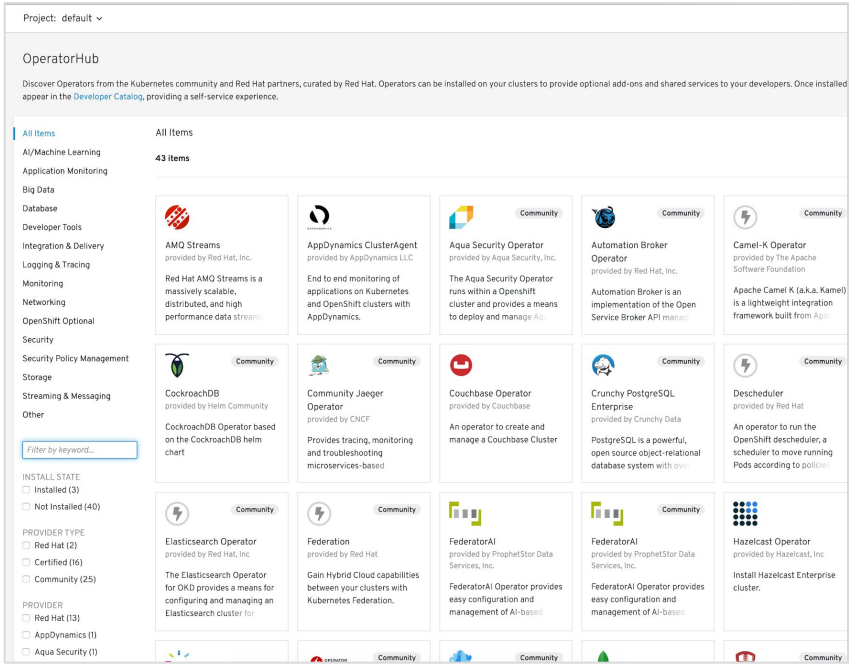
- For 4.1, the cluster must have connectivity to the internet
- Later 4.x releases will add offline capabilities

Operator Metadata

- Stored in quay.io
- Fetches channels and available versions for each Operator

Container Images

- Red Hat products and certified partners come from RHCC
- Community content comes from a variety of registries



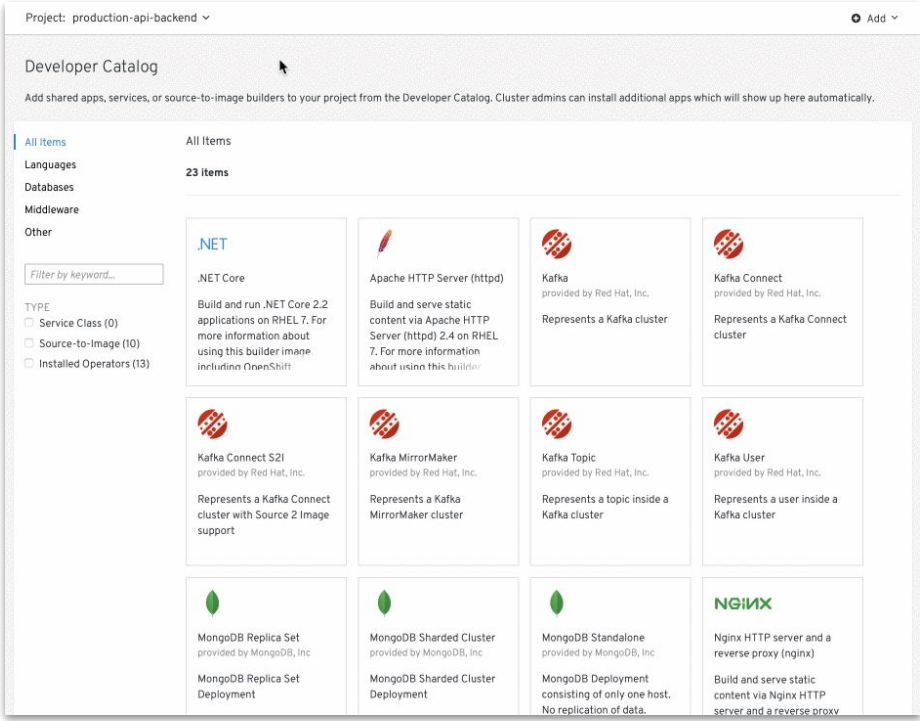
Services ready for your developers

New Developer Catalog aggregates apps

- Blended view of Operators, Templates and Broker backed services
- Operators can expose multiple CRDs. Example:
  - MongoDBReplicaSet
  - MongoDBSharded Cluster
  - MongoDBStandalone
- Developers can't see any of the admin screens

Self-service is key for productivity

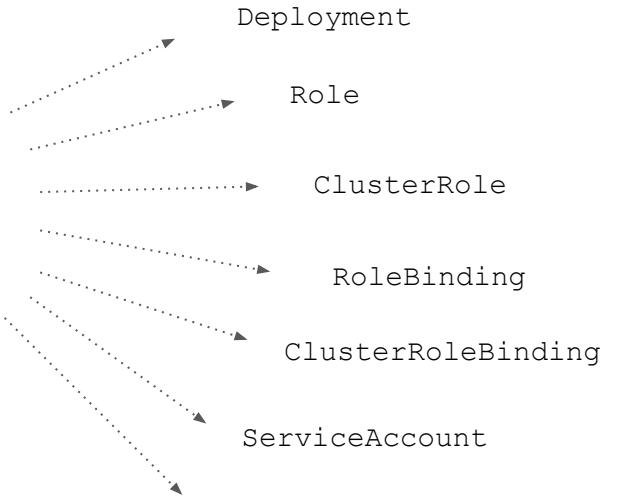
- Developers with access can change settings and test out new services at any time



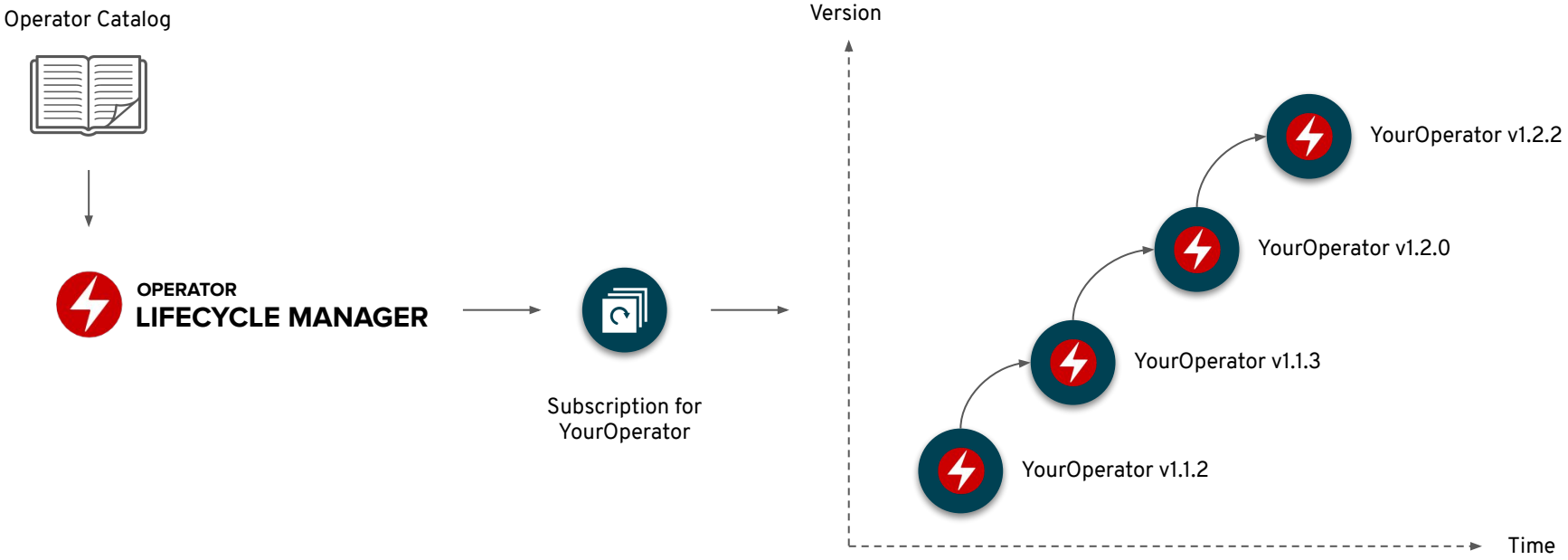
Operators as a First-Class Citizen

YourOperator v1.1.2
Bundle

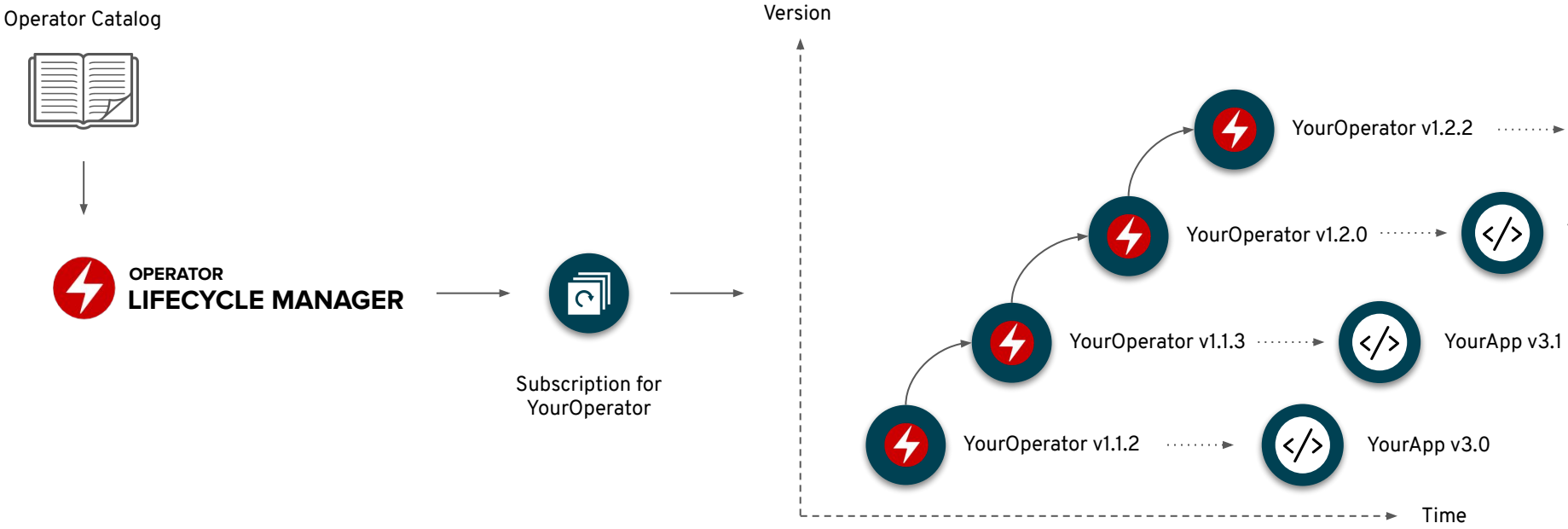
Operator Deployment
Custom Resource
Definitions
RBAC
API Dependencies
Update Path
Metadata



Operator Lifecycle Management



Operator Lifecycle Management



Product Manager: Daniel Messer

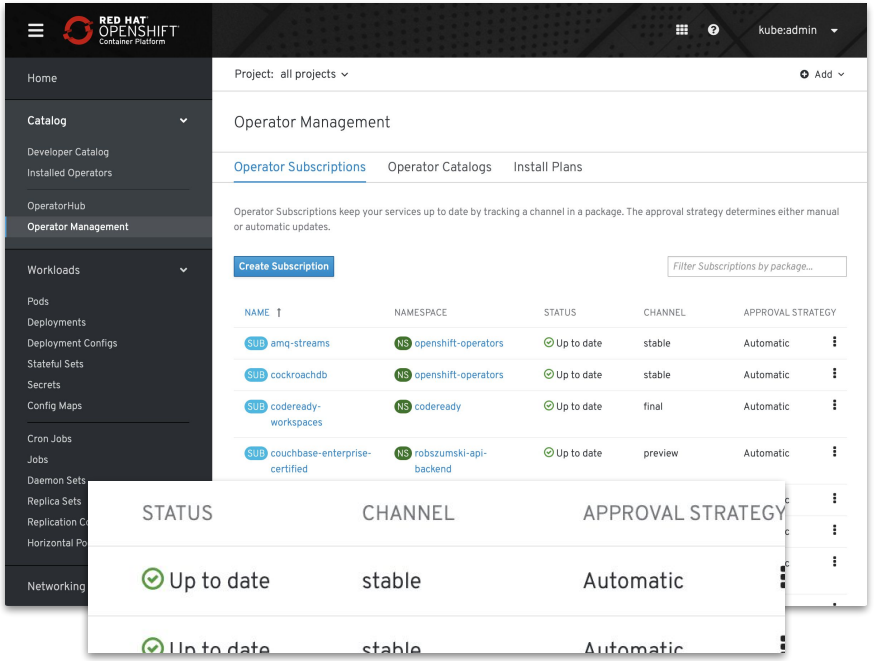
Generally Available

Red Hat

Operator Upgrade in Detail

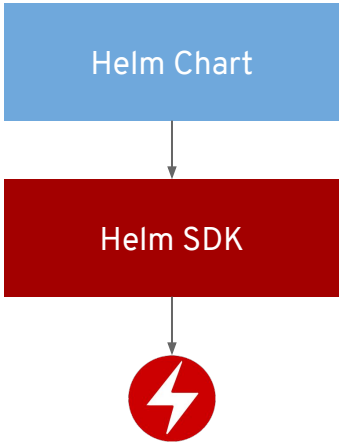
OperatorHub facilitates upgrades of installed Operators

- Manual or automatic modes can be chosen per Operator
- The Operator itself is upgraded by OLM via Deployment and a regular rolling upgrade
- The objects managed by the Operator use built in mechanisms to maintain HA
  - Deployments/StatefulSets
  - affinity/anti-affinity
  - taints/tolerations
  - PodDisruptionBudgets
- Behavior is dependent on the maturity of the Operator
- Optional cluster components like Cluster Logging are well behaved during upgrades

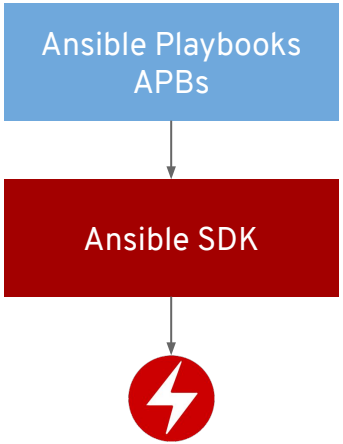


OPERATOR SDK

Build Operators for your apps



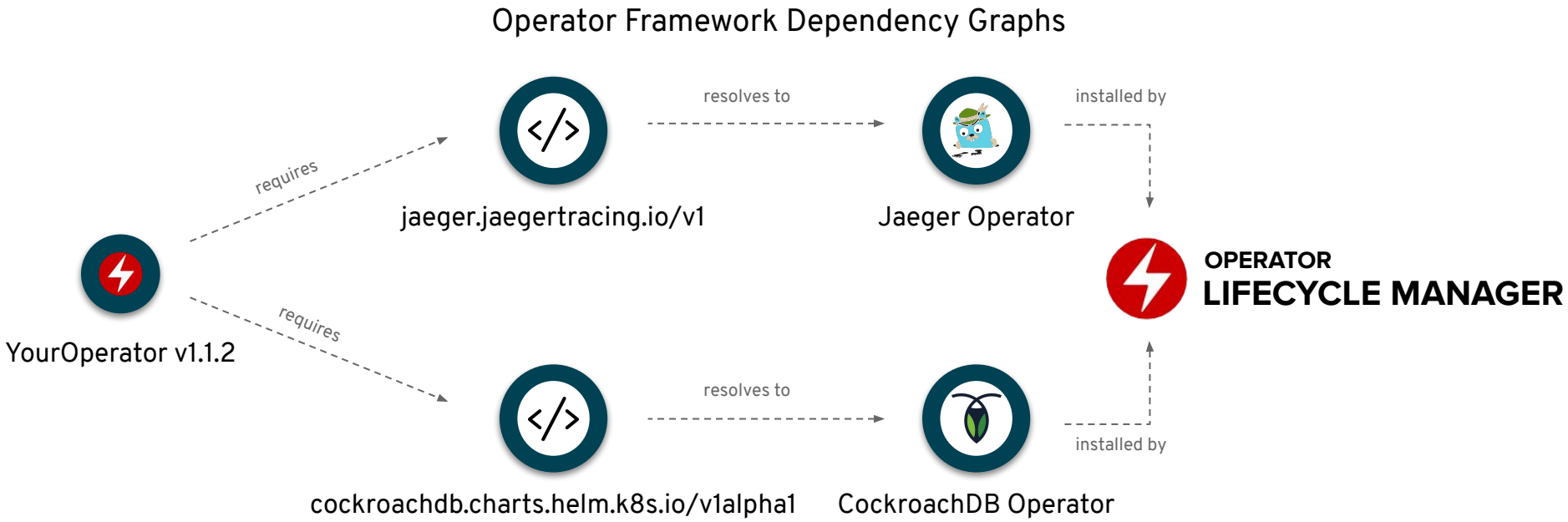
Build operators from Helm chart, without any coding



Build operators from Ansible playbooks and APBs

Build advanced operators for full lifecycle management

Depend on other Operators



Red Hat Middleware

Same experience as 3.x for developers

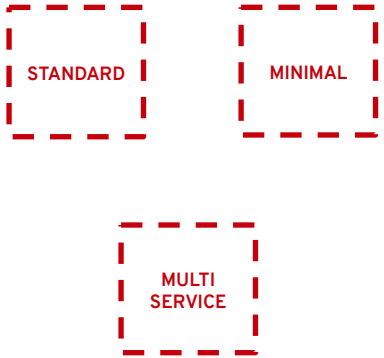
- Admins install Service Brokers via OperatorHub
- Devs consume via Developer Catalog

Transitioning to Operators

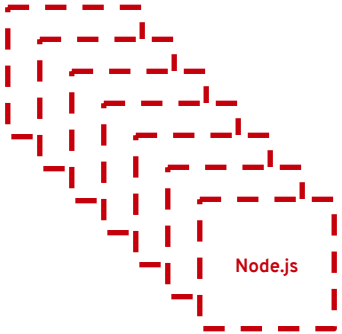
- First Operators are out
  - AMQ Streams (Kafka)
  - Fuse Online
  - CodeReady Workspaces
  - Business Automation (Tech Preview)
  - Data Grid
- More to follow in 2019
  - Red Hat Integration - July:
    - AMQ Interconnect, AMQ Broker
    - 3scale API Management
    - Apicurio API Designer
  - Business Automation - July (GA)
  - Red Hat Application Runtimes
    - MW Component Operator - July

Red Hat Universal Base Image

Enable an ecosystem of freely distributable operators for Kubernetes/OpenShift



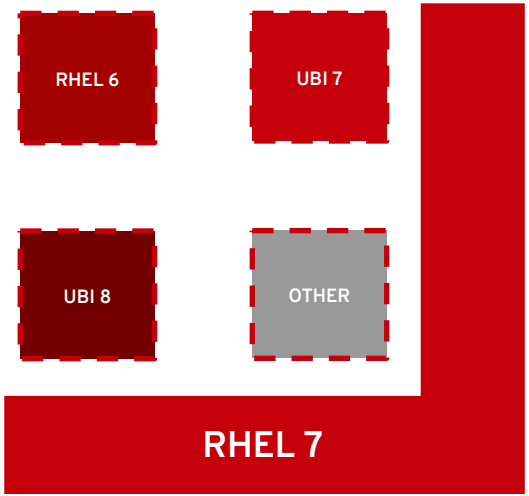
Base Images



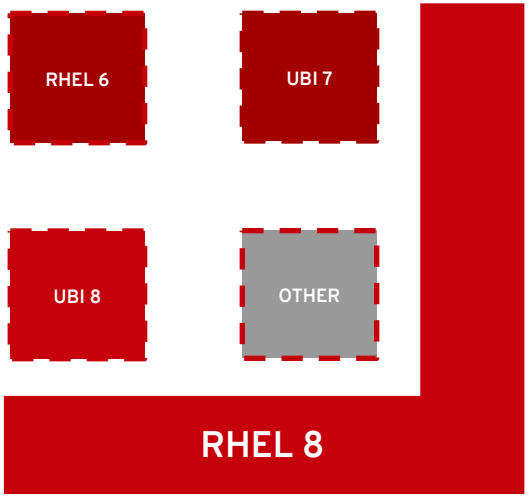
Pre-Built Language Images

Package Subset

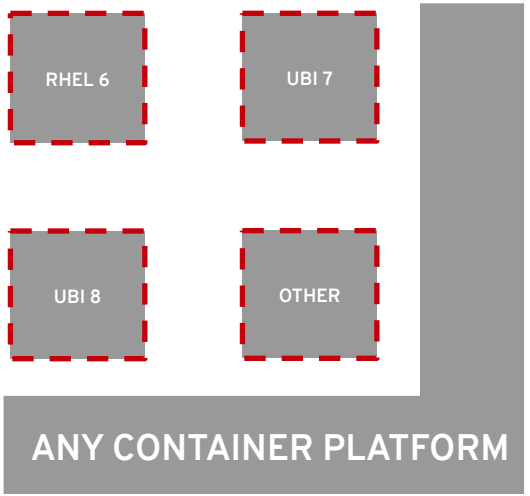
UBI and Host interactions



Red Hat Enterprise Linux 7



Red Hat Enterprise Linux 8



Like any community distro

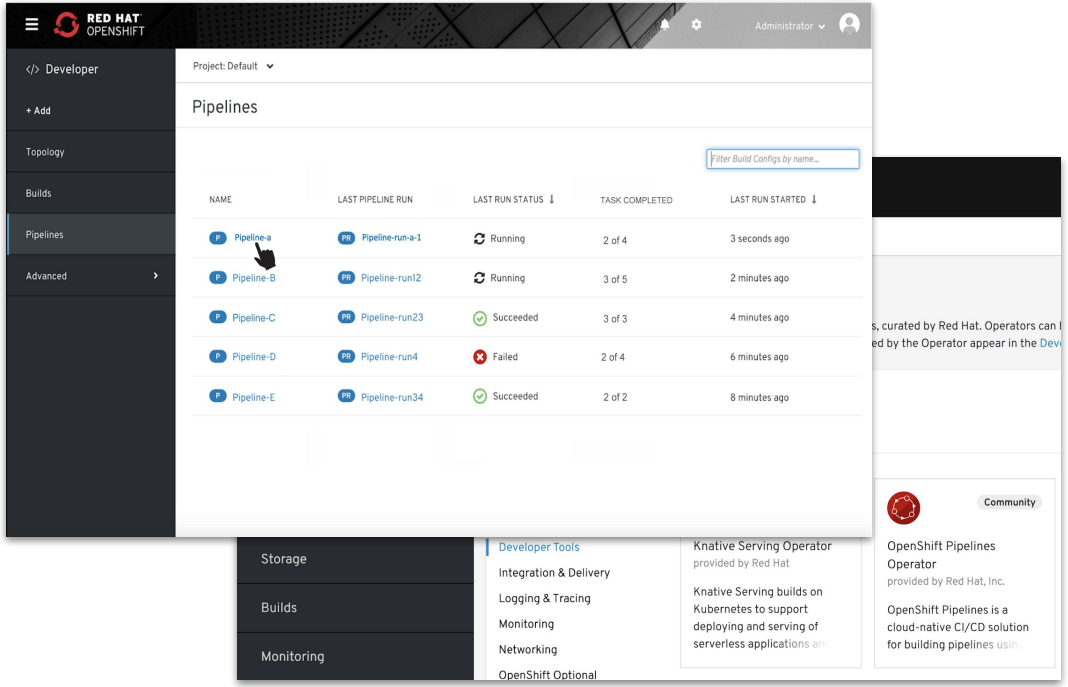
Next wave of developer tools

OpenShift has all of the latest tools to make your devs more productive

Code	**Containers**
Serverless	**Service Mesh**

Cloud-native CI/CD with OpenShift Pipelines

- Based on Tekton Pipelines
- Runs serverless (no babysitting!)
- Containers as building blocks
- Deploy to multiple platforms
- Standard CRDs
- Pipelines portable to any Kubernetes
- Available in OperatorHub



Dev Preview on OCP 4.1 (June)

Product Manager: Siamak Sadeghianfar

Red Hat

Cloud-native CI/CD with OpenShift Pipelines

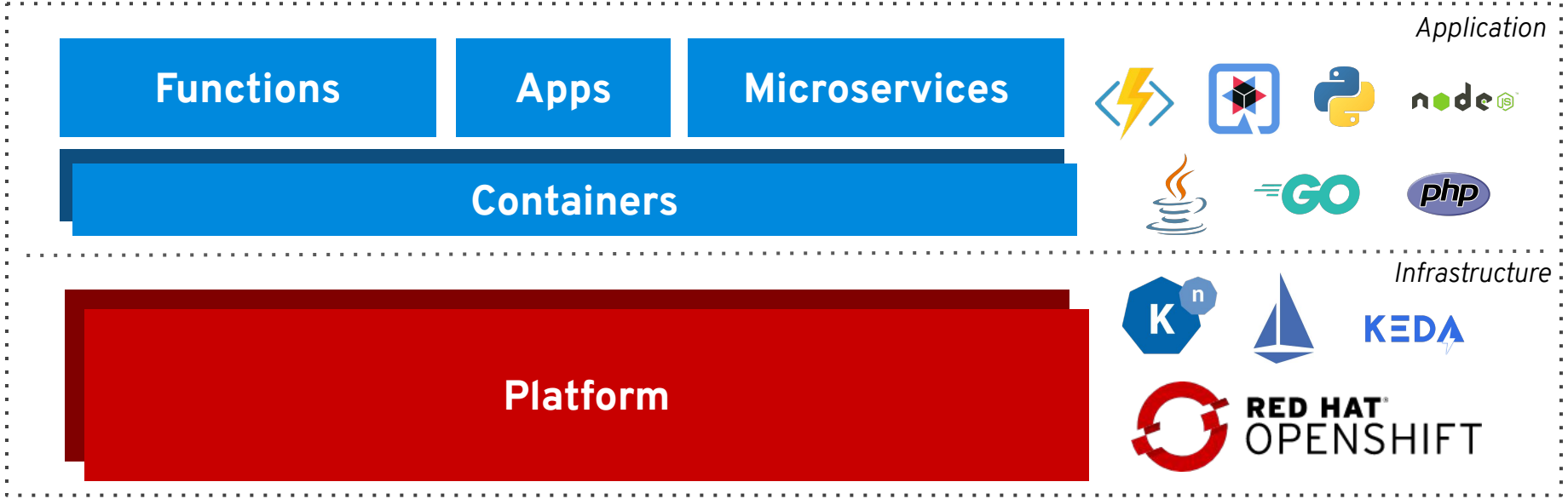
```yaml
apiVersion: tekton.dev/v1alpha1
kind: Pipeline
metadata:
 name: funky-deploy-pipeline
spec:
 resources:
 ... # git, images, etc
 tasks:
 - name: build-app
   taskRef:
     name: mvn-build
   ...
 - name: build-image
   taskRef:
     name: s2i-java
   ...
 - name: deploy
   taskRef:
     name: openshift-cli
   ...
```

Inputs (e.g. git repo) to and outputs (e.g. images) from the pipeline

Provided task library:
`s2i, buildah, oc, jib, kaniko, etc`

User can create custom ones

OpenShift Serverless



OpenShift Serverless

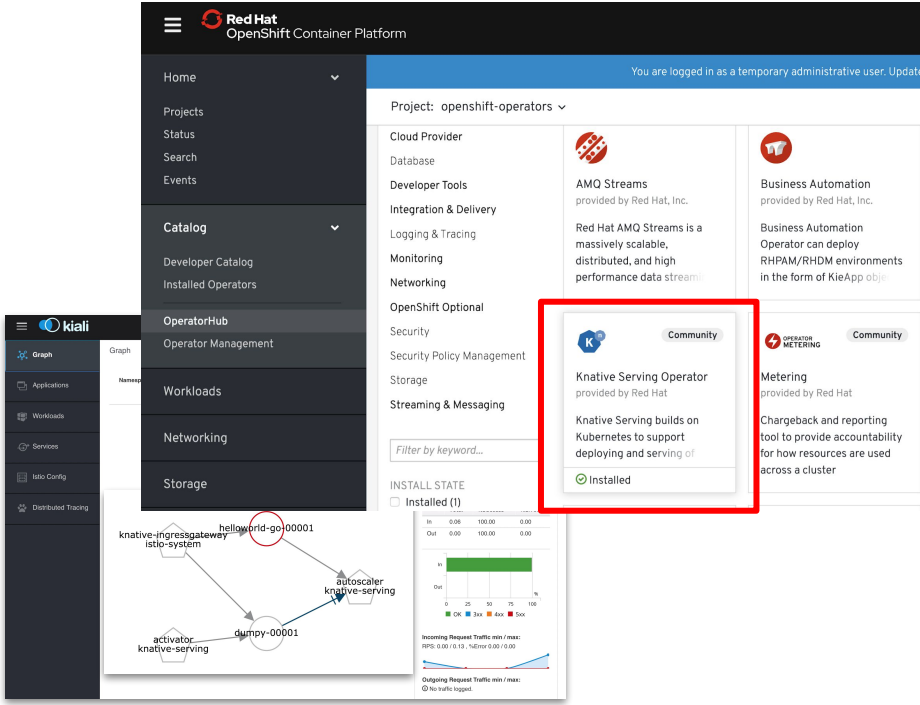
Key Features

- Familiar to Kubernetes users. Native.
- Scale to 0 and autoscale to N based on demand
- Applications and functions. Any container workload.
- Powerful eventing model with multiple event sources.
- Operator available via OperatorHub
- Knative v0.6 (v1beta1 APIs)
- No vendor lock in

Learn more

https://openshift.com/learn/topics/knative

http://bit.ly/knative-tutorial



"Lift & Shift" to Serverless

Kubernetes

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
 name: frontend
 labels:
   app: guestbook
spec:
 selector:
   matchLabels:
     app: guestbook
     tier: frontend
 replicas: 1
 template:
   metadata:
     labels:
       app: guestbook
       tier: frontend
   spec:
     containers:
     - image: markusthoemmes/guest
       name: guestbook
       resources:
         requests:
           cpu: 100m
           memory: 100Mi
       env:
       - name: GET_HOSTS_FROM
         value: dns
       ports:
       - containerPort: 80
```

```yaml
---
apiVersion: v1
kind: Service
metadata:
 name: frontend-service
 labels:
   app: guestbook
   tier: frontend
spec:
 ports:
 - port: 80
 selector:
   app: guestbook
   tier: frontend
---
apiVersion: route.openshift.io/v1
kind: Route
metadata:
 name: frontend-route
spec:
 to:
   kind: Service
   name: frontend-service
```

53 lines

Knative

```yaml
apiVersion: serving.knative.dev/v1alpha1
kind: Service
metadata:
 name: frontend
spec:
 template:
   metadata:
     labels:
       app: guestbook
       tier: frontend
   spec:
     containers:
     - image: markusthoemmes/guestbook
       resources:
         requests:
           cpu: 100m
           memory: 100Mi
       env:
       - name: GET_HOSTS_FROM
         value: dns
       ports:
       - containerPort: 80
```

22 lines

OpenShift Serverless + Azure Functions

Key Features

- Enable FaaS in OpenShift
- Familiar developer experience using VS Code and Azure CLI
- Polling based auto-scaling for Azure Queues, Kafka...
- Reuse Knative event sources, HTTP auto-scaling
- On premise or Any cloud.

Learn more

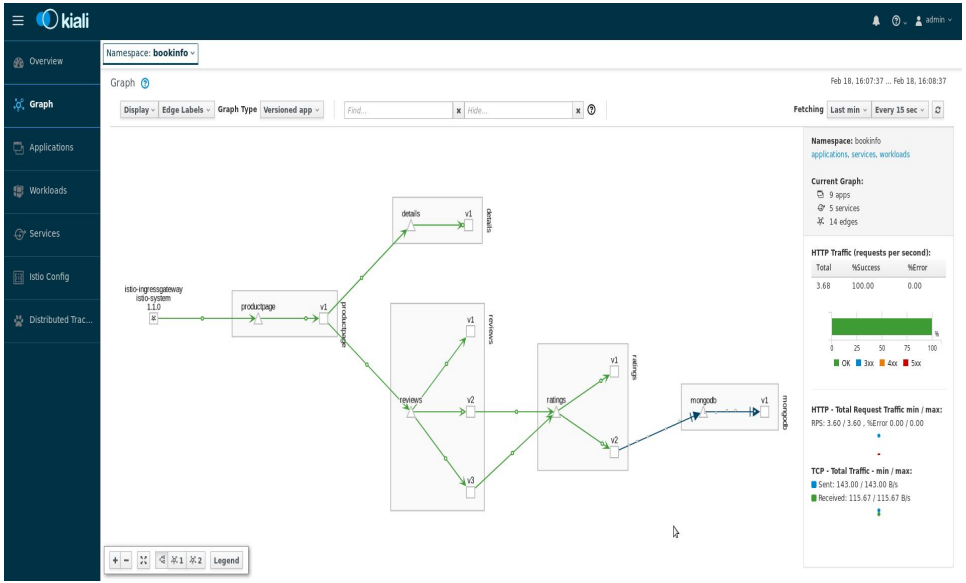
https://github.com/kedacore/keda

In partnership with

Red Hat Service Mesh

Key Features

- A dedicated network for service to service communications
- Observability and distributed tracing
- Policy-driven security
- Routing rules & chaos engineering
- Powerful visualization & monitoring
- Will be available via OperatorHub

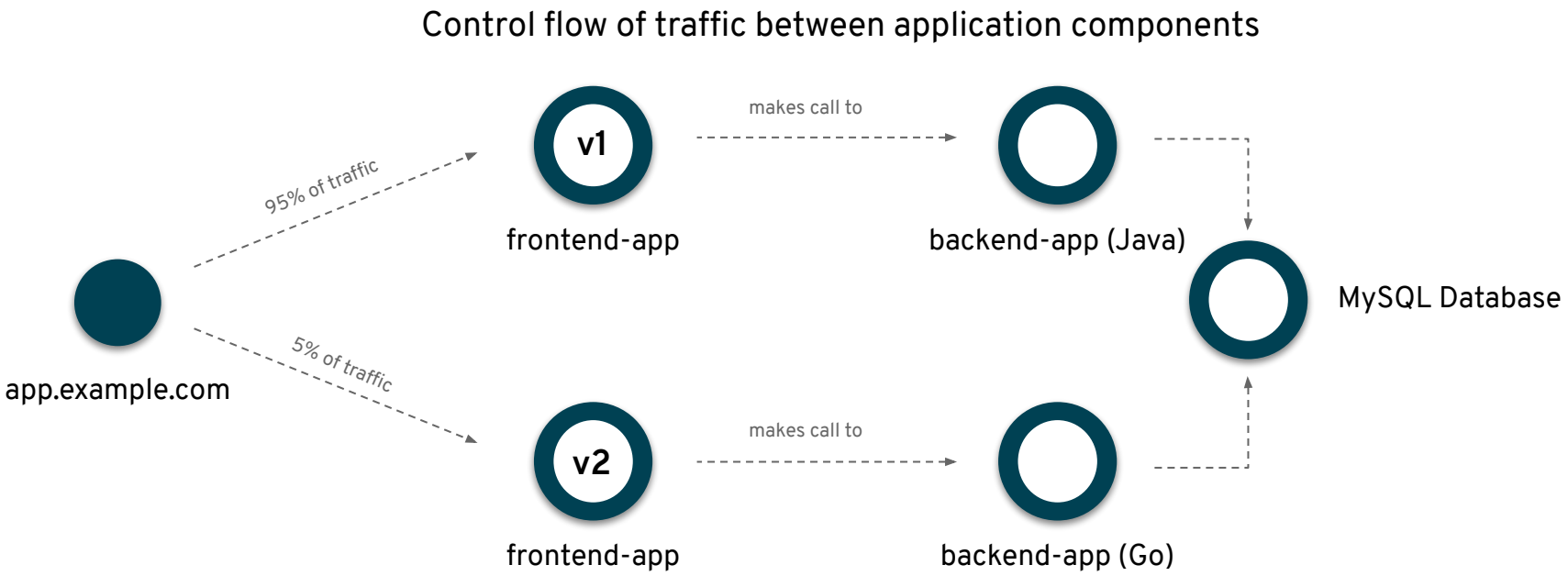


Product Manager: Brian 'redbeard' Harrington

Generally Available in July

Red Hat

Control Traffic Flow



Red Hat Service Mesh

Jaeger

Secure

Istio

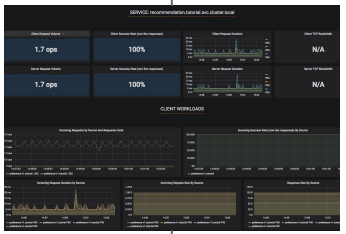
Observe

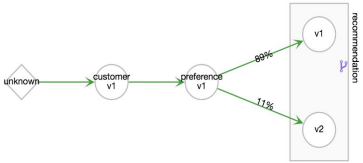
Connect

Control

Observe

Prometheus





kiali

Kiali

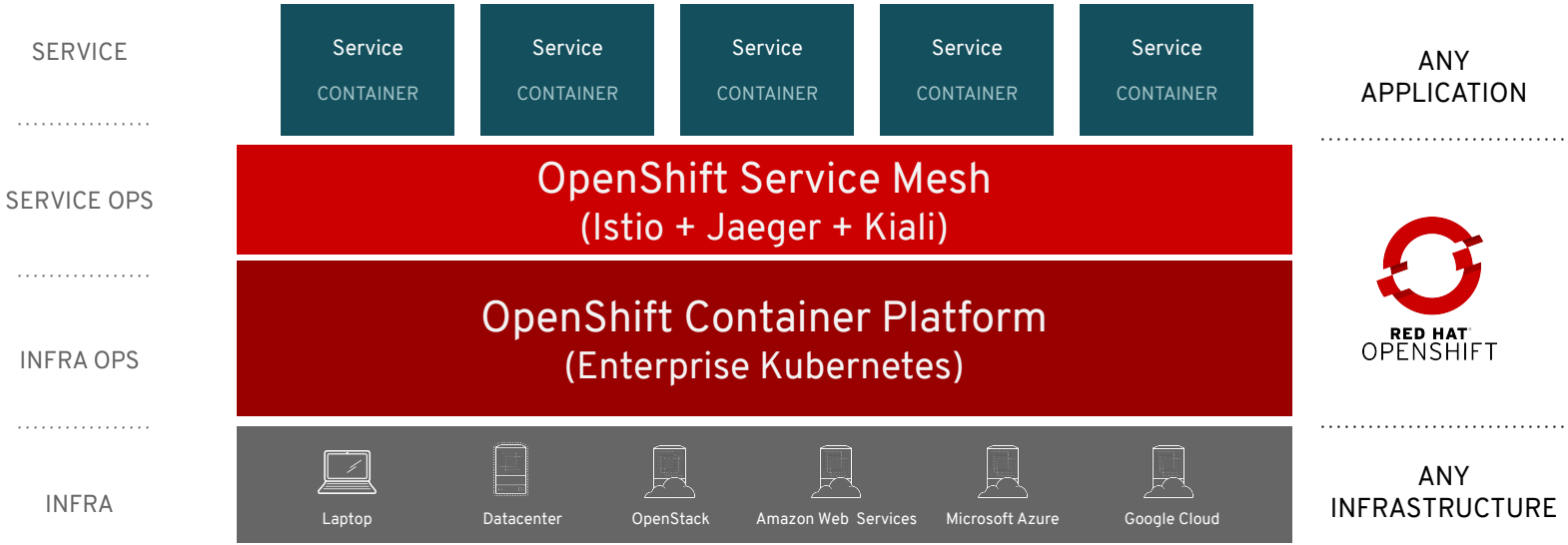
Grafana

Product Manager: Brian ‘redbeard’ Harrington

Generally Available in July

Red Hat

Red Hat Service Mesh



Product Manager: Brian 'redbeard' Harrington

Generally Available in July

Red Hat

CodeReady Workspaces

The collaborative OpenShift-Native IDE. Free for any customer of OpenShift Dedicated or OpenShift Container Platform.

Container Workspaces

Workspace replicas to end "works on my machine" and enable team collaboration.

DevOps Integrations

Reference developer workspaces from any issue, failed build, or git notification.

Protect Source Code

Full access to source code without any of it landing on hard-to-secure laptops.

Based on the open Eclipse Che project	Red Hat Linux and Application Infrastructure	Plugin model for extensibility	Serverless support (coming later)

Use It To: Replace VDI for devs, and enable true container-based DevOps.

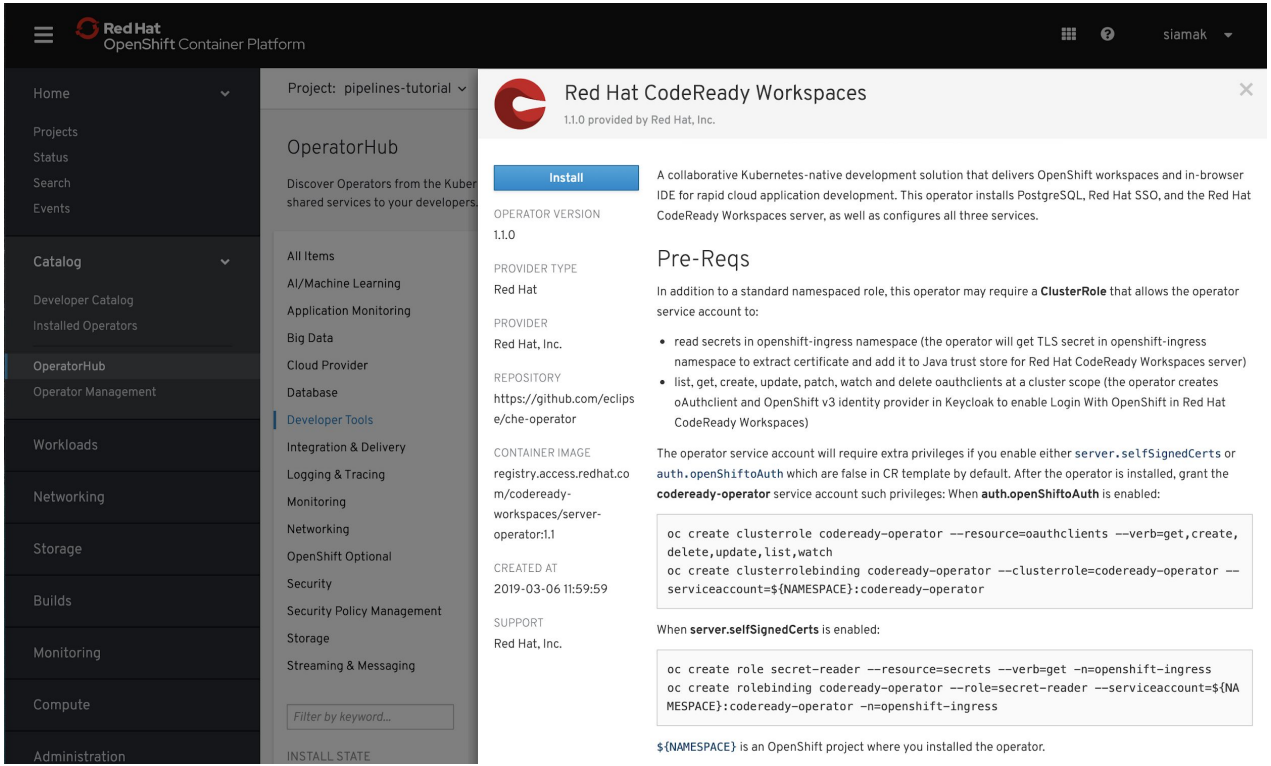
CodeReady Workspaces

Collaborative web IDE

Supported Eclipse Che

Available in OperatorHub

Included in OCP/OSD SKU



Red Hat

Visual Studio Code Extensions

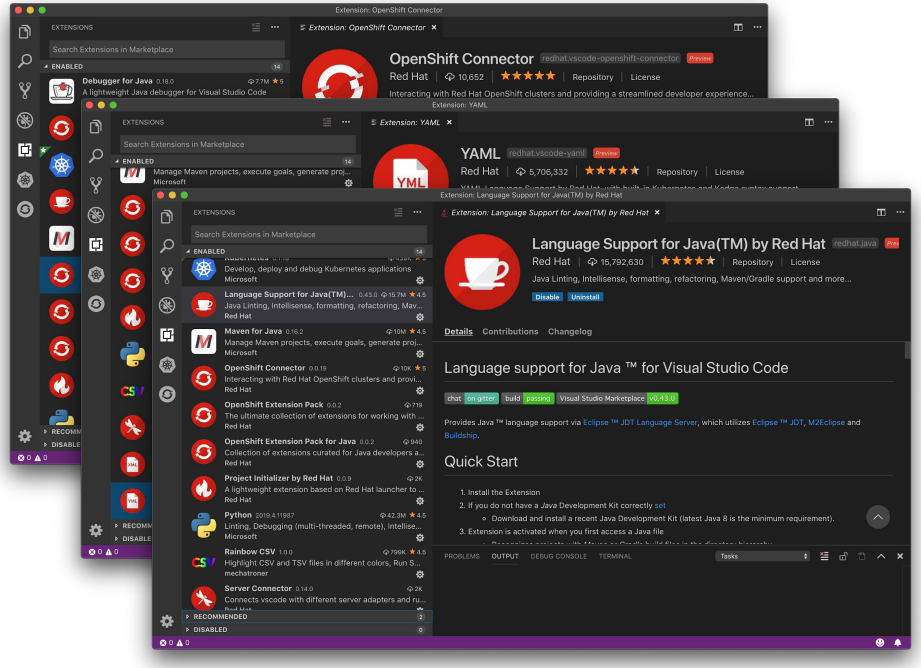
Extremely popular plugins

Our first extension, Language Support for Java™ by Red Hat, was published in Sept., 2016 as an experiment.

Over 50 releases later, it's been downloaded nearly 16 million times by over 2.5 Million developers!

More coming soon

We've been adding more extensions to help developers using VS Code have a fantastic experience when coding in Java, XML, Yaml, etc., or when working with OpenShift or other technologies where Red Hat is the expert.



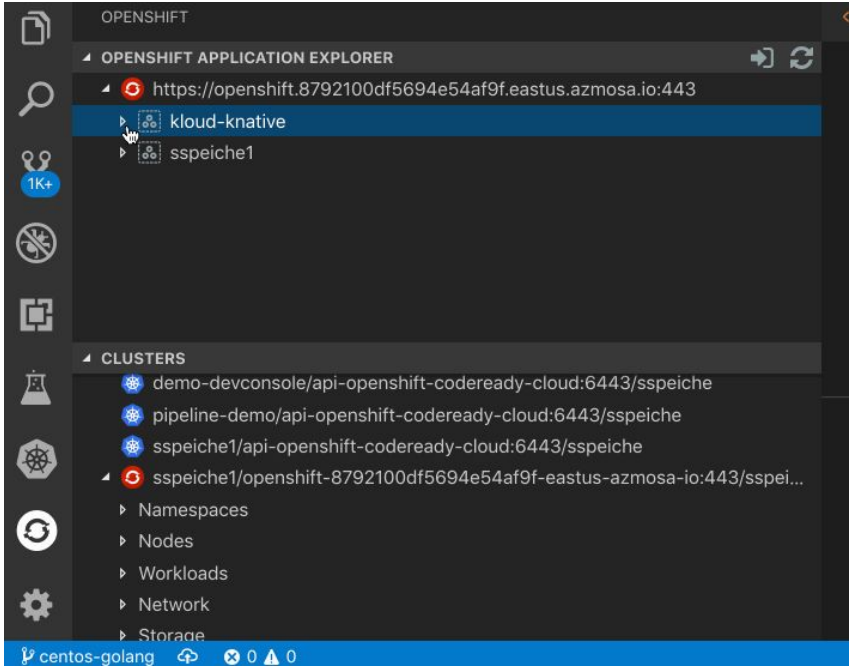
VS Code Kubernetes Extension

Kubernetes Extension Improvements

- Collaboration spearheaded by Red Hat and OpenShift needs
- Many improvements around:
  - Non-cluster-admin use cases
  - Auto-hide Helm features when no Tiller installed
  - Add nodes to navigator

OpenShift Improvements

- OpenShift logo on OpenShift clusters
- Add: Routes, DeploymentConfig, Projects, ImageStreams
- Ability to set Project context



A developer-focused command-line tool for rapid development iterations on OpenShift

```
$odo create
```

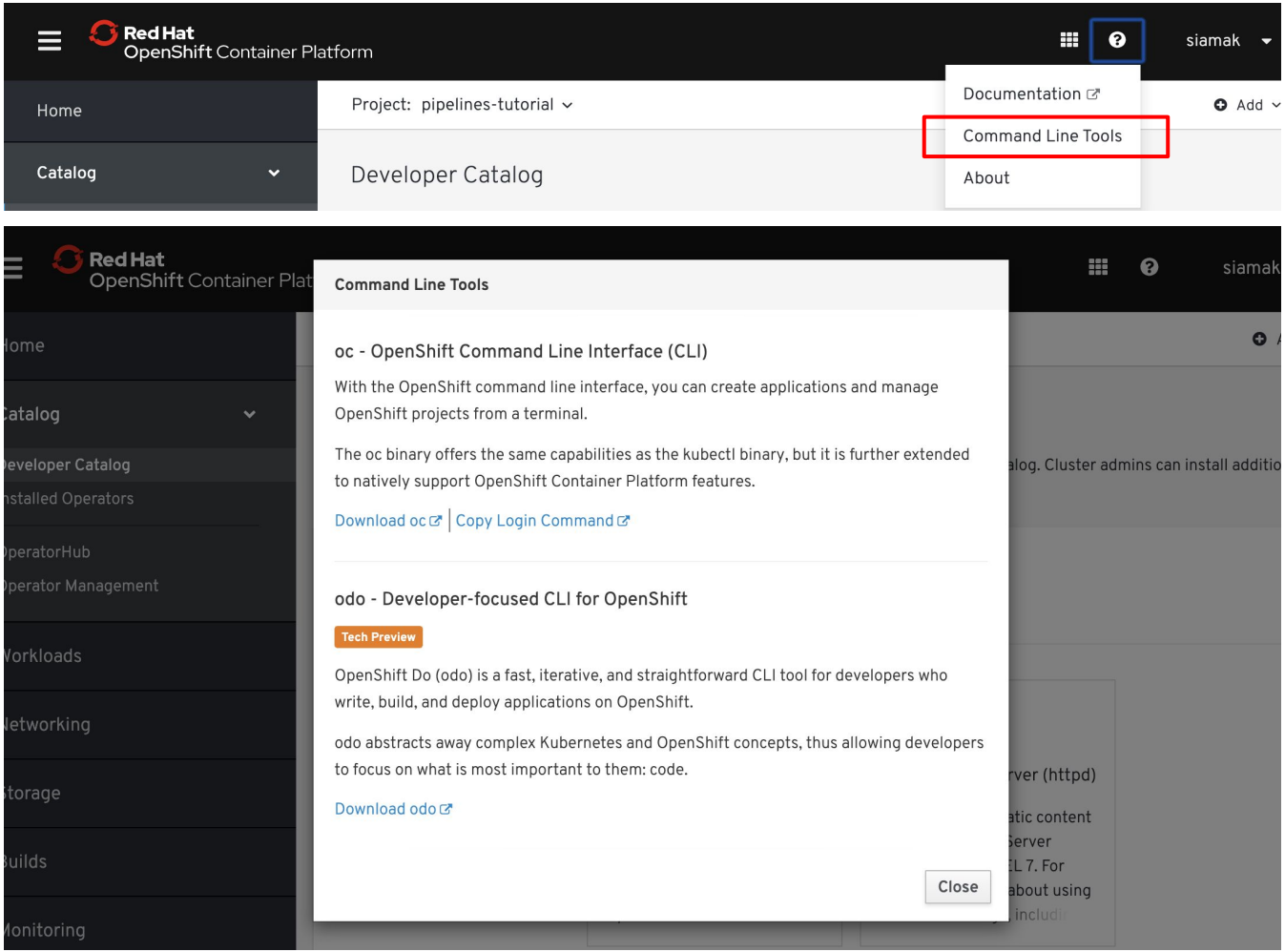
Create app from supported runtimes

```
$odo push
```

Build and deploy app from current directory

```
$odo watch
```

Sync local changes to running pods on OpenShift

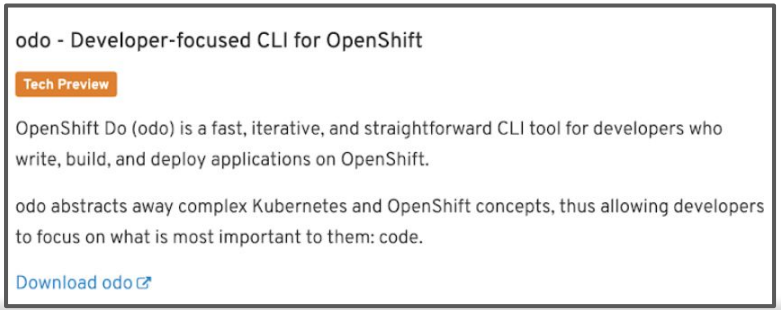

Red Hat
OpenShift Container Platform
siamak
Home
Catalog
Project: pipelines-tutorial
Add
Developer Catalog
Documentation
Command Line Tools
About
Command Line Tools
oc - OpenShift Command Line Interface (CLI)
With the OpenShift command line interface, you can create applications and manage OpenShift projects from a terminal.
The oc binary offers the same capabilities as the kubectl binary, but it is further extended to natively support OpenShift Container Platform features.
Download oc
Copy Login Command
odo - Developer-focused CLI for OpenShift
Tech Preview
OpenShift Do (odo) is a fast, iterative, and straightforward CLI tool for developers who write, build, and deploy applications on OpenShift.
odo abstracts away complex Kubernetes and OpenShift concepts, thus allowing developers to focus on what is most important to them: code.
Download odo
Close

odo: OpenShift's Dev-focused CLI

A developer-focused command-line tool for rapid development iterations on OpenShift.

Available for download from Web Console

```
$ odo create php frontend
Component 'frontend' was created.
To push source code to the component run 'odo push'

$ odo push
Pushing changes to component: frontend

$ odo url create
frontend - http://frontend-myapp.192.168.99.100.nip.io

$ odo watch
Waiting for something to change in /dev/frontend
```



Use It To: Enable the 'git push' flow developers love, but with OpenShift Kubernetes.

CodeReady Containers

Provides a pre-built development environment based on **Red Hat Enterprise Linux** and **OpenShift** for quick container-based application development. Use with OpenShift on-premises or cloud.

Internal Alpha Details

- Linux (KVM) provides a single machine (node) instance
- Commands: setup, start, stop, delete
- Internal-only until pull secret is externalized / configured
- PoCs exist for Windows and MacOS (VirtualBox)

Internal Alpha email

Use It To: Simplify direct-to-OpenShift 4 development on laptops.

Hosted OpenShift

Get the best of OpenShift without being on call

Hosted OpenShift Benefits

OPENSHIFT CONTAINER PLATFORM

HOSTED OPENSHIFT

	Full Stack Automated	Pre-existing Infrastructure	Azure Red Hat OpenShift	OpenShift Dedicated
Skip the on-call rotation			Deploy directly from the Azure console.	Powerful cluster, no maintenance needed
Red Hat engineers keep you up to date			Jointly managed by Red Hat and Azure engineers.	Managed by Red Hat engineers and support
Expand capacity without hassle			Free your team from the distraction of ops	Free your team from the distraction of ops

Azure Red Hat OpenShift

Jointly engineered, operated, and supported by both Microsoft and Red Hat with an integrated support experience

Experience OpenShift as a native Microsoft Azure service.

- Create fully managed OpenShift clusters in minutes using `az openshift create`
- Add or remove compute nodes to match resource demand using `az openshift scale`
- 99.9% SLA
- Will soon inherit Azure regulatory compliance
- Pricing available at https://azure.microsoft.com/en-us/pricing/details/openshift/

OpenShift Dedicated

Dedicated with OpenShift 3

Available today, hosted on Amazon Web Services

Consumption based billing now available

Bring Your Own Cloud Account

Dedicated with OpenShift 4

Initial availability June 2019

Broader availability in fiscal Q2

OperatorHub

Red Hat products and certified Operators will be added in a curated catalog later in the year.

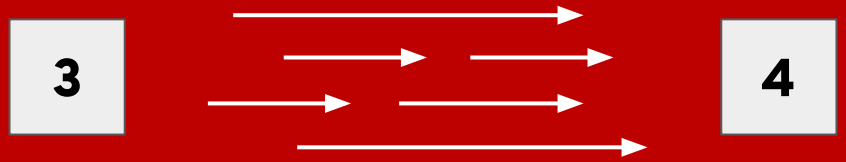
The Service Catalog and Brokers will not migrate to Dedicated due to their deprecation.

Connected to cloud.redhat.com

Clusters will appear beside other self-managed installs

Migrating to OpenShift 4

Tooling and advice for moving from OpenShift 3.x to 4.x



Red Hat

App migration experience

Using open source tooling based on Velero

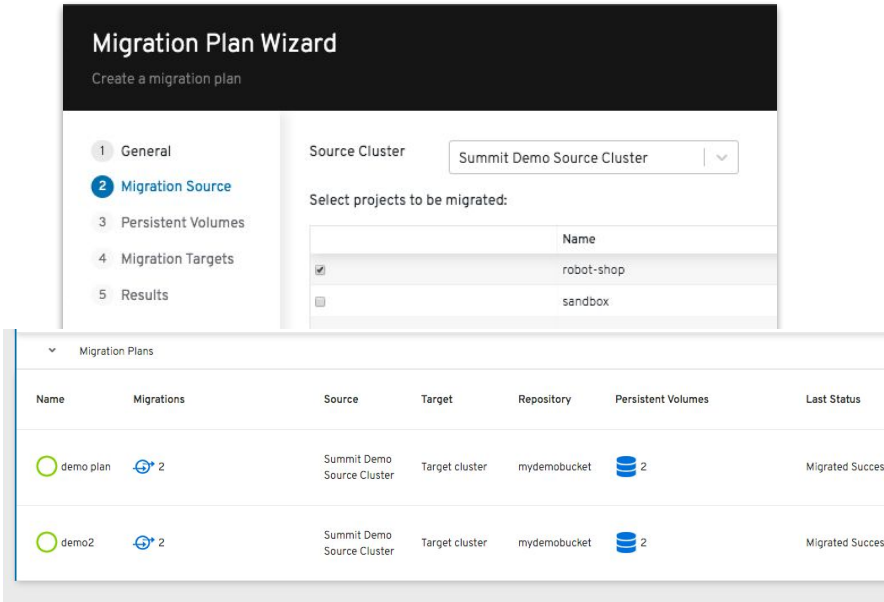
Velero is an upstream project previously known as Ark. Check out this video if you are curious and want to get a sneak peek at our capabilities.

What's moved during a migration

- Namespaces
- Persistent Volumes (move or copy)
- All important resource objects (Deployments, StatefulSets, etc)

Available in OpenShift 4.2

Customers are anxious to get their hands on this, but we want to get it right. We would love to receive sample application workloads to test.



Product Manager: Maria Bracho

Not Available Yet

Red Hat

Why did we choose this migration strategy?

Reducing risk

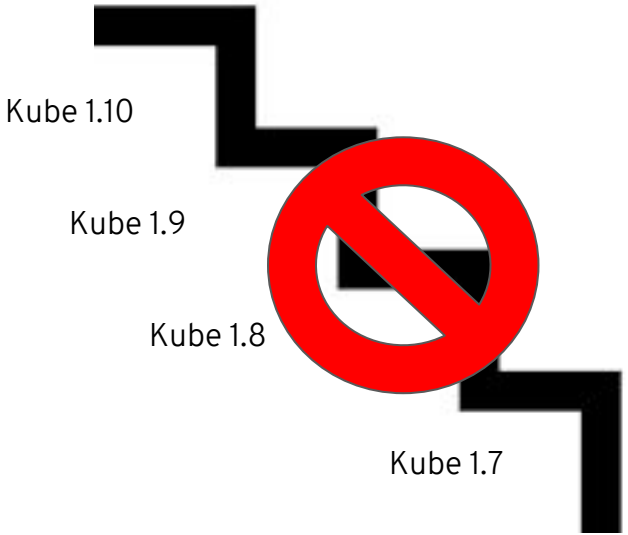
A ton of innovation went into OpenShift 4, and an in-place upgrade would have risk of failure in which there is no forwards or backwards remediation. It allows you to skip from 3.7/3.9/3.10/3.11 to 4.x. Skipping the need to install each one.

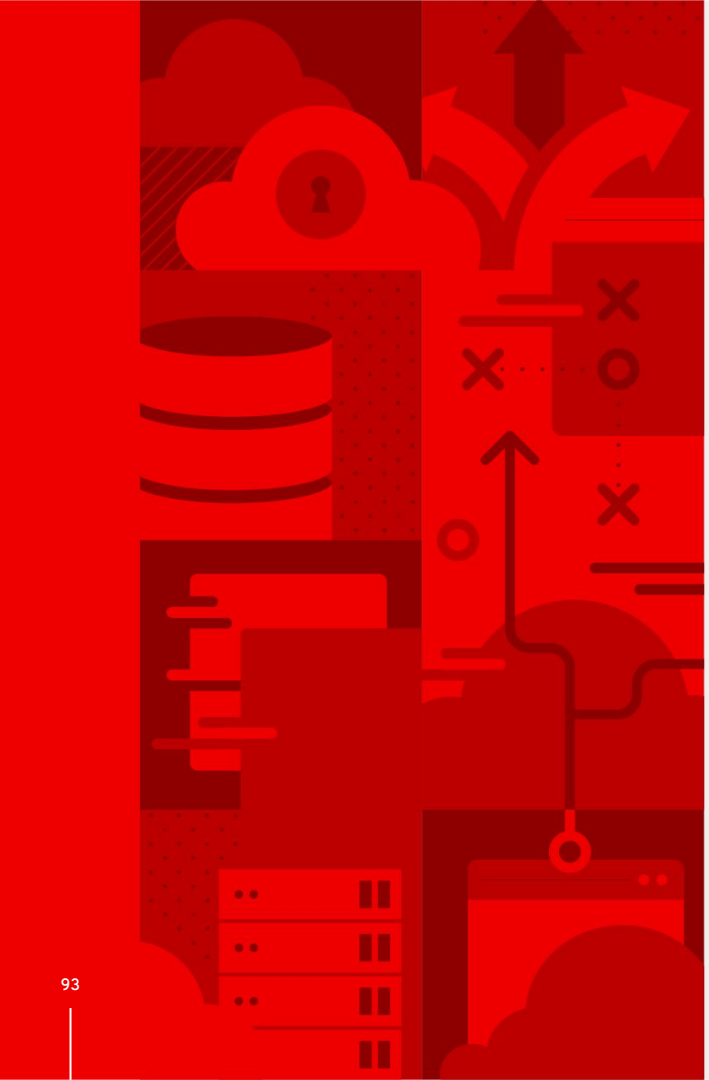
Useful for 4-to-4 migrations

A general migration tool is frequently requested and a better long term investment. Helps you build a foundation towards making your cluster investments less fragile.

Allows for staging

Stage a mock migration before doing it live, on a Project by Project basis. Extremely useful for success.





Questions?

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facebook.com/redhatinc

youtube.com/user/RedHatVideos

twitter.com/RedHat

Red Hat