Red Hat OpenShift

OpenShift 4.x Roadmap

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Cloud Solutions Architect, Red Hat

Red Hat

AGENDA

OpenShift 4 is Awesome (Themes and Roadmap)

Install & Upgrades

Day 2 & Multi-Cluster Management

Networking

Storage

Security

The Console

Enabling Developers

Cloud Native Development - Service Mesh, Serverless, Pipelines, CodeReady

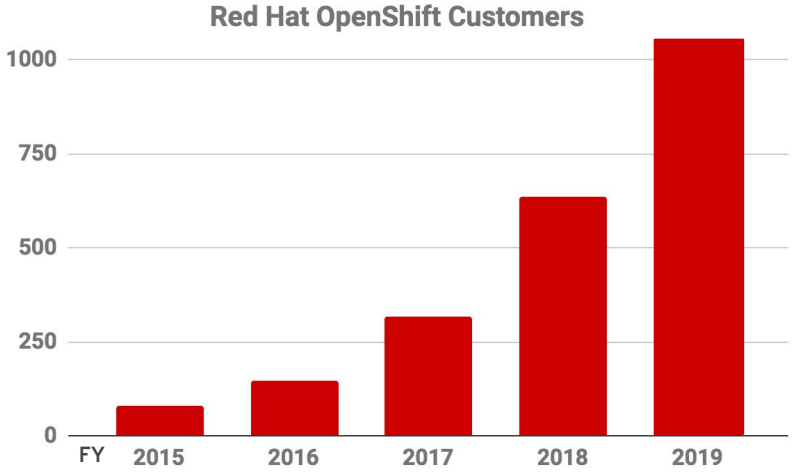
Quay

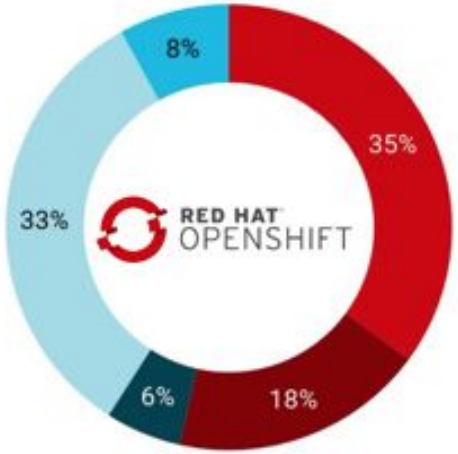
Container Native Virtualization

Migration Plans

OpenShift is gaining momentum

...with more than 1000 customers, worldwide





Financial services | Government | Telco | Media/technology | Other

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What OpenShift Does

Red Hat OpenShift

531%
5-year ROI

66%	36%	8 MONTHS	US$1.29M
Faster development life cycle	More applications per year	Payback period	Average annual benefits per 100 developers

The Business Value of Red Hat OpenShift, IDC #US41845816, October 2017, https://www.redhat.com/en/resources/The-Business-Value-of-Red-Hat-OpenShift.

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Customers are innovating with Openshift

...in every industry, worldwide.

FINANCIAL SERVICES

HEALTHCARE

AUTOMOTIVE

RETAIL

LOGISTICS

TRAVEL

HOSPITALITY

MEDIA | TELCO

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Customers use OpenShift for...

MODERNIZE APPS

WEB APPS

CLOUD NATIVE DEV

MULTI-CLOUD

MOBILE

BIG DATA | ANALYTICS

AI | ML

IOT

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CATHAY PACIFIC

10x

Increased application development throughput from 20 to 200 changes a day

OpenShift on AWS & private cloud

Hilton

Months → Days

Improved time to market by accelerating development time

OpenShift on AWS

Schiphol Amsterdam Airport

50%

Reduction in development time for new services and APIs. Launched a new cloud platform in **10 days**

OpenShift on AWS, Azure, & private cloud

Source:
Cathay Pacific: Red Hat press release, Cathay Pacific Takes Customer Experiences to New Heights with Red Hat's Hybrid Cloud Technologies, May 2018.
Hilton: Red Hat case study, Hilton enhances digital guest experience with Red Hat container and automation technology, October 2018.
Schiphol: Red Hat case study, Amsterdam Airport Schiphol builds agile cloud with Red Hat, August 2017.

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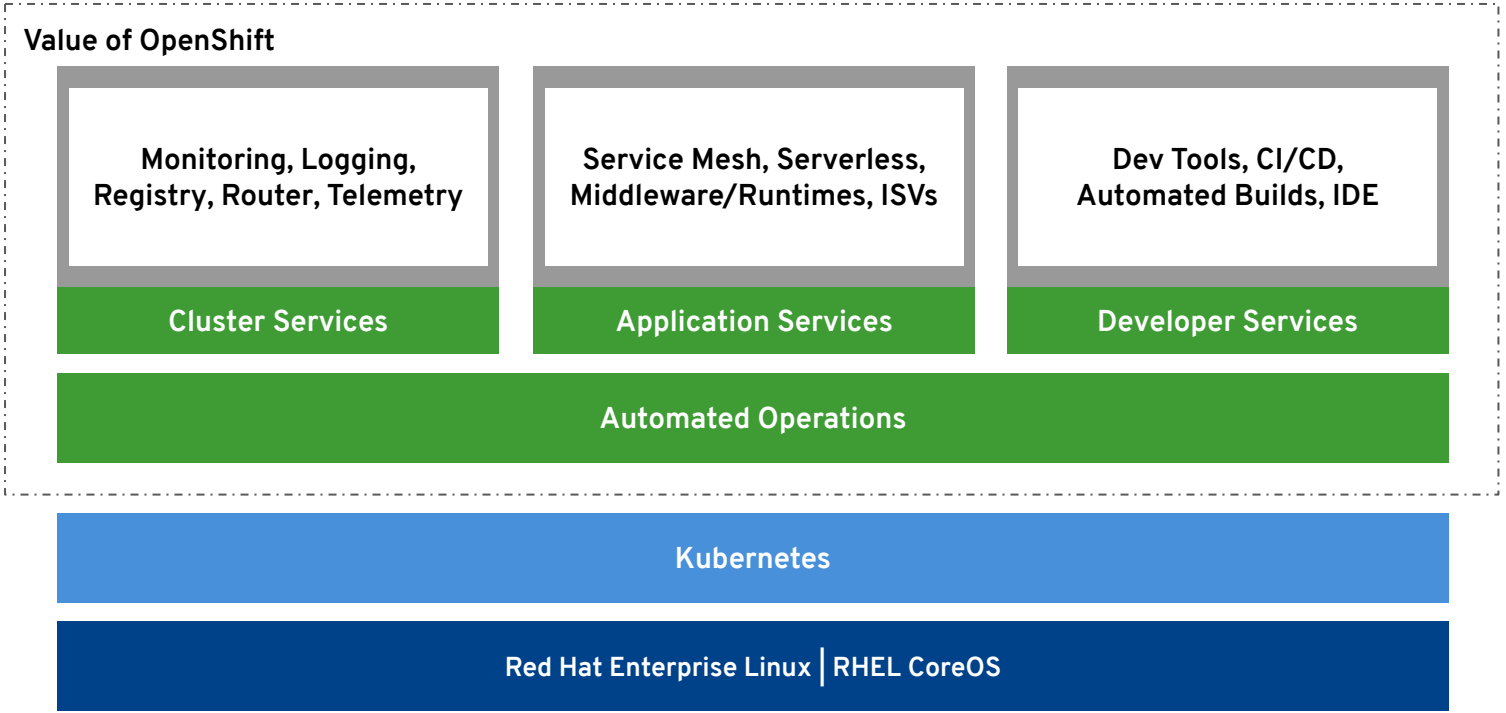

Best IT Ops Experience

CaaS ⟷ PaaS ⟷ FaaS

Best Developer Experience

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OPENSHIFT ROADMAP

Q3 CY2019
OpenShift 4.2

DEV
- Developer Console GA
- OpenShift Serverless (Knative) - TP
- OpenShift Pipelines (Tekton) DP3
- CodeReady Containers GA
- Developer CLI (odo) GA

APP
- OperatorHub Enhancements
- Operator Deployment Field Forms
- Application Migration Console

PLATFORM
- Kubernetes 1.14 w/ CRI-O runtime
- Disconnected Install and Update
- Automated Installer for Azure, GCP, & OSP
- Pre-existing Infra Installer for GCP
- Cluster-wide Egress Proxy
- OVN Tech Preview
- OpenShift Container Storage 4.2 (1 month after)

HOSTED
- Insights Operator
- Azure Red Hat OpenShift new features (monitoring, logging)

Q1 CY2020
OpenShift 4.3

DEV
- OpenShift Pipelines (Tekton) TP
- Helm 3 TP

APP
- Metering for Services
- Windows Containers (Planned)
- GPU Metering
- Application Operator Binding - DP

PLATFORM
- Kubernetes 1.16 w/ CRI-O runtime
- Private/Internal Clusters support from the installer
- Deploy to pre-existing VPC & Subnets
- FIPS
- Pre-existing Infra Installer for Azure (4.3.z)
- OpenShift Container Storage 4.3

HOSTED
- Subscription Mgmt Improvements (cloud.redhat.com)
- Azure Red Hat OpenShift new features (private clusters)
- Azure Red Hat OpenShift preview of 4.x
- OSD on Google Cloud preview on 4.x

CY2020
OpenShift 4.4+

DEV
- OpenShift Serverless (Knative) GA
- Guided application creation
- OpenShift Pipelines (Tekton) GA
- Helm 3 GA

APP
- Monitor application workloads
- Simplify OLM interactions
- Improving native developer console for monitoring and troubleshooting

PLATFORM
- OVN GA w/ Windows Networking Integration (Planned)
- Windows Containers GA
- Multi-cluster summary dashboards
- Centralized cluster updates
- Compliance operator
- Node problem detector
- IPv6 (single/dual on control plane)
- HTTP/2 Support
- CSI certification suite

HOSTED
- Enhanced consumption building
- Regulatory compliance
- Machine autoscaling
- Google cloud platform

OpenShift 4.2

PLATFORM EXPANSION

Disconnected, air-gapped installation

Full-stack Automation for Azure, GCP. OpenStack

Migration tooling

WORKLOAD EXPANSION

Operators for Red Hat Integration, Business Automation, Runtimes

Special resources operator For GPU

DEVELOPER EXPERIENCE

Developer console with application topology

CodeReady Containers

Service Mesh fully supported

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OpenShift 4.3

INSTALLER CUSTOMIZATION

Improvements for disconnected

Internal facing/private clusters

Customer provisioned VPC/VNet/etc and subnets

SECURITY & COMPLIANCE

FIPS validated crypto

Disk encryption for RHCOS

Encrypted etcd datastore

Kubernetes 1.16

IMPROVED NETWORKING

High performance multicast to clients outside cluster

SR-IOV graduates to GA

Additional monitoring for OVN

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OpenShift 4.4

Initiatives

Telecom Edge

Address needs of rapidly emerging Telco 5G Edge use cases, in a manner that can be leveraged for other Edge use cases in future.

Multi-Cluster

Architectural components designed to work with MCM and other open source views into multiple clusters.

Stabilize the platform

Fine tune delivering IaaS platforms. Create new deployment patterns that mix a hosted and on premise customer needs.

Drive Workload and Usage

Deliver the best combination of next generation developer experiences on innovative open source technologies found in the cloud native ecosystem.

Install & Upgrades

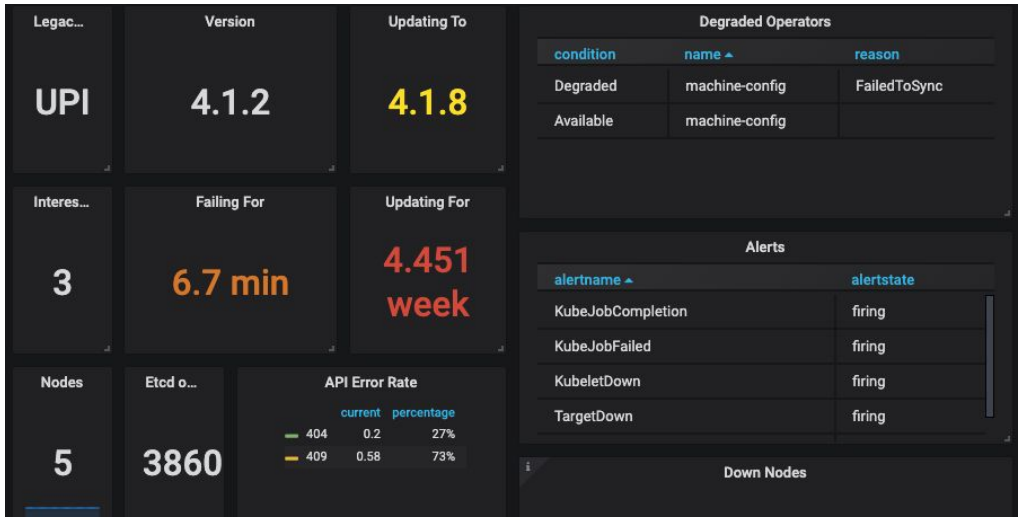
Connected Customer

Proactive support for customer issues

- Active upgrades
- Overall cluster health
- Firing alerts
- Node health

Driving a high quality product

- Monitor and improve upon the health of the customer base
- Prioritize engineering roadmap for platforms and prove they are improving over time
- Active monitoring of fast and stable channels



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Provider Roadmap & Minimum Supported Version

Provider	Full Stack Automation (Installer provisioned infra)	Pre-existing Infrastructure (User provisioned infra)
amazon web services	4.1	4.1
Microsoft Azure	4.2	4.3+ *(z-stream)*
Bare Metal	4.4*	4.1
Google Cloud Platform	4.2	4.2
RED HAT OPENSTACK PLATFORM	4.2	4.4
RED HAT VIRTUALIZATION	4.4	4.5
vmware vSphere	4.5	4.1
IBM Z	-	4.2+ *(z-stream)*
IBM Power Systems	-	4.3+ *(z-stream)*
Alibaba Cloud	4.6*	-

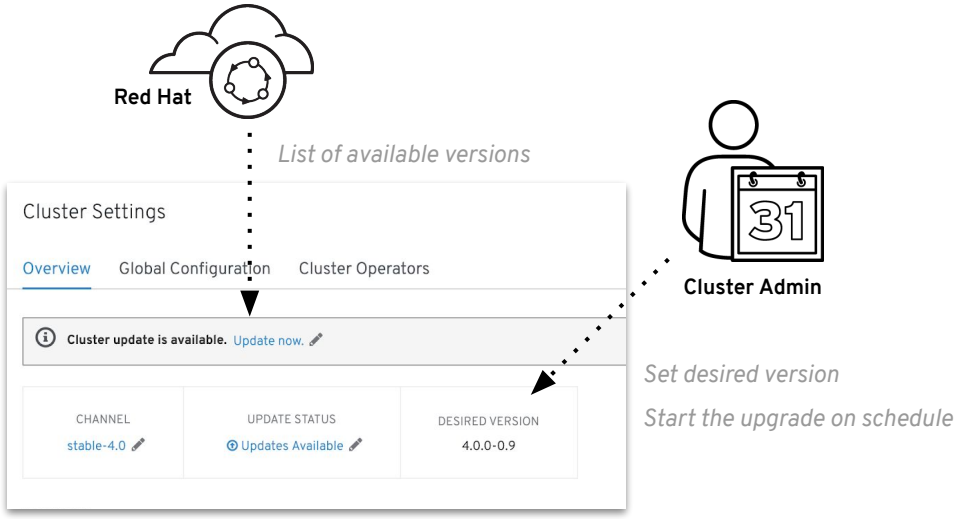
PMs: Katherine Dubé (AWS, Azure, GCP), Maria Bracho (BM UPI, VMware, Alibaba), Peter Lauterbach (RHV), Ramon Acedo Rodriguez (OSP, BM IPI), Mike Barrett (IBM Z & Power)

Smarter, Easier Upgrades

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

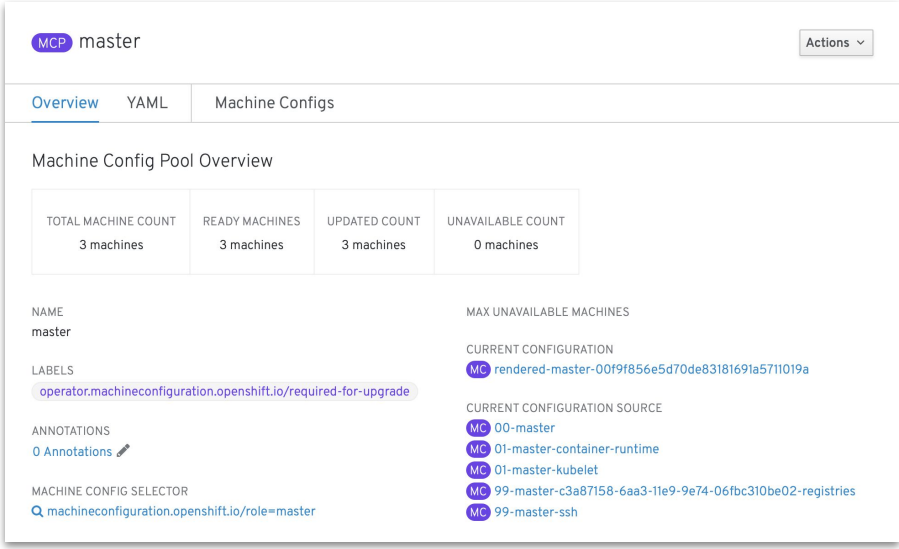
Constant health checking from each Operator
Operators are constantly looking for incompatibilities and issues that might arise



Smarter, Easier Upgrades

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.

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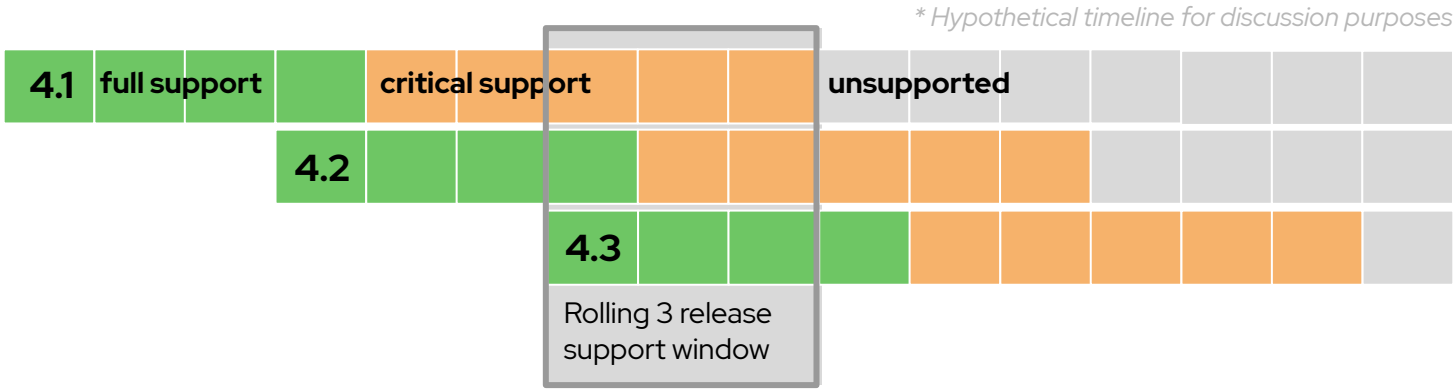
Cluster Upgrades

OCP 4.3 includes three cluster upgrade channels:

- candidate-4.3
  - Should be used to test features coming up in new releases
  - Ideal for **test** environment
- fast-4.3
  - This channel will be updated with new 4.3 patch versions as soon as GA.
- stable-4.3
  - This channel will be updated with new 4.3 patch versions on a time delay by design. This allows Red Hat's SREs to receive feedback from connected environments. If issues are found, then upgrades to it are blocked in both stable and fast channels. New versions on both channels are updated as soon as fixes are in place.

OpenShift 4 Lifecycle



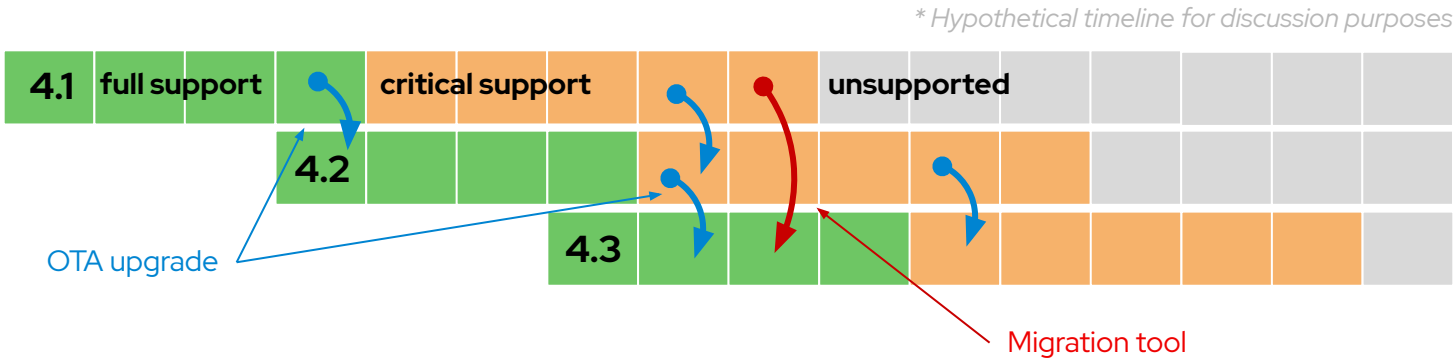
New model
Release based, not date based. Rolling three release window for support.

The overall 4 series will be supported for at least three years

- Minimum two years full support (likely more)
- One year maintenance past the end of full support

EUS release planned
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

OpenShift 4 Upgrades



OTA Upgrades
Works between two minor releases in a serial manner.

Happy path = migrate through each version
On a regular cadence, migrate to the next supported version.

Optional path = migration tooling
If you fall more than two releases behind, you must use the application migration tooling to move to a new cluster.

Current minor release
Full support for all bugs and security issues
1 month full support overlap with next release to aid migrations

Previous minor release
Fixes for critical bugs and security issues for 5 months

Install / Upgrade Roadmap

	Near Term (4.3)	Mid Term (4.4)	Long Term (4.5+)
GENERAL	- Internal/private facing clusters - Pre-existing VPC/VNet & subnets	- MachineSet managed control plane - Compact 3-node clusters - Improvements to disconnected user experience	- Installer appliance & graphical UI - Improvements to user provisioned process - Process for how updates get applied to multiple clusters in a disconnected environments
PROVIDERS	- Installer provisioned infrastructure: • IBM Power Systems (4.3.z) - Support for additional AWS regions • *eu-north-1* (Stockholm)	- Installer provisioned infrastructure: • RHV, Bare Metal - Pre-existing infrastructure: • Azure, OpenStack (OSP) - AWS GovCloud deployment guide	- Installer provisioned infrastructure: • Alibaba, VMware Pre-existing infrastructure: • RHV - Support for AWS & Azure custom endpoints and additional regions

PMs: Katherine Dubé (AWS, Azure, GCP), Maria Bracho (BM UPI, VMware, Alibaba), Peter Lauterbach (RHV), Ramon Acedo Rodriguez (OSP, BM IPI), Mike Barrett (IBM Z & Power)

Day 2 & Multi-Cluster Management

Machine Health Checking

- Machine Health Checking (aka Node Autorecovery) GA
  - Automatically repair damaged machines in a machine pool
  - Opt in i.e. you need to set this up
  - Can’t apply to a Master node
- Setup via creating a machine health check resource
  - define the node conditions you want to monitor for
  - a specific pool of machines
  - the max unhealthy allowed.
- In Action
  - A Machine Health check fail means automatic deletion of the machine.
  - Draining and deletion of the backing node.
  - Recreation of a new machine.

```
apiVersion: machine.openshift.io/v1
kind: MachineHealthCheck
metadata:
  name: example
  namespace: openshift-machine-api
spec:
  selector:
    matchLabels:
      role: worker
  unhealthyConditions:
  - type:    "Ready"
    status:  "Unknown"
    timeout: "300s"
  - type:    "Ready"
    status:  "False"
    timeout: "300s"
  maxUnhealthy: "40%"
status:
  currentHealthy: 5
    expectedMachines: 5
```

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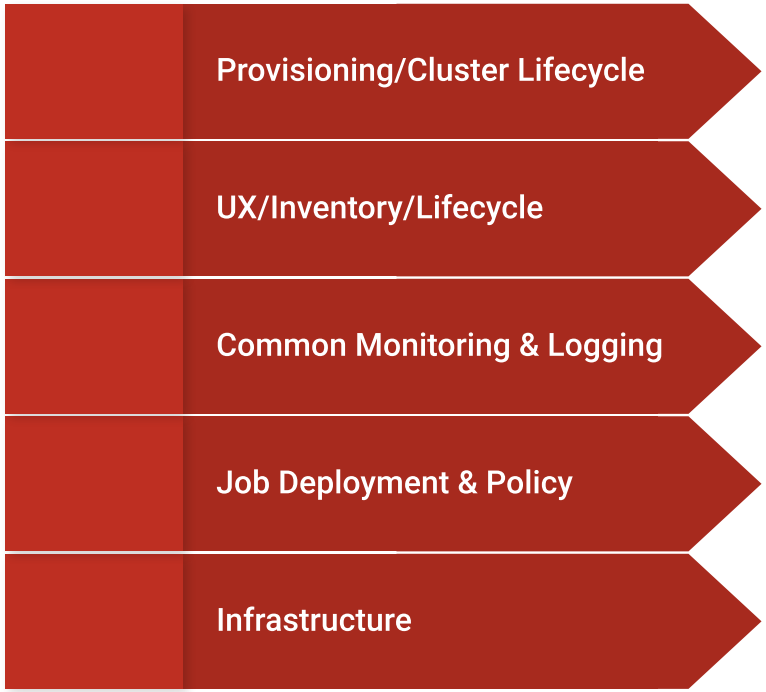
PATH TO MULTI-CLUSTER - FOCUS AREAS



GitOps with ArgoCD

- OpenShift cluster configs with ArgoCD
  - Cluster config CRs (identify provider, registry, etc)
  - Operator installation via OLM
- Multiple clusters with single GitHub repo
  - Shared configs
  - Cluster-specific configs
- ArgoCD Operator

argo

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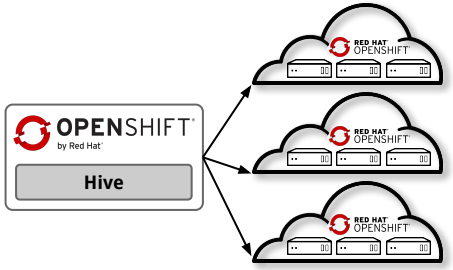
OpenShift Hive

- API driven OpenShift 4 cluster provisioning and management
- Hive is an operator that runs on top of OpenShift
- Used to provision and perform initial configuration of OpenShift clusters
- Working code & documentation available upstream:
  - https://github.com/openshift/hive




```yaml
- apiVersion: hive.openshift.io/v1alpha1
  kind: ClusterDeployment
  metadata:
    labels:
      controller-tools.k8s.io: "1.0"
    annotations:
      hive.openshift.io/delete-after: "8h"
      hive.openshift.io/try-install-once: "${TRY_INSTALL_ONCE}"
    name: ${CLUSTER_NAME}
  spec:
    platformSecrets:
      aws:
        credentials:
          name: "${CLUSTER_NAME}-aws-creds"
    images:
      hiveImage: "${HIVE_IMAGE}"
      hiveImagePullPolicy: "${HIVE_IMAGE_PULL_POLICY}"
      installerImage: "${INSTALLER_IMAGE}"
      installerImagePullPolicy: "${INSTALLER_IMAGE_PULL_POLICY}"
      releaseImage: "${OPENSHIFT_RELEASE_IMAGE}"
    sshKey:
      name: "${CLUSTER_NAME}-ssh-key"
    clusterName: ${CLUSTER_NAME}
    baseDomain: ${BASE_DOMAIN}
    networking:
      type: OpenshiftSDN
      serviceCIDR: "172.30.0.0/16"
      machineCIDR: "10.0.0.0/16"
      clusterNetworks:
        - cidr: "10.128.0.0/14"
          hostSubnetLength: 9
    platform:
      aws:
        region: us-east-1
    pullSecret:
      name: "${CLUSTER_NAME}-pull-secret"
```

OpenShift 4.4

- Initial GA release
- Support for provisioning clusters on AWS, Azure, and GCP

OpenShift 4.5

- On-premise OpenShift Cluster Manager (OCM) front-end

Product Manager: Katherine Dubé

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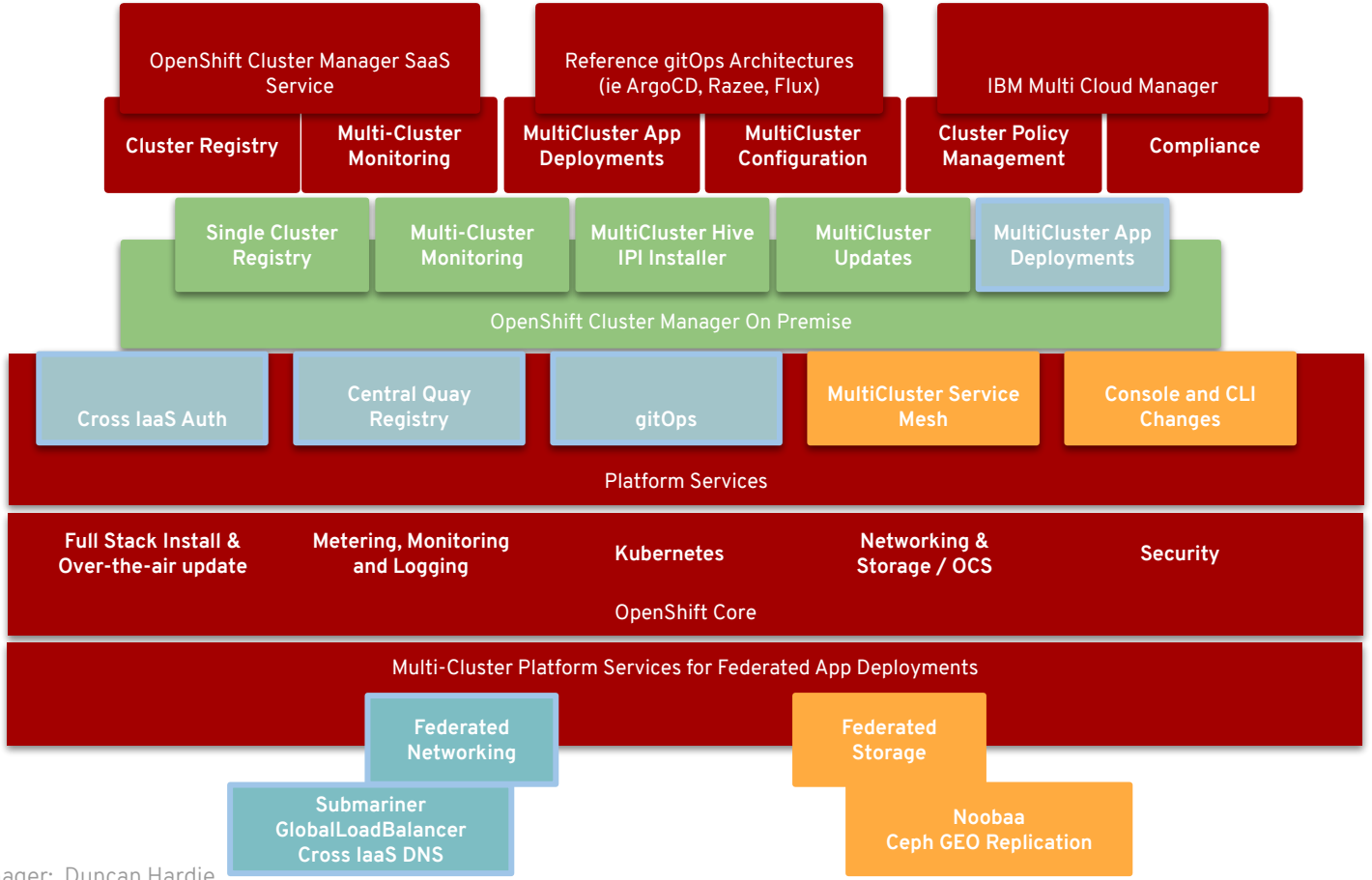
Multi-Cluster Platform Services



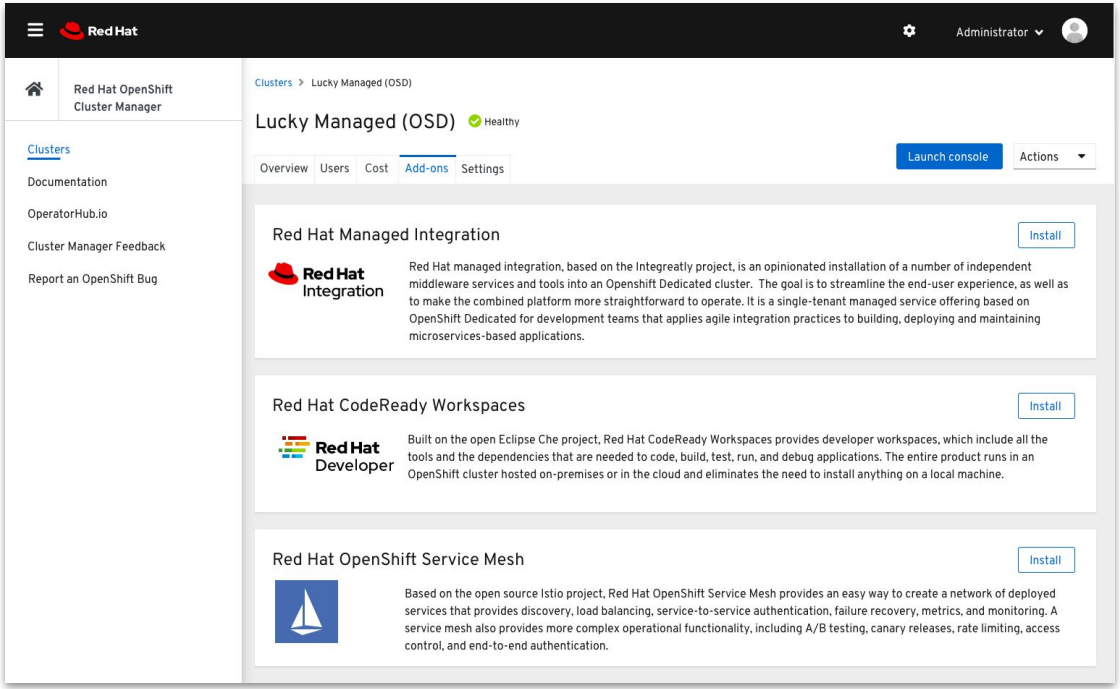
Product Manager: Duncan Hardie

Red Hat

OpenShift Cluster Manager

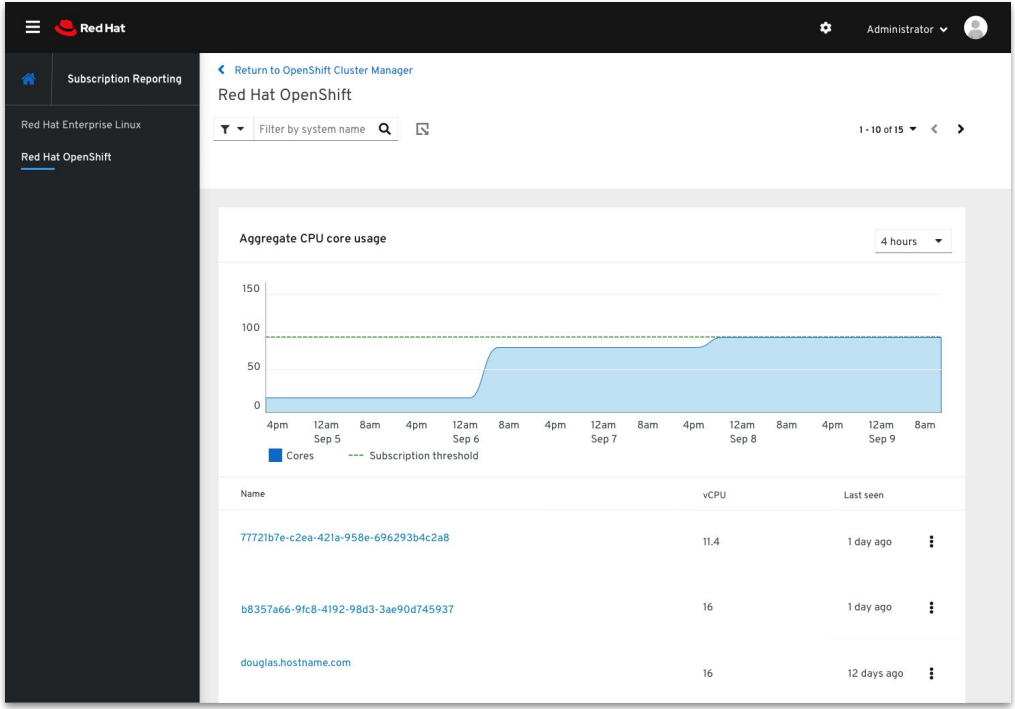
Enablement for OpenShift Dedicated and Red Hat services

- OpenShift Dedicated support for add-on services (Service Mesh, CodeReady workspaces, and more), advanced network configuration, and bring your own cloud (BYOC)
- Data upload/import for disconnected OCP clusters
- Integration with cloud.redhat.com Cost Management service
- Core operator health status reported on monitoring tab



Subscription Management

Delivering improvements to the current system, and transitioning to the new cloud.redhat.com Subscription Watch



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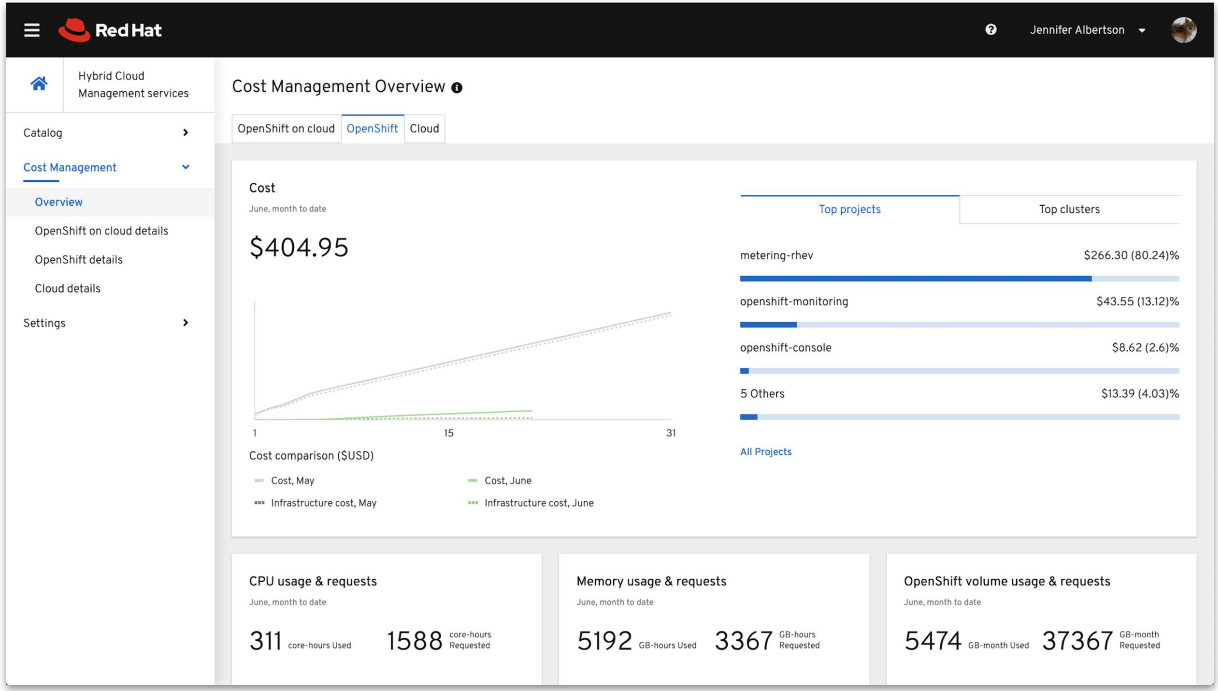
cloud.redhat.com/cost-management

Cost Management Tech Preview

See all of your OpenShift related costs across clouds and clusters

- Break down costs and usage based on projects, clusters, nodes, AWS accounts, or use your own custom tags
- Associate the costs of AWS services, like RDS databases, with your cluster
- Add markups or discounts to your cost models, create your own custom costs, use metadata to modify charges, and more
- *Optional install for OCP 4.3+, included with OpenShift subscription*



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Node Management Roadmap

Next (4.3)

- Kube 1.16
- Node Topology Manager (TP)
- Machine Health Checks

Long Term (4.4+)

- Descheduler
- Vertical Pod Autoscaler
- Pod Density per Node Enhancements
- Masters are schedulable (GA)
- Limit number of pod restarts
- OOM Kills are monitored and logged
- Node problem detector
- GPUDirect
- CGroups V2
- FPGA

Networking

Networking Themes

Stability and Security

Operators
Traffic Isolation
Metrics, Alerting, Telemetry
Security Policy API Enhancements

Performance and Scale

SR-IOV
High-Performance Multicast
RDMA, GPUDirect
Multi-Cluster

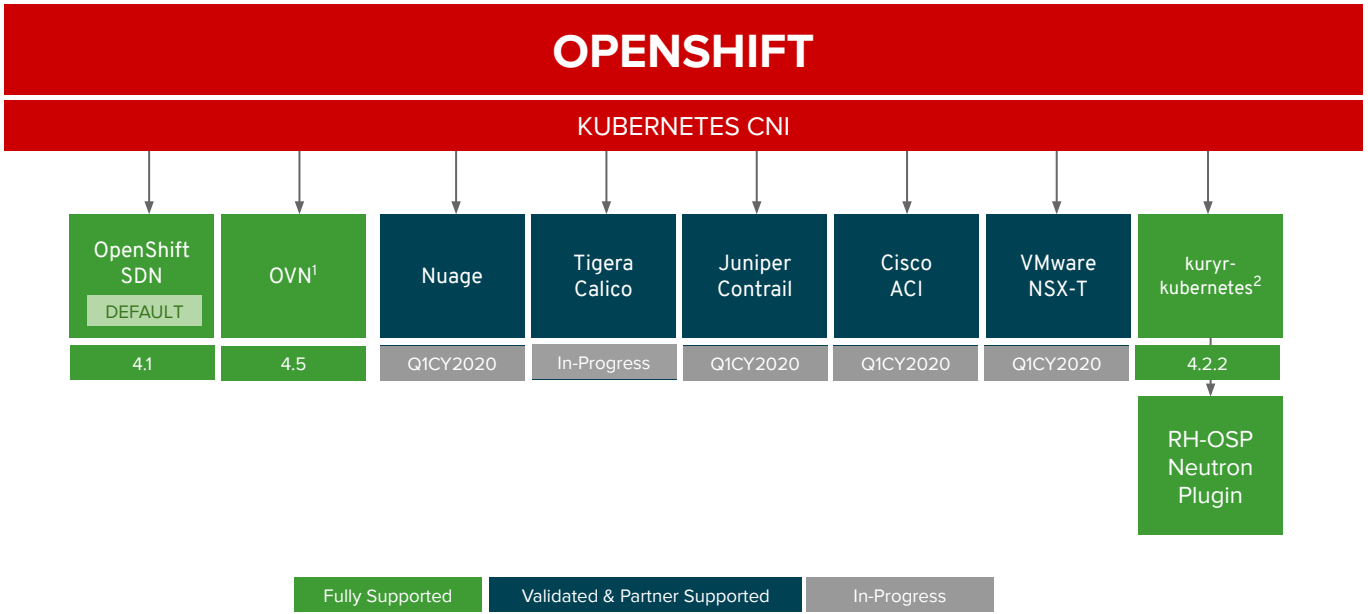
New and Flexible Features

Multus Plug-ins
IPAM, IPv6, External DNS
Multi-Network
Platform Native Support

Telco Enablement

Foundational Capabilities
CNF Onboarding
Host features (e.g. PTP)
Platform integrations (e.g. OSP)

OPENSHIFT 4 NETWORK PLUGINS



[1]Targeting GA at OCP 4.3 (not default SDN)
[2]Available as an install-time option in 4.2.z (targeting 4.2.2)

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Storage

OpenShift Container Storage 4.2

GA with OpenShift Container Platform 4.3

Portability

Seamless data placement and access across clouds

Multi Cloud Data Portability/Hybrid Cloud with S3

Consistent set of management tools across clouds

AWS (UPI + IPI), VMware (UPI)

Simplicity

Operator driven install, upgrade, expand through OLM

Integrated OCP + OCS monitoring and management

Dynamic provisioning of persistent volumes for RWX, RWO, S3 in Converged Mode

Scalability

Support Traditional and Emerging OCP Workloads

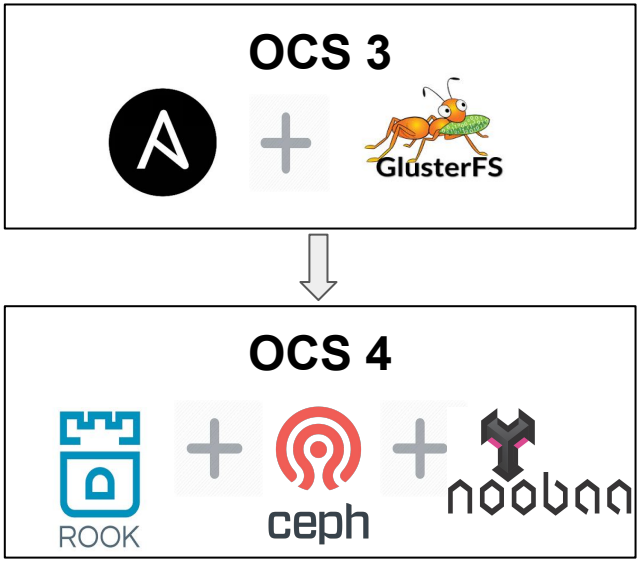
Easily share data across geo-locations and platforms

5,000 PV's in a 10 node setup

OCS 4.2: Change in Technology Stack

Goal to have complete storage for OCP whatever the needs

- **Need for scalable S3 object stack (**New apps, infra like chargeback, metering)
- **Red Hat Ceph is** scalable object stack with block and file
- **Recently acquired Noobaa -** consistent S3 interface over Ceph RGW, AWS S3, Azure Blob; Federation & multi-cloud capable
- **Rook** operator framework for simple install, manage, expand



Full integrated migration support from OCP +OCS 3.11 to OCP + OCS 4.2.

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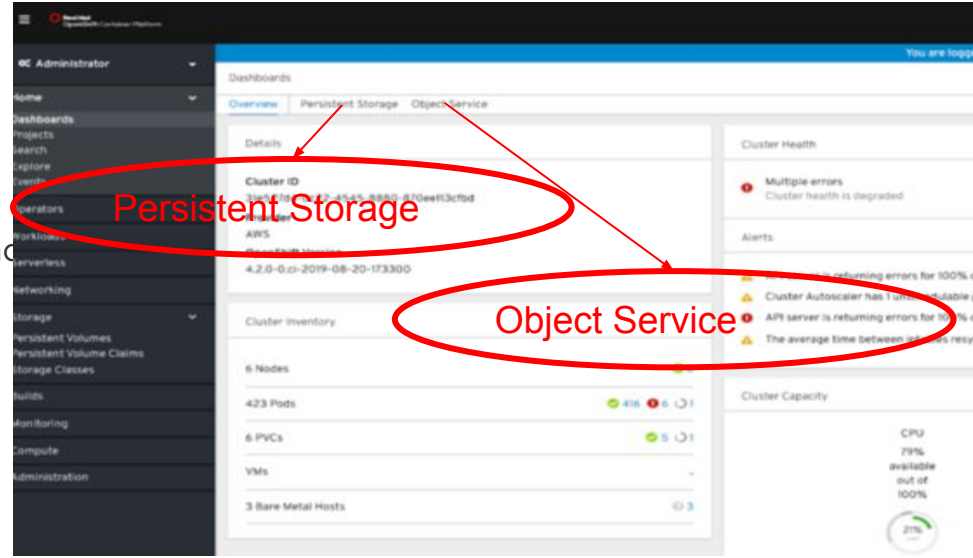
OCS - Deeper integration with OCP

- **Operator** driven - install, expand, manage,
- Integrated **monitoring** using OCP dashboard
- Integrated **management** - Operator driven expand
- Integrated Prometheus metrics, telemetry, must-gather, alerts



Also...

- Health
- Capacity Configuration
- Alerts

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OpenShift Container Storage 4 Roadmap

Near Term (4.2+)

- GA - Converged Mode
- Operator driven install, upgrade, expand through OLM
- PV's backed by RWX, RWO, S3 for apps
- AWS (UPI + IPI), VMware (UPI)
- Multi Cloud Data Portability/Hybrid Cloud with S3
- OCP + OCS monitoring and management
- 5,000 PV's in a 10 node setup

Medium Term (4.3)

- Azure
- Bare Metal
- Data Portability/Hybrid Cloud
- 10,000 PV's in a 10 node setup
- Tech Preview: Snapshot and Clone
- Tech Preview: CephFS Snap, Clone, Restore
- Disconnected Environment

Long Term (4.4+)

- Google, IBM Cloud (TBC), RHV
- GA - Independent Mode, sharing OCS storage with an external OCP
- Support for local NVMe and standard PVs on VMware hypervisor nodes
- GA - Snapshot, Clone, Restore
- Multi-cluster data federation and data portability
- Active/Active and Active/Passive sharing of object stores
- CephFS GA -
  - Scale to 10,000 PV's
  - Metrics
  - Async and Sync replication
  - Stretch cluster
  - Snap, clone, restore

Roadmap is subject to change.

Security

Stronger Platform Security

Defense in Depth

CONTROL
Application Security

DEFEND
Infrastructure

EXTEND

- Support for FIPS validated cryptography
- Encrypt etcd datastore
- RHEL CoreOS network bound disk encryption
- Private clusters with existing VPN / VPC
- Internal ingress controller
- Ingress Cipher & TLS Policy Configuration
- Log forwarding (tech preview)

OpenShift 4 and Fips 140-2

FIPS ready Services

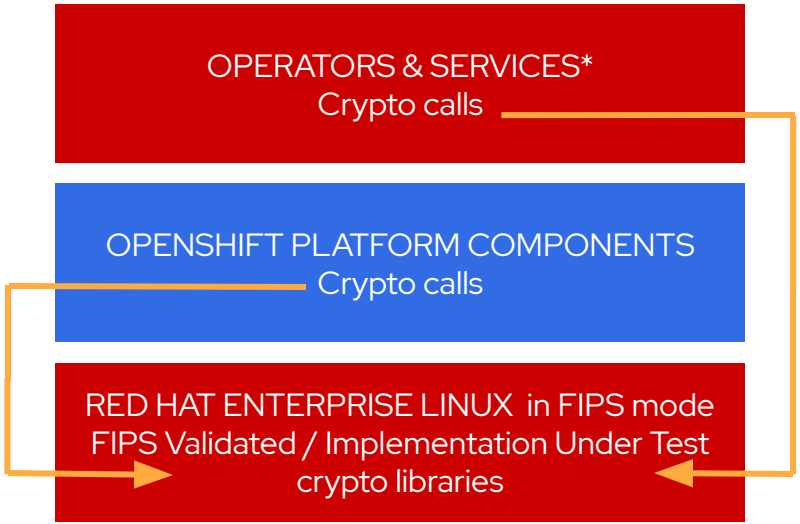
- When built with RHEL 7 base image

OpenShift calls FIPS validated crypto

- When running on RHEL 7.6 in FIPS mode, OpenShift components bypass go cryptographic routines and call into a RHEL FIPS 140-2 validated cryptographic library
- This feature is specific to binaries built with the RHEL go compiler and running on RHEL

RHEL CoreOS FIPS mode

- Configure at install to enforce use of FIPS Implementation Under Test* modules



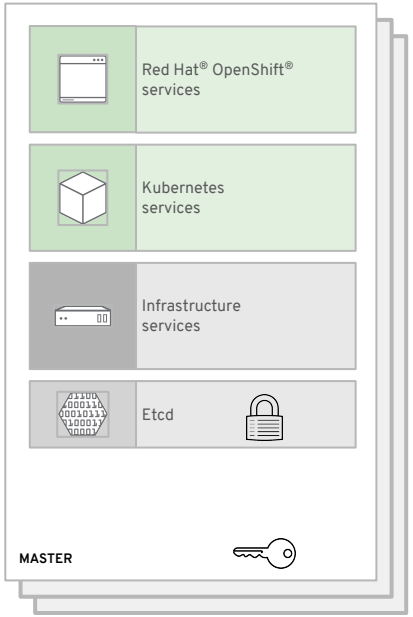
*When built with RHEL base images

More about RHEL go and FIPS 140-2

OpenShift 4 etcd Encryption

Encrypt secrets, config maps...

- Encryption of the etcd datastore is optional. Once enabled, encryption cannot be disabled.
- The aes-cbc cipher is used.
- Keys are created and automatically rotated by an operator and stored on the master node's file system.
- Keys are available as a secret via the kube API to a cluster admin.
- Assuming a healthy cluster: after enabling encryption, within a day, all relevant items in etcd are encrypted
- Backup: The etcd data store should be backed up separately from the file system with the key.
- Disaster recovery: a backup of both the encrypted etcd data and encryption keys must be available.



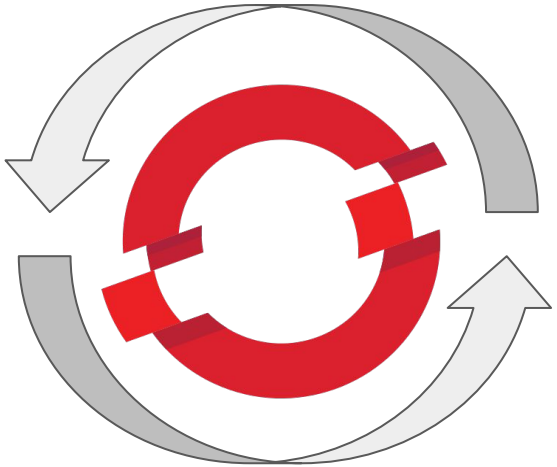
The OpenShift Console

Extending the Console	Improve Observability
Administration made easy	Developer Focused

More Visibility for OpenShift Components

Our goal is to provide a 360° view for Openshift.

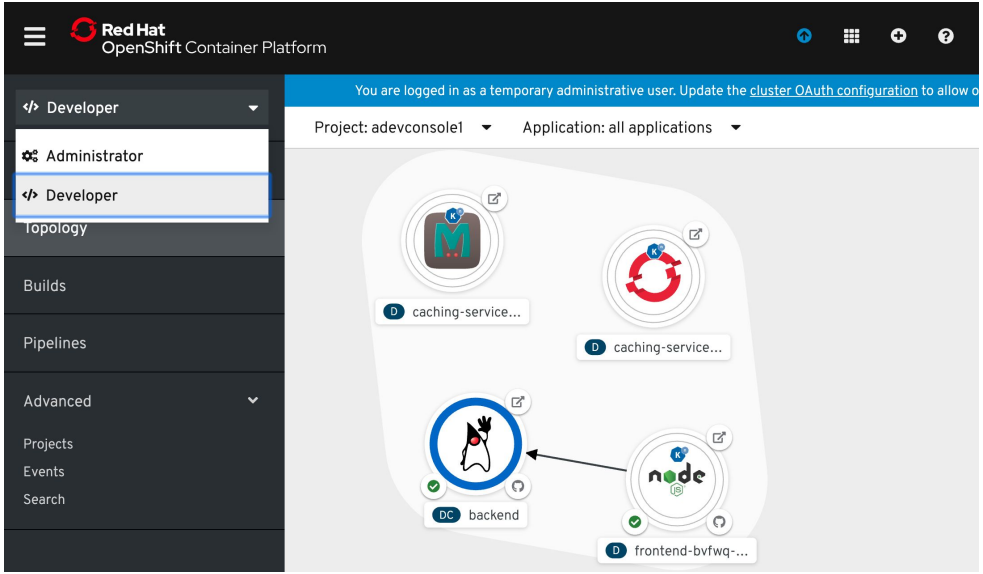
- In every release, we've increased the number of OpenShift components monitored out of the box.



Web Console - Developer Perspective

An alternative perspective in the OpenShift UI that will sit beside the admin console and focus on developer use cases.

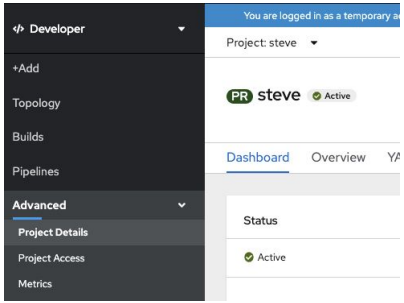
All OpenShift developer tool UIs will be surfaced here...though some (like CodeReady Workspaces) will be links out to unique UIs.



Project Details & Access

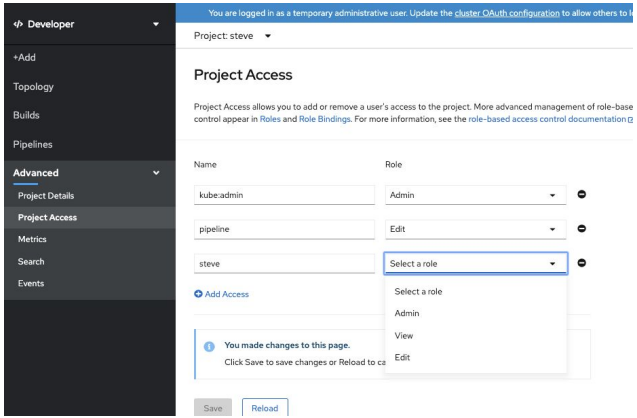
Project Details

- Quick access to current project details
- View dashboard for status and resource utilization
- Actions for edit or delete



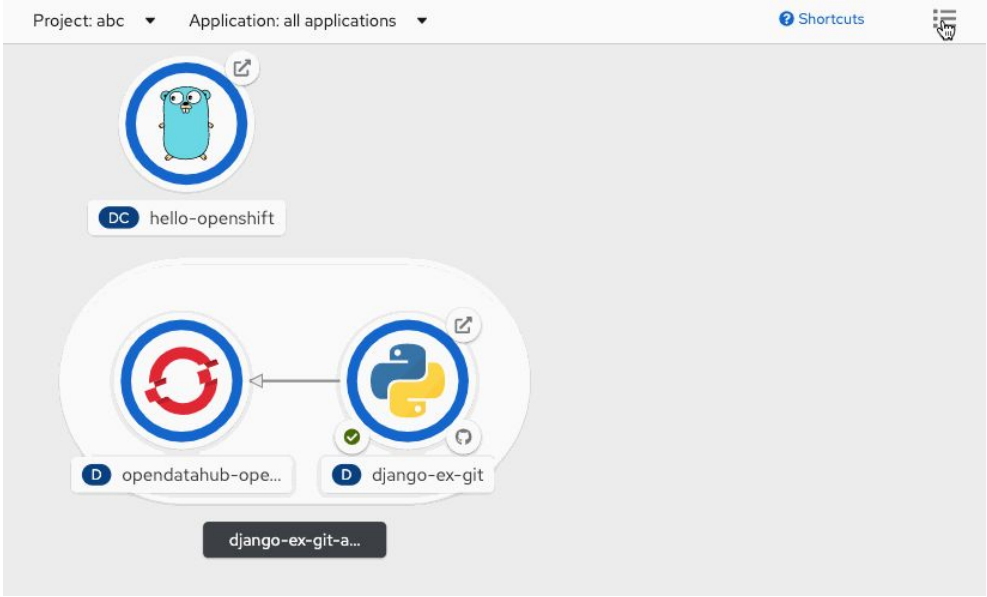
Project Access

- Simplify sharing projects
- Reduces to a simple set of Roles that developer frequently use



Application Topology streamlined flows

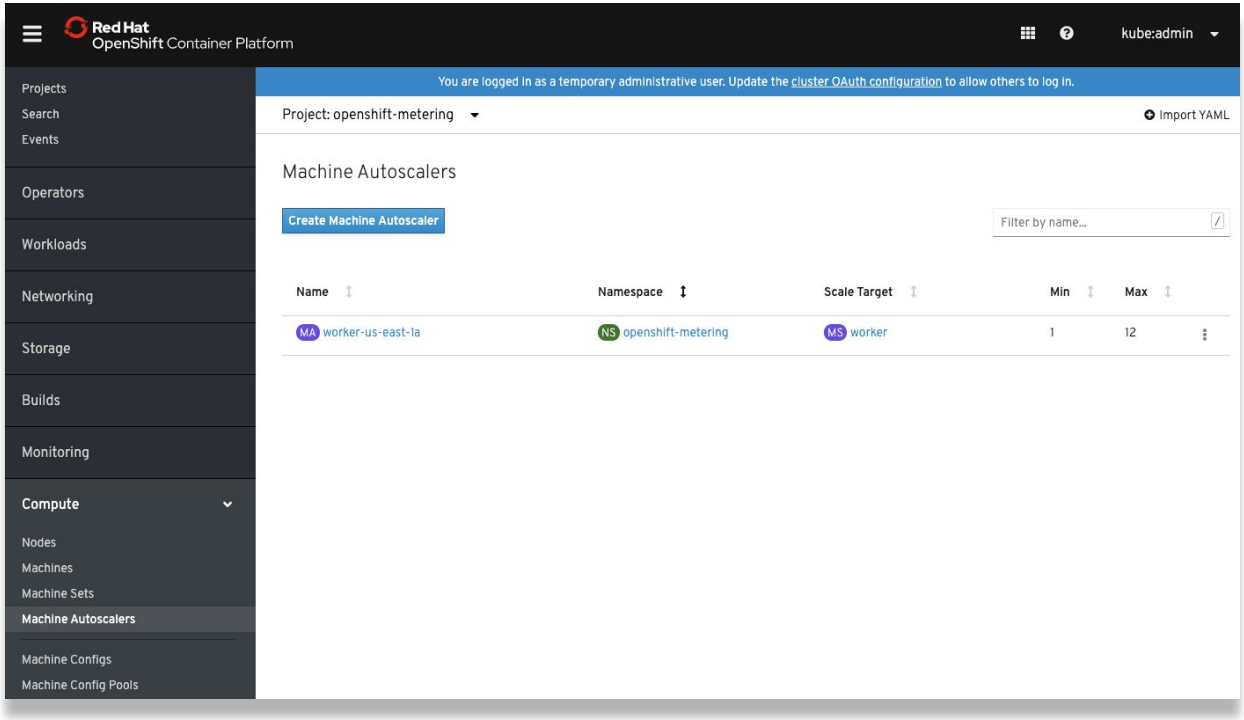
- Toggle between List and Topology views
- Easily group applications
- Connect/bind applications easily
- Contextual actions
- Quickly delete applications



Scaling Your Cluster with the Machine Autoscaler

Machine Autoscaler adjusts the number of Machines in the MachineSets being deployed in your cluster.

- Increase Machines when the cluster runs out of resources to support more deployments.
- Any changes such as the minimum or maximum number of instances, are immediately applied to the MachineSet that MachineAutoscalers target.

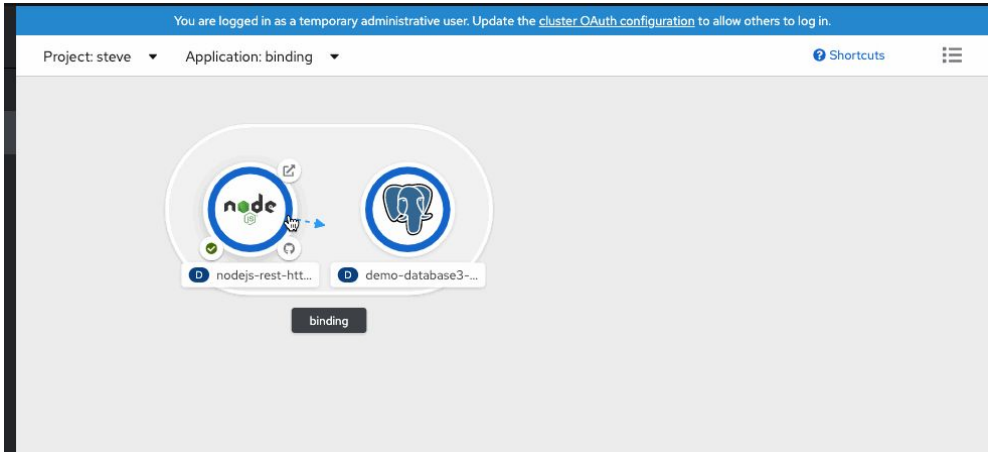


Red Hat

Tech Preview

Service Binding easily connecting apps

- Leverages new ServiceBindingRequest and Operator to handle binding requests
- Easily create in Topology by dropping connector to valid drop target
- Injects config into source pod template as environment variables as a secret
- Pods are redeployed to pick up binding credentials



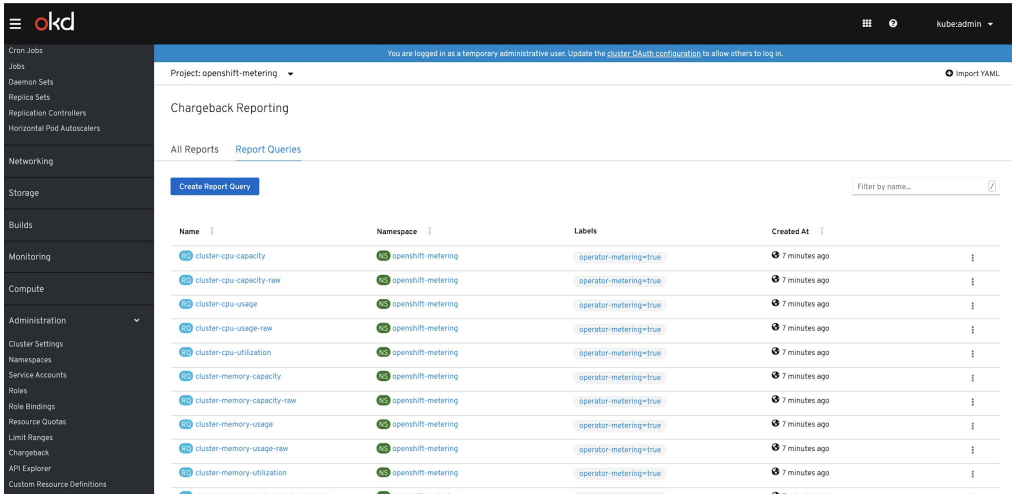
Learn more about service binding:
https://github.com/redhat-developer/service-binding-operator

Red Hat

Metering

ShowBack/ChargeBack Reports available from OperatorHub

- Base functionality on all providers
- Tie into cloud providers
- Some reports included, can also write custom reports
- Can be plugged into other reporting tools as needed



CPU
Memory
Storage

✖

Request
Actual Usage
Utilization %

✖

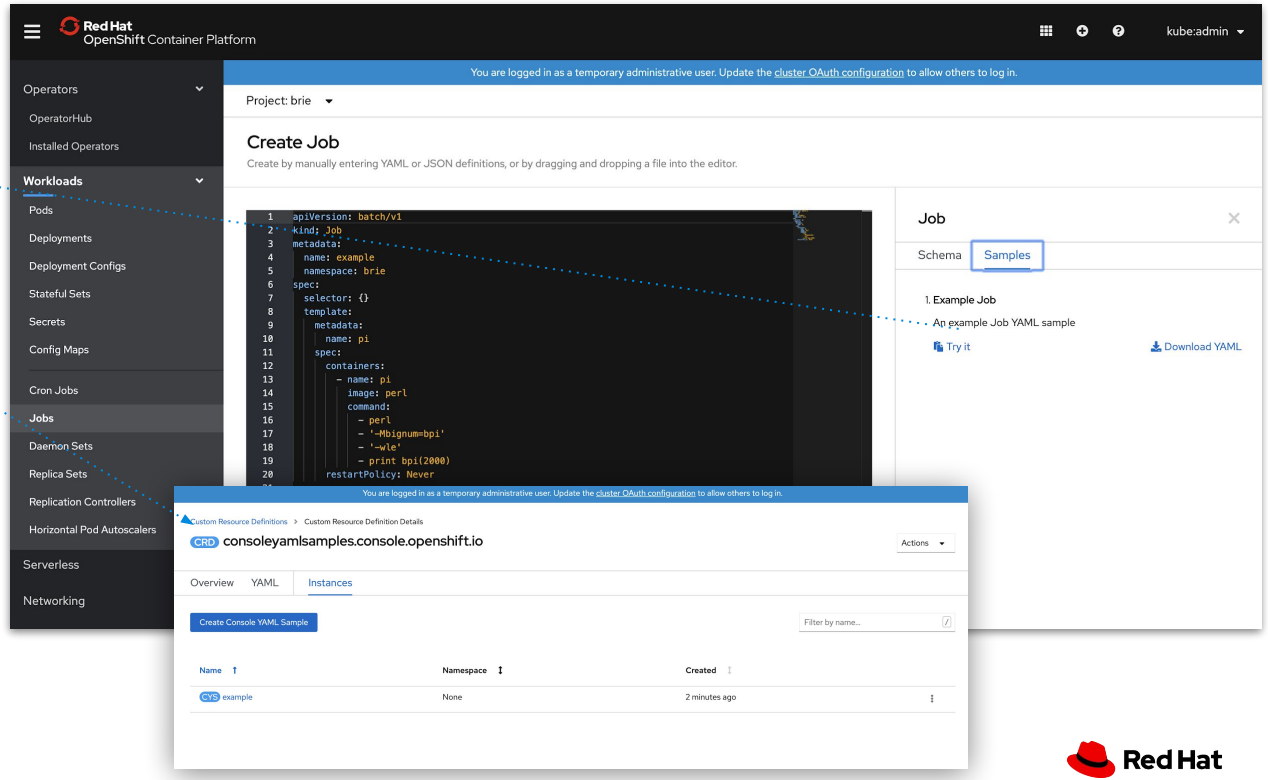
Pod
Namespace
Node
Cluster

Red Hat

Add YAML Samples for a specific resource

Educate your Users with an Easy Way to Understand Kubernetes Resources

- You can now add cluster-wide samples to any Kube Resource with ***ConsoleYAMLSamples CRD***.
- Each team that manages kube resources owns their samples and should make it part of their Operator.
- Any Operators can add YAML samples including Third-Party ISVs

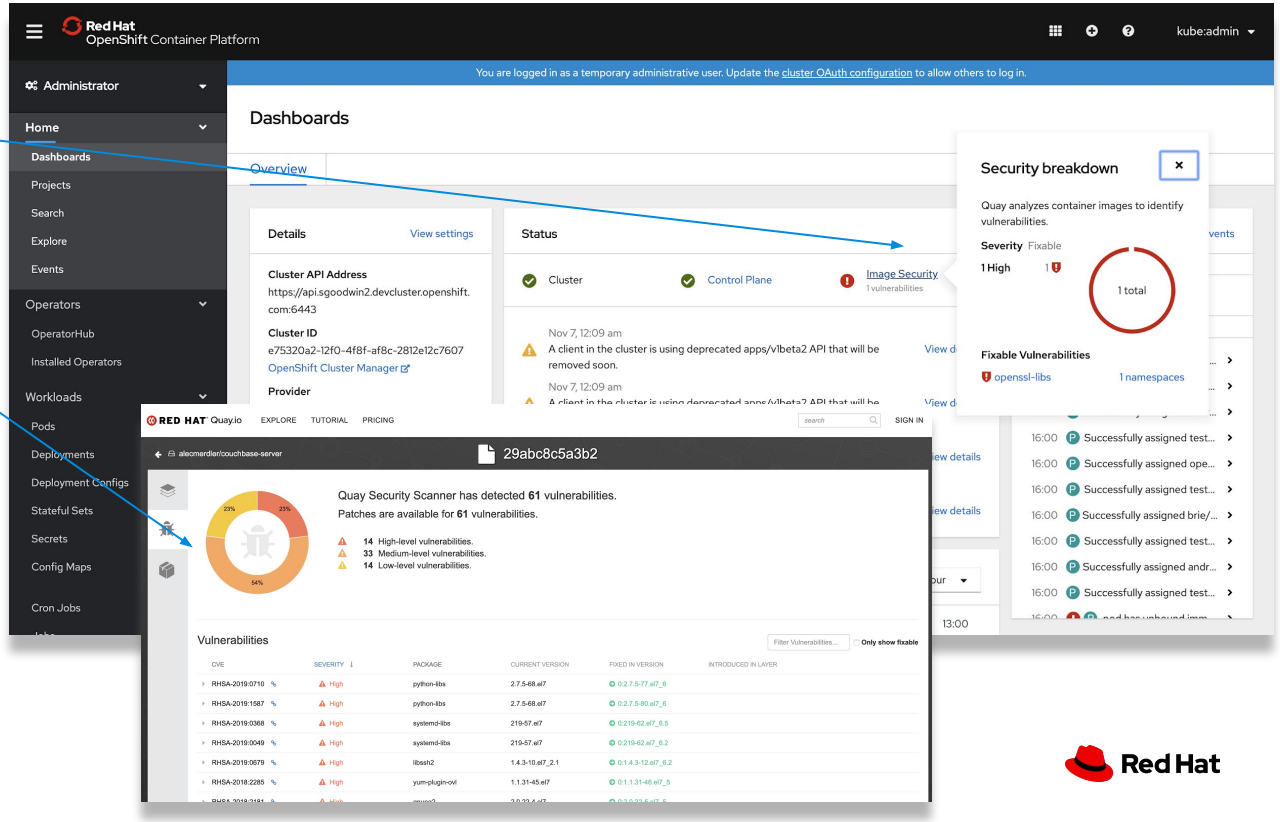


Red Hat

View Security Vulnerabilities with the Quay Operator

See all your Container Vulnerabilities right from the Console Dashboard

- Link out to **Red Hat Quay** for more in depth information
- The Quay Operator supports both **On-premise and External** Quay Registries
- Currently uses **Clair for Security Scan**; Planning to expand to other Vendors(TwistLock, Aqua, e.g.)
- *Only works for images managed by Quay*

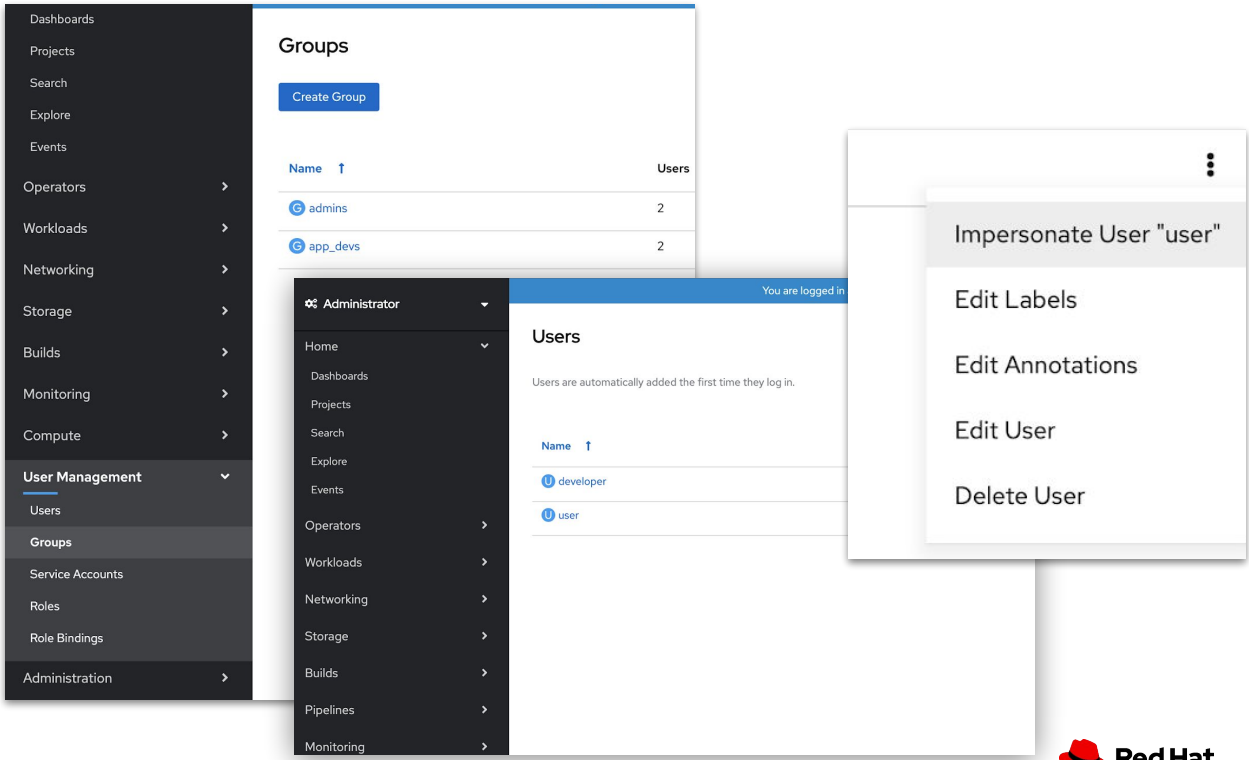


Red Hat

New User Management Section with the Console

Allow cluster admins to easily see who has access to the cluster and how they are organized

1. **All user management** resources under **one navigation section**
2. **Dedicated pages** to view **Users** and **Groups** for the cluster have been added
3. Ability to **impersonate a user;** view exactly what they can see

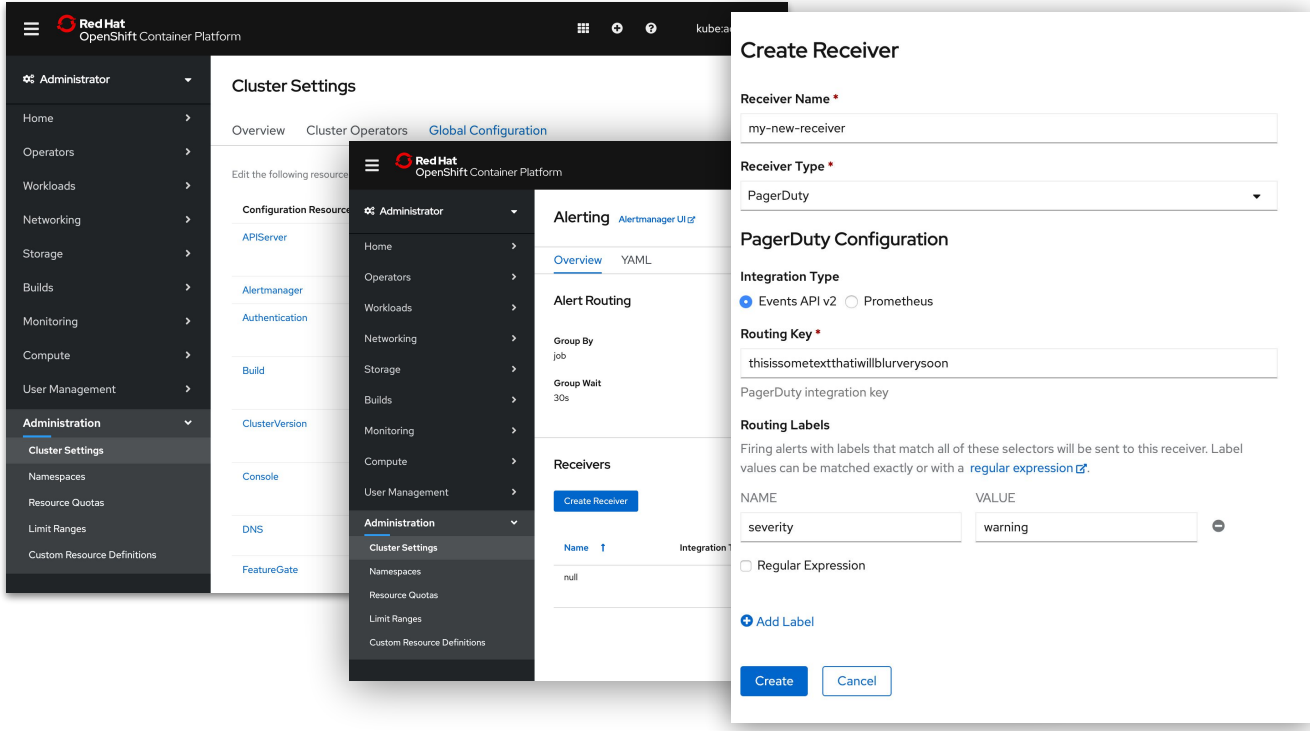


Red Hat

Be Informed with the Alert Receivers

Alerts are only useful if you know about them!

- **Reduce** your **Mean Time To Resolution** (MTTR)
- Create alerts receivers for:
  - **Pager Duty**
  - **Webhooks**
- **More receivers** to come in **future** releases
- Send alerts to the teams that need them; **Reduce the noise** for teams that don't
- Default receiver in place as a **catch all**



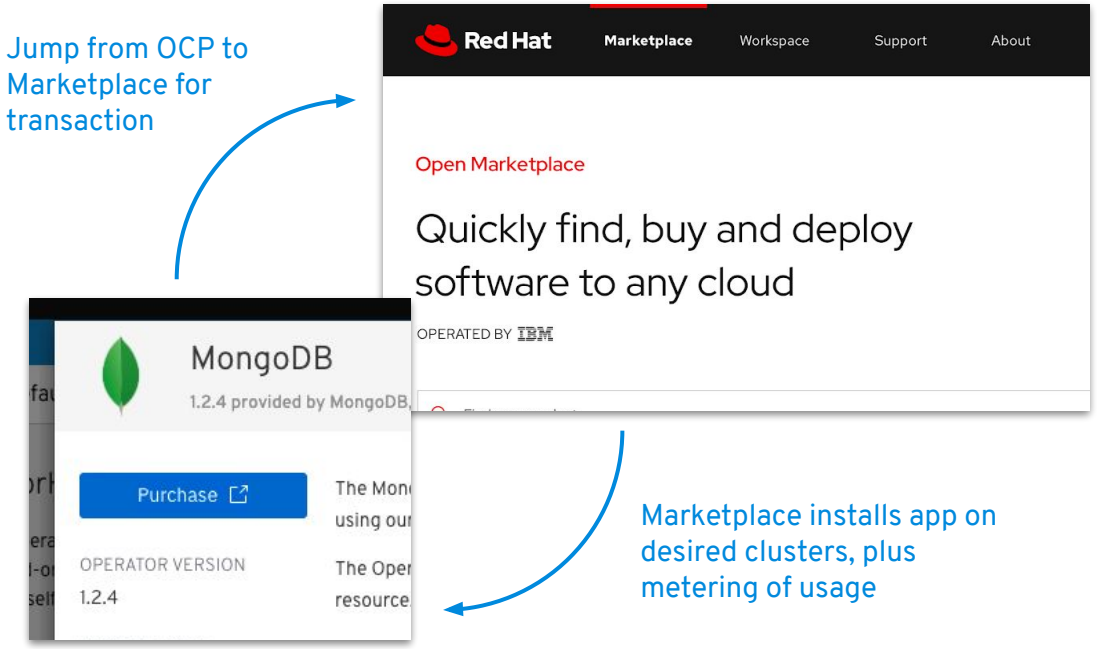
Red Hat

Open Marketplace in collaboration with IBM

New ability to sell ISV software

Builds on our Operator certification program to allow customers to purchase enterprise licenses from partners

- Jointly developed with IBM
- IBM will handle L1-L3 support
- Multi-cluster workflow
- Quotas, approval flow and more
- Developers access installed apps through Dev Catalog



Red Hat

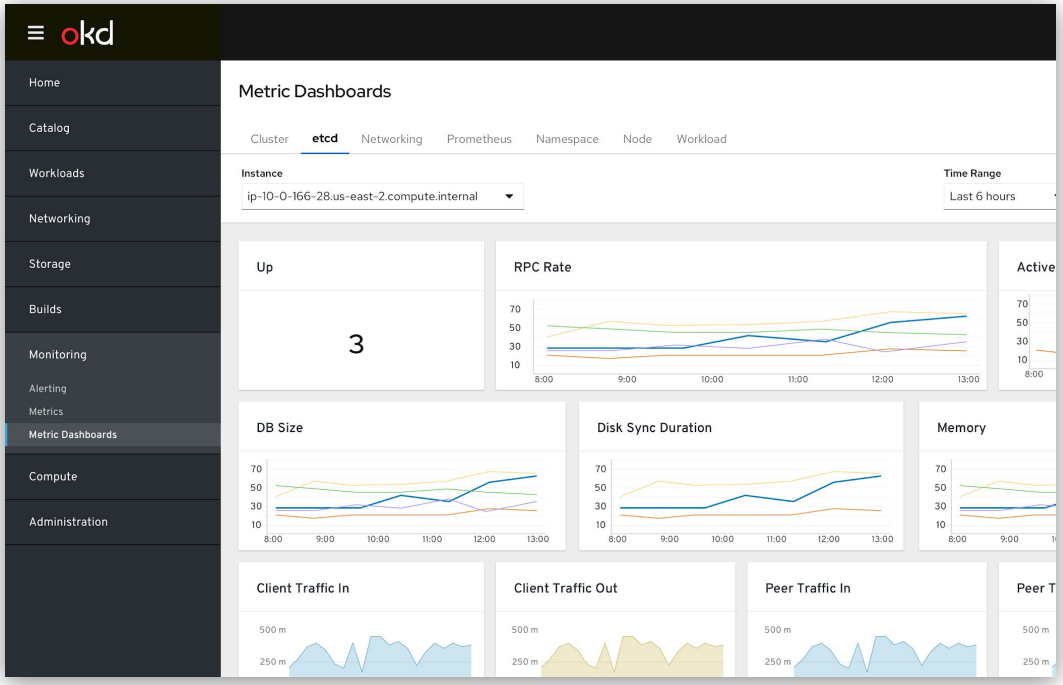
Custom Metrics Dashboards with Console Dashboard Rendering Framework

Dashboards customized to use-case

OpenShift adapts to standard use-cases like Edge, which requires deeper machine management and visibility

Customers have their own needs and can curate/share their own dashboards across clusters

.

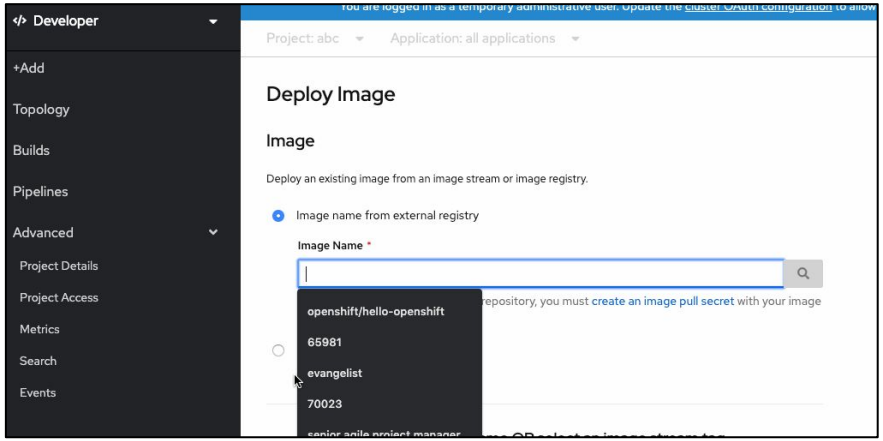


Enabling Developers

Deploy Applications streamlining flows

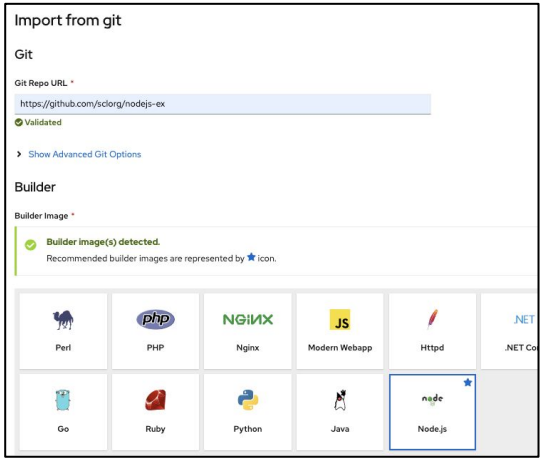
Deploy Image from Internal Registry

- Allow for rapidly deploying with alternate paths
- No need to repush/pull images



Auto-detect builder image

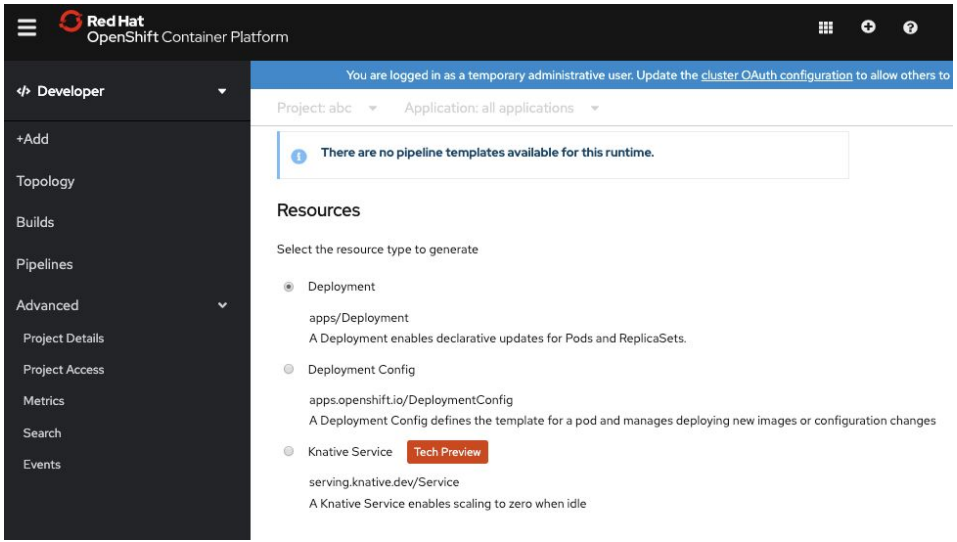
- Recommends builder images based on detected language by git provider



Red Hat

Deploy Applications alternate deployment targets

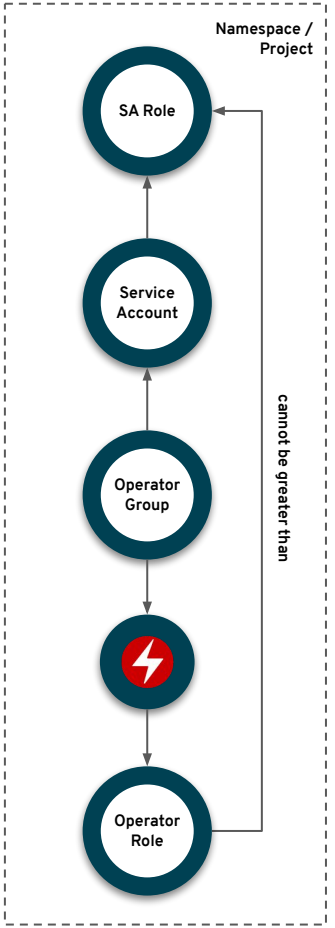
- Default to Kubernetes Deployments
- Alternately can use OpenShift's DeploymentConfigs or Knative Service (tech preview) objects
- Advanced options changes accordingly



Red Hat

Allow regular users to install Operators

- **In 4.1:** only users carrying `cluster-admin` roles are allowed to install Operators
- **In 4.2:** administrators can delegate installation to other users
  - `cluster-admin` can choose projects where project admins can install operators
  - `cluster-admin` can also define a `ServiceAccount` in projects
  - all installed Operators in this project get equal or lower permissions of this `ServiceAccount`



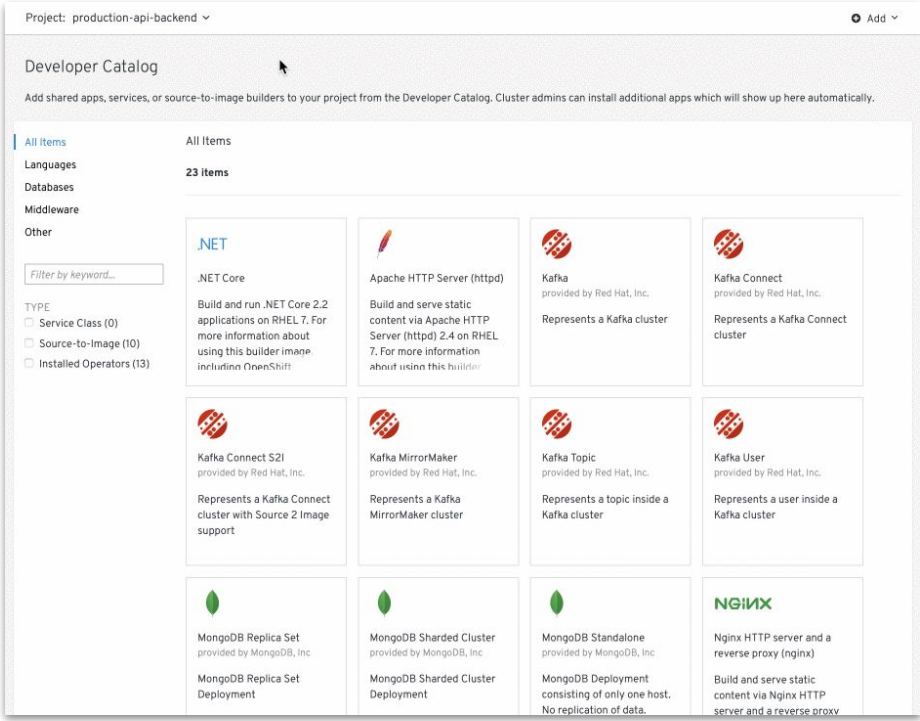
Services ready for your developers

New Developer Catalog aggregates apps

- Blended view of Operators, Templates and Broker backed services
- Operators can expose multiple CRDs. Example:
  - MongoDBReplicaSet
  - MongoDBSharded Cluster
  - MongoDBStandalone

Self-service is key for productivity

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



Cloud Native Development

OpenShift has all of the latest **tools** and **services**
to make your devs more productive.

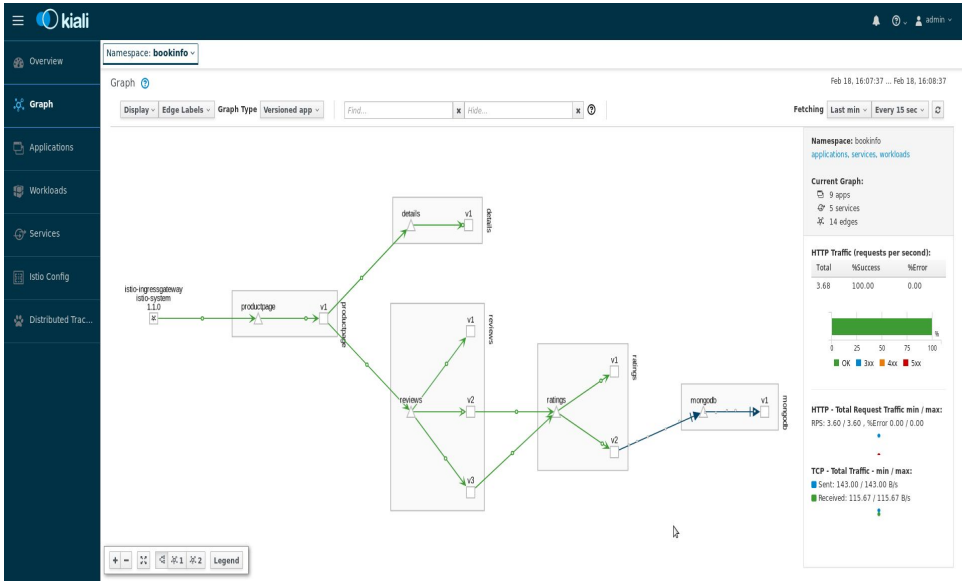
Code	Pipelines
Serverless	Service Mesh

Service Mesh

OpenShift Service Mesh

Key Features & Updates

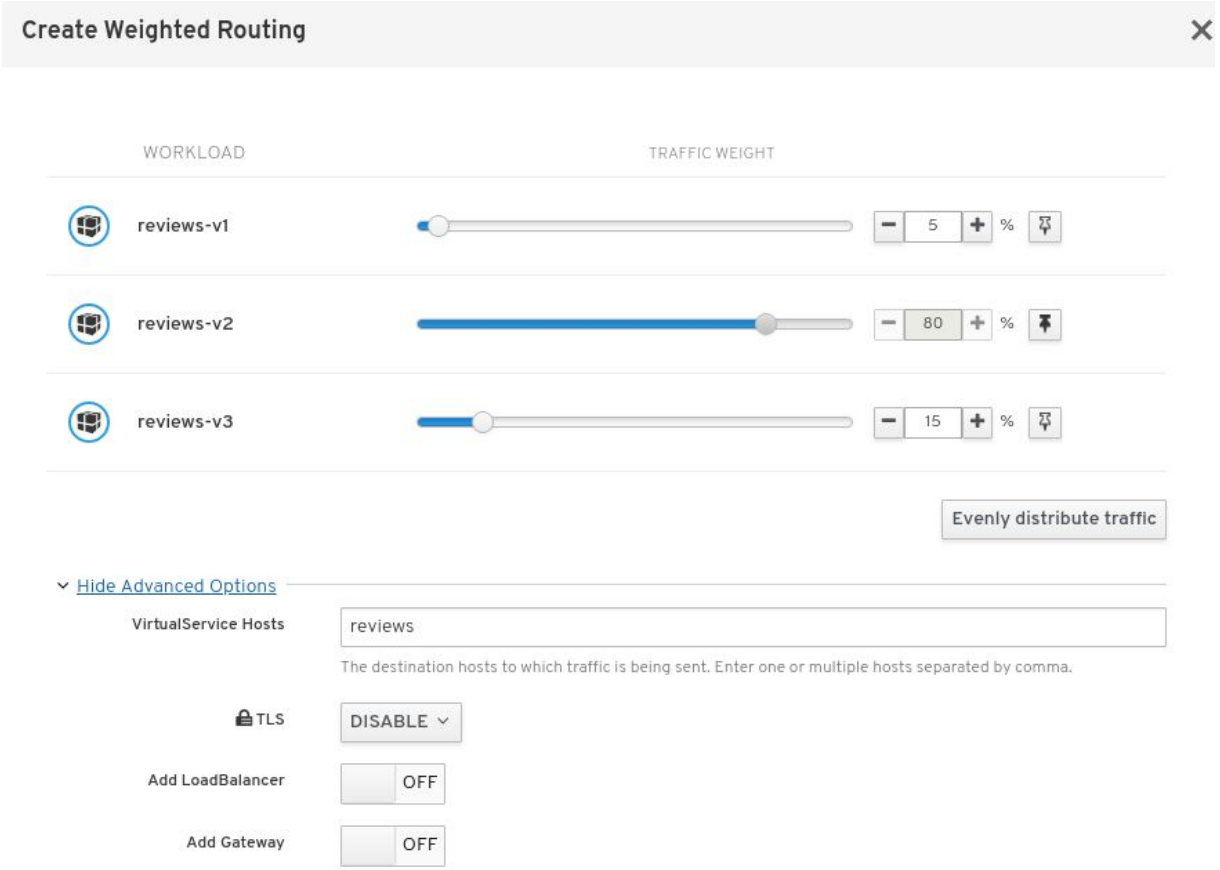
- Version 1.1 coming mid-February
- Upgrade Istio to version 1.4
- Direct links from OCP Console
- Labeled HAProxy routes into the mesh
- Kiali has been updated to Patternfly4
- Jaeger streaming support via Kafka
- Allow Jaeger to be used with an external Elasticsearch instance



Product Manager: Brian 'redbeard' Harrington

Red Hat

Guided Configuration of Traffic Policies

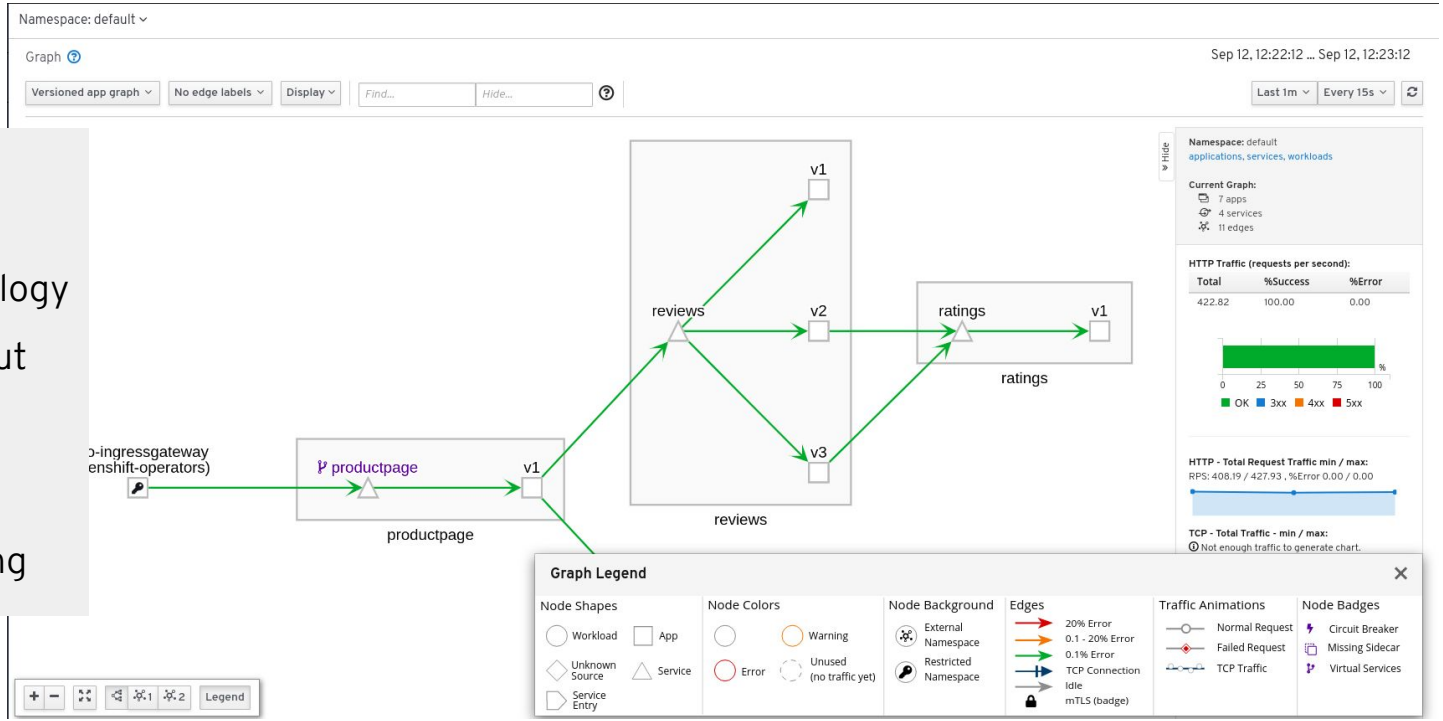


Red Hat

Enhanced Visualization of Cluster Traffic With Kiali

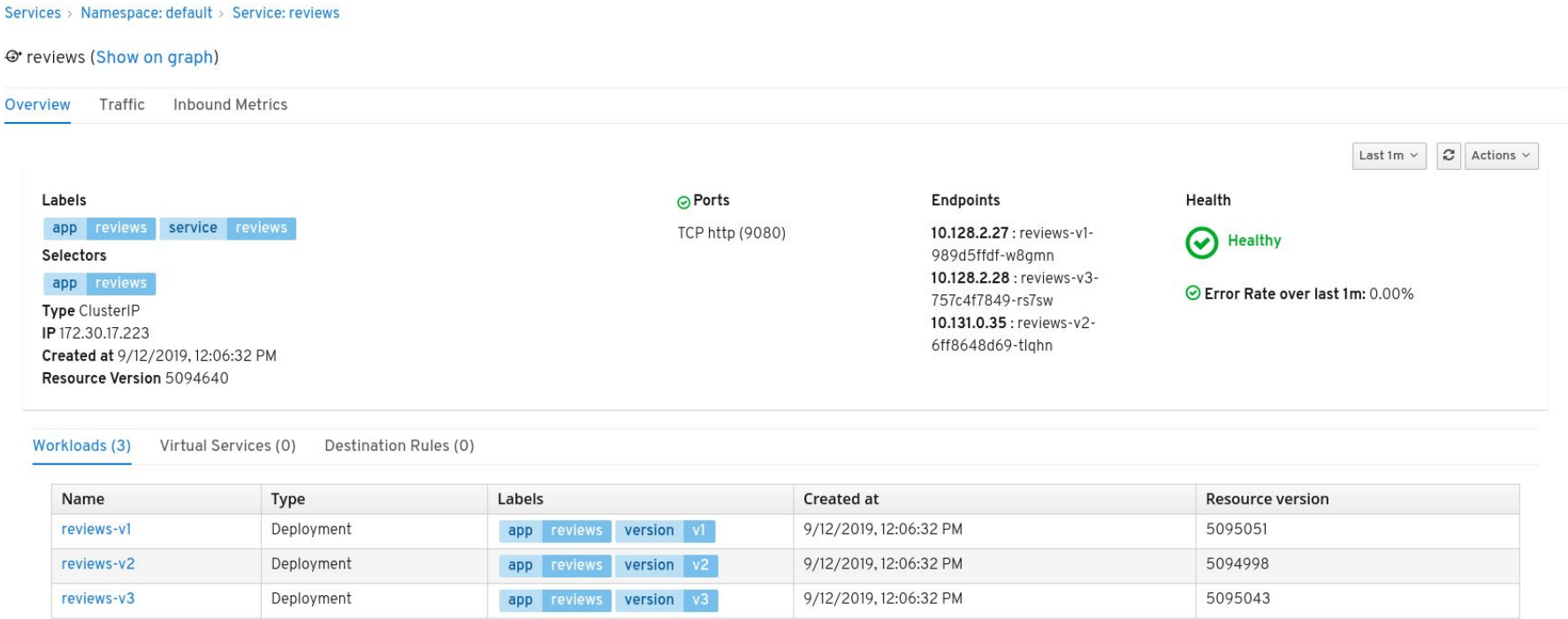
Visualization of what Matters most:

- Application Topology
- Traffic throughput
- Error Rates
- Service Latency
- Service Versioning



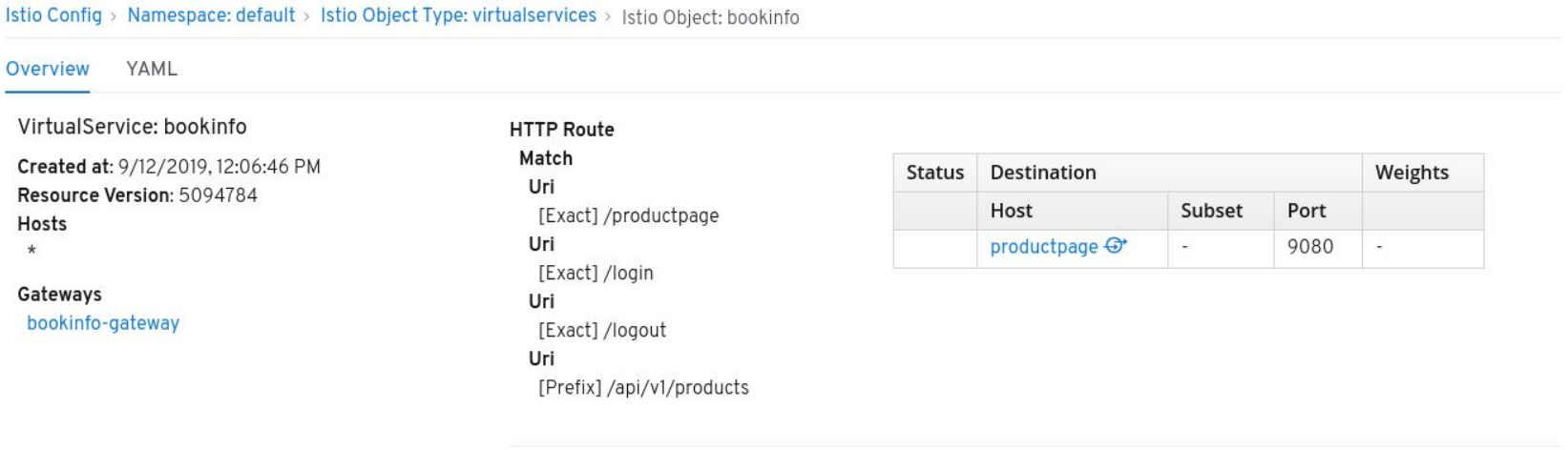
Red Hat

Convenient Overviews of Individual Services



Red Hat

Management of URI Matching for Virtual Services



Red Hat

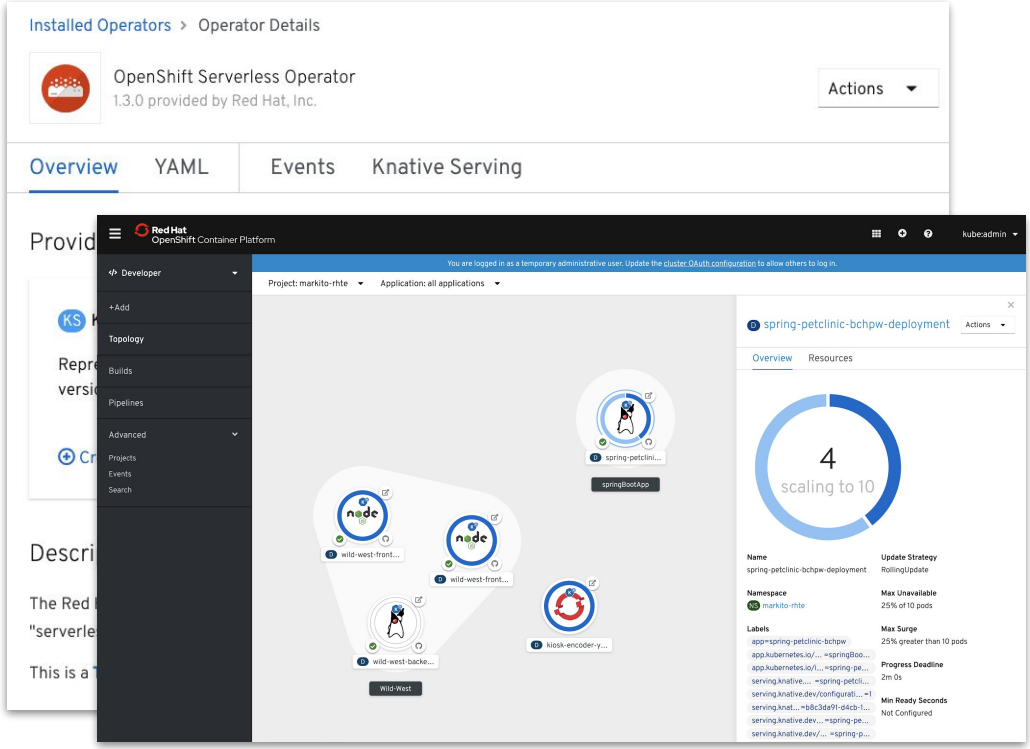
Serverless

Tech Preview

OpenShift Serverless in 4.3

Key features and updates

- **Serverless Operator v1.3.0**
- **Knative v0.10**
- **OLM dependency resolution for Service Mesh**
- Dropped support for Kubernetes 1.14 (OCP 4.1)



Learn more

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

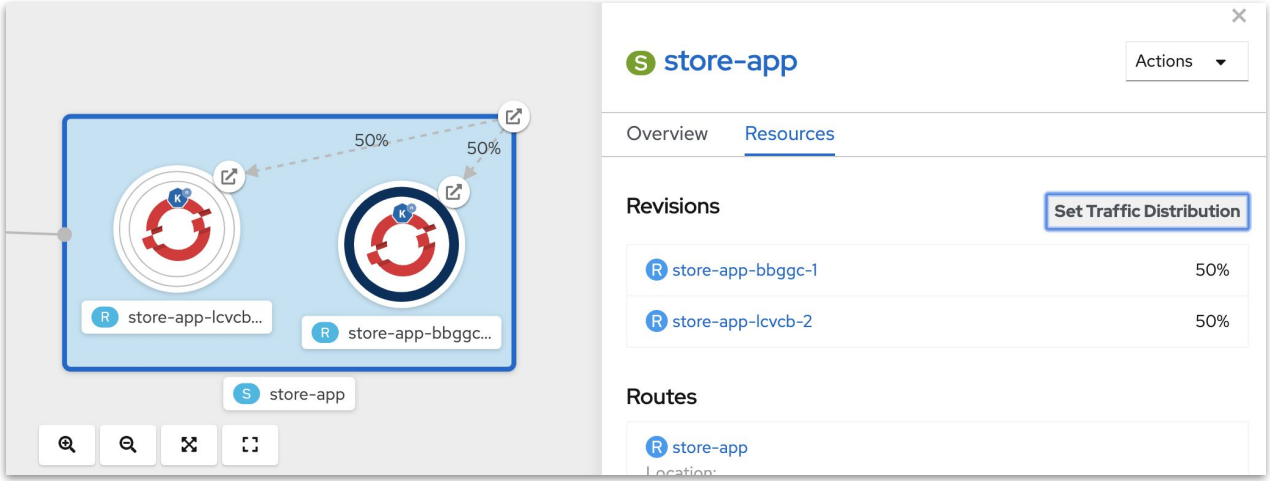
Knative Tutorial

Red Hat

Tech Preview

OpenShift Serverless in 4.3

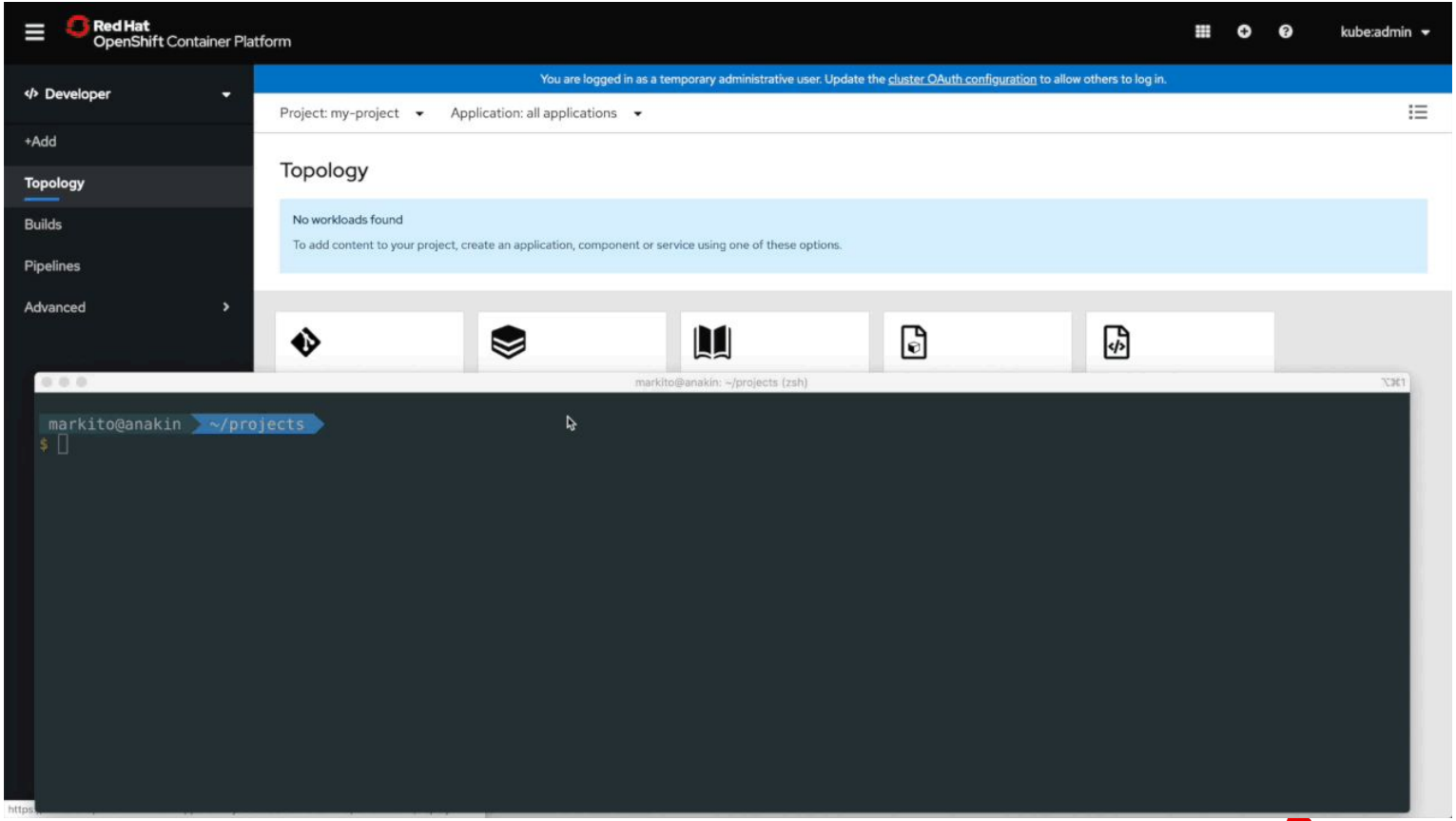
Traffic Split for Revisions



Red Hat

Tech Preview

CLI & UI Integration



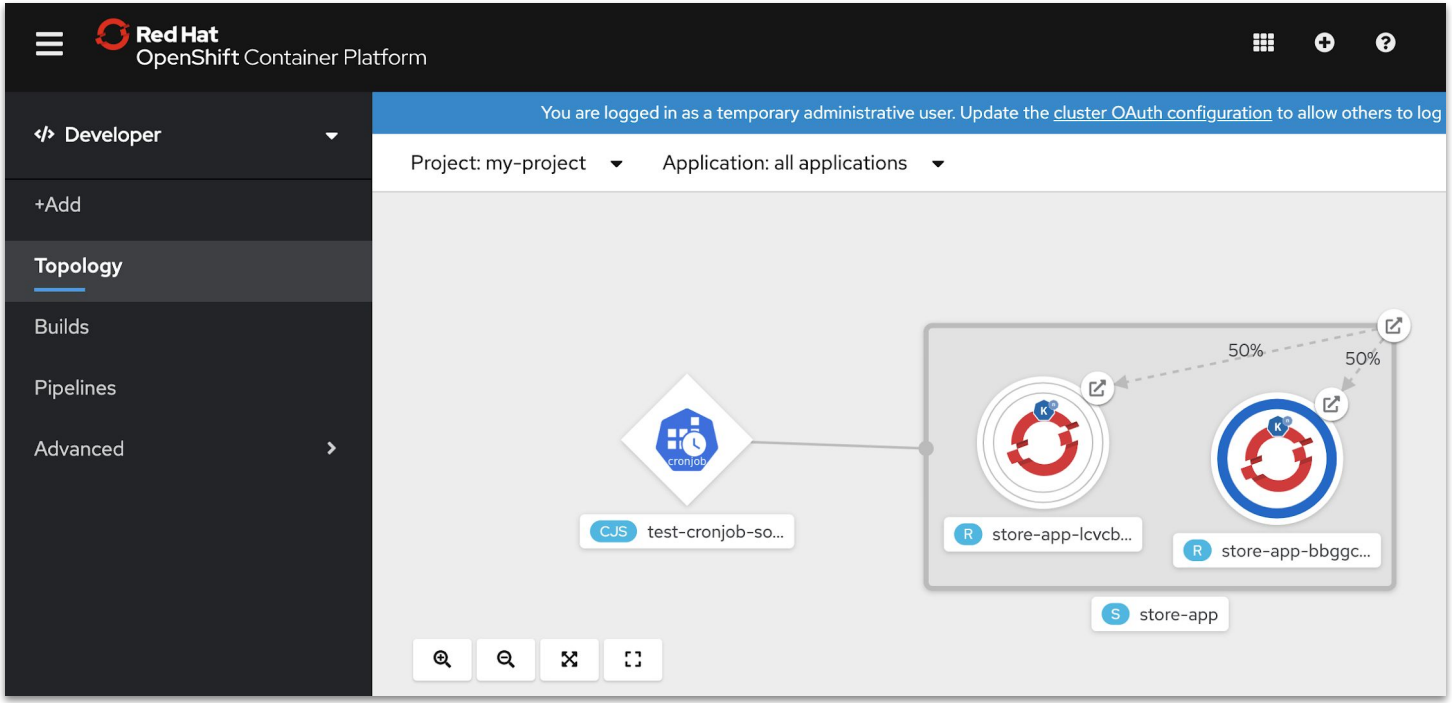
Red Hat

Developer Preview

OpenShift Serverless in 4.3

Event Sources

- KafkaSource
- CamelSource
- CronJobSource
- ContainerSource
- ApiServerSource



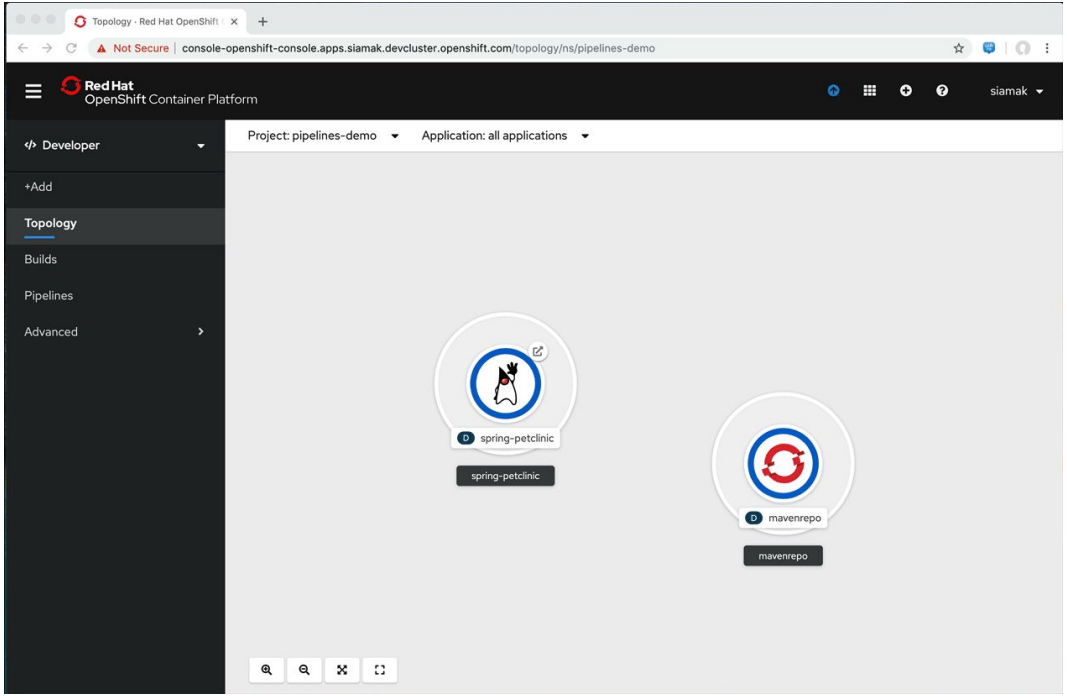
Red Hat

Pipelines and Jenkins

Tech Preview (Feb)

Cloud-native CI/CD with OpenShift Pipelines

- Based on Tekton Pipelines
- Runs serverless (no CI engine!)
- Containers as building blocks
- Build images with Kubernetes tools (s2i, buildah, kaniko, jib, buildpack, etc)
- Pipelines portable to any Kubernetes
- Available in OperatorHub
- Tekton CLI



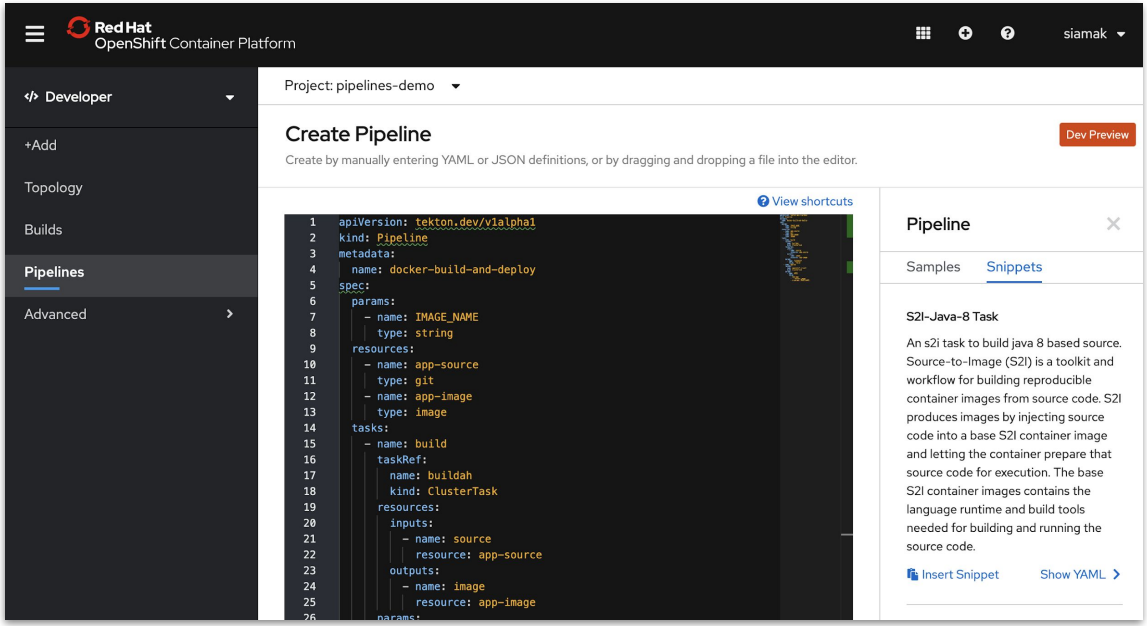
TEKTON

Red Hat

Tech Preview (Feb)

OpenShift Pipelines in OCP 4.3

- Git triggers (webhook)
- Automated RBAC setup
- Default curated tasks
- Pipeline metrics in Prometheus
- Pipeline samples and Task ref snippets in YAML editor

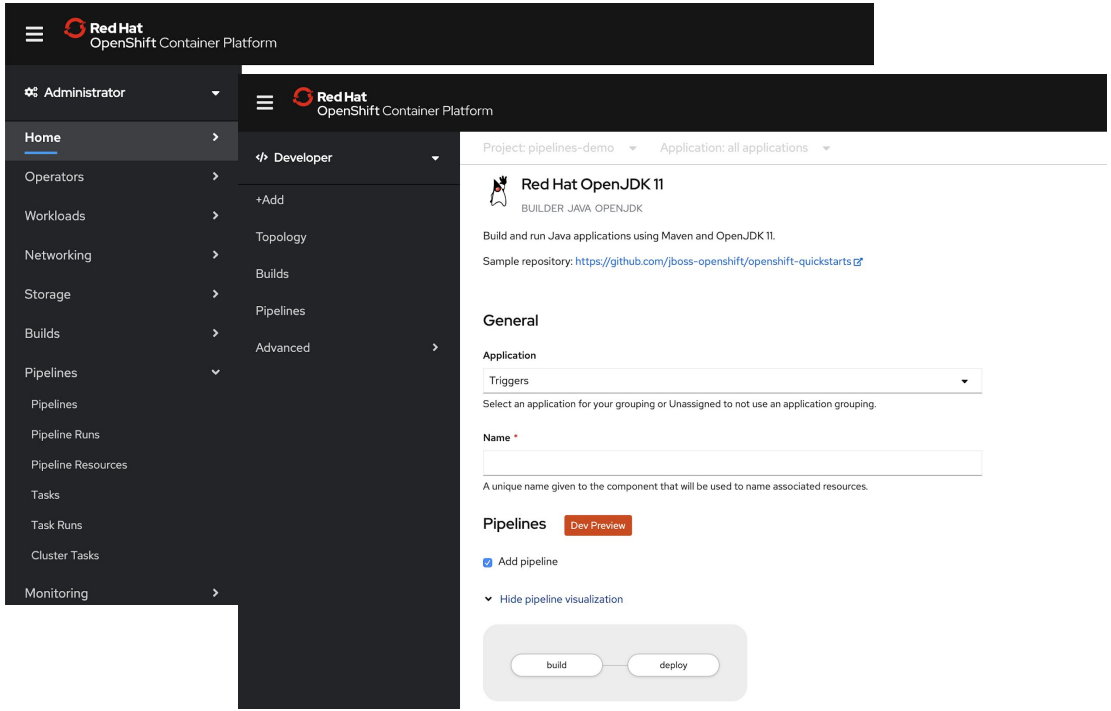


Red Hat

Tech Preview (Feb)

OpenShift Pipelines in OCP 4.3

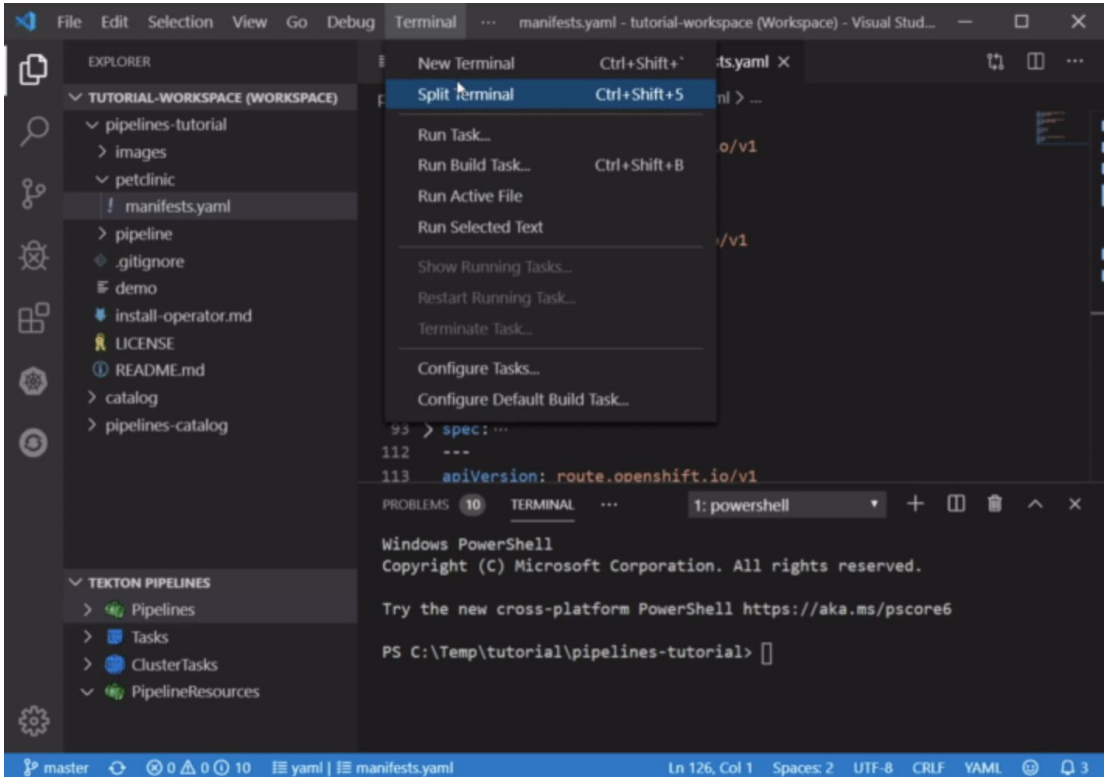
- Default pipeline on app import (+Add) in Dev Console
- Pipeline objects in Admin Console
- New Tekton CLI commands
  - Start pipelines
  - Start tasks
  - Create resources



Red Hat

Tekton Pipelines VSCode Extension

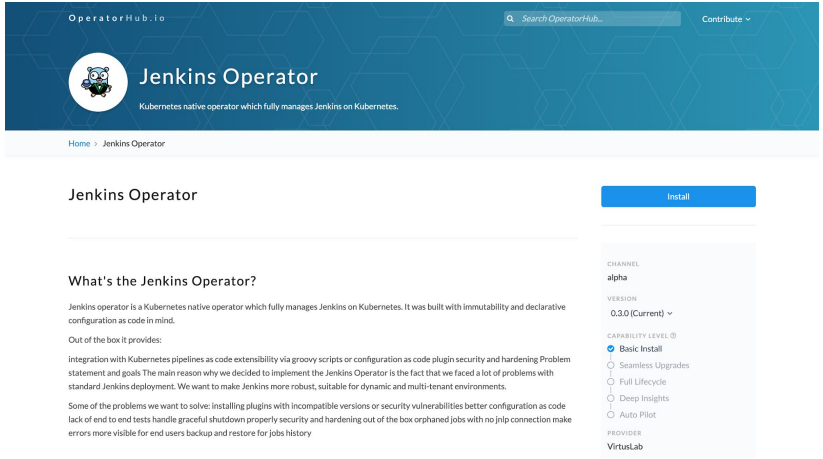
Create, triggers and manage Tekton Pipelines on OpenShift and Kubernetes from Visual Studio Code



Red Hat

Jenkins

- Jenkins server on JDK 8 & 11
- Jenkins agents
  - JDK 11
  - Node.js 10
- Official Jenkins Operator
  - github.com/jenkinsci/kubernetes-operator
  - Available in OperatorHub.io
  - Developer Preview on OCP 4.3
  - Collaboration upstream



Pipelines Roadmap

	Near Term (4.3)	Mid Term (4.4)	Long Term (4.5+)
	• Dev Metrics • Git triggers • Curated tasks • Task catalog • Knative tasks • Disconnected install	• Knative triggers • Admin Metrics • Pipeline-as-code • Grafana dashboard • Imagestream support • More common tasks • VSCode Tekton Plugin	• Notifications • Caching artifacts • Pull-request workflow • Task & pipeline marketplace • VSCode Tekton code assist • GitOps use-cases • Multi-cluster integrations
CONSOLE	• Pipeline editor • Sample pipelines • Pipeline in topology • CLI download link	• Visual pipeline builder • Open code in Che • Task catalog integration	• Pipeline metrics • Editor code assist • Curated pipelines • Task & Pipeline catalogs
	TECH PREVIEW	TECH PREVIEW	GA

Jenkins Roadmap

Near Term (4.3)

- Jenkins Operator (Dev Preview)
- Jenkins with JDK 11
- Maven agent with JDK 11
- Node.js 10 agent

Mid Term (4.4)

- Jenkins Operator (Tech Preview)
- Plugin improvements

Long Term (4.5+)

- Jenkins Operator (GA)
- Plugin improvements

CodeReady/Other Dev Tools

odo - OpenShift's Dev-Focused CLI

Focus on additional stability & customer usage (46 issues fixed)

Improve output when showing list of components

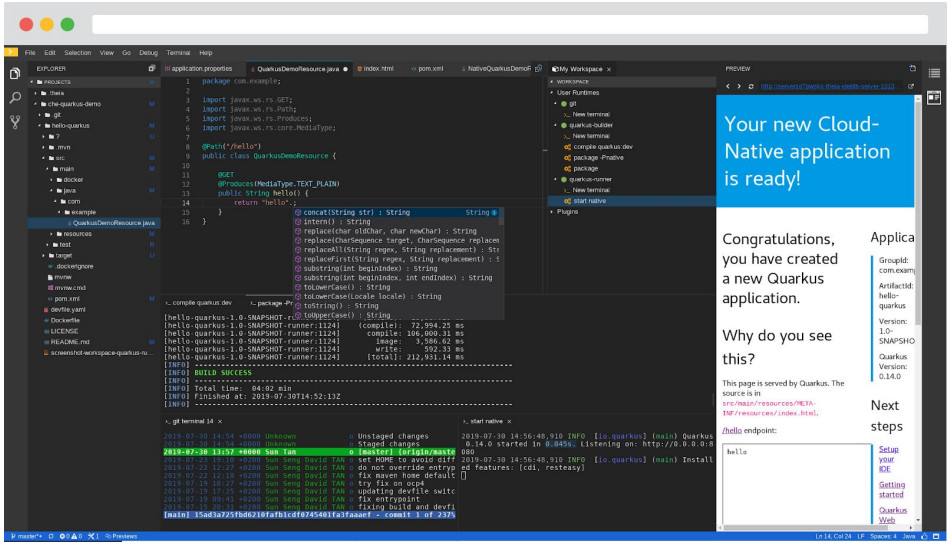
Focus on R&D/spike for new use cases: Knative, other runtimes, devfile support, etc

```
$ odo create wildfly backend
Component 'backend' was created.

$ odo push
Pushing changes to component: backend

$ 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
```

CodeReady Workspaces 2.0

Based on Eclipse Che 7

- **Kubernetes-based developer workspaces:** Fully containerized developer workspaces allowing to bring your K8S application runtime easily in your dev environment.
- **New Editor**: New default web-based editor provides a VSCode like experience in the browser.
- **Devfile:** Configure a devfile for your project and get reproducible and portable developer environments.
- **VSCode plug-ins compatibility**
- **Swappable Editor**
- **OpenShift VSCode Plug-in**
- **Easier to Monitor and Administrate:** Prometheus and Grafana dashboards.



Red Hat

CodeReady Containers: OpenShift on your Laptop

New in 4.3:

- Automatic certificate rotation for internal node<->master communication
- 4.3 embedded GA version targeted for February 4th
- Ongoing updates with 4.2 z-stream updates
- Deprecated: removed VirtualBox support
- crc version outputs embedded OCP version number
- Many stability fixes around host networking

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.

```
$ crc setup
Prepare your machine for running OpenShift

$ crc start
Start with the Hyperkit 4.3 bundle

$ crc status
Get the status of the cluster
```

CodeReady Containers: OpenShift on your Laptop

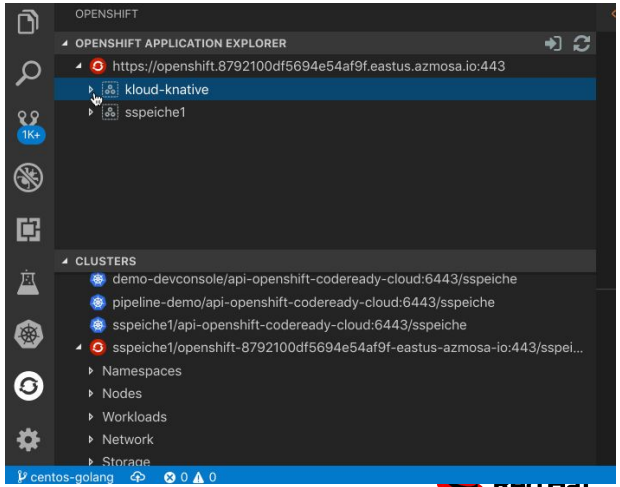
```
$ crc setup
Prepare your machine for running OpenShift

$ crc start
Start with the Hyperkit bundle

$ crc status
Get the status of the cluster
```

- Node cert expiration handling
- Focus on minimizing resource consumption
- Ease of upgrade
- Overall usability
- System tray

OpenShift Deploy Plugin

Evolve Red Hat created plugins to simplify development and deployment to OpenShift from popular IDEs and DevOps Toolchains:

- Azure DevOps
- VS Code
- JetBrains IDEs (e.g. IntelliJ)
- CodeReady Workspaces
- CodeReady Studio
- Eclipse IDE



Code Ready / Dev Tools Roadmap

More details

	4.3: 1Q CY20	4.4: 2Q CY20	4.5+: 2H CY20
odo	Alignment with:IBM & Possible sharing with skaffold	**Knative Serving support** **Alternate builder support**	Transition to outloop App import/export
Dev Perspective	Operator app deployment Pipeline authoring	Additional integrations Monitoring and alerting	More monitoring Guided app creation
Containers	Cert expiration improvements Reduce resource needs	Insecure registry System tray	Upgrade OKD & other machine support
Workspaces	Stabilization and feedbacks from CRW 2.0	Workspaces CRD Guided Flows	Integration with Pipelines, Serverless Live Collaboration
IDE Adapters	Expand odo usage	Expanded language support	More focus on plugins over IDE

Quay

Red Hat Quay v3.2

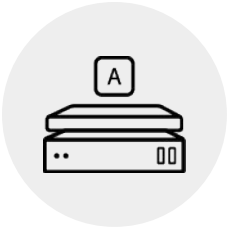
Container Security Operator

enables cluster administrators to monitor known container image vulnerabilities in pods running on their Kubernetes cluster

vulnerability information is shown inside the OpenShift Console (4.3+).

Support for RHOCS 4

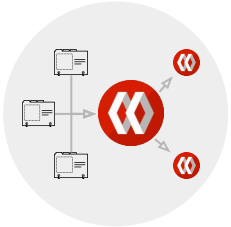
Support for most recent version 4 of Red Hat OpenShift Container Storage leveraging the NooBaa Multi-Cloud Object Gateway Operator



Quay Setup Operator (GA)

Automates the initial deployment of Quay and Clair and simplifies updates & day 2 ops

Configures all relevant OpenShift objects (routes, secrets, etc.)

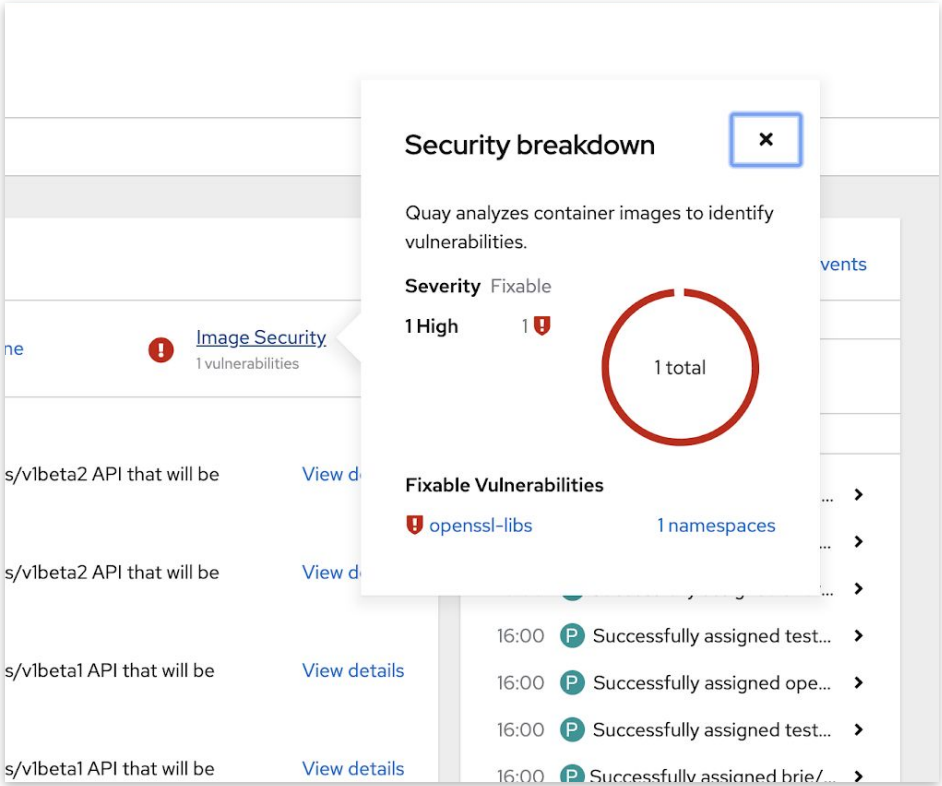


Repository Mirroring (GA)

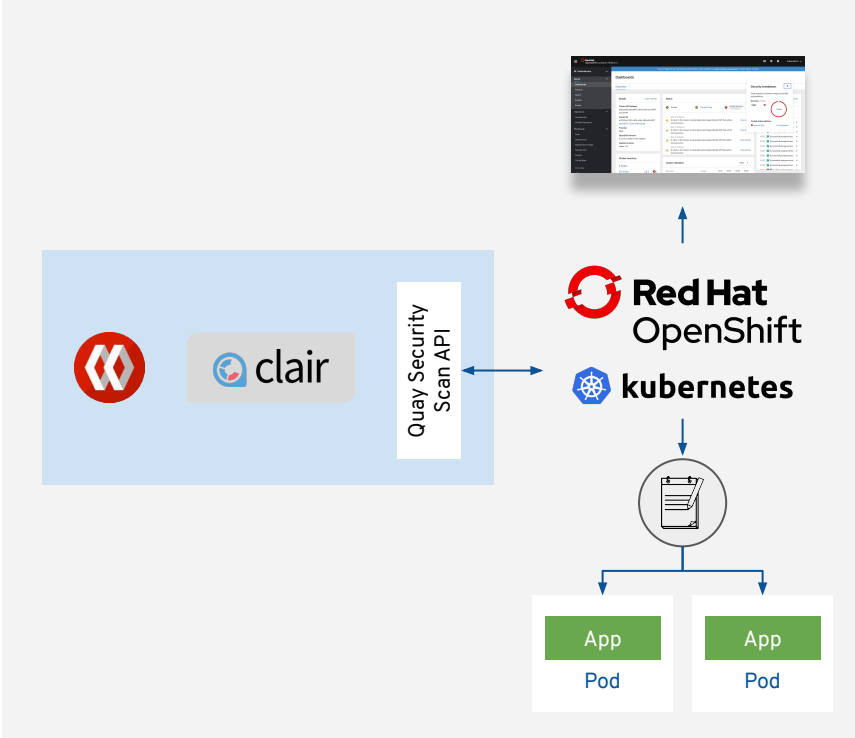
Allows to continually synchronize image repositories are a subset of those from external source registries into Quay (content ingress point / content whitelists)

Learn more: https://www.redhat.com/en/blog/red-hat-quay-32-welcome-container-security-operator

Security Scan Results through the UI



Container Security Operator (CSO)



- Container Security Operator (CSO) runs on OpenShift and watches pod objects
- Pod object changes triggering a data fetch from Quay/Clair and stores vulnerability information in CRs (by image manifest ID)
- CRs gets deleted if pod gets deleted
- Configurable interval to update vulnerability data from Quay / Clair (default: 5min)
- Data available via k8s CLI / APIs
- Supposed to be used by partner security products as well (consistent data ingress)

Red Hat Quay / Quay.io / Quay Dedicated Roadmap

	Near Term (3.2)	Mid Term (3.3)	Long Term (3.4+)
QUAY	• Quay Setup Operator GA • RHOCS4 support • Repo Mirroring GA • Early upstream releases of future features	• Quay - OpenShift integration operator • LDAP filters / bindings • Quota Showback/ Reporting • Repo mirroring enhancem.	• Better air-gapped env support • Deeper integration into OCP • Quay Builder redesign • Content type Enhancements • App registry redesign
CLAIR	• Container Security Operator (CSO) • Vulnerability data in OCP Console (via CSO)	• Application content scanning (Clair v4) • Clair air-gapped & multi-arch support	• 3rd party scanner plugged into Quay via Clair • Enhanced content coverage • Container Health Index

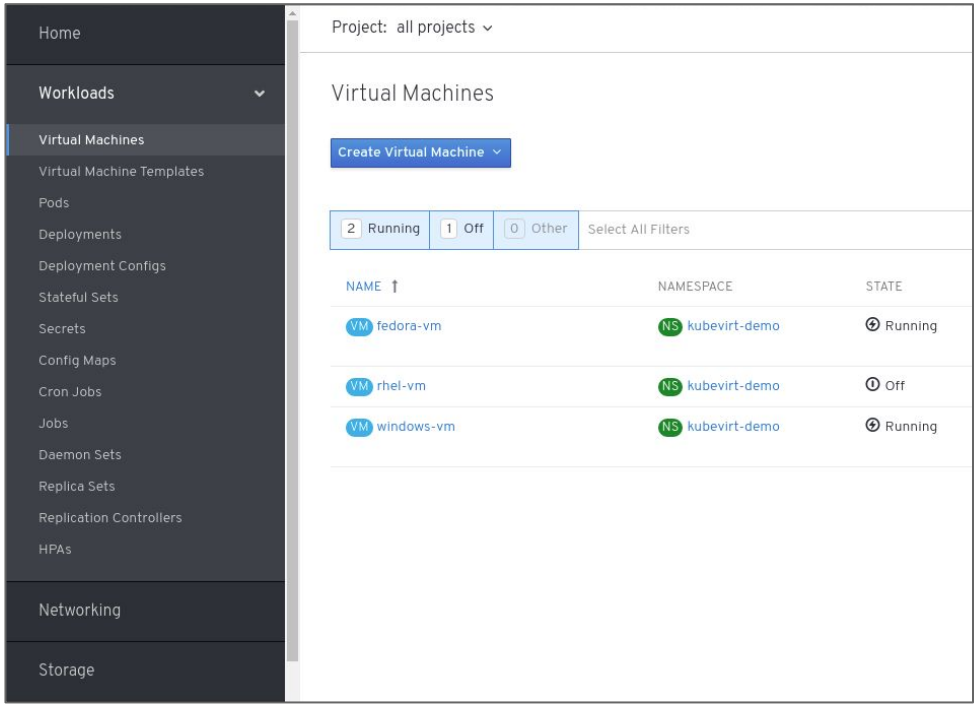
Roadmap is subject to change.

Tech Preview

Container Native Virtualization

Red Hat

- CNV 1.3 Tech Preview (now)
- CNV 1.4 Tech Preview (soon)
  - Basic live migration
  - Containerized data importer
    - Progress reporting
    - Disk expansion
    - Blank disks
  - Operators for KubeVirt, Containerized data importer
  - UI Enhancements
    - RDP, Serial, VNC, consoles
    - CRUD Disks, VM templates



Container-native virtualization roadmap

Near Term (CNV 2.1 / OCP 4.2)

- **Tech Preview**
- Live-migration with shared OpenShift Container Storage 4.2 (when available), to enable mobility of virtual machines for load balancing or maintenance reasons.
- Integration of Container-native Virtualization logs into must-gather, to assist with support case triage and resolution.
- Automated MAC address allocation for secondary NICs.
- Now installable via marketplace.

Medium Term (CNV 2.2 / OCP 4.3)

- **Tech Preview**
- Hostpath-provisioner support.
- Forensic VM capture (pause and capture disk/memory).
- Support CNV 2.x on RHEL 7 workers.

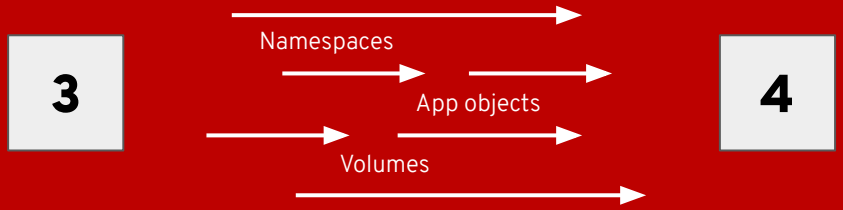
Central focus on enabling current technology preview consumers and improving our ability to deliver shortly after or in parallel to OCP releases.

Long Term (CNV 2.3 / 4.4+)

- **Tech Preview**
- Windows SVVP certification.
- Ensure VM/PV locality when using local storage.
- CPU pinning.
- NUMA locality.

Continue to analyse and address gaps compared to traditional virtualization, while balancing against feedback from technology preview consumers.

Migrating to OpenShift 4

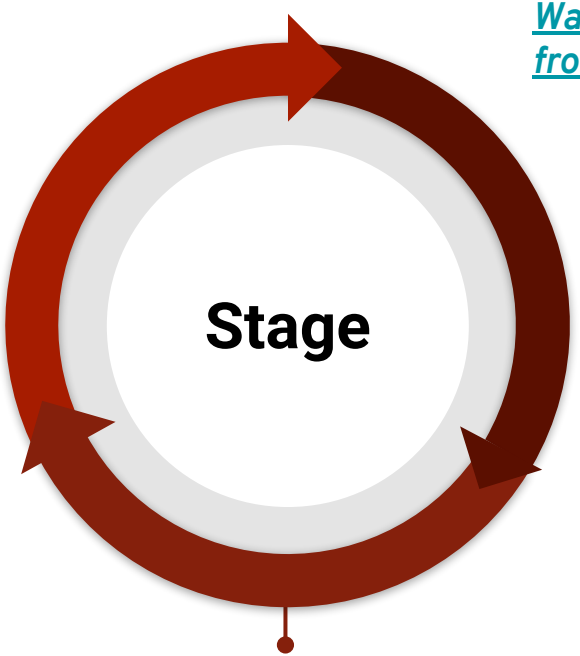


Red Hat

Watch a migration of MS-SQL Server from OCP 3.11 to OCP 4.1!

Plan

1. Select Source Cluster
2. Select Namespaces
3. Choose Copy or Move for each PV
4. Specify Destination



Stages the data from Source to Destination.
May be run multiple times.
Applications are running
no Downtime during step

Migrate

Quiesce Application

Migrate any delta bits not captured in stage.

Product Manager: Maria Bracho

Why did we choose this migration strategy?

Reducing risk

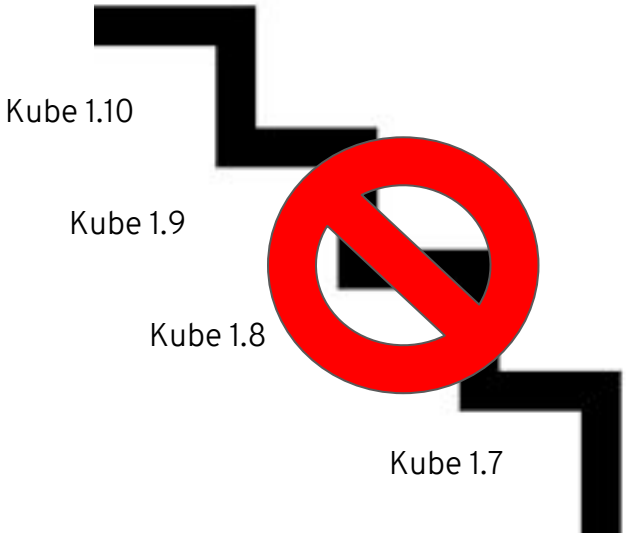
A ton of innovation went into OpenShift 4, and an in-place upgrade would have risk of failure in which there is no forwards or backwards remediation. It allows you to skip from 3.7/3.9/3.10/3.11 to 4.x. Skipping the need to install each one.

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.



Granularity of Namespace(s) & ‘cluster-admin’ required

- Migration is at scope of a Namespace.
  - *Future will allow selecting resources inside of a Namespace*
- Cluster Scoped Resources are not handled
  - Cluster Role Bindings, SCCs, etc are not handled with migration.
  - Expectation is that cluster admin handles cluster scoped resources ahead of running a Migration.
- ‘cluster-admin’ required for initial release targeting OCP 4.2
  - Future plans to allow end user to migrate what they own post OCP 4.2+

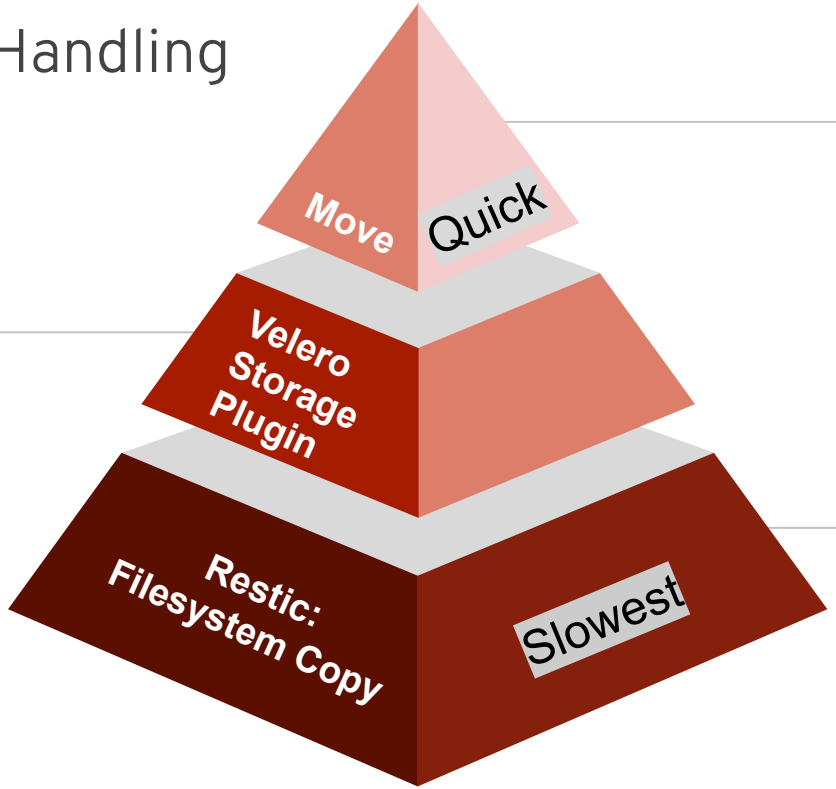
Persistent Volume Handling

Copy: Storage Provider Plugin

(AWS EBS, Google, Azure)

2

Leverage snapshot support from the storage provider such as Amazon EBS snapshots..



Move "Swing the PV"

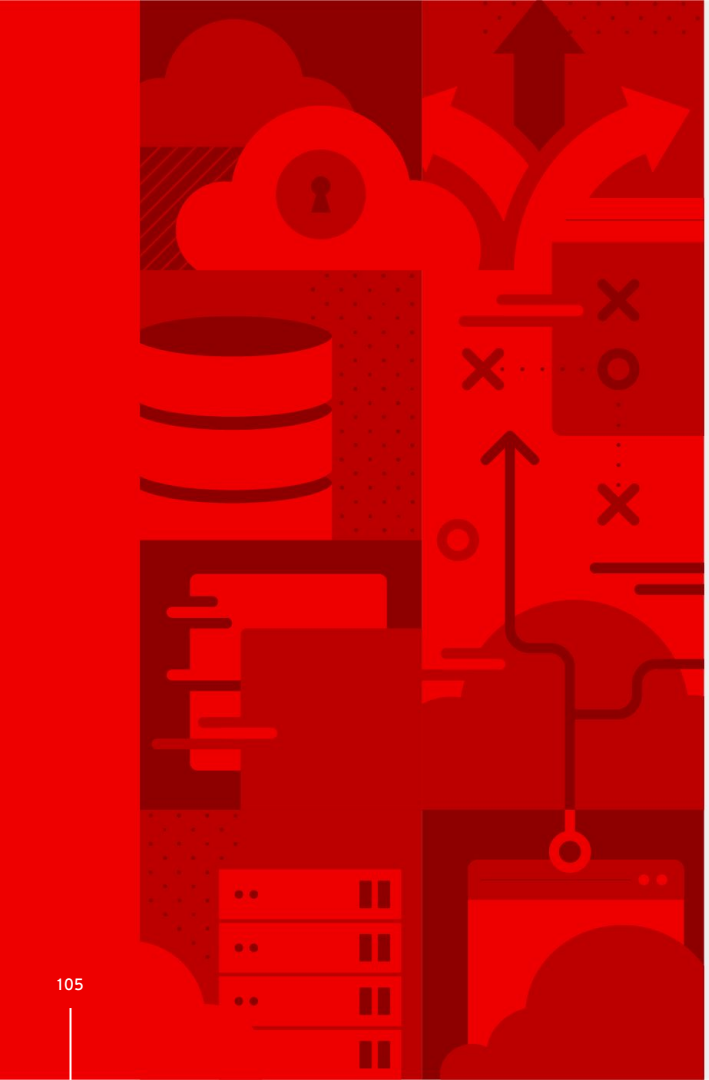
1

The data remains where it is in the volume. The definition of the volume is essentially 'swung' from the source cluster to the destination cluster. Quickest migration strategy as it involves no processing of the data. No rollback capability, recommended to ensure a backup exists prior to moving.

Copy: Restic Filesystem level copy

3

Catchall, if no other plugins exist fall through to a filesystem level copy of the data on a PV. Most flexible approach, yet likely not as performant as other methods.



Questions?

linkedin.com/company/red-hat

facebook.com/redhatinc

youtube.com/user/RedHatVideos

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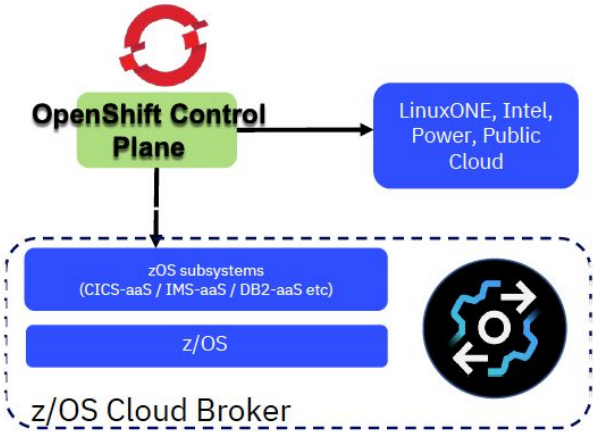
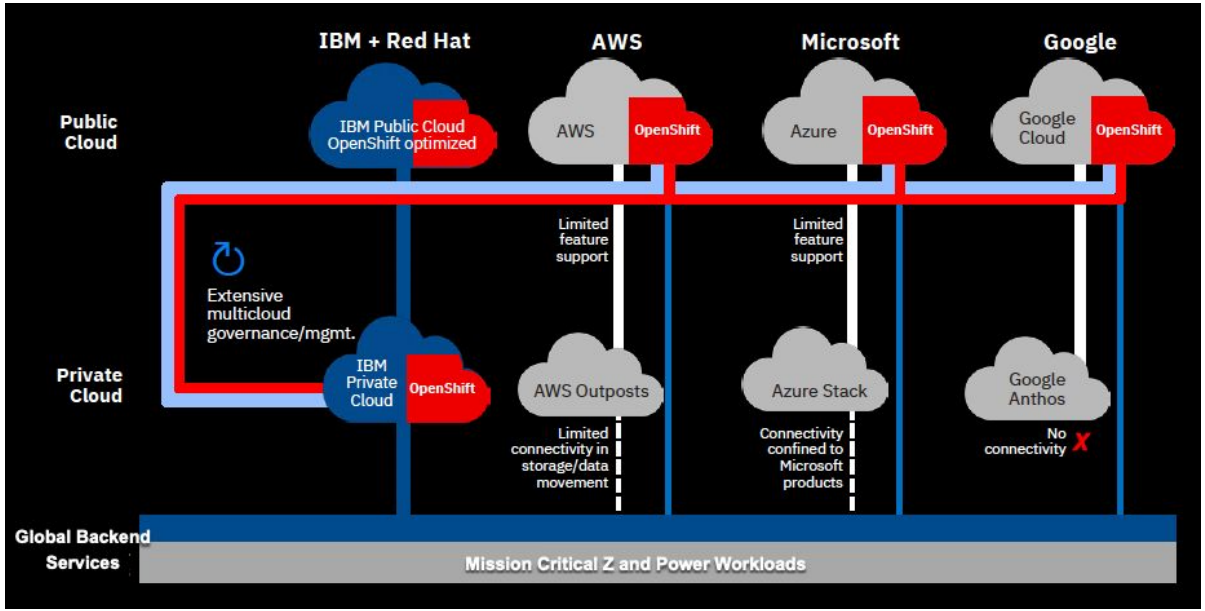
Red Hat

Multi-Arch

OpenShift 4 on IBM Z and Power Deliver the Industry's Only True Hybrid Multi-Cloud Platform for all Datacenter Services





Red Hat

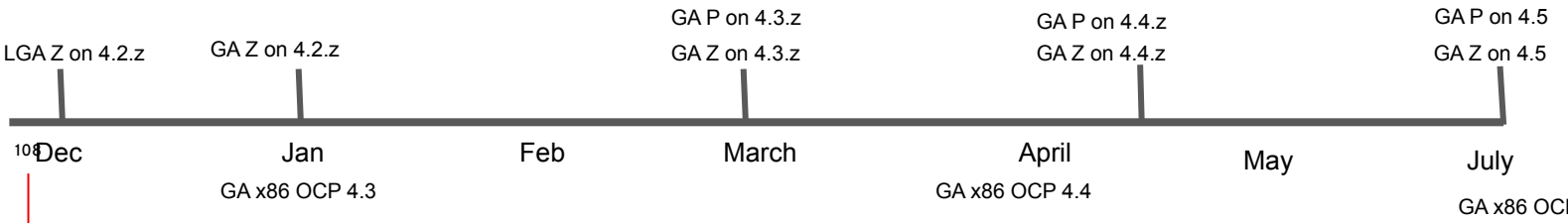
OpenShift 4 on IBM Z and Power

First releases in 2020 will focus on CaaS functionality.

Three Primary Use Cases

1. **Data-gravity** -- apps connect via ultra-low-latency, ultra-secure and highly resilient network into legacy system-of-record (eg. Service Broker to zOS instances)
2. **Security/Compliance** -- apps can be deployed un-modified into zero-trust enclaves with strong data-governance and/or have strong-affinity to highly certified HSM-services (eg. core-banking, blockchain, crypto wallet, digital assets, quantum proof etc)
3. **Cloud-in-a-box** -- instant capacity on-demand with scale-up/out in a single footprint for space and power constrained data-centers

Releases will trail x86 by 1 until the middle of 2020 and then come in sync on 4.5.



Red Hat