OpenShift 4 Roadmap Update

Duncan Hardie
Product Manager

Jan Kleinert
Developer Advocate
OpenShift 4 Platform

- Fully integrated and automated
- Seamless Kubernetes deployment
- Fully automated installation
- 1-click platform updates
- Autoscaling of cloud resources
Full-stack automated install

OPENSHIFT 3 & 4

OPENSHIFT PLATFORM

OPERATING SYSTEM

INFRASTRUCTURE

OPENSHIFT 4 (only)

OPENSHIFT PLATFORM

OPERATING SYSTEM

Red Hat
Enterprise Linux
CoreOS

INFRASTRUCTURE
Operators codify operational knowledge and workflows to automate life-cycle management of containerized applications with Kubernetes.
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
OpenShift CY2020

Initiatives

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

We must drive the foundational components of our architecture stack to converge with MCM and other open source solutions.

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. Strengthen our operator ISV solutions.
**What's new in 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
Install/Upgrade
4.3 Supported Providers

Full Stack Automation (IPI)

Pre-existing Infrastructure (UPI)

* Support planned for an upcoming 4.3 z-stream release
What's new in OpenShift 4.3

OpenShift Upgrades

OCP 4.3 Upgrade Channels

- OCP 4.3 includes three 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.
Disconnected “Air-gapped” Installation & Upgrading

# mirror update image:
$ oc adm -a <secret_json> release mirror \
--from=quay.io/<repo>/<release:version> \
--to=<local registry>/<repo> \
--to-release-image=<local registry>/<repo:version>

# provide cluster with update image to update to:
$ oc adm upgrade --to-mirror=<local repo:version>

Overview
- 4.2 introduces support for installing and updating OpenShift clusters in disconnected environments
- Requires local Docker 2.2 spec compliant container registry to host OpenShift content
- Designed to work with the user provisioned infrastructure deployment method
  - Note: Will not work with Installer provisioned infrastructure deployments

Installation Procedure
- Mirror OpenShift content to local container registry in the disconnected environment
- Generate install-config.yaml: $ ./openshift-install create install-config --dir <dir>
  - Edit and add pull secret (PullSecret), CA certificate (AdditionalTrustBundle), and image content sources (ImageContentSources) to install-config.yaml
- Set the OPENSHIFT_INSTALL_RELEASE_IMAGE_OVERRIDE environment variable during the creation of the ignition configs
- Generate the ignition configuration: $ ./openshift-install create ignition-configs --dir <dir>
- Use the resulting ignition files to bootstrap the cluster deployment

Generally Available
Support for installing private/internal facing clusters

- Enables clusters to be installed on Day 1 as fully private/internal facing on supported public cloud providers
  - Private clusters don't expose any external endpoints (API & default Ingress LB's are private)
  - Cluster is only accessible from an internal network and are not visible to the Internet
  - Useful for customer environments that don't require external connectivity to the outside world and prefer not to expose their cluster network information publicly

Requirements

- Admins need to edit the install-config.yaml file to define how you wish to publish the user-facing endpoints of your cluster [Internal or External]

Documentation

- AWS: https://docs.openshift.com/container-platform/4.3/installing/installing_aws/installing-aws-private.html
- Azure: https://docs.openshift.com/container-platform/4.3/installing/installing_azure/installing-azure-private.html
- GCP: https://docs.openshift.com/container-platform/4.3/installing/installing_gcp/installing-gcp-private.html
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 from OpenShift 4.2
Day 2 Management
Security Themes

Control Application Security
- Connect workload identity to Cloud provider authorization
- Application certificate lifecycle management

Defend the Infrastructure
- Encrypt etcd datastore
- Enhanced certificate management
- RHEL CoreOS disk encryption
- VPN / VPC support
- Consume group membership from Identity Provider
- External Keycloak integration

Automate Compliance
- Disconnected / air-gapped install
- FIPS compliance
- Cipher Suite Configuration
- Compliance Operator
Stronger Platform Security

Defense in Depth

- **FIPS Compliance**
- **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 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

Product Manager: Kirsten Newcomer & Keith Basil
Monitoring your own services

Extend existing stack to configure monitoring for any service running on OpenShift.

Goals for this milestone are:

- Feedback!
- Enable additional Prometheus servers that your customers own, but are managed by us.
- Configure monitoring for your business critical services not covered by the out-of-the-box monitoring stack.
- Access metrics through a single, multi-tenant interface.
- Maintain notifications in a centralized Alertmanager setup.
- Developers can query metrics through the developer perspective.

Product Manager: Christian Heidenreich
Multi Cloud
PATH TO MULTI-CLUSTER

Provisioning/Cluster Lifecycle
- OpenShift Installer, Hive, MCM

UX/Inventory/Lifecycle
- MCM, OCM, On-premise OCM frontend for Hive

Common Monitoring & Logging
- Multi-cluster Monitoring and Observability

Job Deployment & Policy
- MCM, gitOps, App SIG projects

Infrastructure
- Network: Submariner
- Storage: Building on Noobaa

Product Managers: Duncan Hardie, Jacob Lucky (OCM), Katherine Dubé (Installer, Hive)
Multi Cluster Life Cycle

- Getting Clusters as if they were Pods
  - Head cluster with CRD to understand cluster config
- 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](https://github.com/openshift/hive)

OpenShift 4.4
- Initial GA release
- Support for provisioning clusters on AWS, Azure, and GCP

OpenShift 4.5
- On-premise Cluster Manager (MCM) front-end
Integration with IBM MCM

- Discovery
- Application modelling
- Policy
- Compliance
- Incidents and remediation
- Dynamic search
- Multicluster application placement
Multi-Cluster Networking

- **Submariner project**
  - Controlled, secure communication between clusters
  - Agents and controller run on nodes which are connected in a mesh
  - Dev preview available from OCP catalog

- **Lighthouse and Coastguard** are projects that provide multi cluster DNS and network policy accordingly on top of Submariner
GitOps with ArgoCD Reference Architecture

- Install and configuration of ArgoCD on OpenShift
- 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
Cloud Native Development

OpenShift has all of the latest tools and services to make your devs more productive.
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 HAPerxy 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
Serverless
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
Pipelines
Cloud-native CI/CD with OpenShift

- 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 Pipelines VSCode Extension

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

- Jenkins server on JDK 8 & 11
- Jenkins agents
  - JDK 11
  - Node.js 10
- Official Jenkins Operator
  - [github.com/jenkinsci/kubernetes-operator](https://github.com/jenkinsci/kubernetes-operator)
  - Available in OperatorHub.io
  - Developer Preview on OCP 4.3
  - Collaboration upstream
CodeReady / Dev Tools
**odo** - OpenShift’s Dev-Focused CLI

- $ 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

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

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

Product Manager: Steve Speicher
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

Product Manager: Steve Speicher
Helm
Helm 3 on OpenShift

Helm is a package manager for Kubernetes applications and helps to define, install and update apps.

Helm Chart (templates) → Helm CLI → Releases → Image Repository
Values (configs)
Helm 3 on OpenShift

**OpenShift 4.3**
- Helm 3 CLI in Tech Preview
- Built and shipped with OpenShift
- Available in Console CLI menu
- Added to OpenShift Docs

**OpenShift 4.4+**
- Helm 3 in Dev Console
  - Charts in Developer Catalog
  - Releases in Dev Console
  - Update/rollback/delete
- Helm developer guides
Helm and Operators

Package and Install

- **Helm**
  - Basic Install
    - Automated application provisioning and configuration management
  - Seamless Upgrades
    - Patch and minor version upgrades supported

Automated Day-2 Operations

- **Operator**
  - Phase I: Full Lifecycle
    - App lifecycle, storage lifecycle (backup, failure recovery)
  - Phase II: Deep Insights
    - Metrics, alerts, log processing and workload analysis
  - Phase III: Auto Pilot
    - Horizontal/vertical scaling, auto config tuning, abnormal detection, scheduling tuning
  - Phase IV
  - Phase V

Product Manager: Siamak Sadeghianfar
OpenShift Console
The future is now.

Extending the Console
Administration made easy

Improve Observability
Developer Focused

Developer Focused Administration made easy
Enhanced Visibility with the New Project Dashboard

Project-scope Dashboard gives Developer Clear Insights

Drill down in context from the new project dashboard widgets:

- Project Details
- Project Status/Health
- Project External Links (Launcher)
- Project Inventory
- Project Utilization
- Project Resource Quota
- Project Activity (Top consumers)

Product Manager: Ali Mobrem
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

Product Manager: Ali Mobrem
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
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

Product Manager: Ali Mobrem
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**

Product Manager: Ali Mobrem
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
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
Application Topology streamlined flows

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

Product Manager: Steve Speicher
Quick access to key application metrics

- Use of Prometheus Query Language
- Easily build up queries and plot to visualize application and component trends
Roadmap
# OpenShift Roadmap

## Q3 CY2019
OpenShift 4.2

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## Q1 CY2020
OpenShift 4.3

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OpenShift 4.4+

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## Timeline
- OpenShift 4.2: Q3 CY2019
- OpenShift 4.3: Q1 CY2020
- OpenShift 4.4+: CY2020
## OPENSHIFT ROADMAP

### Q3 CY2019
OpenShift 4.2

- Developer Console GA
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- OpenShift Pipelines (Tekton) DP3
- CodeReady Containers GA
- Developer CLI (odo) GA

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

- 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)

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

### Q1 CY2020
OpenShift 4.3

- OpenShift Pipelines (Tekton) TP
- Helm 3 TP

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

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- 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

- 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+

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

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- CSI certification suite

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

- Azure Red Hat OpenShift new features (monitoring, logging)
Questions?

try.openshift.com

linkedin.com/company/red-hat
youtube.com/user/RedHatVideos
facebook.com/redhatinc
twitter.com/RedHat