Red Hat OpenShift

CoreOS and CRI-O & Operator Framework

Red Hat

Red Hat Enterprise Linux

	RED HAT® **ENTERPRISE LINUX®** General Purpose OS	**RED HAT®** **ENTERPRISE LINUX CoreOS** 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

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.

**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

RHEL CoreOS admins are responsible for:

Nothing. 😃 🙌

Red Hat
OpenShift
Container Platform

v4.1.6

Red Hat
Enterprise Linux
CoreOS

v4.1.6
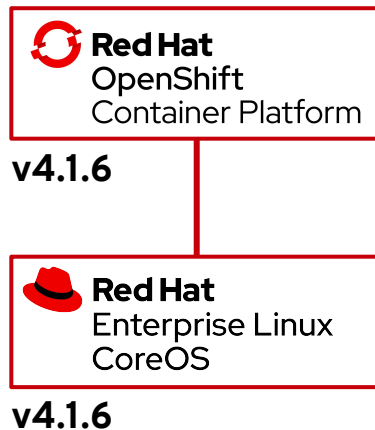
cri-o

A lightweight, OCI-compliant container runtime

Minimal and Secure Architecture	Optimized for Kubernetes	Runs any OCI-compliant image (including docker)

Red Hat

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

Red Hat
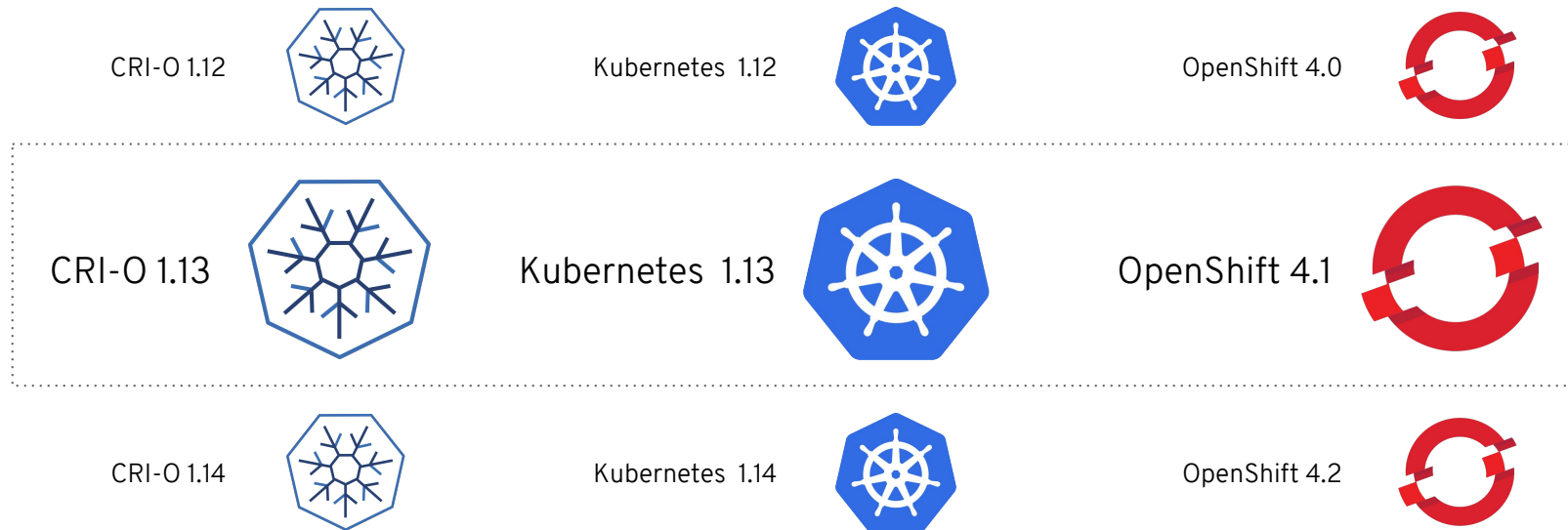
podman

A docker-compatible CLI
for containers

- Remote
  management API
  via Varlink
- Image/container
  tagging
- Advanced
  namespace
  isolation

buildah

Secure & flexible OCI container builds

- Integrated into OCP build pods
- Performance improvements for knative enablement
- Image signing improvements

HandsOn Part two

"Build an app with Buildah"

A broad ecosystem of workloads

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

Relational DBs

Big Data

Monitoring

Security

NoSQL DBs

DevOps

AL/ML

Messaging
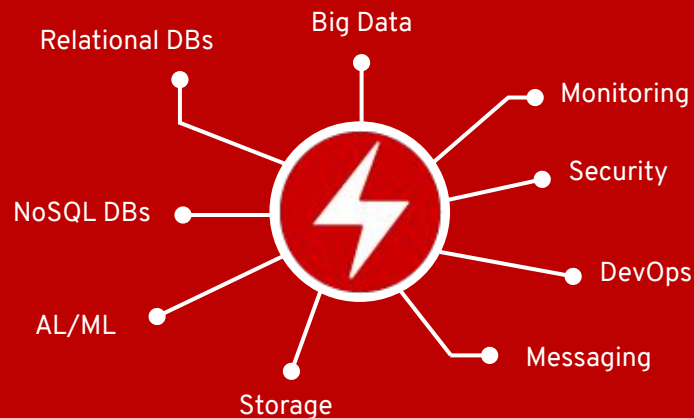
Storage

Red Hat Certified Operators

DEVOPS	
APM	
DATA SERVICES	
DATABASE	
SECURITY	
STORAGE	

OperatorHub data sources
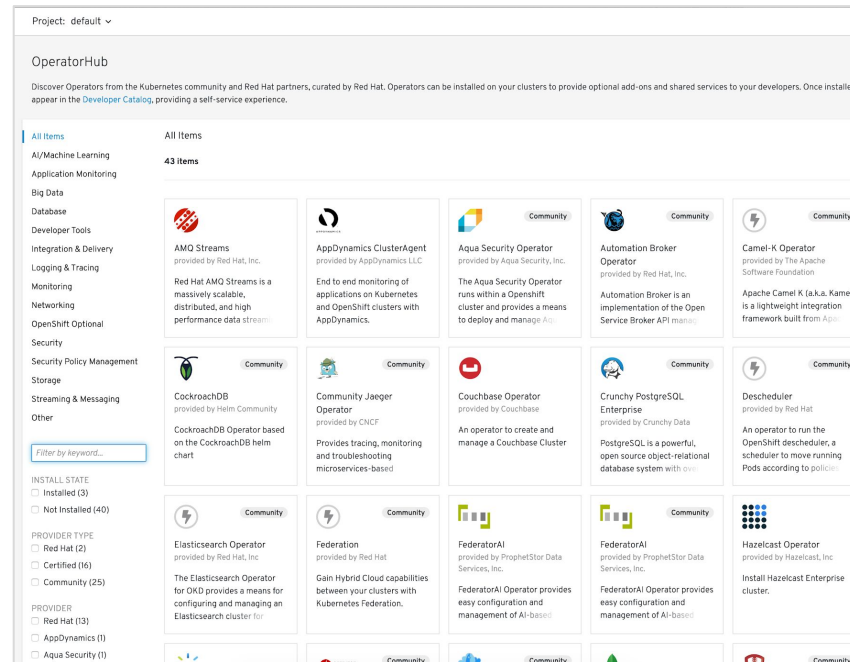
Requires an online cluster

- 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
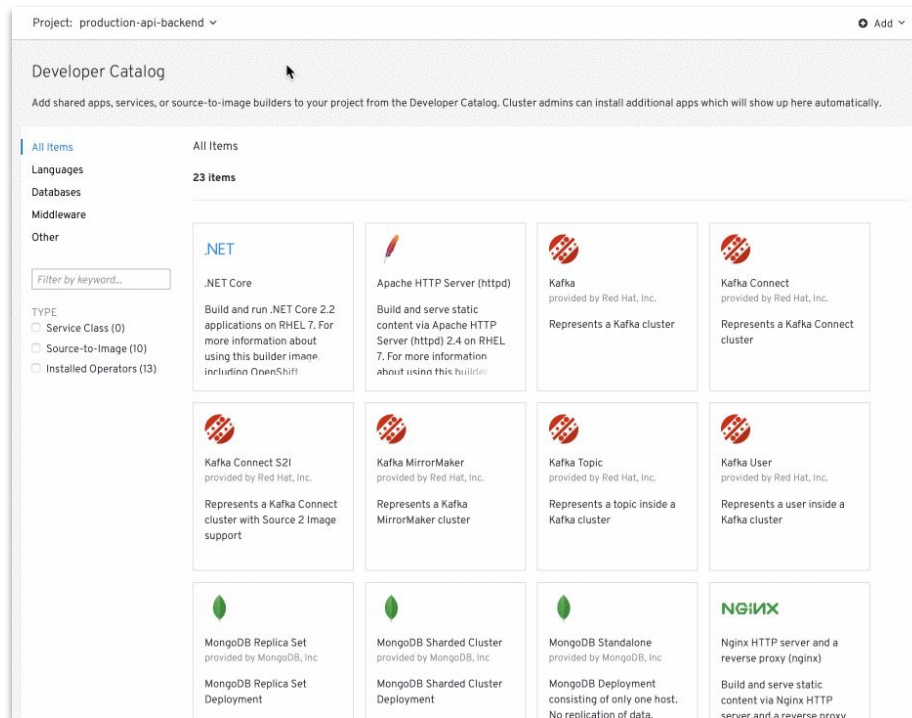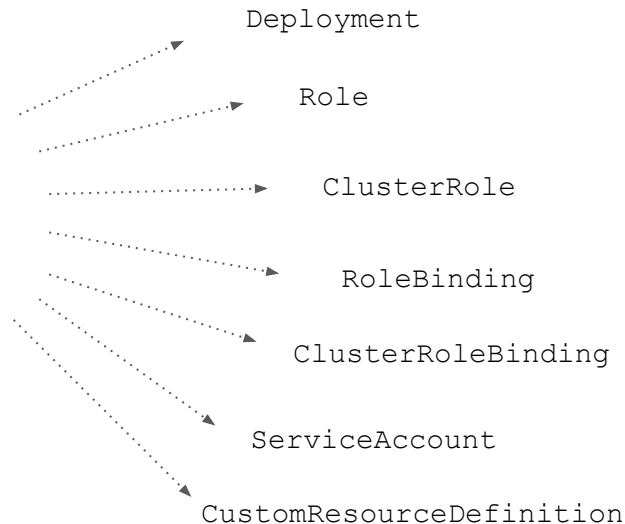
Operators as a First-Class Citizen

YourOperator v1.1.2
Bundle

**OPERATOR
LIFECYCLE MANAGER**

Operator Deployment
Custom Resource
Definitions
RBAC
API Dependencies
Update Path
Metadata

```
Deployment

Role

ClusterRole

RoleBinding

ClusterRoleBinding

ServiceAccount

CustomResourceDefinition
```

Product Manager: Daniel Messer   Generally Available

Red Hat

Operator Lifecycle Management

Operator Catalog

Version

OPERATOR LIFECYCLE MANAGER

Subscription for YourOperator

YourOperator v1.2.2

YourOperator v1.2.0

YourOperator v1.1.3

YourOperator v1.1.2

Time

Product Manager: Daniel Messer

Generally Available

Red Hat

Operator Lifecycle Management

Operator Catalog

Version

OPERATOR LIFECYCLE MANAGER

Subscription for YourOperator

YourOperator v1.2.2

YourOperator v1.2.0

YourOperator v1.1.3 ....> YourApp v3.1

YourOperator v1.1.2 ....> YourApp v3.0

Time

Product Manager: Daniel Messer   Generally Available   **Red Hat**
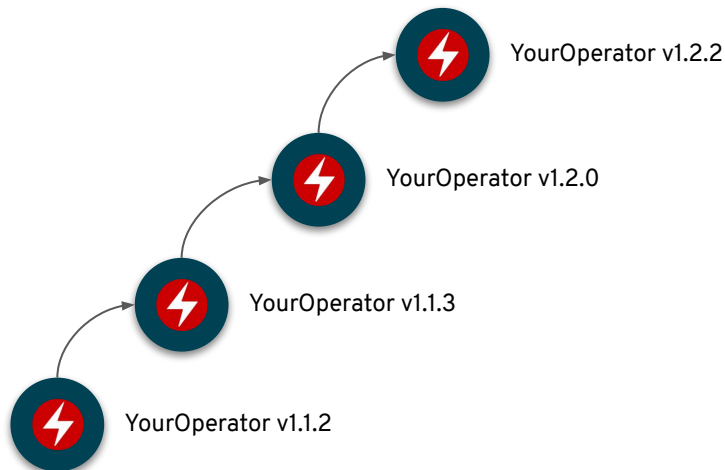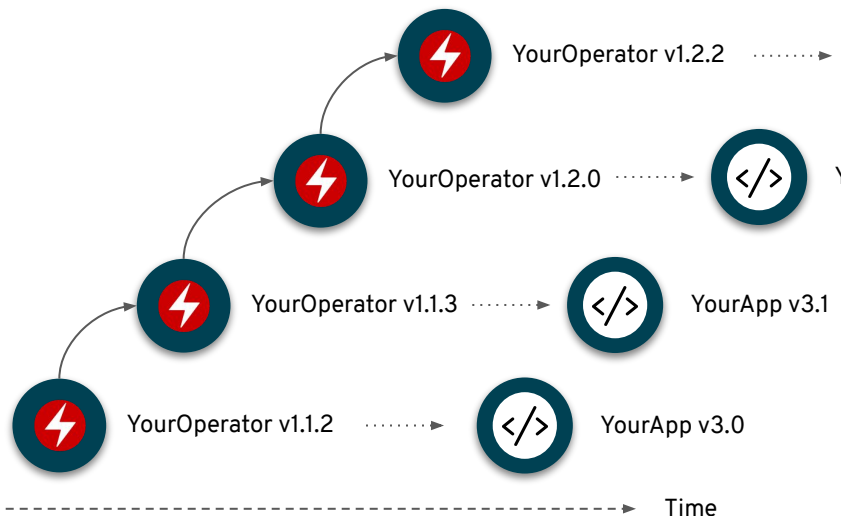
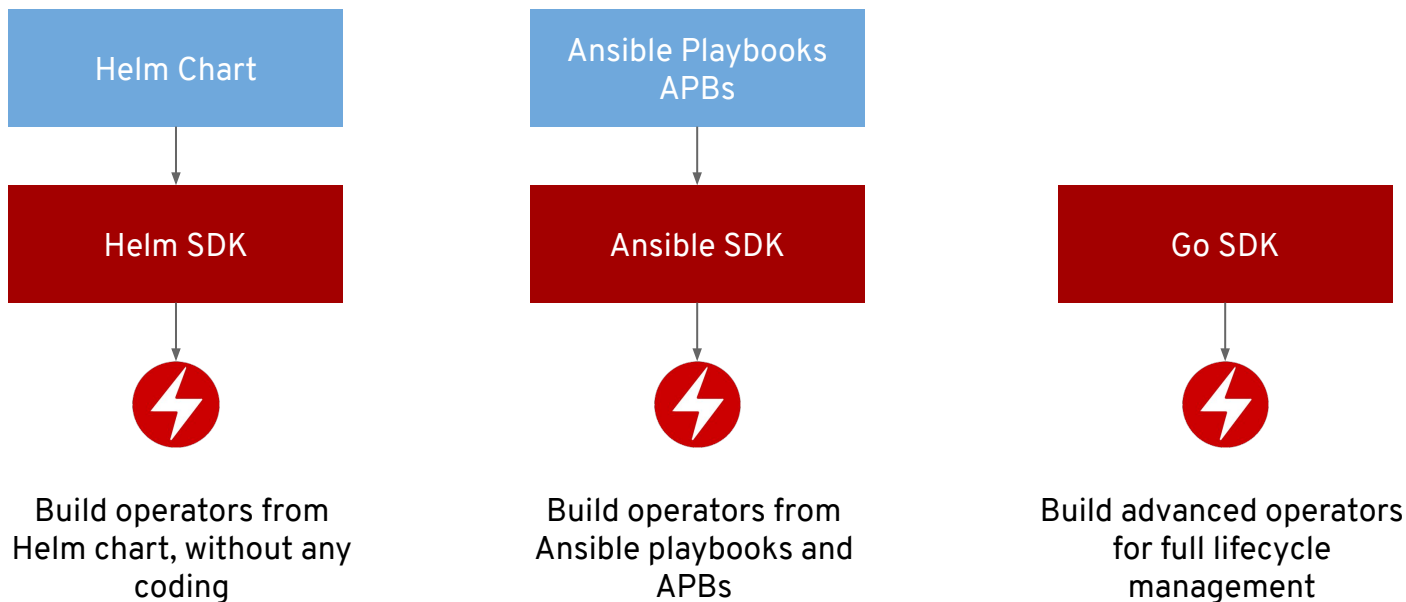# Operator Upgrade in Detail

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

Product Manager: Daniel Messer   Generally Available

OPERATOR
SDK

Build Operators for your apps

| Helm Chart | Ansible Playbooks APBs | |

| Helm SDK | Ansible SDK | Go SDK |

Build operators from Helm chart, without any coding

Build operators from Ansible playbooks and APBs

Build advanced operators for full lifecycle management

Red Hat

Depend on other Operators

Operator Framework Dependency Graphs

YourOperator v1.1.2

requires → jaeger.jaegertracing.io/v1 → resolves to → Jaeger Operator → installed by

requires → cockroachdb.charts.helm.k8s.io/v1alpha1 → resolves to → CockroachDB Operator → installed by

OPERATOR LIFECYCLE MANAGER
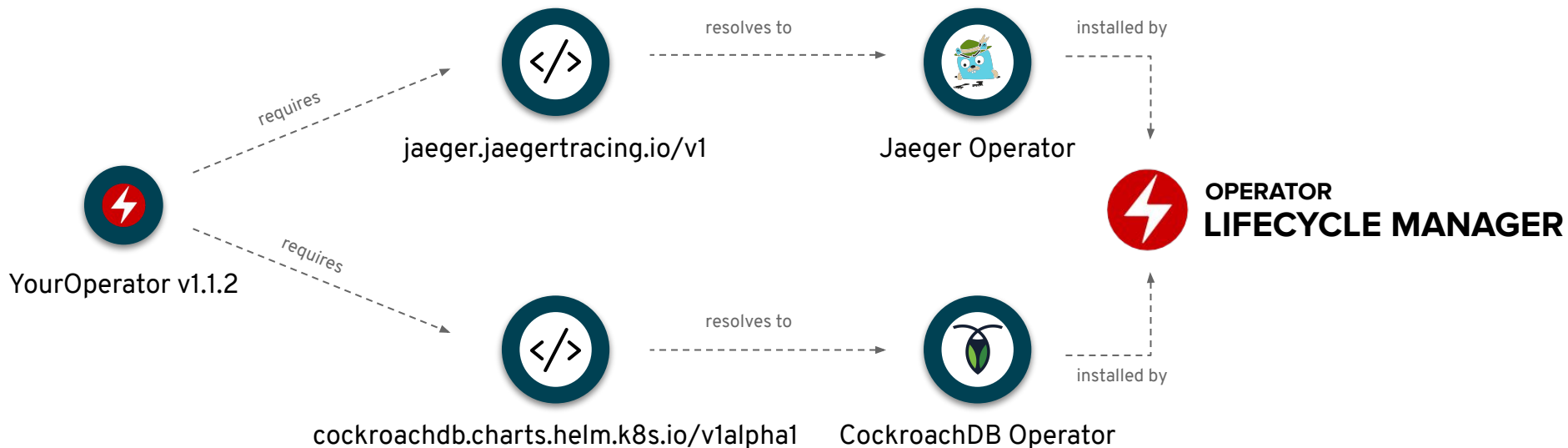
Red Hat Middleware

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

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