



**Red Hat**  
OpenShift

CoreOS and CRI-O &  
Operator Framework



CoreOS

# 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

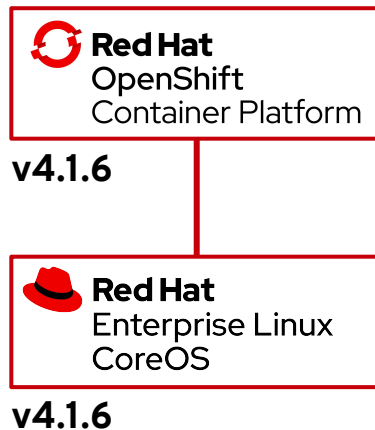
The Operating system is operated as part of the cluster, with the config for components managed by Machine Config

Operator:

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

RHEL CoreOS admins are responsible for:

Nothing. 😊 🙌





A lightweight, OCI-compliant container runtime

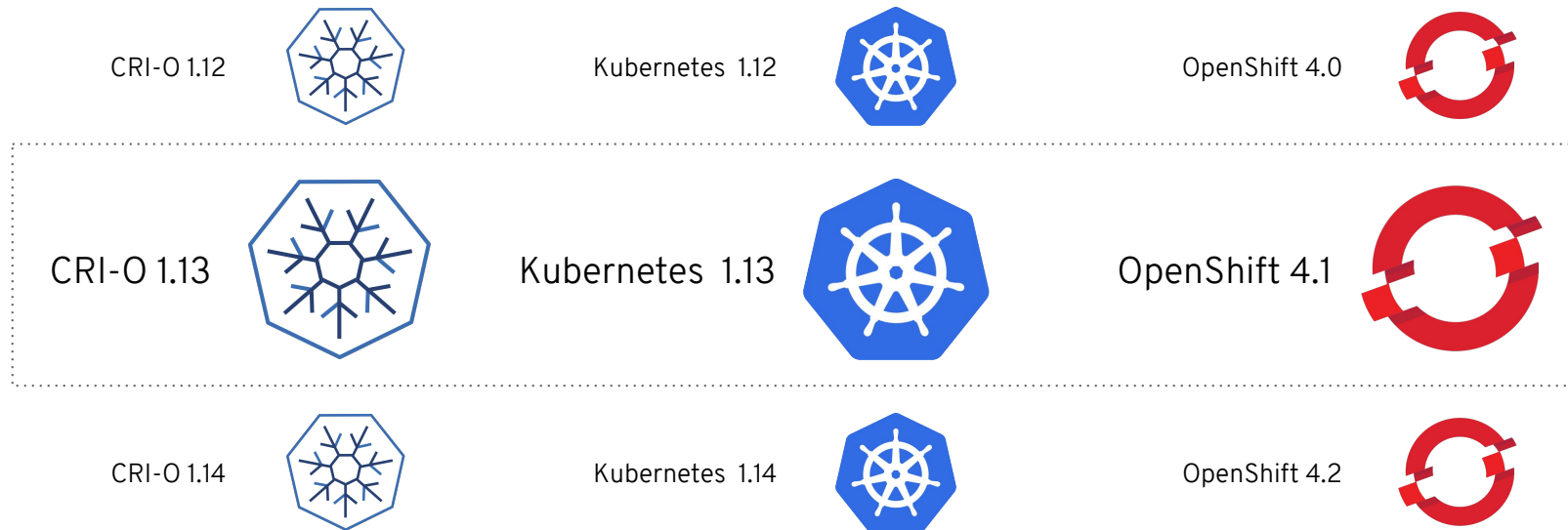
Minimal and Secure  
Architecture

Optimized for  
Kubernetes

Runs any  
OCI-compliant image  
(including docker)

# CRI-O Support in OpenShift

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



# podman



A docker-compatible CLI  
for containers

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

buildah



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”***

## Welcome!

Building Container Images with Buildah

★ Difficulty: **Beginner**

🕒 Estimated Time: **10 minutes**



# buildah

**Buildah** - a tool that facilitates building OCI container images

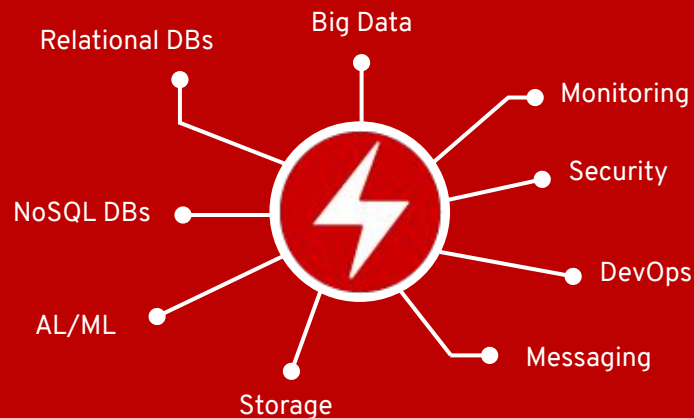
Buildah creates OCI container images without requiring a Docker Daemon.

In this scenario you will learn how to build images based on existing Dockerfiles using Buildah. You will also learn how to build images from bash scripts allowing for different syntax and approaches to image creation.

The scenario also introduces skopeo, a tool for inspecting images and container registries

# A broad ecosystem of workloads

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



# Red Hat Certified Operators

## DEVOPS



## APM



## DATA SERVICES



## DATABASE



## SECURITY



## STORAGE



# OperatorHub data sources

## Requires an online cluster

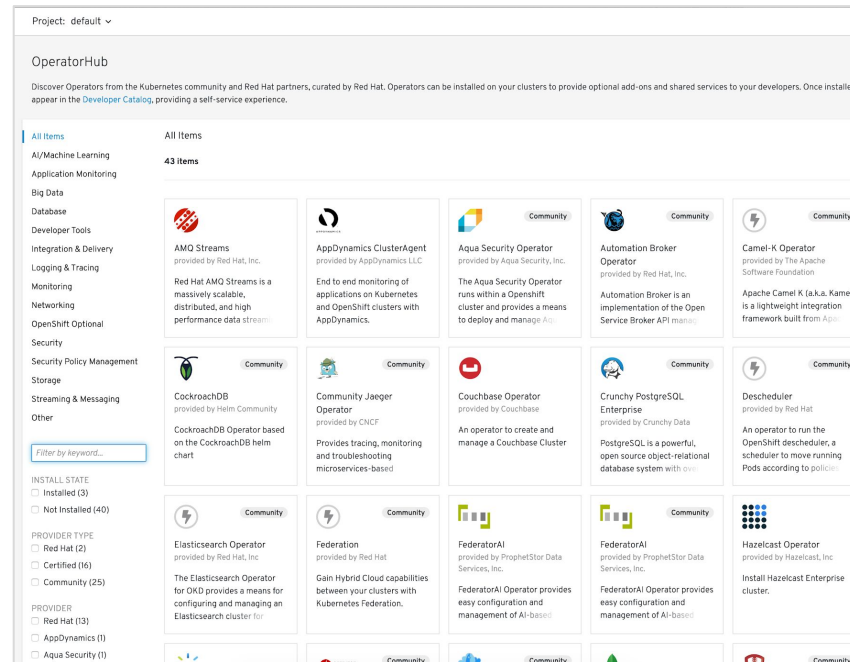
- For 4.1, the cluster must have connectivity to the internet
- Later 4.x releases will add offline capabilities

## 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



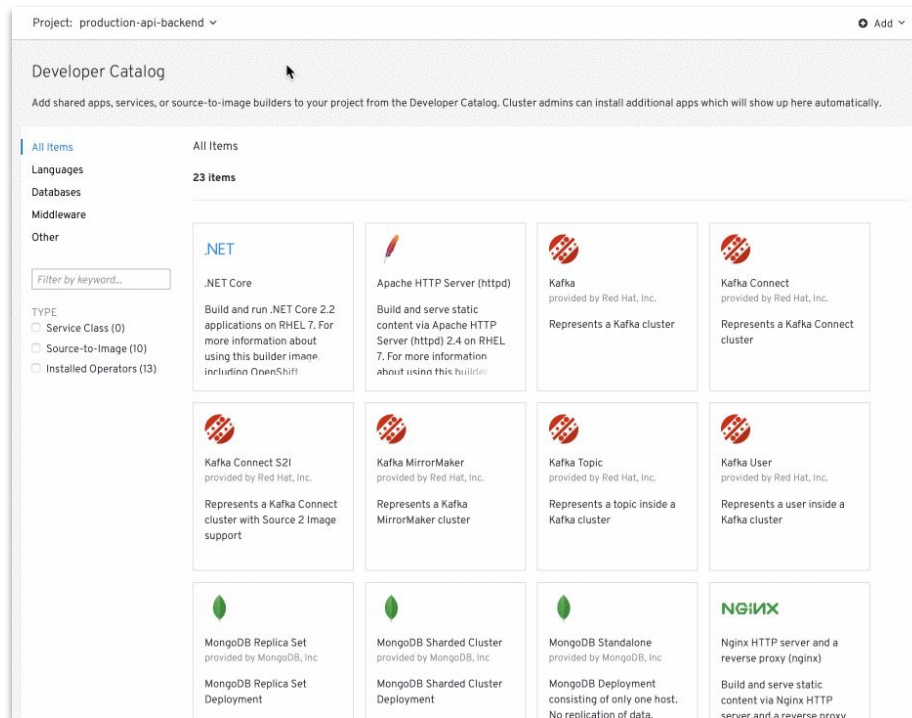
# Services ready for your developers

## 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

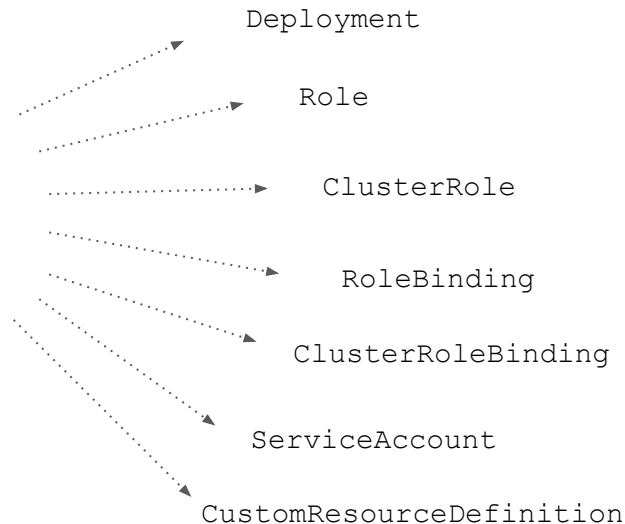


YourOperator v1.1.2  
Bundle

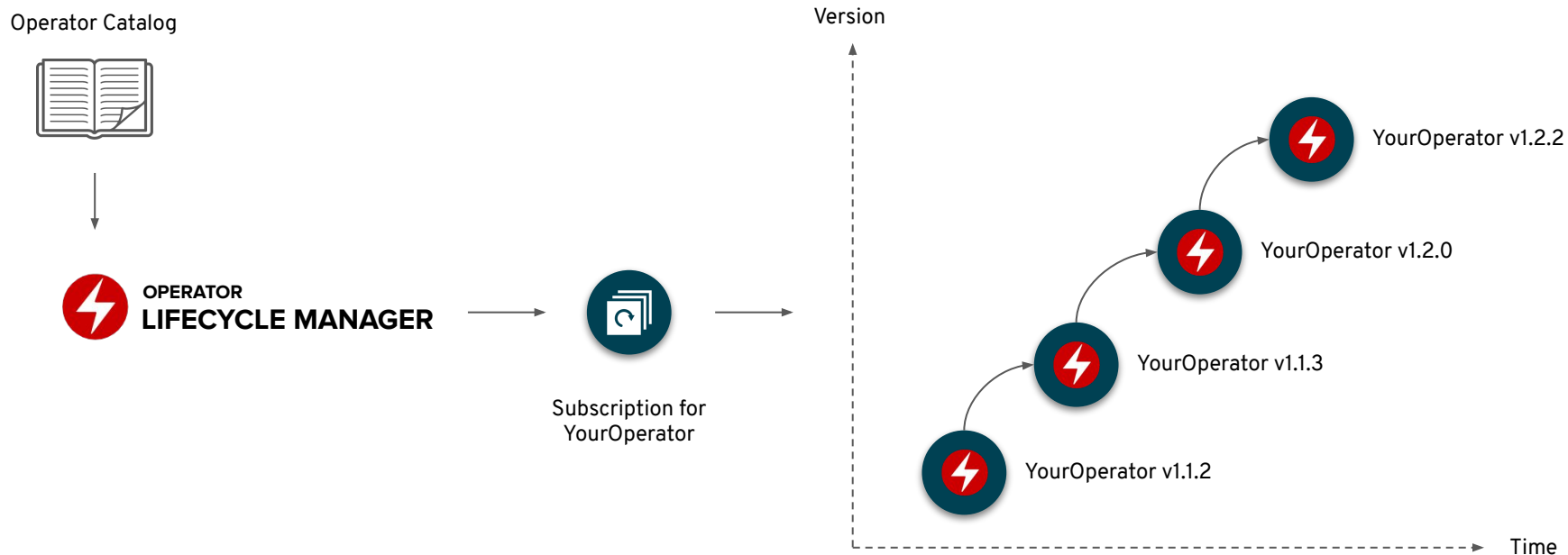


**OPERATOR  
LIFECYCLE MANAGER**

Operator Deployment  
Custom Resource  
Definitions  
RBAC  
API Dependencies  
Update Path  
Metadata



# Operator Lifecycle Management



# Operator Lifecycle Management

Operator Catalog



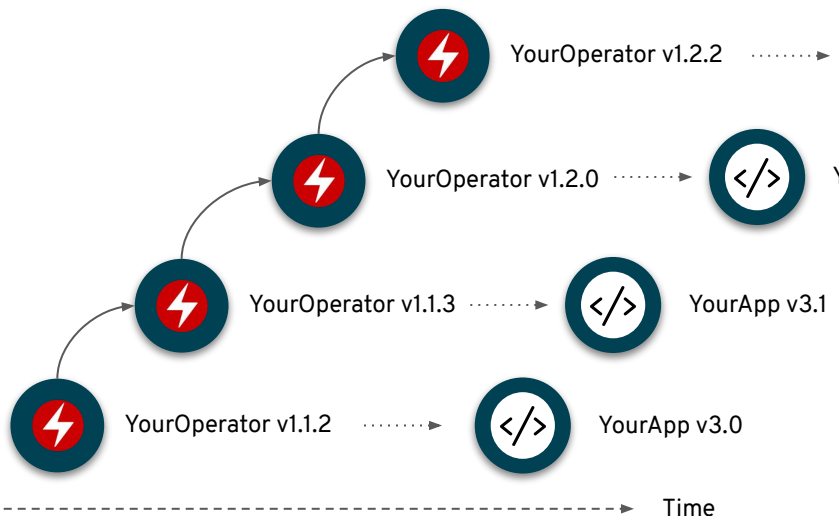
**OPERATOR  
LIFECYCLE MANAGER**



Subscription for  
YourOperator



Version





# 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

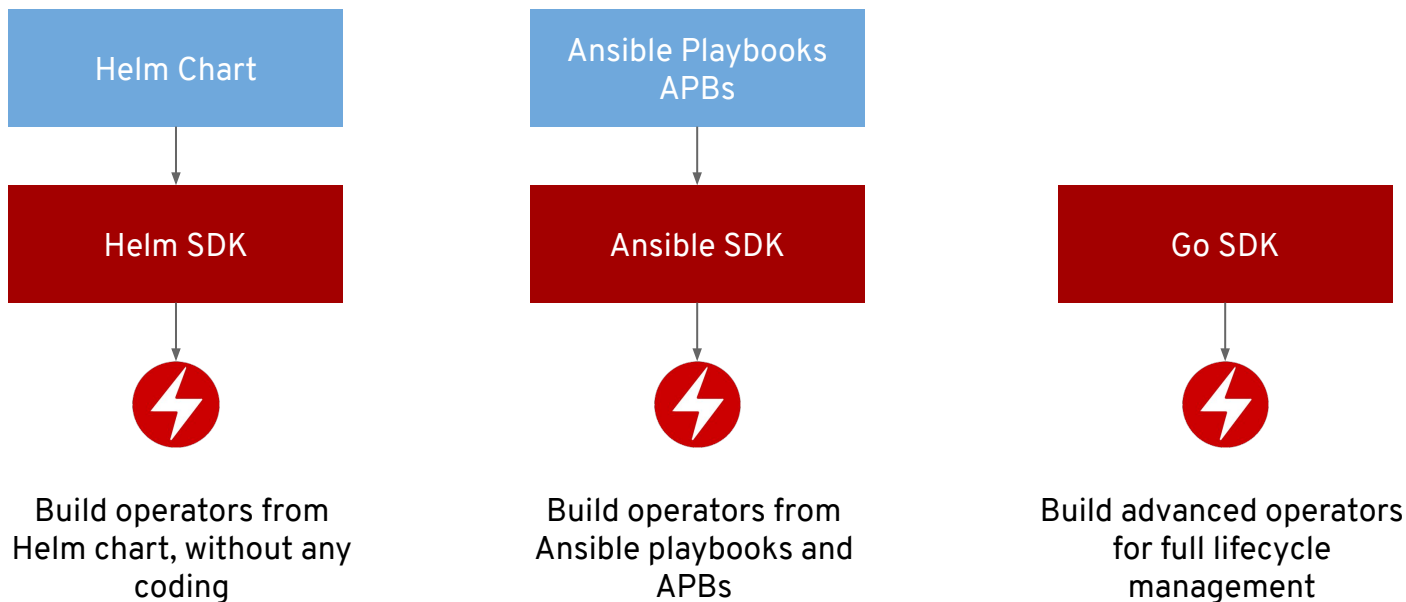
The screenshot displays the Red Hat OpenShift Operator Management interface. The left sidebar shows the navigation menu with 'Operator Management' selected. The main panel shows 'Operator Subscriptions' with a table of installed operators. A tooltip is visible over the table, showing details for the 'amq-streams' operator.

NAME	NAMESPACE	STATUS	CHANNEL	APPROVAL STRATEGY
amq-streams	openshift-operators	Up to date	stable	Automatic
cockroachdb	openshift-operators	Up to date	stable	Automatic
codeready-workspaces	codeready	Up to date	final	Automatic
couchbase-enterprise-certified	robszumski-api-backend	Up to date	preview	Automatic

Tooltip details for 'amq-streams':

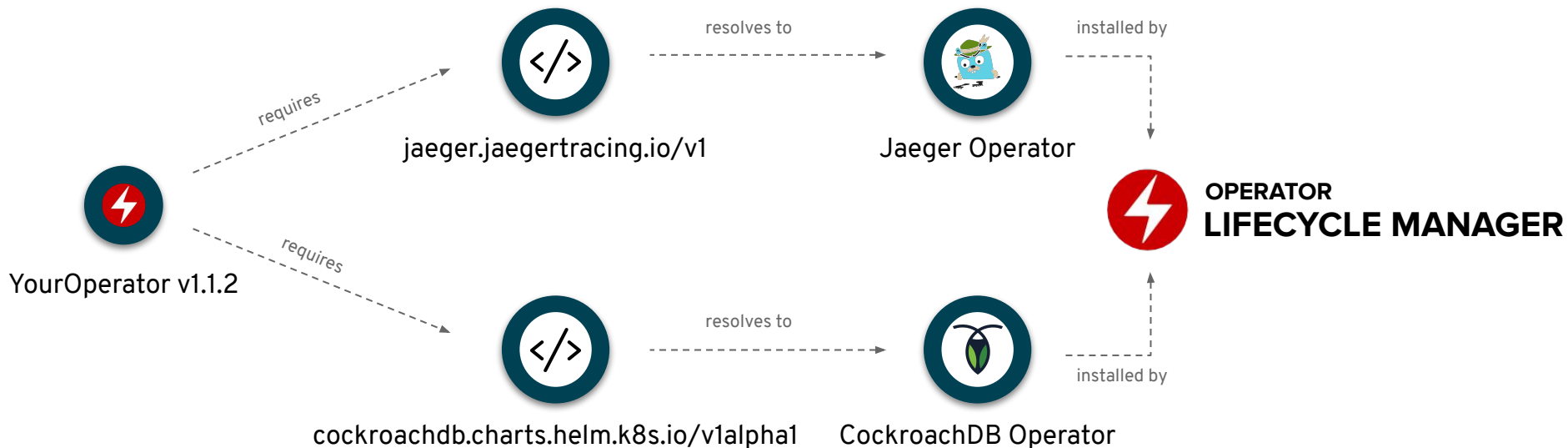
STATUS	CHANNEL	APPROVAL STRATEGY
Up to date	stable	Automatic

# Build Operators for your apps



# Depend on other Operators

## Operator Framework Dependency Graphs



# 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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