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State of the Operators

Framework and SDKs

Openshift and Cloud Native Rome meetup, March 4th, 2019

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OPERATORS ACROSS THE INDUSTRY

...and many more

https://github.com/operator-framework/awesome-operators

Why do we need Operators?

Why do we need Operators?

Containers brought simplicity to the development world

```
$ docker pull postgres
$ docker pull redis
```

```
$ docker run --name some-postgres -e POSTGRES_PASSWORD=foo -d postgres
$ docker run --name some-redis -d redis
```

Existing operational logic in Kubernetes

- Deployment
- ReplicaSet
- StatefulSet
- DaemonSet
- CronJob
- …

- Resize/Upgrade
- Reconfigure
- Backup
- Healing

OK, but what *is* an Operator?

What is an Operator?

- An operator is a kubernetes native application
  - Leverages the kubernetes API (usable with kubectl)
  - Runs on kubernetes as containers
  - Resembles a custom controller

- Purposely built for an application
  - Operational knowledge baked in and automated
    - handling upgrades from one version to another
    - handling complex failure recovery scenarios
    - scaling a stateful application up and down
  - Best suited for complex and stateful applications (but not only!)
  - Example: a prometheus operator specifically designed for it

OPERATOR FRAMEWORK

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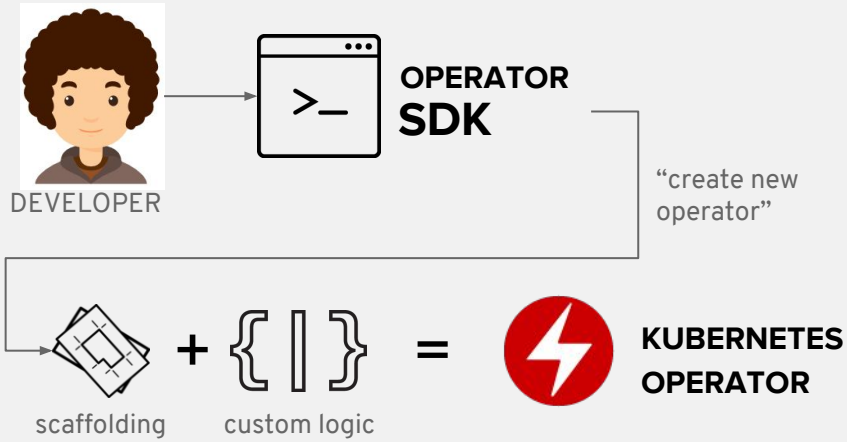
OPERATOR FRAMEWORK

- **Operator SDK** - Allows developers to build, package and test an Operator based on your expertise without requiring all the knowledge of Kubernetes API complexities

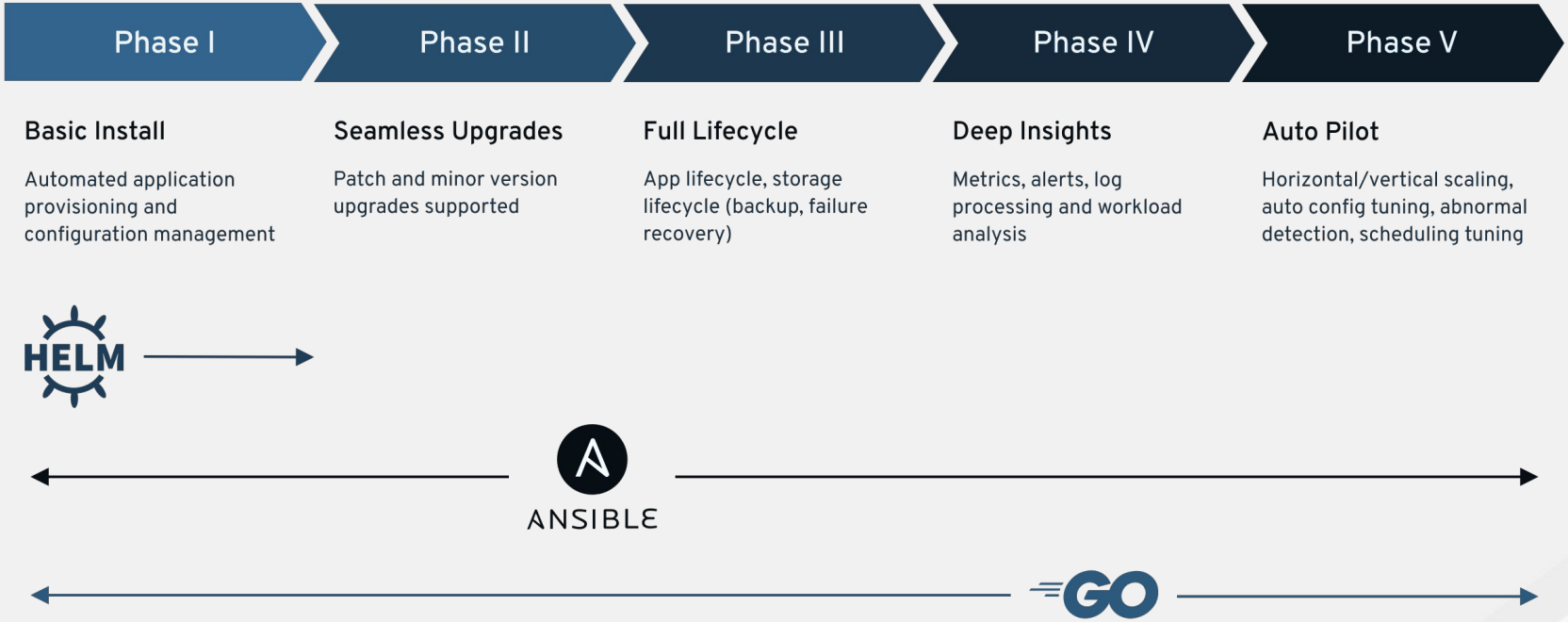
- **Operator Lifecycle Manager** - Helps you to install, and update, and generally manage the lifecycle of all of the Operators (and their associated services) running across your clusters

- **Operator Metering** - Enable usage reporting for Operators and resources within Kubernetes

OPERATOR FRAMEWORK IN ACTION



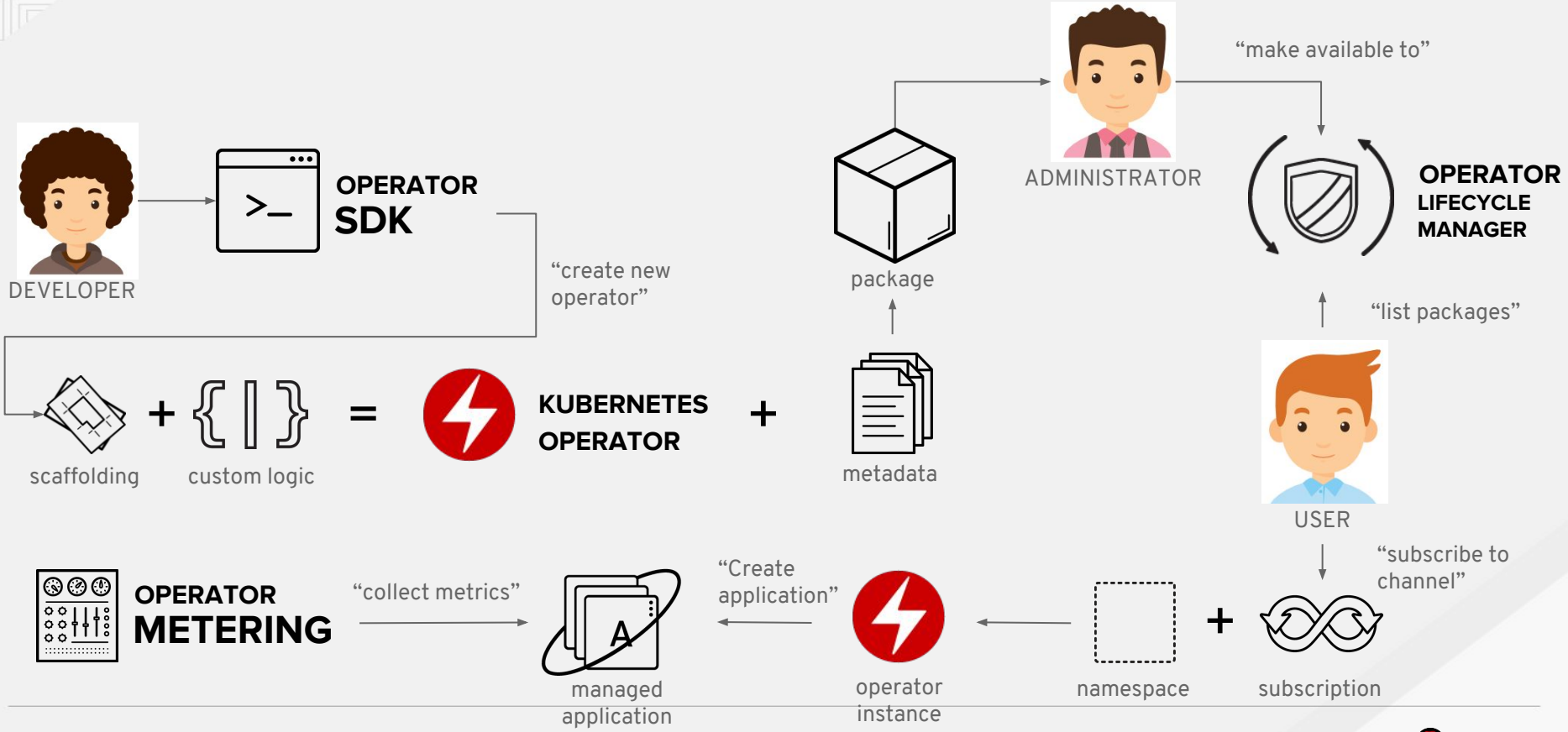
TYPES OF OPERATORS



CREATE AN OPERATOR WITHOUT CODING

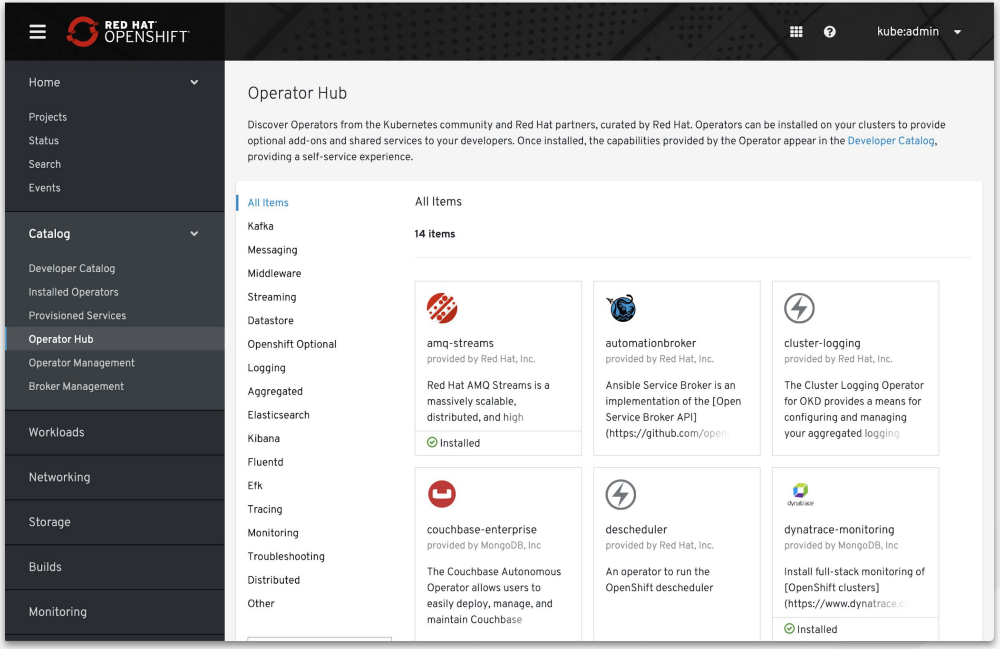
```
$ operator-sdk new cockroachdb-operator --type=helm --helm-chart stable/cockroachdb
```

OPERATOR FRAMEWORK IN ACTION



OPERATORS IN OPENSHIFT

Operator Hub - Allows administrators to selectively make operators available from curated sources to users in the cluster.



COMMUNITY OPERATOR CONTRIBUTION

DEVELOPER

OPERATOR
SDK

"create new operator"

scaffolding + custom logic =

KUBERNETES OPERATOR

pull request

COMMUNITY REPO

QUAY

OPERATOR
HUB

"browse catalog"

USER

"install"

"Create application"

operator instance

"collect metrics"

managed application

OPERATOR
METERING

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OPERATORS IN OPENSHIFT

cluster-kube-apiserver-operator
cluster-kube-controller-manager-operator
cluster-kube-scheduler-operator
cluster-openshift-api-server-operator
cluster-openshift-controller-manager-operator
cluster-monitoring-operator
cluster-network-operator
cluster-dns-operator
cluster-ingress-operator
machine-api-operator
auth-config-operator

cluster-autoscaler-operator
cluster-node-tuning-operator
cluster-storage-operator
cluster-samples-operator
cluster-image-registry-operator
cluster-logging-operator
cluster-service-catalog-operator
console-operator
machine-config-operator
service-serving-cert-signer
olm-operator

Demo

What’s ahead

OPERATOR SDK & LIFECYCLE

Now

Operator Testability

SDK

Objectives:
- aid developers with e2e testing
- validate operator maturity

Features:
- `scorecard` utility

Stage: Prototype

Cross-Platform Support

OLM

SDK

Objectives:
- OCP, OKD and k8s consistency

Features:
- Universal Base Image Support
- installation for non-OCP clusters

Stage: Development

Next

Continuous Testing

SDK

Objectives:
- automated scorecard testing
- validate operator maturity

Stage: Discovery

Partner Enablement

SDK

Objectives:
- UBI support for partners
- `scorecard` for partners

Stage: Discovery

No-Fuzz Operator Install

OLM

Features:
- `OperatorGroups`

Stage: Prototype

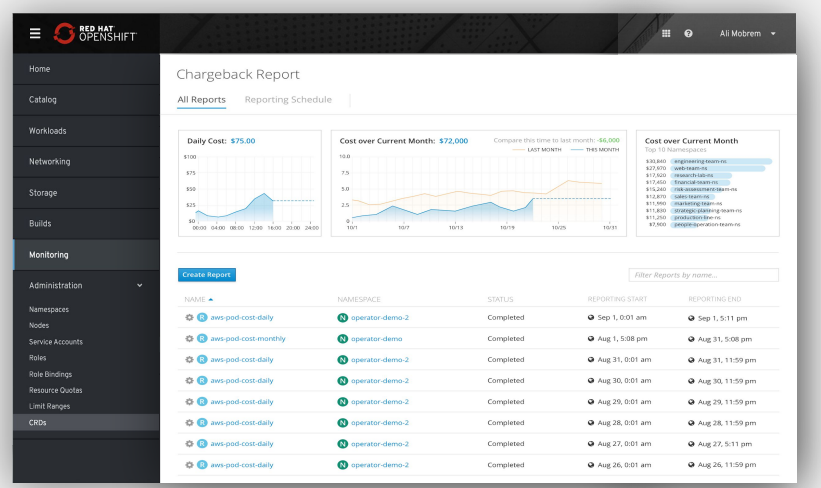
Future

TBD, ideas around over-the-air updates, operator status aggregated from operands...

https://github.com/operator-framework/community-operators

METERING/CHARGEBACK

- Testing a developer preview now
  - Install from OperatorHub
- Base functionality on all providers
- Tie into cloud providers for $$
- Included reports for 80% use-case
  - Customers can write custom reports and time periods
- Popular use-case: shame teams over requesting RAM



CPU
Memory
Storage

✖

Request
Actual Usage
Utilization %

✖

Pod
Namespace
Node
Cluster

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Where to get started?

- https://github.com/operator-framework/getting-started
- https://github.com/operator-framework/community-operators
- https://commons.openshift.org/sig/operators.html
- #kubernetes-operators on the kubernetes slack
- https://groups.google.com/forum/#!forum/operator-framework
- Openshift Commons Briefing my Daniel Messer https://youtu.be/GgEKEYH9MMM

Thank you!