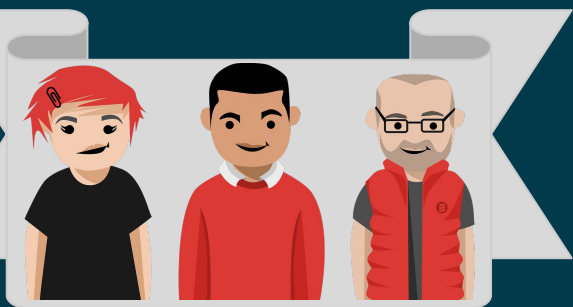




Automating Stateful Applications with Kubernetes Operators

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February 6, 2019

Hello!



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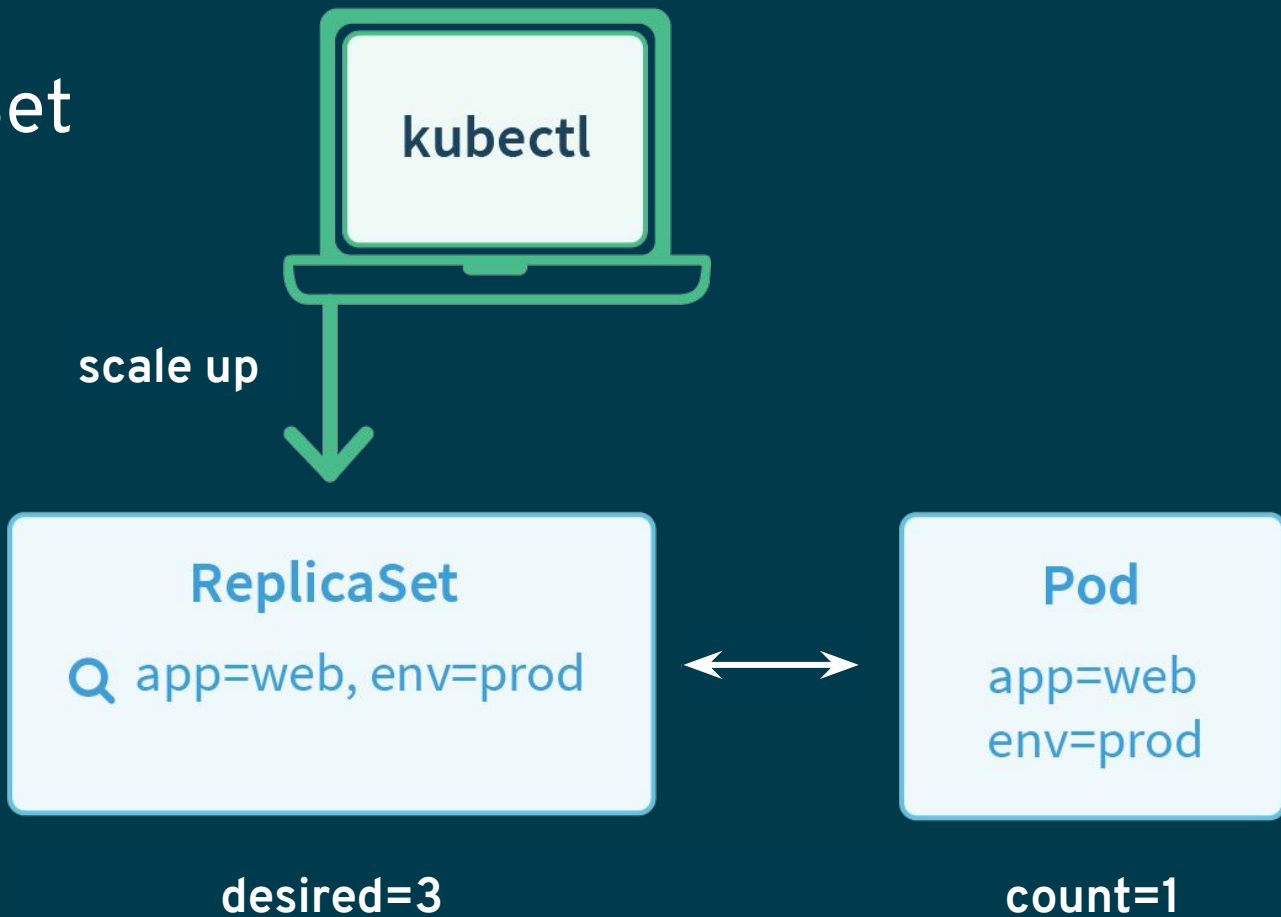
What is Kubernetes?

Why should you care about operators?

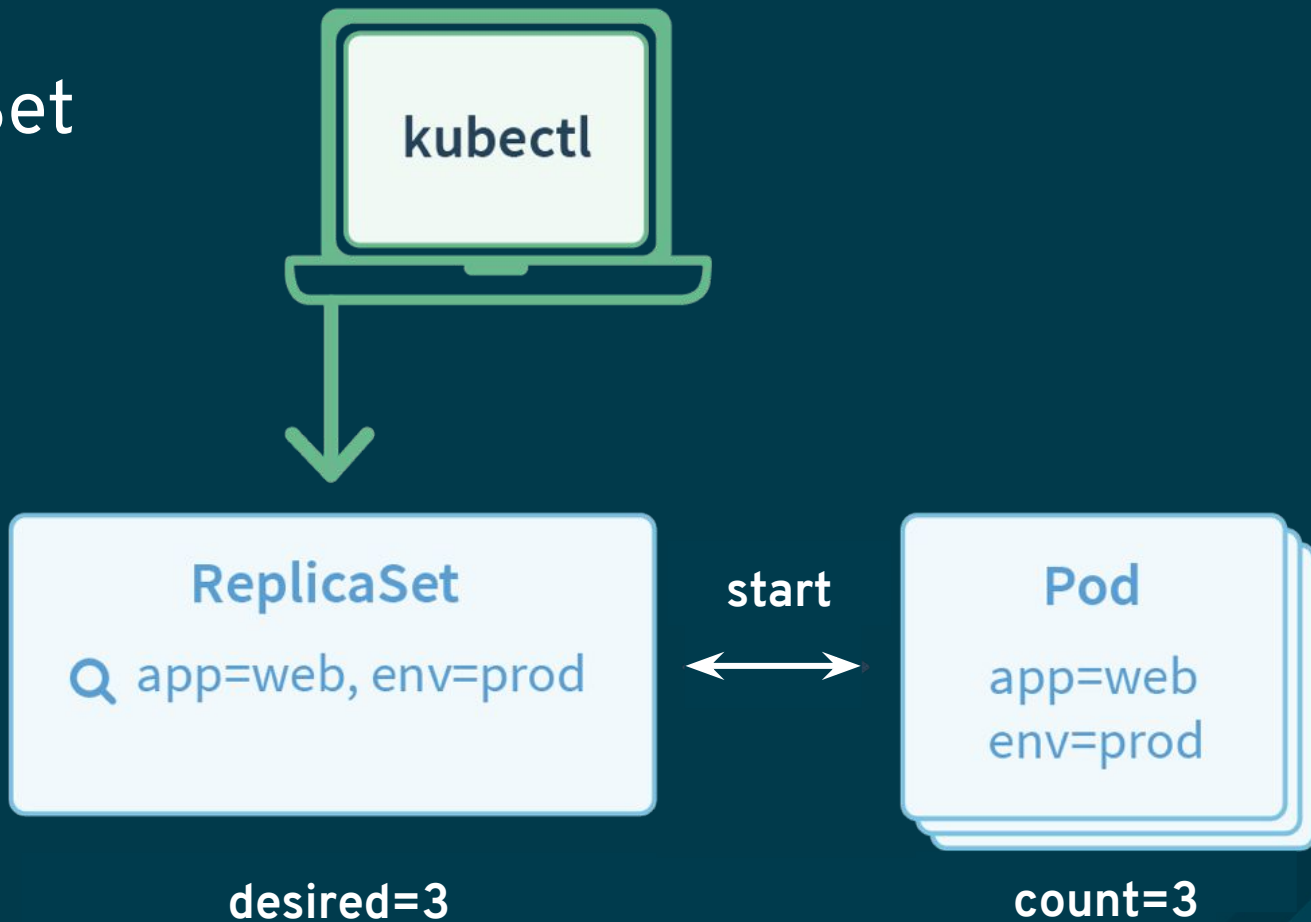
Scaling stateless apps: **easy**

```
$ kubectl scale deploy/staticweb --replicas=3
```

ReplicaSet



ReplicaSet



What about apps that **store data**?

Creating a database is **easy**

```
$ kubectl run db --image=quay.io/my/db
```

Running a database **over time** is harder



⬡ Resize/Upgrade

⬡ Reconfigure

⬡ Backup

⬡ Healing



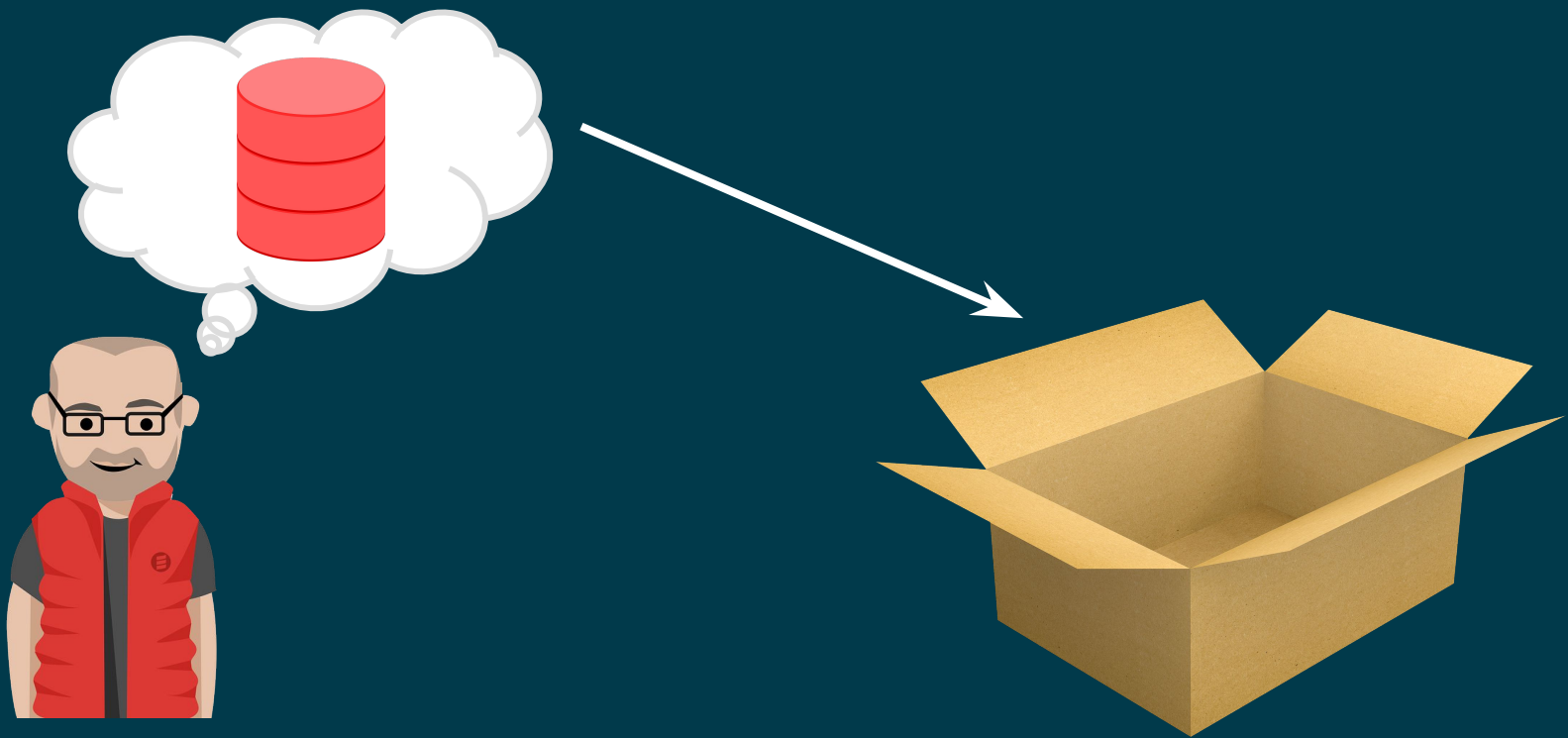
Every application on any platform must
be **installed, configured, managed,** and
upgraded over time

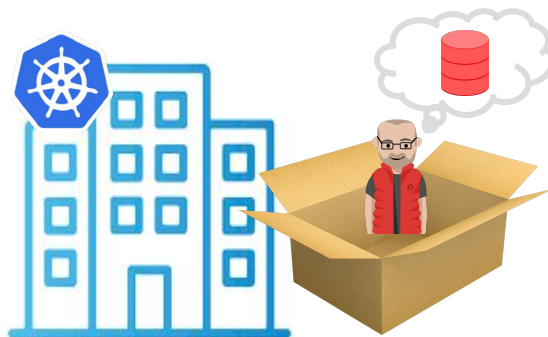
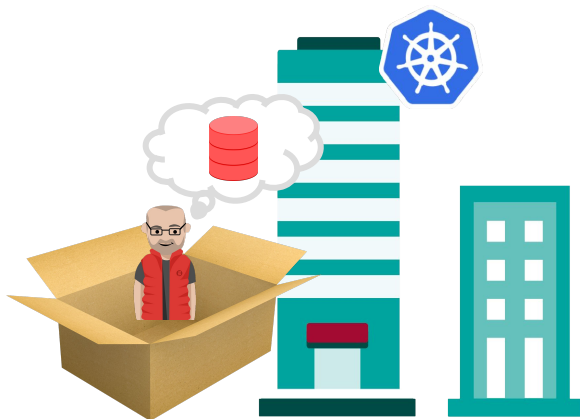
Patching is critical to security



Anything not automated is slowing you down

If only Kubernetes knew...





Operators are **automated software managers** that deal with installation and lifecycle of Kubernetes applications

Extending the Kubernetes API

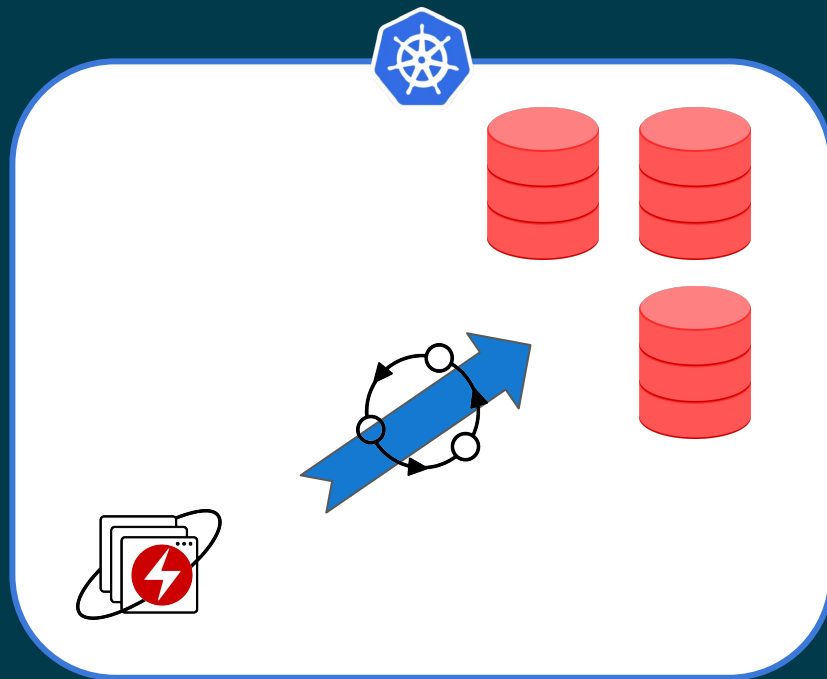
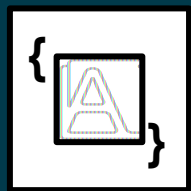
1. Application-specific custom controllers
2. Custom resource definitions (CRD)

Application-Specific Controllers



Custom Resource Definition (CRD)

```
kind: ProductionReadyDatabase
apiVersion: database.example.com/v1alpha1
metadata:
  name: my-production-ready-database
spec:
  clusterSize: 3
  readReplicas: 2
  version: v4.0.1
[...]
```



Example: etcd Operator

What is etcd?



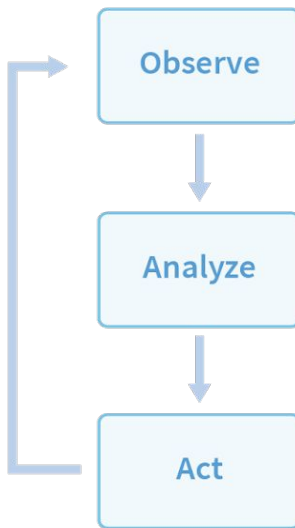
- distributed key-value store
- primary datastore of Kubernetes
- stores and replicates all Kubernetes cluster state

Example: etcd Operator

```
kind: EtcdCluster
apiVersion: etcd.database.coreos.com/v1beta2
metadata:
  name: example-etcd-cluster
spec:
  size: 3
  version: "3.1.0"
```

Example: etcd Operator

⚡ etcd Operator



Cluster “A” has 2 running pods:

- name: A-000, version 3.0.9
- name: A-001, version 3.1.0

Differences from desired config:

- should be version 3.1.0
- should have 3 members

How to get to desired config:

- Recover 1 member
- Back up cluster
- Upgrade to 3.1.0



Define an etcd cluster by referring to the EtcdCluster Custom Resource

```
Terminal Dashboard Terminal 2 +
customresourcedefinition.apiextensions.k8s.io/etcdclusters.etcd.database.coreos.com created
$ kubectl create -f etcd-operator-sa.yaml
serviceaccount/etcd-operator-sa created
$ kubectl create -f etcd-operator-role.yaml
role.rbac.authorization.k8s.io/etcd-operator-role created
$ kubectl create -f etcd-operator-rolebinding.yaml
rolebinding.rbac.authorization.k8s.io/etcd-operator-rolebinding created
$ kubectl create -f etcd-operator-deployment.yaml
deployment.extensions/etcd-operator created
$ kubectl get deploy
NAME          DESIRED   CURRENT   UP-TO-DATE   AVAILABLE   AGE
etcd-operator 1          1         1            0           5s
$ kubectl get pods
NAME                                READY   STATUS    RESTARTS   AGE
etcd-operator-594fbd565f-nch74      1/1     Running   0           12s
$ cat etcd-operator-cr.yaml
```

Try It! Hands-On Operator Tutorials

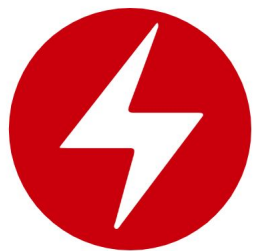
<https://learn.openshift.com/operatorframework/>

(or come by the OpenShift booth #601)

Use Operators Today

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

- etcd
- Prometheus
- Elasticsearch
- MySQL
- “and many more!”



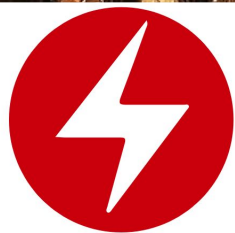
OPERATOR FRAMEWORK

<https://github.com/operator-framework>



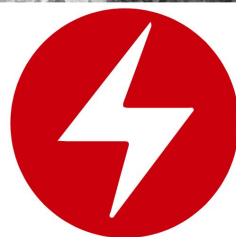
OPERATOR LIFECYCLE MANAGER





OPERATOR METERING

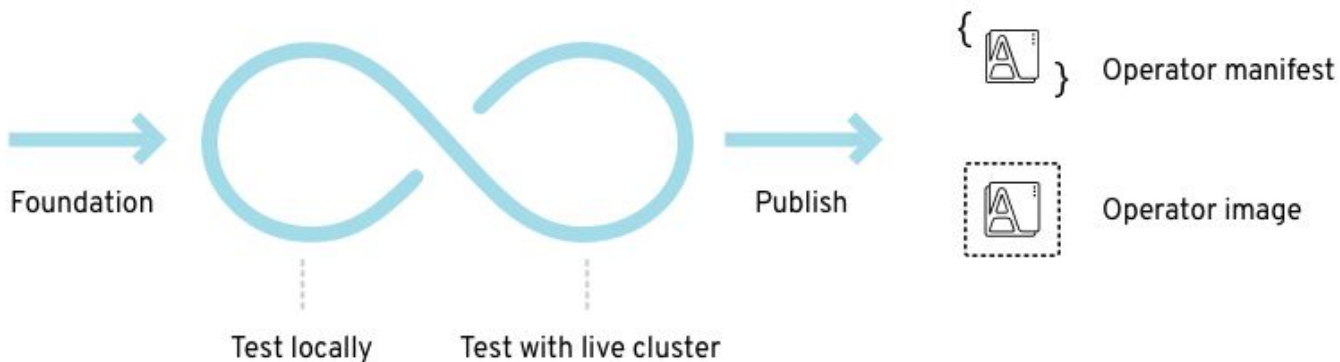




**OPERATOR
SDK**

Operator SDK

Operator SDK *Build, test, iterate*



Resources

<https://github.com/operator-framework>

<https://coreos.com/operators/>

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

<https://coreos.com/blog/introducing-operator-framework>

<https://learn.openshift.com/operatorframework/>



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Eben Hewitt (Sabre)
1:15pm-2:05pm Wednesday, February 6, 2019
[Enterprise architecture](#)
Location: Grand Ballroom West
Level: Intermediate
Secondary topics: [Best Practice](#), [Framework-focused](#)

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Who is this presentation for?

- Architects of all stripes, tech leads, senior developers, and managers

Prerequisite knowledge

- Experience as a senior developer or architect working on software projects

What you'll learn

- Learn a holistic approach to architecture that explains how to bring business architecture, information architecture, data architecture, application (software) architecture together to have the best chance for your system's success
- Explore a practical set of architecture practices to create winning technical architectural guidance
- Understand how architecture works effectively with development teams, management, and product management teams through the value chain
- Get usable templates you can start incorporating into your teams immediately

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1:15 PM - 2:05 PM, Wed, Feb 6, 2019

Speakers

 **Eben Hewitt**
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Grand Ballroom West

Eben Hewitt shares a holistic approach to enterprise architecture that explains how to bring business architecture, information architecture, data architecture, application architecture, and infrastructure architecture together into a comprehensive design. You'll also learn how to incorporate design thinking principles and work effectively with Agile teams.

SESSION EVALUATION

Track

50-minute session

Topic

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