Red Hat Developer

The Automation Challenge: Kubernetes Operators vs Helm Charts

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Red Hat

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Guide

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Hello! I am Ana

ammbra1508

Java Champion, Certified Architect

Developer Advocate @ Red Hat

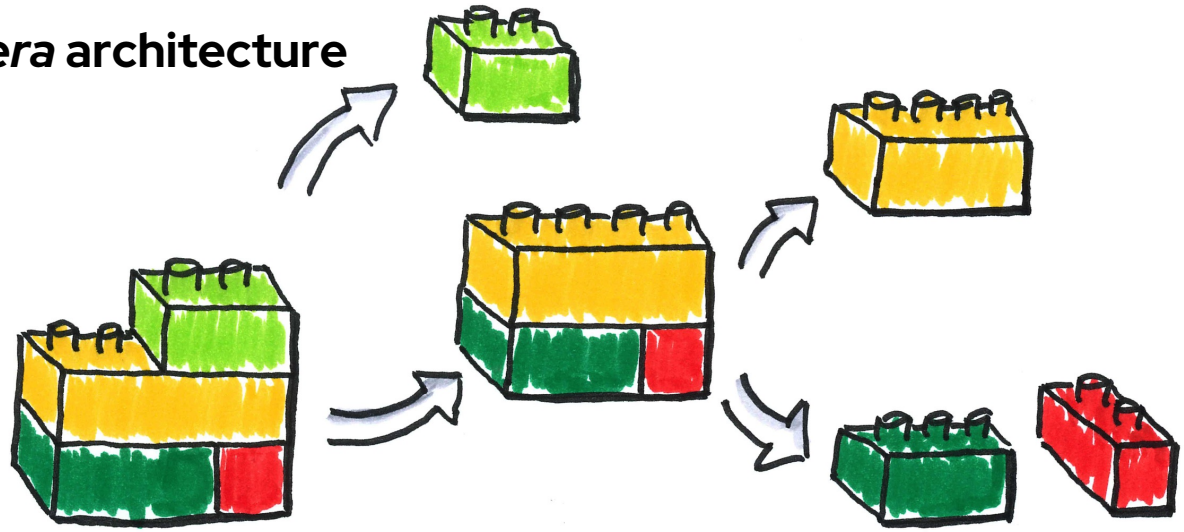
“Control” enthusiast

Know well what leads you forward and what holds you back, and choose the path that leads to wisdom

Budha

Microservices ⟷ Kubernetes

Divide et Impera architecture



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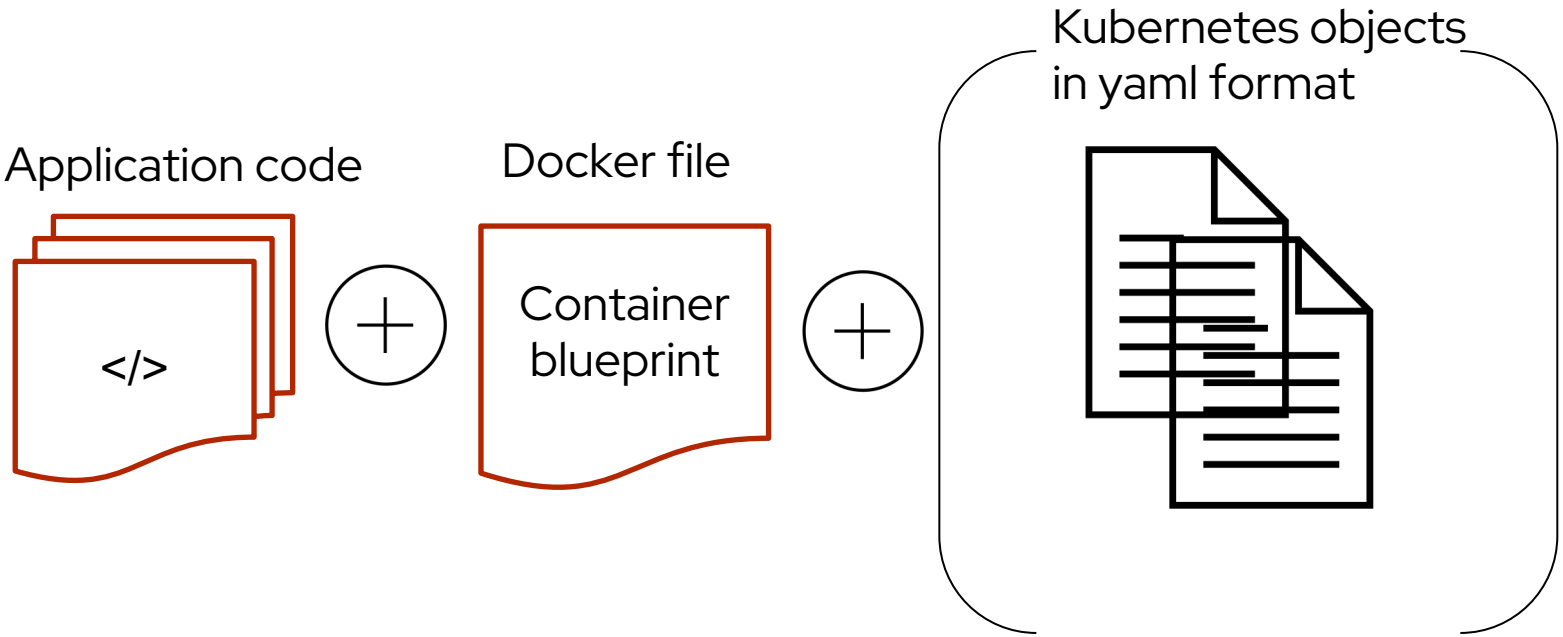
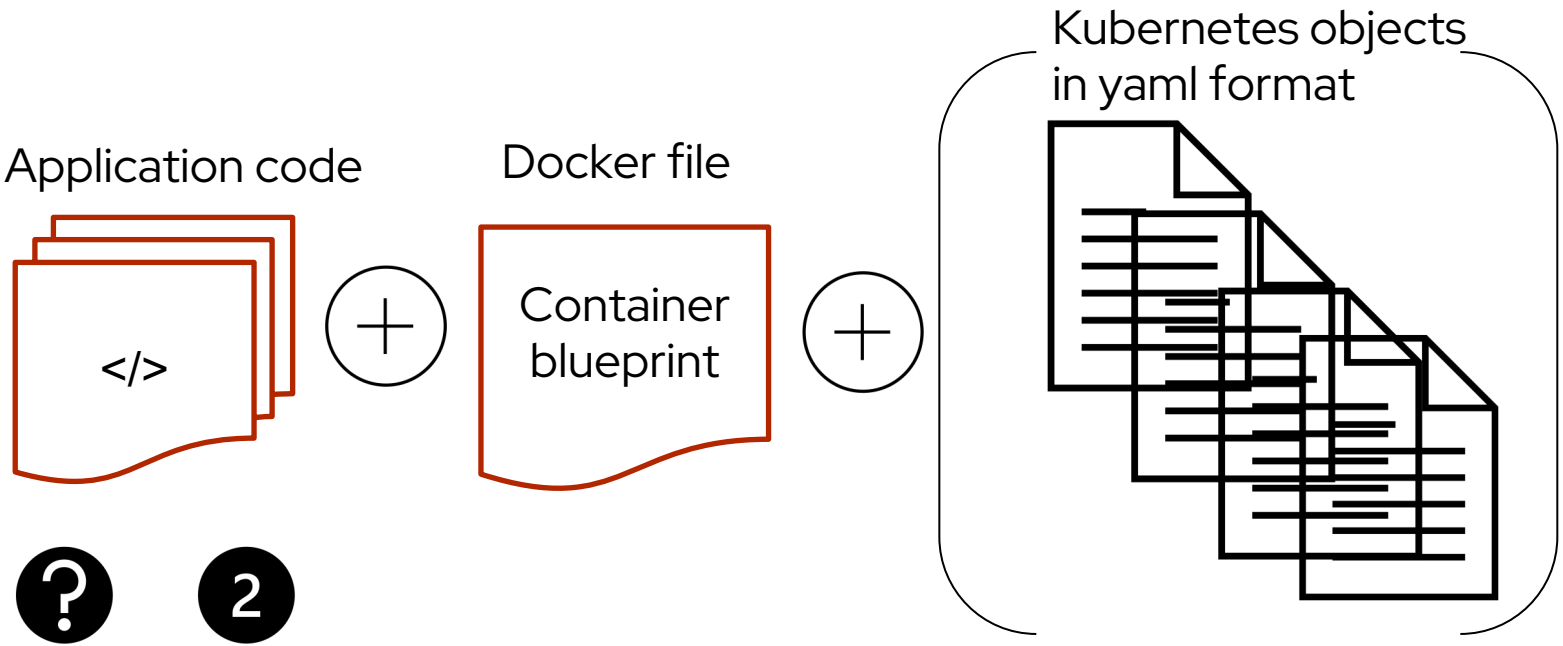
(Some) Kubernetes Features

- Self-healing
- Batch execution
- Horizontal scaling
- Storage orchestration
- Automated rollouts and rollbacks
- Service discovery and load balancing
- Secret and configuration management

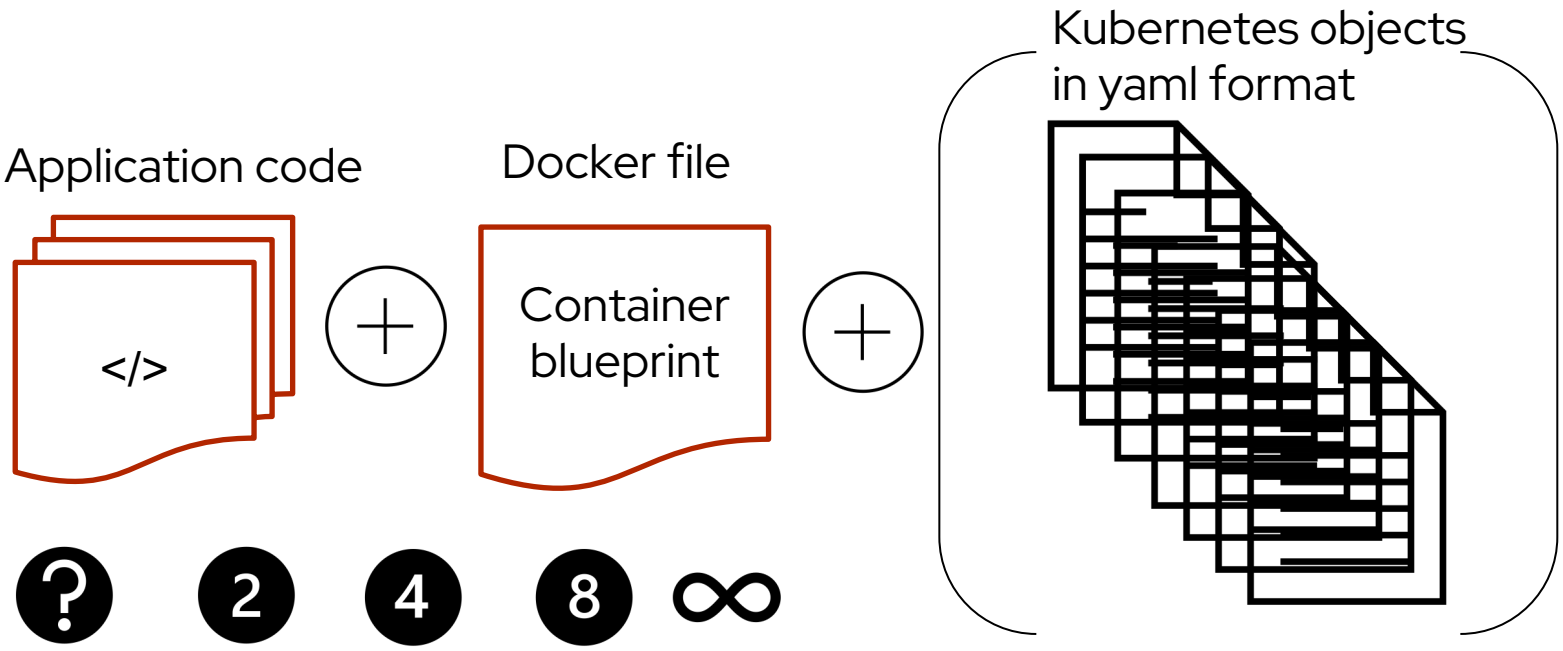
The story of a microservice



The story of a microservice



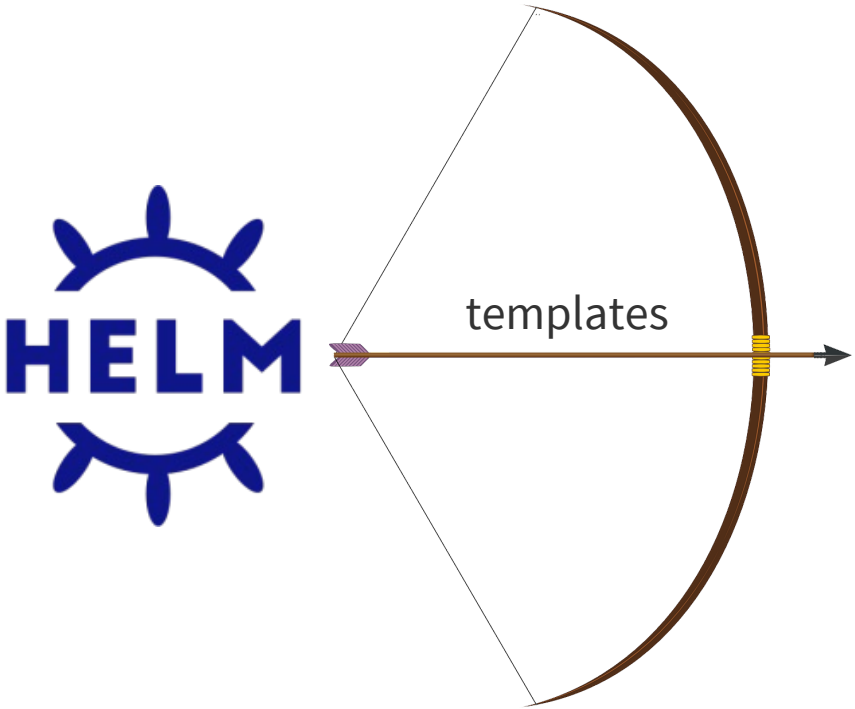
The story of a microservice




UNDERSTAND YOUR NEMESIS
Vampire
Sunlight
Superman
Kryptonite
Devs
YAML

Automation heroes

Kubernetes Package Manager

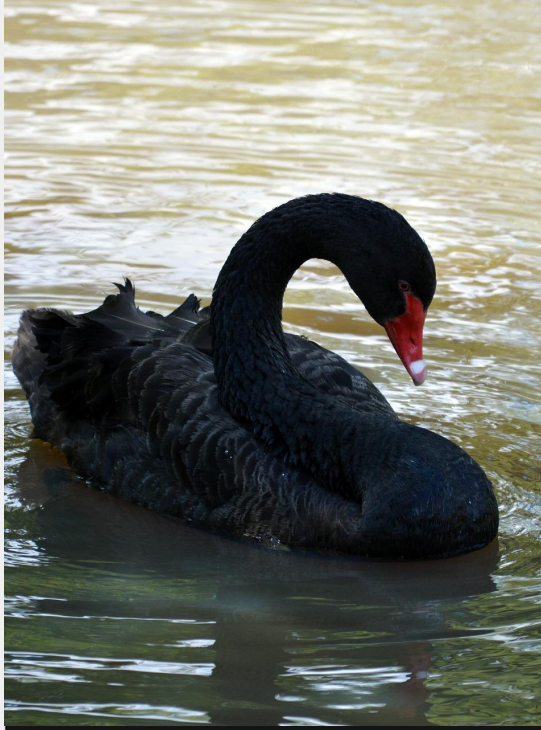


Manage and update multiple Kubernetes configurations

Deploy many configs as a SINGLE application

Parametrize for multiple environments support

Helm differentiators



Helm advantages

Prototype

Easily prototype an application installation.

Separate

Deploy

Check

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Non-final values are separated from the actual objects.

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Many configurations can be deployed through a single chart instance.

Check

In a template, you can check nested values at every level

Distinctive Helm Aspects (1)

deployment.yaml

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  annotations:
    rollme: {{ randAlphaNum 5 | quote }}
  name: {{ include "landmark.fullname" . }}
  labels:
    {{- include "landmark.labels" . | nindent 4 }}
```

Automatically roll deployments via **annotations**

Reusability is encouraged via **include, _helpers.tpl, tpl**

_helpers.tpl

```
{{/* vim: set filetype=mustache: */}}
{{/*
Expand the name of the chart.
*/}}
{{- define "landmark.name" -}}
{{- default landmark <empty value> | trunc 63 | trimSuffix "-" -}}
{{- end -}}
```

Distinctive Helm Aspects (2)

deployment.yaml

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  annotations:
    rollme: {{ randAlphaNum 5 | quote }}
  name: {{ include "landmark.fullname" . }}
  labels:
    {{- include "landmark.labels" . | nindent 4 }}
```

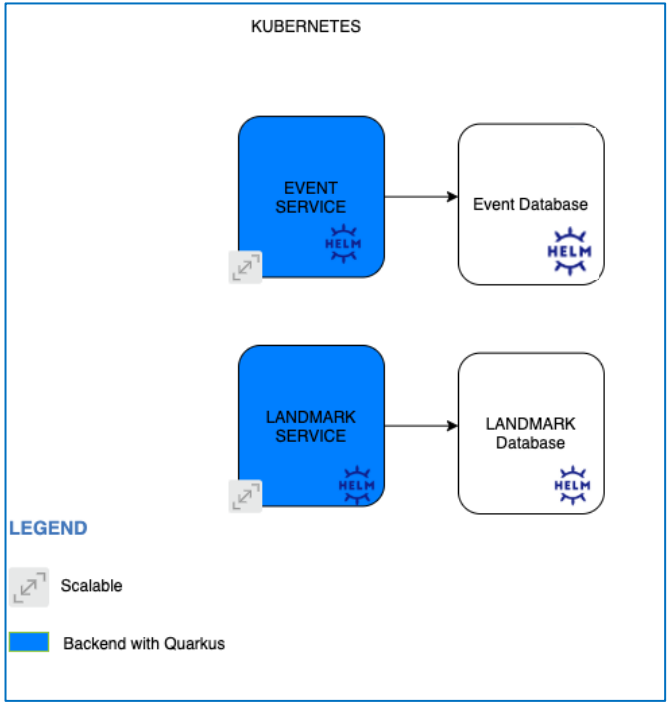
Automatically roll deployments via **annotations**

Instruct Helm to keep resources upon uninstall

service.yaml

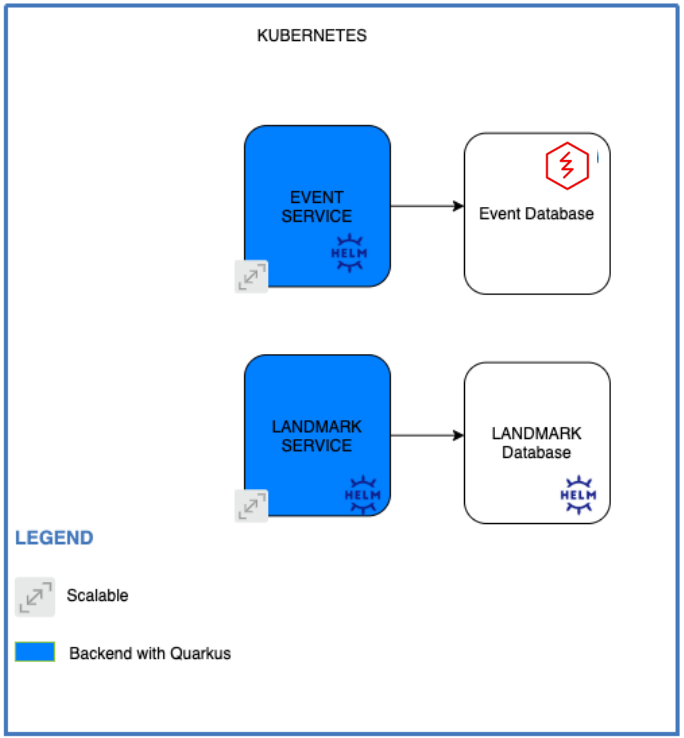
```yaml
apiVersion: v1
kind: Service
metadata:
  annotations:
    "helm.sh/resource-policy": keep
```

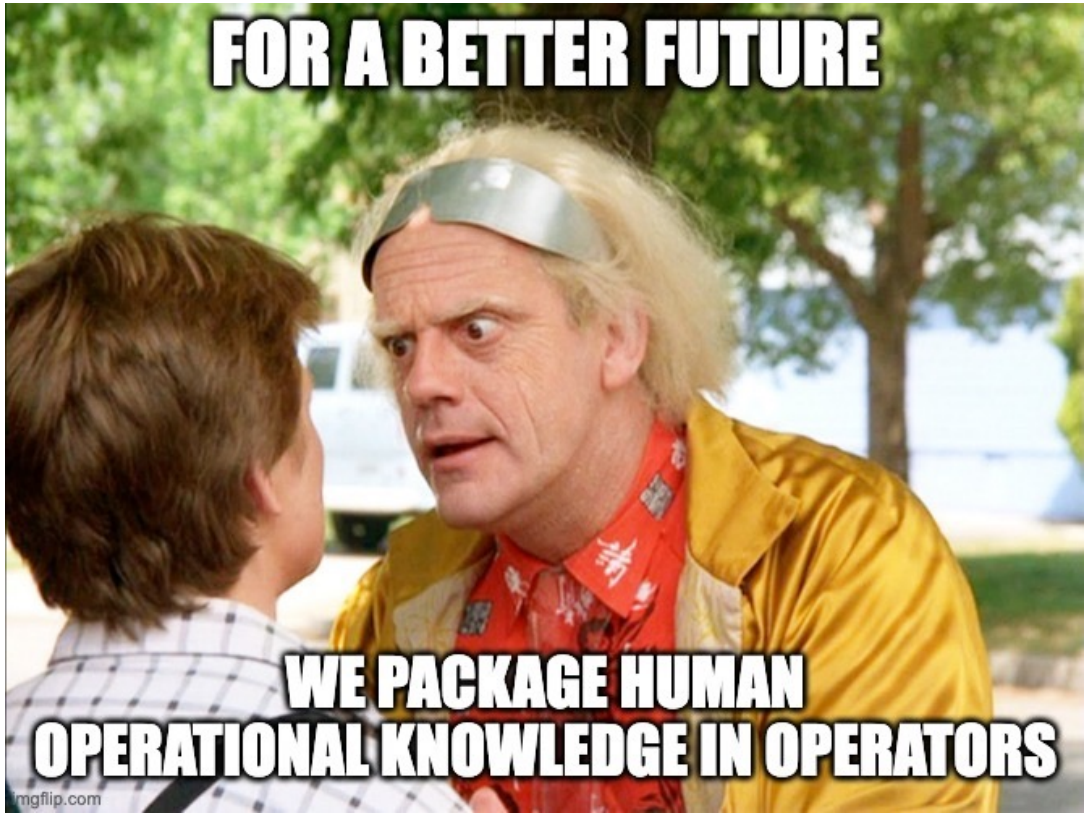
Helm demo status



What happens at the maturity of a system?

Dealing with growing complexity




FOR A BETTER FUTURE
WE PACKAGE HUMAN
OPERATIONAL KNOWLEDGE IN OPERATORS
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Benefits of Using Operators

Package human operational knowledge

Clients like kubectl and dashboard automatically work with Operators.

The resources created via Operators are secured and use HTTPS.

Operators can be used to create backups or for configuring your cluster

What's next?

Discover and decide on an operator to use

https://operatorhub.io/

Deploy

Isolate

Maintain

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Keep Helm charts for installing the application(s).

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Follow the deployment instructions.

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Keep Helm charts for installing the application(s).

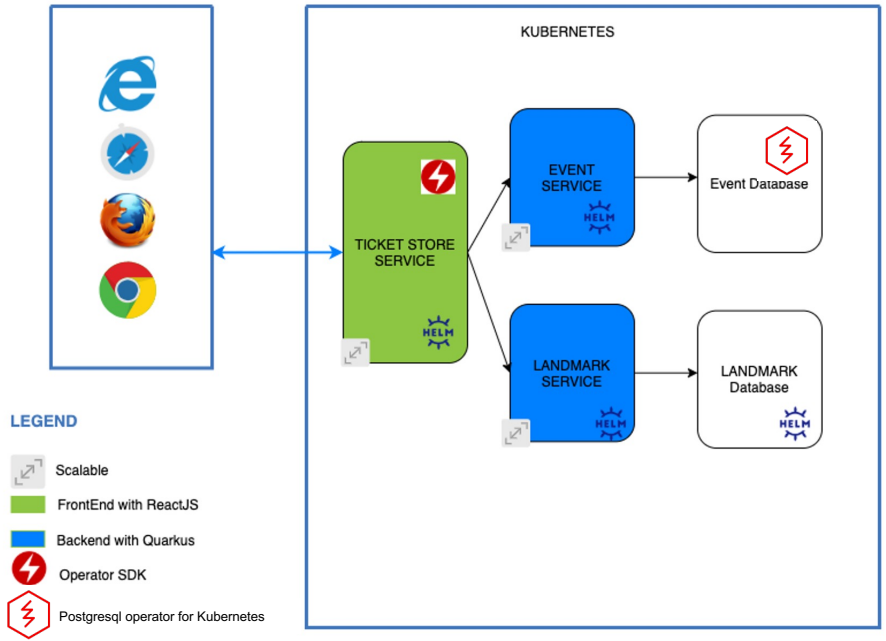
Maintain

Maintain the PostgreSQL database via the operator.

Create an Operator?

- KUDO
- kubebuilder
- Metacontroller
- Operator Framework
- Java Operator SDK

Demo final view



From Helm Charts to Operators

Publish Helm Charts to a Repo

Package charts.

```
git checkout gh-pages
helm package ticket-store
mv ticket-store-0.1.0.tgz docs
helm repo index docs --url https://ammbra.github.io/helm-vs-operators
```

Generate an **index** file based on docs directory

Github repo as a Helm **repository**

```
git add .
git commit -am "published charts"
git push origin
```

Create an Operator from Helm Charts

Reference the Github repo.

```
helm repo add store https://ammbra.github.io/helm-vs-operators/
operator-sdk init --plugins helm --helm-chart store/ticket-store --helm-chart-version=0.1.0
#make install run
kubectl apply -f config/samples/charts_v1alpha1_ticketstore.yaml
```

Generate the operator and its API **based on Helm charts**

Takeaways

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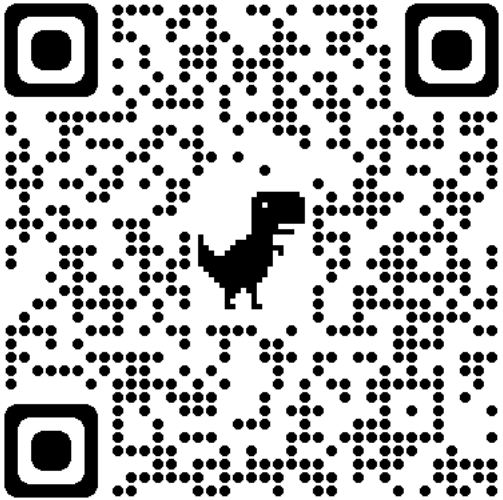
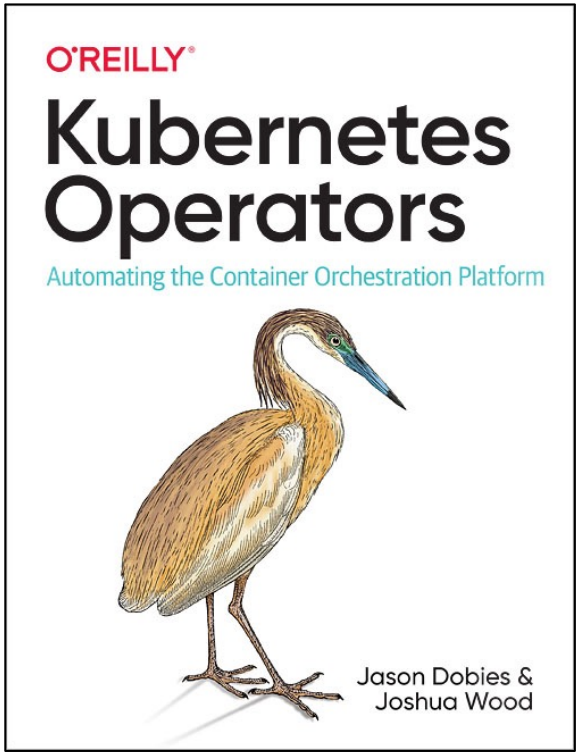
Helm	Operators
Have a custom packaging format.	Include many complex configuration data within the package.
You are deploying a stateless application and are happy with its settings.	Can deploy a stateful application and maintain it in a completely automatic way.
Great for checking an application deployment via its release information.	Can deploy an application configured in a particular way across a cluster to achieve high availability.
Have annotations that can trigger automatic deployments.	Useful for operations related to backups or cluster configuration.

Code made available at

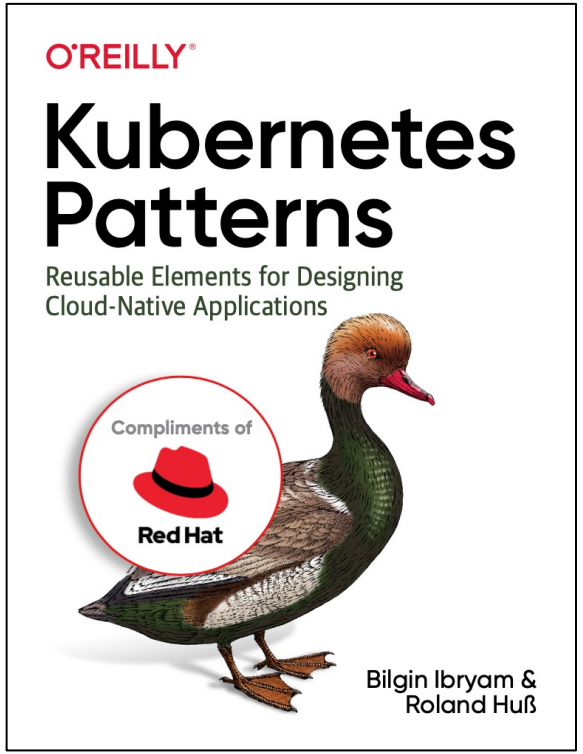
https://github.com/ammbra/helm-vs-operators



Additional resources



dn.dev/k8soperators



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