Delivering Kubernetes Apps with Helm

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Agenda

- Intro to Kubernetes
- Intro to Helm
- Helm Demo
- Chart Package and Repositories
- Lessons learned
Kubernetes

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Production-Grade Container Orchestration Platform

Google does it, so can you

Integrates with GCE, AWS, Azure, OpenStack, etc.

Backed by a large open source community
Kubernetes Objects

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Pods are the smallest deployable units of computing
No pet cows
Services

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Pods will come and go, but services will never leave you
Example: Kubernetes resource

```yaml
apiVersion: extensions/v1beta1
kind: Deployment
metadata:
  name: nginx-deployment
spec:
  minReadySeconds: 5
  template:
    metadata:
      labels:
        app: nginx
    spec:
      containers:
      - name: nginx
        image: nginx:1.7.9
        ports:
        - containerPort: 80
```
apiVersion: extensions/v1beta1
kind: Deployment
metadata:
  name: newbie-bobcat-jenkins
  labels:
    heritage: "Tiller"
    release: "newbie-bobcat"
    chart: "jenkins-0.1.14"
    component: "newbie-bobcat-jenkins-master"
spec:
  replicas: 1
  strategy:
    type: RollingUpdate
  selector:
    matchLabels:
      component: "newbie-bobcat-jenkins-master"
  template:
    metadata:
      labels:
        heritage: "Tiller"
        release: "newbie-bobcat"
        chart: "jenkins-0.1.14"
        component: "newbie-bobcat-jenkins-master"
      annotations:
      spec:
        securityContext:
          runAsUser: 0
        containers:
        - name: newbie-bobcat-jenkins
          image: "gcr.io/kubernetes-charts-ci/jenkins-master-k8s:v0.6.0"
          imagePullPolicy: "Always"
          args: [ "--argumentsRealm.passwd.$(ADMIN_USER)=$(ADMIN_PASSWORD)", "--argumentsRealm.roles.$(ADMIN_USER)=admin" ]
          env:
            - name: JAVA_OPTS
              value: ""
            - name: ADMIN_PASSWORD
              valueFrom:
                secretKeyRef:
                  name: newbie-bobcat-jenkins
                  key: jenkins-admin-password
            - name: ADMIN_USER
              valueFrom:
                secretKeyRef:
                  name: newbie-bobcat-jenkins
                  key: jenkins-admin-user
          ports:
            - containerPort: 8080
              name: http
            - containerPort: 50000
              name: slavelistener
          resources:
            requests:
              cpu: "200m"
Kubernetes’ tools let you build your furniture from scratch.
Most of us don’t want to build our furniture from scratch
We need a tool to manage a group of resources as one unit.
The Package Manager for Kubernetes

Packages == Charts
Charts

- Are application definitions
- Consist of...
  - Metadata
  - Kubernetes resource definitions
  - Documentation
- Live in chart repositories
Let's take Helm for a spin
Grab Helm on Github

github.com/kubernetes/helm
Getting Started is Simple

$ helm init
Helm & Tiller
Like peanut butter & jelly
Tiller

- Server-side component component
- Stores the state of your app deployments
- Helps manage app deployments in your cluster
We saw how...

- Kubernetes manifests are painful
- Helm makes this easier
- Installed a chart
Discover & launch great Kubernetes-ready apps

- Artifactory
  - Version: v4.16.1
  - Status: incubator

- AWS Cluster Autoscaler
  - Version: v0.2.0
  - Status: stable

- Chaoskube
  - Version: v0.8.0
  - Status: stable

- Chronograf
  - Version: v0.1.2
  - Status: stable

- Cockroachdb
  - Version: v0.2.2
  - Status: stable

- Concourse
  - Version: v0.13
  - Status: incubator

- Consul
  - Version: v0.14
  - Status: incubator

- Datadog
  - Version: v0.21
  - Status: stable

- Dokuwiki
  - Version: v0.12
  - Status: stable

- Drupla
  - Version: v0.4.3
  - Status: stable

- Elasticsearch
  - Version: v5.1.4
  - Status: incubator

- Etcd
  - Version: v1.3
  - Status: incubator

- Etcd Operator
  - Version: v1.11
  - Status: stable

- Factorio
  - Version: v0.1.6
  - Status: stable

- GCloud Endpoints
  - Version: v1.0
  - Status: stable

- GHOST
  - Version: v1.4.9
  - Status: stable

- Gitlab-CE
  - Version: v1.15
  - Status: stable

- Grafana
  - Version: v2.2.0
  - Status: stable

- InfluxDB
  - Version: v2.1
  - Status: stable

- JasperReports
  - Version: v1.9.0
  - Status: stable

- Kafka
  - Version: v0.15
  - Status: stable

- Kubernetes
  - Version: v1.16
  - Status: stable

- Nginx
  - Version: v1.17.4
  - Status: stable

- OpenShift
  - Version: v3.11
  - Status: stable

- Redis
  - Version: v3.2.9
  - Status: stable

- RabbitMQ
  - Version: v3.7.6
  - Status: stable

- RabbitMQ Operator
  - Version: v0.2.2
  - Status: stable

- Red Hat OpenShift
  - Version: v4.3
  - Status: stable

- Spinnaker
  - Version: v1.16
  - Status: stable

- Thrift
Helm Charts

Use this repository to submit official Charts for Kubernetes Helm. Charts are curated application definitions for Kubernetes Helm. For more information about installing and using Helm, see its README.md. To get a quick introduction to Charts see this chart document.
Official Chart Repository

- Ready-to-deploy apps
  - Up-to-date
  - Secure
- Community contributed
- Define best practices
Your First Chart

$ helm create myapp
Navigating a Chart

myapp
  ├── Chart.yaml
  │    ├── README.md
  │    ├── charts
  │    │    └── templates
  │    └── values.yaml
Configuration

myapp
 ├── Chart.yaml
 │    ├── README.md
 │    └── templates
 └── values.yaml

values.yaml
image: mycompany/myapp:1.0.0
imagePullPolicy: IfNotPresent
service:
  port: 80

templates/deployment.yaml
apiVersion: extensions/v1beta1
class: Deployment
spec:
  template:
    spec:
      containers:
        - name: {{ .Chart.Name }}
          image: "{{ .Values.image }}"
          imagePullPolicy: {{ .Values.imagePullPolicy }}
          ports:
            - containerPort: {{ .Values.service.port }}
Configuration

$ helm install --set service.port=8080 ./myapp

$ helm install -f myvalues.yaml ./myapp
Chart Docs

myapp
  ├── Chart.yaml
  │     ├── README.md
  │     ├── charts
  │     │     └── templates
  │     │             └── NOTES.txt
  │     └── values.yaml

I'm not saying it's documentation
But it's documentation
name: mariadb
version: 0.5.2
description: Chart for MariaDB
keywords:
  - mariadb
  - mysql
  - database
  - sql
home: https://mariadb.org
sources:
  - https://github.com/bitnami/bitnami-docker-mariadb
maintainers:
  - name: Bitnami
    email: containers@bitnami.com
engine: gotpl
Host Your Very Own Charts

- [github.com/kubernetes/helm-docs](https://github.com/kubernetes/helm-docs)
- `$ helm repo add mycompany charts.mycompany.com`
- `$ helm install mycompany/myapp`
Helm Today

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- Over 100 contributors
- Over 1.5 years old
- First project to graduate from Kubernetes Incubator

Join us!
Lessons Learned/Helm History

- Timing is everything
- Making it dance
- Finding our users
- Past iterations
Lessons Learned: Official Charts Repository

- Influx of submissions
- Version conflicts
- Mass changes
- Inconsistent configurations
Improvements: Official Charts Repository

- Labeling PRs
- Milestones
- Weekly Maintainer Syncs
Charts 2.0

- CANT WE
- AUTOMATE THIS?

- Functional testing
- Common/Base chart
Thank You!

Slack channel with 1000 members
Kubernetes/#Helm

Public dev meetings
Thursdays @ 9:30 pacific

Weekly updates & demos at SIG-Apps meetings
Mondays @ 9am pacific