# Deploying to Kubernetes with Helm

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Ahead of change

# Agenda

- What is **Helm**?
- Installing and upgrading **Charts**
- Developing **Templates**
- Lab
- Helm 2 v Helm 3

## … without Helm

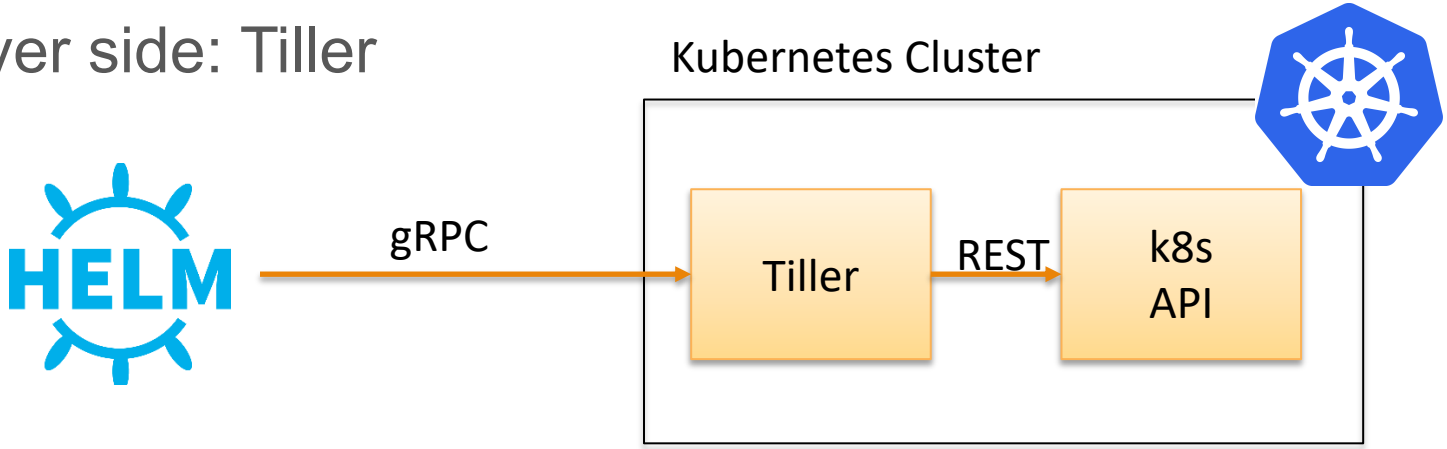
- Write Kubernetes manifests by hand
- Do this for every application
- Manage everything with `kubectl`

## What is Helm?

- Package manager for Kubernetes
- Install applications using **Charts**
- Templating engine (Go template)
- Helm Hub

# What is Helm?

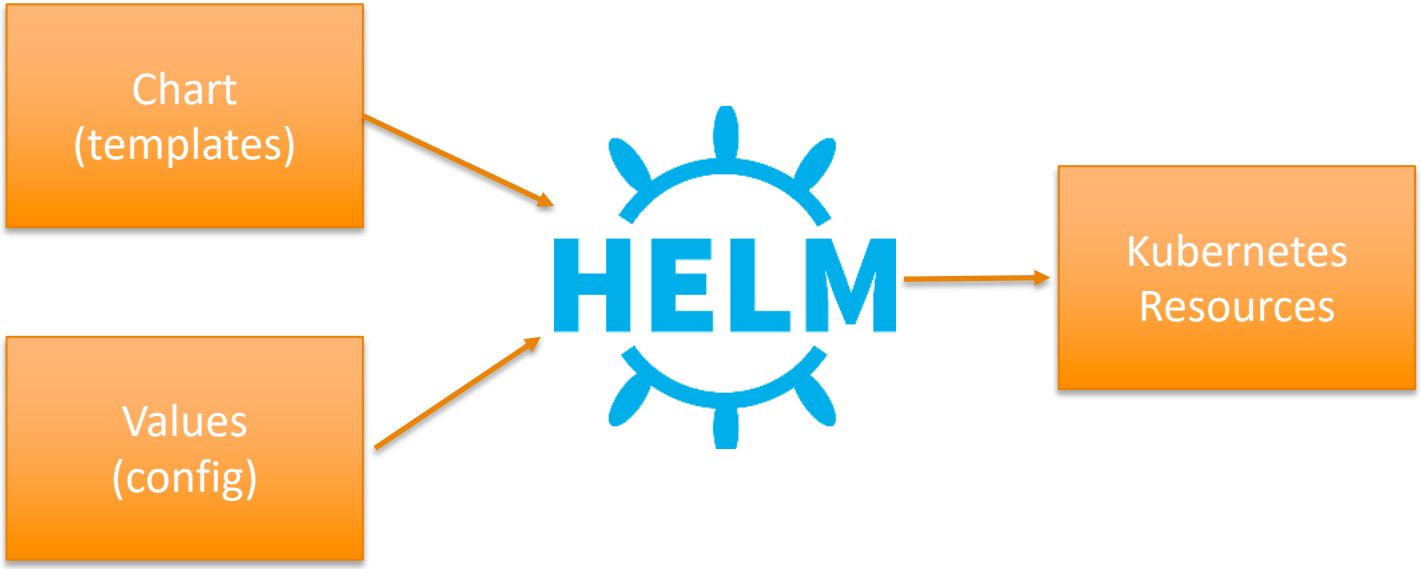
- Client side: Helm
- Server side: Tiller



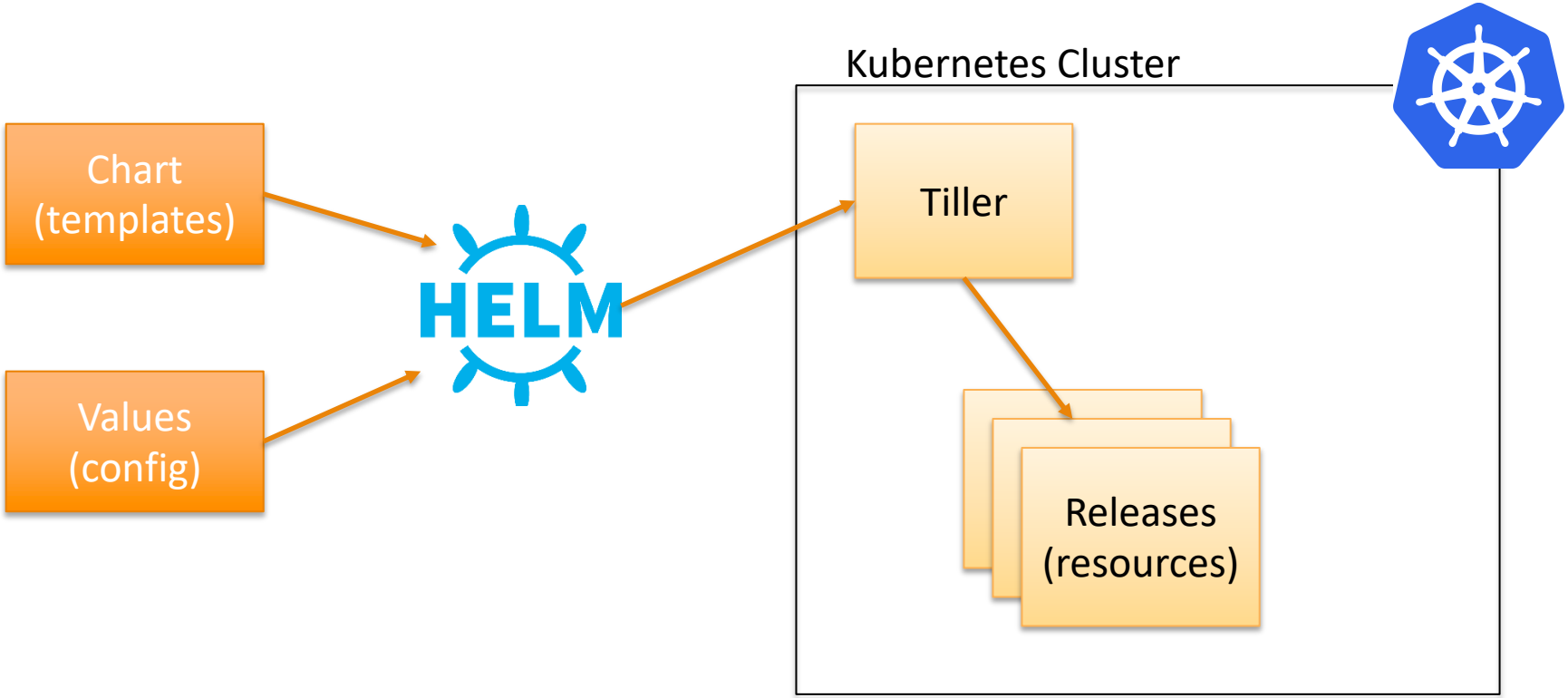
# What is Helm

- Installing resources should be easy
- Releases should be reproducible
- Packages should be shareable

# Templating



# Architecture



# helm init

- Setup Helm for the first time
- Installs Tiller

# helm install <chart>

- Installs a chart
- Creates a release

# `helm list`

- Lists releases

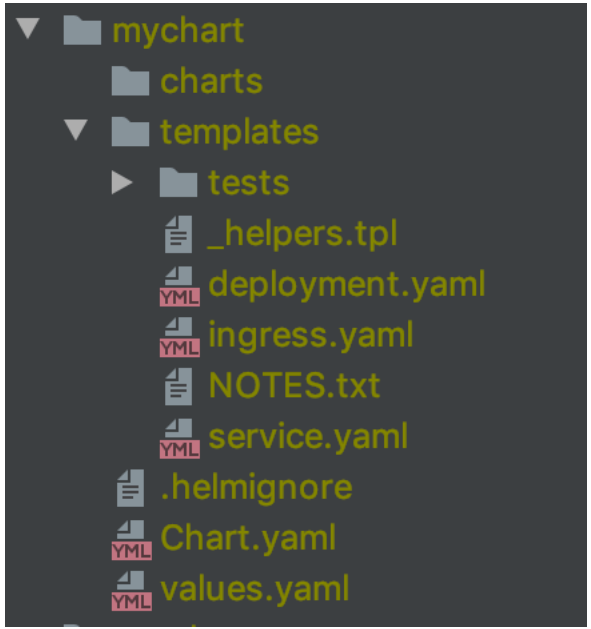
# helm get <release>

- Get a release

# Charts

# Chart

- Chart.yaml
  - Name, version, … of the chart
- values.yaml
  - Default config of the chart
- templates/
  - Contains templates, helper functions, …
- charts/
  - Contains subcharts (dependencies)



# helm create <name>

- Creates a chart

# Templates

# Templates

- Go templating
- {{ … }}

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: {{ include "mychart.fullname" . }}
  labels:
{{ include "mychart.labels" . | indent 4 }}
spec:
  replicas: {{ .Values.replicaCount }}
  selector:
    matchLabels:
      app.kubernetes.io/name: {{ include "mychart.name" . }}
      app.kubernetes.io/instance: {{ .Release.Name }}
  template:
    metadata:
      labels:
        app.kubernetes.io/name: {{ include "mychart.name" . }}
        app.kubernetes.io/instance: {{ .Release.Name }}
    spec:
    {{- with .Values.imagePullSecrets }}
      imagePullSecrets:
        {{- toYaml . | nindent 8 }}
    {{- end }}
```

# Built-in Objects

- Release information

```
{{ .Release.Name }}
{{ .Release.NameSpace }}
…
```

## Built-in Objects

- Values from values.yaml

```
{{ .Values.foo.bar }}
{{ .Values.image.tag }}
…
```

## Built-in Objects

- Chart: data from Chart.yaml

```
{{ .Chart.Name }}
{{ .Chart.Version }}
…
```

# Built-in Objects

- Files

```
{{ .Files.Get config.ini }}
{{ .Files.GetBytes myimage.jpg }}
…
```

## Built-in Objects

- Capabilities: Kubernetes cluster support info

```
{{ .Capabilities.APIVersions }}
{{ .Capabilities.KubeVersion.Major }}
…
```

## Built-in Objects

- Template: current template information

```
{{ .Template.Name }}
{{ .Template.BasePath }}
```

## Control whitespace

- Remove new lines before and after using -

```
{{   .Values.someSetting   }}
{{-  .Values.someSetting   }}
{{   .Values.someSetting  -}}
{{-  .Values.someSetting  -}}
```

# Define templates

- Define named templates

```
{{- define “mychart.labels” }}
  labels:
    app: {{ .Release.Name }}-myapp
{{- end }}
```

## Use templates

- Use named templates

```
apiVersion: v1
kind: ConfigMap
metadata:
  name: {{ .Release.Name }}-configmap
  {{- template “mychart.labels” }}
```

# Functions

- Functions

```
{{ functionName arg1 arg2 … }}
```

# Functions

- Control flow

```
{{- if eq .Values.someBoolean }}
  ...
{{- else }}
  ...
{{- end }}
```

# Functions

- Control flow

```
{{- if eq .Values.someString “value” }}
  ...
{{- else }}
  ...
{{- end }}
```

# Functions

- Pipe functions

```
foo: {{ .Values.foo | quote }}
bar: {{ .Values.bar | upper | quote)

foo: “foo”
bar: “BAR”
```

# helm template

- Locally renders templates
- Used for development …
- … or if you don’t use Tiller

# Lab

# Demo App

House of Commons

Order!!

Speaker

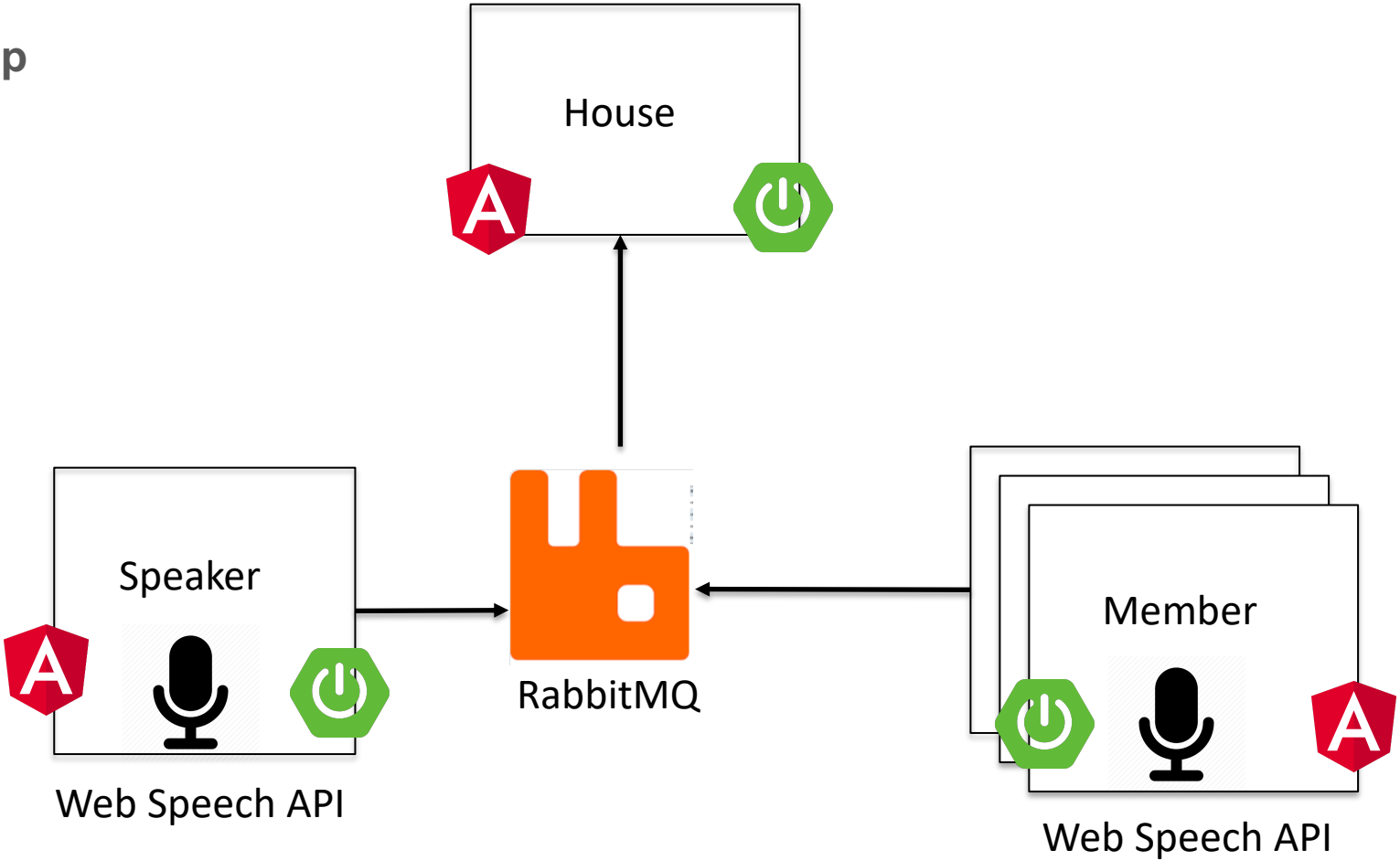
Motions

NO!

AYE!

Members

# Demo App


House
Speaker
RabbitMQ
Member
Web Speech API
Web Speech API

# Helm 2 v Helm 3

# Helm 3

- Removal of Tiller
  - Difficult to manage after Kubernetes v1.6
  - No need for in-cluster operator to maintain state
  - Use Kubernetes RBAC instead
- Improved upgrade strategy

## Improved upgrade strategy

- Helm 2: two-way merge
  - Installed chart's manifest
  - Proposed chart's manifest

- Helm 3: three-way merge
  - Installed chart's manifest
  - Proposed chart's manifest
  - Live state

# Kustomize

- Alternative to Helm
- Workshop at 29/10 (invites soon, date could change)
- Blogpost by Pieter Vincken 👍

  https://ordina-jworks.github.io/cloud/2019/09/18/kustomize.html