

# Helm 3 Deep Dive

All the things you ~~never~~ wanted to know

# A Huge Thanks

- The Helm Core maintainers
- Josh Dolitsky



## BRIEF HISTORY OF HELM



Helm v1 is  
announced at the  
first KubeCon

"k8splace" is  
developed at a  
Deis hackathon

Helm merges with  
Google  
Deployment  
Manager

Helm 2.0.0 is  
released

Helm Summit  
takes place to kick  
off discussion on  
Helm 3

  
Helm project joins  
the CNCF



Helm 3 is  
Released

OCT 2015

NOV 2015

JAN 2016

NOV 2016

FEB 2018

JUN 2018

???

# The Helm 3 Project Board

<https://github.com/helm/helm/projects/1>

# Major changes to expect in Helm 3

- **Embedded Lua engine**

Removal of Tiller

Chart repo auth & upload

New Charts.yaml

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- **New Chart.yaml**



## Other Helm 3 changes

- “Managed” hooks - if Helm creates something, it will delete it
- index.yaml will move to index.json, and be partitioned for performance
- Schematize your values by including a values.schema.yaml file
- Helm client libraries will be much better



# Embedded Lua engine

Making Helm charts more  
robust and programmable

## Major changes to expect in Helm 3

---

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# Embedded Lua engine

- Lua can be used with, or in place of, YAML templates
- Treat Kubernetes resources as objects, not strings
- Intercept lifecycle events, modify chart on-the-fly
- Sandboxed - optionally limit access to network/io
- Develop and import reusable “library charts”
- Helm plugins will have access to the Lua runtime

## Helm 2

```
apiVersion: v1
kind: Pod
metadata:
  name: {{ template "alpine.fullname" . }}
  labels:
    heritage: {{ .Release.Service }}
    release: {{ .Release.Name }}
    chart: {{ .Chart.Name }}-{{ .Chart.Version }}
    app: {{ template "alpine.name" . }}
spec:
  restartPolicy: {{ .Values.restartPolicy }}
  containers:
    - name: waiter
      image: "{{.Values.img}}:{{.Values.img.tag}}"
      imagePullPolicy: {{ .Values.img.pullPolicy }}
      command: ["/bin/sleep", "9000"]
```

## Helm 3

## Helm 2

```
apiVersion: v1
kind: Pod
metadata:
  name: {{ template "alpine.fullname" . }}
  labels:
    heritage: {{ .Release.Service }}
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    app: {{ template "alpine.name" . }}
spec:
  restartPolicy: {{ .Values.restartPolicy }}
  containers:
  - name: waiter
    image: "{{.Values.img}}:{{.Values.img.tag}}"
    imagePullPolicy: {{ .Values.img.pullPolicy }}
    command: ["/bin/sleep", "9000"]
```

## Helm 3

```
function create_alpine_pod(_)
  local pod = {
    apiVersion = "v1",
    kind = "Pod",
    metadata = {
      name = alpine_fullname(_),
      labels = {
        heritage = _.Release.Service or "helm",
        release = _.Release.Name,
        chart = _.Chart.Name .. "-" .. _.Chart.Version,
        app = alpine_name(_)
      }
    },
    spec = {
      restartPolicy = _.Values.restartPolicy,
      containers = {
        {
          name = waiter,
          image = _.Values.image.repository .. ":" ..
            _.Values.image.tag,
          imagePullPolicy = _.Values.image.pullPolicy,
          command = {
            "/bin/sleep",
            "9000"
          }
        }
      }
    }
  }
  return pod
```

## Helm 2

```
apiVersion: v1
kind: Pod
metadata:
  name: {{ template "alpine.fullname" . }}
  labels:
    heritage: {{ .Release.Service }}
    release: {{ .Release.Name }}
    chart: {{ .Chart.Name }}-{{ .Chart.Version }}
    app: {{ template "alpine.name" . }}
spec:
  restartPolicy: {{ .Values.restartPolicy }}
  containers:
    - name: waiter
      image: "{{.Values.img}}:{{.Values.img.tag}}"
      imagePullPolicy: {{ .Values.img.pullPolicy }}
      command: ["/bin/sleep", "9000"]
```

## Helm 3

```
-- Example of using a "library chart"
local pods = require("mylib.pods");

function create_alpine_pod(_)
  myPod = pods.new("alpine:3.7", _)
  myPod.spec.restartPolicy = "Always"
  -- set any other properties
  _.Manifests.add(myPod)
end
```



## Removal of Tiller

Improving security by delegating auth  
to Kubernetes RBAC

## Major changes to expect in Helm 3

---

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auth & upload

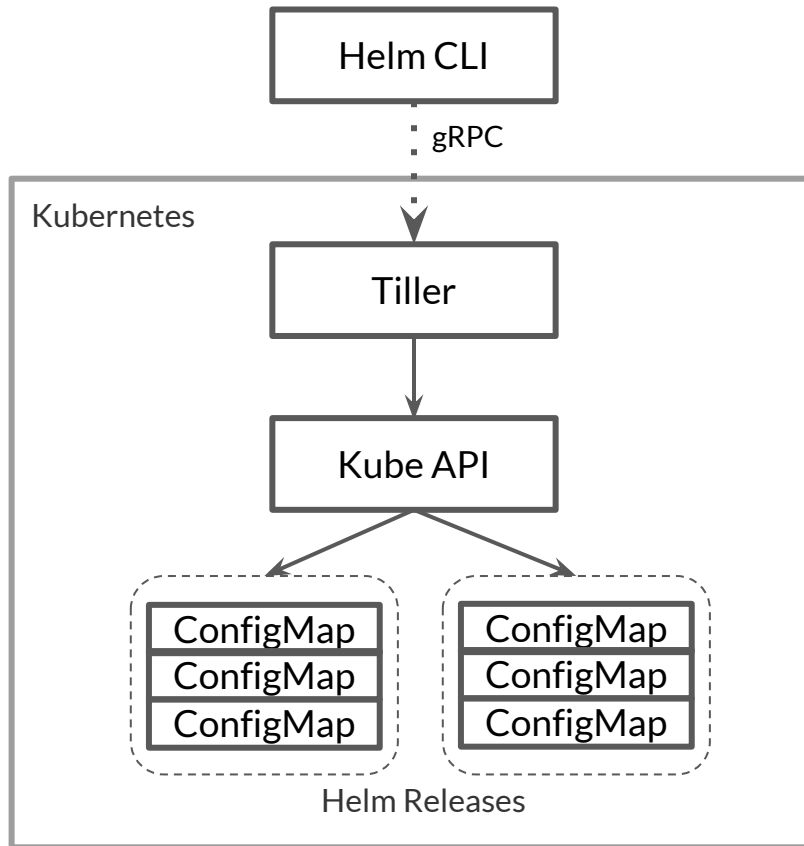
New Chart.yaml

# Removal of Tiller

- Shrinks the security model for Helm, now client-only
- Auth is delegated to Kubernetes RBAC
- Release history maintained using ULIDs vs. integers
- “Release” CRD will store instance of an application
- “ReleaseVersion” CRD will store version of release

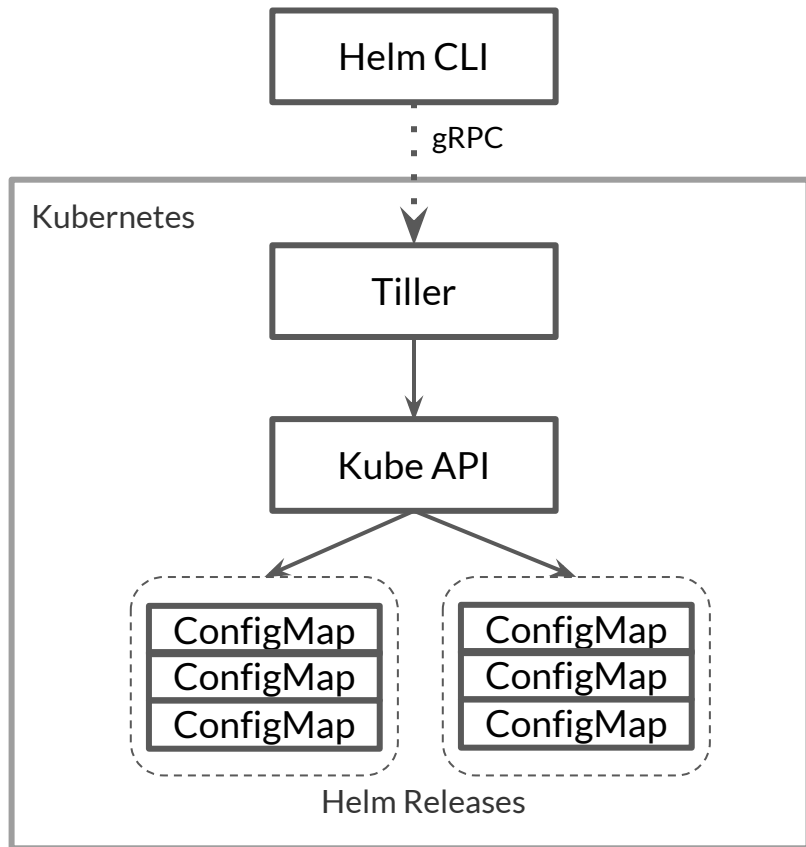


## Helm 2

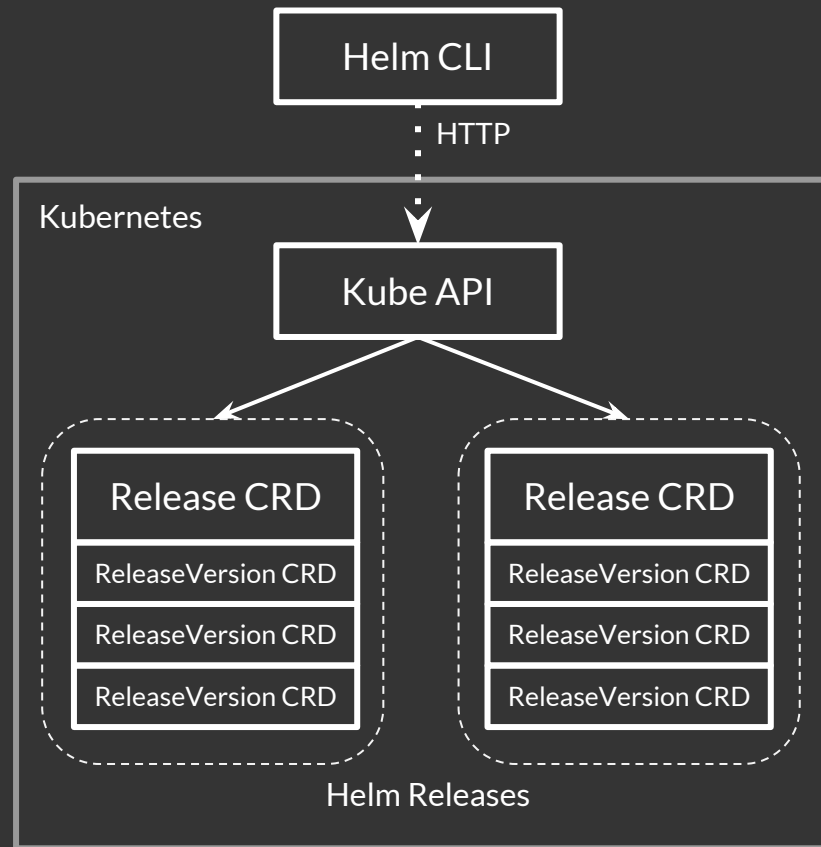


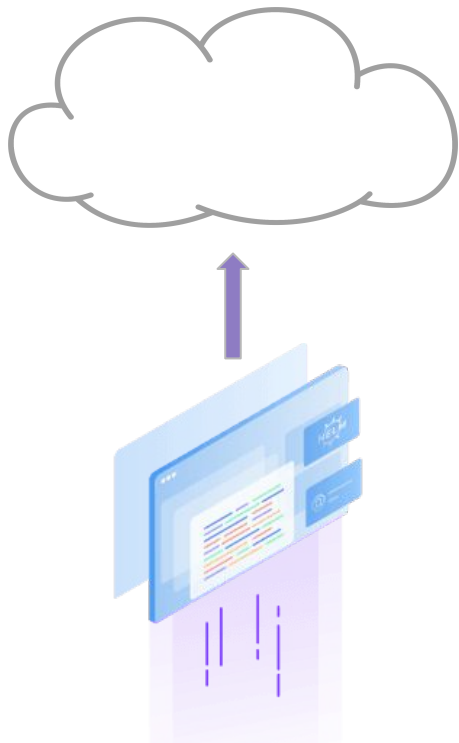
## Helm 3

## Helm 2



## Helm 3





# Chart repo auth & upload

New commands and API spec for  
working with chart repositories

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New Chart.yaml

# Chart repo auth & upload

- “helm push” command to upload chart to a repo
- Push spec is still being finalized
- Plugins can supply custom protocols (e.g. `s3://`)
- “helm login” command to authenticate against a repo
- OAuth2 authorization flow, bearer/token auth
- Limit which users can upload/install which charts

## Helm 2

```
$ helm repo add myrepo \
  https://site.com/myrepo \
  --username=josh \
  --password=*****
```

---

```
$ helm package mychart/
```

---

```
$ ./my-custom-uploader.sh \
  mychart-0.1.0.tgz
```

---

```
$ helm repo update
```

---

```
$ helm install myrepo/mychart
```

## Helm 3

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```
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---

```
$ helm install myrepo/mychart
```

## Helm 3

```
$ helm login https://site.com
```

---

```
$ helm repo add myrepo \
  https://site.com/myrepo
```

---

```
$ helm push mychart/ myrepo
```

---

```
$ helm repo update
```

---

```
$ helm install myrepo/mychart
```

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New Chart.yaml

# New chart.yaml

- Current chart.yaml files will not be broken
- The requirements file will no longer exist
- Requirements will now be part of the charts.yaml

## Helm 2

```
# requirements.yaml
dependencies:
- name: reqsubchart
  version: 0.1.0
  repository: "https://example.com/charts"
- name: reqsubchart2
  version: 0.2.0
  repository: "https://example.com/charts"
- name: reqsubchart3
  version: ">=0.1.0"
  repository: "https://example.com/charts"

# chart.yaml
description: A Helm chart for Kubernetes
name: reqtest
version: 0.1.0
```

## Helm 3



## Helm 2

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dependencies:
- name: reqsubchart
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  repository: "https://example.com/charts"
- name: reqsubchart2
  version: 0.2.0
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name: reqtest
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- name: reqsubchart
  version: 0.1.0
  repository: "https://example.com/charts"
- name: reqsubchart2
  version: 0.2.0
  repository: "https://example.com/charts"
- name: reqsubchart3
  version: ">=0.1.0"
  repository: "https://example.com/charts"
```

# Want to know more about Helm 3?

## **Helm 3 Design Proposal**

<https://github.com/helm/community/tree/master/helm-v3>

## **The Helm 3 Dev Branch**

<https://github.com/helm/helm/tree/dev-v3>