



# The Better Way to Deploy on Kubernetes

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# The Package Manager for Kubernetes

Compare

- Apt
- Yum
- Homebrew
- Chocolatey
- ...



# Terminology

- Chart

A Helm package. Bundles together a set of Kubernetes resource definitions

- Repository

Hosts a collection of charts on an HTTP server

- Release

An instance of a chart running in a Kubernetes cluster

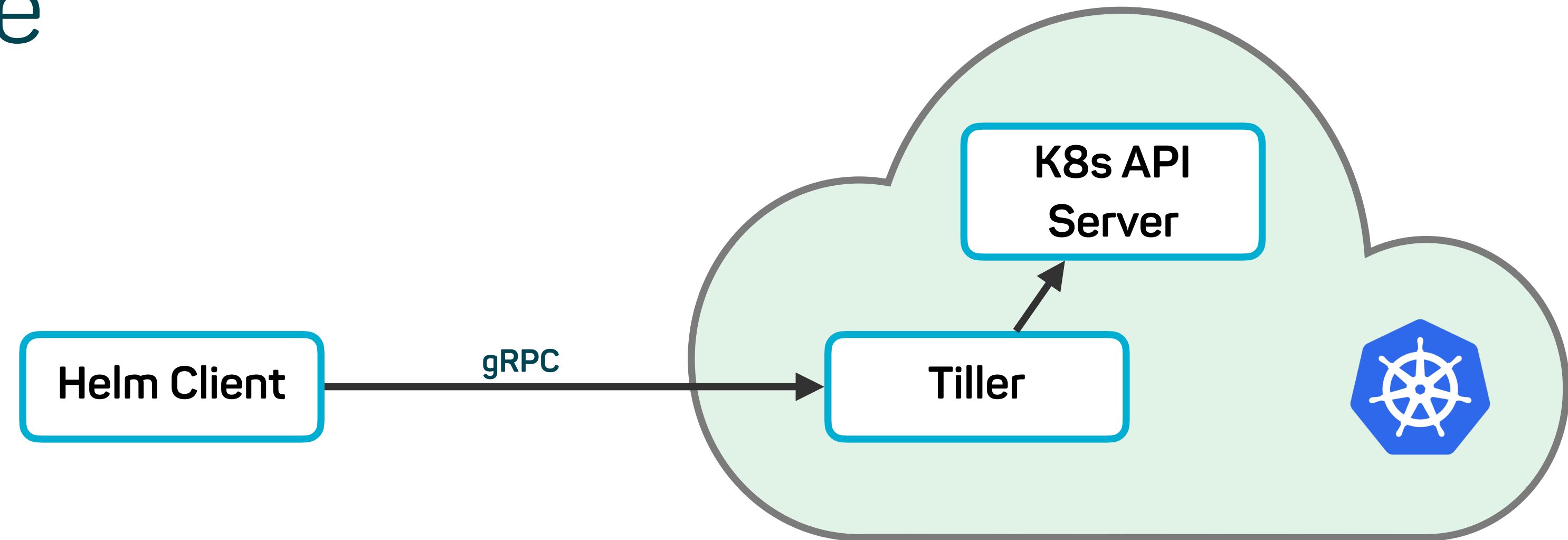
# Features

- Release history
- Go templating support
- JSON Schema support
- Access to Kubernetes capabilities
- Lifecycle management with hooks
- CRD support
- Dependencies
- Support for Library charts
- PGP support
- Plugin support

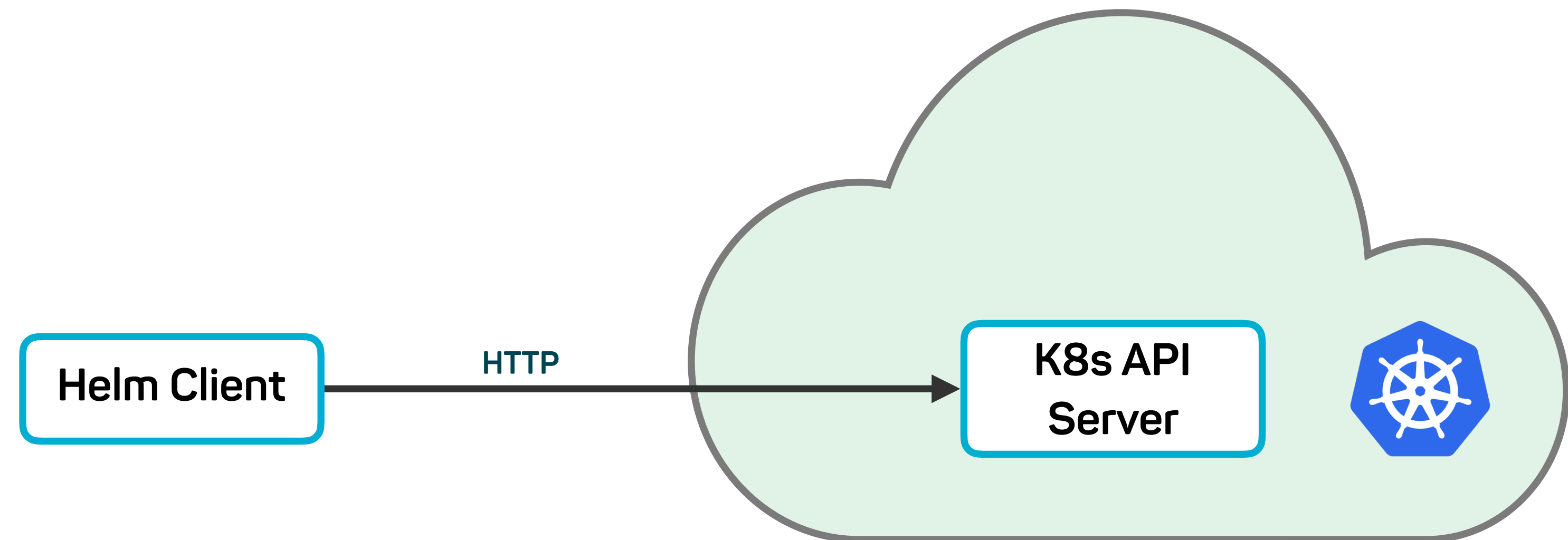


# Helm Architecture

## Helm v2



## Helm v3



# Helm CLI

Helm 2	Helm 3	Description
<code>init</code>	<i>(removed)</i>	Set up Helm on the cluster
<code>install/upgrade</code>	<code>install/upgrade</code>	Install or upgrade a chart
<code>delete --purge</code>	<code>uninstall</code>	Uninstall a chart
<code>get/status/list</code>	<code>get/status/list</code>	Find out information about running charts
<code>search</code>	<code>search</code>	Search for charts in repositories or the Hub
<code>create</code>	<code>create</code>	Create a new chart
<code>template</code>	<code>template</code>	Render chart templates locally

# Chart Directory Structure

Name	
▼	templates
	_helpers.tpl
	deployment.yaml
	ingress.yaml
	NOTES.txt
	service.yaml
	Chart.yaml
	values.schema.json
	values.yaml



# Chart.yaml

```
apiVersion: v2
name: foo
description: A Helm chart for Kubernetes

# A chart can be either an 'application' or a 'library' chart.
#
# Application charts are a collection of templates that can be packaged into versioned archives
# to be deployed.
#
# Library charts provide useful utilities or functions for the chart developer. They're included as
# a dependency of application charts to inject those utilities and functions into the rendering
# pipeline. Library charts do not define any templates and therefore cannot be deployed.
type: application

# This is the chart version. This version number should be incremented each time you make changes
# to the chart and its templates, including the app version.
version: 0.1.0

# This is the version number of the application being deployed. This version number should be
# incremented each time you make changes to the application.
appVersion: 1.16.0
```

# Templating

- Standard Kubernetes YAML manifest files
- Parameterizable via Go template language
- Sprig function library included
- Chart should provide default values in `values.yaml`

```
image: {{ .Values.image.repository }}:{{ .Values.image.tag }}  
imagePullPolicy: {{ .Values.image.pullPolicy }}
```

# Templating – Flow Control

<code>if/else/else if</code>	for creating conditional blocks
<code>with</code>	to specify a scope
<code>range</code>	provides a “for each”-style loop

# Templating — Built-in Objects

- Values
- Release (Release.Name, Release.Namespace, ...)
- Chart (Chart.Name, Chart.Version, ...)
- Files (Files.Get, Files.GetBytes)
- Capabilities (Capabilities.APIVersions, Capabilities.KubeVersion, ...)
- Template (Template.Name, Template.BasePath)

# Templating – Partial

```
{{- define "MY_NAME" }}  
# body of template here  
{{- end }}
```

```
{{- define "sample.labels" }}  
app: {{ include "sample.name" . }}  
component: server  
{{- end }}
```

```
apiVersion: apps/v1  
kind: Deployment  
metadata:  
  name: {{ include "sample.fullname" . }}  
  labels:  
    {{- include "sample.labels" . | nindent 4 }}
```

# Dependencies

~~requirements.yaml~~

Chart.yaml

```
dependencies:
- name: apache
  version: 1.2.3
  repository: https://example.com/charts
- name: mysql
  version: 3.2.1
  repository: https://another.example.com/charts
```

```
$ helm dependency build demo-app
Hang tight while we grab the latest from your chart repositories...
...Successfully got an update from the "stable" chart repository
...Successfully got an update from the "example" chart repository
...Successfully got an update from the "another" chart repository
Update Complete. Happy Helming!
Saving 2 charts
Downloading apache from repo https://example.com/charts
Downloading mysql from repo https://another.example.com/charts
```



# Hooks

- Perform operations at strategic points in a release lifecycle
- Can be weighted for ordering

- pre-install
- post-install
- pre-delete
- post-delete
- pre-upgrade
- post-upgrade
- pre-rollback
- post-rollback
- ~~crd-install~~

```
apiVersion: batch/v1
kind: Job
metadata:
  name: hook-job
  annotations:
    helm.sh/hook: pre-install,pre-upgrade
spec:
  ...
```

# Installing Charts

- `helm install <chart> --generate-name`
- `helm install <release> <chart>`
- `helm upgrade <release> <chart>`
- `helm upgrade <release> <chart> --install`

```
$ helm upgrade demo charts/hello-world --install \
  -f hello-world__values.yaml
```

# Tests

- Sanity checks for chart releases
- Pod specification with test commands to run
- Since Helm 3: Tests can be Kubernetes Jobs
- Triggered by test hook annotations
  - `helm.sh/hooks: test-success`
  - ~~`helm.sh/hooks: test-failure`~~

```
apiVersion: v1
kind: Pod
metadata:
  name: my-app-test
  annotations:
    helm.sh/hook: test-success
spec:
  containers:
    - name: my-app-test
      image: foo/my-app-test:42
      ...
```

# Migration to Helm 3

- helm-2to3 plugin
- Migrates configuration and releases
- <https://helm.sh/docs/faq/#changes-since-helm-2>
- <https://github.com/helm/helm-2to3>
- <https://helm.sh/blog/migrate-from-helm-v2-to-helm-v3/>

# Demo Time

<https://github.com/unguiculus/hello-world>

# Helm Hub

<https://github.com/helm/charts>

<https://hub.helm.sh>

helm / charts

Unwatch

Unstar

10.8k

Fork

Code

Issues 321

Pull requests 297

ZenHub

Actions

More

Settings

Curated applications for Kubernetes

kubernetes

charts

helm

Manage topics

11,013 commits

3 branches

0 releases

2,632 contributors

Apache-2.0

Branch: master

Create new file

Find file

Clone or download


Helm Hub

Charts • About

Discover & launch great  
Kubernetes-ready apps

Search charts...

881 charts ready to deploy



mogaal/adminer

4.7.3



aerospike/aerospike

4.7.0.2



stable/aerospike

v4.5.0.5



# ct – The Chart Testing Tool

- Lint, install, and test Helm charts in a CI pipeline
- Test chart upgrades
- <https://github.com/helm/chart-testing>

The screenshot shows the GitHub repository page for `helm / chart-testing`. The repository is a CLI tool for linting and testing Helm charts. It has 294 stars, 17 issues, 4 pull requests, 11 releases, and 21 contributors. The repository is licensed under Apache-2.0. The page includes a navigation bar with links to Code, Issues, Pull requests, ZenHub, Actions, Releases, More, and Settings. Below the navigation bar, there is a description of the tool and a list of topics: helm, docker, testing, linting, kubernetes, and golang. At the bottom, there is a section for repository statistics and a 'Clone or download' button.

helm / chart-testing

Unwatch Star 294 Fork

Code Issues 17 Pull requests 4 ZenHub Actions Releases 11 More Settings

CLI tool for linting and testing Helm charts Edit

helm docker testing linting kubernetes golang [Manage topics](#)

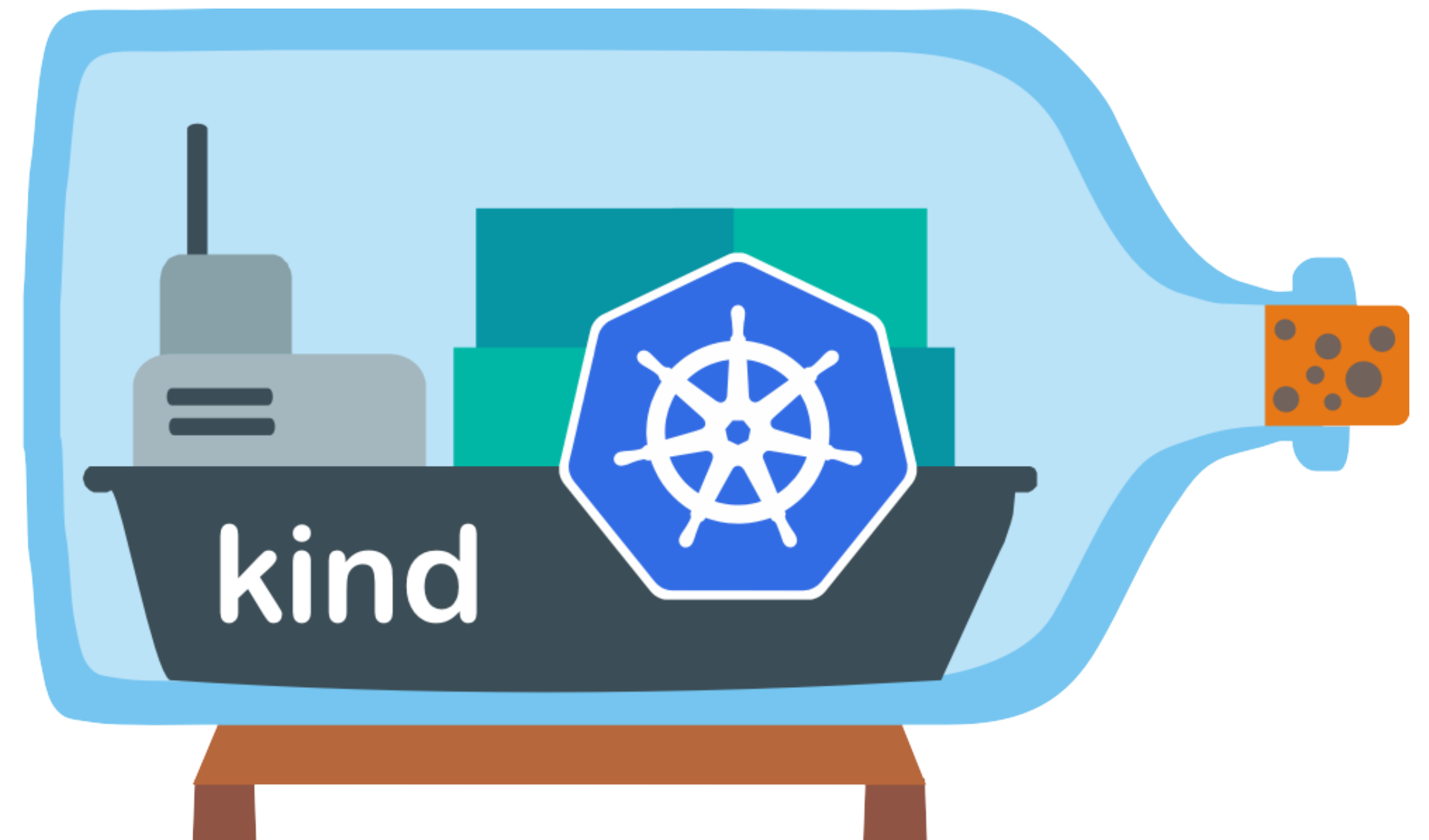
105 commits 3 branches 11 releases 21 contributors Apache-2.0

Branch: master

Create new file Find file Clone or download

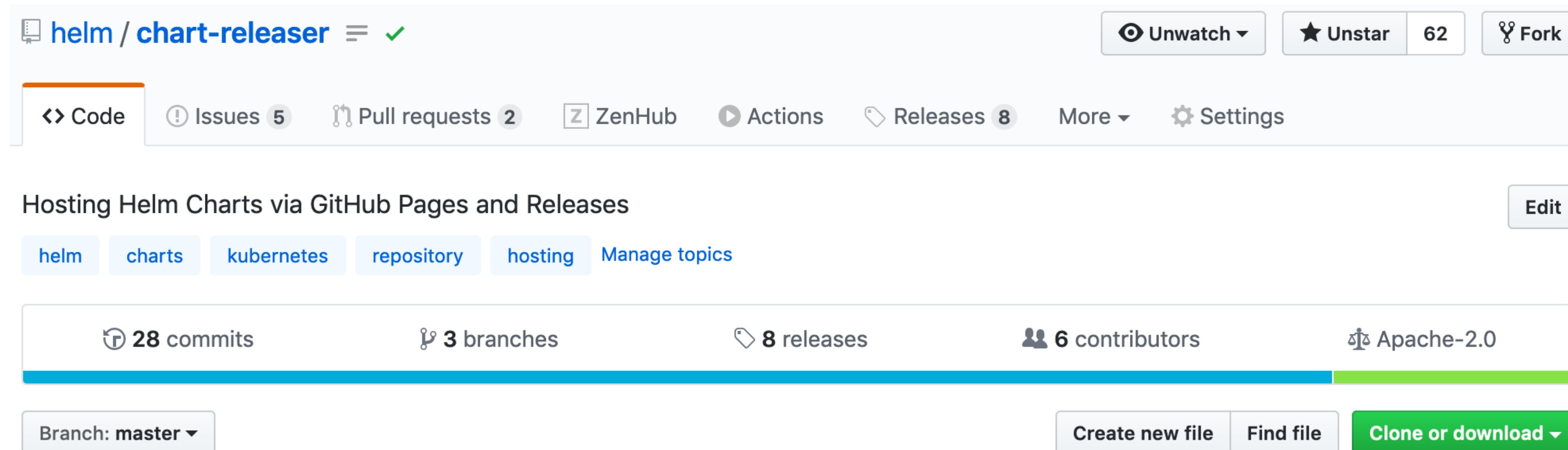
# kind – *Kubernetes in Docker*

- Run local Kubernetes clusters using Docker
- Perfect for use in CI pipeline
- Supports multi-node clusters
- <https://github.com/kubernetes-sigs/kind>



# cr – The Chart Releaser Tool

- Use GitHub pages and releases to host your Helm charts
- Already usable, but still work in progress
- Planned: GitHub Action/GitHub App
- <https://github.com/helm/chart-releaser>



The screenshot shows the GitHub repository page for `helm / chart-releaser`. The repository is public and has 62 stars. The repository description is "Hosting Helm Charts via GitHub Pages and Releases". The repository has 28 commits, 3 branches, 8 releases, 6 contributors, and is licensed under Apache-2.0. The repository is currently on the `master` branch. The repository is hosted on GitHub Pages and has a release page. The repository is also available on GitHub Actions and GitHub App.

helm / chart-releaser

Unwatch Unstar 62 Fork

Code Issues 5 Pull requests 2 ZenHub Actions Releases 8 More Settings

Hosting Helm Charts via GitHub Pages and Releases Edit

helm charts kubernetes repository hosting Manage topics

28 commits 3 branches 8 releases 6 contributors Apache-2.0

Branch: master Create new file Find file Clone or download



# Thank you



Reinhard Nägele



<https://github.com/unguiculus>



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