DATE : 29.04.2025

DT/NT : DT

LESSON : KUBERNETES

SUBJECT: HELM-1

BATCH : B 303

AWS-DEVOPS

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I want to be able to deploy and share my app everywhere consistently, and manage it as a single entity regardless of the different parts.

Kubectl way

- CI/CD pipeline
  - *kubectl* deployments are not easy to configure, update and rollback
    - Deploying app to dev/test/production may require different configuration
      - Update deployment e.g. update with a new image
      - Change the configuration based on certain conditions
      - A different serviceType is needed in different environments (e.g. NodePort/LoadBalancer)
      - Need for rollback
      - Need of having multiple deployments (e.g. multiple Redis deployments)
  - Requires to track your deployment and modify YAML files (can be error prone)
  - Does not allow multiple deployments without updating metadata in manifest files
- Share your deployment configurations with your friend, team or customer?
  - You need to share many files and related dependencies
  - Your users are required to have knowledge of deployment configuration

Helm way

- No expertise of Kubernetes deployment needed as Helm hides Kubernetes domain complexities
- Helm packages all dependencies
- Desired configuration can be passed at runtime as key-value
- Helm tracks deployment making it easy to update and rollback
- Same workload can be deployed multiple times
- Helm allows assigning workload release names at runtime
- Easy to share

Helm

Helm is the package manager for Kubernetes

So, What is Helm?

- Helm is a tool that streamlines installation and management of Kubernetes applications
  - Helm became a CNCF project in mid 2018
- It uses a packaging format called **charts**
  - A chart is a collection of files that describe Kubernetes resources
  - Think of Helm like apt/yum/homebrew for Kubernetes
- Helm is available for various operating systems like OSX, Linux and Windows
- Run Helm anywhere e.g. laptop, CI/CD etc.

Three Big Concepts

- A Chart is a Helm package. It contains all of the resource definitions necessary to run an application, tool, or service inside of a Kubernetes cluster.
- A Repository is the place where charts can be collected and shared.
- A Release is an instance of a chart running in a Kubernetes cluster.
- One chart can often be installed many times into the same cluster.
- And each time it is installed, a new release is created.

Three Big Concepts

HELM		DOCKER
Chart	------>	Image
Repository	------>	ECR
Release	------>	Container

Chart Structure

- A chart is organized as a collection of files inside of a directory
- The directory name is the name of the chart e.g. guestbook.
- Inside of the directory, the expected file structure is

Required files:

Chart.yaml - A YAML file containing information about the chart.

One of the **charts** or **templates** directory:

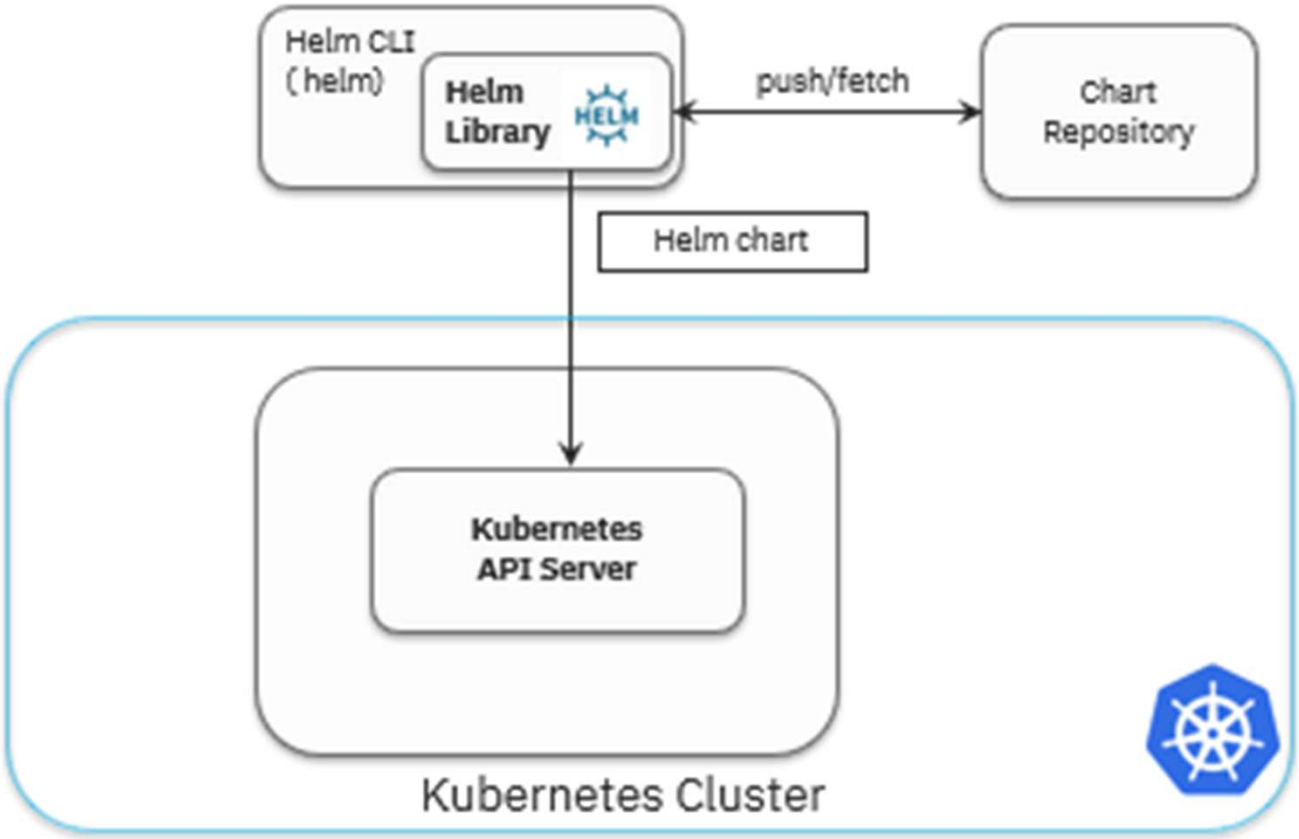
- **charts/** - A directory containing any charts upon which this chart depends. (static linked)
- **templates/** - A directory of templates with Kubernetes manifest files or that will generate valid Kubernetes manifest files when combine with values.yaml.

Optional files:

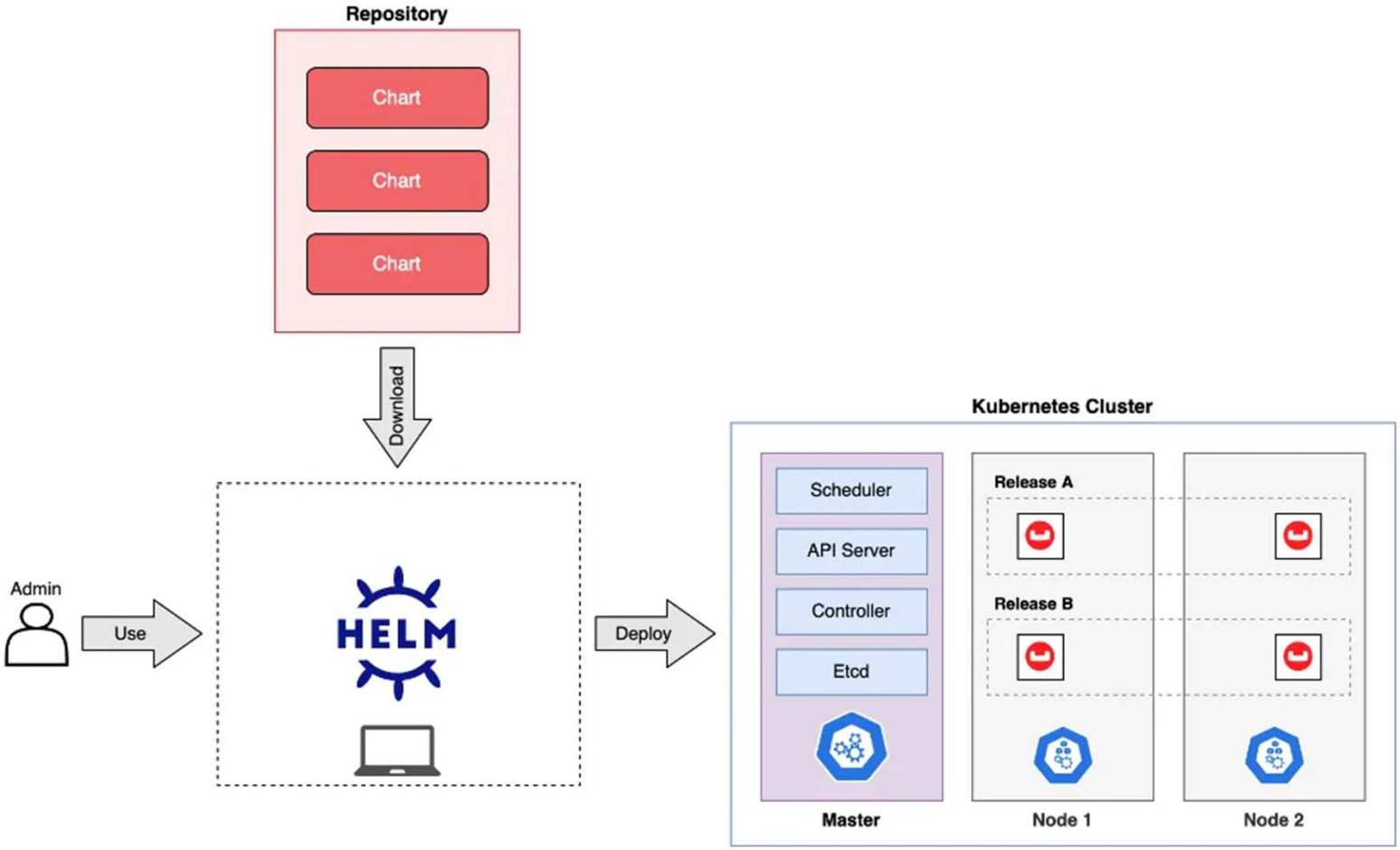
LICENSE - A plain text file containing the license for the chart
README.md - A human-readable README file
requirements.yaml - A YAML file listing dependencies for the chart (dynamic linked)
values.yaml - The default configuration values for this chart
templates/NOTES.txt - A plain text file containing short usage notes
template/_helpers.tpl – template helpers that you can re-use throughout the chart

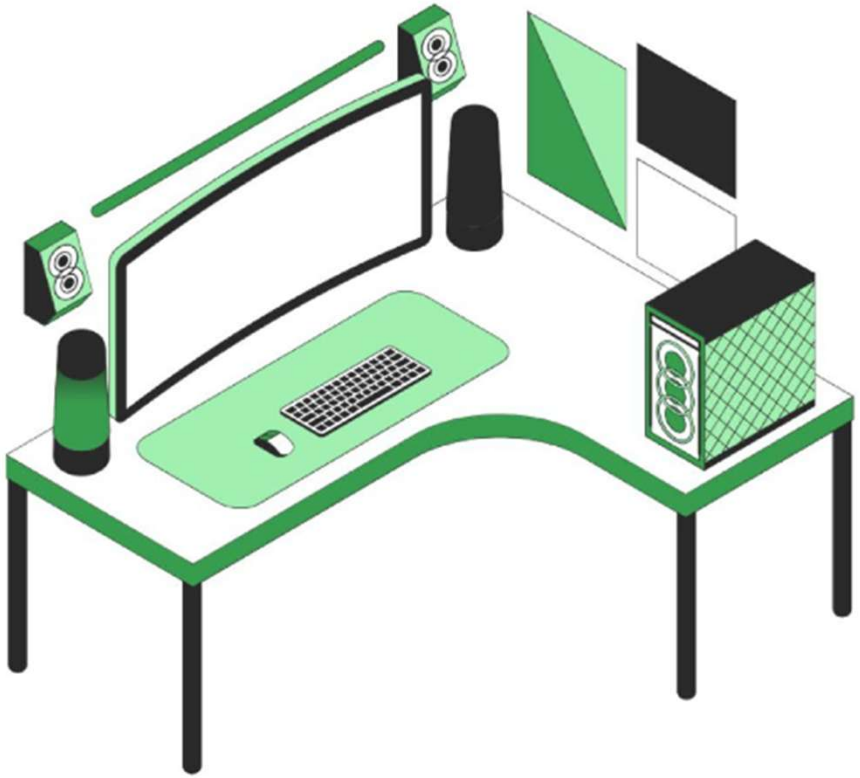
```
Sahdevs-MBP:guestbook sahdevzala$ tree
.
├── Chart.yaml
├── LICENSE
├── README.md
├── charts
├── templates
│   ├── NOTES.txt
│   ├── _helpers.tpl
│   ├── guestbook-deployment.yaml
│   ├── guestbook-service.yaml
│   ├── redis-master-deployment.yaml
│   ├── redis-master-service.yaml
│   ├── redis-slave-deployment.yaml
│   └── redis-slave-service.yaml
└── values.yaml
```

Helm v3 Architecture



Helm v3 Architecture





Do you have any questions?

Send it to us! We hope you learned something new.

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