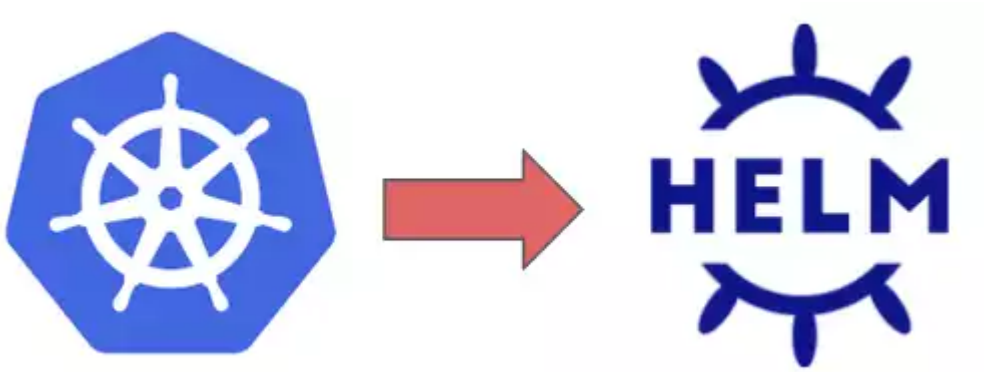
Convert Kubernetes deployment YAML into Helm Chart YAML

Nov 26, 2020 · 8 min read · HELM CHART · Share on:



Convert kubernetes yamls into Helm chart

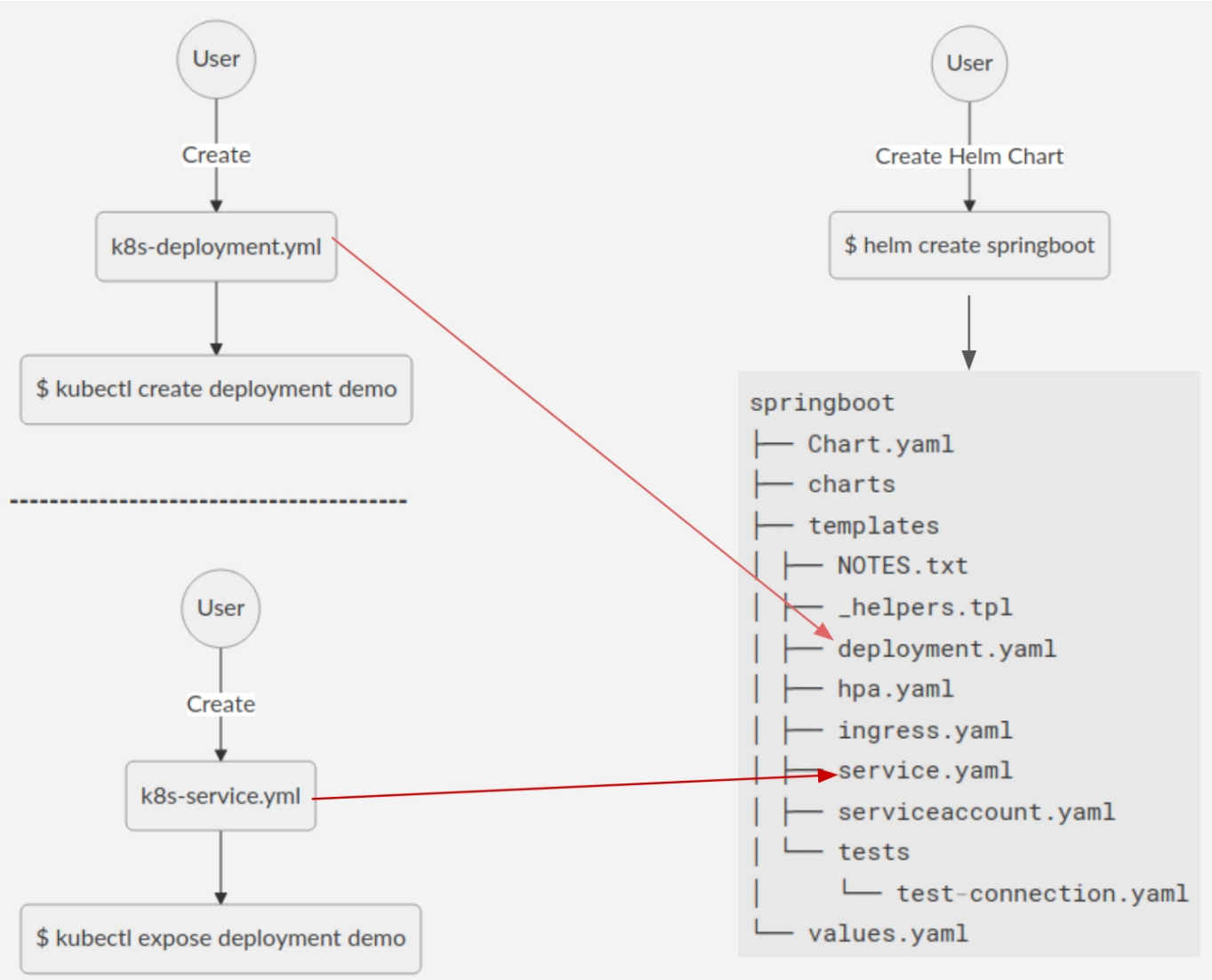
In this article we are going to look how can we convert Kubernetes YAMLs into Helm Chart YAMLs.

Objective 1 : - At first we are going to create simple Kubernetes deployment(k8s-deployment.yaml)` and in that deployment we are going to deploy a microservice application.

Objective 2 : - Secondly we are going to `create service(k8s-service.yaml) for exposing the deployment as a service on NodePort.

Objective 3 : - Here we are going to convert `Kubernetes deployment(k8s-deployment.yaml)` and `create service(k8s -service.yaml)` into a Helm Chart YAMls.

1. On a high level this is how it looks -



process flow of converting kubernetes yamls into helm chart

How to convert Kubernetes yaml to Helm Chart yaml

2.Create kubernetes deployment YAML(k8s-deployment.yaml)

Before we jump to Helm Chart lets create simple YAMLs for kubernetes.

2.1 k8s-deployment.yaml

We are going to keep `k8s-deployment.yaml` very simple and we are going to deploy very small microservice application.

Let's create `k8s-deployment.yaml`

BASH

```
touch k8s-deployment.yaml
```

Open the deployment YAML into `vi` mode

BASH

```
vi k8s-deployment.yaml
```

Copy following deployment configs and save

BASH

```
apiVersion: apps/v1
kind: Deployment
metadata:
  creationTimestamp: null
  labels:
    app: demo
  name: demo
spec:
  replicas: 1
  selector:
    matchLabels:
      app: demo
  strategy: {}
  template:
    metadata:
      creationTimestamp: null
```

```
    spec:
      containers:
      - image: rahulwagh17/kubernetes:jhooq-k8s-springboot
        name: kubernetes
        resources: {}
status: {}
```

2.2 Deploy k8s-deployment.yaml

After creating the `k8s-deployment.yaml` now you need to deploy it inside the kubernetes cluster

Run the following kubectl command to deploy

BASH

```
kubectl apply -f k8s-deployment.yaml
```

Check the deployment status by running following command

BASH

```
kubectl get deployment demo
```

It should return the following status on successful deployment

```
NAME   READY   UP-TO-DATE   AVAILABLE   AGE
demo   1/1     1            1           4m52s
```

3. Create kubernetes service YAML(k8s-service.yaml)

After successful deployment, now we need to create service YAML .i.e. - k8s-service.yaml

Let's create `k8s-service.yaml`

BASH

```
touch k8s-service.yaml
```

```bash
vi k8s-service.yaml
```

Copy following deployment configs and save

```bash
apiVersion: v1
kind: Service
metadata:
  creationTimestamp: null
  labels:
    app: demo
  name: demo-service
spec:
  ports:
  - port: 8080
    protocol: TCP
    targetPort: 8080
  selector:
    app: demo
  type: NodePort
status:
  loadBalancer: {}
```

Run the following kubectl command to expose the service as `NodePort` on port `8080`

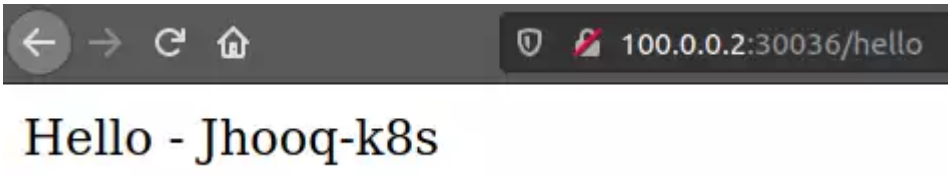
```bash
kubectl apply -f k8s-service.yaml
```

Check the service status by running following command

```bash
kubectl get service demo-service
```

It should return the following status once you expose it successfully

```bash
NAME           TYPE       CLUSTER-IP     EXTERNAL-IP   PORT(S)          AGE
demo-service   NodePort   10.233.10.61   <none>        8080:30036/TCP   9s
```



microservice output after deploying it into kubernetes cluster

4. Convert kubernetes YAML to Helm Chart

Now lets start converting kubernetes(k8s) YAMLs into Helm Chart.

4.1 Create your Helm Chart

The first step for this conversion is to create the Helm Chart, so that we can have all the necessary YAMLs generated.

Here is comparision of YAMLs generated by Helm Chart and Kubernetes(k8s) -

	YAMLs Generated by Helm Chart	Kubernetes(k8s) YAMLs
1	Chart.yaml	
2	helper.tpl	
3	deployment.yaml	k8s-deployment.yaml
4	hpa.yaml	
5	ingress.yaml	
6	service.yaml	k8s-service.yaml
7	serviceaccount.yaml	
8	test-connection.yaml	
9	values.yaml	In k8s-deployment.yaml 1. replicas: 1 2. docker image =`rahulwagh17/kubernetes:jhooq-k8s-springboot`

Lets create `demo-helm-chart`

Verify the YAML files generated after running the `helm create` command

BASH

```
tree demochart
```

It should return you back with following file tree structure

BASH

```
demochart
├── Chart.yaml
├── charts
├── templates
|  ├── NOTES.txt
|  ├── _helpers.tpl
|  ├── deployment.yaml
|  ├── hpa.yaml
|  ├── ingress.yaml
|  ├── service.yaml
|  ├── serviceaccount.yaml
|  └── tests
|      └── test-connection.yaml
└── values.yaml
```

4.2 Convert and Update Chart.yaml, deployment.yaml, service.yaml and values.yaml

Follow the instructions for updating the each YAML

4.2.1 Chart.yaml

The first YAML which we are converting is `chart.yaml` but it is optional and does not require any change but it would be nice to update some value with regards to your project name.

So update the following values inside your `chart.yaml`

BASH

```
apiVersion: v2
name: demochart
description:  Convert Kubernetes(yamls) to Helm Chart
type: application
```

4.2.2 deployment.yaml

The next YAML to convert is `deployment.yaml` but here we need to disable the `livenessProbe` and `readinessProbe` because it is very small application and we can verify the application deployment manually.

When we generate the Helm Chart then by default `deployment.yaml` is prefilled/pre-populated with some configs, so we need to update only -

1. containerPort : 8080

BASH

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: {{ include "demochart.fullname" . }}
  labels:
    {{- include "demochart.labels" . | nindent 4 }}
spec:
  {{- if not .Values.autoscaling.enabled }}
  replicas: {{ .Values.replicaCount }}
  {{- end }}
  selector:
    matchLabels:
      {{- include "demochart.selectorLabels" . | nindent 6 }}
  template:
    metadata:
      {{- with .Values.podAnnotations }}
      annotations:
        {{- toYaml . | nindent 8 }}
      {{- end }}
      labels:
        {{- include "demochart.selectorLabels" . | nindent 8 }}
    spec:
      {{- with .Values.imagePullSecrets }}
      imagePullSecrets:
        {{- toYaml . | nindent 8 }}
      {{- end }}
      serviceAccountName: {{ include "demochart.serviceAccountName" . }}
      securityContext:
        {{- toYaml .Values.podSecurityContext | nindent 8 }}
      containers:
        - name: {{ .Chart.Name }}
          securityContext:
            {{- toYaml .Values.securityContext | nindent 12 }}
```

```
        ports:
          - name: http
            containerPort: 8080 #update the port here to 8080
            protocol: TCP
        livenessProbe:
          httpGet:
            path: /
            port: http
        readinessProbe:
          httpGet:
            path: /
            port: http
        resources:
          {{- toYaml .Values.resources | nindent 12 }}
      {{- with .Values.nodeSelector }}
      nodeSelector:
        {{- toYaml . | nindent 8 }}
      {{- end }}
      {{- with .Values.affinity }}
      affinity:
        {{- toYaml . | nindent 8 }}
      {{- end }}
      {{- with .Values.tolerations }}
      tolerations:
        {{- toYaml . | nindent 8 }}
      {{- end }}
```

4.2.3 service.yaml

The next YAML which we need to convert is service.yaml and here we do not need to update anything configs, we can pretty much keep it in the same shape.

BASH

```
apiVersion: v1
kind: Service
metadata:
  name: {{ include "demochart.fullname" . }}
  labels:
    {{- include "demochart.labels" . | nindent 4 }}
spec:
  type: {{ .Values.service.type }}
  ports:
    - port: {{ .Values.service.port }}
      targetPort: http
```

```
  selector:
    {{- include "demochart.selectorLabels" . | nindent 4 }}
```

4.2.4 values.yaml

The last YAMLs which is left for conversion is `values.yaml` and here we need to update couple values -

1. repository : rahulwagh17/kubernetes:jhooq-k8s-springboot
2. port : 8080

Here is how it should look like

BASH

```
replicaCount: 1

image:
  repository: rahulwagh17/kubernetes:jhooq-k8s-springboot #update the docker image n
  pullPolicy: IfNotPresent
  # Overrides the image tag whose default is the chart appVersion.
  tag: ""

imagePullSecrets: []
nameOverride: ""
fullnameOverride: ""

serviceAccount:
  # Specifies whether a service account should be created
  create: true
  # Annotations to add to the service account
  annotations: {}
  # The name of the service account to use.
  # If not set and create is true, a name is generated using the fullname template
  name: ""

podAnnotations: {}

podSecurityContext: {}
  # fsGroup: 2000

securityContext: {}
  # capabilities:
  #   drop:
  #   - ALL
  # readOnlyRootFilesystem: true
  # runAsNonRoot: true
  # runAsUser: 1000
```

```
  type: NodePort
  port: 8080

ingress:
  enabled: false
  annotations: {}
    # kubernetes.io/ingress.class: nginx
    # kubernetes.io/tls-acme: "true"
  hosts:
    - host: chart-example.local
      paths: []
  tls: []
  #  - secretName: chart-example-tls
  #    hosts:
...
```

5. Verify the Conversion of YAMLs

Lets verify the conversion of the YAMLs with `helm template` command. This command will show us the `serviceaccount.yaml, service.yaml` and `deployment.yaml` which will be equivalent of the kubernetes(k8s) YAMLs which we generated manually.

BASH

```
helm template demoHelmChart
```

It should return you back with -

BASH

```
---
# Source: demochart/templates/serviceaccount.yaml
apiVersion: v1
kind: ServiceAccount
metadata:
  name: RELEASE-NAME-demochart
  labels:
    helm.sh/chart: demochart-0.1.0
    app.kubernetes.io/name: demochart
    app.kubernetes.io/instance: RELEASE-NAME
    app.kubernetes.io/version: "1.16.0"
    app.kubernetes.io/managed-by: Helm
---
# Source: demochart/templates/service.yaml
apiVersion: v1
```

```
  name: RELEASE-NAME-demochart
  labels:
    helm.sh/chart: demochart-0.1.0
    app.kubernetes.io/name: demochart
    app.kubernetes.io/instance: RELEASE-NAME
    app.kubernetes.io/version: "1.16.0"
    app.kubernetes.io/managed-by: Helm
spec:
  type: NodePort
  ports:
    - port: 8080
      targetPort: http
      protocol: TCP
      name: http
  selector:
    app.kubernetes.io/name: demochart
    app.kubernetes.io/instance: RELEASE-NAME
---
# Source: demochart/templates/deployment.yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: RELEASE-NAME-demochart
  labels:
    helm.sh/chart: demochart-0.1.0
    app.kubernetes.io/name: demochart
    app.kubernetes.io/instance: RELEASE-NAME
    app.kubernetes.io/version: "1.16.0"
    app.kubernetes.io/managed-by: Helm
spec:
  replicas: 1
  selector:
    matchLabels:
...
```

There is one more command `lint` which will tell you if there are any syntactical errors in the YAMls.

BASH

```
helm lint demochart
```

BASH

```
==> Linting demochart
[INFO] Chart.yaml: icon is recommended

1 chart(s) linted, 0 chart(s) failed
```

The final step which we need to do is to install the Helm Chart and verify the rest endpoint so that we can test conversion of YAMLs.

Run the following helm command to install the chart

```bash
helm install k8sToHelmChart demochart
```

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