# Reusable Helm Charts using Helm Templates

The DevOps team needs to share and reuse the helm charts using helm templates.

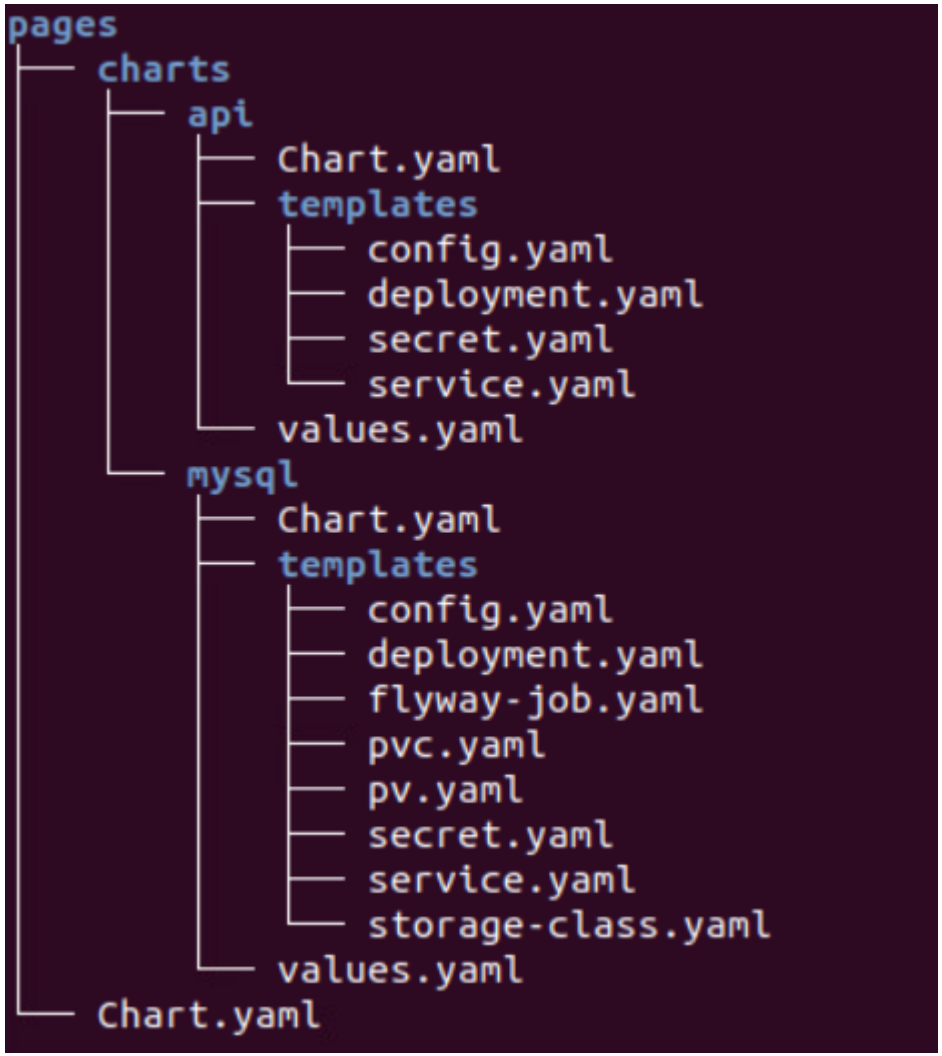
## Learning Outcomes

After completing the lab, you will be able to understand

1. Create simple, reusable helm charts using helm templates
2. Overview of Helm template Engine and Data

## Reviewing the helm directory structure

1. Create the files and directory structure as per the below `umbrella chart` structure




2. Update `values.yaml` files with the properties to be reused in kubernetes manifest files.

`pages/charts/api/values.yaml`

```
deployment:
  containerPort: 8080

secrets:
  SDP: cGFzc3dvcmQ=
```

```
service:
  port: 8080
  type: NodePort
  protocol: TCP
  targetPort: 8080

imagePullPolicy: IfNotPresent
image:
  repository: dellcloud/pages
  tag: monitor


config:
  PAGE_CONTENT: Green-Pages coming from Yellow-World!

env:
  SPRING_DATASOURCE_URL: jdbc:mysql://pages-mysql/pages?useSSL=false
  SPRING_DATASOURCE_USERNAME: root
  DEBUG: true
  LOGGING_FILE_NAME: [replace-this-with-your-namespace]/logs/app.log
  LOGGING_LEVEL_ORG_SPRINGFRAMEWORK_WEB: debug
  LOGGING_LEVEL_ROOT: debug
  MANAGEMENT_ENDPOINTS_WEB_EXPOSURE_INCLUDE: "*"


volumeMounts:
  mount_path: /[replace-this-with-your-namespace]

readinessProbe:
  tcpSocket:
    port: 8080
  initialDelaySeconds: 15
  periodSeconds: 30
livenessProbe:
  httpGet:
```

```
    path: /actuator/health
    port: 8080
  initialDelaySeconds: 15
  periodSeconds: 30
```

pages/charts/mysql/values.yaml

```
config:
  spring_datasource_username: root

deployment:
  containerPort: 3306

secrets:
  SDP: cGFzc3dvcmQ=

service:
  port: 3306
  type: ClusterIP
  protocol: TCP
  targetPort: 3306

imagePullPolicy: IfNotPresent
image:
  repository: mysql
  tag: "8.0"

env:
  MYSQL_SERVICE_HOST: mysql
  MYSQL_SERVICE_PORT: 3306
  MYSQL_DATABASE: pages

volumeMounts:
  mountPath: /var/lib/mysql
```

```
job:
  image:
    repository: flyway/flyway
    tag: "6.4.4"
  env:
    FLYWAY_URL: jdbc:mysql://pages-mysql/pages
    FLYWAY_USER: root
    FLYWAY_PLACEHOLDER_REPLACEMENT: true

pv:
  capacity:
    storage: 3Gi
  accessMode: ReadWriteMany
  hostPath:
    path: "/var/lib/mysql/[replace-this-with-your-namespace]"
pvc:
  resources:
    requests:
      storage: 1Gi

storageClass:
  provisioner: k8s.io/minikube-hostpath
  reclaimPolicy: Delete
  volumeBindingMode: Immediate
```

# Create the manifest files

1. Create the manifest files for pages api service

`pages/charts/api/templates/config.yaml`

```
apiVersion: v1
data:
  PAGE_CONTENT: {{ .Values.config.PAGE_CONTENT}}
```

```
kind: ConfigMap
metadata:
  name: {{ .Chart.Name }}
```

pages/charts/api/templates/secret.yaml

```
apiVersion: v1
data:
  password: {{ .Values.secrets.SDP }}
kind: Secret
metadata:
  name: {{ .Release.Name }}-{{ .Chart.Name }}
```

pages/charts/api/templates/service.yaml

```
apiVersion: v1
kind: Service
metadata:
  labels:
    app: {{ .Release.Name }}-{{ .Chart.Name }}
  name: {{ .Release.Name }}-{{ .Chart.Name }}
spec:
  ports:
  - port: {{ .Values.service.port }}
    protocol: {{ .Values.service.protocol }}
    targetPort: {{ .Values.service.targetPort }}
  selector:
    app: {{ .Release.Name }}-{{ .Chart.Name }}
  type: {{ .Values.service.type }}
```

pages/charts/api/templates/deployment.yaml

```
apiVersion: apps/v1
kind: Deployment
```

```
metadata:
  labels:
    app: {{ .Release.Name }}-{{ .Chart.Name }}
  name: {{ .Release.Name }}-{{ .Chart.Name }}
spec:
  replicas: 1
  selector:
    matchLabels:
      app: {{ .Release.Name }}-{{ .Chart.Name }}
  strategy: {}
  template:
    metadata:
      labels:
        app: {{ .Release.Name }}-{{ .Chart.Name }}
    spec:
      containers:
        - image: {{ .Values.image.repository }}:{{ .Values.image.tag }}
          name: {{ .Chart.Name }}
          imagePullPolicy: {{ .Values.imagePullPolicy }}
          ports:
            - containerPort: {{ .Values.deployment.containerPort }}
          env:
            - name: PAGE_CONTENT
              valueFrom:
                configMapKeyRef:
                  name: {{ .Chart.Name }}
                  key: PAGE_CONTENT
            - name: SPRING_DATASOURCE_URL
              value: {{ .Values.env.SPRING_DATASOURCE_URL }}
            - name: SPRING_DATASOURCE_USERNAME
              value: {{ .Values.env.SPRING_DATASOURCE_USERNAME | quote}}
            - name: SPRING_DATASOURCE_PASSWORD
              valueFrom:
                secretKeyRef:
                  name: {{ .Release.Name }}-{{ .Chart.Name }}
```

```
                key: password
          - name: DEBUG
            value: {{ .Values.env.DEBUG | quote}}
          - name: LOGGING_FILE_NAME
            value: {{ .Values.env.LOGGING_FILE_NAME | quote}}
          - name: LOGGING_LEVEL_ORG_SPRINGFRAMEWORK_WEB
            value: {{ .Values.env.LOGGING_LEVEL_ORG_SPRINGFRAMEWORK_WEB }}
          - name: LOGGING_LEVEL_ROOT
            value: {{ .Values.env.LOGGING_LEVEL_ROOT }}
          - name: MANAGEMENT_ENDPOINTS_WEB_EXPOSURE_INCLUDE
            value: "*"
        volumeMounts:
          - name: node-dir
            mountPath: /{{ .Release.Namespace }}
        readinessProbe:
          tcpSocket:
            port: {{ .Values.readinessProbe.tcpSocket.port }}
          initialDelaySeconds: {{ .Values.readinessProbe.initialDelaySeconds
}}
          periodSeconds: {{ .Values.readinessProbe.periodSeconds }}
        livenessProbe:
          httpGet:
            path: {{ .Values.livenessProbe.httpGet.path }}
            port: {{ .Values.livenessProbe.httpGet.port }}
          initialDelaySeconds: {{ .Values.livenessProbe.initialDelaySeconds }}
          periodSeconds: {{ .Values.livenessProbe.periodSeconds }}
    volumes:
      - name: node-dir
        hostPath:
          path: /{{ .Release.Namespace }}
```

pages/charts/mysql/templates/config.yaml

```
apiVersion: v1
kind: ConfigMap
```

```
metadata:
  name: {{ .Chart.Name }}
data:
  spring.datasource.username: {{ .Values.config.spring_datasource_username }}
  V1__inital_schema.sql: |
    USE pages;
    create table pages(
    id bigint(20) not null auto_increment,
    business_name VARCHAR(50),
    address VARCHAR(50),
    category_id bigint(20),
    contact_number VARCHAR(50),
    primary key (id)
    )
    engine = innodb
    default charset = utf8;
```

pages/charts/mysql/templates/secret.yaml

```
apiVersion: v1
data:
  password: {{ .Values.secrets.SDP }}
kind: Secret
metadata:
  name: {{ .Release.Name }}-{{ .Chart.Name }}
```

pages/charts/mysql/templates/service.yaml

```
apiVersion: v1
kind: Service
metadata:
  name: pages-mysql
  labels:
    app: {{ .Release.Name }}-{{ .Chart.Name }}
```

```
spec:
  ports:
    - port: {{ .Values.service.port }}
  selector:
    app: {{ .Release.Name }}-{{ .Chart.Name }}
  type: {{ .Values.service.type }}
```

pages/charts/mysql/templates/storage-class.yaml

```
kind: StorageClass
apiVersion: storage.k8s.io/v1
metadata:
  name: {{ .Release.Name }}-{{ .Chart.Name }}-{{ .Release.Namespace }}
  labels:
    addonmanager.kubernetes.io/mode: EnsureExists
provisioner: {{ .Values.storageClass.provisioner }}
reclaimPolicy: {{ .Values.storageClass.reclaimPolicy }}
volumeBindingMode: {{ .Values.storageClass.volumeBindingMode }}
```

pages/charts/mysql/templates/pv.yaml

```
apiVersion: v1
kind: PersistentVolume
metadata:
  name: {{ .Release.Name }}-{{ .Chart.Name }}-{{ .Release.Namespace }}
  labels:
    type: local
spec:
  storageClassName: {{ .Release.Name }}-{{ .Chart.Name }}-{{ .Release.Namespace
 }}
  capacity:
    storage: {{ .Values.pv.capacity.storage }}
  accessModes:
    - {{ .Values.pv.accessMode }}
```

```
  hostPath:
    path: {{ .Values.pv.hostPath.path }}
```

pages/charts/mysql/templates/pvc.yaml

```
apiVersion: v1
kind: PersistentVolumeClaim
metadata:
  name: {{ .Release.Name }}-{{ .Chart.Name }}
spec:
  storageClassName: {{ .Release.Name }}-{{ .Chart.Name }}-{{ .Release.Namespace
 }}
  accessModes:
    - {{ .Values.pv.accessMode }}
  resources:
    requests:
      storage: {{ .Values.pvc.resources.requests.storage }}
```

pages/charts/mysql/templates/flyway-job.yaml

```
apiVersion: batch/v1
kind: Job
metadata:
  name: {{ .Release.Name }}-{{ .Chart.Name }}
  labels:
    app: {{ .Release.Name }}-{{ .Chart.Name }}
spec:
  template:
    spec:
      containers:
        - name: {{ .Chart.Name }}
          image: {{ .Values.job.image.repository }}:{{ .Values.job.image.tag }}
          imagePullPolicy: {{ .Values.imagePullPolicy }}
          args:
```

```
          - info
          - migrate
          - info
        env:
          - name: FLYWAY_URL
            value: {{ .Values.job.env.FLYWAY_URL }}
          - name: FLYWAY_USER
            value: {{ .Values.job.env.FLYWAY_USER }}
          - name: FLYWAY_PASSWORD
            valueFrom:
              secretKeyRef:
                name: {{ .Release.Name }}-{{ .Chart.Name }}
                key: password
          - name: FLYWAY_PLACEHOLDER_REPLACEMENT
            value: {{ .Values.job.env.FLYWAY_PLACEHOLDER_REPLACEMENT | quote}}
          - name: FLYWAY_PLACEHOLDERS_USERNAME
            valueFrom:
              configMapKeyRef:
                name: {{ .Chart.Name }}
                key: spring.datasource.username
          - name: FLYWAY_PLACEHOLDERS_PASSWORD
            valueFrom:
              secretKeyRef:
                name: {{ .Release.Name }}-{{ .Chart.Name }}
                key: password
        volumeMounts:
          - mountPath: /flyway/sql
            name: sql
      volumes:
        - name: sql
          configMap:
            name: {{ .Chart.Name }}
      restartPolicy: Never
```

pages/charts/mysql/templates/deployment.yaml

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: {{ .Release.Name }}-{{ .Chart.Name }}
  labels:
    app: {{ .Release.Name }}-{{ .Chart.Name }}
spec:
  selector:
    matchLabels:
      app: {{ .Release.Name }}-{{ .Chart.Name }}
  strategy:
    type: Recreate
  template:
    metadata:
      labels:
        app: {{ .Release.Name }}-{{ .Chart.Name }}
    spec:
      containers:
        - image: {{ .Values.image.repository }}:{{ .Values.image.tag }}
          name: {{ .Chart.Name }}
          imagePullPolicy: {{ .Values.imagePullPolicy }}
          env:
            - name: MYSQL_ROOT_PASSWORD
              valueFrom:
                secretKeyRef:
                  name: {{ .Release.Name }}-{{ .Chart.Name }}
                  key: password
            - name: MYSQL_SERVICE_HOST
              value: {{ .Values.env.MYSQL_SERVICE_HOST | quote }}
            - name: MYSQL_SERVICE_PORT
              value: {{ .Values.env.MYSQL_SERVICE_PORT | quote }}
            - name: MYSQL_DATABASE
              value: {{ .Values.env.MYSQL_DATABASE | quote }}
          ports:
```

```
          - containerPort: {{ .Values.deployment.containerPort }}
        volumeMounts:
          - name: mysql-persistent-storage
            mountPath: {{ .Values.volumeMounts.mountPath }}
      volumes:
        - name: mysql-persistent-storage
          persistentVolumeClaim:
            claimName: {{ .Release.Name }}-{{ .Chart.Name }}
```

## Deploy using helm chart

1. Before installing the helm chart check if your namespace exists and set the kubectl context to point to the right namespace.

```
kubectl get  ns
kubectl config get-contexts
kubectl config set-context --current --namespace [name-of-your-team]-dev
```

2. Uninstall the previous app as we cannot upgrade

3. Install the umbrella chart for pages app

```
helm template pages
helm uninstall pagesapp
helm install pagesapp pages --dry-run --debug
helm install pagesapp pages -n [name-of-your-team]-dev
```

4. Verify the installation and deployment

```
helm list
kubectl get deploy pagesapp-api
kubectl get svc pagesapp-api
```

5. Port forward to connect to pages service running inside K8s from the local machine

```
kubectl port-forward svc/pagesapp-api 8080:8080
```

6. Test the pages application by performing CRUD operations using curl/postman. Refer Pages Curl Guide for testing.

## Task Accomplished

Devops team was successful in refactoring the helm chart to be simple and reusable.