1. Deploy your your previous assignment flask frontend and express backend in kubernetes cluster locally with minikube.

EXPLANATION:-

## **Goal:**

Deploy both apps — Flask (backend) and Express (frontend) — inside **Kubernetes pods**, expose them via **services**, and run them locally using **Minikube**.

## **Step 1: Install Required Tools**

Before starting, ensure you have:

* **Docker** – to build images
* **Minikube** – to run Kubernetes locally
* **kubectl** – to interact with the cluster

To verify:

docker -v

minikube version

kubectl version --client

## **Step 2: Start Minikube**

Start a local Kubernetes cluster:

minikube start

You can check if it’s running:

kubectl get nodes

## **Step 3: Create Dockerfiles for Both Apps**

### **Backend (Flask/Dockerfile)**

FROM python:3.9-slim

WORKDIR /app

COPY requirements.txt .

RUN pip install -r requirements.txt

COPY . .

CMD ["python", "app.py"]

### **Frontend (Express/Dockerfile)**

FROM node:18

WORKDIR /app

COPY package\*.json ./

RUN npm install

COPY . .

CMD ["node", "server.js"]

## **Step 4: Build Docker Images Inside Minikube**

Tell Docker to use Minikube’s Docker daemon:

eval $(minikube docker-env)

Then build images:

docker build -t flask-backend:latest ./backend

docker build -t express-frontend:latest ./frontend

Check images:

docker images

## **Step 5: Create Kubernetes Deployment Files**

### **flask-deployment.yaml**

apiVersion: apps/v1

kind: Deployment

metadata:

name: flask-backend

spec:

replicas: 1

selector:

matchLabels:

app: flask

template:

metadata:

labels:

app: flask

spec:

containers:

- name: flask

image: flask-backend:latest

ports:

- containerPort: 5000

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apiVersion: v1

kind: Service

metadata:

name: flask-service

spec:

type: ClusterIP

selector:

app: flask

ports:

- port: 5000

targetPort: 5000

### **express-deployment.yaml**

apiVersion: apps/v1

kind: Deployment

metadata:

name: express-frontend

spec:

replicas: 1

selector:

matchLabels:

app: express

template:

metadata:

labels:

app: express

spec:

containers:

- name: express

image: express-frontend:latest

ports:

- containerPort: 3000

env:

- name: BACKEND\_URL

value: "http://flask-service:5000"

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apiVersion: v1

kind: Service

metadata:

name: express-service

spec:

type: NodePort

selector:

app: express

ports:

- port: 3000

targetPort: 3000

nodePort: 30080

## **Step 6: Apply the Deployments**

Run:

kubectl apply -f flask-deployment.yaml

kubectl apply -f express-deployment.yaml

Check status:

kubectl get pods

kubectl get services

## **Step 7: Access the Application**

Get Minikube IP:

minikube ip

Now, open the app in browser:

http://<MINIKUBE\_IP>:30080

Your Express frontend will connect to Flask backend inside the Kubernetes cluster 🎉

## **Step 8: Cleanup (Optional)**

To delete all:

kubectl delete -f flask-deployment.yaml

kubectl delete -f express-deployment.yaml

minikube stop