Day 3-Kubernetes

1. Setup Directory Structure

First, create a project directory to keep all files organized.

```
mkdir E-commerce && cd E-commerce
```

Backend Setup

Create a backend directory and navigate into it.

```
mkdir backend && cd backend
```

Create `products.csv`

This file will store product details in CSV format.

```
nano products.csv
```

Paste the following sample data:

```
id,name,price,quantity
1,Smartphone,15000,25
2,Laptop,45000,15
3,Headphones,1500,5
0
4,Smartwatch,8000,3
0 5,Tablet,20000,20
6,Wireless Mouse,700,100
7,Bluetooth Speaker,1200,60
8,External Hard Drive,4000,40
9,USB Flash Drive,500,150
10,Monitor,10000,10
```

Create `app.py`

This script sets up a Flask server to read the CSV file and return product data as JSON.

```
nano app.py
```

Paste the following Python script:

```
from flask import
Flask import pandas as
pd

app = Flask(__name__)

@app.route("/products",
methods=['GET']) def read_data():
   df = pd.read_csv("products.csv")  # Ensure products.csv exists
```

```
    json_data = df.to_json()
    return json_data
if __name___== "__main__":
    app.run(host="0.0.0.0", port=5005)
```

Create `requirements.txt`

This file lists the dependencies required for the backend.

```
nano requirements.txt
```

Add dependencies:

```
flask
pandas
```

Create `Dockerfile`

This Dockerfile defines how to package the backend application into a container.

```
nano Dockerfile
```

Paste the following:

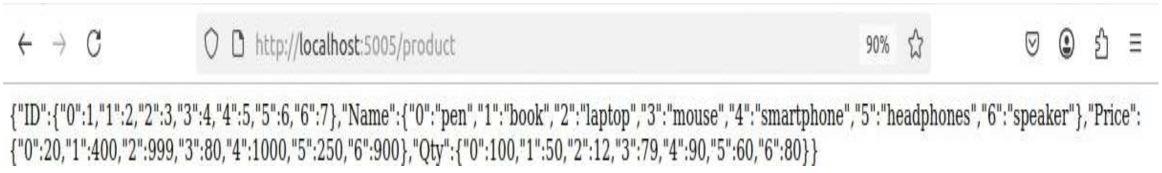
```
FROM python:3.11
WORKDIR /app
COPY requirements.txt .
RUN pip install --no-cache-dir -r
requirements.txt COPY . .
EXPOSE 5005
CMD ["python", "app.py"]
```

Build & Run Backend Container

Build and run the backend container.

```
docker build -t backend:latest .
docker run -itd -p 5005:5005
backend
docker logs $(docker ps -q --filter "ancestor=backend")
```

Run the application in the 5005/product



```
{"ID":{"0":1,"1":2,"2":3,"3":4,"4":5,"5":6,"6":7},"Name":{"0":"pen","1":"book","2":"laptop","3":"mouse","4":"smartphone","5":"headphones","6":"speaker"},"Price":
{"0":20,"1":400,"2":999,"3":80,"4":1000,"5":250,"6":900},"Qty":{"0":100,"1":50,"2":12,"3":79,"4":90,"5":60,"6":80}}
```

Frontend Setup

Create a frontend directory and navigate into it.

```
cd ..
mkdir frontend && cd frontend
```

Create `index.html`

This HTML file loads the product list from the backend.

```
nano index.html
```

Paste the following:

```
<!DOCTYPE html>
<html lang="en">
<head>
   <meta charset="UTF-8">
   <meta name="viewport" content="width=device-width, initial-
   scale=1.0">
   <title>E-Commerce Store</title>
   <script>
      async function fetchProducts() {
         const response = await
         fetch("http://localhost:5050/products"); const products
         = await response.json();
         let output = "<h2>Product
         List</h2><ul>"; for (const id in
         products.name) {
            output += `<li>${products.name[id]} -
$${products.price[id]}</li>`;
         }
         output += "</ul>";
         document.getElementById("product-list").innerHTML =
         output;
        }
    </script>
</head>
<body onload="fetchProducts()">
   <h1>Welcome to Our Store</h1>
   <div id="product-list">Loading...</div>
</body>
</html>
```

Create `Dockerfile`

This Dockerfile packages the frontend as an Nginx container.

```
nano Dockerfile
```

Paste:

```
FROM nginx:alpine
COPY index.html /usr/share/nginx/html/index.html
```

Build & Run Frontend Container

```
docker build -t frontend:latest .
```

2. Kubernetes Deployment

Create a `k8s` directory for Kubernetes configuration files.

```
cd ..
mkdir k8s && cd k8s
```

Backend Deployment (`backend-deployment.yaml`)

Defines a backend pod in Kubernetes.

```
nano backend-deployment.yaml
```

Paste:

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: backend
spec:
  replicas: 1
  selector:
    matchLabels:
      app: backend
  template:
    metadata:
      labels:
        app: backend
    spec:
      containers:
      - name: backend
        image: backend:latest
        ports:
        - containerPort: 5005
```

Frontend Deployment (`frontend-deployment.yaml`)

Defines a frontend pod in Kubernetes.

```
nano frontend-deployment.yaml
```

Paste:

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: frontend
spec:
  replicas: 1
 selector:
   matchLabels:
     app: frontend
 template:
   metadata:
     labels:
       app: frontend
   spec:
     containers:
     - name: frontend
       image: frontend:latest
       ports:
       - containerPort: 3000
```

Connecting Frontend & Backend (`service.yaml`)

Defines services for communication between frontend and backend.

```
nano service.yaml
```

Paste:

```
apiVersion: v1
kind: Service
metadata:
  name: backend-service
spec:
  selector:
    app: backend
  ports:
    - protocol: TCP
      port: 5005
      targetPort: 5005
  type: ClusterIP
---
apiVersion: v1
kind: Service
metadata:
  name: frontend-service
spec:
  selector:
    app: frontend
  ports:
    - protocol: TCP
      port: 3000
      targetPort: 3000
  type: NodePort
```

ConfigMap (`configmap.yaml`)

Stores backend configuration values.

```
nano configmap.yaml
```

Paste:

```
apiVersion: v1
kind: ConfigMap
metadata:
  name: backend-config
data:
  DATABASE_FILE: "/backend/products.csv"
```