DEVOPS

DAY-3

To create a one Directory

```
ajay@Sparkajay:~$ mkdir fullstack
ajay@Sparkajay:~$ ls
docker-python-app  fullstack
ajay@Sparkajay:~$ cd fullstack
ajay@Sparkajay:~/fullstack$ mkdir backend
ajay@Sparkajay:~/fullstack$ mkdir frontend
ajay@Sparkajay:~/fullstack$ ls
backend  frontend
ajay@Sparkajay:~/fullstack$ cd backend
ajay@Sparkajay:~/fullstack/backend$ nano products.csv
ajay@Sparkajay:~/fullstack/backend$ cat products.csv
ID,Name,Price,Qty
1,Mobile,20000,2
2,Laptop,100000,2
3,Book,150,10
4,Pen,1000,20
```

To install python:

```
ajay@Sparkajay:~/fullstack/backend$ sudo apt install python3-pip
[sudo] password for ajay:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  build-essential bzip2 cpp cpp-13 cpp-13-x86-64-linux-gnu
  cpp-x86-64-linux-gnu dpkg-dev fakeroot g++ g++-13 g++-13-x86-64-linux-gnu
  g++-x86-64-linux-gnu gcc gcc-13 gcc-13-base gcc-13-x86-64-linux-gnu
  gcc-x86-64-linux-gnu javascript-common libalgorithm-diff-perl
  libalgorithm-diff-xs-perl libalgorithm-merge-perl libaom3 libasan8
  libatomic1 libc-dev-bin libc-devtools libc6-dev libcc1-0 libcrypt-dev
  libde265-0 libdpkg-perl libexpat1-dev libfakeroot libfile-fcntllock-perl
  libgcc-13-dev libgd3 libgomp1 libheif-plugin-aomdec libheif-plugin-aomenc
  libheif-plugin-libde265 libheif1 libhwasan0 libisl23 libitm1 libjs-jquery
  libjs-sphinxdoc libjs-underscore liblsan0 libmpc3 libpython3-dev
  libpython3.12-dev libpython3.12-minimal libpython3.12-stdlib
  libpython3.12t64 libquadmath0 libstdc++-13-dev libtsan2 libubsan1
  linux-libc-dev lto-disabled-list make manpages-dev python3-dev
  python3-wheel python3.12 python3.12-dev python3.12-minimal rpcsvc-proto
  zlib1g-dev
Suggested packages:
  bzip2-doc cpp-doc gcc-13-locales cpp-13-doc debian-keyring g++-multilib
  g++-13-multilib gcc-13-doc gcc-multilib autoconf automake libtool flex
  bison gdb gcc-doc gcc-13-multilib gdb-x86-64-linux-gnu glibc-doc bzr
  libgd-tools libheif-plugin-x265 libheif-plugin-ffmpegdec
  libheif-plugin-jpegdec libheif-plugin-jpegenc libheif-plugin-j2kdec
  libheif-plugin-j2kenc libheif-plugin-rav1e libheif-plugin-svtenc
  libstdc++-13-doc make-doc python3.12-venv python3.12-doc binfmt-support
```

After Creating Python, Create an **Backend** and store the files,

App.py

```
ajay@Sparkajay:~/fullstack/backend$ cat app.py
from flask import Flask
import pandas as pd

app=Flask(__name__)
@app.route("/products",method=['GET'])
def read_data():
        df=pd.read_csv("products.csv")
        json_data=df.to_json()
        return json_data
if __name__ == "__main__":
        app.run(host="0.0.0.0",port=7000)
```

Docker

```
ajay@Sparkajay:~/fullstack/backend$ cat Dockerfile
FROM python:3.11
WORKDIR /app
COPY requirement.txt .
RUN pip install --no-cache-dir -r requirement.txt
COPY . .

EXPOSE 7000
CMD ["python", "app.py"]
```

Requirements.txt:

```
ajay@Sparkajay:~/fullstack/backend$ cat requirements.txt
flask
pandas
```

docker-compose.yml

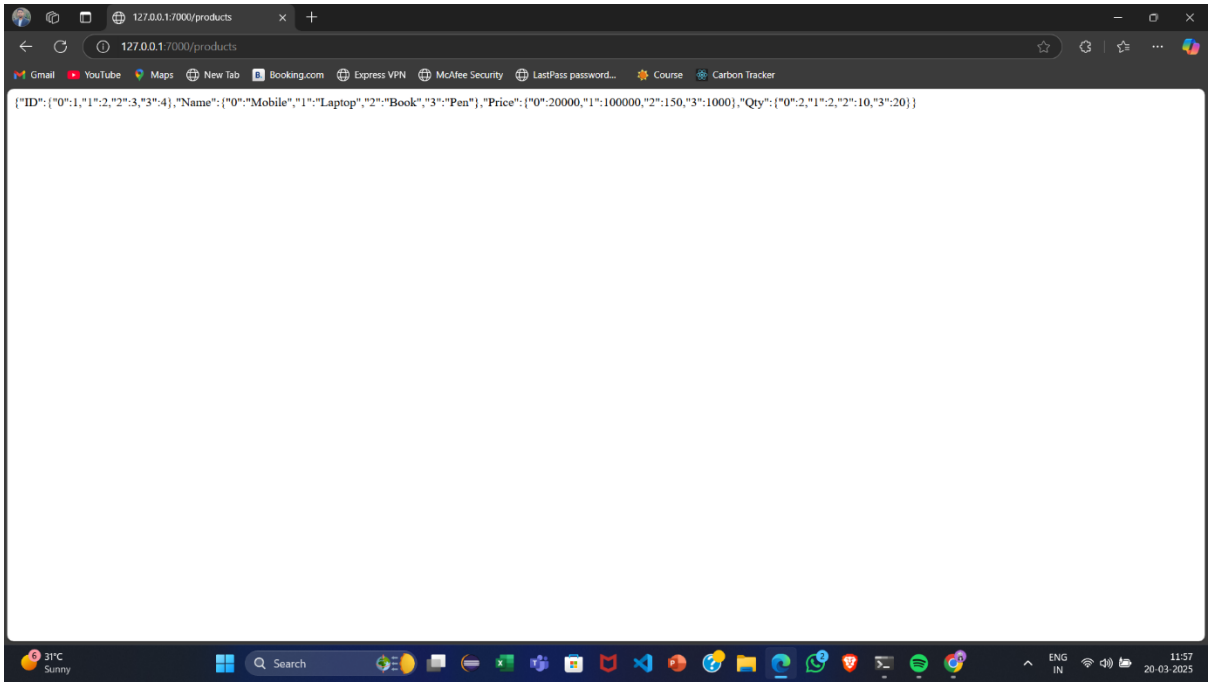
```
ajay@Sparkajay:~/fullstack/backend$ cat docker-compose.yml
version: '3.8'

services:
  web:
    build: .
    ports:
      - "7000:7000"
    volumes:
      - .:/app
    restart: always
```

then build Docker and Run the Docker

```
ajay@Sparkajay:~/fullstack/backend$ sudo docker build -t test .
DEPRECATED: The legacy builder is deprecated and will be removed in a future release.
            Install the buildx component to build images with BuildKit:
            https://docs.docker.com/go/buildx/

Sending build context to Docker daemon  6.144kB
Step 1/7 : FROM python:3.11
 ---> 18c0f2265fd9
Step 2/7 : WORKDIR /app
 ---> Using cache
 ---> c74d97a78594
Step 3/7 : COPY requirements.txt .
 ---> Using cache
 ---> 21653e467847
Step 4/7 : RUN pip install --no-cache-dir -r requirements.txt
 ---> Using cache
 ---> 9227532eeb2e
Step 5/7 : COPY . .
 ---> Using cache
 ---> 2437319d1f68
Step 6/7 : EXPOSE 7000
 ---> Using cache
 ---> e744ca585d79
Step 7/7 : CMD ["python", "app.py"]
 ---> Using cache
 ---> 9980d41a1051
Successfully built 9980d41a1051
Successfully tagged test:latest
ajay@Sparkajay:~/fullstack/backend$ sudo docker run -d -p 7000:7000 test
12bda684ff5afd737a286a5cf51d08c9cab605b2fb5a5238ef08bfe99237749c
ajay@Sparkajay:~/fullstack/backend$ sudo docker logs 12bda684ff5afd737a286a5cf51d08c9cab605b2fb5a5238ef08bfe99237749c
 * Serving Flask app 'app'
 * Debug mode: off
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
 * Running on all addresses (0.0.0.0)
 * Running on http://127.0.0.1:7000
 * Running on http://172.17.0.2:7000
Press CTRL+C to quit
```

To see the Output, goto the website and put the URL:

then it will display the Json format in website



In **frontend**, Create the files like

index.html

```
ajay@Sparkajay:~/fullstack/frontend$ cat index.html
<!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:7000/products");
            const products = await response.json();
            let output = "<h2>Product List</h2><ul>";
            products.forEach(product => {
                output += `<li>${product.Name} - $${product.Price} </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>
```

Dockerfile

```
ajay@Sparkajay:~/fullstack/frontend$ cat Dockerfile
FROM nginx:alpine
COPY index.html /usr/share/nginx/html/index.html
```

Build the Docker image in Frontend

```
ajay@Sparkajay:~/fullstack/frontend$ sudo docker build -t frontend:latest .
[sudo] password for ajay:
Sorry, try again.
[sudo] password for ajay:
DEPRECATED: The legacy builder is deprecated and will be removed in a future release.
            Install the buildx component to build images with BuildKit:
            https://docs.docker.com/go/buildx/

Sending build context to Docker daemon  3.584kB
Step 1/2 : FROM nginx:alpine
alpine: Pulling from library/nginx
f18232174bc9: Pull complete
ccc35e35d420: Pull complete
43f2ec460bdf: Pull complete
984583bcf083: Pull complete
8d27c072a58f: Pull complete
ab3286a73463: Pull complete
6d79cc6084d4: Pull complete
0c7e4c092ab7: Pull complete
Digest: sha256:4ff102c5d78d254a6f0da062b3cf39eaf07f01eec0927fd21e219d0af8bc0591
Status: Downloaded newer image for nginx:alpine
 ---> 1ff4bb4faebc
Step 2/2 : COPY index.html /usr/share/nginx/html/index.html
 ---> 3aa76d667572
Successfully built 3aa76d667572
Successfully tagged frontend:latest
```

To create an k8s folder in fullstack using mkdir command:

For deployment use Kubernetes

```
ajay@Sparkajay:~/fullstack$ mkdir k8s
ajay@Sparkajay:~/fullstack$ ls
backend  frontend  k8s
ajay@Sparkajay:~/fullstack$ cd k8s
```

Deployment.yaml (for Backend)

```
ajay@Sparkajay:~/fullstack/k8s$ nano deployment.yaml
ajay@Sparkajay:~/fullstack/k8s$ cat deployment.yaml
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: 7000
```

Deployment.yaml (for Frontend)

```
ajay@Sparkajay:~/fullstack/k8s$ nano frontend-deployment.yaml
ajay@Sparkajay:~/fullstack/k8s$ cat frontend-deployment.yaml
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
```

Service.yaml:

For **frontend-** nodeport **backend-**cluster IP

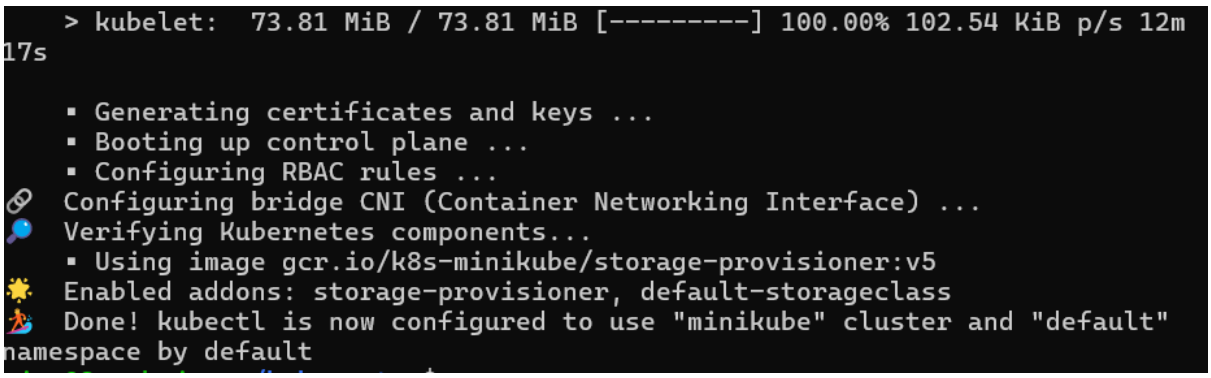
```
ajay@Sparkajay:~/fullstack/k8s$ cat service.yaml
apiVersion: v1
kind: Service
metadata:
  name: backend-service
spec:
  selector:
    app: backend
  ports:
    - protocol: TCP
      port: 7000
      targetPort: 7000
  type: ClusterIP

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

Configmap.yaml:

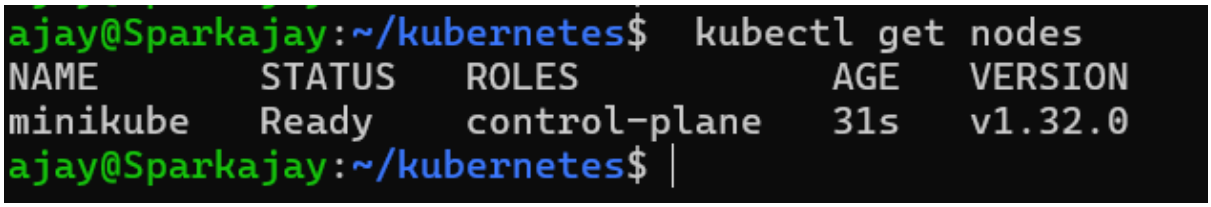
```
ajay@Sparkajay:~/fullstack/k8s$ cat configmap.yaml
apiVersion: v1
kind: ConfigMap
metadata:
  name: backend-config
data:
  DATABASE_FILE: "/backend/products.csv"
```

Day-4

Minikube start:



Kubectl nodes:



To Build docker in Backend

```
ajay@Sparkajay:~/kubernetes$ cd backend/
ajay@Sparkajay:~/kubernetes/backend$ docker build -t backend:latest .
DEPRECATED: The legacy builder is deprecated and will be removed in a future release.
            Install the buildx component to build images with BuildKit:
            https://docs.docker.com/go/buildx/

Sending build context to Docker daemon   5.12kB
Step 1/6 : FROM python:3.9
 ---> 859d4a0f1fd8
Step 2/6 : WORKDIR /app
 ---> Using cache
 ---> ae27c81ec929
Step 3/6 : COPY requirements.txt .
 ---> Using cache
 ---> 9f03d572763d
Step 4/6 : RUN pip install -r requirements.txt
 ---> Using cache
 ---> 18b868f8c6c4
Step 5/6 : COPY . .
 ---> Using cache
 ---> d85a885ee39d
Step 6/6 : CMD ["python", "app.py"]
 ---> Using cache
 ---> d0cff2fe7bb0
Successfully built d0cff2fe7bb0
```

Minikube for backend:

```
ajay@Sparkajay:~/kubernetes/backend$ minikube image load backend:latest
```

To Build Docker in Frontend:

```
ajay@Sparkajay:~/kubernetes$ cd backend/
ajay@Sparkajay:~/kubernetes/backend$ docker build -t backend:latest .
DEPRECATED: The legacy builder is deprecated and will be removed in a future release.
            Install the buildx component to build images with BuildKit:
            https://docs.docker.com/go/buildx/

Sending build context to Docker daemon   5.12kB
Step 1/6 : FROM python:3.9
 ---> 859d4a0f1fd8
Step 2/6 : WORKDIR /app
 ---> Using cache
 ---> ae27c81ec929
Step 3/6 : COPY requirements.txt .
 ---> Using cache
 ---> 9f03d572763d
Step 4/6 : RUN pip install -r requirements.txt
 ---> Using cache
 ---> 18b868f8c6c4
Step 5/6 : COPY . .
 ---> Using cache
 ---> d85a885ee39d
Step 6/6 : CMD ["python", "app.py"]
 ---> Using cache
```

Minikube for frontend:

```
ajay@Sparkajay:~/kubernetes/frontend$ minikube image load frontend:latest
```

To create a Deployment file for Kubernetes for frontend, Backend, service.yaml,

```
ajay@Sparkajay:~/kubernetes/backend$ cd ..
ajay@Sparkajay:~/kubernetes$ cd k8s/
ajay@Sparkajay:~/kubernetes/k8s$ kubectl apply -f backend-deployment.yaml --validate=false
deployment.apps/backend created
ajay@Sparkajay:~/kubernetes/k8s$ kubectl apply -f frontend-deployment.yaml --validate=false
deployment.apps/frontend created
ajay@Sparkajay:~/kubernetes/k8s$ kubectl apply -f service.yaml --validate=false
service/backend-service created
service/frontend-service created
ajay@Sparkajay:~/kubernetes/k8s$ kubectl apply -f configmap.yaml --validate=false
configmap/backend-config created
ajay@Sparkajay:~/kubernetes/k8s$ kubectl get pods
NAME                       READY   STATUS    RESTARTS   AGE
backend-dfd8d5579-8rdzg    1/1     Running   0          63s
frontend-6cfd7c46-5txnb    1/1     Running   0          54s
ajay@Sparkajay:~/kubernetes/k8s$ kubectl get svc
NAME               TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)          AGE
backend-service    ClusterIP   10.110.154.68   <none>        5000/TCP         87s
frontend-service   NodePort    10.98.250.114   <none>        3000:32434/TCP   87s
kubernetes         ClusterIP   10.96.0.1       <none>        443/TCP          12m
ajay@Sparkajay:~/kubernetes/k8s$ minikube service frontend-service --url
http://127.0.0.1:42597
❗  Because you are using a Docker driver on linux, the terminal needs to be open to run it.
```

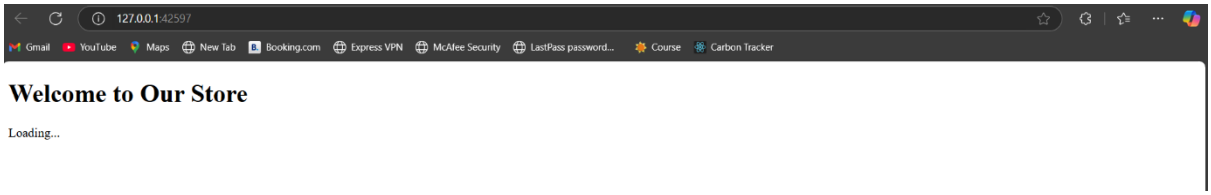
Create an pods and svc

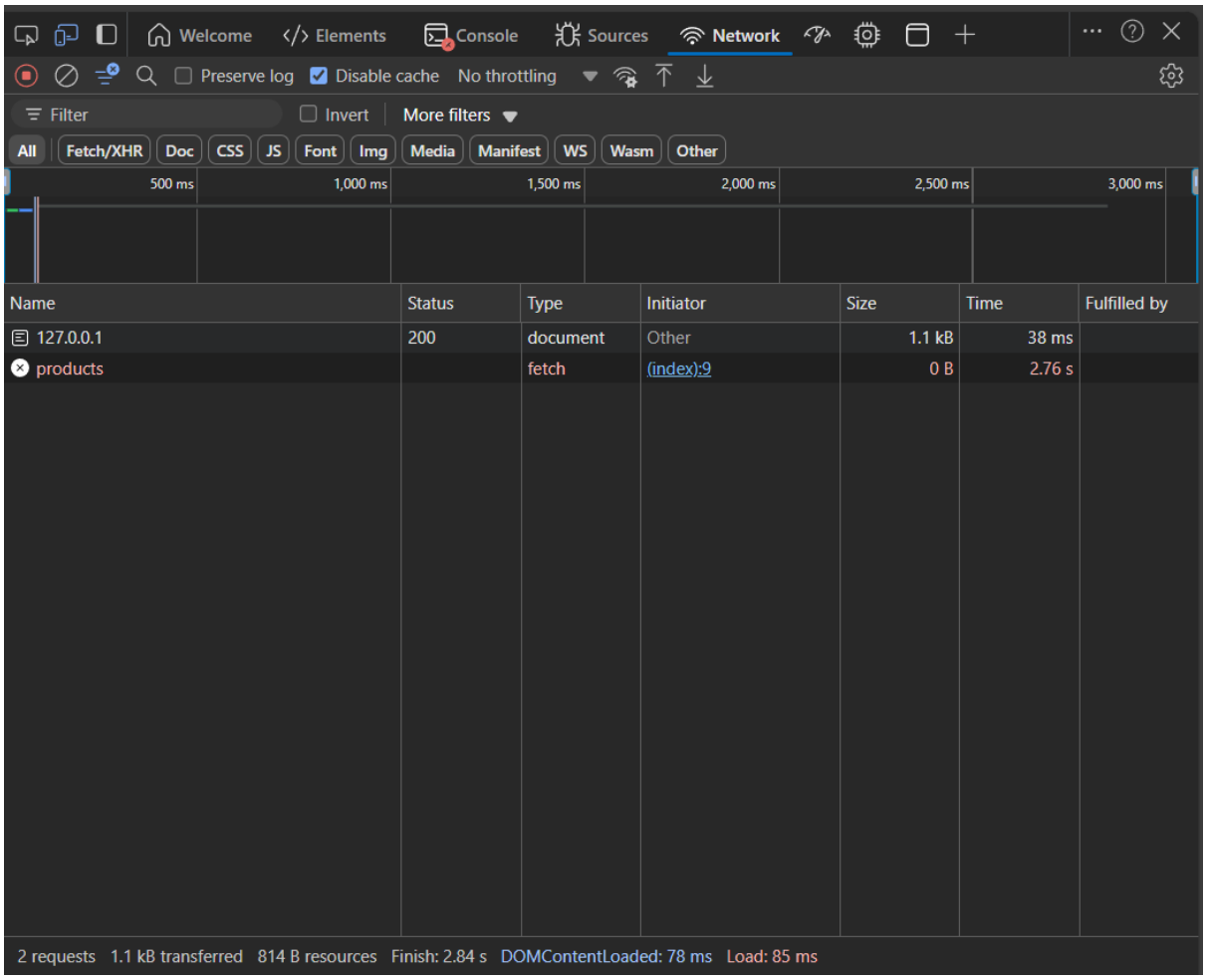
```
ajay@Sparkajay:~/kubernetes/k8s$ kubectl get pods
NAME                       READY   STATUS    RESTARTS   AGE
backend-dfd8d5579-8rdzg    1/1     Running   0          63s
frontend-6cfd7c46-5txnb    1/1     Running   0          54s
ajay@Sparkajay:~/kubernetes/k8s$ kubectl get svc
NAME               TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)          AGE
backend-service    ClusterIP   10.110.154.68   <none>        5000/TCP         87s
frontend-service   NodePort    10.98.250.114   <none>        3000:32434/TCP   87s
kubernetes         ClusterIP   10.96.0.1       <none>        443/TCP          12m
```

To run the frontend

```
ajay@Sparkajay:~/kubernetes/k8s$ minikube service frontend-service --url
http://127.0.0.1:42597
❗  Because you are using a Docker driver on linux, the terminal needs to be open to run it.
```

Output





Note : Since, we are expected this kind of output, because we are running this frontend in localhost.