☑ Check the status of Minikube:

```
● vishal@vishalranka        :~/Documents/Kubernates$ minikube status
  minikube
  type: Control Plane
  host: Running
  kubelet: Running
  apiserver: Running
  kubeconfig: Configured
```

☑ Access the Docker Environment and check if Docker is installed:

```
● vishal@vishalranka    :~/Documents/Kubernates$ eval $(minikube docker-env)
● vishal@vishalranka    :~/Documents/Kubernates$ docker run --rm hello-world
  Unable to find image 'hello-world:latest' locally
  latest: Pulling from library/hello-world
  c1ec31eb5944: Pull complete
  Digest: sha256:305243c734571da2d100c8c8b3c3167a098cab6049c9a5b066b6021a60fcb966
  Status: Downloaded newer image for hello-world:latest

  Hello from Docker!
  This message shows that your installation appears to be working correctly.

  To generate this message, Docker took the following steps:
   1. The Docker client contacted the Docker daemon.
   2. The Docker daemon pulled the "hello-world" image from the Docker Hub.
      (amd64)
   3. The Docker daemon created a new container from that image which runs the
      executable that produces the output you are currently reading.
   4. The Docker daemon streamed that output to the Docker client, which sent it
      to your terminal.

  To try something more ambitious, you can run an Ubuntu container with:
   $ docker run -it ubuntu bash

  Share images, automate workflows, and more with a free Docker ID:
   https://hub.docker.com/

  For more examples and ideas, visit:
   https://docs.docker.com/get-started/
```

☑ Docker Images

```
● vishal@vishalranka    :~/Documents/Kubernates$ docker images
  REPOSITORY                                   TAG        IMAGE ID        CREATED          SIZE
  registry.k8s.io/kube-scheduler               v1.31.0    1766f54c897f    3 months ago     67.4MB
  registry.k8s.io/kube-controller-manager      v1.31.0    045733566833    3 months ago     88.4MB
  registry.k8s.io/kube-apiserver               v1.31.0    604f5db92eaa    3 months ago     94.2MB
  registry.k8s.io/kube-proxy                   v1.31.0    ad83b2ca7b09    3 months ago     91.5MB
  registry.k8s.io/etcd                         3.5.15-0   2e96e5913fc0    4 months ago     148MB
  registry.k8s.io/pause                        3.10       873ed7510279    6 months ago     736kB
  registry.k8s.io/coredns/coredns              v1.11.1    cbb01a7bd410    15 months ago    59.8MB
  hello-world                                  latest     d2c94e258dcb    19 months ago    13.3kB
  gcr.io/k8s-minikube/storage-provisioner      v5         6e38f40d628d    3 years ago      31.5MB
○ vishal@vishalranka    :~/Documents/Kubernates$ █
```

☑ Create an app.py file along with a Dockerfile, and then build the Docker image within the Docker environment.

```
app.py

from flask import Flask, request, jsonify

app = Flask(__name__)

graph = {"nodes": [], "edges": []}

@app.route('/node', methods=['POST'])
def add_node():
    """Add a node to the graph."""
    data = request.json
    if not all(key in data for key in ("id", "type", "name")):
        return jsonify({"error": "Missing required fields"}), 400
    graph["nodes"].append(data)
    return jsonify({"message": "Node added", "node": data}), 201

@app.route('/edge', methods=['POST'])
def add_edge():
    """Add an edge to the graph."""
    data = request.json
    if not all(key in data for key in ("source", "target", "type")):
        return jsonify({"error": "Missing required fields"}), 400
    graph["edges"].append(data)
    return jsonify({"message": "Edge added", "edge": data}), 201

@app.route('/graph', methods=['GET'])
def get_graph():
    """Retrieve the entire graph."""
    return jsonify(graph)

if __name__ == '__main__':
    app.run(host='0.0.0.0', port=5000)
```

```
Dockerfile

FROM python:3.9-slim
WORKDIR /app
COPY requirements.txt .
RUN pip install --no-cache-dir -r requirements.txt
COPY . .
EXPOSE 5000
CMD ["python", "app.py"]
```

```
vishal@vishalranka  :~/Documents/Kubernates$ docker build -t treasurebook-api:v1 .
[+] Building 82.2s (10/10) FINISHED
 => [internal] load build definition from Dockerfile                                                    0.6s
 => => transferring dockerfile: 193B                                                                    0.1s
 => [internal] load metadata for docker.io/library/python:3.9-slim                                      4.5s
 => [internal] load .dockerignore                                                                       0.2s
 => => transferring context: 2B                                                                         0.0s
 => [1/5] FROM docker.io/library/python:3.9-slim@sha256:6250eb7983c08b3cf5a7db9309f8630d3ca03dd15      48.0s
 => => resolve docker.io/library/python:3.9-slim@sha256:6250eb7983c08b3cf5a7db9309f8630d3ca03dd152      0.2s
 => => sha256:6250eb7983c08b3cf5a7db9309f8630d3ca03dd152158fa37a3f8daaf397085d 10.41kB / 10.41kB        0.0s
 => => sha256:43e98aa4594b2a62ace026fb04338453f799bd6012b7933ecd442d6876787cb5 1.75kB / 1.75kB         0.0s
 => => sha256:6a22698eab0ea915af39918e5d2e4f27e49afc6944fd1d97466e13820324bc62 5.41kB / 5.41kB         0.0s
 => => sha256:2d429b9e73a6cf90a5bb85105c8118b30a1b2deedeae3ea9587055ffcb80eb45 29.13MB / 29.13MB       9.0s
 => => sha256:4920a3bd5f7ed3269b647eb643846a0652dc21daa31763b4afc848701981d141 3.51MB / 3.51MB         1.8s
 => => sha256:77edb37367fad6d17c53a3cabdf41a57c0221a49f77250d97e3f5bb1fc1ed6e0 14.93MB / 14.93MB       7.0s
 => => sha256:02c34c079cc82f150c24eae4d136fd997632cd64c1f922aa8c5974be33792ae5 255B / 255B             2.6s
 => => extracting sha256:2d429b9e73a6cf90a5bb85105c8118b30a1b2deedeae3ea9587055ffcb80eb45              17.9s
 => => extracting sha256:4920a3bd5f7ed3269b647eb643846a0652dc21daa31763b4afc848701981d141               2.1s
 => => extracting sha256:77edb37367fad6d17c53a3cabdf41a57c0221a49f77250d97e3f5bb1fc1ed6e0              11.5s
 => => extracting sha256:02c34c079cc82f150c24eae4d136fd997632cd64c1f922aa8c5974be33792ae5               0.0s
 => [internal] load build context                                                                      0.3s
 => => transferring context: 1.26kB                                                                     0.0s
 => [2/5] WORKDIR /app                                                                                  1.5s
 => [3/5] COPY requirements.txt .                                                                       0.6s
 => [4/5] RUN pip install --no-cache-dir -r requirements.txt                                           23.7s
 => [5/5] COPY . .                                                                                      0.5s
 => exporting to image                                                                                  1.5s
 => => exporting layers                                                                                 1.3s
 => => writing image sha256:3863b6b12ef7cf84de4468f2468b7d467f22dcce9b5cd6b14e37b447368dbda3            0.0s
 => => naming to docker.io/library/treasurebook-api:v1                                                  0.1s
vishal@vishalranka  :~/Documents/Kubernates$
```

☑ Apply deployment and services using kubernetes

```yaml
api-deployment.yaml

apiVersion: apps/v1
kind: Deployment
metadata:
  name: treasurebook-api
spec:
  replicas: 3
  selector:
    matchLabels:
      app: treasurebook-api
  template:
    metadata:
      labels:
        app: treasurebook-api
    spec:
      containers:
      - name: treasurebook-api
        image: treasurebook-api:latest
        imagePullPolicy: Never
        ports:
        - containerPort: 5000
        env:
        - name: MONGO_URL
          value: mongodb-service:27017
---
apiVersion: v1
kind: Service
metadata:
  name: treasurebook-api-service
spec:
  type: NodePort
  selector:
    app: treasurebook-api
  ports:
  - port: 5000
    targetPort: 5000
    nodePort: 30001
```

```yaml
# mongodb-deployment.yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: mongodb
spec:
  replicas: 1
  selector:
    matchLabels:
      app: mongodb
  template:
    metadata:
      labels:
        app: mongodb
    spec:
      containers:
      - name: mongodb
        image: mongo:6.0
        ports:
        - containerPort: 27017
---
apiVersion: v1
kind: Service
metadata:
  name: mongodb-service
spec:
  type: ClusterIP
  ports:
  - port: 27017
    targetPort: 27017
  selector:
    app: mongodb
```

```yaml
hpa.yaml

apiVersion: autoscaling/v2
kind: HorizontalPodAutoscaler
metadata:
  name: treasurebook-api-hpa
spec:
  scaleTargetRef:
    apiVersion: apps/v1
    kind: Deployment
    name: treasurebook-api
  minReplicas: 3
  maxReplicas: 10
  metrics:
  - type: Resource
    resource:
      name: cpu
      target:
        type: Utilization
        averageUtilization: 50
```

```
vishal@vishalranka      :~/Documents/Kubernetes$ kubectl apply -f mongodb-deployment.yaml
deployment.apps/mongodb created
service/mongodb-service created
vishal@vishalranka      :~/Documents/Kubernetes$ kubectl apply -f api-deployment.yaml
deployment.apps/treasurebook-api created
service/treasurebook-api-service created
vishal@vishalranka      :~/Documents/Kubernetes$ kubectl apply -f hpa.yaml
horizontalpodautoscaler.autoscaling/treasurebook-api-hpa created
vishal@vishalranka      :~/Documents/Kubernetes$
```

☑ Check if all kubernetes pods are running

```
vishal@vishalranka         :~/Documents/Kubernetes$ kubectl get pods
NAME                                  READY   STATUS    RESTARTS     AGE
mongodb-b947d7c77-468xw               0/1     Running   1 (6s ago)   15s
treasurebook-api-7fdd868bcf-b8xt9     1/1     Running   0            12m
treasurebook-api-7fdd868bcf-m5pp8     1/1     Running   0            12m
treasurebook-api-7fdd868bcf-w4w4x     1/1     Running   0            12m
vishal@vishalranka         :~/Documents/Kubernetes$
                                                                    Ln 57, Col 1    Spac
```

```
 vishal@vishalranka      :~/Documents/Kubernates$ kubectl get svc
 NAME                           TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)          AGE
 kubernetes                     ClusterIP   10.96.0.1       <none>        443/TCP          30h
 mongodb-service                ClusterIP   10.103.203.33   <none>        27017/TCP        35m
 treasurebook-api-service       NodePort    10.108.81.166   <none>        5000:30001/TCP   35m
 vishal@vishalranka      :~/Documents/Kubernates$
```

☑ Simulate traffic using artillery and check pods scaling

```
vishal@vishalranka       :~/Documents/Kubernates$ npm install -g artillery
npm warn deprecated q@1.5.1: You or someone you depend on is using Q, the JavaScript Promise library that gave JavaScript developers
 strong feelings about promises. They can almost certainly migrate to the native JavaScript promise now. Thank you literally everyon
e for joining me in this bet against the odds. Be excellent to each other.
npm warn deprecated
npm warn deprecated (For a CapTP with native promises, see @endo/eventual-send and @endo/captp)
npm warn deprecated read-package-json@7.0.1: This package is no longer supported. Please use @npmcli/package-json instead.
npm warn deprecated inflight@1.0.6: This module is not supported, and leaks memory. Do not use it. Check out lru-cache if you want a
 good and tested way to coalesce async requests by a key value, which is much more comprehensive and powerful.
npm warn deprecated querystring@0.2.0: The querystring API is considered Legacy. new code should use the URLSearchParams API instead
.
npm warn deprecated glob@7.2.3: Glob versions prior to v9 are no longer supported
npm warn deprecated rimraf@3.0.2: Rimraf versions prior to v4 are no longer supported
npm warn deprecated rimraf@2.6.3: Rimraf versions prior to v4 are no longer supported

added 961 packages in 6m

137 packages are looking for funding
  run `npm fund` for details
vishal@vishalranka       :~/Documents/Kubernates$ artillery --version


     _____         __  _ ____
    /  _  \ _____/  |_(_) / /_____ __
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  /    |    \|  | \/|  | |  / \  ___/|  | \/   |  /
  \____|__  /|__|   |__| |__|_|\___  >__|  |___  /
          \/                       \/          \/


VERSION INFO:

Artillery: 2.0.21
Node.js:   v18.20.5
OS:        linux

vishal@vishalranka       :~/Documents/Kubernates$
```

```
--------------------------------------------
Metrics for period to: 11:03:30(+0530) (width: 0.088s)
--------------------------------------------


http.request_rate: ................................................ 2/sec
http.requests: .................................................... 2
vusers.created: ................................................... 2
vusers.created_by_name.0: ......................................... 2




--------------------------------------------
Metrics for period to: 11:03:40(+0530) (width: 9.971s)
--------------------------------------------


errors.ETIMEDOUT: ................................................. 1
http.request_rate: ................................................ 50/sec
http.requests: .................................................... 497
vusers.created: ................................................... 497
```