BUYOGO ASSIGNMENT

PART 2:

Github link: https://github.com/abhishekporwal-836/Flask-app-deployment-k8.git

➢ **Step 1: Dockerfile for the Python Project to create the Docker image.**
1) Go to the root folder and create a Dockerfile with following content before that configure the app.env with your username and password:

```
FROM python:3.11
WORKDIR /app
COPY . /app/
RUN pip install -r /app/requirements.txt
EXPOSE 5000
ENV FLASK_APP=app.py
ENV FLASK_ENV=deployment
ENV $(cat .env | xargs)
CMD ["python","app.py"]
```

-Then run:

- docker build -t flask-app .
- docker run -p 5000:5000 flask-app
- docker tag flask-app abhishekporwal836/flask-app-buyogo:latest
- docker push abhishekporwal836/flask-app-buyogo:latest

```
PS D:\Project_vedant\sample project\sample project> docker build -t flask-app .          docker:default
[+] Building 0.1s (1/1) FINISHED
 => [internal] load build definition from Dockerfile                                            0.0s
 => => transferring dockerfile: 2B                                                              0.0s
ERROR: failed to solve: failed to read dockerfile: open Dockerfile: no such file or directory

View build details: docker-desktop://dashboard/build/default/default/yx5tbj8xbi3nf4yt43inlksp0
PS D:\Project_vedant\sample project\sample project> docker run -p 5000:5000 flask-app
 * Serving Flask app 'app' (lazy loading)
 * Environment: production
   WARNING: This is a development server. Do not use it in a production deployment.
   Use a production WSGI server instead.
 * Debug mode: off
 * Running on all addresses.
   WARNING: This is a development server. Do not use it in a production deployment.
 * Running on http://172.17.0.2:5000/ (Press CTRL+C to quit)
172.17.0.1 - - [04/Sep/2024 06:34:28] "GET / HTTP/1.1" 200 -
172.17.0.1 - - [04/Sep/2024 06:34:28] "GET /favicon.ico HTTP/1.1" 404 -
```

-Application is up and running:

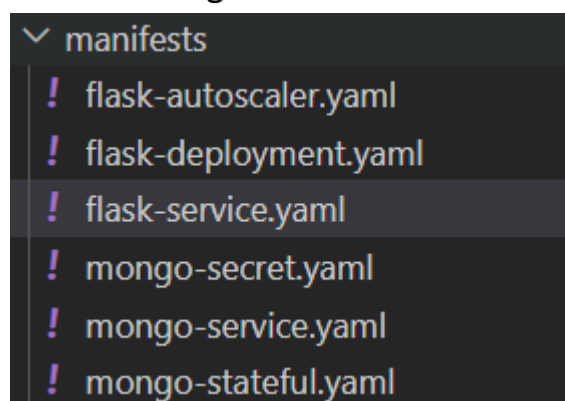Welcome to the Flask app! The current time is: 2024-09-04 12:26:26.396306
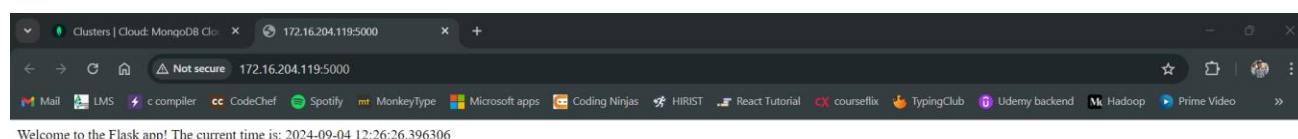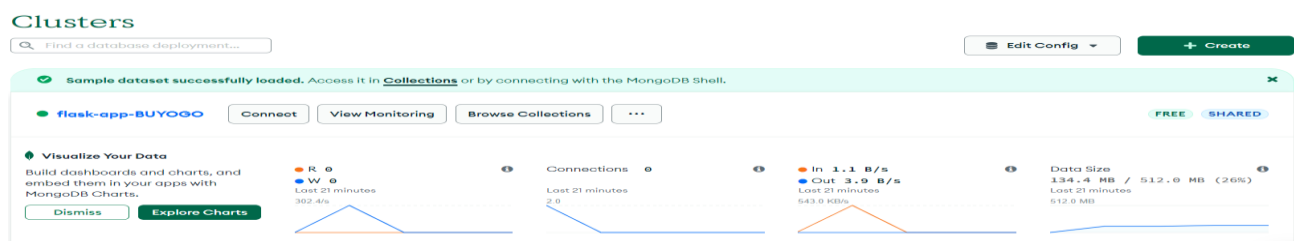
- **Step 2: Manifests for Kubernetes/Minikube:**

  Since we are running single node K8's cluster we will with Minikube on our local system.

  We will configure the files which are there on GitHub :

- minikube start
- kubectl get ns
- kubectl create ns abhishek


```
C:\Users\Abhishek Porwal>kubectl get nodes
NAME        STATUS    ROLES           AGE     VERSION
minikube    Ready     control-plane   177d    v1.28.3

C:\Users\Abhishek Porwal>kubectl get ns
NAME              STATUS    AGE
app               Active    164d
argo-rollouts     Active    164d
argocd            Active    164d
default           Active    177d
kube-node-lease   Active    177d
kube-public       Active    177d
kube-system       Active    177d

C:\Users\Abhishek Porwal>kubectl create ns abhishek
namespace/abhishek created

C:\Users\Abhishek Porwal>
```

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- kubectl create ns abhishek

- kubectl get ns

```
D:\Buyugo assignment\manifests>kubectl get all -n abhishek\
No resources found in abhishek\ namespace.

D:\Buyugo assignment\manifests>kubectl apply -n abhishek\ -f flask-deployment.yaml
Error from server (NotFound): error when creating "flask-deployment.yaml": namespaces "abhishek\\

D:\Buyugo assignment\manifests>kubectl get ns
NAME              STATUS   AGE
abhishek          Active   10m
app               Active   164d
argo-rollouts     Active   164d
argocd            Active   164d
default           Active   177d
kube-node-lease   Active   177d
kube-public       Active   177d
kube-system       Active   177d
```

- kubectl apply -n abhishek -f flask-deployment.yaml

- kubectl apply -n abhishek -f flask-service.yaml

- kubectl apply -n abhishek -f mongo-stateful.yaml

- kubectl apply -n abhishek -f mongo-service.yaml

```
D:\Buyugo assignment\manifests>kubectl apply -n abhishek -f flask-deployment.yaml
deployment.apps/flask-app created

D:\Buyugo assignment\manifests>kubectl apply -n abhishek -f flask-service.yaml
service/flask-app created

D:\Buyugo assignment\manifests>kubectl apply -n abhishek -f mongo-stateful.yaml
statefulset.apps/mongodb created

D:\Buyugo assignment\manifests>kubectl apply -n abhishek -f mongo-service.yaml
service/mongo created
```

- kubectl apply -n abhishek -f mongo-secret.yaml

```
D:\Buyugo assignment\manifests>kubectl apply -n abhishek -f mongo-secret.yaml
secret/mongo-secret created
```

- kubectl get all -n abhishek

```
D:\Buyugo assignment\manifests>kubectl get all -n abhishek
NAME                             READY   STATUS             RESTARTS   AGE
pod/flask-app-5576689c66-gtb94   0/1     ContainerCreating  0          34s
pod/flask-app-7959c4b57b-tdknh   0/1     ImagePullBackOff   0          2m58s
pod/flask-app-97664cd7-t9sns     0/1     ImagePullBackOff   0          57m
pod/mongodb-0                    1/1     Running            0          55m

NAME                TYPE           CLUSTER-IP       EXTERNAL-IP   PORT(S)          AGE
service/flask-app   LoadBalancer   10.102.248.208   <pending>     5000:30417/TCP   56m
service/mongo       ClusterIP      10.108.211.94    <none>        27017/TCP        55m

NAME                        READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/flask-app   0/2     1            0           57m

NAME                                   DESIRED   CURRENT   READY   AGE
replicaset.apps/flask-app-5576689c66   1         1         0       34s
replicaset.apps/flask-app-7959c4b57b   1         1         0       2m58s
replicaset.apps/flask-app-97664cd7     1         1         0       57m

NAME                        READY   AGE
statefulset.apps/mongodb    1/1     55m
```

Now all the pods are up and running.

```
D:\Buyugo assignment\manifests>kubectl get all -n abhishek
NAME                                READY   STATUS    RESTARTS   AGE
pod/flask-app-5576689c66-gtb94      1/1     Running   0          2m48s
pod/flask-app-5576689c66-q2klt      1/1     Running   0          86s
pod/mongodb-0                       1/1     Running   0          57m

NAME                  TYPE           CLUSTER-IP       EXTERNAL-IP   PORT(S)          AGE
service/flask-app     LoadBalancer   10.102.248.208   <pending>     5000:30417/TCP   58m
service/mongo         ClusterIP      10.108.211.94    <none>        27017/TCP        57m

NAME                          READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/flask-app     2/2     2            2           59m

NAME                                    DESIRED   CURRENT   READY   AGE
replicaset.apps/flask-app-5576689c66    2         2         2       2m49s
replicaset.apps/flask-app-7959c4b57b    0         0         0       5m13s
replicaset.apps/flask-app-97664cd7      0         0         0       59m

NAME                          READY   AGE
statefulset.apps/mongodb      1/1     57m

D:\Buyugo assignment\manifests>
```

- **Accessing the application:**

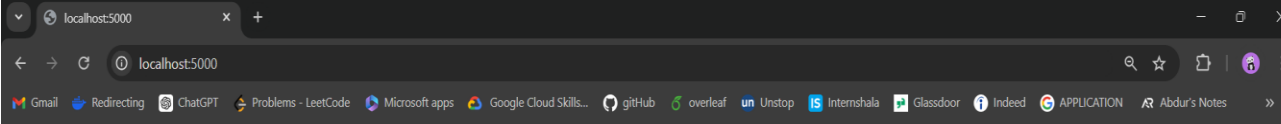 kubectl port-forward svc/flask-app 5000:5000 -n abhishek

  Now access on the localhost:5000

```
D:\Buyugo assignment\manifests>kubectl get svc flask-app -n abhishek
NAME        TYPE           CLUSTER-IP       EXTERNAL-IP   PORT(S)          AGE
flask-app   LoadBalancer   10.102.248.208   <pending>     5000:30417/TCP   73m

D:\Buyugo assignment\manifests>kubectl port-forward svc/flask-app 5000:5000 -n abhishek
Forwarding from 127.0.0.1:5000 -> 5000
Forwarding from [::1]:5000 -> 5000
Handling connection for 5000
Handling connection for 5000
```

localhost:5000

Welcome to the Flask app! The current time is: 2024-09-04 12:58:28.904891

Alternatively we can use NodePort. We can connect the external ip to it and access the application from external link.

- AutoScalers:

kubectl apply -f flask-autoscaler.yaml

```
D:\Buyugo assignment\manifests>kubectl apply -f flask-autoscaler.yaml
horizontalpodautoscaler.autoscaling/flask-autoscaler created

D:\Buyugo assignment\manifests>kubectl get all -n abhishek
NAME                              READY   STATUS    RESTARTS   AGE
pod/flask-app-5576689c66-gtb94    1/1     Running   0          38m
pod/flask-app-5576689c66-q2klt    1/1     Running   0          37m
pod/mongodb-0                     1/1     Running   0          93m

NAME                  TYPE           CLUSTER-IP       EXTERNAL-IP   PORT(S)          AGE
service/flask-app     LoadBalancer   10.102.248.208   <pending>     5000:30417/TCP   93m
service/mongo         ClusterIP      10.108.211.94    <none>        27017/TCP        93m

NAME                          READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/flask-app     2/2     2            2           95m

NAME                                      DESIRED   CURRENT   READY   AGE
replicaset.apps/flask-app-5576689c66      2         2         2       38m
replicaset.apps/flask-app-7959c4b57b      0         0         0       40m
replicaset.apps/flask-app-97664cd7        0         0         0       95m

NAME                        READY   AGE
statefulset.apps/mongodb    1/1     93m

NAME                                                        REFERENCE             TARGETS       MINPODS   MAXPODS   REPLICAS   AGE
horizontalpodautoscaler.autoscaling/flask-autoscaler        Deployment/flask-app  <unknown>/70% 2         5         2          27s

D:\Buyugo assignment\manifests>
```

- Checking the DNS configuration of the pod:

kubectl exec -n abhishek **flask-app-5576689c66-gtb94** -- cat /etc/resolv.conf

```
D:\Buyugo assignment\manifests>kubectl exec -n abhishek flask-app-5576689c66-gtb94 -- cat /etc/resolv.conf
nameserver 10.96.0.10
search abhishek.svc.cluster.local svc.cluster.local cluster.local
options ndots:5

D:\Buyugo assignment\manifests>kubectl exec -n abhishek mongodb-0 -- cat /etc/resolv.conf
nameserver 10.96.0.10
search abhishek.svc.cluster.local svc.cluster.local cluster.local
options ndots:5
```

Received some error:

```
D:\Buyugo assignment\manifests>kubectl exec -it flask-app-5576689c66-gtb94 -- nslookup mongodb.abhishek.svc.cluster.local svc.cluster.local cluster.local
Error from server (NotFound): pods "flask-app-5576689c66-gtb94" not found

D:\Buyugo assignment\manifests>kubectl exec -it flask-app-5576689c66-gtb94 -n abhishek -- nslookup mongodb.abhishek.svc.cluster.local svc.cluster.local cluster.local
OCI runtime exec failed: exec failed: unable to start container process: exec: "nslookup": executable file not found in $PATH: unknown
command terminated with exit code 126

D:\Buyugo assignment\manifests>kubectl exec -it flask-app-5576689c66-gtb94 -n abhishek -- curl mongodb.abhishek.svc.cluster.local svc.cluster.local cluster.local
curl: (6) Could not resolve host: mongodb.abhishek.svc.cluster.local
curl: (6) Could not resolve host: svc.cluster.local
curl: (6) Could not resolve host: cluster.local
command terminated with exit code 6

D:\Buyugo assignment\manifests>kubectl exec -it flask-app-5576689c66-gtb94 -n abhishek -- curl abhishek.svc.cluster.local svc.cluster.local cluster.local
curl: (6) Could not resolve host: abhishek.svc.cluster.local
curl: (6) Could not resolve host: svc.cluster.local
curl: (6) Could not resolve host: cluster.local
command terminated with exit code 6

D:\Buyugo assignment\manifests>kubectl exec -it flask-app-5576689c66-gtb94 -n abhishek -- nslookup mongodb.abhishek.svc.cluster.local
OCI runtime exec failed: exec failed: unable to start container process: exec: "nslookup": executable file not found in $PATH: unknown
command terminated with exit code 126

D:\Buyugo assignment\manifests>kubectl exec -it flask-app-5576689c66-gtb94 -n abhishek -- curl mongo.abhishek.svc.cluster.local:27017
It looks like you are trying to access MongoDB over HTTP on the native driver port.
```

- Changes in the flask-deployment.yaml
- And mongo-stateful.yaml -and the changes are shown in the manifests file as comments.

kubectl apply -n abhishek -f flask-deployment.yaml

kubectl apply -n abhishek -f mongo-stateful.yaml

```
D:\Buyugo assignment\manifests>kubectl apply -n abhishek -f flask-deployment.yaml
deployment.apps/flask-app unchanged

D:\Buyugo assignment\manifests>kubectl apply -n abhishek -f mongo-stateful.yaml
statefulset.apps/mongodb configured

D:\Buyugo assignment\manifests>kubectl get all -n abhishek
NAME                              READY   STATUS    RESTARTS   AGE
pod/flask-app-86f88dcb9b-8zbdj    1/1     Running   0          70s
pod/flask-app-86f88dcb9b-zht4b    1/1     Running   0          80s
pod/mongodb-0                     1/1     Running   0          40s

NAME                  TYPE           CLUSTER-IP       EXTERNAL-IP   PORT(S)          AGE
service/flask-app     LoadBalancer   10.102.248.208   <pending>     5000:30417/TCP   142m
service/mongo         ClusterIP      10.108.211.94    <none>        27017/TCP        141m

NAME                        READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/flask-app   2/2     2            2           143m

NAME                                   DESIRED   CURRENT   READY   AGE
replicaset.apps/flask-app-5576689c66   0         0         0       86m
replicaset.apps/flask-app-7959c4b57b   0         0         0       89m
replicaset.apps/flask-app-86f88dcb9b   2         2         2       80s
replicaset.apps/flask-app-97664cd7     0         0         0       143m

NAME                        READY   AGE
statefulset.apps/mongodb    1/1     141m

NAME                                                        REFERENCE              TARGETS         MINPODS   MAXPODS   REPLICAS   AGE
horizontalpodautoscaler.autoscaling/flask-autoscaler        Deployment/flask-app   <unknown>/70%   2         5         2          48m

D:\Buyugo assignment\manifests>
```