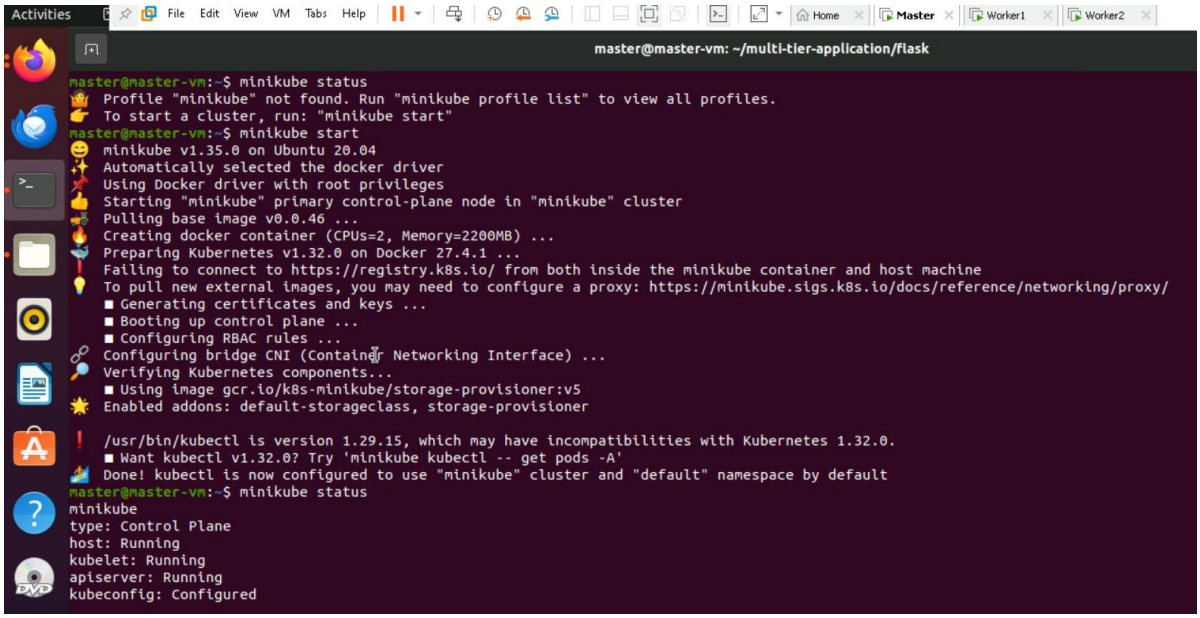
Kubernetes Project 3

DEPLOY A MULTI-TIER WEB APPLICATION ON KUBERNETES

Step 1: First check the minikube is there or not, if not there install

Set Up Kubernetes Cluster

1. **Ensure Kubernetes is running (Minikube/Kubeadm).**
2. **Install kubectl and Docker on your system.**



Step 2: Check docker install and node is connected or not

Step 3: Make directory and add all the files with code

```
master@master-vm:~$ cd multi-tier-application/
master@master-vm:~/multi-tier-application$ ls
flask  mysql  nginx  README.md
master@master-vm:~/multi-tier-application$ cd flask/
master@master-vm:~/multi-tier-application/flask$ ls
app.py  Dockerfile  flask-deployment.yaml  flask-service.yaml  requirements.txt
master@master-vm:~/multi-tier-application/flask$ nano Dockerfile
```

Step 4: Build the docker image and push to the docker hub

Containerize the Flask app using Docker and deploy it with Kubernetes Deployment & Service.

```
master@master-vm:~/multi-tier-application/flask$ docker build -t juhichoudhary/flaskapp
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/

"docker build" requires exactly 1 argument.
See 'docker build --help'.

Usage:  docker build [OPTIONS] PATH | URL | -

Build an image from a Dockerfile
master@master-vm:~/multi-tier-application/flask$ docker push juhichoudhary/flaskapp
Using default tag: latest
The push refers to repository [docker.io/juhichoudhary/flaskapp]
An image does not exist locally with the tag: juhichoudhary/flaskapp
master@master-vm:~/multi-tier-application/flask$ docker build -t juhichoudhary/flaskapp .
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  8.192kB
Step 1/6 : FROM python:3.8
3.8: Pulling from library/python
cdd62bf39133: Pull complete
a47cff7f31e9: Pull complete
a173f2aee8e9: Pull complete
01272fe8adba: Extracting [==================================================> ]  210.6MB/211.3MB
01272fe8adba: Pull complete
cddc73e4e6c7: Pull complete
cc48f13b5f0f: Pull complete
5a98c896c047: Pull complete
Digest: sha256:d411270700143fa2683cc8264d9fa5d3279fd3b6afff62ae81ea2f9d070e390c
```

Step 5: login to the Docker and push the image

```
Successfully built 3439a3e04d5e
Successfully tagged juhichoudhary/flaskapp:latest
master@master-vm:~/multi-tier-application/flask$ docker login
Authenticating with existing credentials...
WARNING! Your password will be stored unencrypted in /home/master/.docker/config.json.
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credentials-store

Login Succeeded
master@master-vm:~/multi-tier-application/flask$ docker push juhichoudhary/flaskapp
Using default tag: latest
The push refers to repository [docker.io/juhichoudhary/flaskapp]
b005f8114e16: Pushing [>                                                  ]  1.083MB/73.82MB
3c41ae1085d1: Pushing [==================================================>]   2.56kB
5245d34565af: Pushing [==================================================>]  4.096kB
a4bcd1c9ec6a: Pushing  1.536kB
32ee710ca3c7: Preparing
1767e4d52b5a: Waiting
45b98afd69b3: Waiting
b005f8114e16: Pushed
3c41ae1085d1: Pushed
5245d34565af: Pushed
a4bcd1c9ec6a: Pushed
32ee710ca3c7: Mounted from library/python
1767e4d52b5a: Mounted from library/python
45b98afd69b3: Mounted from library/python
2bce433c3a29: Mounted from library/python
f91dc7a486d9: Mounted from library/python
3e14a6961052: Mounted from library/python
d50132f2fe78: Mounted from library/python
latest: digest: sha256:eb87883880e4c8522d4d1a94aad94cf906212b50be6aeb000781bffcf6c03c78 size: 2628
```

Step 6: Apply the configuration

```
master@master-vm:~/multi-tier-application/nginx$ kubectl apply -f ~/multi-tier-application/flask/flask-deployment.yaml
deployment.apps/flask-app configured
master@master-vm:~/multi-tier-application/nginx$ kubectl apply -f ~/multi-tier-application/flask/flask-service.yaml
service/flask-service unchanged
master@master-vm:~/multi-tier-application/nginx$ kubectl apply -f ~/multi-tier-application/mysql/mysql-deployment.yaml
deployment.apps/mysql unchanged
service/mysql unchanged
master@master-vm:~/multi-tier-application/nginx$ kubectl apply -f ~/multi-tier-application/mysql/mysql-pv.yaml
persistentvolume/mysql-pv unchanged
persistentvolumeclaim/mysql-pvc unchanged
master@master-vm:~/multi-tier-application/nginx$ kubectl apply -f ~/multi-tier-application/mysql/mysql-secret.yaml
secret/mysql-secret unchanged
master@master-vm:~/multi-tier-application/nginx$ kubectl apply -f ~/multi-tier-application/nginx/nginx-configmap.yaml
configmap/nginx-config unchanged
master@master-vm:~/multi-tier-application/nginx$ kubectl apply -f ~/multi-tier-application/nginx/nginx-deployment.yaml
deployment.apps/nginx unchanged
master@master-vm:~/multi-tier-application/nginx$ kubectl apply -f ~/multi-tier-application/nginx/nginx-service.yaml
service/nginx-service unchanged
```

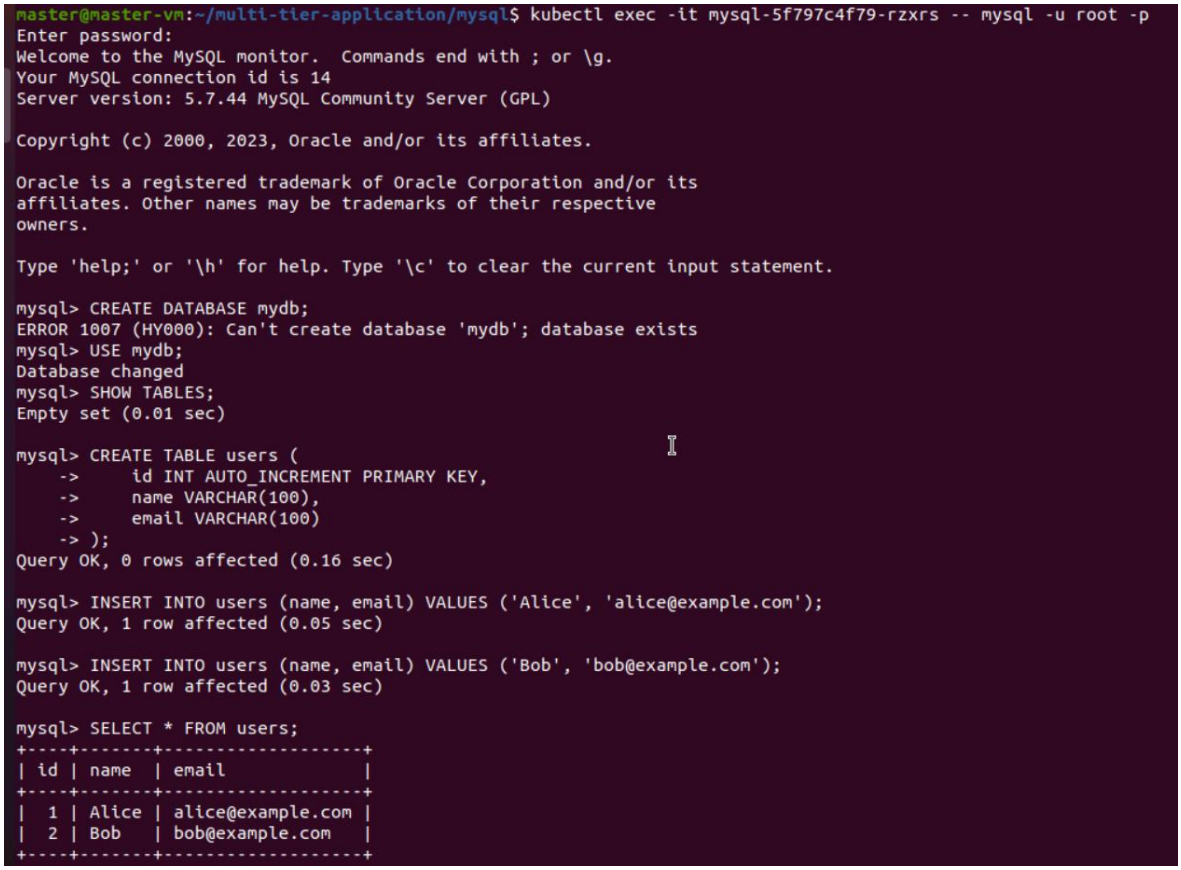
Step 7: get all pods

```
master@master-vm:~/multi-tier-application/nginx$ kubectl get pods -o wide
NAME                         READY   STATUS    RESTARTS   AGE   IP            NODE       NOMINATED NODE   READINESS GATES
flask-app-5b4dfc7c78-27mhf   1/1     Running   0          15h   10.244.0.19   minikube   <none>           <none>
flask-app-5b4dfc7c78-74fm4   1/1     Running   0          15h   10.244.0.17   minikube   <none>           <none>
flask-app-5b4dfc7c78-9scrk   1/1     Running   0          15h   10.244.0.16   minikube   <none>           <none>
flask-app-5b4dfc7c78-qdzkm   1/1     Running   0          15h   10.244.0.18   minikube   <none>           <none>
mysql-5f797c4f79-rzxrs       1/1     Running   0          15h   10.244.0.20   minikube   <none>           <none>
nginx-766c76446-6pf2g        1/1     Running   0          34s   10.244.0.22   minikube   <none>           <none>
master@master-vm:~/multi-tier-application/nginx$ minikube ip
192.168.49.2
master@master-vm:~/multi-tier-application/nginx$ kubectl get services nginx-service
NAME            TYPE       CLUSTER-IP     EXTERNAL-IP   PORT(S)        AGE
nginx-service   NodePort   10.97.49.102   <none>        80:30007/TCP   15h
```

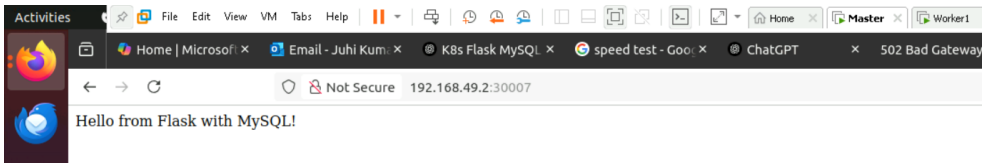
Step 8: Database created and outputs

Deploy MySQL Database

3. **Create Persistent Volume (PV) and Persistent Volume Claim (PVC) for MySQL.**
4. **Deploy MySQL using StatefulSet and secure credentials with Secrets.**



Step 9: open browser and run ip:30007



Step10: Database output table created