

IUDX_DEVOPS_Task

Name: **Tejashwini Kottha**

Mail: tejashwinikottha@gmail.com

Mobile: +918179038873

Task Instructions

1) Pick a application/use your existing/easy to do projects from internet with following criteria :

a) A basic HTTP web application in any language which takes some input through an API endpoint and process it and store the data to db

b) The database can be mysql, psql, mongodb etc.

NOTE: We strongly suggest to pick application language and db which you are familiar with for containerisation and deployment and we are not concerned with the code until unless it meets the criteria above.

2) Containerise and deploy the above application components in local machine using docker-compose a) Refer docker docs and docker-compose docs

b) Expose the web application in docker to outside world, so that it can be accessed through something like <http://localhost:35622/xyz/>

3) Containerise and deploy the above application in local K8s minikube cluster (using kubectl only):-.

a) Please see the instructions on how to create a minikube on a local machine at

<https://github.com/datakaveri/iudx-deployment/tree/master/K8s-deployment/K8s-cluster/minikube> .

b) Add auto scaling to any one of the components - web server or database. c) Expose the web application in K8s to outside world, so that it can be accessed through something like <http://localhost:35622/xyz/> i.e. through localhost of host machine

Steps To solve this:

1. Set up Docker — Install docker desktop , activate docker,login.
2. Make sure our flask app runs successfully in host app
3. After make a docker file and build an image for the flask app.
4. Pull a database container and and run
5. Run the flask app container
6. Run the database container
7. Now connect these two containers using same network
8. After connecting , make Generate docker compose file for the setup
9. Setup minikube and kubectl
10. Minikube start
11. Write the deployment files like service file, persistent volume file, cluster ip and nodeport files along with autoscaling and exposing process
12. Deploy those files using cmds
13. Check for the pods, deployments , services whether they are launched or not !!

IUDX_DEVOPS_Task

Used Docker and kubernetes commands are :

- `docker build -t flask-book-api .`
- `docker run --name flask-book-api -d -p 8000:5000 --rm flask-book-api:latest`
- `docker network create mynetwork2`
- `docker run --name sqlite-container1 --network mynetwork2 -v /path/to/your/sqlite/db:/data -d sqlite`
- `docker run --name flask-app-container1 --network mynetwork2 -p 5000:5000 your-flask-image`
- `docker volume create myvolume`
- `docker run --rm -v myvolume:/data -v /path/to/your/sqlite/db:/backup sqlite \cp /backup/mydatabase.db /data/mydatabase.db`
- `docker run --name new-sqlite-container2 -v myvolume:/data -d keinos/sqlite`
- `minikube start`
- `kubectl apply -f flask-app.yaml`
- `kubectl get deployments`
- `kubectl get services`
- `minikube ip`
- `minikube service flask-app-service`

For more detailed code and commands , you can refer github url :

https://github.com/Tejashwini690/IUDX_Task.git

IUDX_DEVOPS_Task

Screens after executing commands and yaml files:

```

Command Prompt
C:\Users\DELL\Desktop>cd flask-book-api

C:\Users\DELL\Desktop\flask-book-api>docker ps
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES

C:\Users\DELL\Desktop\flask-book-api>docker login
Authenticating with existing credentials...
Login Succeeded

Logging in with your password grants your terminal complete access to your account.
For better security, log in with a limited-privilege personal access token. Learn more at https://docs.docker.com/go/access-tokens/

C:\Users\DELL\Desktop\flask-book-api> docker build -t flask-book-api .
[+] Building 4.5s (11/11) FINISHED
=> [internal] load build definition from Dockerfile                                0.2s
=> => transferring dockerfile: 568B                                              0.1s
=> [internal] load .dockerignore                                                  0.2s
=> => transferring context: 2B                                                  0.1s
=> [internal] load metadata for docker.io/library/python:3.9                    4.1s
=> [auth] library/python:pull token for registry-1.docker.io                   0.0s
=> [1/5] FROM docker.io/library/python:3.9@sha256:98f018a1afd67f2e17a4abd5bfe09b998734ba7c1ee54780e7ed216f8b8095 0.0s
=> [internal] load build context                                                 0.0s
=> => transferring context: 662B                                                0.0s
=> CACHED [2/5] WORKDIR /app                                                    0.0s
=> CACHED [3/5] COPY requirements.txt .                                          0.0s
=> CACHED [4/5] RUN pip install --no-cache-dir -r requirements.txt              0.0s
=> CACHED [5/5] COPY . .                                                        0.0s
=> exporting to image                                                           0.0s
=> => exporting layers                                                           0.0s
=> => writing image sha256:cf5a314bfe34277acb26609e741b476e539d4faa0b57f9e77d427fd21fa1fada 0.0s
=> => naming to docker.io/library/flask-book-api                                0.0s

```

```

=> => exporting layers                                                           0.0s
=> => writing image sha256:cf5a314bfe34277acb26609e741b476e539d4faa0b57f9e77d427fd21fa1fada 0.0s
=> => naming to docker.io/library/flask-book-api                                0.0s

C:\Users\DELL\Desktop\flask-book-api>docker run --name flask-book-api -d -p 8000:5000 --rm flask-book-api:latest
b9929d4be1bfe3688acf8e54cd9e0814662daeeb5caf291e9426af61ff7bc9ed

C:\Users\DELL\Desktop\flask-book-api>docker pull keinos/sqlite3
Using default tag: latest
latest: Pulling from keinos/sqlite3
Digest: sha256:dab9a328dbad11574801a7d0de0747547d846e2e097ab6d0511911c0bcd09406
Status: Image is up to date for keinos/sqlite3:latest
docker.io/keinos/sqlite3:latest

C:\Users\DELL\Desktop\flask-book-api>docker run -it keinos/sqlite3
SQLite version 3.42.0 2023-05-16 12:36:15
Enter ".help" for usage hints.
Connected to a transient in-memory database.
Use ".open FILENAME" to reopen on a persistent database.
sqlite> ^C
sqlite> ^C
sqlite>
C:\Users\DELL\Desktop\flask-book-api>quit()qqqqqqqqqa
'quit' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\DELL\Desktop\flask-book-api>
C:\Users\DELL\Desktop\flask-book-api>
C:\Users\DELL\Desktop\flask-book-api>docker network create mynetwork2
aea4e1d9cb18cb62e6ffb20f96d1b3e01e081ab1f29c1ea3cf3fe6be96b314f9

C:\Users\DELL\Desktop\flask-book-api>docker run --name sqlite-container --network mynetwork2 -v /path/to/your/sqlite/db:/data -d keino

```

IUDX_DEVOPS_Task

```

Command Prompt

C:\Users\DELL\Desktop\flask-book-api>kubectl apply -f flask-app.yml
service/flask-book-app-service created
persistentvolume/myvolume created
The Deployment "flask-book-api-deployment" is invalid: spec.template.spec.containers[0].volumeMounts[0].name: Not found: "myvolume"

C:\Users\DELL\Desktop\flask-book-api>kubectl apply -f flask-app.yml
service/flask-book-app-service unchanged
persistentvolume/myvolume1 created
The Deployment "flask-book-api-deployment" is invalid: spec.template.spec.containers[0].volumeMounts[0].name: Not found: "myvolume"

C:\Users\DELL\Desktop\flask-book-api>kubectl apply -f flask-app.yml
service/flask-book-app-service unchanged
persistentvolume/myvolume1 unchanged
The Deployment "flask-book-api-deployment" is invalid: spec.template.spec.containers[0].volumeMounts[0].name: Not found: "myvolume1"

C:\Users\DELL\Desktop\flask-book-api>kubectl get deployments
NAME          READY   UP-TO-DATE   AVAILABLE   AGE
flask-book-api 0/1      1             0           3h33m

C:\Users\DELL\Desktop\flask-book-api>kubectl get services
NAME                TYPE        CLUSTER-IP    EXTERNAL-IP   PORT(S)          AGE
flask-app-service   LoadBalancer  10.98.43.115   <pending>     80:30684/TCP     3h31m
flask-book-app-service ClusterIP    10.108.20.64   <none>        8000/TCP         7m49s
kubernetes          ClusterIP    10.96.0.1      <none>        443/TCP          34h

C:\Users\DELL\Desktop\flask-book-api>kubectl apply -f flask-app.yml
service/flask-book-app-service unchanged
persistentvolume/myvolume1 unchanged
The Deployment "flask-book-api-deployment" is invalid: spec.template.spec.containers[0].volumeMounts[0].name: Not found: "myvolume1"

C:\Users\DELL\Desktop\flask-book-api>

```

```

Command Prompt

2856869a723cb8b8182ffb83a554951019536b5d203ad9c2a6d749f35e50b355

C:\Users\DELL\Desktop\flask-book-api>docker-compose up -d
[+] Building 0.0s (0/0)
[+] Running 1/1
✓ Container flask-book-api-web-1 Started 0.4s

C:\Users\DELL\Desktop\flask-book-api>docker ps
CONTAINER ID   IMAGE          COMMAND                  CREATED        STATUS        PORTS
AMES          55638d4f842f   keinos/sqlite3          "/bin/sh -c /usr/bin..." 13 minutes ago Up 13 minutes (healthy)
ompetent_shannon b9929d44be1bf flask-book-api:latest   "flask run --host=0.0.0.0" 14 minutes ago Up 14 minutes      0.0.0.0:8000->5000/tcp
lask-book-api   cd76ad901173   flask-book-api-web      "flask run --host=0.0.0.0" 9 hours ago   Up 26 seconds   0.0.0.0:5000->5000/tcp
lask-book-api-web-1

C:\Users\DELL\Desktop\flask-book-api>minikube start
* minikube v1.30.1 on Microsoft Windows 11 Home Single Language 10.0.22621.1848 Build 22621.1848
* Using the virtualbox driver based on existing profile
* Starting control plane node minikube in cluster minikube
* Restarting existing virtualbox VM for "minikube" ...
! This VM is having trouble accessing https://registry.k8s.io
* To pull new external images, you may need to configure a proxy: https://minikube.sigs.k8s.io/docs/reference/networking/proxy/
* Preparing Kubernetes v1.26.3 on Docker 20.10.23 ...
* Configuring bridge CNI (Container Networking Interface) ...
  - Using image gcr.io/k8s-minikube/storage-provisioner:v5
* Verifying Kubernetes components...
* Enabled addons: storage-provisioner, default-storageclass
* Done! kubectl is now configured to use "minikube" cluster and "default" namespace by default

C:\Users\DELL\Desktop\flask-book-api>

```

IUDX_DEVOPS_Task

```

Command Prompt
NAME                TYPE                CLUSTER-IP    EXTERNAL-IP    PORT(S)        AGE
flask-app-service   LoadBalancer      10.98.43.115  <pending>      80:30684/TCP   3h31m
flask-book-app-service ClusterIP          10.108.20.64  <none>         8000/TCP       7m49s
kubernetes          ClusterIP          10.96.0.1     <none>         443/TCP        34h

C:\Users\DELL\Desktop\flask-book-api>kubectl apply -f flask-app.yml
service/flask-book-app-service unchanged
persistentvolume/myvolume1 unchanged
The Deployment "flask-book-api-deployment" is invalid: spec.template.spec.containers[0].volumeMounts[0].name: Not found: "myvolume1"

C:\Users\DELL\Desktop\flask-book-api>minikube service flask-book-api

✖ Exiting due to SVC_NOT_FOUND: Service 'flask-book-api' was not found in 'default' namespace.
You may select another namespace by using 'minikube service flask-book-api -n <namespace>'. Or list out all the services using 'minikube service list'

C:\Users\DELL\Desktop\flask-book-api>kubectl apply -f flask_nodeport.yml
service/flask-app-service configured

C:\Users\DELL\Desktop\flask-book-api>minikube ip
192.168.59.100

C:\Users\DELL\Desktop\flask-book-api>minikube service flask-app-service
+-----+-----+-----+-----+
| NAMESPACE | NAME           | TARGET PORT | URL                               |
+-----+-----+-----+-----+
| default   | flask-app-service | 5000        | http://192.168.59.100:30003      |
+-----+-----+-----+-----+
🌐 Opening service default/flask-app-service in default browser...

C:\Users\DELL\Desktop\flask-book-api>

```

```

Command Prompt
flask-app-deployment-hpa 0/1 1 0 7s
flask-book-api           0/1 1 0 3h48m

C:\Users\DELL\Desktop\flask-book-api>kubectl get services
NAME                TYPE                CLUSTER-IP    EXTERNAL-IP    PORT(S)        AGE
flask-app-service   NodePort            10.98.43.115  <none>         5000:30003/TCP 3h46m
flask-book-app-service ClusterIP          10.108.20.64  <none>         8000/TCP       22m
kubernetes          ClusterIP          10.96.0.1     <none>         443/TCP        34h

C:\Users\DELL\Desktop\flask-book-api>minikube service flask-app-service
+-----+-----+-----+-----+
| NAMESPACE | NAME           | TARGET PORT | URL                               |
+-----+-----+-----+-----+
| default   | flask-app-service | 5000        | http://192.168.59.100:30003      |
+-----+-----+-----+-----+
🌐 Opening service default/flask-app-service in default browser...

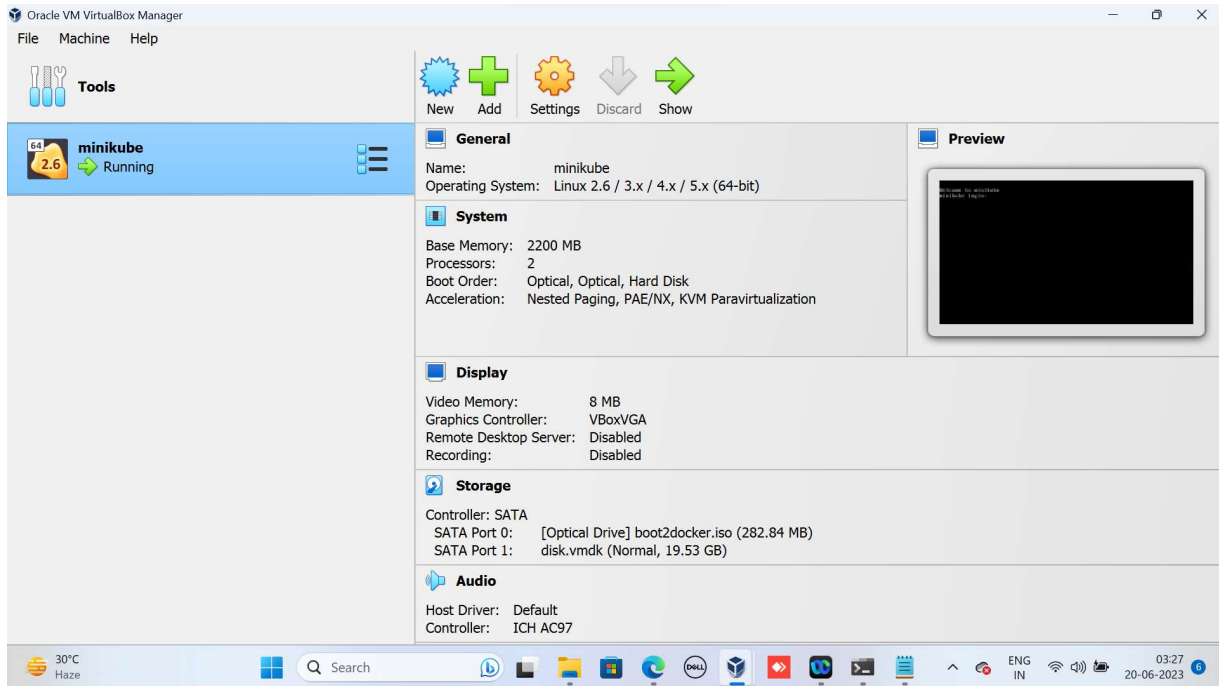
C:\Users\DELL\Desktop\flask-book-api>minikube service flask-book-app-service
+-----+-----+-----+-----+
| NAMESPACE | NAME           | TARGET PORT | URL                               |
+-----+-----+-----+-----+
| default   | flask-book-app-service |            | No node port                     |
+-----+-----+-----+-----+
📁 service default/flask-book-app-service has no node port

C:\Users\DELL\Desktop\flask-book-api>
C:\Users\DELL\Desktop\flask-book-api>kubectl get pods
NAME                READY  STATUS             RESTARTS  AGE
flask-app-deployment-hpa-9969d7d59-6pqpvr 0/1    ImagePullBackOff   0          39m
flask-book-api-664585dfd9-8k9rw            0/1    ImagePullBackOff   0          4h27m

C:\Users\DELL\Desktop\flask-book-api>

```


IUDX_DEVOPS_Task



```

C:\Users\DELL\Desktop\flask-book-api>kubectl apply -f flask-app-deployment.yml
deployment.apps/flask-app-deployment-hpa created

C:\Users\DELL\Desktop\flask-book-api>kubectl get deployments
NAME          READY  UP-TO-DATE  AVAILABLE  AGE
flask-app-deployment-hpa  0/1    1            0           7s
flask-book-api  0/1    1            0          3h48m

C:\Users\DELL\Desktop\flask-book-api>kubectl get services
NAME          TYPE        CLUSTER-IP    EXTERNAL-IP  PORT(S)          AGE
flask-app-service  NodePort    10.98.43.115   <none>       5000:30003/TCP   3h46m
flask-book-app-service  ClusterIP   10.108.20.64   <none>       8000/TCP         22m
kubernetes      ClusterIP   10.96.0.1      <none>       443/TCP         34h

C:\Users\DELL\Desktop\flask-book-api>minikube service flask-app-service
|-----|
| NAMESPACE | NAME           | TARGET PORT | URL                               |
|-----|
| default   | flask-app-service | 5000        | http://192.168.59.100:30003     |
|-----|
Opening service default/flask-app-service in default browser...

C:\Users\DELL\Desktop\flask-book-api>minikube service flask-book-app-service
|-----|
| NAMESPACE | NAME           | TARGET PORT | URL                               |
|-----|
| default   | flask-book-app-service |             | No node port                     |
|-----|
service default/flask-book-app-service has no node port

C:\Users\DELL\Desktop\flask-book-api>
C:\Users\DELL\Desktop\flask-book-api>

```

-----END-----