

Cloud Computing and Big Data Systems - Fall 2023 Assignment 2

Part 2: Containerizing the Application on Docker:

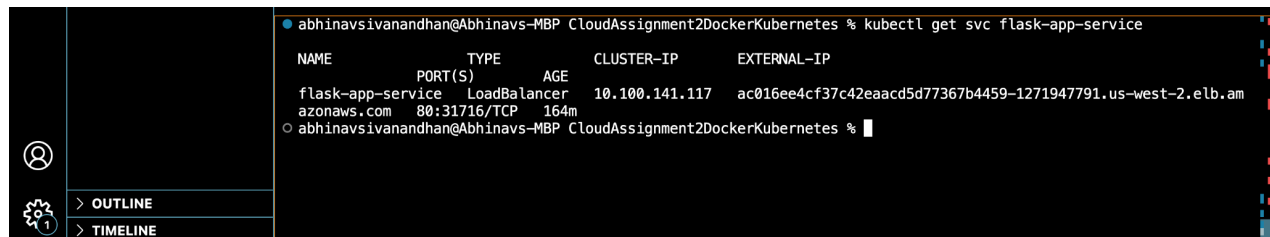
```
! flask-app-service.ya... 2-C
! mongo-pod.yaml
! prometheus-rules.y...
requirements.txt
! values.yaml

(venv) abhinavsivanandhan@Abhinavs-MBP app % docker images
REPOSITORY          TAG          IMAGE ID      CREATED       SIZE
abhinavs2000/flask-app 1.0         70bc734f5024  2 days ago   196MB
flask-app-trial3      latest      26bd0c85e4f3  2 days ago   196MB
abhinavs2000/assignment2 latest      26bd0c85e4f3  2 days ago   196MB
abhinavs2000/flask-img 1.0         5469ad654552  5 days ago   1.05GB
flask-app             latest      5469ad654552  5 days ago   1.05GB
abhinavs2000/assignment2 <none>      3d303dfb4744  5 days ago   1.05GB
app-flask-app         latest      b57e9386dcf7  5 days ago   1.05GB
abhinavs2000/mongo-img latest      8b10e7ef0208  4 weeks ago  712MB
mongo                 latest      8b10e7ef0208  4 weeks ago  712MB
gcr.io/k8s-minikube/kicbase v0.0.40    f52519afe5f6  4 months ago 1.1GB
```

```
! flask-app-replicatio...
! flask-app-service.ya...
! mongo-pod.yaml
! prometheus-rules.y...
requirements.txt
! values.yaml

(venv) abhinavsivanandhan@Abhinavs-MBP app % docker ps
CONTAINER ID   IMAGE                                COMMAND                  CREATED        STATUS        PORTS
c1b424d5f1b8   abhinavs2000/flask-app:1.0         "flask run"             2 days ago    Up 2 days    0.0.0.0:8
080->5000/tcp
a95eb1d072fb   flask-app-container                "docker-entrypoint.s..." 2 days ago    Up 2 days    0.0.0.0:2
7017->27017/tcp
mongo-container
c0d9da06f935   gcr.io/k8s-minikube/kicbase:v0.0.40 "/usr/local/bin/entr..." 5 days ago    Up 5 days    127.0.0.1
:58538->22/tcp, 127.0.0.1:58539->2376/tcp, 127.0.0.1:58541->5000/tcp, 127.0.0.1:58537->8443/tcp, 127.0.0.1:58540
->32443/tcp
minikube
```

Part 3: Deploying the Application on Minikube:

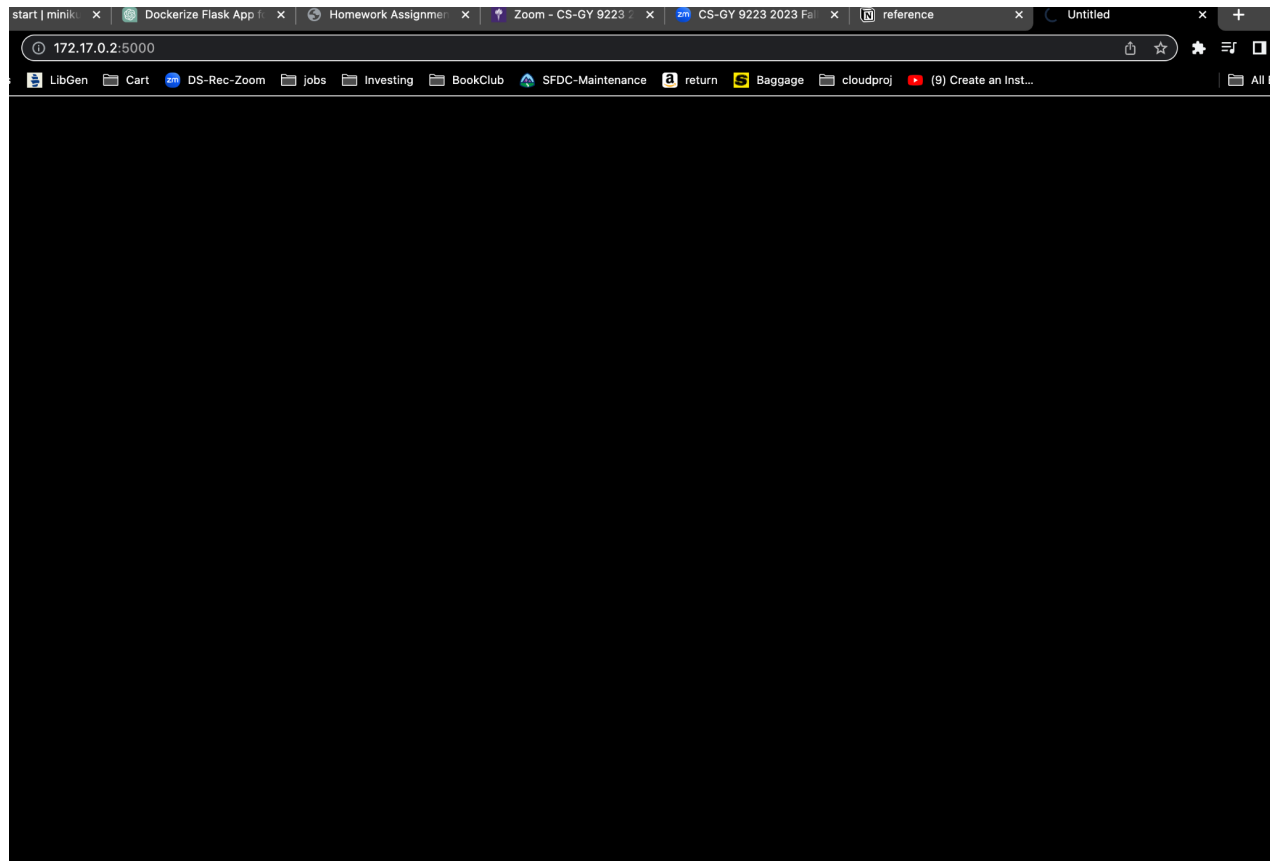


```
abhinavsivanandhan@Abhinavs-MBP CloudAssignment2DockerKubernetes % kubectl get svc flask-app-service
```

NAME	TYPE	PORT(S)	AGE	CLUSTER-IP	EXTERNAL-IP
flask-app-service	LoadBalancer			10.100.141.117	ac016ee4cf37c42eaacd5d77367b4459-1271947791.us-west-2.elb.amazonaws.com

```
abhinavsivanandhan@Abhinavs-MBP CloudAssignment2DockerKubernetes %
```

The terminal window shows the command `kubectl get svc flask-app-service` being executed. The output is a table with columns: NAME, TYPE, PORT(S), AGE, CLUSTER-IP, and EXTERNAL-IP. The table shows a single service named 'flask-app-service' of type 'LoadBalancer' with an external IP of 'ac016ee4cf37c42eaacd5d77367b4459-1271947791.us-west-2.elb.amazonaws.com'. The terminal also shows a sidebar with 'OUTLINE' and 'TIMELINE' options.



Part 4: Deploying the Application on AWS EK

Part 5: Replication controller feature:

eks-flask-app-deplo...

eks-flask-app-servi...

eks-flask-app-servi...

flask-app-deployme...

flask-app-pod.yaml

flask-app-replicatio...

flask-app-service.ya...

mongo-pod.yaml

requirements.txt

NAME

flask-app-replication-controller

DESIRED

3

CURRENT

3

READY

0

AGE

8s

NAME

flask-app-replication-controller

DESIRED

5

CURRENT

5

READY

0

AGE

60s

Screen Reader Optimized

Ln 6, Col 11

Spaces: 2

UTF-8

LF

YAM

eks-flask-app-deplo...

eks-flask-app-servi...

eks-flask-app-servi...

flask-app-deployme...

flask-app-pod.yaml

flask-app-replicatio...

flask-app-service.ya...

mongo-pod.yaml

requirements.txt

deployment.apps/flask-app-deployment unchanged

(venv) abhinavsivanandhan@Abhinavs-MBP app % kubectl apply -f flask-app-replication-controller.yaml

error: the path "flask-app-replication-controller.yaml" does not exist

(venv) abhinavsivanandhan@Abhinavs-MBP app % kubectl apply -f flask-app-replication-controller.yaml

replicationcontroller/flask-app-replication-controller created

(venv) abhinavsivanandhan@Abhinavs-MBP app % kubectl get replicationcontroller

NAME

flask-app-replication-controller

DESIRED

3

CURRENT

3

READY

0

AGE

8s

(venv) abhinavsivanandhan@Abhinavs-MBP app % kubectl apply -f flask-app-replication-controller.yaml

replicationcontroller/flask-app-replication-controller configured

(venv) abhinavsivanandhan@Abhinavs-MBP app % kubectl get replicationcontroller

NAME

flask-app-replication-controller

DESIRED

5

CURRENT

5

READY

0

AGE

60s

(venv) abhinavsivanandhan@Abhinavs-MBP app %

Screen Reader Optimized

Ln 6, Col 14

Spaces: 2

UTF-8

LF

YAM

2023-11-12 21:16:55 [i] node "ip-192-168-71-176.us-west-2.compute.internal" is ready

2023-11-12 21:16:56 [i] kubectl command should work with "/Users/abhinavsivanandhan/.kube/config", try 'kubectl get nodes'

2023-11-12 21:16:56 [✓] EKS cluster "eks-flask-app" in "us-west-2" region is ready

(venv) abhinavsivanandhan@Abhinavs-MBP app % kubectl get nodes

NAME

ip-192-168-25-156.us-west-2.compute.internal

STATUS

Ready

ROLES

<none>

AGE

24m

VERSION

v1.28.3-eks-4f4795d

ip-192-168-45-58.us-west-2.compute.internal

Ready

<none>

24m

v1.28.3-eks-4f4795d

ip-192-168-71-176.us-west-2.compute.internal

Ready

<none>

24m

v1.28.3-eks-4f4795d

(venv) abhinavsivanandhan@Abhinavs-MBP app %

Screen Reader Optimized

Ln 129, Col 40

Tab Size: 4

UTF-8

LF

{ } Python 3.11.6 (venv)

flask-app-replicatio...

flask-app-service.ya...

mongo-pod.yaml

requirements.txt

PROBLEMS (2)

OUTPUT

DEBUG CONSOLE

TERMINAL

PORTS

flask-app-deployment-5cf88c6c96-dvzsz

0/1

ImagePullBackOff

0

2m33s

flask-app-deployment-5cf88c6c96-r2dsj

0/1

ImagePullBackOff

0

2m33s

(venv) abhinavsivanandhan@Abhinavs-MBP app % kubectl get nodes

NAME

ip-192-168-25-156.us-west-2.compute.internal

STATUS

Ready

ROLES

<none>

AGE

34m

VERSION

v1.28.3-eks-4f4795d

ip-192-168-45-58.us-west-2.compute.internal

Ready

<none>

34m

v1.28.3-eks-4f4795d

ip-192-168-71-176.us-west-2.compute.internal

Ready

<none>

34m

v1.28.3-eks-4f4795d

(venv) abhinavsivanandhan@Abhinavs-MBP app % kubectl get pods

NAME

flask-app-deployment-5cf88c6c96-dvzsz

READY

STATUS

ImagePullBackOff

RESTARTS

0

AGE

20m

flask-app-deployment-5cf88c6c96-r2dsj

0/1

ImagePullBackOff

0

20m

(venv) abhinavsivanandhan@Abhinavs-MBP app %

Screen Reader Optimized

Ln 11, Col 23

Spaces: 2

UTF-8

LF

YAM

flask-app-replicatio...

flask-app-service.ya...

mongo-pod.yaml

requirements.txt

(venv) abhinavsivanandhan@Abhinavs-MBP app % kubectl apply -f flask-app-replication-controller.yaml

replicationcontroller/flask-app-replication-controller created

(venv) abhinavsivanandhan@Abhinavs-MBP app % kubectl get replicationcontroller

NAME

flask-app-replication-controller

DESIRED

5

CURRENT

5

READY

0

AGE

4s

(venv) abhinavsivanandhan@Abhinavs-MBP app %

Screen Reader Optimized

Ln 6, Col 14

Spaces: 2

UTF-8

LF

YAM

flask-app-service.y...

! mongo-pod.yaml

≡ requirements.txt

Cloud - Assignment ...

OUTLINE

TIMELINE

flask-app-replication-controller 55031m

● abhinavsivanandhan@Abhinavs-MBP Assignment2-trial3 % kubectl get pods --selector=app=flask-app

NAME	READY	STATUS	RESTARTS	AGE
flask-app-deployment-5cf88c6c96-dvzsz	0/1	ImagePullBackOff	0	57m
flask-app-deployment-5cf88c6c96-r2dsj	0/1	ImagePullBackOff	0	57m
flask-app-replication-controller-9t9dx	0/1	ImagePullBackOff	0	31m
flask-app-replication-controller-fwxmm	0/1	ImagePullBackOff	0	31m
flask-app-replication-controller-jpr8q	0/1	ImagePullBackOff	0	31m
flask-app-replication-controller-msvcz	0/1	ImagePullBackOff	0	31m
flask-app-replication-controller-s45dw	0/1	ImagePullBackOff	0	31m

○ abhinavsivanandhan@Abhinavs-MBP Assignment2-trial3 % kubectl delete pod flask-app-replication-controller-s45dw

venv

app.py

aws-iam-authentic...

docker-compose.yml

Dockerfile

eks-cluster-role-tr...

eks-flask-app-depl...

eks-flask-app-serv...

eks-flask-app-serv...

flask-app-deployem...

flask-app-pod.yaml

flask-app-replicati...

flask-app-service.y...

mongo-pod.yaml

requirements.txt

Cloud - Assignment ...

OUTLINE

TIMELINE

PROBLEMS

OUTPUT

DEBUG CONSOLE

TERMINAL

PORTS

zsh

NAME

DESIRED

CURRENT

READY

AGE

flask-app-replication-controller 55031m

● abhinavsivanandhan@Abhinavs-MBP Assignment2-trial3 % kubectl get pods --selector=app=flask-app

NAME	READY	STATUS	RESTARTS	AGE
flask-app-deployment-5cf88c6c96-dvzsz	0/1	ImagePullBackOff	0	57m
flask-app-deployment-5cf88c6c96-r2dsj	0/1	ImagePullBackOff	0	57m
flask-app-replication-controller-9t9dx	0/1	ImagePullBackOff	0	31m
flask-app-replication-controller-fwxmm	0/1	ImagePullBackOff	0	31m
flask-app-replication-controller-jpr8q	0/1	ImagePullBackOff	0	31m
flask-app-replication-controller-msvcz	0/1	ImagePullBackOff	0	31m
flask-app-replication-controller-s45dw	0/1	ImagePullBackOff	0	31m

● abhinavsivanandhan@Abhinavs-MBP Assignment2-trial3 % kubectl delete pod flask-app-replication-controller-s45dw

pod "flask-app-replication-controller-s45dw" deleted

● abhinavsivanandhan@Abhinavs-MBP Assignment2-trial3 % kubectl get pods --selector=app=flask-app

NAME	READY	STATUS	RESTARTS	AGE
flask-app-deployment-5cf88c6c96-dvzsz	0/1	ImagePullBackOff	0	58m
flask-app-deployment-5cf88c6c96-r2dsj	0/1	ImagePullBackOff	0	58m
flask-app-replication-controller-9t9dx	0/1	ErrImagePull	0	32m
flask-app-replication-controller-bk95n	0/1	ErrImagePull	0	5s
flask-app-replication-controller-fwxmm	0/1	ImagePullBackOff	0	32m
flask-app-replication-controller-jpr8q	0/1	ImagePullBackOff	0	32m
flask-app-replication-controller-msvcz	0/1	ImagePullBackOff	0	32m

● abhinavsivanandhan@Abhinavs-MBP Assignment2-trial3 % kubectl get replicationcontroller

NAME

DESIRED

CURRENT

READY

AGE

flask-app-replication-controller 55032m

Part 6: Rolling update strategy:

> __pycache__

> static

> templates

> venv

app.py

aws-iam-authentic...

docker-compose.yml

Dockerfile

eks-cluster-role-tr...

eks-flask-app-depl...

eks-flask-app-serv...

eks-flask-app-serv...

flask-app-deploy...

flask-app-pod.yaml

flask-app-replicati...

1

Flask==2.1.3

PROBLEMS

OUTPUT

DEBUG CONSOLE

TERMINAL

PORTS

zsh - app

prometheus-kube-state-metrics1/1160m

prometheus-prometheus-pushgateway1/160m

prometheus-server0/160m

(venv) abhinavsivanandhan@Abhinavs-MBP app % kubectl get replicasets

NAMEDESIREDCURRENTREADYAGE

flask-app-deployment-5cf88c6c96220136m

prometheus-example-kube-state-metrics-66f967591156m

prometheus-example-prometheus-pushgateway-96b9d96941156m

prometheus-example-server-74894d764c1156m

prometheus-kube-state-metrics-6b464f5b881160m

prometheus-prometheus-pushgateway-7857c44f491160m

prometheus-server-58944f5698160m

(venv) abhinavsivanandhan@Abhinavs-MBP app % kubectl rollout history deployment flask-app-deployment

deployment.apps/flask-app-deployment

REVISIONCHANGE-CAUSE

1<none>

eks-flask-app-serv...

eks-flask-app-serv...

flask-app-deploy...

flask-app-pod.yaml

https://prometheus.io/

(venv) abhinavsivanandhan@Abhinavs-MBP app % kubectl cluster-info

Kubernetes control plane is running at https://45484F3A967B990A842CF63F5FDB1940.gr7.us-west-2.eks.amazonaws.

CoreDNS is running at https://45484F3A967B990A842CF63F5FDB1940.gr7.us-west-2.eks.amazonaws.com/api/v1/namesp

/kube-system/services/kube-dns/dns/proxy

> templates

> venv

app.py

aws-iam-authentic...

docker-compose.yml

Dockerfile

eks-cluster-role-tr...

eks-flask-app-depl...

eks-flask-app-serv...

eks-flask-app-serv...

flask-app-deploy...

flask-app-pod.yaml

flask-app-replicati...

flask-app-service.y...

mongo-pod.yaml

prometheus-rules....

requirements.txt

values.yaml

Cloud - Assignment ...

OUTLINE

TIMELINE

(venv) abhinavsivanandhan@Abhinavs-MBP app % kubectl describe deployment flask-app-deployment

Name:flask-app-deployment

Namespace:default

CreationTimestamp:Sun, 12 Nov 2023 21:45:25 -0500

Labels:<none>

Annotations:deployment.kubernetes.io/revision: 1

Selector:app=flask-app

Replicas:2 desired | 2 updated | 2 total | 0 available | 2 unavailable

StrategyType:RollingUpdate

MinReadySeconds:0

RollingUpdateStrategy: 1 max unavailable, 25% max surge

Pod Template:

Labels: app=flask-app

Containers:

flask-app-container:

Image: abhinavs2000/flask-app-trial3:latest

Port: 5000/TCP

Host Port: 0/TCP

Liveness: http-get http://:5000/healthz delay=10s timeout=1s period=10s #success=1 #failure=3

Readiness: http-get http://:5000/healthz delay=5s timeout=1s period=5s #success=1 #failure=3

Environment:<none>

Mounts:<none>

Volumes:<none>

Conditions:

TypeStatusReason

AvailableFalseMinimumReplicasUnavailable

ProgressingFalseProgressDeadlineExceeded

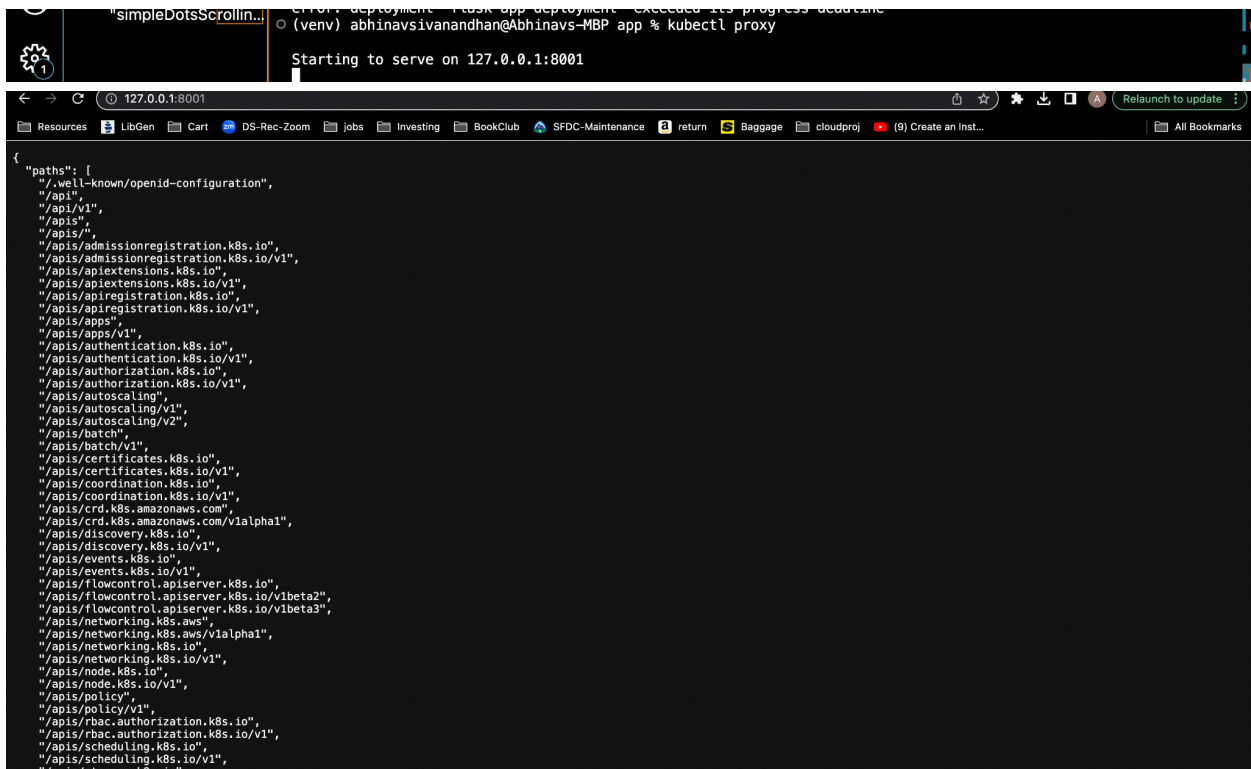
OldReplicaSets:<none>

NewReplicaSet:flask-app-deployment-5cf88c6c96 (2/2 replicas created)

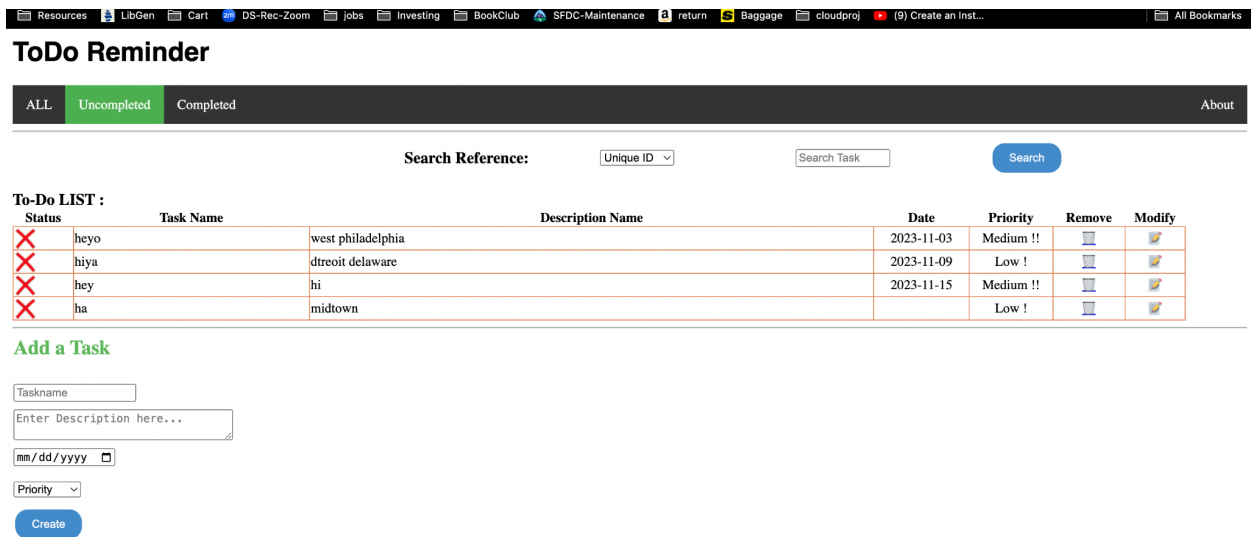
Events:<none>

(venv) abhinavsivanandhan@Abhinavs-MBP app %

Part 7: Health monitoring:



Step 8: Alerting (Extra Credit 20 Points):



Submission Requirements

- Dockerfile for the application - this is the file that defines the Docker image for the application.
- Kubernetes configuration files for the application deployment and service - these files specify how the application should be deployed and made available on Kubernetes.

- Document explaining the steps followed to complete the assignment - this should include screenshots of the application running on Minikube and AWS EKS

