Assignment 7

Question 1

Create index.html file

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Kubernetes App</title>
</head>
<body>
    <h1>This application is running on Kubernetes!!!</h1>
</body>
</html>
```

Create a Dockerfile to configure the image

```
FROM httpd:latest

COPY index.html /usr/local/apache2/htdocs/index.html

~
~
~
```

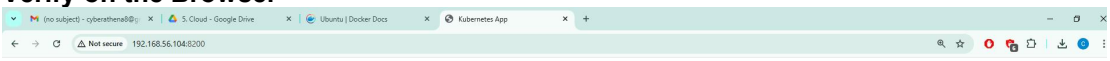
Build the Docker image

```
Pushpak@ubuntu:~/assign/kubernetes-httpd$ vi index.html
Pushpak@ubuntu:~/assign/kubernetes-httpd$ vi Dockerfile
Pushpak@ubuntu:~/assign/kubernetes-httpd$ docker build -t kubernetes-httpd .
[+] Building 0.3s (7/7) FINISHED                                                                                docker:default
 => [internal] load build definition from Dockerfile                                                                      0.0s
 => => transferring dockerfile: 110B                                                                                      0.0s
 => [internal] load metadata for docker.io/library/httpd:latest                                                           0.0s
 => [internal] load .dockerignore                                                                                         0.0s
 => => transferring context: 2B                                                                                           0.0s
 => [internal] load build context                                                                                         0.0s
 => => transferring context: 305B                                                                                         0.0s
 => CACHED [1/2] FROM docker.io/library/httpd:latest                                                                      0.0s
 => [2/2] COPY index.html /usr/local/apache2/htdocs/index.html                                                            0.1s
 => exporting to image                                                                                                    0.1s
 => => exporting layers                                                                                                   0.0s
 => => writing image sha256:e6dcf7a09a8ead91b96d2a97fe122b71f8fd5bdc8df97da2fb1b2c895ed38699                              0.0s
 => => naming to docker.io/library/kubernetes-httpd                                                                       0.0s
Pushpak@ubuntu:~/assign/kubernetes-httpd$
```

Run the Docker container

```
Pushpak@ubuntu:~/assign/kubernetes-httpd$ docker run -d -p 8200:80 kubernetes-httpd
d1b943800ce811c3cd293e07c01646cb837616b0d2178412397e508ffd2648ef
Pushpak@ubuntu:~/assign/kubernetes-httpd$ docker ps -a
CONTAINER ID   IMAGE              COMMAND              CREATED          STATUS         PORTS
          NAMES
d1b943800ce8   kubernetes-httpd   "httpd-foreground"   10 seconds ago   Up 9 seconds   0.0.0.0:8200->80/tcp, [::]:8200
->80/tcp   unruffled_herschel
Pushpak@ubuntu:~/assign/kubernetes-httpd$
```

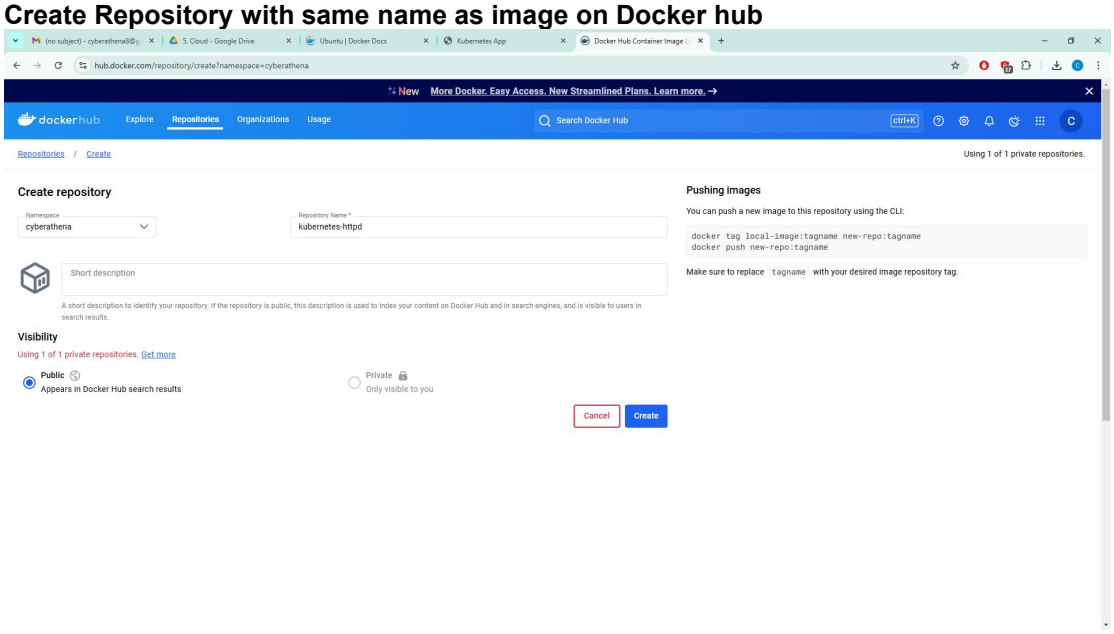
Verify on the Browser



This application is running on Kubernetes!!!

Question 2

Create Repository with same name as image on Docker hub



Log in into Docker Account

```
Pushpak@ubuntu:~/assign/kubernetes-httpd$ docker login

USING WEB-BASED LOGIN
To sign in with credentials on the command line, use 'docker login -u <username>'

Your one-time device confirmation code is: ZPDX-BWKT
Press ENTER to open your browser or submit your device code here: https://login.docker.com/activate

Waiting for authentication in the browser…
WARNING! Your password will be stored unencrypted in /home/Pushpak/.docker/config.json.
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credential-stores

Login Succeeded
Pushpak@ubuntu:~/assign/kubernetes-httpd$
```

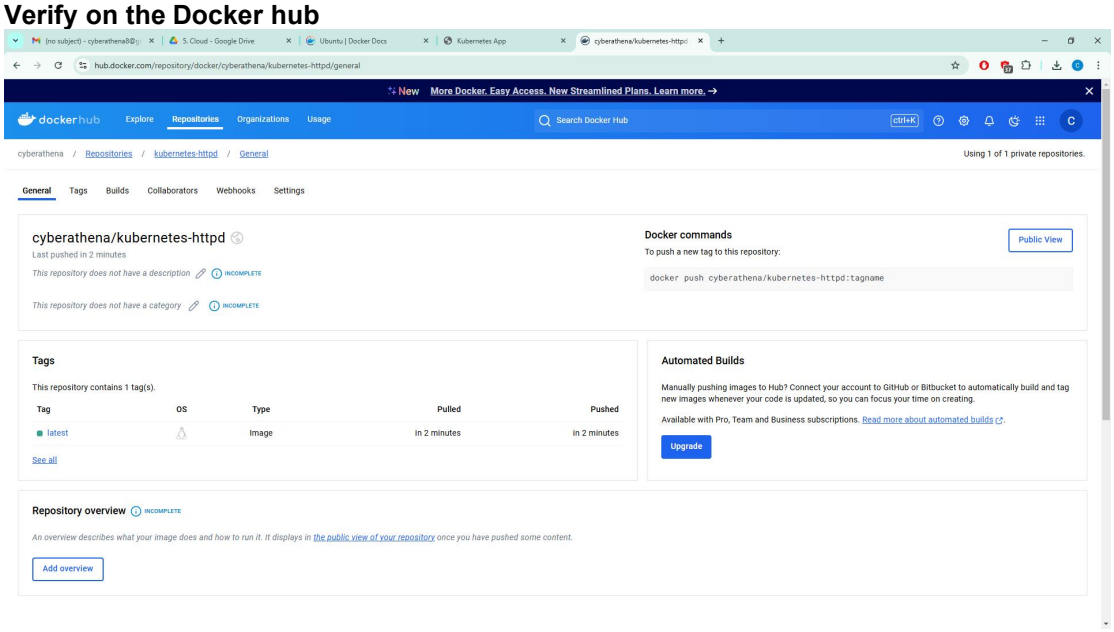
Tag the Docker image

```
Pushpak@ubuntu:~/assign/kubernetes-httpd$ docker tag kubernetes-httpd cyberathena/kubernetes-httpd:latest
```

Push the Docker image

```
Pushpak@ubuntu:~/assign/kubernetes-httpd$ docker push cyberathena/kubernetes-httpd:latest
The push refers to repository [docker.io/cyberathena/kubernetes-httpd]
23a0fcd8d6ff: Pushed
9ce89b648dd7: Mounted from library/httpd
d32b5bce7355: Mounted from library/httpd
5e96151062b7: Mounted from library/httpd
5f70bf18a086: Mounted from library/httpd
8cc10dae2ae3: Mounted from library/httpd
c3548211b826: Mounted from library/httpd
latest: digest: sha256:7061ec7a0e3ac803a362f404e91c8ea125449430527bfa5a62964a802ca40575 size: 1779
Pushpak@ubuntu:~/assign/kubernetes-httpd$
```

Verify on the Docker hub



Verify the Push

```
Pushpak@ubuntu:~/assign$ docker pull cyberathena/kubernetes-httpd:latest
latest: Pulling from cyberathena/kubernetes-httpd
Digest: sha256:7061ec7a0e3ac803a362f404e91c8ea125449430527bfa5a62964a802ca40575
Status: Image is up to date for cyberathena/kubernetes-httpd:latest
docker.io/cyberathena/kubernetes-httpd:latest
Pushpak@ubuntu:~/assign$
```

Question 3

Create a Deployment using the httpd image

```
[dhpcsa@master pushpak]$ kubectl create deployment httpd-deployment --image=httpd
deployment.apps/httpd-deployment created
[dhpcsa@master pushpak]$ kubectl get pods -o wide
NAME                                READY   STATUS              RESTARTS   AGE   IP       NODE       NOMINATED NODE   READINESS GATES
httpd-deployment-5cbb485569-pj5j7   0/1     ContainerCreating   0          10s   <none>   worker-2   <none>           <none>
[dhpcsa@master pushpak]$
```

Check the which node on pod is running

```
[dhpcsa@master pushpak]$ kubectl get pods -o wide
NAME                                READY   STATUS    RESTARTS   AGE   IP           NODE       NOMINATED NODE   READINESS GATES
httpd-deployment-5cbb485569-pj5j7   1/1     Running   0          91s   10.244.2.2   worker-2   <none>           <none>
[dhpcsa@master pushpak]$
```

Create a service of type NodePort

```
[dhpcsa@master pushpak]$ kubectl expose deployment httpd-deployment --type=NodePort --port=80
service/httpd-deployment exposed
[dhpcsa@master pushpak]$ kubectl get svc -o wide
NAME               TYPE        CLUSTER-IP     EXTERNAL-IP   PORT(S)        AGE   SELECTOR
httpd-deployment   NodePort    10.96.134.47   <none>        80:32216/TCP   14s   app=httpd-deployment
kubernetes         ClusterIP   10.96.0.1      <none>        443/TCP        42h   <none>
[dhpcsa@master pushpak]$
```

Get the nodes IP

```
[dhpcsa@master pushpak]$ kubectl get nodes -o wide
NAME       STATUS   ROLES           AGE   VERSION    INTERNAL-IP      EXTERNAL-IP   OS-IMAGE                      KERNEL-VERSION
CONTAINER-RUNTIME
master     Ready    control-plane   40h   v1.29.10   192.168.56.101   <none>        Rocky Linux 9.4 (Blue Onyx)   5.14.0-427.13.1.el9_4.x86_64
containerd://1.7.22
worker-1   Ready    <none>          39h   v1.29.10   192.168.56.103   <none>        Rocky Linux 9.4 (Blue Onyx)   5.14.0-427.13.1.el9_4.x86_64
containerd://1.7.22
worker-2   Ready    <none>          39h   v1.29.10   192.168.56.102   <none>        Rocky Linux 9.4 (Blue Onyx)   5.14.0-427.13.1.el9_4.x86_64
containerd://1.7.22
[dhpcsa@master pushpak]$
```

Get the Web page

Get the website using curl

```
[dhpcsa@master pushpak]$ curl 192.168.56.102:32216
<html><body><h1>It works!</h1></body></html>
[dhpcsa@master pushpak]$
```

Question 4

Scale Deployment to 10 pods

```
[dhpcsa@master pushpak]$ kubectl scale deployment httpd-deployment --replicas=10
deployment.apps/httpd-deployment scaled
[dhpcsa@master pushpak]$ kubectl get pods -o wide
NAME                              READY   STATUS    RESTARTS   AGE     IP            NODE       NOMINATED NODE   READINESS GATES
httpd-deployment-5cbb485569-8swq7   1/1     Running   0          71s     10.244.2.11   worker-2   <none>           <none>
httpd-deployment-5cbb485569-8v5k6   1/1     Running   0          71s     10.244.1.16   worker-1   <none>           <none>
httpd-deployment-5cbb485569-fzdsf   1/1     Running   0          71s     10.244.2.14   worker-2   <none>           <none>
httpd-deployment-5cbb485569-m5khb   1/1     Running   0          71s     10.244.1.12   worker-1   <none>           <none>
httpd-deployment-5cbb485569-nbh2h   1/1     Running   0          71s     10.244.2.12   worker-2   <none>           <none>
httpd-deployment-5cbb485569-np4dl   1/1     Running   0          71s     10.244.1.15   worker-1   <none>           <none>
httpd-deployment-5cbb485569-pj5j7   1/1     Running   0          7m39s   10.244.2.2    worker-2   <none>           <none>
httpd-deployment-5cbb485569-qr89b   1/1     Running   0          71s     10.244.1.13   worker-1   <none>           <none>
httpd-deployment-5cbb485569-vs4l4   1/1     Running   0          71s     10.244.1.14   worker-1   <none>           <none>
httpd-deployment-5cbb485569-w2vnz   1/1     Running   0          71s     10.244.2.13   worker-2   <none>           <none>
[dhpcsa@master pushpak]$
```

Check the IP addressing Assigned to the Pods

```
[dhpcsa@master pushpak]$ kubectl get pods -o wide
NAME                              READY   STATUS    RESTARTS   AGE     IP            NODE       NOMINATED NODE   READINESS GATES
httpd-deployment-5cbb485569-8swq7   1/1     Running   0          71s     10.244.2.11   worker-2   <none>           <none>
httpd-deployment-5cbb485569-8v5k6   1/1     Running   0          71s     10.244.1.16   worker-1   <none>           <none>
httpd-deployment-5cbb485569-fzdsf   1/1     Running   0          71s     10.244.2.14   worker-2   <none>           <none>
httpd-deployment-5cbb485569-m5khb   1/1     Running   0          71s     10.244.1.12   worker-1   <none>           <none>
httpd-deployment-5cbb485569-nbh2h   1/1     Running   0          71s     10.244.2.12   worker-2   <none>           <none>
httpd-deployment-5cbb485569-np4dl   1/1     Running   0          71s     10.244.1.15   worker-1   <none>           <none>
httpd-deployment-5cbb485569-pj5j7   1/1     Running   0          7m39s   10.244.2.2    worker-2   <none>           <none>
httpd-deployment-5cbb485569-qr89b   1/1     Running   0          71s     10.244.1.13   worker-1   <none>           <none>
httpd-deployment-5cbb485569-vs4l4   1/1     Running   0          71s     10.244.1.14   worker-1   <none>           <none>
httpd-deployment-5cbb485569-w2vnz   1/1     Running   0          71s     10.244.2.13   worker-2   <none>           <none>
```

Get the port Number

```
[dhpcsa@master pushpak]$ kubectl get svc
NAME               TYPE        CLUSTER-IP     EXTERNAL-IP   PORT(S)        AGE
httpd-deployment   NodePort    10.96.134.47   <none>        80:32216/TCP   12m
kubernetes         ClusterIP   10.96.0.1      <none>        443/TCP        42h
[dhpcsa@master pushpak]$
```

Curl from the Worker 1

```
[dhpcsa@master pushpak]$ curl http://192.168.56.103:32216
<html><body><h1>It works!</h1></body></html>
[dhpcsa@master pushpak]$
```

Curl from Worker2

So I did ssh into worker-2 since that port wasn't accessible from master so I performed ssh and the run curl there

```
[dhpcsa@worker-2 ~]$ curl localhost:32216
<html><body><h1>It works!</h1></body></html>
[dhpcsa@worker-2 ~]$
```

Scale down the deployment to 2 replicas

```
[dhpcsa@master pushpak]$ kubectl scale deployment httpd-deployment --replicas=2
deployment.apps/httpd-deployment scaled
[dhpcsa@master pushpak]$ kubectl get pods -o wide
NAME                              READY   STATUS    RESTARTS   AGE   IP            NODE       NOMINATED NODE   READINESS GATES
httpd-deployment-5cbb485569-pj5j7   1/1     Running   0          19m   10.244.2.2    worker-2   <none>           <none>
httpd-deployment-5cbb485569-w2vnz   1/1     Running   0          12m   10.244.2.13   worker-2   <none>           <none>
[dhpcsa@master pushpak]$
```