

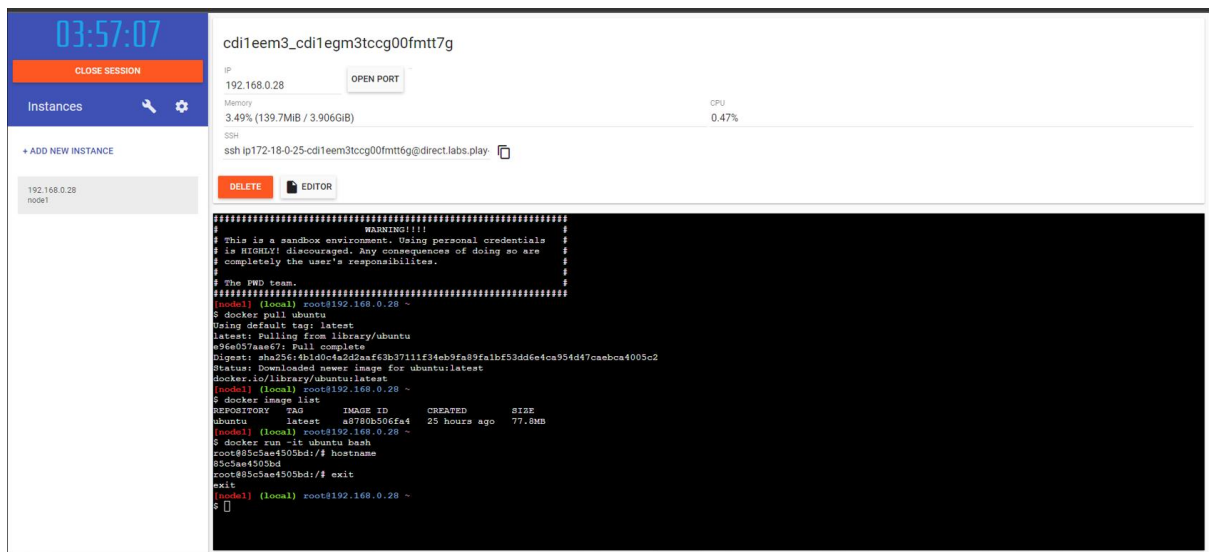
ASSIGNMENT -4

DOCKER AND KUBERNETES

Assignment Date	04 November 2022
Student Name	Samreen Ayesha. S
Student Roll Number	2019103055
Maximum Marks	2 Marks

Question-1:

Pull an image from docker hub and run it on a docker playground



The screenshot shows a Docker Playground interface. On the left, there's a sidebar with a clock showing 03:57:07, a 'CLOSE SESSION' button, and a list of instances. The main area displays the details of an instance named 'cdi1eem3_cdi1egm3tccg00fmm7g'. It shows the IP address 192.168.0.28, memory usage at 3.49% (139.7MiB / 3.906GiB), and CPU usage at 0.47%. Below this, there are buttons for 'DELETE' and 'EDITOR'. The terminal window shows the following commands and output:

```
##### WARNING!!!! #####
# This is a sandbox environment. Using personal credentials #
# is strictly discouraged. Any consequences of doing so are #
# completely the user's responsibility. #
# The FWD team. #
#####
[rodel] (local) root@192.168.0.28 ~
$ docker pull ubuntu
Using default tag: latest
latest: Pulling from library/ubuntu
e9ae077aa567: Pull complete
Digest: sha256:4b1d0cfa2d2aef63b3711f34eb9fa89fabf53dd6fca954d47c9ebca4005c2
Status: Downloaded newer image for ubuntu:latest
[rodel] (local) root@192.168.0.28 ~
$ docker image list
REPOSITORY    TAG       IMAGE ID       CREATED        SIZE
ubuntu        latest    a8780b506fa4   25 hours ago   77.8MB
[rodel] (local) root@192.168.0.28 ~
$ docker run -it ubuntu bash
root@85c5ae4505bd:/# hostname
85c5ae4505bd
root@85c5ae4505bd:/# exit
exit
[rodel] (local) root@192.168.0.28 ~
$
```

Question-2:

Create a docker file for the job portal application and deploy it in docker desktop application

Dockerfile:

```
Dockerfile
1 FROM python
2 WORKDIR /jobportalapp
3 COPY . .
4 RUN pip install -r requirements.txt
5 CMD ["python", "app.py"]
6 EXPOSE 5000
```

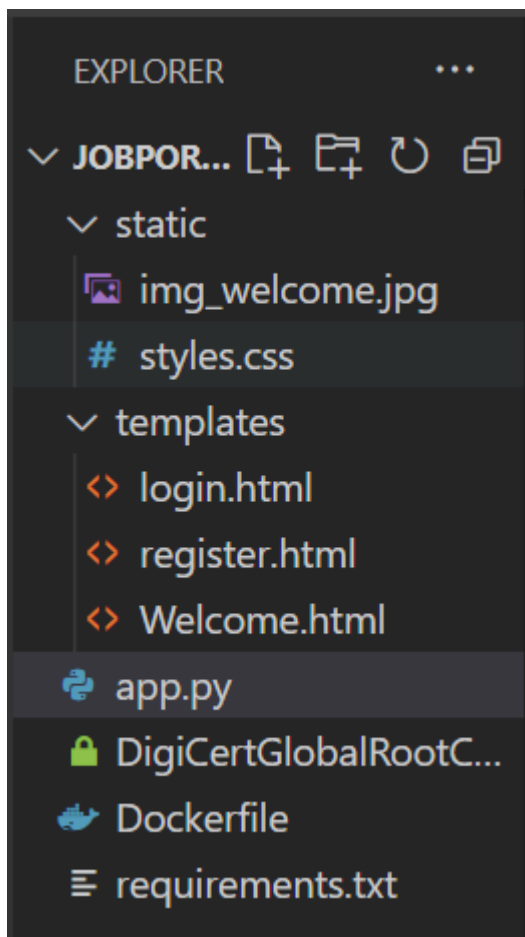
Requirements.txt:

```
requirements.txt
1 flask
2 ibm_db
```

App.py:

```
app.py > ...
45         flash("Wrong Username or Password")
46         return render_template('login.html')
47     else:
48         return render_template('login.html')
49
50
51 if __name__ == '__main__':
52     app.config['SECRET_KEY'] = 'super secret key'
53     app.config['SESSION_TYPE'] = 'filesystem'
54     port = int(os.environ.get('PORT', 5000))
55     app.run(port=port, host='0.0.0.0')
56
```

File structure:



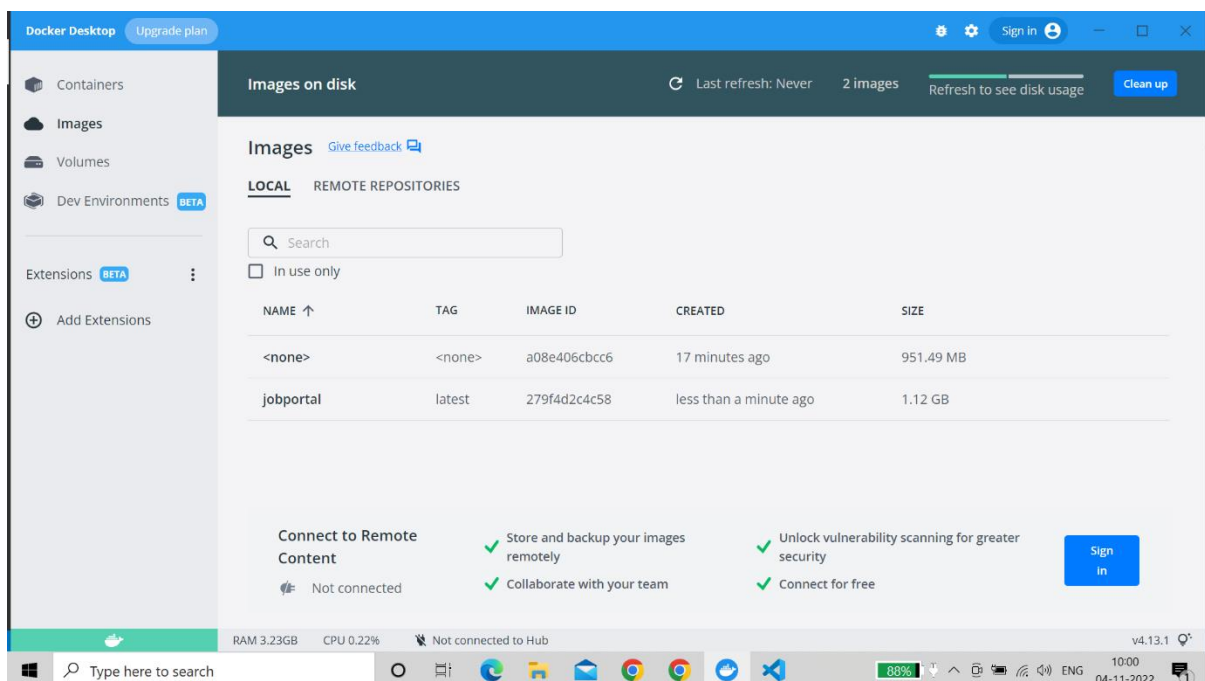
Building a docker image:

```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL JUPYTER
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Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\My documents\Sem 7\IBM project\Assignments\jobportalapp> docker build -t jobportal . --no-cache
[+] Building 133.8s (9/9) FINISHED
=> [internal] load build definition from Dockerfile                                0.1s
=> => transferring dockerfile: 156B                                              0.0s
=> [internal] load .dockerignore                                                  0.0s
=> => transferring context: 2B                                                  0.0s
=> [internal] load metadata for docker.io/library/python:latest                 2.8s
=> [internal] load build context                                                  0.4s
=> => transferring context: 3.33kB                                              0.4s
=> CACHED [1/4] FROM docker.io/library/python@sha256:fc809ada71c087cec7e2d2244bcb9fba137638978a669f2aaf6267db43e89fdf 0.0s
=> [2/4] WORKDIR /jobportalapp                                                  0.1s
=> [3/4] COPY . .                                                                0.1s
=> [4/4] RUN pip install -r requirements.txt                                    129.2s
=> exporting to image                                                            1.3s
=> => exporting layers                                                            1.2s
=> => writing image sha256:279f4d2c4c587c7aaf0eca40322f8ec51ed5530e41fb0bc00e54235b671bd1e0 0.0s
=> => naming to docker.io/library/jobportal                                     0.0s

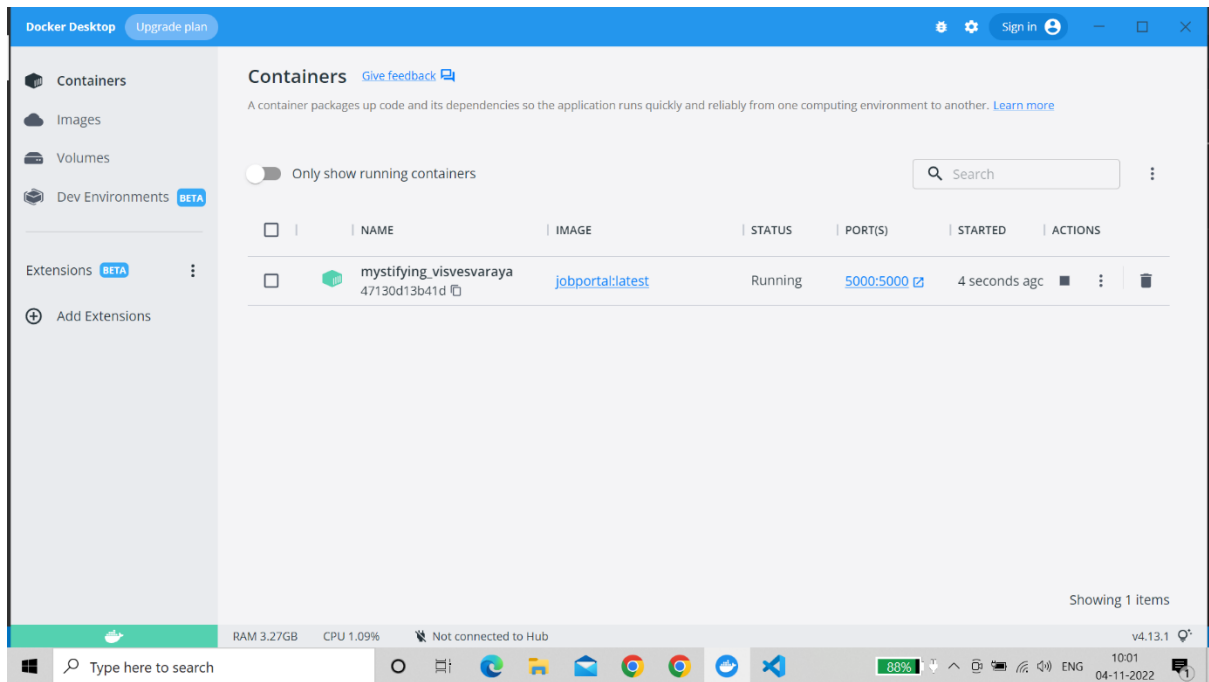
Use 'docker scan' to run Snyk tests against images to find vulnerabilities and learn how to fix them
PS D:\My documents\Sem 7\IBM project\Assignments\jobportalapp>
```



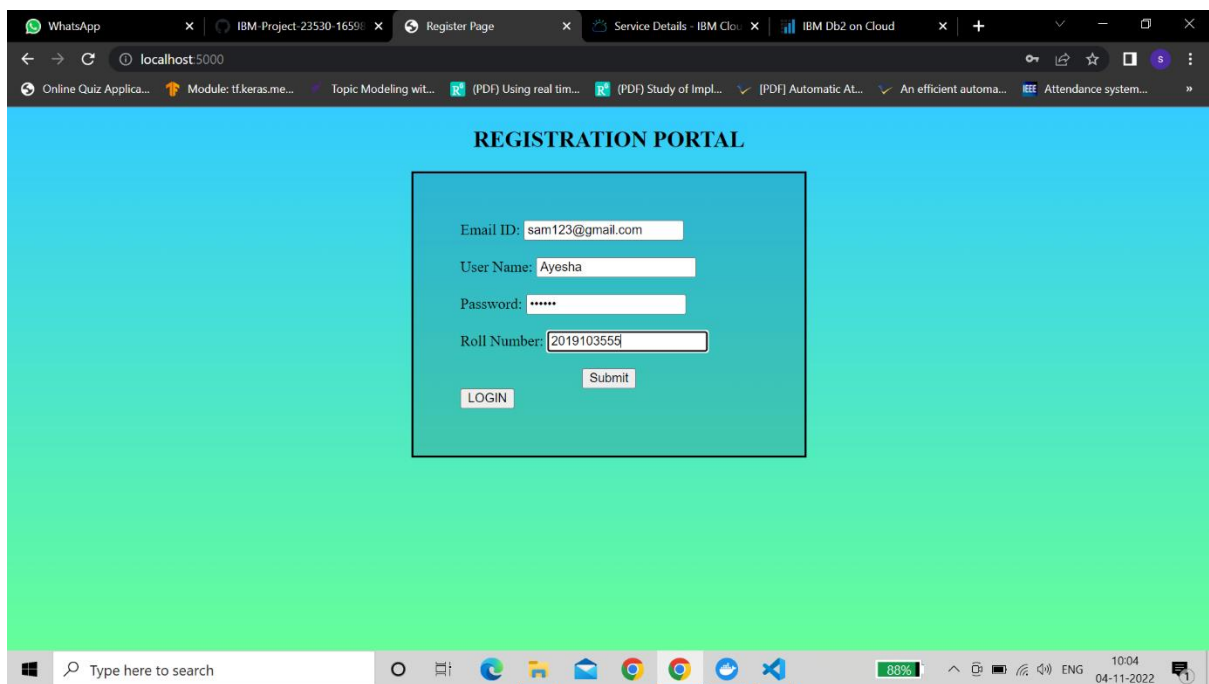
Run the image:

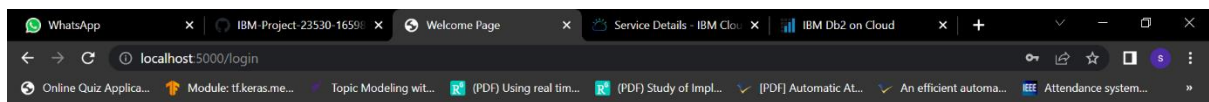
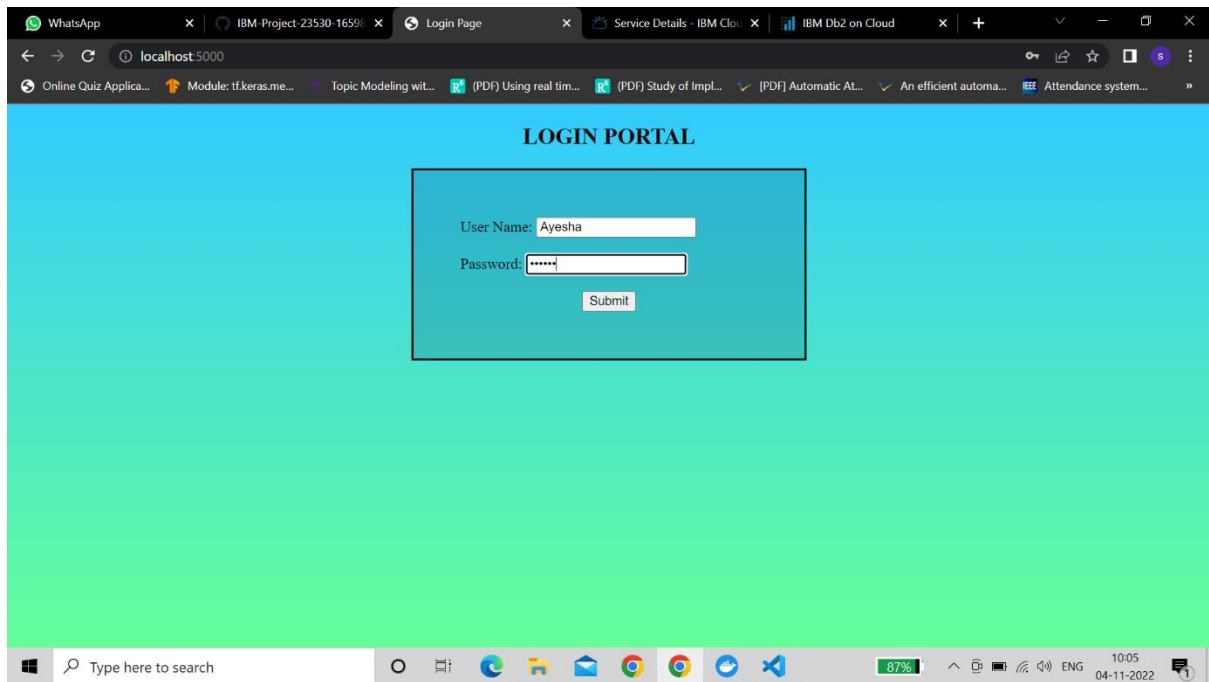
```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL JUPYTER
=> [internal] load .dockerignore                                0.0s
=> => transferring context: 2B                                  0.0s
=> [internal] load metadata for docker.io/library/python:latest 2.8s
=> [internal] load build context                                0.4s
=> => transferring context: 3.33kB                              0.4s
=> CACHED [1/4] FROM docker.io/library/python@sha256:fc809ada71c087cec7e2d2244bcb9fba137638978a669f2aaf6267db43e89fdf 0.0s
=> [2/4] WORKDIR /jobportalapp                                0.1s
=> [3/4] COPY . .                                             0.1s
=> [4/4] RUN pip install -r requirements.txt                  129.2s
=> exporting to image                                         1.3s
=> => exporting layers                                         1.2s
=> => writing image sha256:279f4d2c4c587c7aaf0eca40322f8ec51ed5530e41fb0bc00e54235b671bd1e0 0.0s
=> => naming to docker.io/library/jobportal                   0.0s

Use 'docker scan' to run Snyk tests against images to find vulnerabilities and learn how to fix them
PS D:\My documents\Sem 7\IBM project\Assignments\jobportalapp> docker run -p 5000:5000 jobportal
* Serving Flask app 'app'
* Debug mode: off
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
* Running on all addresses (0.0.0.0)
* Running on http://127.0.0.1:5000
* Running on http://172.17.0.2:5000
Press CTRL+C to quit
```



Output:



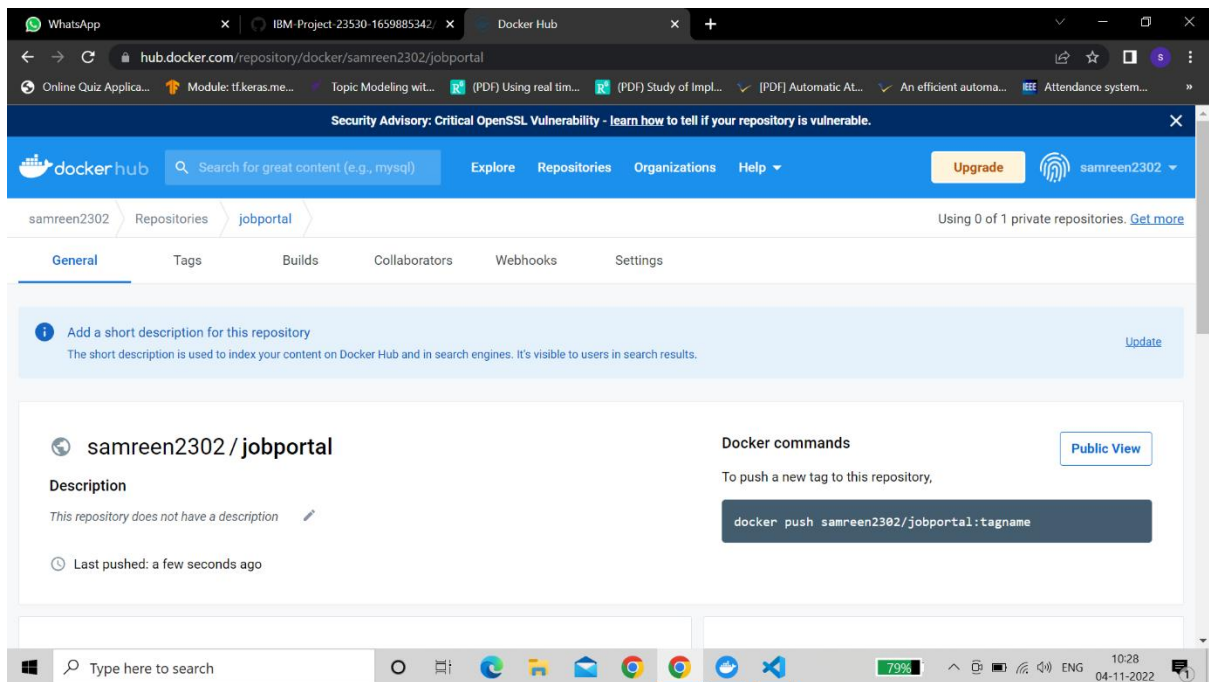


Authentication Successful



```
PS D:\My documents\Sem 7\IBM project\Assignments\jobportalapp> docker run -p 5000:5000 jobportal
* Serving Flask app 'app'
* Debug mode: off
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
* Running on all addresses (0.0.0.0)
* Running on http://127.0.0.1:5000
* Running on http://172.17.0.2:5000
Press CTRL+C to quit
172.17.0.1 - - [04/Nov/2022 04:31:29] "GET / HTTP/1.1" 200 -
172.17.0.1 - - [04/Nov/2022 04:31:30] "GET /static/styles.css HTTP/1.1" 200 -
172.17.0.1 - - [04/Nov/2022 04:34:24] "POST / HTTP/1.1" 200 -
172.17.0.1 - - [04/Nov/2022 04:34:24] "GET /static/styles.css HTTP/1.1" 304 -
172.17.0.1 - - [04/Nov/2022 04:35:30] "POST /login HTTP/1.1" 200 -
172.17.0.1 - - [04/Nov/2022 04:35:30] "GET /static/img_welcome.jpg HTTP/1.1" 200 -
PS D:\My documents\Sem 7\IBM project\Assignments\jobportalapp>
```

```
PS D:\My documents\Sem 7\IBM project\Assignments\jobportalapp> docker push samreen2302/jobportal
Using default tag: latest
The push refers to repository [docker.io/samreen2302/jobportal]
9e878ba0da9e: Pushed
9de1cc2f8495: Pushed
ea6713f6c621: Pushed
6f6e69c2c592: Mounted from library/python
53b8bfee7a0a: Mounted from library/python
5b3f1ed98915: Mounted from library/python
6b183c62e3d7: Mounted from library/python
882fd36bf35: Mounted from library/python
d1dec9017839: Mounted from library/python
d38adf39e1dd: Mounted from library/python
4ed121b04368: Mounted from library/python
d9d07d703dd5: Mounted from library/python
latest: digest: sha256:2f97426e34062f85d3cf1b64ef092092255581c7d4dc06b4b9f3e8f7879e7745 size: 2847
PS D:\My documents\Sem 7\IBM project\Assignments\jobportalapp>
```



Question-3

Create an IBM container registry and deploy helloworld or jobportal app

Log into ibm cloud using ibm cloud CLI

```

C:\Users\Samreen>ibmcloud login -a https://cloud.ibm.com
API endpoint: https://cloud.ibm.com

Email> 2019103055@student.annauniv.edu

Password>
Authenticating...
OK

Targeted account Samreen Ayesha's Account (1916f372177142bab6a8e385aea32b9a)

Select a region (or press enter to skip):
1. au-syd
2. in-che
3. jp-osa
4. jp-tok
5. kr-seo
6. eu-de
7. eu-gb
8. ca-tor
9. us-south
10. us-east
11. br-sao
Enter a number> 9
Targeted region us-south

API endpoint: https://cloud.ibm.com
Region: us-south
User: 2019103055@student.annauniv.edu
Account: Samreen Ayesha's Account (1916f372177142bab6a8e385aea32b9a)
Resource group: No resource group targeted, use 'ibmcloud target -g RESOURCE_GROUP'
CF API endpoint:
Org:
Space:

C:\Users\Samreen>

```

Install the container-registry plugin and set region

```

C:\Users\Samreen>ibmcloud plugin install container-registry
Looking up 'container-registry' from repository 'IBM Cloud'...
Plug-in 'container-registry[cr] 1.0.2' found in repository 'IBM Cloud'
Attempting to download the binary file...
 11.90 MiB / 11.90 MiB [=====] 100.00% 0s
12476416 bytes downloaded
Installing binary...
OK
Plug-in 'container-registry 1.0.2' was successfully installed into C:\Users\Samreen\bluemix\plugins\container-registry. Use 'ibmcloud plugin show container-registry' to view its details.

C:\Users\Samreen>ibmcloud cr region-set us-south
The region is set to 'us-south', the registry is 'us.icr.io'.

OK

C:\Users\Samreen>

```

Add a namespace

```

C:\Users\Samreen>ibmcloud cr namespace-add sam-ns-1
No resource group is targeted. Therefore, the default resource group for the account ('Default') is targeted.

Adding namespace 'sam-ns-1' in resource group 'Default' for account Samreen Ayesha's Account in registry us.icr.io...

Successfully added namespace 'sam-ns-1'

OK

C:\Users\Samreen>

```

```

C:\Users\Samreen>ibmcloud cr namespace-list
Listing namespaces for account 'Samreen Ayesha's Account' in registry 'us.icr.io'...

Namespace
sam-ns-1

OK

C:\Users\Samreen>

```

Log the local docker daemon into IBM cloud container registry and give repository name and tag


```
C:\Users\Samreen>ibmcloud cr login
Logging 'docker' in to 'us.icr.io'...
Logged in to 'us.icr.io'.

OK

C:\Users\Samreen>docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
jobportal            latest             279f4d2c4c58       About an hour ago   1.12GB
samreen2302/jobportal latest             279f4d2c4c58       About an hour ago   1.12GB
<none>              <none>            a08e406cbcc6       About an hour ago   951MB

C:\Users\Samreen>docker tag jobportal us.icr.io/sam-ns-1/sam-repo-1:jobportal

C:\Users\Samreen>docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
samreen2302/jobportal latest             279f4d2c4c58       About an hour ago   1.12GB
us.icr.io/sam-ns-1/sam-repo-1 jobportal          279f4d2c4c58       About an hour ago   1.12GB
jobportal            latest             279f4d2c4c58       About an hour ago   1.12GB
<none>              <none>            a08e406cbcc6       About an hour ago   951MB

C:\Users\Samreen>
```

Push the image and check if it is available in the container registry's images list

```
C:\Users\Samreen>docker push us.icr.io/sam-ns-1/sam-repo-1:jobportal
The push refers to repository [us.icr.io/sam-ns-1/sam-repo-1]
9e878ba0da9e: Pushed
9de1cc2f8495: Pushed
ea6713f6c621: Pushed
6f6e69c2c592: Pushed
53b8bfee7a0a: Pushed
5b3f1ed98915: Pushed
6b183c62e3d7: Pushed
882fd36bfd35: Pushed
d1dec9917839: Pushed
d38ad939e1dd: Pushed
4ed121b04368: Pushed
d9d07d703dd5: Pushed
jobportal1: digest: sha256:2f97426e34062f85d3cf1b64ef092092255581c7d4dc06b4b9f3e8f7879e7745 size: 2847

C:\Users\Samreen>ibmcloud cr image-list
Listing images...

Repository          Tag                 Digest              Namespace   Created    Size    Security status
us.icr.io/sam-ns-1/sam-repo-1 jobportal          2f97426e3406       sam-ns-1   1 hour ago  449 MB  -

OK

C:\Users\Samreen>
```

The screenshot shows the IBM Cloud Container Registry interface. On the left, the 'Container Registry' menu is open, and 'Images' is selected. The main panel displays the 'Images' page for the namespace 'sam-ns-1'. The location is set to 'Dallas'. A table lists the images, showing the repository 'sam-ns-1/sam-repo-1', the digest 'sha256:2f97426e3406...', the tag 'jobportal', the manifest type 'Docker', the creation time '1 hour ago', the size '449 MB', and the security status '4 issues'. The 'Create' button is visible in the top right corner of the table area.

Question-4

Create a Kubernetes cluster in IBM cloud and deploy helloworld or jobportal image and also expose the same app to run on nodeport

Create a new cluster

IBM Cloud Search resources and products... Catalog Manage Samreen Aysha's Account

Clusters / mycluster-free Normal Expires in 30 days Add tags

Overview Worker nodes Worker pools DevOps New

Expires in 30 days: Be sure to back up your data, your cluster will be deleted in 30 days. To access the full capabilities of the service, try out a standard cluster.

Node status: 1 of 1 Normal Details

Add-on status: 0 of 0 Normal Details

Master status: Normal Docs

Ingress status: Unknown Docs

Details

Cluster ID: cd1b44e89ggo432jtug

Version: 1.24.7_1542

Infrastructure: Classic

Zones: Milan 01

Created: 11/4/2022, 12:26 PM

Resource group: Default

Image security enforcement: Enable

Node health 1 total nodes

1 Critical 0% 0 Warning 0% 1 Normal 100% 0 Pending 0%

Worker node details

IBM Cloud Search resources and products... Catalog Manage Samreen Aysha's Account

Clusters / mycluster-free Normal Expires in 30 days Add tags

Overview Worker nodes Worker pools DevOps New

Pool: Filter... Search Add

Name	Status	Worker pool	Zone	Private IP	Public IP	Version
0000006f	Normal - Soft reboot request successful	default	Milan 01	10.144.194.236	169.51.204.44	1.24.6_1541

Items per page: 25 1-1 of 1 item 1 1 of 1 page

Access the Kubernetes dashboard and deploy the application image

kubernetes default Search

Create

Workloads Cron Jobs Daemon Sets Deployments Jobs Pods Replica Sets Replication Controllers Stateful Sets

Service Ingresses Ingress Classes Services

Config and Storage Config Maps Persistent Volume Claims Secrets Storage Classes

Cluster Cluster Role Bindings Cluster Roles

Create from input Create from file Create from form

App name * job-portal-app

Container image * samreen2302/jobportal:latest

Number of pods * 1

Service * External

Port * 5000 Target port * 500 Protocol * TCP

Port Target port Protocol * TCP

Namespace * default

Deploy Preview Cancel Show advanced options

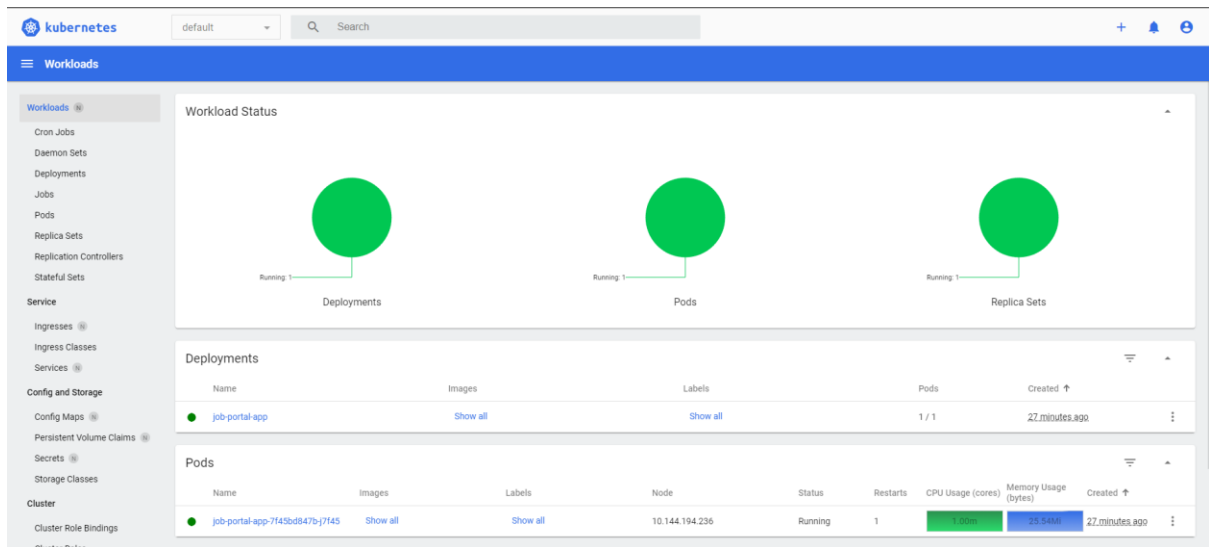
An 'app' label with this value will be added to the Deployment and Service that get deployed. [Learn more](#)

Enter the URL of a public image on any registry, or a private image hosted on Docker Hub or Google Container Registry. [Learn more](#)

A Deployment will be created to maintain the desired number of pods across your cluster. [Learn more](#)

Optionally, an internal or external Service can be defined to map an incoming Port to a target Port seen by the container. [Learn more](#)

Namespaces let you partition resources into logically named groups. [Learn more](#)



In services tab edit the YAML file of the jobportal application

Edit a resource

YAML

JSON

```
38   ports:
39     - name: tcp-5000-500-xpfbw
40       protocol: TCP
41       port: 5000
42       targetPort: 5000
43       nodePort: 31492
44   selector:
45     k8s-app: job-portal-app
46   clusterIP: 172.21.139.135
47   clusterIPs:
48     - 172.21.139.135
49   type: NodePort
50   sessionAffinity: None
51   externalTrafficPolicy: Cluster
52   ipFamilies:
53     - IPv4
54   ipFamilyPolicy: SingleStack
55   internalTrafficPolicy: Cluster
56   status:
57     loadBalancer: {}
58
```

i This action is equivalent to: `kubectl apply -f <spec.yaml>`

Update

Cancel

Name	Labels	Type	Cluster IP	Internal Endpoints	External Endpoints	Created
job-portal-app	Show all	NodePort	172.21.199.135	job-portal-app:5000 TCP job-portal-app:31492 TCP	-	27 minutes ago
kubernetes	Show all	ClusterIP	172.21.0.1	kubernetes:443 TCP kubernetes:0 TCP	-	80 hours ago

OUTPUT:

REGISTRATION PORTAL

Email ID:

User Name:

Password:

Roll Number:

DEPLOYED IP address: <http://169.51.204.44:31492/>