

# ASSIGNMENT-4

## Kubernetes / Docker

ASSIGNMENT DATE	25 OCTOBER 2022
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STUDENT ROLL NO	9517201903081
MAXIMUM MARKS	2 Marks

**Question1 Pull an Image from docker hub and run it in docker playground.**

The screenshot shows the Docker Playground interface in a web browser. The URL is [https://labs.play-with-docker.com/p/cdqvg5e0qau0009edheg#cdqvg5e0\\_cdqvgbe0qau0009edhf0](https://labs.play-with-docker.com/p/cdqvg5e0qau0009edheg#cdqvg5e0_cdqvgbe0qau0009edhf0). The interface includes a sidebar with a timer (03:58:05), a 'CLOSE SESSION' button, and a list of instances. The main panel shows the details of an instance named 'cdqvg5e0\_cdqvgbe0qau0009edhf0' with IP 192.168.0.28, 30.90% memory usage, and 0.31% CPU usage. Below this, there is a terminal window showing the command `docker pull lackhmi priya/imsr_projectdeploy` and its output, which lists the layers being pulled from the Docker Hub.

```
[model] (local) root@192.168.0.28 ~
$ docker pull lackhmi priya/imsr_projectdeploy
Using default tag: latest
latest: Pulling from lackhmi priya/imsr_projectdeploy
001c52e26ad5: Pull complete
d9d4b9b6e964: Pull complete
2068746827ec: Pull complete
9daef329d350: Pull complete
8a335986117b: Pull complete
588423e31bcf: Pull complete
ecb6a3f01c0d: Pull complete
00d40f20f0cf: Pull complete
5d588b4f3b55: Pull complete
ca54d9b5155c: Pull complete
9fe661488514: Pull complete
```

cdqvg5e0\_cdqvgbe0qau0009edhf0

IP

192.168.0.28

OPEN PORT

Memory

30.89% (1.207GiB / 3.906GiB)

CPU

0.18%

SSH

ssh ip172-18-0-95-cdqvg5e0qau0009edheg@direct.labs.pla



DELETE



EDITOR

```
5d588b4f3b55: Pull complete
ca54d9b5155c: Pull complete
9fe661488514: Pull complete
f6fc4f9725f4: Pull complete
c8d3c8a0060c: Pull complete
7dc8e0a43ce2: Pull complete
Digest: sha256:23bb0601d8893c42dd4c0c7084d9e4e77e6c5c9016007f67211e38f04625be3c
Status: Downloaded newer image for lackhmipriya/imsr_projectdeploy:latest
docker.io/lackhmipriya/imsr_projectdeploy:latest
[node1] (local) root@192.168.0.28 ~
$ docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
lackhmipriya/imsr_projectdeploy  latest             6d667290ffeb       About an hour ago   1.1GB
[node1] (local) root@192.168.0.28 ~
$
```

Command Prompt - docker run -p 8080:5000 lackhmipriya/imsrprojectdeploy

```
service/kubernetes-dashboard created
secret/kubernetes-dashboard-certs created
secret/kubernetes-dashboard-csrf created
secret/kubernetes-dashboard-key-holder created
configmap/kubernetes-dashboard-settings created
role.rbac.authorization.k8s.io/kubernetes-dashboard created
clusterrole.rbac.authorization.k8s.io/kubernetes-dashboard configured
rolebinding.rbac.authorization.k8s.io/kubernetes-dashboard created
clusterrolebinding.rbac.authorization.k8s.io/kubernetes-dashboard configured
deployment.apps/kubernetes-dashboard created
service/dashboard-metrics-scraper created
deployment.apps/dashboard-metrics-scraper created

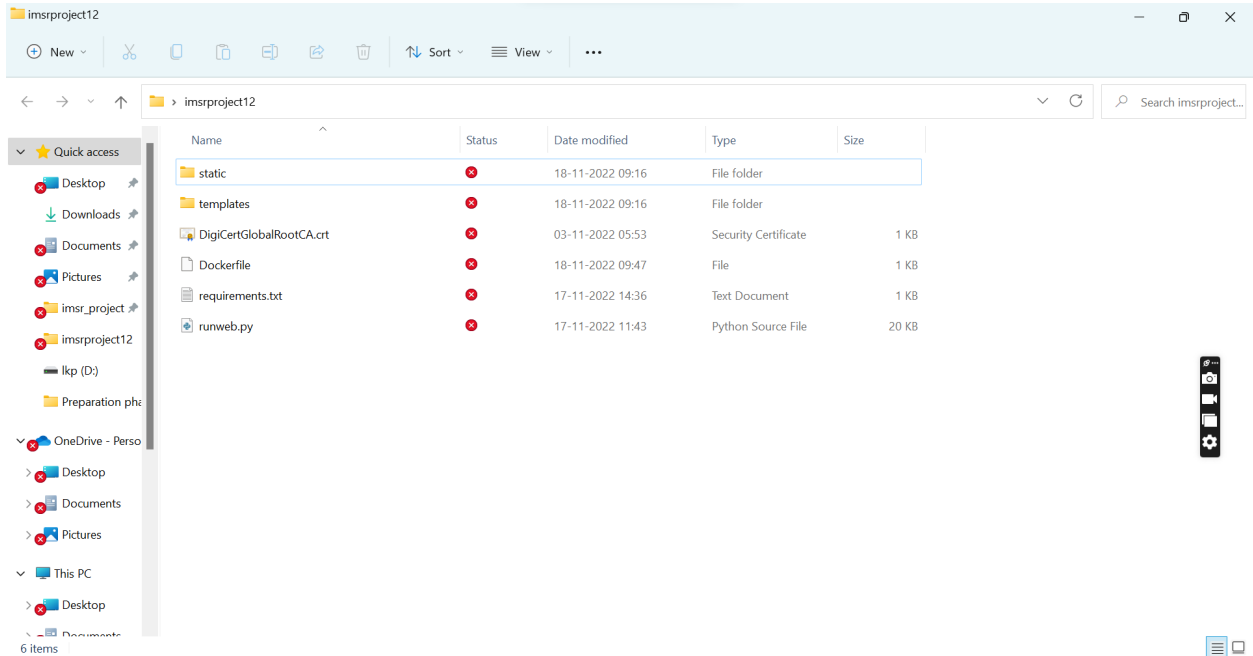
C:\Users\lackh\OneDrive\Desktop\imsr_project>
C:\Users\lackh\OneDrive\Desktop\imsr_project>kubect1 proxy
Starting to serve on 127.0.0.1:8081
^C
C:\Users\lackh\OneDrive\Desktop\imsr_project>kubect1 create -f imsrproject18119-deployment.yaml
error: the path "imsrproject18119-deployment.yaml" does not exist

C:\Users\lackh\OneDrive\Desktop\imsr_project>kubect1 create -f imsrproject18119.yaml
error: the path "imsrproject18119.yaml" does not exist

C:\Users\lackh\OneDrive\Desktop\imsr_project>kubect1 get pods
NAME                                READY    STATUS              RESTARTS   AGE
imsrproject-deployment-7df9649b7b-6rcnm    0/1     ImagePullBackOff    0           23m
imsrproject-deployment-7df9649b7b-b7xr5     0/1     ImagePullBackOff    0           9m14s
imsrproject18119-deployment-878fcf5cb-mbkv2  0/1     ImagePullBackOff    0           6m43s
imsrproject18119-deployment-878fcf5cb-prh4t  0/1     ImagePullBackOff    0           6m43s

C:\Users\lackh\OneDrive\Desktop\imsr_project>docker run -p 8080:5000 lackhmipriya/imsrprojectdeploy
* Serving Flask app 'runweb'
* Debug mode: on
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
* Running on http://127.0.0.1:5000
Press CTRL+C to quit
* Restarting with stat
* Debugger is active!
* Debugger PIN: 288-019-273
```

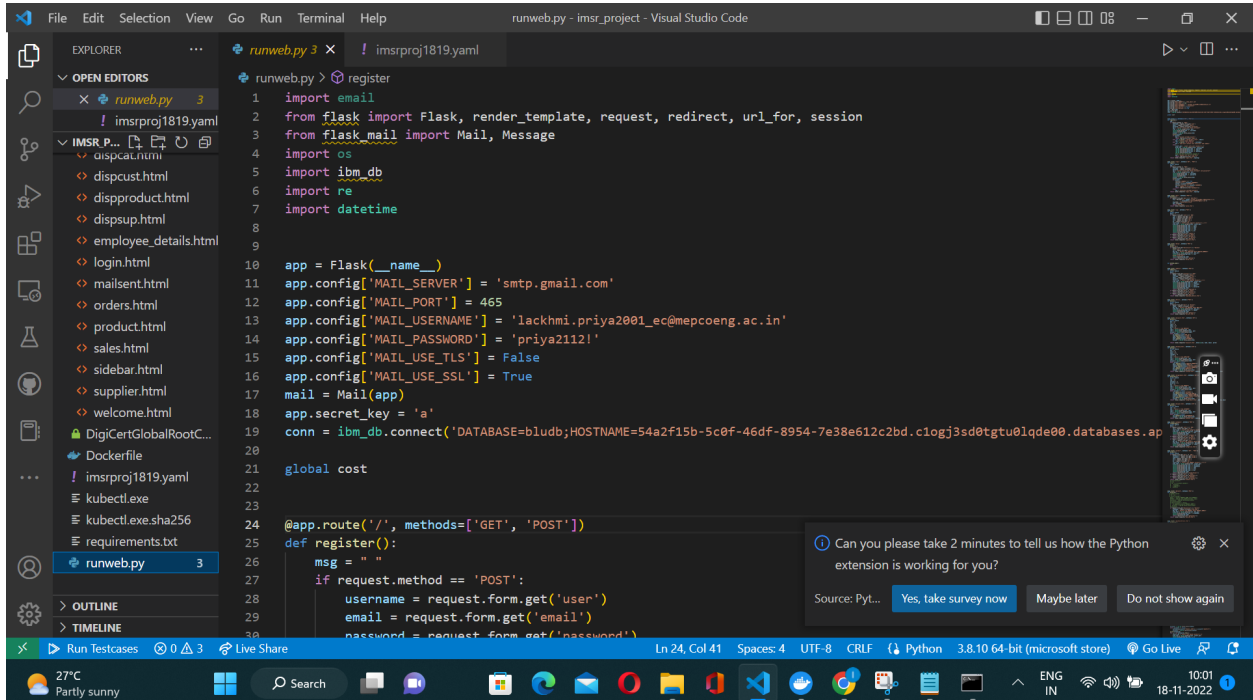
## 2. Create a docker file for the application and deploy it in the Docker desktop application.



The screenshot shows a Windows File Explorer window titled 'imsrproject12'. The left sidebar shows the 'Quick access' pane with 'imsrproject12' selected. The main pane displays a table of files and folders:

Name	Status	Date modified	Type	Size
static	✖	18-11-2022 09:16	File folder	
templates	✖	18-11-2022 09:16	File folder	
DigiCertGlobalRootCA.crt	✖	03-11-2022 05:53	Security Certificate	1 KB
Dockerfile	✖	18-11-2022 09:47	File	1 KB
requirements.txt	✖	17-11-2022 14:36	Text Document	1 KB
runweb.py	✖	17-11-2022 11:43	Python Source File	20 KB

The Windows taskbar at the bottom shows the system clock as 10:00 on 18-11-2022.

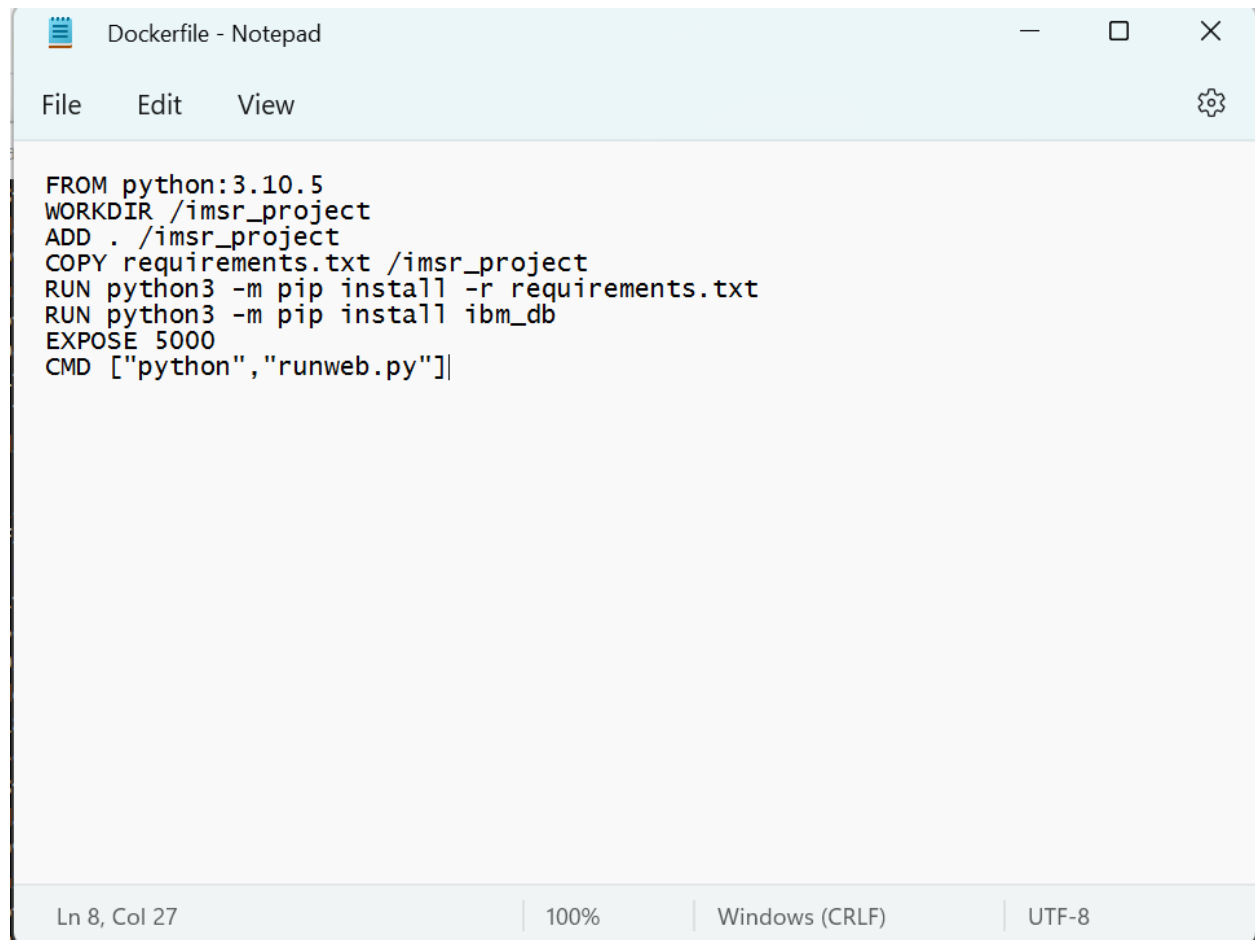


The screenshot shows the Visual Studio Code editor with the 'runweb.py' file open. The code is as follows:

```
1 import email
2 from flask import Flask, render_template, request, redirect, url_for, session
3 from flask_mail import Mail, Message
4 import os
5 import ibm_db
6 import re
7 import datetime
8
9
10 app = Flask(__name__)
11 app.config['MAIL_SERVER'] = 'smtp.gmail.com'
12 app.config['MAIL_PORT'] = 465
13 app.config['MAIL_USERNAME'] = 'lackhmi.priya2001_ec@mepcoeng.ac.in'
14 app.config['MAIL_PASSWORD'] = 'priya2112!'
15 app.config['MAIL_USE_TLS'] = False
16 app.config['MAIL_USE_SSL'] = True
17 mail = Mail(app)
18 app.secret_key = 'a'
19 conn = ibm_db.connect('DATABASE=bludb;HOSTNAME=54a2f15b-5c0f-46df-8954-7e38e612c2bd.c1ogj3sd0tgtu0lqde00.databases.ap
20
21 global cost
22
23
24 @app.route('/', methods=['GET', 'POST'])
25 def register():
26     msg = "
27     if request.method == 'POST':
28         username = request.form.get('user')
29         email = request.form.get('email')
30         password = request.form.get('password')
```

The Visual Studio Code status bar at the bottom shows the file is at line 24, column 41, with 4 spaces, UTF-8 encoding, and CRLF line endings. The Python version is 3.8.10 64-bit (microsoft store). The Windows taskbar at the bottom shows the system clock as 10:01 on 18-11-2022.

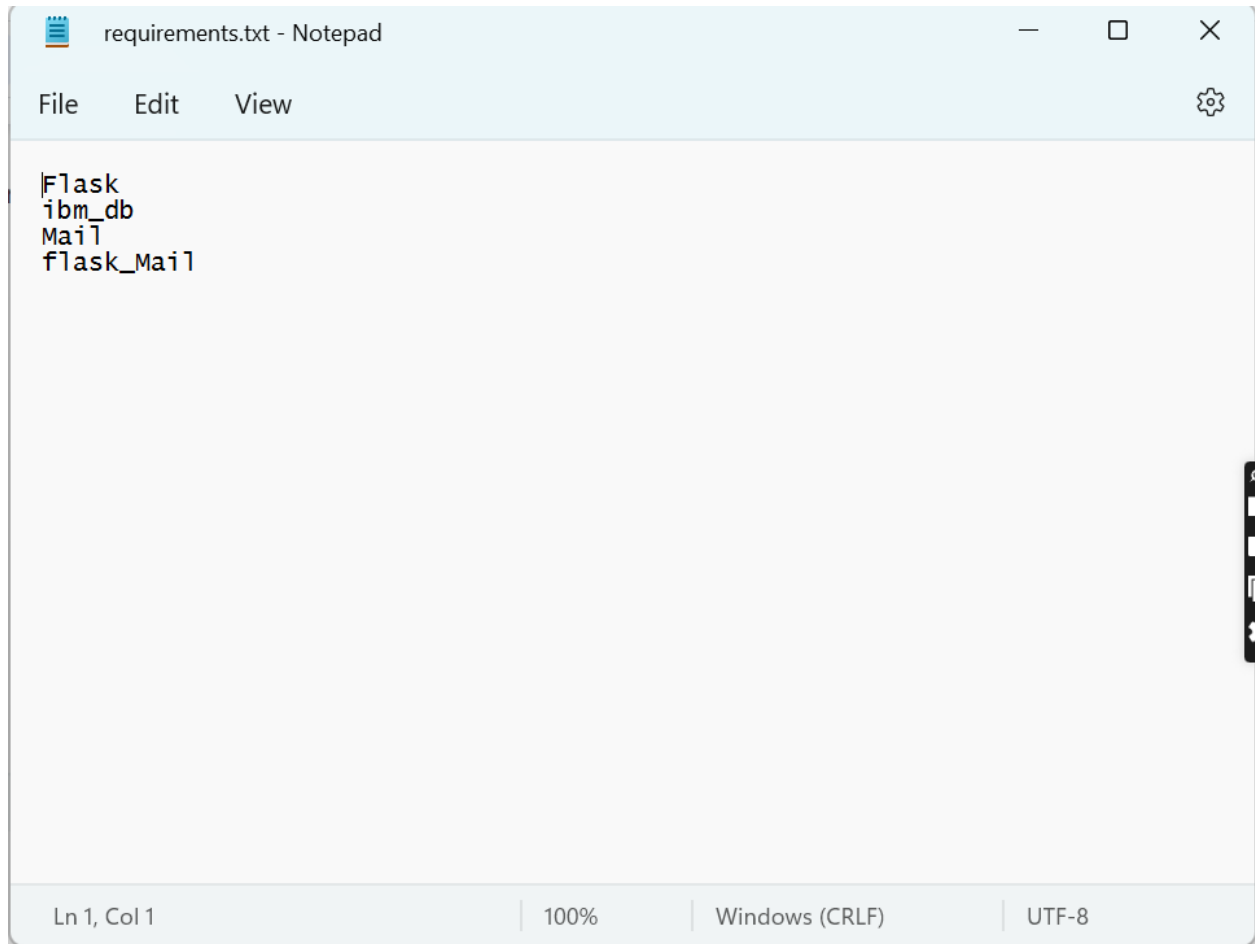
## Create a docker file



```
FROM python:3.10.5
WORKDIR /imsr_project
ADD . /imsr_project
COPY requirements.txt /imsr_project
RUN python3 -m pip install -r requirements.txt
RUN python3 -m pip install ibm_db
EXPOSE 5000
CMD ["python", "runweb.py"]
```

Ln 8, Col 27 | 100% | Windows (CRLF) | UTF-8

## Create a requirement file



```
requirements.txt - Notepad
File Edit View
Flask
ibm_db
Mail
flask_Mail
Ln 1, Col 1 | 100% | Windows (CRLF) | UTF-8
```

**Build the application**

**-> The commands are highlighted**

```
C:\Users\lackh>cd C:\Users\lackh\OneDrive\Desktop\imsrproject12

C:\Users\lackh\OneDrive\Desktop\imsrproject12>docker build -t imsrproject12 .
[+] Building 177.0s (12/12) FINISHED
=> [internal] load build definition from Dockerfile                                0.1s
=> => transferring dockerfile: 235B                                              0.0s
=> [internal] load .dockerignore                                                  0.0s
=> => transferring context: 2B                                                  0.0s
=> [internal] load metadata for docker.io/library/python:3.10.5                 2.9s
=> [auth] library/python:pull token for registry-1.docker.io                   0.0s
=> [1/6] FROM docker.io/library/python:3.10.5@sha256:febf94b56cef20a29427ff697bccbc659952f0b99eb8f3ba8296b8e51 0.0s
=> [internal] load build context                                                0.0s
=> => transferring context: 1.63kB                                              0.0s
=> CACHED [2/6] WORKDIR /app                                                    0.0s
=> [3/6] ADD . /app                                                            0.1s
=> [4/6] COPY requirements.txt /app                                            0.1s
=> [5/6] RUN python3 -m pip install -r requirements.txt                       169.1s
=> [6/6] RUN python3 -m pip install ibm_db                                    2.4s
=> exporting to image                                                            2.1s
=> => exporting layers                                                            2.1s
=> => writing image sha256:e57067a7258edcb857fd5396305a58262016ae1805eec0375aad73f4069b3a6 0.0s
=> => naming to docker.io/library/imsrproject12                                0.0s

Use 'docker scan' to run Snyk tests against images to find vulnerabilities and learn how to fix them

C:\Users\lackh\OneDrive\Desktop\imsrproject12>docker tag imsrproject12 lackhmiptiya/imsrproject18119final

C:\Users\lackh\OneDrive\Desktop\imsrproject12>docker push lackhmiptiya/imsrproject18119final
Using default tag: latest
The push refers to repository [docker.io/lackhmiptiya/imsrproject18119final]
aed444cc5133: Layer already exists
a9636a1e73dc: Layer already exists
0d367f38d54c: Layer already exists
d6b23a085084: Layer already exists
05ddb6a6a286d: Layer already exists
c4c2f1c63c2f: Layer already exists
4be7fe848f91: Layer already exists
```

k8s.gcr.io/pause	IN USE	3.8	4873874c08ef	5 months ago	711.18 KB
lackhmiptiya/docker_exp	IN USE	latest	a10b020dd682	19 days ago	1.12 GB
lackhmiptiya/imsr_proj...		latest	6d667290feb	about 21 hours ago	1.1 GB
lackhmiptiya/imsrproje...	IN USE	latest	48f4e7b0034d	34 minutes ago	1.1 GB
lackhmiptiya/imsrproje...	IN USE	latest	e57067a7258e	17 minutes ago	1.1 GB
lackhmiptiya/imsrproje...	IN USE	latest	7fe9f54d3001	about 19 hours ago	1.1 GB

Wasm is a fast, light alternative to Linux containers — try it out today in the Docker+Wasm Technical Preview

dockerhub

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lackhmiptiya

lackhmiptiya

Repositories

imsrproject18119final

Using 0 of 1 private repositories. [Get more](#)

General

Tags

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Pull command copied

docker pull lackhmiptiya/imsrpr...

TAG

latest

Last pushed 2 minutes ago by lackhmiptiya

DIGEST

202fe0cca8a2

OS/ARCH

linux/amd64

LAST PULL

---

COMPRESSED SIZE

422.81 MB

Sprint 4 (1).docx

inventory manag...pptx

Show all

## Question 3. Create an IBM container registry and deploy an app.

### IBM CLOUD CLI

#### 1) Login to IBM cloud CLI

```
Command Prompt
C:\Users\lackh\OneDrive\Desktop\imsr_project>ibmcloud login
API endpoint: https://cloud.ibm.com
Region: au-syd

Email> lackhmipriyagopal@gmail.com

Password>
Authenticating...
OK

Targeted account Lackhmi Priya Gopalakrishnan's Account (c8c352587f834445a5fd10e6e00e1efa)

API endpoint: https://cloud.ibm.com
Region: au-syd
User: lackhmipriyagopal@gmail.com
Account: Lackhmi Priya Gopalakrishnan's Account (c8c352587f834445a5fd10e6e00e1efa)
Resource group: No resource group targeted, use 'ibmcloud target -g RESOURCE_GROUP'
CF API endpoint:
Org:
Space:

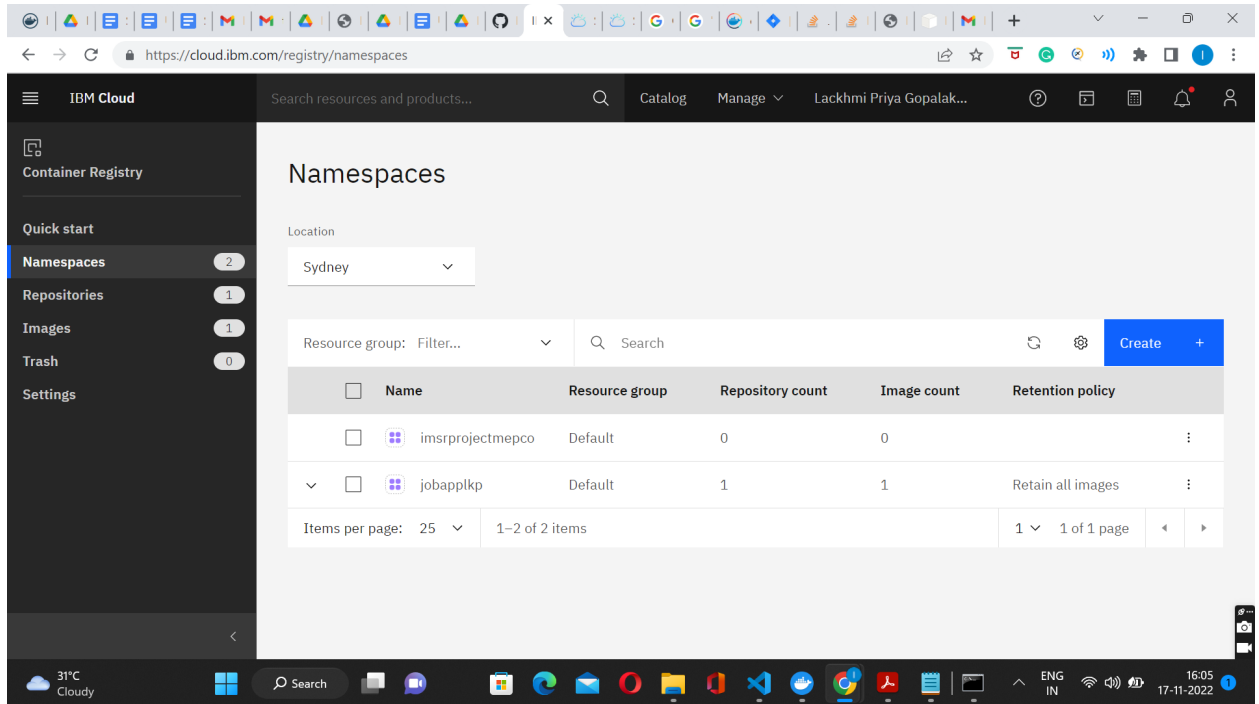
New version 2.12.1 is available.
Change logs: https://github.com/IBM-Cloud/ibm-cloud-cli-release/releases/tag/v2.12.1
TIP: use 'ibmcloud config --check-version=false' to disable update check.

Do you want to update? [y/N] > N

C:\Users\lackh\OneDrive\Desktop\imsr_project>ibmcloud plugin install container-service
Looking up 'container-service' from repository 'IBM Cloud'...
Plug-in 'container-service[kubernetes-service/ks] 1.0.459' found in repository 'IBM Cloud'
Attempting to download the binary file...
 26.86 MiB / 26.86 MiB [=====] 100.00% 4s
28168192 bytes downloaded
Installing binary...
OK
Plug-in 'container-service 1.0.459' was successfully installed into C:\Users\lackh\.bluemix\plugins\container-service. Use 'ibmcloud plugin show container-service' to show its details.

C:\Users\lackh\OneDrive\Desktop\imsr_project>
```

#### 2) Create a namespace in the IBM Container registry



#### 4) Log your local Docker daemon into the IBM Cloud Container Registry.

```
New version 2.12.1 is available.
Change logs: https://github.com/IBM-Cloud/ibm-cloud-cli-release/releases/tag/v2.12.1
TIP: use 'ibmcloud config --check-version=false' to disable update check.

Do you want to update? [y/N] > N

C:\Users\lackh\OneDrive\Desktop\imsr_project>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\lackh\OneDrive\Desktop\imsr_project>ibmcloud cr region-set ap-south
The region is set to 'ap-south', the registry is 'au.icr.io'.

OK

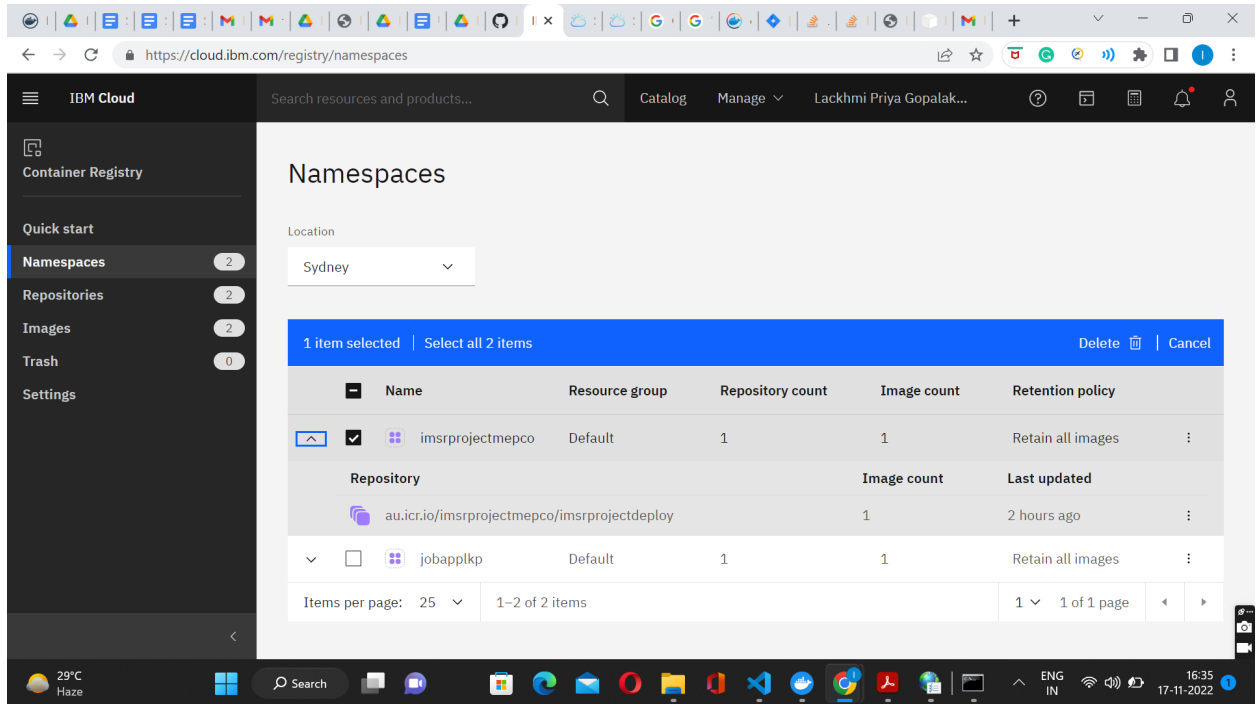
C:\Users\lackh\OneDrive\Desktop\imsr_project>ibmcloud cr login
Logging 'docker' in to 'au.icr.io'...
Logged in to 'au.icr.io'.

OK
```

#### 5) Pushing the project into IBM Container Registry.

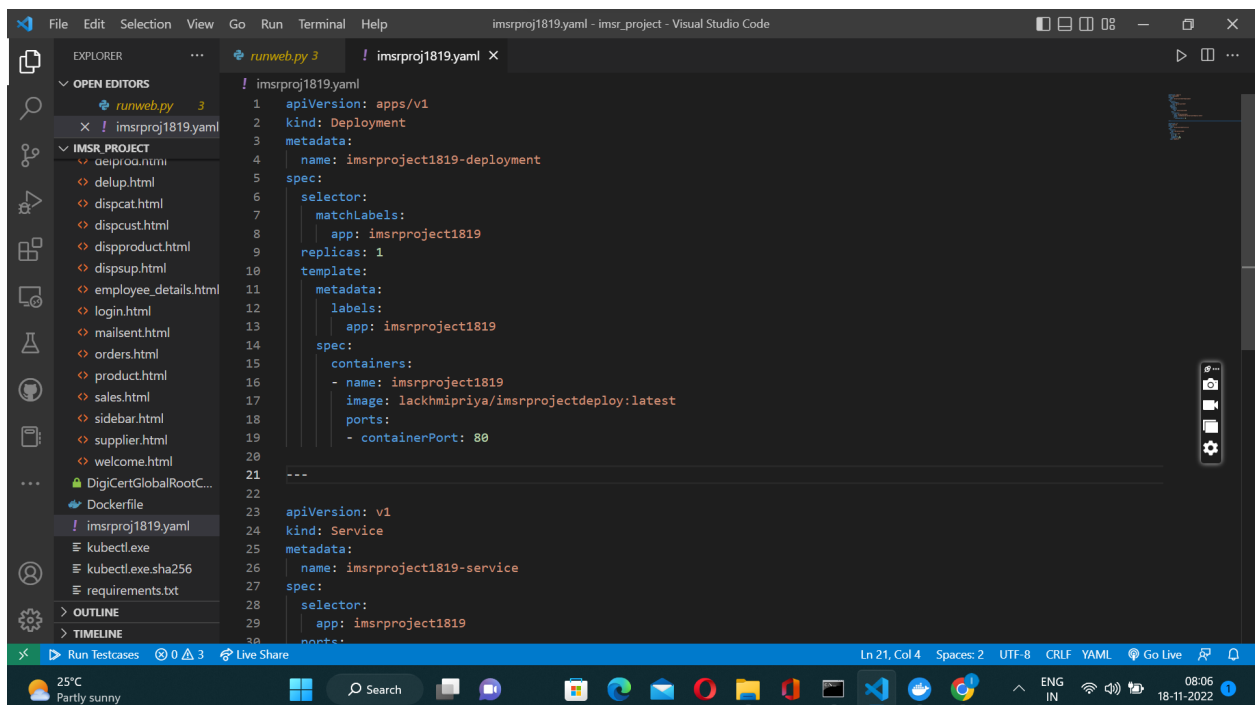






4. Create a Kubernetes cluster in IBM cloud and deploy image and also expose the same app to run in node port.

### 1) Created an YAML file



## 2)Deploy the YAML file in Kubernetes

```
C:\Users\lackh\OneDrive\Desktop\imsr_project>kubectl apply -f imsrproj1819.yaml
deployment.apps/imsrproject1819-deployment created

C:\Users\lackh\OneDrive\Desktop\imsr_project>kubectl apply -f imsrproj1819.yaml
deployment.apps/imsrproject1819-deployment unchanged
error: error validating "imsrproj1819.yaml": error validating data: ValidationError(Service.spec.ports[0]): unknown field "targetport" in io.k8s.api.core.v1.ServicePort; if you choose to ignore these errors, turn validation off with --validate=false

C:\Users\lackh\OneDrive\Desktop\imsr_project>kubectl apply -f imsrproj1819.yaml
deployment.apps/imsrproject1819-deployment unchanged
service/imsrproject1819-service created
```

https://cloud.ibm.com/kubernetes/clusters/cdr245cf064lmte1s260/nodes

IBM Cloud Search resources and products... Catalog Manage ▾ Lackhmi Priya Gopalak...

Clusters / mycluster-free Normal Expires in 29 days Add tags [Help](#) [Kubernetes dashboard](#) [Actions...](#)

Overview

**Worker nodes**

Worker pools

DevOps New

1 item selected								Reload	Reboot	Update	Delete	Cancel
<input checked="" type="checkbox"/>	Name	Status	Worker pool	Zone	Private IP	Public IP	Version					
<input checked="" type="checkbox"/>	000000038	<span>Normal</span>	default	Milan 01	10.144.186.26	159.122.177.25	1.24.7_1543					
ID kube-cdr245cf064lmte1s260-myclusterfr-default-000000038												
Status --		Flavor Free - 2 vCPUs 4GB RAM		Private VLAN 2218181		Public VLAN 2218179						

Items per page: 25 ▾ 1-1 of 1 item 1 ▾ 1 of 1 page ◀ ▶

25°C Partly sunny Search 08:10 18-11-2022

https://eu-de.containers.cloud.ibm.com/kubeproxy/clusters/cdr245cf064lnte1s260/service/#/pod/default/imsrproject1819-depl...

kubernetes default Search

Workloads > Pods > imsrproject1819-deployment-84848867d-fsqwn

Workloads (N)

- Cron Jobs
- Daemon Sets
- Deployments
- Jobs
- Pods**
- Replica Sets
- Replication Controllers
- Stateful Sets

Service

- Ingresses (N)
- Ingress Classes
- Services (N)

imsrproject1819

Image  
lackhmipriya/imsrprojectdeploy:latest

Status

Ready	Started	Started At
true	true	2022-11-18T01:30:43Z

Mounts

Name	Read Only	Mount Path	Sub Path	Source Type	Source
kube-api-access-qjhb...	true	/var/run/secrets/kubernetes.io/serviceaccount		Projected	-

25°C Partly sunny Search ENG IN 08:11 18-11-2022

## The deployed file is highlighted

kubernetes default Search

Workloads

Workloads (N)

- Workloads (N)**
- Cron Jobs
- Daemon Sets
- Deployments
- Jobs
- Pods
- Replica Sets
- Replication Controllers
- Stateful Sets

Service

- Ingresses (N)
- Ingress Classes
- Services (N)

Replica Sets

Deployments

Name	Images	Labels	Pods	Created
imsrproject1819-deployment	Show all	-	1 / 1	an
imsrproject18119-deployment	Show all	-	0 / 2	12
imsrproject-deployment	Show all	-	0 / 2	12

Pods

Name	Images	Labels	Node	Status	Restarts	CPU Usage (cores)	Memory Usage (bytes)
------	--------	--------	------	--------	----------	-------------------	----------------------

https://eu-de.containers.cloud.ibm.com/kubeproxy/clusters/cdr245cf064lmt1s260/service/#/workloads?namespace=default

kubernetes default Search

Workloads

imsrproject-deployment Show all 0 / 2 12

Pods

Name	Images	Labels	Node	Status	Restarts	CPU Usage (cores)	Memory Usage (bytes)
imsrproject1819-deployment-848488867d-fsqwn	Show all	Show all	10.144.186.26	Running	0	3.00m	59
imsrproject18119-deployment-878fcf5cb-mbkv2	Show all	Show all	10.144.186.26	ImagePullB 0	-	-	-
imsrproject18119-deployment-878fcf5cb-prh4t	Show all	Show all	10.144.186.26	ImagePullB 0	-	-	-
imsrproject-deployment-7df9649b7b-b7xr5	Show all	Show all	10.144.186.26	ImagePullB 0	-	-	-
imsrproject-deployment-7df9649b7b-6rcnm	Show all	Show all	10.144.186.26	ImagePullB 0	-	-	-

25°C Partly sunny Search 08:14 18-11-2022

Nodeport:31000  
Target port :80

https://eu-de.containers.cloud.ibm.com/kubeproxy/clusters/cdr245cf064lmt1s260/service/#/service?namespace=default

kubernetes default Search

Service > Services

Services

Name	Labels	Type	Cluster IP	Internal Endpoints	External Endpoints
imsrproject1819-service	-	NodePort	172.21.161.165	imsrproject1819-service:80 TCP imsrproject1819-service:31000 TCP	-
kubernetes	Show all	ClusterIP	172.21.0.1	kubernetes:443 TCP kubernetes:0 TCP	-

25°C Partly sunny Search 08:14 18-11-2022

### 3)View all the files deployed in Kubernetes

```
C:\Users\lackh\OneDrive\Desktop\imsr_project>kubectl get deployments
NAME                                READY    UP-TO-DATE    AVAILABLE    AGE
imsrproject-deployment              0/2      2              0            11h
imsrproject18119-deployment          0/2      2              0            11h
imsrproject1819-deployment           1/1      1              1            18m

C:\Users\lackh\OneDrive\Desktop\imsr_project>kubectl get pod -o wide
NAME                                READY    STATUS      RESTARTS   AGE    IP              NODE              NOMINATED NODE    READINESS GATES
imsrproject-deployment-7df9649b7b-6rcnm    0/1      ImagePullBackOff    0          11h    172.30.45.205   10.144.186.26    <none>             <none>
imsrproject-deployment-7df9649b7b-b7xr5     0/1      ImagePullBackOff    0          11h    172.30.45.207   10.144.186.26    <none>             <none>
imsrproject18119-deployment-878fcf5cb-mbkv2  0/1      ImagePullBackOff    0          11h    172.30.45.208   10.144.186.26    <none>             <none>
imsrproject18119-deployment-878fcf5cb-prh4t  0/1      ErrImagePull        0          11h    172.30.45.209   10.144.186.26    <none>             <none>
imsrproject1819-deployment-848488867d-fsqwn  1/1      Running            0          35m    172.30.45.210   10.144.186.26    <none>             <none>

C:\Users\lackh\OneDrive\Desktop\imsr_project>kubectl get service --all-namespaces
NAMESPACE    NAME                                TYPE    CLUSTER-IP    EXTERNAL-IP    PORT(S)    AGE
default      imsrproject1819-service            NodePort  172.21.161.165  <none>         80:31000/TCP  25m
default      kubernetes                         ClusterIP  172.21.0.1      <none>         443/TCP      14h
kube-system  calico-typha                       ClusterIP  172.21.148.38   <none>         5473/TCP     13h
kube-system  dashboard-metrics-scraper          ClusterIP  172.21.78.107   <none>         8000/TCP     13h
kube-system  ibm-k8s-controller-default-backend ClusterIP  172.21.245.51   <none>         80/TCP       13h
kube-system  kube-dns                           ClusterIP  172.21.0.10     <none>         53/UDP,53/TCP,9153/TCP  13h
kube-system  kubernetes-dashboard               ClusterIP  172.21.209.178   <none>         443/TCP      13h
kube-system  metrics-server                     ClusterIP  172.21.67.149    <none>         443/TCP      13h
kube-system  node-local-dns                     ClusterIP  172.21.81.212    <none>         53/UDP,53/TCP  13h
kubernetes-dashboard  dashboard-metrics-scraper          ClusterIP  172.21.219.150   <none>         8000/TCP     12h
```

```
C:\Users\lackh\OneDrive\Desktop\imsr_project>kubectl describe services imsrproject1819-service
Name:      imsrproject1819-service
Namespace: default
Labels:    <none>
Annotations: <none>
Selector:  app=imsrproject1819
Type:      NodePort
IP Family Policy: SingleStack
IP Families: IPv4
IP:        172.21.161.165
IPs:       172.21.161.165
Port:      <unset> 80/TCP
TargetPort: 80/TCP
NodePort:   <unset> 31000/TCP
Endpoints:  172.30.45.210:80
Session Affinity: None
External Traffic Policy: Cluster
Events:     <none>
```

### To access the web application deployed in Kubernetes

**http://<external-ip>:<port>**

**External ip :- 159.122.177.25**

**Port:31000**

**http://159.122.177.25:31000**

Hi | m | m | IB x

Dr | (1 | Se | G | Cl | H | 17 | G | A | B | Ex | G | B | Cr | A | Fi | +

← → ↻ https://cloud.ibm.com/kubernetes/clusters/cdr245cf064lnte1s260/nodes

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<input checked="" type="checkbox"/>	Name	Status	Worker pool	Zone	Private IP	Public IP	Version
<input checked="" type="checkbox"/>	000000038	<span>Normal</span>	default	Milan 01	10.144.186.26	159.122.177.25	1.24.7_1543
ID kube-cdr245cf064lnte1s260-myclusterfr-default-000000038							
Status --		Flavor Free - 2 vCPUs 4GB RAM		Private VLAN 2218181		Public VLAN 2218179	

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