

Name	Naveen M R
Roll No	SSNCE195001305
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Team ID	PNT2022TMID53149
Project Name	Project - Personal Expense Tracker

## Assignment - 4

### Kubernetes and Docker

#### Question

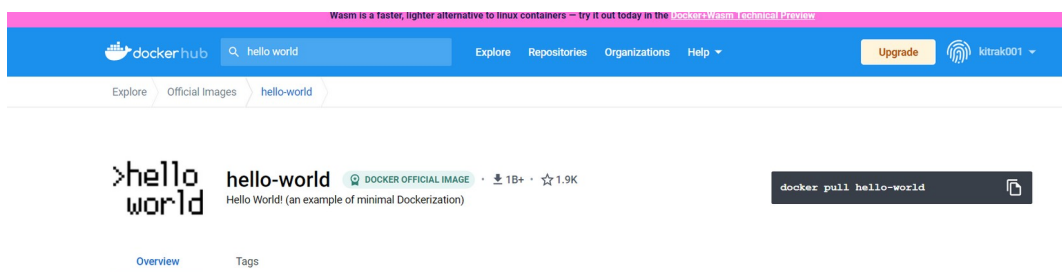
1. Pull an Image from docker hub and run it in Docker Playground
2. Create a docker file for the jobportal application and deploy it in Docker desktop application
3. Create a IBM container registry and deploy helloworld app or jobportal app
4. Create a Kubernetes cluster in IBM cloud and deploy helloworld image or jobportal image and also expose the same app to run in nodeport

#### Solutions

##### 1. Pull an Image from docker hub and run it in Docker Playground

- a. Pull an image *uifd/ui-for-docker* from the docker hub
- b. This image is used for viewing and managing the docker engine
- c. Use **docker pull image\_name** and **docker run -it image\_name** commands to run the above image in the Docker Playground

**hello-world - Official Image | Docker Hub**([https://hub.docker.com/\\_/hello-world](https://hub.docker.com/_/hello-world))



## Pull

03:35:56

CLOSE SESSION

Instances

+ ADD NEW INSTANCE

192.168.0.18  
node1

cdbm03e0\_cdbm05m0qau000es4mug

IP  
192.168.0.18

OPEN PORT

Memory CPU

SSH  
ssh ip172-18-0-198-cdbm03e0qau000es4mtg@direct.labs.p

DELETE EDITOR

```
[node1] (local) root@192.168.0.18 ~
$ docker pull hello-world
Using default tag: latest
latest: Pulling from library/hello-world
2db29710123e: Pull complete
Digest: sha256:18a657d0cc1c7d0678a3fba8b7eb4918bba25968d3e1b0adebfa71caddbc346
Status: Downloaded newer image for hello-world:latest
docker.io/library/hello-world:latest
[node1] (local) root@192.168.0.18 ~
$ docker run hello-world

Hello from Docker!
This message shows that your installation appears to be working correctly.

To generate this message, Docker took the following steps:
1. The Docker client contacted the Docker daemon.
2. The Docker daemon pulled the "hello-world" image from the Docker Hub.
   (amd64)
```

## Run

03:36:16

CLOSE SESSION

Instances

+ ADD NEW INSTANCE

192.168.0.18  
node1

cdbm03e0\_cdbm05m0qau000es4mug

IP  
192.168.0.18

OPEN PORT

Memory CPU

SSH  
ssh ip172-18-0-198-cdbm03e0qau000es4mtg@direct.labs.p

DELETE EDITOR

```
[node1] (local) root@192.168.0.18 ~
$ docker run hello-world

Hello from Docker!
This message shows that your installation appears to be working correctly.

To generate this message, Docker took the following steps:
1. The Docker client contacted the Docker daemon.
2. The Docker daemon pulled the "hello-world" image from the Docker Hub.
   (amd64)
3. The Docker daemon created a new container from that image which runs the
   executable that produces the output you are currently reading.
4. The Docker daemon streamed that output to the Docker client, which sent it
   to your terminal.

To try something more ambitious, you can run an Ubuntu container with:
$ docker run -it ubuntu bash

Share images, automate workflows, and more with a free Docker ID:
https://hub.docker.com/
```

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

- Create a docker file for build and deploy flask app.
- Use **docker build -t image\_name .** in the current directory to start building the docker image and deploy in our local docker
- Use **docker run -p 5000:5000 image\_name** to run in local system

### Dockerfile

```
FROM python

COPY ./requirements.txt /flaskApp/requirements.txt

WORKDIR /flaskApp

RUN pip install scipy
RUN pip install -r requirements.txt

COPY . /flaskApp

ENTRYPOINT [ "python" ]

CMD [ "app.py" ]
EXPOSE 5000
```

Steps:

```
(venv) D:\Projects\IBM_assignments\Assignment3>docker image build -t flask_docker .
[+] Building 62.9s (11/11) FINISHED
=> [internal] load build definition from Dockerfile
=> => transferring dockerfile: 32B
=> [internal] load .dockerignore
=> => transferring context: 2B
=> [internal] load metadata for docker.io/library/python:latest
=> CACHED [stage-1 1/6] FROM docker.io/library/python@sha256:03d1adc831e7ca7119666ce4825d91526a32c1323a2f6d69be6dcfbd3a50e111
=> [internal] load build context
=> => transferring context: 1.28kB
=> [stage-1 2/6] COPY ./requirements.txt /flaskApp/requirements.txt
=> [stage-1 3/6] WORKDIR /flaskApp
=> [stage-1 4/6] RUN pip install scipy
=> [stage-1 5/6] RUN pip install -r requirements.txt
=> [stage-1 6/6] COPY . /flaskApp
=> exporting to image
=> => exporting layers
```

```
(venv) D:\Projects\IBM_assignments\Assignment3>docker images
```

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
flask_docker	latest	568a320e1c73	47 seconds ago	1.47GB
sandeepdoodigani/jobportalapp	latest	c8641e59c3bd	3 months ago	1.08GB
tensorflow/tensorflow	latest-gpu-jupyter	5f9e07bacf1d	5 months ago	6.07GB
sandeepdoodigani/jobportal	latest	d0dab7559fe5	6 months ago	1.08GB
hello-world	latest	feb5d9fea6a5	13 months ago	13.3kB

```
(venv) D:\Projects\IBM_assignments\Assignment3>docker
```

```
(venv) D:\Projects\IBM_assignments\Assignment3>docker run -p 5000:5000 flask_docker
* Serving Flask app 'app'
* 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: 555-164-836
```

Run locally using docker

Register

×

+

←

→

↻

localhost:5000/register

Register Page

Email

Email

Please fill out this field.

Username

Username

Rollnumber

RollNumber

Password

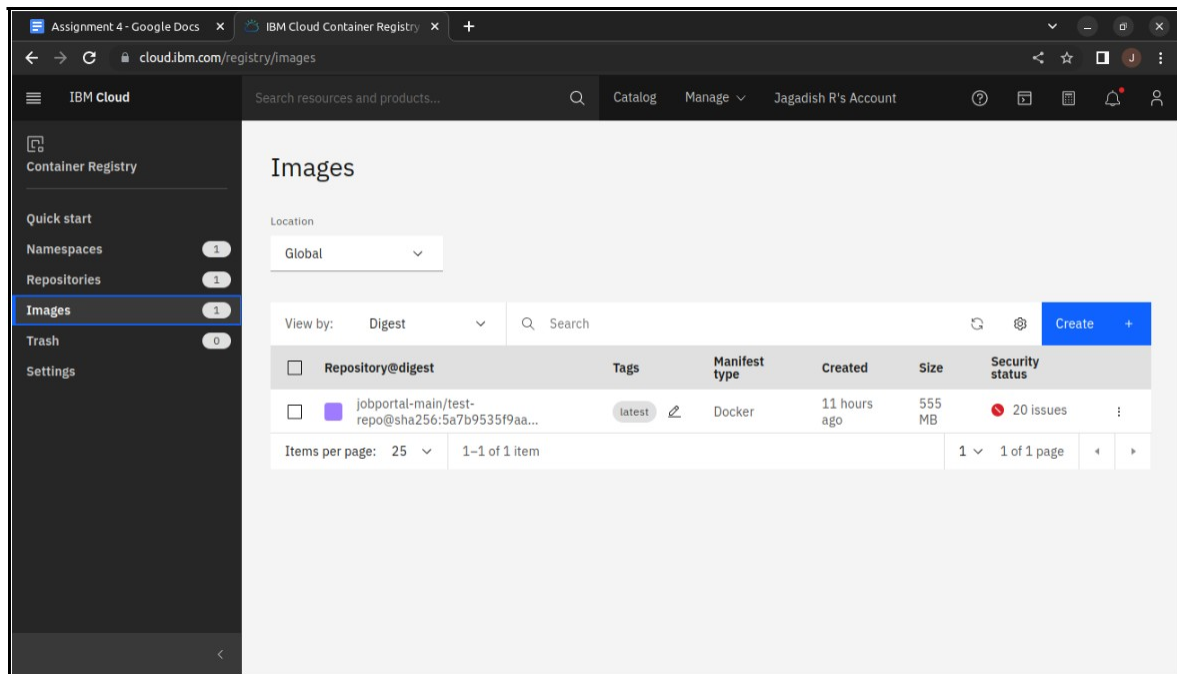
Password

Register

[Already have an account? Log In](#)

### 3. Create a IBM container registry and deploy helloworld app or jobportal app

- Log into IBM cloud
- Create a **container registry**
- Using IBM Cloud CLI, install the **container registry plugin** in our system
- Push our docker image into the created container registry using **docker push**
- So, our job portal app is deployed in the IBM container registry



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

- Log into IBM cloud
- Create a **kubernete**
- Using IBM Cloud CLI, install the **ks plugin** in our system
- Create a **cluster** in the kubernetes

- e. Now, go to the **kubernetes dashboard** where we need to create a service based on a yml file (given below)
- f. In that file, we have to mention *which image we are going to use* and the *app name*
- g. Take the **public IP address** and **Nodeport** since we exposed the *flask app in nodeport*
- h. Finally, we got the **url address** where our flask app is hosted

```
8. ca-tor
9. us-south
10. us-east
11. br-sao
Enter a number> 2
Targeted region in-che
```

```
API endpoint: https://cloud.ibm.com
Region: in-che
User: karthikraja19048@cse.ssn.edu.in
Account: Karthik Raja Anandan's Account (cf3187da5683419fbc644dedb6c35d4a)
Resource group: No resource group targeted, use 'ibmcloud target -g RESOURCE_GROUP'
CF API endpoint:
Org:
Space:
```

```
D:\Projects\IBM_assignments>
```

```
D:\Projects\IBM_assignments>ibmcloud login
API endpoint: https://cloud.ibm.com
```

```
Email> karthikraja19048@cse.ssn.edu.in
```

```
Password>
Authenticating...
OK
```

```
Targeted account Karthik Raja Anandan's Account (cf3187da5683419fbc644dedb6c35d4a)
```

```
Select a region (or press enter to skip):
```

- 1. au-syd
- 2. in-che
- 3. jp-osa

```
D:\Projects\IBM_assignments>ibmcloud plugin list
Listing installed plug-ins...
```

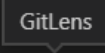
Plugin Name	Version	Status	Private endpoints supported
container-registry	1.0.2		true
observe-service[ob]	1.0.82		false

```
D:\Projects\IBM_assignments>
```

In 17

```
D:\Projects\IBM_assignments>ibmcloud ks
```

FAILED

'ks' is not a registered command. Check your  installed plug-ins. See 'ibmcloud help'.

```
D:\Projects\IBM_assignments>ibmcloud plugin install ks
```

Looking up 'ks' 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...

Plugin installation was canceled.

```
D:\Projects\IBM_assignments>ibmcloud cr namespace-add karthikibm
```

No resource group is targeted. Therefore, the default resource group for the account ('Default') is targeted.

Adding namespace 'karthikibm' in resource group 'Default' for account Karthik Raja Anandan's Account in registry icr.io...

Successfully added namespace 'karthikibm'

OK

```
D:\Projects\IBM_assignments>ibmcloud cr namespace-list -v
```

Listing namespaces for account 'Karthik Raja Anandan's Account' in registry 'icr.io'...

Namespace	Resource Group	Created
karthikibm	Default	46 seconds ago

OK

```
D:\Projects\IBM_assignments>docker tag flask_docker:latest job_portal:latest
```

```
D:\Projects\IBM_assignments>
```



```
D:\Projects\IBM_assignments>docker tag job_portal icr.io/karthikibm/job_portal:latest
```

```
D:\Projects\IBM_assignments>docker push icr.io/karthikibm/job_portal:latest
```

The push refers to repository [icr.io/karthikibm/job\_portal]

```
fa8bc0492236: Pushed
31f3c05b48a6: Pushed
94c3a9ca4264: Pushed
5f70bf18a086: Pushed
5e21a51c70c5: Pushed
3894db7b92b6: Pushed
df34520418a8: Pushed
e10dffc9c9bd: Pushed
0c7daf9a72c8: Pushed
75ba02937496: Pushing [=====>] 456.8MB/528.9MB
288cf3a46e32: Pushed
186da837555d: Pushed
955c9335e041: Pushed
8e079fee2186: Pushed
```

```
D:\Projects\IBM_assignments>docker tag job_portal icr.io/karthikibm/job_portal:latest
```

```
D:\Projects\IBM_assignments>docker push icr.io/karthikibm/job_portal:latest
```

The push refers to repository [icr.io/karthikibm/job\_portal]

```
fa8bc0492236: Pushed
31f3c05b48a6: Pushed
94c3a9ca4264: Pushed
5f70bf18a086: Pushed
5e21a51c70c5: Pushed
3894db7b92b6: Pushed
df34520418a8: Pushed
e10dffc9c9bd: Pushed
0c7daf9a72c8: Pushed
75ba02937496: Pushed
288cf3a46e32: Pushed
186da837555d: Pushed
955c9335e041: Pushed
8e079fee2186: Pushed
latest: digest: sha256:11f15b251724d066af433d65355467a872760175a2ce40df211aff7158da3955 size: 3265
```

```
D:\Projects\IBM_assignments>ibmcloud cr image-list
```

Listing images...

Repository	Tag	Digest	Namespace	Created	Size	Security status
icr.io/karthikibm/job_portal	latest	11f15b251724	karthikibm	56 minutes ago	584 MB	-

OK

```
D:\Projects\IBM_assignments>ibmcloud cr quota
```

Getting quotas and usage for the current month, for account 'Karthik Raja Anandan's Account'...

Quota	Limit	Used
Pull traffic	5.0 GB	0 B
Storage	512 MB	557 MB

Your account has exceeded its storage quota.

Review your storage quota in the preceding table, and use the 'ibmcloud cr plan' command to review your current pricing plan.

You can either delete some images, or modify your quota and plan settings.

If you want to modify your quota, run the 'ibmcloud cr quota-set' command. If you want to upgrade your plan, run the 'ibmcloud cr plan' command.

OK

## **job-portal-app.yml**

```
apiVersion: v1
kind: Service
metadata:
  name: job-portal-app
spec:
  selector:
    app: job-portal-app
  ports:
    - port: 5000
    type: NodePort
---
apiVersion: apps/v1
kind: Deployment
metadata:
  name: job-portal-app
  labels:
    app: job-portal-app
spec:
  selector:
    matchLabels:
      app: job-portal-app
  replicas: 1
  template:
    metadata:
      labels:
```

```
    app: job-portal-app
spec:
  containers:
  - name: job-portal-app
    image: image_name
    ports:
      - containerPort:
        5000 env:
      - name: DISABLE_WEB_APP
        value: "false"
```

## Cluster creation

```
D:\Projects\IBM_assignments>ibmcloud ks cluster config -c cdbndb0f0qs6d8luac40
OK
The configuration for cdbndb0f0qs6d8luac40 was downloaded successfully.

Added context for cdbndb0f0qs6d8luac40 to the current kubeconfig file.
You can now execute 'kubectl' commands against your cluster. For example, run 'kubectl get nodes'.
If you are accessing the cluster for the first time, 'kubectl' commands might fail for a few seconds while RBAC synchronizes.
```

Search resources and products... Catalog Manage Karthik Raja Anandan's...

### Kubernetes clusters

Resource group: Filter...		Location: Filter...		Search		Create cluster +	
Name	State	Location	Worker count	Created	Version	Infrastructure	
Karthik-free	Normal	Paris 01	1	Expires in 30 days	1.23.12_1546	Classic	
Items per page: 25		1-1 of 1 item				1  1 of 1 page	

## Configuring the cluster



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

cdbnb0f0qs6d8Luac40

Version

1.23.12\_1546

Infrastructure

Classic

Zones

Milan 01

Created

10/25/2022, 11:09 AM

Resource group

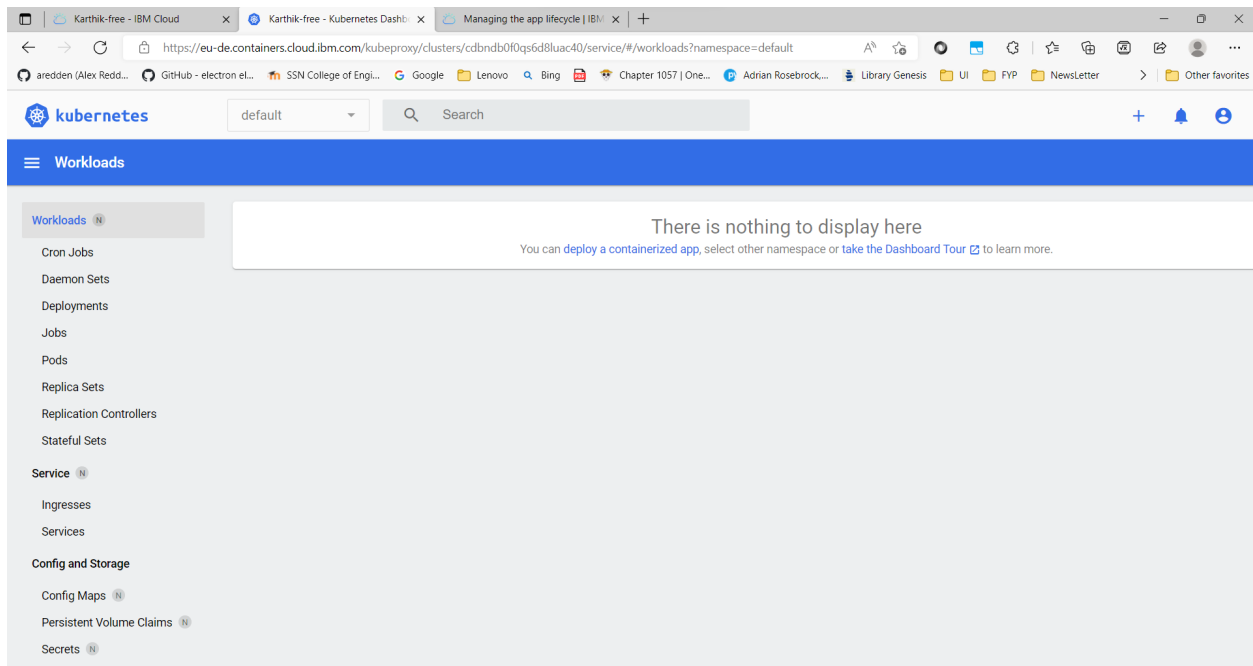
Default

Image security enforcement

Enable

Node health

[Worker node details](#)



```
D:\Projects\IBM_assignments>kubectl create deployment jobportal --image=icr.io/karthikibm/job_portal@sha256:11f15b251724d066af433d65355467a872760175a2ce40df211aff7158da3955
deployment.apps/jobportal created
```

```
D:\Projects\IBM_assignments>
```

```
jobportal 1/1 1 1 67s
```

```
D:\Projects\IBM_assignments>kubectl create deployment jobportal --image=icr.io/karthikibm/job_portal@sha256:11f15b251724d066af433d65355467a872760175a2ce40df211aff7158da3955
error: failed to create deployment: deployments.apps "jobportal" already exists
```

```
D:\Projects\IBM_assignments>kubectl get deployments
NAME          READY  UP-TO-DATE  AVAILABLE  AGE
jobportal     1/1    1           1          89s
```

```
D:\Projects\IBM_assignments>
```

```
jobportal 1/1 1 1 10m

D:\Projects\IBM_assignments>kubectl expose deployment/jobportal --type="NodePort" --port 8080
service/jobportal exposed

D:\Projects\IBM_assignments>kubectl get services
NAME         TYPE        CLUSTER-IP    EXTERNAL-IP    PORT(S)          AGE
jobportal    NodePort    172.21.163.50 <none>         8080:31355/TCP   18s
kubernetes  ClusterIP   172.21.0.1    <none>         443/TCP          138m

D:\Projects\IBM_assignments>kubectl describe services/jobportal
Name:         jobportal
Namespace:    default
Labels:       app=jobportal
Annotations:   <none>
Selector:     app=jobportal
Type:         NodePort
IP Family Policy: SingleStack
IP Families:  IPv4
IP:           172.21.163.50
IPs:          172.21.163.50
Port:         <unset> 8080/TCP
TargetPort:   8080/TCP
NodePort:     <unset> 31355/TCP
Endpoints:    172.30.209.139:8080
Session Affinity: None
External Traffic Policy: Cluster
Events:       <none>
```

## Procedure to find the exposed url

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  GITLENS
D:\Projects\IBM_assignments>kubectl expose deployment/jobportal --type="NodePort" --port 5000 service/jobportal
service/jobportal exposed
Name:         jobportal
Namespace:    default
Labels:       app=jobportal
Annotations:   <none>
Selector:     app=jobportal
Type:         NodePort
IP Family Policy: SingleStack
IP Families:  IPv4
IP:           172.21.143.58
IPs:          172.21.143.58
Port:         <unset> 5000/TCP
TargetPort:   5000/TCP
NodePort:     <unset> 30551/TCP
Endpoints:    172.30.209.141:5000
Session Affinity: None
External Traffic Policy: Cluster
Events:       <none>

D:\Projects\IBM_assignments>ibmcloud cs workers --cluster cdbndb0f0qs6d8luac40
OK
ID
kube-cdbndb0f0qs6d8luac40-karthikfree-default-00000036
Public IP 159.122.187.65 Private IP 10.144.185.9 Flavor free State normal Status Ready Zone mil01 Version 1.23.12_1548

D:\Projects\IBM_assignments>
```

] **Run our flask app in the IBM kubernetes**

