

## Assignment -4

### Docker and Kubernetes

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

Pull Image from docker hub

```
[node2] (local) root@192.168.0.7 ~
$ docker pull ibmproject/flask
Using default tag: latest
latest: Pulling from ibmproject/flask
48ecbb6b270e: Pull complete
692f29ee68fa: Pull complete
6439819450d1: Pull complete
3c7be240f7bf: Pull complete
ca4b349df8ed: Pull complete
70900d8ef90b: Pull complete
8fe472f74dd9: Pull complete
Digest: sha256:f334f3fd6a8373dda3f3f4e8d1e53c0f54b2007682b4746ecd3bf2546b8eefcd
Status: Downloaded newer image for ibmproject/flask:latest
docker.io/ibmproject/flask:latest
```

Running the image

```
[node2] (local) root@192.168.0.7 ~
$ docker run -p 5001:5001 ibmproject/flask
* 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 all addresses (0.0.0.0)
* Running on http://127.0.0.1:5001
* Running on http://172.17.0.2:5001
Press CTRL+C to quit
* Restarting with stat
* Debugger is active!
* Debugger PIN: 128-856-208
172.18.0.1 - - [21/Oct/2022 09:10:03] "GET / HTTP/1.1" 200 -
172.18.0.1 - - [21/Oct/2022 09:10:03] "GET /favicon.ico HTTP/1.1" 404 -
```

Output



Flask program Containerized and run

```
from flask import Flask
app = Flask(__name__)
```

```
@app.route('/')
def hello():
    return "welcome to the flask "
```

```
if __name__ == "__main__":
    app.run(host='0.0.0.0', port = 5001, debug = True)
```

### Dockerfile

```
FROM python:alpine3.7
COPY . /app
WORKDIR /app
RUN pip install -r requirements.txt
EXPOSE 5001
ENTRYPOINT [ "python" ]
CMD [ "app.py" ]
```

## 2.Create a dockerfile and deploy it in docker desktop

### Flask application

```
from flask import Flask
app = Flask(__name__)
```

```
@app.route('/')
def hello():
    return "welcome to the flask"
```

```
if __name__ == "__main__":
    app.run(host='0.0.0.0', port = 5001, debug = True)
```

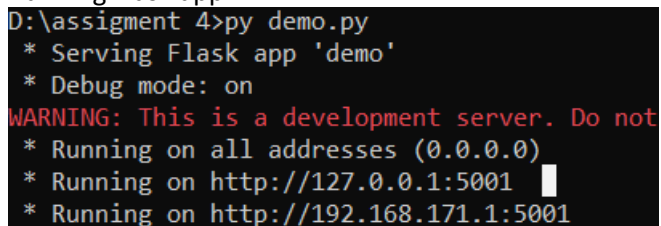
### Dockerfile

```
FROM python:alpine3.7
COPY . /app
WORKDIR /app
RUN pip install -r requirements.txt
EXPOSE 5001
ENTRYPOINT [ "python" ]
CMD [ "demo.py" ]
```

### Requirement.txt

Flask

### Running Flask app

A terminal window with a black background and white text. The first line shows the command 'D:\assignment 4>py demo.py'. The output includes: '\* Serving Flask app 'demo'', '\* Debug mode: on', a red 'WARNING: This is a development server. Do not', '\* Running on all addresses (0.0.0.0)', '\* Running on http://127.0.0.1:5001', and '\* Running on http://192.168.171.1:5001'.

```
D:\assignment 4>py demo.py
* Serving Flask app 'demo'
* Debug mode: on
WARNING: This is a development server. Do not
* Running on all addresses (0.0.0.0)
* Running on http://127.0.0.1:5001
* Running on http://192.168.171.1:5001
```

Flask app output

welcome to the flask

## Build docker image

```
D:\assignment 4>docker build --tag flask-docker-demo-app .
[+] Building 61.5s (9/9) FINISHED
=> [internal] load build definition from Dockerfile                                0.0s
=> => transferring dockerfile: 183B                                              0.0s
=> [internal] load .dockerignore                                                  0.0s
=> => transferring context: 2B                                                    0.0s
=> [internal] load metadata for docker.io/library/python:alpine3.7              6.2s
=> [internal] load build context                                                  0.0s
=> => transferring context: 470B                                                  0.0s
=> [1/4] FROM docker.io/library/python:alpine3.7@sha256:35f6f83ab08f98c727dbefd53738e3b3174a48b 46.8s
=> => resolve docker.io/library/python:alpine3.7@sha256:35f6f83ab08f98c727dbefd53738e3b3174a48b4 0.0s
=> => sha256:35f6f83ab08f98c727dbefd53738e3b3174a48b4571ccb1910bae480dcdba847 2.04kB / 2.04kB 0.0s
=> => sha256:014f52b0e7ae4fcd43201bfa4c4e0320c8517b611d7daa0e41ba33a0cb1fab80 1.37kB / 1.37kB 0.0s
=> => sha256:00be2573e9f79754b17954ba7a310a5f70c25b8f5bb78375e27e9e86d874877e 6.13kB / 6.13kB 0.0s
=> => sha256:48ecbb6b270eb481cb6df2a5b0332de294ec729e1968e92d725f1329637ce01b 2.11MB / 2.11MB 5.3s
=> => sha256:692f29ee68fa6bab04aa6a1c6d8db0ad44e287e5ff5c7e1d5794c3aabc55884 308.48kB / 308.48kB 2.0s
=> => sha256:6439819450d10d1aae92561f3ffff722137aada46d509644e8de4ca82bb26b07 25.90MB / 25.90MB 45.0s
=> => sha256:3c7be240f7bfb19ec575d8547832a9f20b95eec9b4cc94fe717dd047ad661159 230B / 230B 2.7s
=> => sha256:ca4b349df8ed83a59776df8f3868ece2783aa1ee2e9f052c9c9f3b54ae51a593 1.81MB / 1.81MB 6.3s
=> => extracting sha256:48ecbb6b270eb481cb6df2a5b0332de294ec729e1968e92d725f1329637ce01b 0.3s
=> => extracting sha256:692f29ee68fa6bab04aa6a1c6d8db0ad44e287e5ff5c7e1d5794c3aabc55884d 0.2s
=> => extracting sha256:6439819450d10d1aae92561f3ffff722137aada46d509644e8de4ca82bb26b07 1.4s
=> => extracting sha256:3c7be240f7bfb19ec575d8547832a9f20b95eec9b4cc94fe717dd047ad661159 0.0s
=> => extracting sha256:ca4b349df8ed83a59776df8f3868ece2783aa1ee2e9f052c9c9f3b54ae51a593 0.2s
=> [2/4] COPY . /app                                                            0.2s
=> [3/4] WORKDIR /app                                                            0.0s
=> [4/4] RUN pip install -r requirements.txt                                    8.0s
=> exporting to image                                                            0.2s
=> => exporting layers                                                            0.2s
=> => writing image sha256:4f6ecb81f19c4743e41cf4461b31de8c7dafc532a0653fdc61211003b709fd65 0.0s
=> => naming to docker.io/library/flask-docker-demo-app                        0.0s
```

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

## Run docker image

```

D:\assignment 4>docker run --name flask-docker-demo-app -p 5001:5001 flask-docker-demo-app
* Serving Flask app 'demo'
* 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 all addresses (0.0.0.0)
* Running on http://127.0.0.1:5001
* Running on http://172.17.0.2:5001
Press CTRL+C to quit
* Restarting with stat
* Debugger is active!
* Debugger PIN: 133-108-616

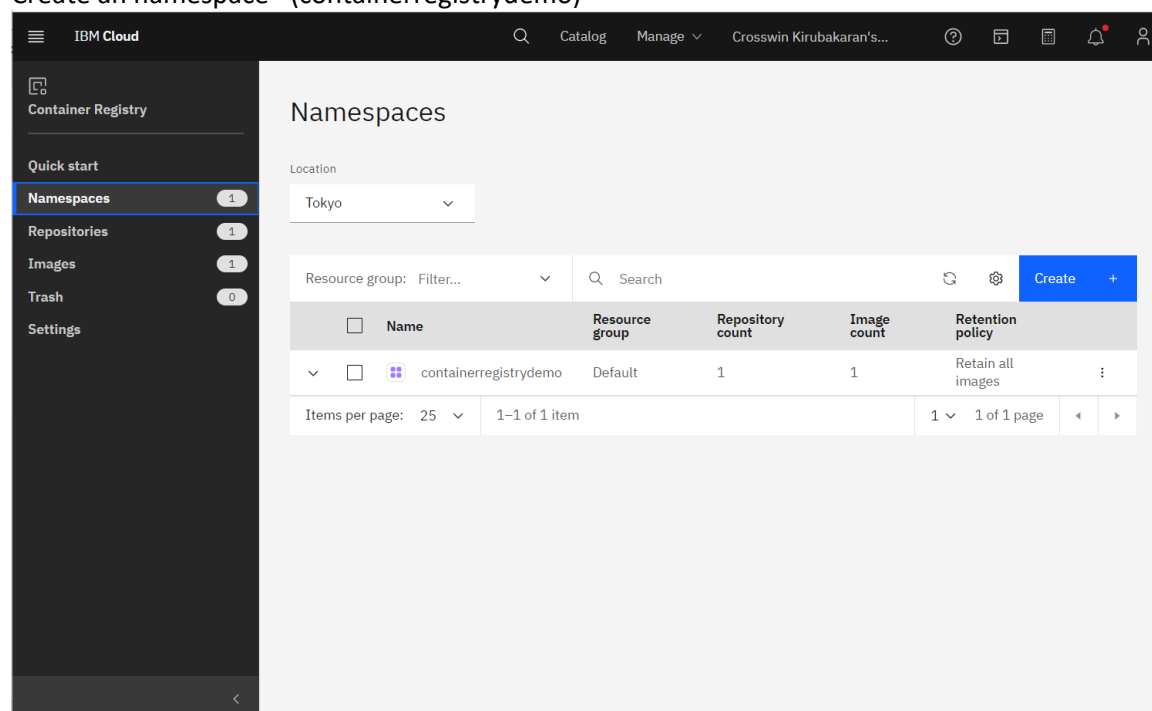
```

## Container output

welcome to the flask

## 3.Create IBM container registry and push flask app

### Create an namespace –(containerregistrydemo)



IBM Cloud

Container Registry

Quick start

**Namespaces** 1

Repositories 1

Images 1

Trash 0

Settings

### Namespaces

Location: Tokyo

Resource group: Filter... Search Create +

Name	Resource group	Repository count	Image count	Retention policy
containerregistrydemo	Default	1	1	Retain all images

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

## Change docker image name

```
C:\Users\Aravindhan>docker tag flask-docker-demo-app jp.icr.io/containerregistrydemo/flaskdemoapp:new
```

```
C:\Users\Aravindhan>docker images
```

REPOSITORY	TAG	IMAGE ID	CREATED
flask-docker-demo-app	latest	4f6ecb81f19c	6 days ago
jp.icr.io/containerregistrydemo/flaskdemoapp	new	4f6ecb81f19c	6 days ago

Login to container registry

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

OK

Push the image to container registry

```
C:\Users\Aravindhan>docker push jp.icr.io/containerregistrydemo/flaskdemoapp:new
The push refers to repository [jp.icr.io/containerregistrydemo/flaskdemoapp]
aa097e2a4fe5: Pushed
5f70bf18a086: Pushed
18ae541d104a: Pushed
5fa31f02caa8: Pushed
88e61e328a3c: Pushed
9b77965e1d3f: Pushed
50f8b07e9421: Pushed
629164d914fc: Pushed
new: digest: sha256:62b1fe0d5214737b8a5f3c486aa5753ba73eacf67b4fffb8ed1424c69dff3edb5
size: 1992
```

Image list in container registry

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

Repository	Created	Size	Security status	Tag	Digest	Namespace
jp.icr.io/containerregistrydemo/flaskdemoapp	6 days ago	35 MB	-	new	62b1fe0d5214	containerregistr

OK

4. Deploy the flask app in IBM Kubernetes cluster and expose it in nodeport

Deployment.yaml file

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: flasknode
spec:
  replicas: 2
  selector:
```

```

matchLabels:
  app: flasknode
template:
  metadata:
    labels:
      app: flasknode
  spec:
    containers:
      - name: flasknode
        image: jp.icr.io/containerregistrydemo/flaskdemoapp:new
        imagePullPolicy: Always
        ports:
          - containerPort: 5001

```

Service.yaml file

```

apiVersion: v1
kind: Service
metadata:
  name: flasknode
spec:
  ports:
    - port: 5001
      targetPort: 5001
  selector:
    app: flasknode
  protocol: TCP

```

1. connect to IBM ks cluster
2. create deployment
3. create a service
4. get services to get the service port

```

D:\ibmproject>ibmcloud ks cluster config -c cdm8ln2f0hgi8h1fiueg
OK
The configuration for cdm8ln2f0hgi8h1fiueg was downloaded successfully.

Added context for cdm8ln2f0hgi8h1fiueg 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.

D:\ibmproject>kubectl create -f deployment.yaml
deployment.apps/flasknode created

D:\ibmproject>kubectl expose deployment flasknode --type=NodePort --name=flasknode
service/flasknode exposed

D:\ibmproject>kubectl get services

```

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	AGE
flasknode	NodePort	172.21.222.68	<none>	5001:31390/TCP	15s
kubernetes	ClusterIP	172.21.0.1	<none>	443/TCP	51m

Public ip is available in Kubernetes cluster dashboard

IBM Cloud

Q

Catalog

Manage

Clusters /

mycluster-free

Normal

Expires in 30 days

Add tags

Help

Kubernetes dashboard

Actions...

Overview

Worker nodes

Worker pools

DevOps

New

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Name	Status	Worker pool	Zone	Private IP	Public IP	Version
000000ed	Normal	default	Milan 01	10.144.214.25	159.122.183.185	1.24.7_154

ID

kube-cdm8ln2f0hgi8h1fiueg-myclusterfr-default-000000ed

Status

--

Flavor

Free - 2 vCPUs 4GB RAM

Private VLAN

2218181

Public VLAN

2218179

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1

1 of 1 page

English (United States)

English (India)

To switch input methods, press Windows key + space.

## Output

159.122.183.185:31390

x

+

←

→

↻

Not secure | 159.122.183.185:31390

Q

Guest

welcome to the flask