Flask ML Model Deployment on Azure

U.S.A Cites Taxi Fare Price Prediction

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CLOUD DEPLOYMENT

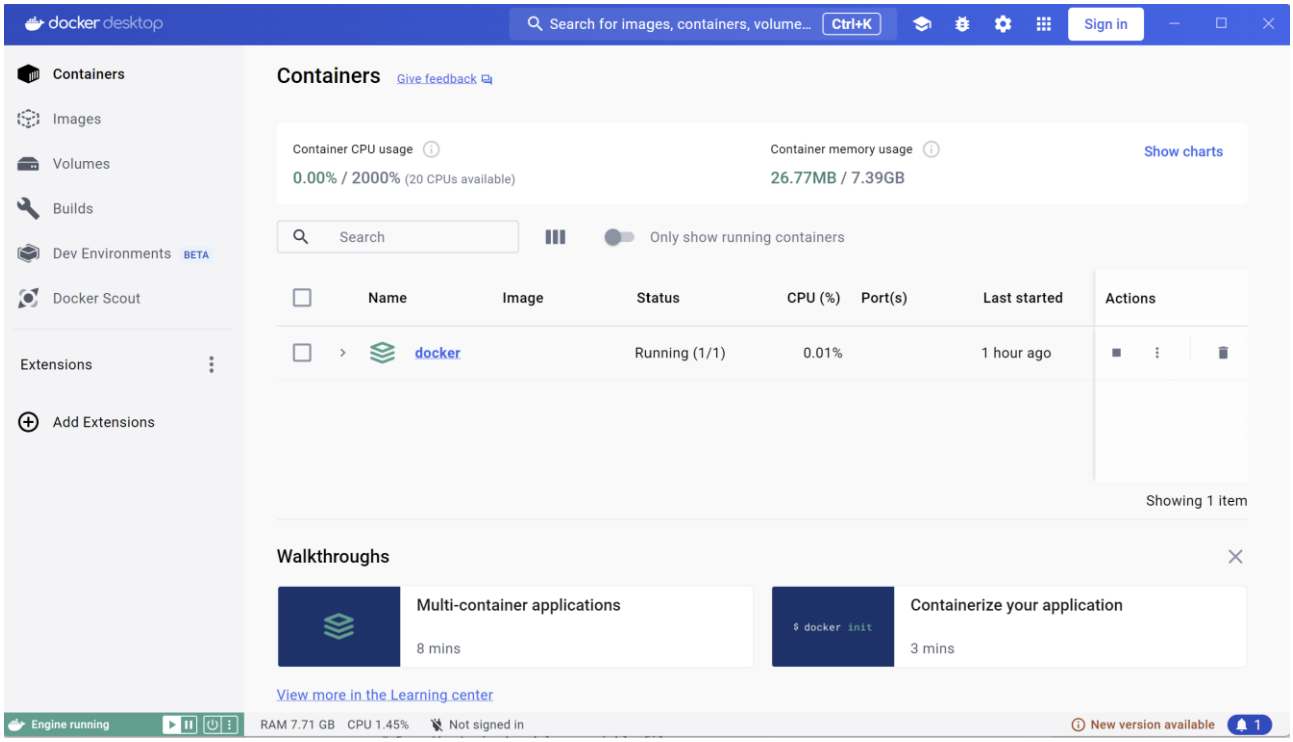
I have chosen Microsoft Azure to host my ML Flask application.

1. Create a docker image for ML Flaks application

1. Install Docker

https://www.docker.com/products/docker-desktop/

Once installed, start the docker service



2. Create Requirements.txt file

- pip install pipreqs
- C:\Virtual_Internships\FarePricePrediction
- cd ..
- pipreqs FarePricePrediction\

3. Create a Docker File

In VSC

- New file → Dockerfile (without any extension)

This Automatically creates a docker file.

Dockerfile content

```
# Use the Fedora base image
FROM fedora:latest

# Install Python and pip
RUN yum -y install python3 && \
    yum -y install python3-pip && \
    yum -y clean all

# Set the working directory in the container
```

```
WORKDIR /app

# Copy the current directory contents into the container at /app
COPY . /app

# Install any needed dependencies specified in requirements.txt
RUN pip3 install --no-cache-dir -r requirements.txt

# Expose the port Flask runs on
EXPOSE 5000

#set enivronment variable
ENV NAME OpentoAll

# Run the app model
CMD ["python3", "app.py"]
```

Note:

The use of python as base image created a large size docker image.

So instead of python:3.12.1 , I have used `fedora:latest`

Results:

The file size has been reduced from 3.56 GB to 2.7GB

```
REPOSITORY                          TAG       IMAGE ID       CREATED         SIZE
app                                 latest    05540488b0d7   15 hours ago    2.7G
monishashree/cab_price_prediction   2.0       05540488b0d7   15 hours ago    2.7G
monishashree/cab_price_prediction   1.0       9a565bbf0d89   15 hours ago    3.56
monishashree/cab_price_prediction   latest    ae8694b29202   21 hours ago    2.95
postgres                            latest    d60dc4bd84c0   2 months ago    431M
```

4. Build Docker Image

In VSC terminal, run the below code

- docker image build -t app .

```
[+] Building 85.9s (9/9) FINISHED                                                                                    docker:default
 => [internal] load build definition from Dockerfile                                                                          0.1s
 => => transferring dockerfile: 367B                                                                                          0.0s
 => [internal] load metadata for docker.io/library/python:3.12.2                                                              0.8s
 => [internal] load .dockerignore                                                                                             0.0s
 => => transferring context: 2B                                                                                               0.0s
 => [1/4] FROM docker.io/library/python:3.12.2@sha256:19973e1796237522ed1fcc1357c766770b47dc15854eafdda055b65953fe5ec1        0.0s
 => [internal] load build context                                                                                             0.9s
 => => transferring context: 1.04MB                                                                                           0.8s
 => CACHED [2/4] WORKDIR /app                                                                                                 0.0s
 => [3/4] COPY . /app                                                                                                        28.5s
 => [4/4] RUN pip install  -r requirements.txt                                                                               49.6s
 => exporting to image                                                                                                        5.9s
 => => exporting layers                                                                                                       5.9s
 => => writing image sha256:ae8694b2920217cc3a51d079ffe5183ff768c35cfdc56cdb305ce0c26d1331a3                                  0.0s
 => => naming to docker.io/library/app                                                                                        0.0s
PS C:\DDrive\Virtual Internships\Data Glacier April to June 2024\Week 4\FarePriceProediction>
```

5. **Check docker image**
   - C:\>docker images

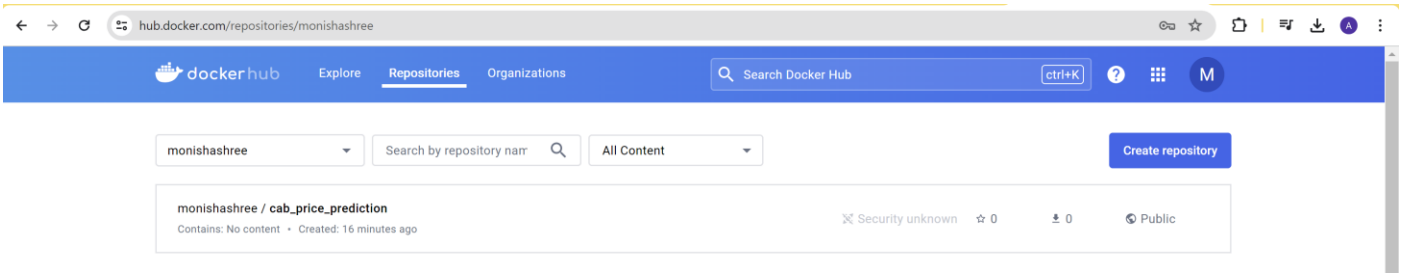
```
C:\>docker images
REPOSITORY   TAG       IMAGE ID       CREATED          SIZE
app          latest    ae8694b29202   3 minutes ago    2.95GB
postgres     latest    d60dc4bd84c0   2 months ago     431MB
```

6. **Run the Docker Container Locally**
   - docker run -d -p 5000:5000 app

7. **Login into Docker (*Only for First time*)**
   - C:\>docker login docker.io
   - Username and password

```
Login Succeeded
```

8. **Create a repo in Docker Hub**



9. **Create a tag**

- C:\>docker tag app monishashree/cab_price_prediction

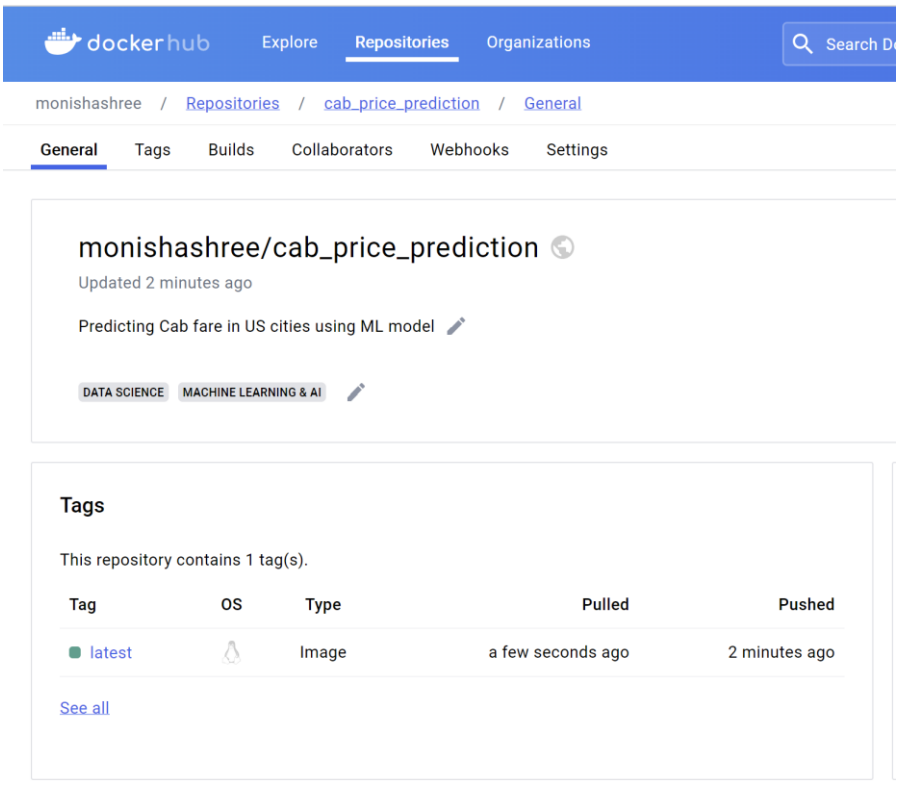
10. **Push the tag with image**

- C:\>docker push monishashree/cab_price_prediction

```
C:\>docker tag app monishashree/cab_price_prediction

C:\>docker push monishashree/cab_price_prediction
Using default tag: latest
The push refers to repository [docker.io/monishashree/cab_price_prediction]
8b9efe906b47: Pushed
485bbc9e0128: Pushed
99d0c42ff449: Pushed
9adbc4b1428d: Mounted from library/python
f52093e4f67d: Mounted from library/python
1193f41e6b14: Mounted from library/python
e077e19b6682: Mounted from library/python
21e1c4948146: Mounted from library/python
68866beb2ed2: Mounted from library/python
e6e2ab10dba6: Mounted from library/python
0238a1790324: Mounted from library/python
latest: digest: sha256:f80ad930745734173fb11c643941459369657074b77cd3307487558366b53a5a size: 2639
```

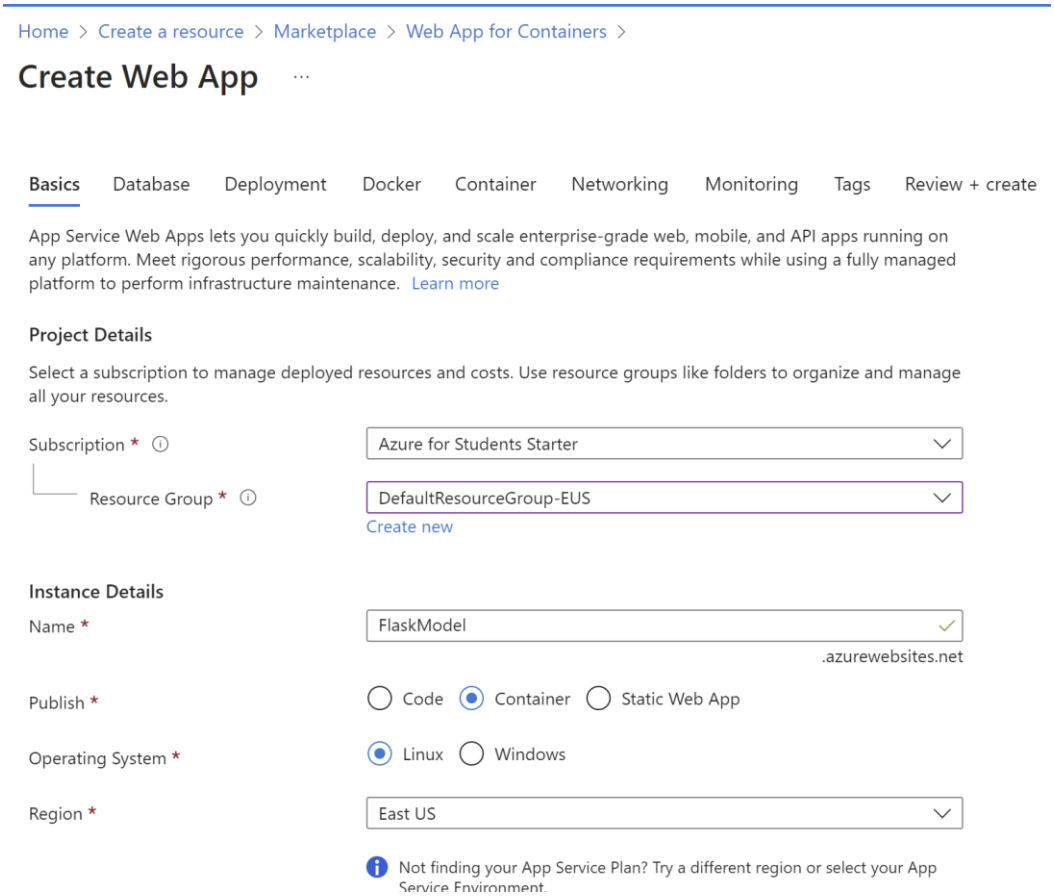
11. Verify if tag is updated in Docker hub



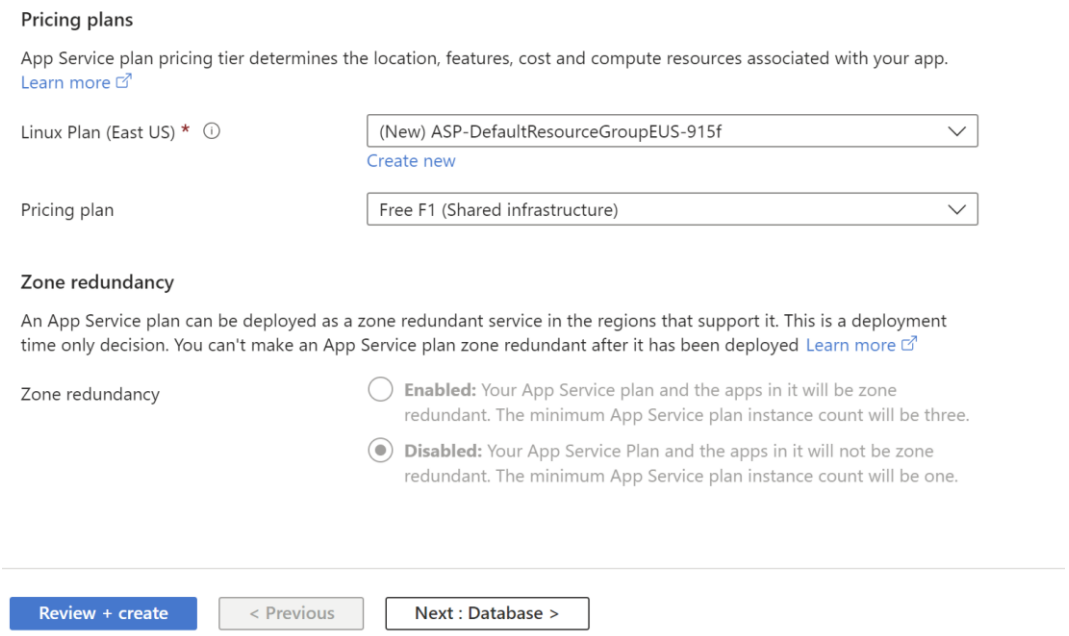
2. Create Web App Resource

12.1 Student Subscription

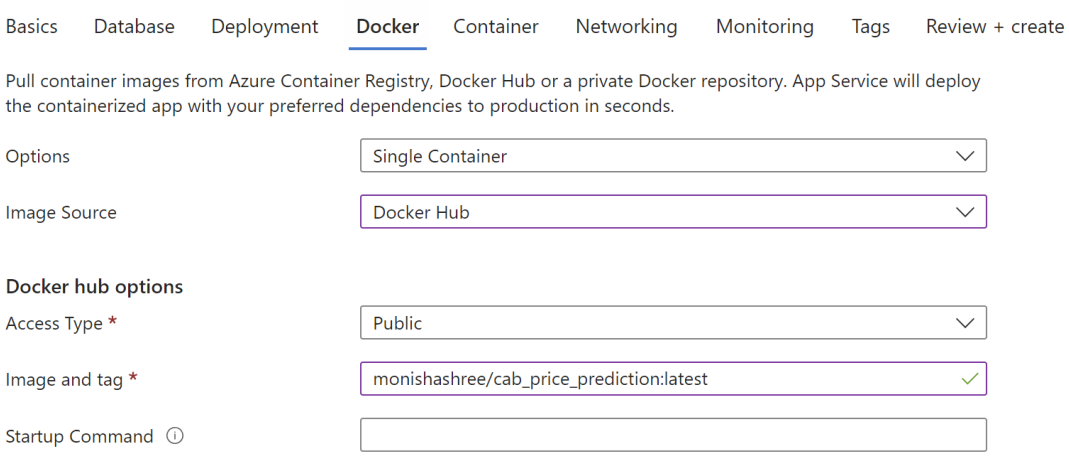
12.1.1 Basics



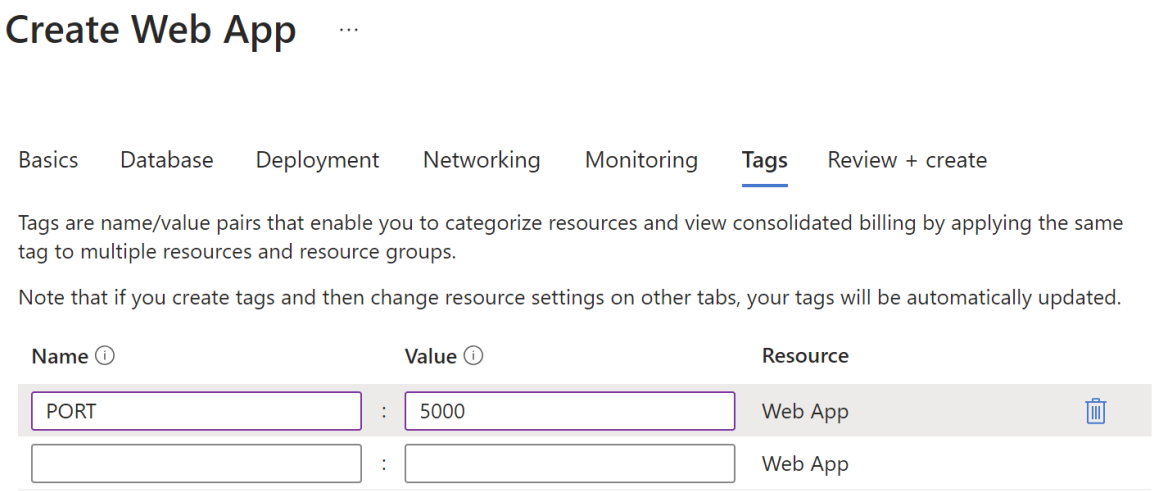
12.1.2 Choose the default configuration



12.1.3 Docker setup



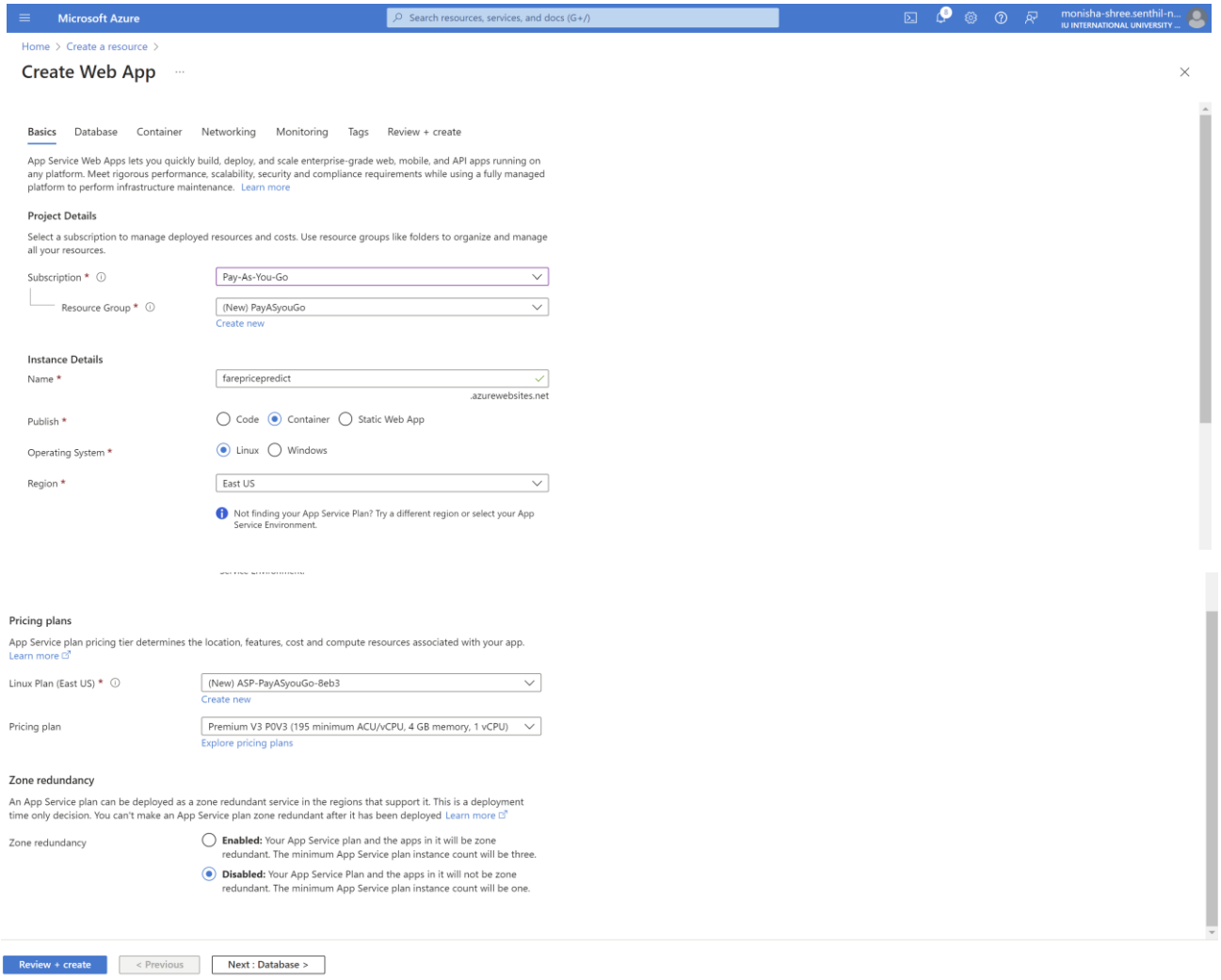
12.1.4 Tags



Leave other fields as default. Give create and review.

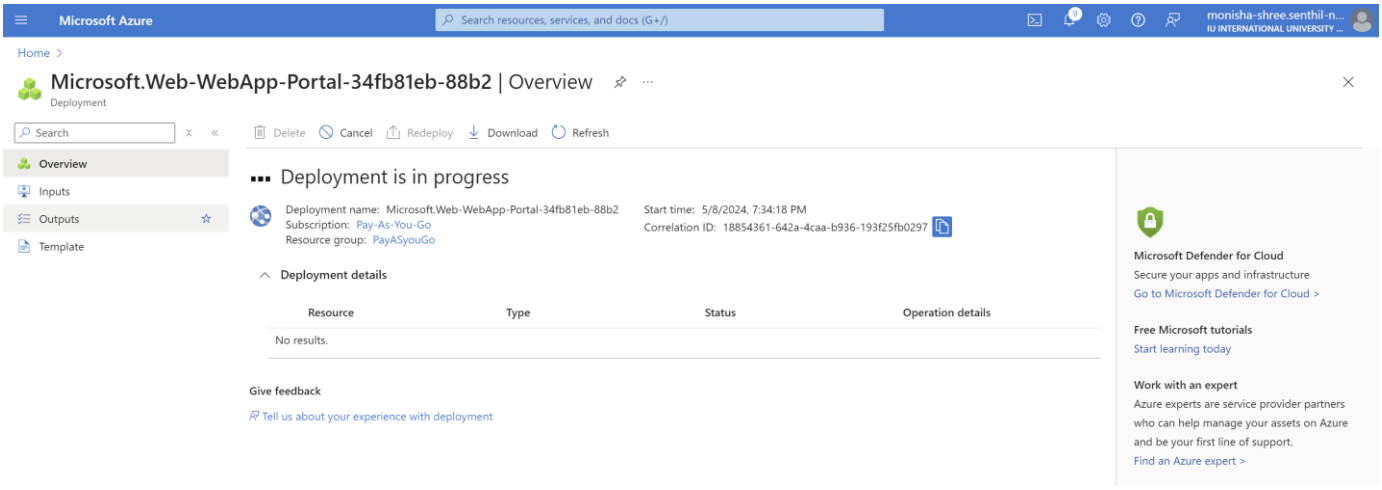
12.2 PAY-AS-YOU-GO subscription

Since my model size is large, my Docker image size is also large ie. more than 1 GB. In Free service plan(F1) only 1 GB memory is free. Therefore, I chose pay-as-you-go subscription to create a webapp resource with premium service plan that offered 4GB.



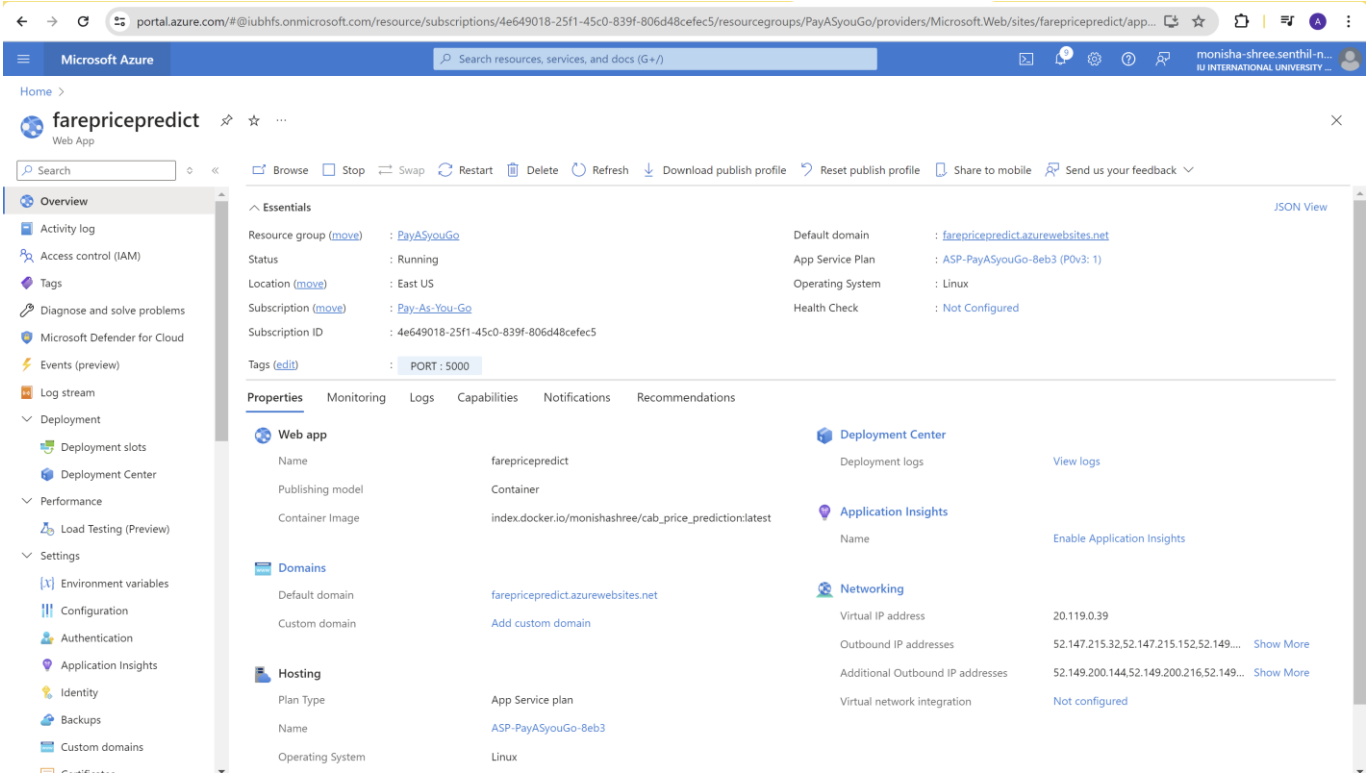
3. Deployment

- Click Review + create.
- Deployment will be started.

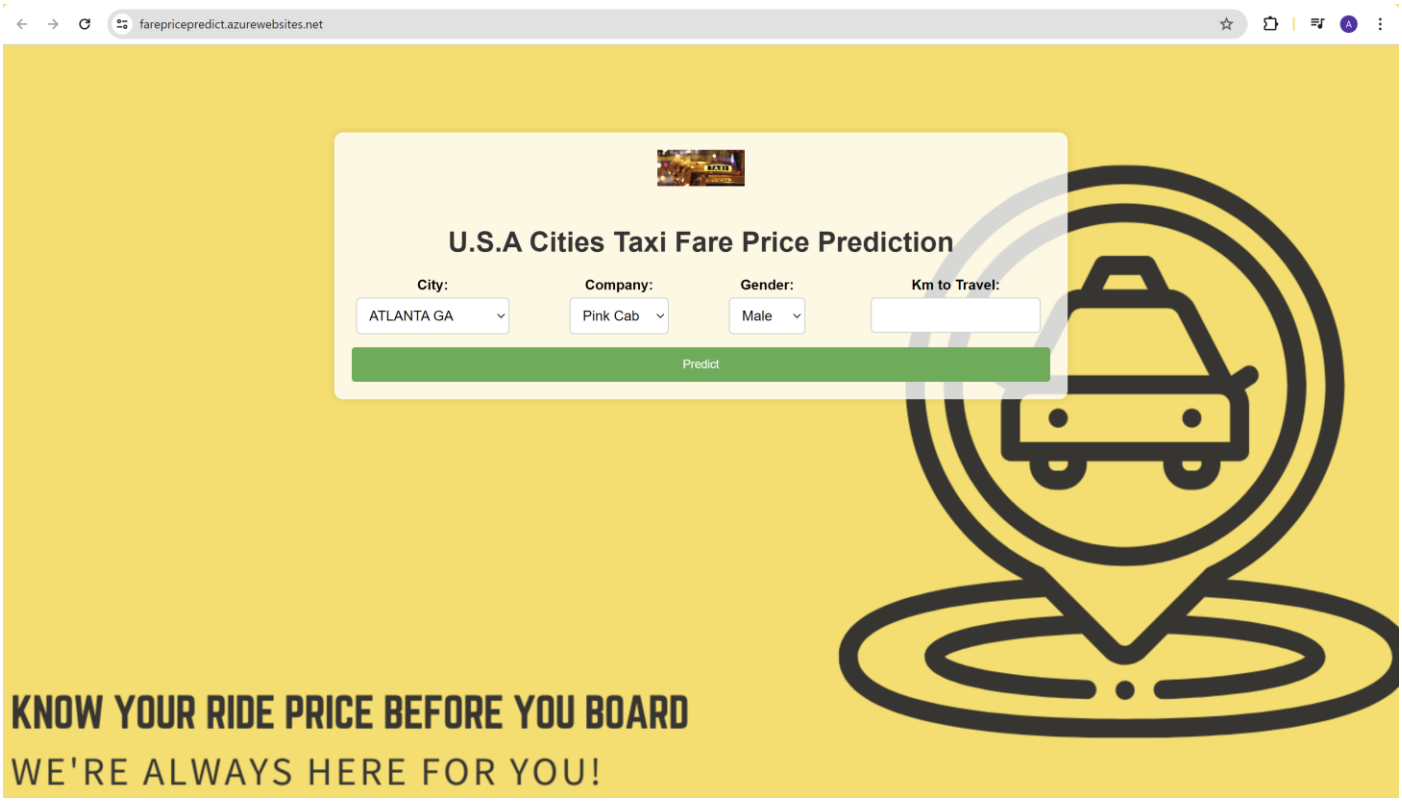


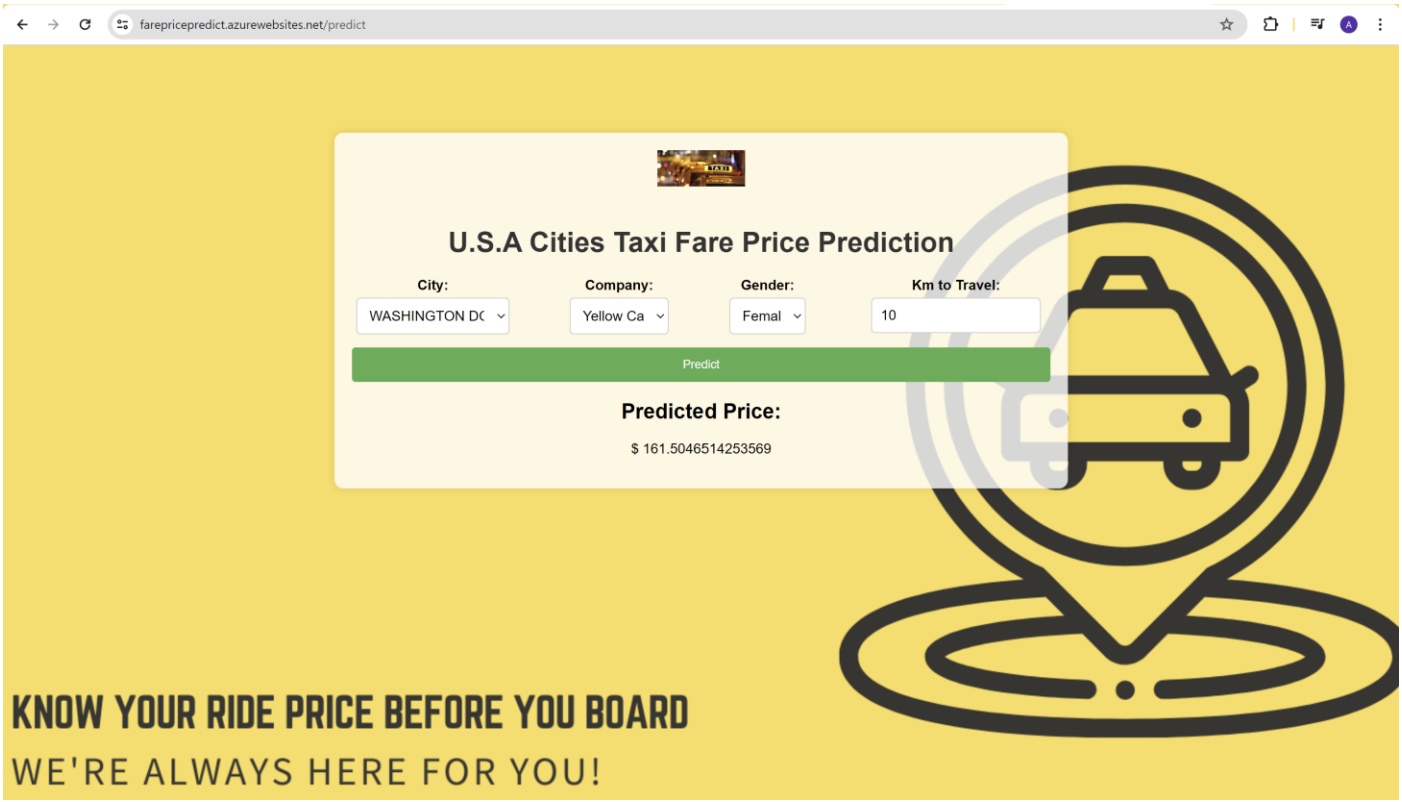
- Once deployment is completed, we can find the website link under Default Domain.

- Click on the URL: flaskmodel.azurewebsites.net



- **Finally, the webapp is hosted on Azure!**





Attention!!

Do not forget to delete the resources as well as the service plan if you choose pay-to-go subscription