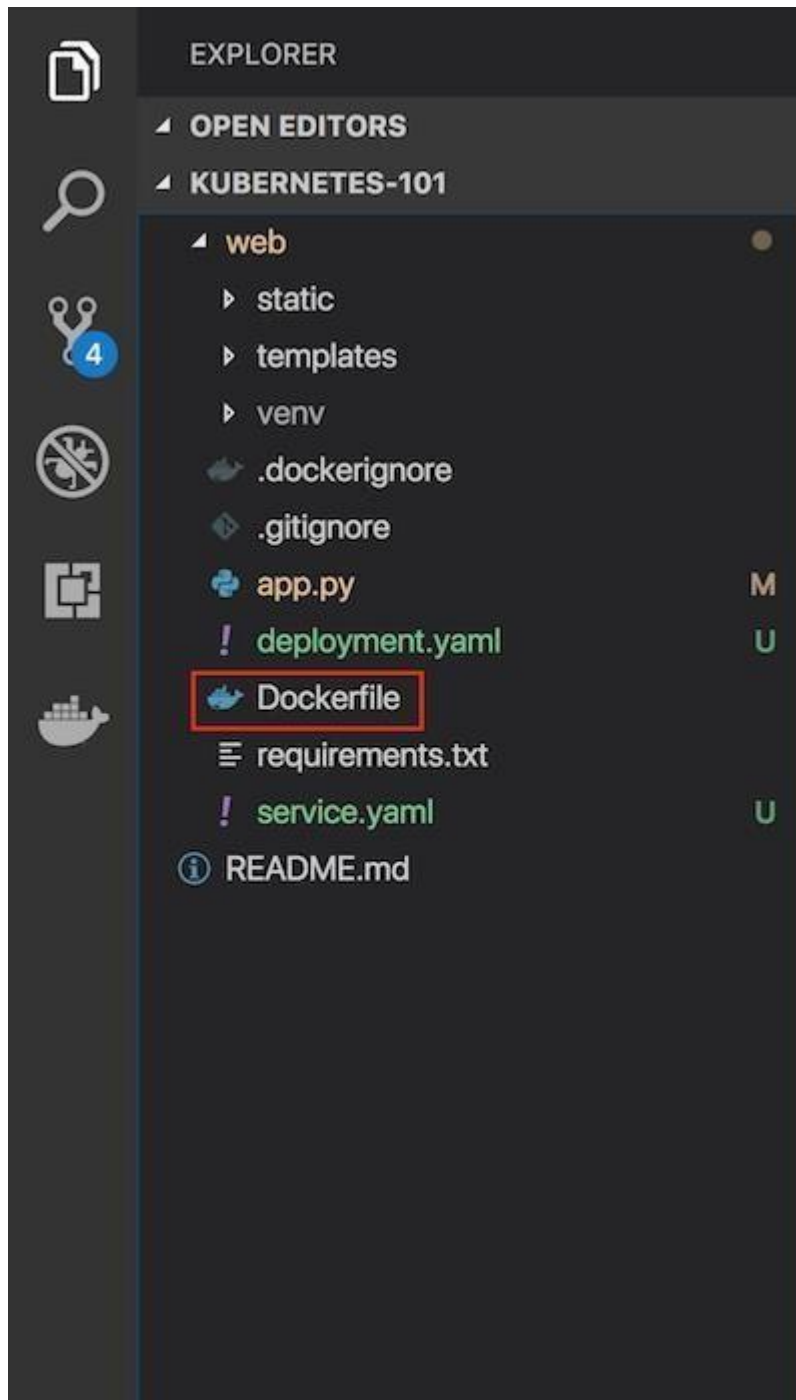


## Containerize your Flask application

Date	27 OCT 2022
Team ID	PNT2022TMID04903
Project Name	Skill and Job Recommender Application

- In your project directory, create a file named "Dockerfile." *Suggestion: Name your file exactly "Dockerfile," nothing else.*



A "Dockerfile" is used to indicate to Docker a base image, the Docker settings you need, and a list of commands you would like to have executed to prepare and start your new container.

- In the file, paste this code:

```
• FROM python:2.7
• LABEL maintainer="Kunal Malhotra, kunal.malhotra1@ibm.com"
```

- RUN apt-get update
- RUN mkdir /app WORKDIR /app COPY ./app
- RUN pip install -r requirements.txt
- EXPOSE 5000
- ENTRYPOINT [ "python" ]
- CMD [ "app.py" ]

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## Explanation and breakdown of the above Dockerfile code

1.

The `FROM python:2.7`

first

part of the code above is:

2.

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Because this Flask application uses Python 2.7, we want an environment that supports it and already has it installed. Fortunately, DockerHub has an official image that's installed on top of Ubuntu. In one line, we will have a base Ubuntu image with Python 2.7, virtualenv, and pip. There are tons of images on DockerHub, but if you would like to start off with a fresh Ubuntu image and build on top of it, you could do that.

3. Let's look at the next part of the code:
4. `LABEL maintainer="Kunal Malhotra, kunal.malhotra1@ibm.com"`
5. `RUN apt-get update`

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6. Note the maintainer and update the Ubuntu package index. The command is `RUN`, which is a function that runs the command after it.

```
7. RUN mkdir /app
8. WORKDIR /app
9. COPY ./app
```

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10. Now it's time to add the Flask application to the image. For simplicity, copy the application under the `/app` directory on our Docker Image.

`WORKDIR` is essentially a `cd` in bash, and `COPY` copies a certain directory to the provided directory in an image. `ADD` is another command that does the same thing as `COPY`, but it also allows you to add a repository from a URL. Thus, if you want to clone your git repository instead of copying it from your local repository (for staging and production purposes), you can use that. `COPY`, however, should be used most of the time unless you have a URL.

11. Now that we have our repository copied to the image, we will install all of our dependencies,

```
RUN pip install --no-cache-dir -r requirements.txt
```

which is defined in the `requirements.txt` part of the code.

12.

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13.

We want

```
EXPOSE 5000
```

to expose the port(5000) the Flask application runs on, so we use `EXPOSE`.

14.

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15. `ENTRYPOINT` specifies the entrypoint of your application.

16. `ENTRYPOINT` [ "python" ]

17. `CMD` [ "app.py" ]

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## Build an image from the Dockerfile

Open the terminal and type this command to build an image from your Dockerfile:  
`docker build -t <image_name>:<tag> .` (note the period to indicate we're in our apps top level directory). For example: `docker build -t app:latest .`

```

kunal@mbp:~$ docker build -t app:latest .
Sending build context to Docker daemon 348.2Kb
Step 1/8 : FROM python:2.7
--> 6c76e39e7cfe
Step 2/8 : LABEL maintainer="Kunal Malhotra, kunal.malhotra@ibm.com"
--> Using cache
--> d8b57d41591c
Step 3/8 : RUN apt-get update
--> Using cache
--> 6262a154e0b
Step 4/8 : COPY . /app
--> f07f7377099f
Step 5/8 : WORKDIR /app
Removing intermediate container f9010b99d2fe
--> 0bccc6af20e3d
Step 6/8 : RUN pip install -r requirements.txt
--> Running in 8153040b00b7
Collecting click==6.7 (from -r requirements.txt (line 1))
  Downloading https://files.pythonhosted.org/packages/34/c1/8806f99713ddb993c5366c362b2f908f18269f8d792aff1abfd700775a77/click-6.7-py2.py3-none-any.whl (71kB)
Collecting Flask==1.0.2 (from -r requirements.txt (line 2))
  Downloading https://files.pythonhosted.org/packages/7f/e7/08578774ed4536d3242b14dcb4696386634607af824ea997202cd0ed4b/Flask-1.0.2-py2.py3-none-any.whl (91kB)
Collecting itsdangerous==0.24 (from -r requirements.txt (line 3))
  Downloading https://files.pythonhosted.org/packages/d0/b4/a600c0ba945c00f6d608d8975131ab3f25b22f2bcefdab221165194b2d4/itsdangerous-0.24.tar.gz (46kB)
Collecting Jinja2==2.10 (from -r requirements.txt (line 4))
  Downloading https://files.pythonhosted.org/packages/7f/ff/ae64bacdfc95f27a016a7bed8e8686763ba4d277a78ca76f32659220a731/Jinja2-2.10-py2.py3-none-any.whl (126kB)
Collecting MarkupSafe==1.0 (from -r requirements.txt (line 5))
  Downloading https://files.pythonhosted.org/packages/4d/de/32d741db316d8f8b7680822dd37001ef7a44825de9699ab4bfcdbf4172b/MarkupSafe-1.0.tar.gz
Collecting Werkzeug==0.14.1 (from -r requirements.txt (line 6))
  Downloading https://files.pythonhosted.org/packages/20/c4/12e3e56473e52375a29c4764e70d1b8f3efaf6682bef8d0aae04fe335243/Werkzeug-0.14.1-py2.py3-none-any.whl (322kB)
Building wheels for collected packages: itsdangerous, MarkupSafe
Running setup.py bdist_wheel for itsdangerous: started
Running setup.py bdist_wheel for itsdangerous: finished with status 'done'
Stored in directory: /root/.cache/pip/wheels/2c/4a/61/5599631c1554768c6290b08c02c7d7317910374ca602ff1e5
Running setup.py bdist_wheel for MarkupSafe: started
Running setup.py bdist_wheel for MarkupSafe: finished with status 'done'
Stored in directory: /root/.cache/pip/wheels/33/56/20/ebe49a5c612fffe1c5a632146b16596f9e64676768661e4e6
Successfully built itsdangerous MarkupSafe
Installing collected packages: click, itsdangerous, MarkupSafe, Jinja2, Werkzeug, Flask
Successfully installed Flask-1.0.2 Jinja2-2.10 MarkupSafe-1.0 Werkzeug-0.14.1 click-6.7 itsdangerous-0.24
Removing intermediate container 8153040b00b7
--> 66d2636b97bc
Step 7/8 : ENTRYPOINT [ "python" ]
--> Running in bdc1c83815e1
Removing intermediate container bdc1c83815e1
--> 73cfc38ac1c
Step 8/8 : CMD [ "app.py" ]
--> Running in a784d430dd6f
Removing intermediate container a784d430dd6f
--> d866b83763a5
Successfully built d866b83763a5
Successfully tagged app:latest
kunal@mbp:~$

```

## Run your container locally and test

After you build your image successfully, type: `docker run -d -p 5000:5000 app`

This command will create a container that contains all the application code and dependencies from the image and runs it locally.

The screenshot shows a terminal window with the following output:

```

kunal@mbp:~$ docker run -d -p 5000:5000 app
3c2bbf86f7580a006eb52a2ef389ea8400eb88263137ca5543c60c616247
kunal@mbp:~$ docker ps
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS               NAMES
3c2bbf86f758        app                 "python app.py"     Less than a second ago    Up 5 seconds        0.0.0.0:5000->5000/tcp    compassionate_ke1dysh
kunal@mbp:~$

```

Below the terminal output, there is a visual representation of Docker containers as blue whales carrying stacks of blue blocks. A large orange gavel is shown on the right side, symbolizing the execution or enforcement of the command.