Experiment 10 - Docker Image

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Subject	DevOps Lab
LO Mapped	LO1: To understand the fundamentals of DevOps engineering and be fully proficient with DevOps terminologies, concepts, benefits, and deployment options to meet your business requirements. LO5: To understand the concept of containerization and Analyze the Containerization of OS images and deployment of applications over Docker.

Aim:

To learn Dockerfile instructions, and build an image for a sample web application using Dockerfile.

Introduction:

What Is a Dockerfile?

So, our first question is simply what is a Dockerfile? When you run the Docker run command and specify WordPress, Docker uses this file to build the image. The Dockerfile is essentially the build instructions to create the image.

The advantage of a Dockerfile over just storing the binary image (or a snapshot/template in other virtualization systems) is that the automatic builds will ensure you have the latest version available. This is a good thing from a security perspective, as you want to ensure you're not installing any vulnerable software.

Building a docker image:

In this experiment, we will create a docker image for a sample flask API which on connection returns a greeting. You can clone this application from this GitHub repository.

Steps:

1. Clone the GitHub Repository.

```
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PS D:\37> git clone https://github.com/sreekeshiyer/sample-flask-app.git
Cloning into 'sample-flask-app'...
remote: Enumerating objects: 20, done.
remote: Counting objects: 100% (20/20), done.
remote: Compressing objects: 100% (15/15), done.
remote: Total 20 (delta 6), reused 4 (delta 0), pack-reused 0
Receiving objects: 100% (20/20), done.
Resolving deltas: 100% (6/6), done.
PS D:\37>
```

2. Check the requirements.txt file to confirm installing the latest flask version.

requirements - Notepad

File Edit View

```
Flask==2.2.2
gunicorn==20.1.0
```

3. You can view the code in app.py

app.py 1

app.py > ...

```python
from flask import Flask, jsonify

app = Flask(__name__)


@app.route('/')
def hello_world():
    return jsonify({
        "message": "Hello World."
    })


if __name__ == '__main__':
    app.run()
```

As you can see, we are creating a flask app that simply returns a greeting when you run it.

4. Create a new file in the same folder, named ‘Dockerfile’. Add the following contents to the file, like so.

Dockerfile - Notepad

File Edit View

```
FROM python:3.9.7-slim-buster
#Set the working directory to /sample-flask-app
WORKDIR /sample-flask-app
#Copy the Code from the source to the images' code directory
COPY . .
#Install dependencies
RUN pip install -r requirements.txt
#env variables
ENV FLASK_APP=app.py
ENV FLASK_RUN_HOST=0.0.0.0
ENV FLASK_ENV=development
#Expose the port
EXPOSE 5000
#Start the dev server
CMD ["flask", "run"]
```

This Dockerfile will be used to create a Docker image for our sample app.

5. Open the terminal and run docker build -t .

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```
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PS D:\37\sample-flask-app> docker build -t sampleflask .
[+] Building 14.3s (9/9) FINISHED
 => [internal] load build definition from Dockerfile                                                    0.0s
 => => transferring dockerfile: 447B                                                                    0.0s
 => [internal] load .dockerignore                                                                       0.0s
 => => transferring context: 2B                                                                         0.0s
 => [internal] load metadata for docker.io/library/python:3.9.7-slim-buster                             4.4s
 => [1/4] FROM docker.io/library/python:3.9.7-slim-buster@sha256:76eaa9e5bd357d6983a88ddc9c4545ef4ad64c50f84f081b  6.6s
 => => resolve docker.io/library/python:3.9.7-slim-buster@sha256:76eaa9e5bd357d6983a88ddc9c4545ef4ad64c50f84f081b  0.0s
 => => sha256:b380bbd43752f83945df8b5d1074fef8dd044820e7d3aef33b655a2483e030c7 27.14MB / 27.14MB         4.0s
 => => sha256:14063a2781d6ddd50c6afb4a9e22cccf2205cb04a72caff066c71cf3e4d19c76 2.77MB / 2.77MB           2.2s
 => => sha256:5a63271f8164c4a1fd42b70f29316cfe5ec83c34cb6de7289ecb802f6583a063 10.99MB / 10.99MB         2.5s
 => => sha256:76eaa9e5bd357d6983a88ddc9c4545ef4ad64c50f84f081ba952c7ed08e3bdd6 1.86kB / 1.86kB           0.0s
 => => sha256:1075c6cab453237a9c37116de539158429e8b2e360c0a78ff042ae048ebadc5f 1.37kB / 1.37kB           0.0s
 => => sha256:564b1a543bd3c638c5878c22e852edcf4e1a2166aafb197b355990d63143d835 7.88kB / 7.88kB           0.0s
 => => sha256:8bcf4fd3160ad38c522f2edcf11277e643a6ebc542bdbe7014eff790bd4baa89 233B / 233B               2.8s
 => => sha256:537014b023270e5e978b116acc4a0d6a92f3f5ee48c2c48480e9d9cd392b3b10 2.64MB / 2.64MB           4.2s
 => => extracting sha256:b380bbd43752f83945df8b5d1074fef8dd044820e7d3aef33b655a2483e030c7                1.2s
 => => extracting sha256:14063a2781d6ddd50c6afb4a9e22cccf2205cb04a72caff066c71cf3e4d19c76                0.2s
 => => extracting sha256:5a63271f8164c4a1fd42b70f29316cfe5ec83c34cb6de7289ecb802f6583a063                0.4s
 => => extracting sha256:8bcf4fd3160ad38c522f2edcf11277e643a6ebc542bdbe7014eff790bd4baa89                0.0s
 => => extracting sha256:537014b023270e5e978b116acc4a0d6a92f3f5ee48c2c48480e9d9cd392b3b10                0.2s
```
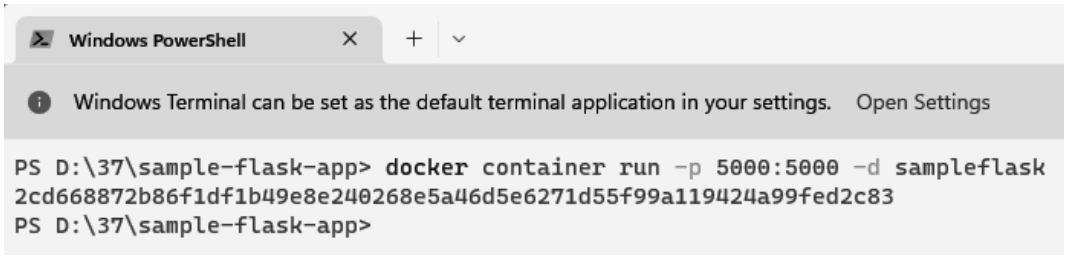

6. Once the image is successfully created, you can use docker images to check it.

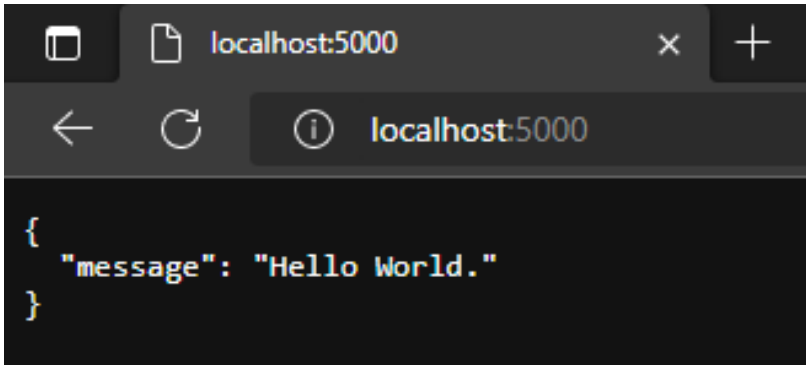
```
PS D:\37\sample-flask-app> docker images
REPOSITORY    TAG       IMAGE ID       CREATED          SIZE
sampleflask   latest    987292ed8aa0   28 seconds ago   126MB
nginx         latest    51086ed63d8c   15 hours ago     142MB
sonarqube     latest    2cf2f2494695   5 weeks ago      534MB
PS D:\37\sample-flask-app>
```

7. After that, we can use this image to run a container using -

docker container run -p 5000:5000 -d sampleflask



8. Check localhost:5000 in your browser and you can see your app running.



Conclusion:

Thus, we learned about Dockerfile, created and wrote Dockerfile for a sample Flask WebApp and built a Docker Image using it.