St. Francis Institute of Technology, Mumbai-400 103
Department Of Information Technology

A.Y. 2023-2024
Class: TE-ITA/B, Semester: V

Subject: **DevOps Lab**

Experiment – 10: To learn Dockerfile instructions, build an image for a sample web application using Dockerfile

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

1. **Objectives:** Aim of this experiment is that, the students will learn:
   - To understand concept of containerization
   - To analyze the Containerization of OS images and deployment of applications over Docker
2. **Outcomes:** After study of this experiment, the students will learn following:
   - Create and implement docker images using Dockerfile.
   - Container Lifecycle and working with containers.
   - To Build, deploy and manage web or software application on Docker Engine.
3. **Prerequisite:** None
4. **Requirements:** Docker Desktop, JDK, Visual Studio Code, Personal Computer, Windows operating system, Internet Connection, Microsoft Word.
5. **Pre-Experiment Exercise:**
   Brief Theory: Refer shared material
6. **Laboratory Exercise**
   A. **Procedure:**
      a. **Answer the following:**
         - What is a Dockerfile?

A Dockerfile typically consists of a series of commands and directives that instruct Docker on how to construct an image. These commands include actions like copying files into the image, setting environment variables, and running specific commands during image build. Once a Dockerfile is defined, you can use the "docker build" command to create a Docker image from it, and then you can use that image to run containers. Dockerfiles are a fundamental component of containerization, enabling the easy packaging and distribution of applications and their dependencies. They play a crucial role in achieving consistency and reproducibility in containerized environments.

- Explain Dockerfile commands with syntax and example.

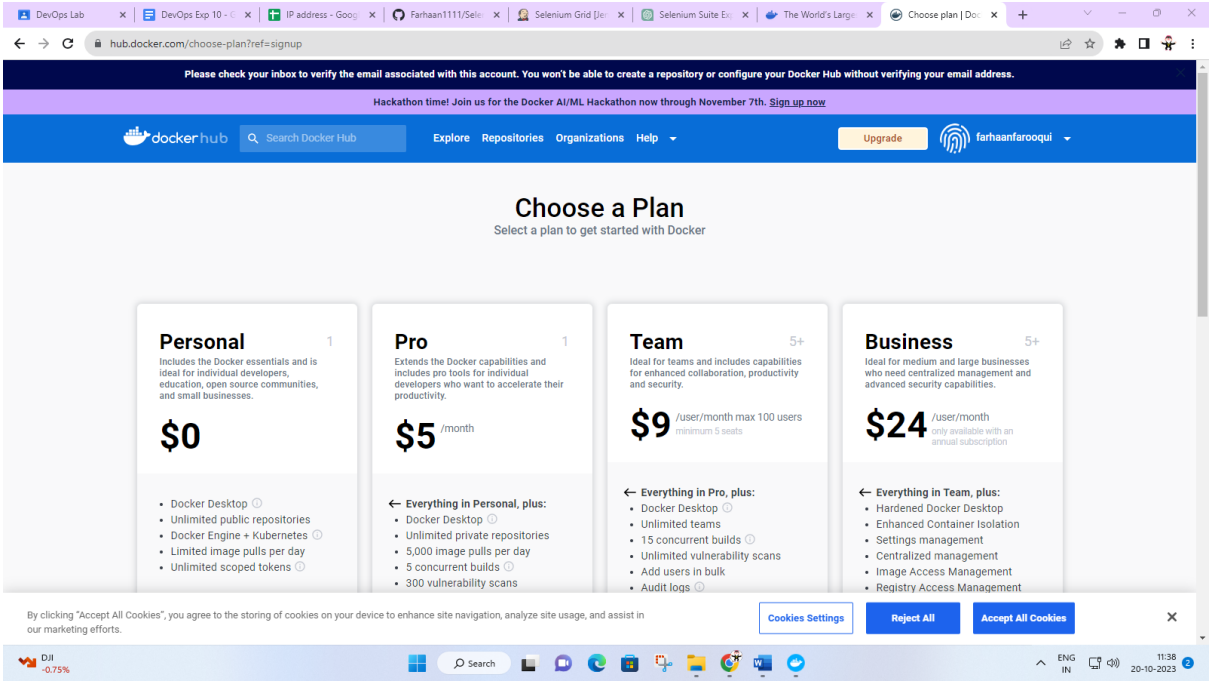
Here are some common Dockerfile commands, along with their syntax and examples:

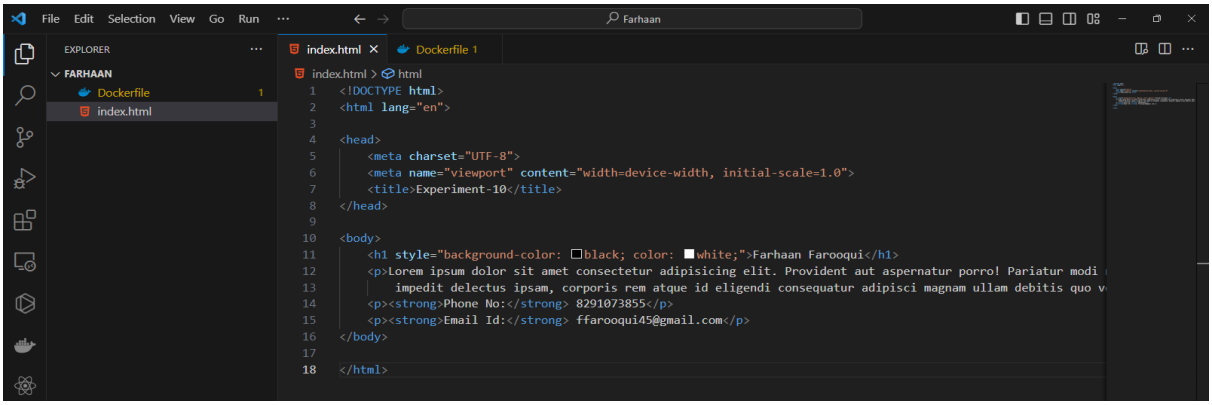
FROM:
Syntax: FROM image:tag
Example: FROM ubuntu:20.04
Specifies the base image for your Docker image.
WORKDIR:
Syntax: WORKDIR /path/to/directory
Example: WORKDIR /app
Sets the working directory for subsequent commands.
COPY:
Syntax: COPY source destination
Example: COPY . /app
Copies files or directories from the host into the image.
RUN:
Syntax: RUN command
Example: RUN apt-get update && apt-get install -y python
Executes a shell command during image build.
CMD:
Syntax: CMD ["executable", "param1", "param2"]
Example: CMD ["python", "app.py"]
Specifies the default command to run when a container is started.

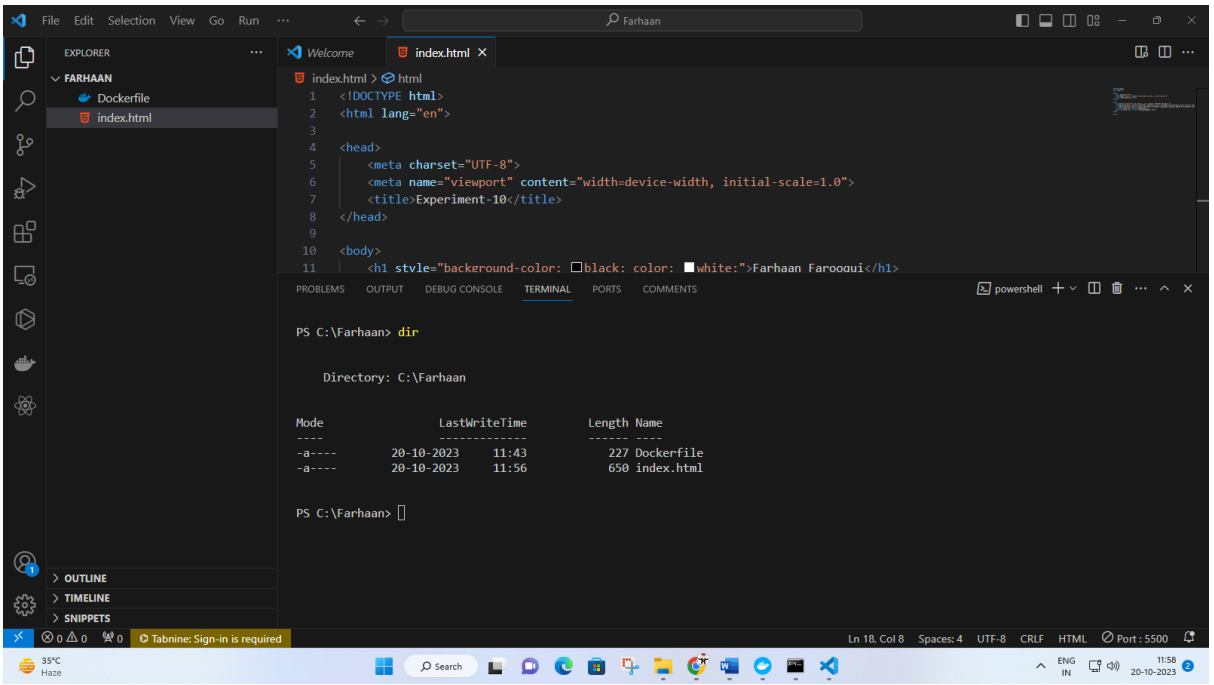
EXPOSE:
Syntax: EXPOSE port
Example: EXPOSE 80
Informs Docker that the container listens on a specified network port at runtime.
ENV:
Syntax: ENV key=value
Example: ENV DB_HOST=localhost
Sets environment variables in the image.
ENTRYPOINT:
Syntax: ENTRYPOINT ["executable", "param1", "param2"]
Example: ENTRYPOINT ["python", "app.py"]
Defines the executable to run as the container's main process.

b. Execute following (Refer the shared material) and attach screenshots:

- Create a Dockerfile
- Create an html file
- Build and run the web application on Docker Engine






File Edit Selection View Go Run
Farhaan
EXPLORER
FARHAAN
Dockerfile
index.html
Welcome
index.html
index.html > html
1 <!DOCTYPE html>
2 <html lang="en">
3
4 <head>
5 <meta charset="UTF-8">
6 <meta name="viewport" content="width=device-width, initial-scale=1.0">
7 <title>Experiment-10</title>
8 </head>
9
10 <body>
11 <h1 style="background-color: black; color: white;">Farhaan Farooqui</h1>
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS COMMENTS
powershell
PS C:\Farhaan> dir
Directory: C:\Farhaan
Mode LastWriteTime Length Name
-a---- 20-10-2023 11:43 227 Dockerfile
-a---- 20-10-2023 11:56 650 index.html
PS C:\Farhaan>
OUTLINE
TIMELINE
SNIPPETS
Tabnine: Sign-in is required
Ln 18, Col 8 Spaces: 4 UTF-8 CRLF HTML Port : 5500
35°C Haze
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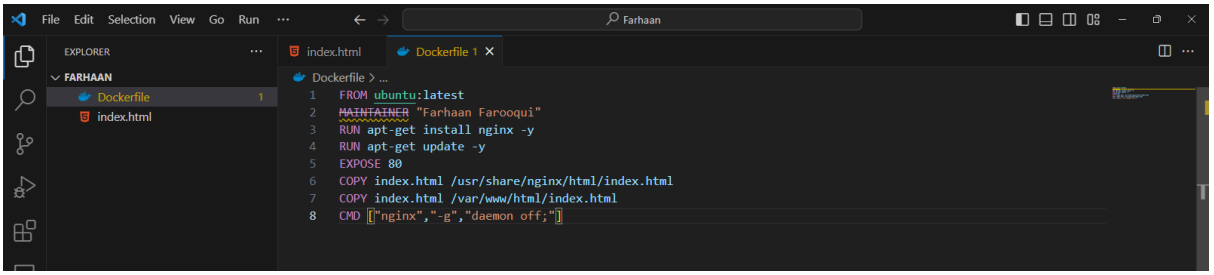
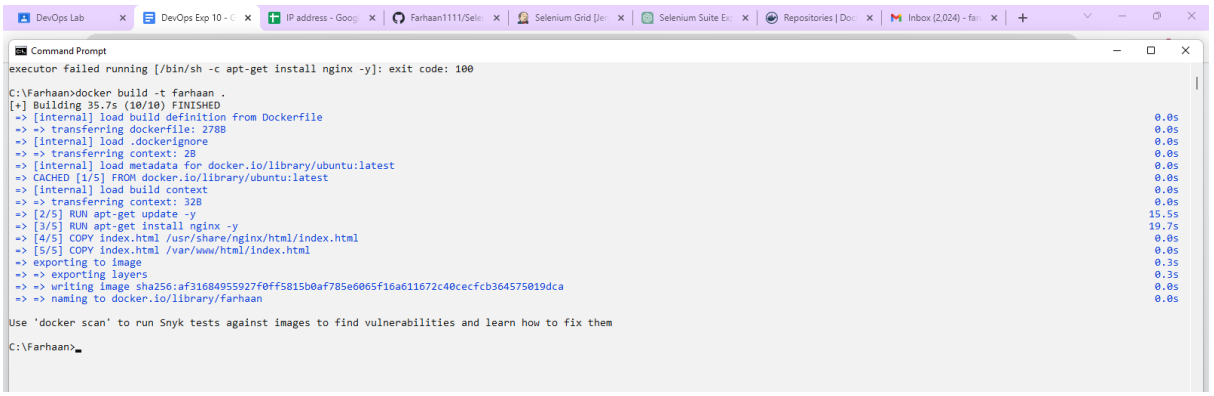
ENG IN
11:58 20-10-2023


File Edit Selection View Go Run
Farhaan
EXPLORER
FARHAAN
Dockerfile 1
index.html
index.html
Dockerfile 1
Dockerfile > ...
1 FROM ubuntu:latest
2 MAINTAINER "Farhaan Farooqui"
3 RUN apt-get install nginx -y
4 RUN apt-get update -y
5 EXPOSE 80
6 COPY index.html /usr/share/nginx/html/index.html
7 COPY index.html /var/www/html/index.html
8 CMD ["nginx","-g","daemon off;"]


DevOps Lab
DevOps Exp 10 -
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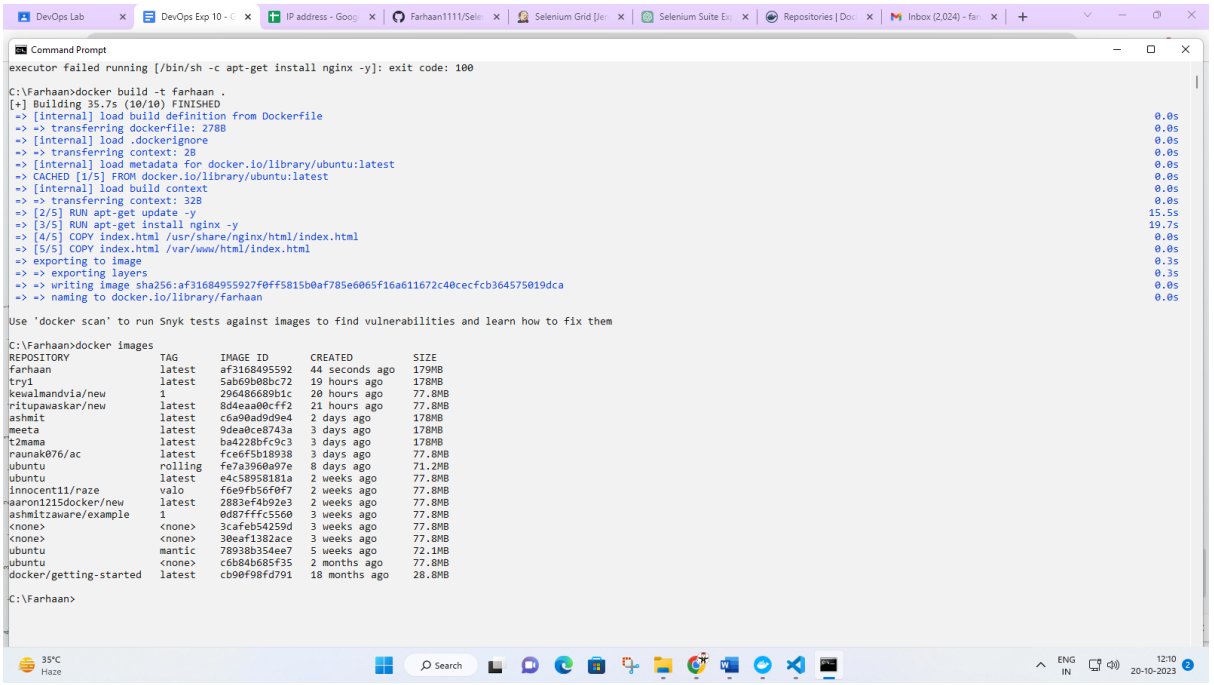
Selenium Suite Ex
Repositories | Doc
Inbox (2,024) - far
Command Prompt
executor failed running [/bin/sh -c apt-get install nginx -y]: exit code: 100
C:\Farhaan>docker build -t farhaan .
[+] Building 35.7s (10/10) FINISHED
=> [internal] load build definition from Dockerfile 0.0s
=> => transferring dockerfile: 278B 0.0s
=> [internal] load .dockerignore 0.0s
=> => transferring context: 2B 0.0s
=> [internal] load metadata for docker.io/library/ubuntu:latest 0.0s
=> CACHED [1/5] FROM docker.io/library/ubuntu:latest 0.0s
=> [internal] load build context 0.0s
=> => transferring context: 32B 0.0s
=> [2/5] RUN apt-get update -y 15.5s
=> [3/5] RUN apt-get install nginx -y 19.7s
=> [4/5] COPY index.html /usr/share/nginx/html/index.html 0.0s
=> [5/5] COPY index.html /var/www/html/index.html 0.0s
=> exporting to image 0.3s
=> => exporting layers 0.3s
=> => writing image sha256:af31684955927f0ff5815b0af785e6065f16a611672c40cecfcb364575019dca 0.0s
=> => naming to docker.io/library/farhaan 0.0s
Use 'docker scan' to run Snyk tests against images to find vulnerabilities and learn how to fix them
C:\Farhaan>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Repositories | Doc
Inbox (2,024) - far
Command Prompt
executor failed running [/bin/sh -c apt-get install nginx -y]: exit code: 100
C:\Farhaan>docker build -t farhaan .
[+] Building 35.7s (10/10) FINISHED
=> [internal] load build definition from Dockerfile 0.0s
=> => transferring dockerfile: 278B 0.0s
=> [internal] load .dockerignore 0.0s
=> => transferring context: 2B 0.0s
=> [internal] load metadata for docker.io/library/ubuntu:latest 0.0s
=> CACHED [1/5] FROM docker.io/library/ubuntu:latest 0.0s
=> [internal] load build context 0.0s
=> => transferring context: 32B 0.0s
=> [2/5] RUN apt-get update -y 15.5s
=> [3/5] RUN apt-get install nginx -y 19.7s
=> [4/5] COPY index.html /usr/share/nginx/html/index.html 0.0s
=> [5/5] COPY index.html /var/www/html/index.html 0.0s
=> exporting to image 0.3s
=> => exporting layers 0.3s
=> => writing image sha256:af31684955927f0ff5815b0af785e6065f16a611672c40cecfcb364575019dca 0.0s
=> => naming to docker.io/library/farhaan 0.0s
Use 'docker scan' to run Snyk tests against images to find vulnerabilities and learn how to fix them
C:\Farhaan>docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
farhaan latest af3168495592 44 seconds ago 179MB
try1 latest 5ab69b08bc72 19 hours ago 178MB
kewalmandvia/new 1 2964866689b1c 20 hours ago 77.8MB
ritupawaskar/new latest 8d4eaa00cff2 21 hours ago 77.8MB
ashmit latest c6a90ad9d9e4 2 days ago 178MB
meeta latest 9dea0ce8743a 3 days ago 178MB
t2mama latest ba4228bfc9c3 3 days ago 178MB
raunak076/ac latest fce6f5b18938 3 days ago 77.8MB
ubuntu rolling fe7a39660a97e 8 days ago 71.2MB
ubuntu latest e4c58958181a 2 weeks ago 77.8MB
innocent11/raze valo f6e9fb56f0f7 2 weeks ago 77.8MB
aaron1215docker/new latest 2883ef4b92e3 2 weeks ago 77.8MB
ashmitzaware/example 1 0d87fffc5560 3 weeks ago 77.8MB
<none> <none> 3cafeb54259d 3 weeks ago 77.8MB
<none> <none> 30eaf1382ace 3 weeks ago 77.8MB
ubuntu mantic 78938b354ee7 5 weeks ago 72.1MB
ubuntu <none> c6b84b685f35 2 months ago 77.8MB
docker/getting-started latest cb90f98fd791 18 months ago 28.8MB
C:\Farhaan>


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Command Prompt
C:\Farhaan>docker inspect farhaan
[
{
"Id": "sha256:af31684955927f0ff5815b0af785e6065f16a611672c40cecfcb364575019dc
"RepoTags": [
"farhaan:latest"
],
"RepoDigests": [],
"Parent": "",
"Comment": "buildkit.dockerfile.v0",
"Created": "2023-10-20T06:40:07.058949Z",
"Container": "",
"ContainerConfig": {
"Hostname": "",
"Domainname": "",
"User": "",
"AttachStdin": false,
"AttachStdout": false,
"AttachStderr": false,
"Tty": false,
"OpenStdin": false,
"StdinOnce": false,
"Env": null,
"Cmd": null,
"Image": "",
"Volumes": null,
"WorkingDir": "",
"Entrypoint": null,
"OnBuild": null,
"Labels": null
},
"DockerVersion": "",
"Author": "\"Farhaan Farooqui\"",
"Config": {
"Hostname": "",
"Domainname": "",
"User": "",
"AttachStdin": false,
"AttachStdout": false,
"AttachStderr": false,
"ExposedPorts": {
"80/tcp": {}
},
"Tty": false,
"OpenStdin": false,
"StdinOnce": false,
"Env": [
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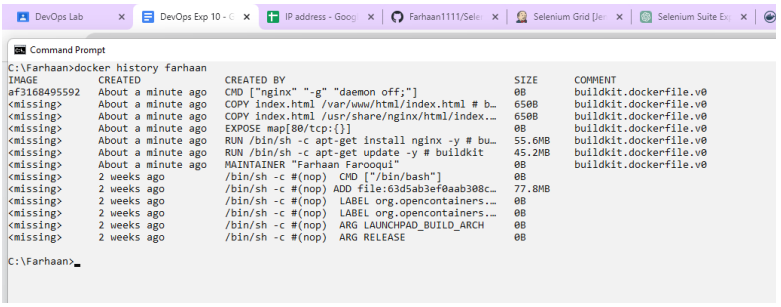
DevOps Lab
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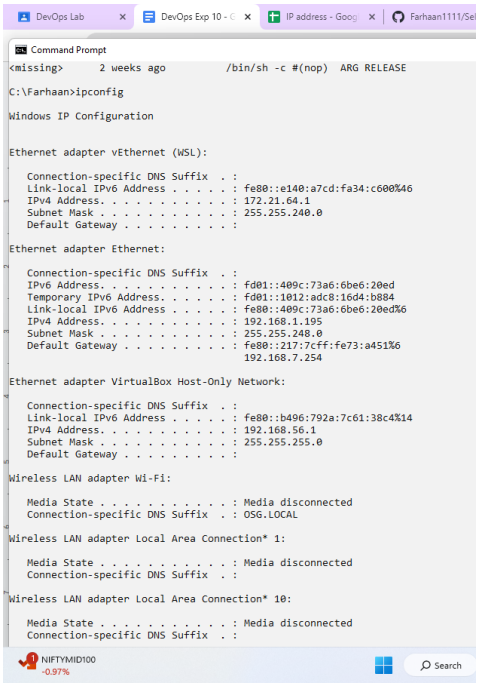
Selenium Grid [Jen
Selenium Suite Ex
Command Prompt
C:\Farhaan>docker history farhaan
IMAGE CREATED CREATED BY SIZE COMMENT
af3168495592 About a minute ago CMD ["nginx" "-g" "daemon off;"] 0B buildkit.dockerfile.v0
<missing> About a minute ago COPY index.html /var/www/html/index.html # b… 650B buildkit.dockerfile.v0
<missing> About a minute ago COPY index.html /usr/share/nginx/html/index.… 650B buildkit.dockerfile.v0
<missing> About a minute ago EXPOSE map[80/tcp:{}] 0B buildkit.dockerfile.v0
<missing> About a minute ago RUN /bin/sh -c apt-get install nginx -y # bu… 55.6MB buildkit.dockerfile.v0
<missing> About a minute ago RUN /bin/sh -c apt-get update -y # buildkit 45.2MB buildkit.dockerfile.v0
<missing> About a minute ago MAINTAINER "Farhaan Farooqui" 0B buildkit.dockerfile.v0
<missing> 2 weeks ago /bin/sh -c #(nop) CMD ["/bin/bash"] 0B
<missing> 2 weeks ago /bin/sh -c #(nop) ADD file:63d5ab3ef0aab308c… 77.8MB
<missing> 2 weeks ago /bin/sh -c #(nop) LABEL org.opencontainers.… 0B
<missing> 2 weeks ago /bin/sh -c #(nop) LABEL org.opencontainers.… 0B
<missing> 2 weeks ago /bin/sh -c #(nop) ARG LAUNCHPAD_BUILD_ARCH 0B
<missing> 2 weeks ago /bin/sh -c #(nop) ARG RELEASE 0B
C:\Farhaan>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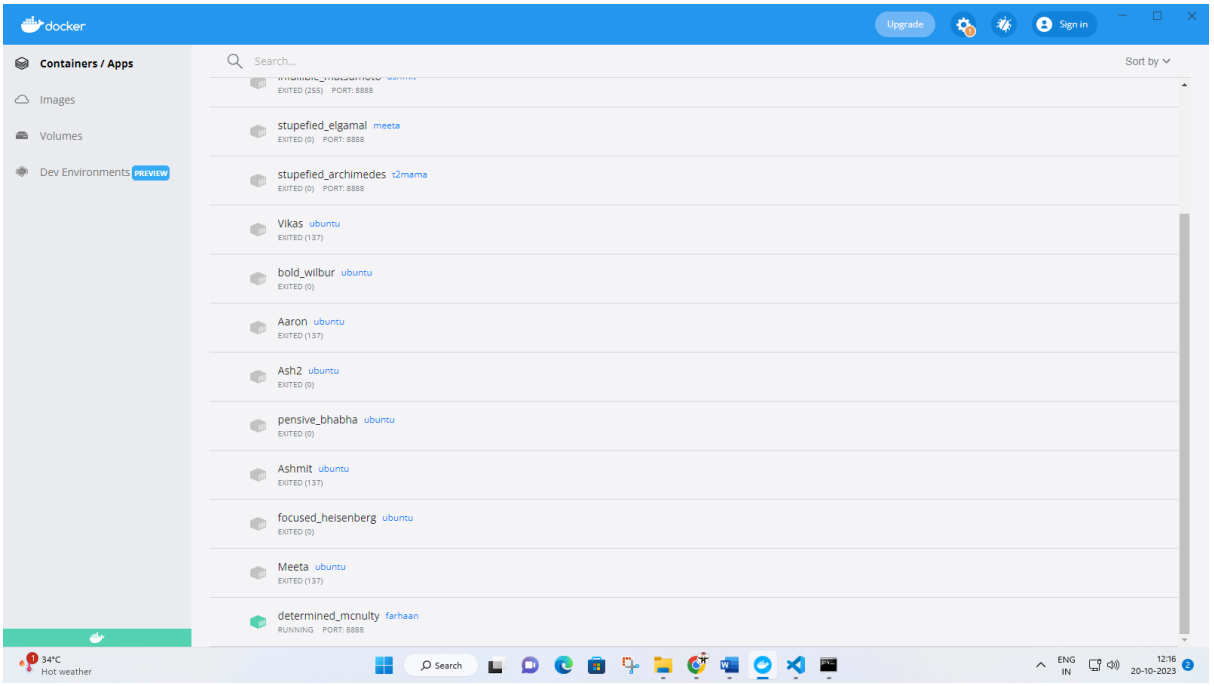
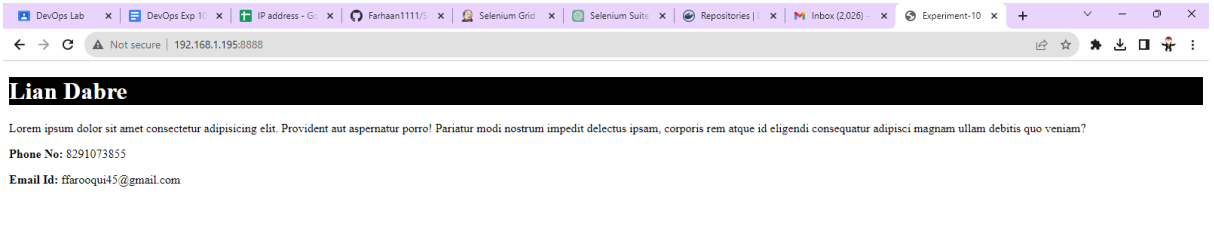
Command Prompt
<missing> 2 weeks ago /bin/sh -c #(nop) ARG RELEASE
C:\Farhaan>ipconfig
Windows IP Configuration
Ethernet adapter vEthernet (WSL):
Connection-specific DNS Suffix . :
Link-local IPv6 Address . . . . . : fe80::e140:a7cd:fa34:c600%46
IPv4 Address. . . . . : 172.21.64.1
Subnet Mask . . . . . : 255.255.240.0
Default Gateway . . . . . :
Ethernet adapter Ethernet:
Connection-specific DNS Suffix . :
IPv6 Address. . . . . : fd01::409c:73a6:6be6:20ed
Temporary IPv6 Address. . . . . : fd01::1012:adc8:16d4:b884
Link-local IPv6 Address . . . . . : fe80::409c:73a6:6be6:20ed%6
IPv4 Address. . . . . : 192.168.1.195
Subnet Mask . . . . . : 255.255.248.0
Default Gateway . . . . . : fe80::217:7cff:fe73:a451%6
192.168.7.254
Ethernet adapter VirtualBox Host-Only Network:
Connection-specific DNS Suffix . :
Link-local IPv6 Address . . . . . : fe80::b496:792a:7c61:38c4%14
IPv4 Address. . . . . : 192.168.56.1
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . :
Wireless LAN adapter Wi-Fi:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . : OSG.LOCAL
Wireless LAN adapter Local Area Connection* 1:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
Wireless LAN adapter Local Area Connection* 10:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
NIFTYMID100
-0.97%
Search


Farhaan
Command Prompt
Microsoft Windows [Version 10.0.22000.1098]
(c) Microsoft Corporation. All rights reserved.
C:\Users\Lenovo>cd/
C:\>cd C:/farhaan
C:\Farhaan>docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
6435e27756a7 farhaan "nginx -g 'daemon of…" About a minute ago Up About a minute 0.0.0.0:8888->80/tcp determined_mcnulty
C:\Farhaan>





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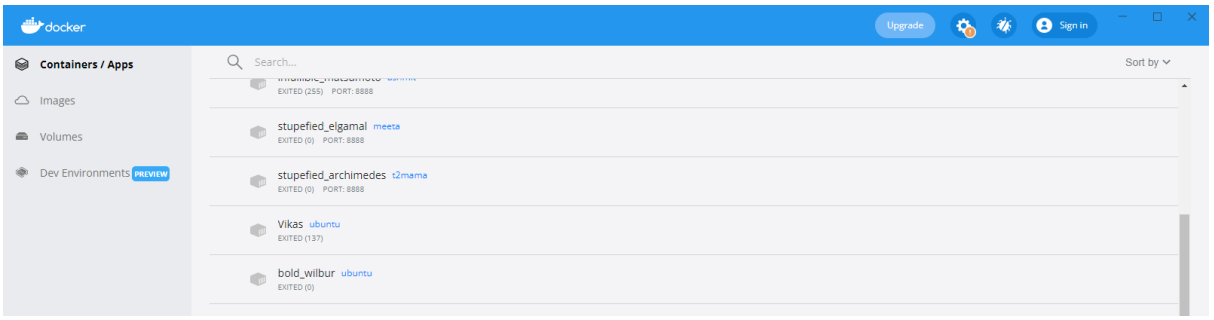
Phone No: 8291073855

Email Id: ffarooqui45@gmail.com



7. Post-Experiments Exercise

A. Extended Theory:

Nil

B. Questions:

- What is a Docker cheat sheet?
- Why do we require volumes for Docker?

C. Conclusion:

- Write what was performed in the experiment.
- Write the significance of the topic studied in the experiment.

D. References:

https://www.youtube.com/watch?v=zJ6WbK9zFpI
https://www.simplilearn.com/tutorials/docker-tutorial
https://www.edureka.co/blog/docker-explained/
https://www.youtube.com/watch?v=3c-iBn73dDE