Assignment 6

Question 1

Python program

Calculator.py


```python
def main():
    num1 = float(input("Enter the first number: "))
    num2 = float(input("Enter the second number: "))

    addition_result = num1 + num2
    multiplication_result = num1 * num2

    print(f"Addition result: {addition_result}")
    print(f"Multiplication result: {multiplication_result}")

if __name__ == "__main__":
    main()
~
~
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~
~
:wq
```

Create the Dockerfile


```dockerfile
FROM python:3.9-slim

WORKDIR /app

COPY calculator.py .

CMD ["python", "calculator.py"]
~
~
~
~
```

Build the docker image

```
Pushpak@ubuntu:~/assign/lab-6$ docker build -t calculator-image .
[+] Building 11.9s (8/8) FINISHED                                                    docker:default
 => [internal] load build definition from Dockerfile                                 0.1s
 => => transferring dockerfile: 128B                                                 0.0s
 => [internal] load metadata for docker.io/library/python:3.9-slim                   2.7s
 => [internal] load .dockerignore                                                    0.0s
 => => transferring context: 2B                                                      0.0s
 => [1/3] FROM docker.io/library/python:3.9-slim@sha256:6250eb7983c08b3cf5a7db9309f8630d3ca03dd152158fa37a3f8da  8.4s
 => => resolve docker.io/library/python:3.9-slim@sha256:6250eb7983c08b3cf5a7db9309f8630d3ca03dd152158fa37a3f8da  0.0s
 => => sha256:6250eb7983c08b3cf5a7db9309f8630d3ca03dd152158fa37a3f8daaf397085d 10.41kB / 10.41kB                 0.0s
 => => sha256:43e98aa4594b2a62ace026fb04338453f799bd6012b7933ecd442d6876787cb5 1.75kB / 1.75kB                  0.0s
 => => sha256:6a22698eab0ea915af39918e5d2e4f27e49afc6944fd1d97466e13820324bc62 5.41kB / 5.41kB                  0.0s
 => => sha256:2d429b9e73a6cf90a5bb85105c8118b30a1b2deedeae3ea9587055ffcb80eb45 29.13MB / 29.13MB                0.9s
 => => sha256:4920a3bd5f7ed3269b647eb643846a0652dc21daa31763b4afc848701981d141 3.51MB / 3.51MB                  0.6s
 => => sha256:77edb37367fad6d17c53a3cabdf41a57c0221a49f77250d97e3f5bb1fc1ed6e0 14.93MB / 14.93MB               1.0s
 => => sha256:02c34c079cc82f150c24eae4d136fd997632cd64c1f922aa8c5974be33792ae5 255B / 255B                     1.0s
 => => extracting sha256:2d429b9e73a6cf90a5bb85105c8118b30a1b2deedeae3ea9587055ffcb80eb45                       4.1s
 => => extracting sha256:4920a3bd5f7ed3269b647eb643846a0652dc21daa31763b4afc848701981d141                       0.4s
 => => extracting sha256:77edb37367fad6d17c53a3cabdf41a57c0221a49f77250d97e3f5bb1fc1ed6e0                       2.3s
 => => extracting sha256:02c34c079cc82f150c24eae4d136fd997632cd64c1f922aa8c5974be33792ae5                       0.0s
 => [internal] load build context                                                    0.1s
 => => transferring context: 393B                                                    0.0s
 => [2/3] WORKDIR /app                                                               0.3s
 => [3/3] COPY calculator.py .                                                       0.1s
 => exporting to image                                                               0.1s
 => => exporting layers                                                              0.1s
 => => writing image sha256:9b9d7e9f1c661611d5a31914bb3e71a9f3c20b21ed11e259c73bbaa4facd5b47                    0.0s
 => => naming to docker.io/library/calculator-image                                  0.0s
Pushpak@ubuntu:~/assign/lab-6$
```

Verify the image

```
Pushpak@ubuntu:~/assign/lab-6$ docker images
REPOSITORY        TAG       IMAGE ID       CREATED         SIZE
calculator-image  latest    9b9d7e9f1c66   48 seconds ago  126MB
```

Run the Container

```
Pushpak@ubuntu:~/assign/lab-6$ docker run -it calculator-image
Enter the first number: 23
Enter the second number: 54
Addition result: 77.0
Multiplication result: 1242.0
Pushpak@ubuntu:~/assign/lab-6$
```

Question-2

Create the index.html

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>My Webpage</title>
</head>
<body>
    <h1>Welcome to My Webpage!</h1>
    <p>This page is served using Docker and Apache HTTP server.</p>
</body>
</html>


~
~
~
~
```

Create the Dockerfile

```dockerfile
FROM httpd:latest


COPY index.html /usr/local/apache2/htdocs/index.html

EXPOSE 80
```

Build the docker image

```
Pushpak@ubuntu:~/assign/my-webpage$ vi index.html
Pushpak@ubuntu:~/assign/my-webpage$ vi Dockerfile
Pushpak@ubuntu:~/assign/my-webpage$ docker build -t my-apache-image .
[+] Building 6.7s (7/7) FINISHED                                          docker:default
 => [internal] load build definition from Dockerfile                          0.0s
 => => transferring dockerfile: 121B                                          0.0s
 => [internal] load metadata for docker.io/library/httpd:latest              2.5s
 => [internal] load .dockerignore                                            0.0s
 => => transferring context: 2B                                              0.0s
 => [internal] load build context                                            0.1s
 => => transferring context: 347B                                            0.0s
 => [1/2] FROM docker.io/library/httpd:latest@sha256:6bdbdf5ac16ac3d6ef543a693fd5dfafae2428b4b0cdc  3.7s
 => => resolve docker.io/library/httpd:latest@sha256:6bdbdf5ac16ac3d6ef543a693fd5dfafae2428b4b0cdc  0.0s
 => => sha256:d675ed392a91a9d52b3d1b8873c6b44be3738bc6d1b322fb64c1404de8d54072 145B / 145B          0.3s
 => => sha256:6bdbdf5ac16ac3d6ef543a693fd5dfafae2428b4b0cdc52a480166603a069136 10.16kB / 10.16kB    0.0s
 => => sha256:508271ee0b00954fcf504a53f1718d5d7e62ddc57a8958ab201d870e20606f7a 2.10kB / 2.10kB      0.0s
 => => sha256:dad6ca1caf78e98e22e8e5a406ab4a3427cedfff254c7fcc9dc3b2ca922c642b 8.00kB / 8.00kB      0.0s
 => => sha256:4f4fb700ef54461cfa02571ae0db9a0dc1e0cdb5577484a6d75e68dc38e8acc1 32B / 32B            0.5s
 => => sha256:3ed0d9182dde2c70e0817dc7ef1f02aad4da2eef2656098597257098a3bc8b5a 4.20MB / 4.20MB      0.9s
 => => extracting sha256:d675ed392a91a9d52b3d1b8873c6b44be3738bc6d1b322fb64c1404de8d54072            0.0s
 => => sha256:0062038102c990223e92353e4bab9ae1ee778f28f80a051879c5768dda84b10d 26.04MB / 26.04MB    1.5s
 => => extracting sha256:4f4fb700ef54461cfa02571ae0db9a0dc1e0cdb5577484a6d75e68dc38e8acc1            0.0s
 => => sha256:334a67c7f78bddd148eb4d24df67ed1ed4f3856c0d7edd9679a6a400dc54783c 291B / 291B          0.9s
 => => extracting sha256:3ed0d9182dde2c70e0817dc7ef1f02aad4da2eef2656098597257098a3bc8b5a            0.7s
 => => extracting sha256:0062038102c990223e92353e4bab9ae1ee778f28f80a051879c5768dda84b10d           1.6s
 => => extracting sha256:334a67c7f78bddd148eb4d24df67ed1ed4f3856c0d7edd9679a6a400dc54783c            0.0s
 => [2/2] COPY index.html /usr/local/apache2/htdocs/index.html                0.2s
 => exporting to image                                                        0.1s
 => => exporting layers                                                        0.0s
 => => writing image sha256:57090be22a47c7c56eb8e8873d378ea99c616b1629577b3b0108cd3938e37d5a         0.0s
 => => naming to docker.io/library/my-apache-image                           0.0s
Pushpak@ubuntu:~/assign/my-webpage$
```

Verify the image

```
Pushpak@ubuntu:~/assign/my-webpage$ docker images
REPOSITORY          TAG       IMAGE ID       CREATED          SIZE
my-apache-image     latest    57090be22a47   36 seconds ago   148MB
calculator-image    latest    9b9d7e9f1c66   9 minutes ago    126MB
Pushpak@ubuntu:~/assign/my-webpage$
```

Run the docker container

```
Pushpak@ubuntu:~/assign/my-webpage$ docker run -d -p 8000:80 --name my-apache-container my-apache-image
2f251f77c458fa32c048bd4e3dadc06e1742ee09668bcff942d15ce236d61e2c
Pushpak@ubuntu:~/assign/my-webpage$
```

Verify the Web page

Welcome to My Webpage!

This page is served using Docker and Apache HTTP server.

Using curl

```
Pushpak@ubuntu:~/assign/my-webpage$ curl localhost:8000
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>My Webpage</title>
</head>
<body>
    <h1>Welcome to My Webpage!</h1>
    <p>This page is served using Docker and Apache HTTP server.</p>
</body>
</html>

Pushpak@ubuntu:~/assign/my-webpage$
```

Question 3

Create test.py

```python
import mysql.connector
from mysql.connector import Error

def create_database():
    try:
        connection = mysql.connector.connect(
            host='mysql-container',
            user='root',
            password='rootpassword'
        )

        if connection.is_connected():
            print("Connected to MySQL server")

            cursor = connection.cursor()
            cursor.execute("CREATE DATABASE IF NOT EXISTS testdb")
            print("Database 'testdb' created or already exists.")

    except Error as e:
        print(f"Error: {e}")
    finally:
        if connection.is_connected():
            cursor.close()
            connection.close()
            print("MySQL connection is closed.")

if __name__ == "__main__":
    create_database()

~
~
~
                                                                          1,1              All
```

Create the Dockerfile

```dockerfile
FROM python:3.9-slim

RUN pip install mysql-connector-python

WORKDIR /app

COPY test.py .

CMD ["python", "test.py"]

~
~
~
```

Create the Docker network

```
Pushpak@ubuntu:~/assign/mysql-py$ docker network create app2
053798d19dbd72e7e8fe5ea48c5a4eb2c5a70706ba6a816264c7cfc62e54c1da
Pushpak@ubuntu:~/assign/mysql-py$ docker network ls
NETWORK ID      NAME       DRIVER     SCOPE
053798d19dbd    app2       bridge     local
9f0cd0655f62    bridge     bridge     local
e18cd1d993b8    host       host       local
6398904e976b    none       null       local
Pushpak@ubuntu:~/assign/mysql-py$ 
```

Run the MySQL container

```
Pushpak@ubuntu:~/assign/mysql-py$ docker run -d --name mysql-container \
  --network app2 \
  -e MYSQL_ROOT_PASSWORD=rootpassword \
  mysql:latest
Unable to find image 'mysql:latest' locally
latest: Pulling from library/mysql
f1a9f94fc2db: Pull complete
f98254a2b688: Pull complete
6ad83e89f981: Pull complete
a42d733ea779: Pull complete
6fd1af2601dd: Pull complete
0233a63dc5cd: Pull complete
5f31e56c9bea: Pull complete
c0fb96d14e5b: Pull complete
d57074c62694: Pull complete
7030c241d9b8: Pull complete
Digest: sha256:2be51594eba5983f47e67ff5cb87d666a223e309c6c64450f30b5c59a788ea40
Status: Downloaded newer image for mysql:latest
6820f68a565c716cb73381f33849ab924d5f30a0a02656eb57f7dd456dd82cb1
Pushpak@ubuntu:~/assign/mysql-py$ 
```

Build the Docker image for the test.py application.

```
Pushpak@ubuntu:~/assign/mysql-py$ docker build -t test-py-app .

[+] Building 7.4s (9/9) FINISHED                                                docker:default
 => [internal] load build definition from Dockerfile                                      0.0s
 => => transferring dockerfile: 156B                                                      0.0s
 => [internal] load metadata for docker.io/library/python:3.9-slim                        1.6s
 => [internal] load .dockerignore                                                         0.0s
 => => transferring context: 2B                                                           0.0s
 => CACHED [1/4] FROM docker.io/library/python:3.9-slim@sha256:6250eb7983c08b3cf5a7db9309f8630d3ca03dd15  0.0s
 => [internal] load build context                                                         0.1s
 => => transferring context: 828B                                                         0.0s
 => [2/4] RUN pip install mysql-connector-python                                          4.6s
 => [3/4] WORKDIR /app                                                                     0.1s
 => [4/4] COPY test.py .                                                                   0.1s
 => exporting to image                                                                     0.8s
 => => exporting layers                                                                    0.8s
 => => writing image sha256:93021db828cdf9598128685bed3eb9d8bc03589e69887fbcb986e9e0c313e76b  0.0s
 => => naming to docker.io/library/test-py-app                                             0.0s
Pushpak@ubuntu:~/assign/mysql-py$ _
```

Run the test.py container

```
Pushpak@ubuntu:~/assign/mysql-py$ docker run -d --name test-py-app --network app2 test-py-app
6b380ed7428097f3670f4cc1b874ec789f542293dec74a3644804f7f5bd71d4d
Pushpak@ubuntu:~/assign/mysql-py$ docker ps -a
CONTAINER ID    IMAGE            COMMAND              CREATED           STATUS                    PORTS
                                 NAMES
6b380ed74280    test-py-app      "python test.py"     19 seconds ago    Exited (0) 18 seconds ago
                                 test-py-app
6820f68a565c    mysql:latest     "docker-entrypoint.s…"  2 minutes ago  Up 2 minutes              3306/tc
p, 33060/tcp                     mysql-container
2f251f77c458    my-apache-image  "httpd-foreground"   13 minutes ago    Up 13 minutes             0.0.0.0
:8000->80/tcp, [::]:8000->80/tcp  my-apache-container
445e205e6279    calculator-image "python calculator.py" 22 minutes ago  Exited (0) 22 minutes ago
                                 sleepy_bouman
Pushpak@ubuntu:~/assign/mysql-py$
```

Run the test.py container

```
Pushpak@ubuntu:~/assign/mysql-py$ docker exec -it mysql-container mysql -u root -p
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 9
Server version: 9.1.0 MySQL Community Server - GPL

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affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> SHOW DATABASES;
+--------------------+
| Database           |
+--------------------+
| information_schema |
| mysql              |
| performance_schema |
| sys                |
| testdb             |
+--------------------+
5 rows in set (0.01 sec)

mysql>
```

Question 4

Create a docker-compose.yml File

```yaml
version: '3.8'

services:
  httpd_5000:
    image: httpd:latest
    container_name: httpd_5000
    ports:
      - "5000:80"
    volumes:
      - ./custom_index_5000.html:/usr/local/apache2/htdocs/index.html
    networks:
      - webnet

  httpd_6000:
    image: httpd:latest
    container_name: httpd_6000
    ports:
      - "6000:80"
    volumes:
      - ./custom_index_6000.html:/usr/local/apache2/htdocs/index.html
    networks:
      - webnet
```

-- INSERT --   4,1   Top

```yaml
  httpd_7000:
    image: httpd:latest
    container_name: httpd_7000
    ports:
      - "7000:80"
    volumes:
      - ./custom_index_7000.html:/usr/local/apache2/htdocs/index.html
    networks:
      - webnet

  httpd_8000:
    image: httpd:latest
    container_name: httpd_8000
    ports:
      - "8000:80"
    volumes:
      - ./custom_index_8000.html:/usr/local/apache2/htdocs/index.html
    networks:
      - webnet

networks:
  webnet:
    driver: bridge
```

-- INSERT --   43,1   Bot

Create an Index.html file

For port 5000 (custom_index_5000.html)

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Welcome to HPCSA</title>
</head>
<body>
    <h1>Welcome to HPCSA</h1>
</body>
</html>

~
~
```

For port 6000 (custom_index_6000.html)

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Welcome to DITISS</title>
</head>
<body>
    <h1>Welcome to DITISS</h1>
</body>
</html>
```

For port 7000 (custom_index_7000.html)

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Welcome to DAI</title>
</head>
<body>
    <h1>Welcome to DAI</h1>
</body>
</html>
```

For port 8000 (custom_index_8000.html)

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Welcome to ACTS</title>
</head>
<body>
    <h1>Welcome to ACTS</h1>
</body>
</html>
```
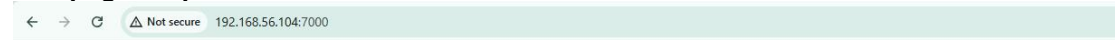
Run the container

```
Pushpak@ubuntu:~/assign/my-httpd-containers$ ls
custom_index_5000.html  custom_index_6000.html  custom_index_7000.html  custom_index_8000.html  docker-compose.yml
Pushpak@ubuntu:~/assign/my-httpd-containers$ docker-compose up -d
Creating httpd_5000 ... done
Creating httpd_6000 ... done
Creating httpd_7000 ... done
Creating httpd_8000 ... done
Pushpak@ubuntu:~/assign/my-httpd-containers$ docker ps -a
CONTAINER ID   IMAGE          COMMAND              CREATED         STATUS         PORTS
        NAMES
88e558335b30   httpd:latest   "httpd-foreground"   14 seconds ago  Up 13 seconds  0.0.0.0:6000->80/tcp, [::]:6000->8
0/tcp    httpd_6000
d94cbf6b67d2   httpd:latest   "httpd-foreground"   14 seconds ago  Up 13 seconds  0.0.0.0:8000->80/tcp, [::]:8000->8
0/tcp    httpd_8000
ba7e881572d5   httpd:latest   "httpd-foreground"   14 seconds ago  Up 13 seconds  0.0.0.0:7000->80/tcp, [::]:7000->8
0/tcp    httpd_7000
1d30d844d4aa   httpd:latest   "httpd-foreground"   14 seconds ago  Up 13 seconds  0.0.0.0:5000->80/tcp, [::]:5000->8
0/tcp    httpd_5000
Pushpak@ubuntu:~/assign/my-httpd-containers$
```

web page for port 5000

← → C ⚠ Not secure 192.168.56.104:5000

Welcome to HPCSA

Webpage for port 6000

← → C ⚠ Not secure 192.168.56.104:6001
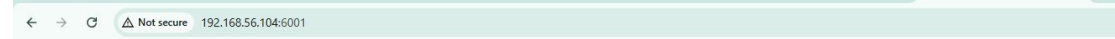
Welcome to DITISS

Webpage for port 7000

← → C ⚠ Not secure 192.168.56.104:7000

Welcome to DAI

Webpage for port 8000

← → C ⚠ Not secure 192.168.56.104:8000

Welcome to ACTS