Docker container:-

To uninstall docker which are pre install:-
sudo apt-get remove docker docker-engine docker.io

Update system by sudo apt-get install

Of some system command :- **sudo apt-get install docker-ce**
If this not work then:-
To get help command:- **docker install it will dive correct command**

To install docker- **sudo apt install docker.io**

For another packages:- Sudo snap install docker

To check weather the docker is install or not we pull docker image from docker hub by command
sudo docker run hello-world

To check it is pulled or not:- **sudo docker images**

It show docker images

To see all pull images:-
sudo docker ps -a

Experiment 28-

Write a python program to perform arithmetic operations and create Docker image accordingly.

Install the docker from above process.

Step 1:- Create a python file containing all arithmetic operations. Name of file must be "**calculator.py**"
Step 2: - Now create the Docker file by name "**Dockerfile".**
Add following content in it that file

```
# Dockerfile

# Use an official Python runtime as a parent image
FROM python:3.8
```

```
# Set the working directory to /app
WORKDIR /app

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

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

# Make port 80 available to the world outside this container
EXPOSE 80

# Define environment variable
ENV NAME World

# Run calculator.py when the container launches
CMD ["python", "calculator.py"]
```

Step 3:- Create a requirement file for some additional requirements for the python script use by us.
The name of file must be **“requirement.txt”**

Step 4:- Build the docker image by running the below command but condition is that all the file calculator,Docker,requirement must be in a single folder.

```
docker build -t calculator-app .
```

Step 4:- Now we run the docker image.

```
docker run -it calculator-app
```

Experiment Number 29:-

Run the Docker container with the created image .

Step 1:- There is no predefined container then create the container from above process (Experiment and create the docker image).

Step 2:- To run the docker image use command

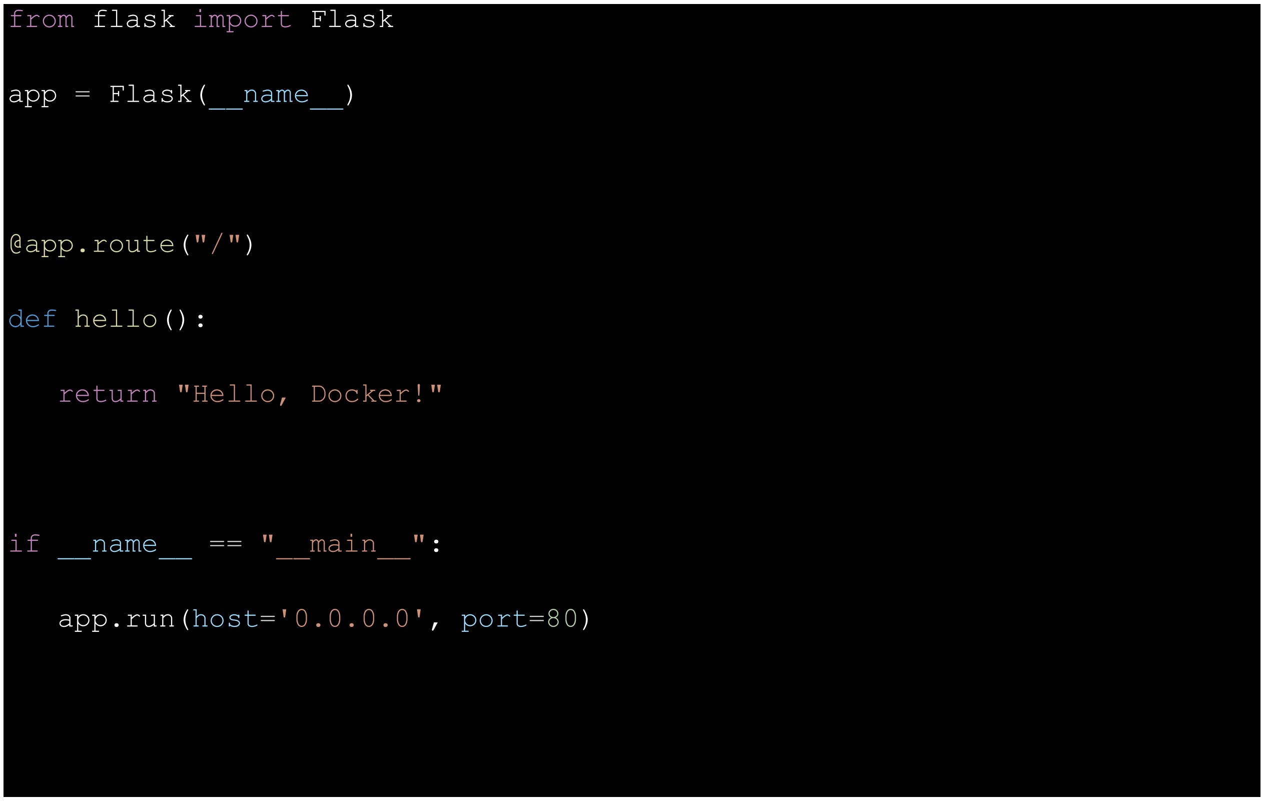
“docker run -it calculator-app”

Use your own file name instead of a calculator.

Experiment No 32

Run the Docker container from recently created image and run the container at port number 80 in the host system.

Step 1:- Create the python file by name app.py



```
from flask import Flask

app = Flask(__name__)


@app.route("/")

def hello():

   return "Hello, Docker!"


if __name__ == "__main__":

   app.run(host='0.0.0.0', port=80)
```

Step 2:-

Create the docker file by name Dockerfile

```
# Use an official Python runtime as a parent image

FROM python:3.6

# Set the working directory to /app

WORKDIR /app

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

COPY . /app

# Install any needed packages specified in requirements.txt

RUN pip install -r requirements.txt

# Make port 80 available to the world outside this container

EXPOSE 80

# Define environment variable

ENV NAME World

# Run app.py when the container launches

CMD ["python", "app.py"]
```

Step 4:- Create the file by name **“requirements.txt”**

In file type **“flask”**

```
flask
```

Sep 5:- Run the command

“sudo docker build -t flask-app .”

Step 6:- Run the command to open on port 80:80
sudo docker run -p 80:80 flask-app

In terminal of vs code it give one http:// address copy it and run it on browser

Example http://172.17.0.2:80/

Experiment 33:-

Create a simple Hello-world python flask application and create the docker image of that Flask application.

Repeat the above experiment again because it is done by flask only.

Experiment 34:-

Run the docker container from recently created image and run that docker container to 5000 port of host system.

Step 1:- Use the command to run

sudo docker build -t flask-app .

Step 2:- Ue this command to run on 5000

sudo docker run -p 5000:80 flask-app

Then see in terminal the https:// link copy it and use it on the browser.

Experiment 35:-

Exp19:-

Create two applications in two different docker containers. Push those applications and run to show the communications between two dockers.

Backend Application (Flask API)

1. **Create a directory for your project:**

   mkdir docker_communication_demo

   cd docker_communication_demo

2. **Create a file named `app.py` for the Flask API:**

```
# app.py
from flask import Flask, jsonify

app = Flask(__name__)

@app.route('/api/data')

def get_data():

   return jsonify({"message": "Hello from the backend!"})

if __name__ == '__main__':

   app.run(debug=True, host='0.0.0.0', port=5000)
```

3. **Create a `Dockerfile` for the backend:**

```
# Dockerfile

FROM python:3.8

WORKDIR /app

COPY requirements.txt .

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

COPY . .
```

```
CMD ["python", "app.py"]
```

4. Create a `requirements.txt` file:

```
Flask>=2.1.5

Werkzeug>=2.0.2
```

5.Build and run the backend Docker container:

docker build -t backend-app .

docker run -p 5000:5000 backend-app

Frontend Application (Flask Web App)

1. **Create a directory for the frontend in** same directory in which backend directory are there:

   mkdir frontend-app

   cd frontend-app

2. **Create a file named `app.py` for the Flask web app:**

   # app.py

```
from flask import Flask, render_template

import requests

app = Flask(__name__)

backend_url = "http://backend:5000"  # This is the Docker service name

@app.route('/')

def home():

   response = requests.get(f"{backend_url}/api/data")
```

```
    data = response.json()

    return render_template('index.html', message=data['message'])

if __name__ == '__main__':

    app.run(debug=True, host='0.0.0.0', port=5001)
```

3. Create a `Dockerfile` for the frontend:

```
# Dockerfile

FROM python:3.8

WORKDIR /app

COPY requirements.txt .

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

COPY . .

CMD ["python", "app.py"]
```

4. Create a `requirements.txt` file:

```
Flask>=2.1.5

requests==2.26.0
```

5.Create a directory named `templates` and add a file named `index.html`:

```
<!-- templates/index.html -->
```

```
<!DOCTYPE html>

<html lang="en">

<head>
```

```
   <meta charset="UTF-8">

   <meta http-equiv="X-UA-Compatible" content="IE=edge">

   <meta name="viewport" content="width=device-width, initial-scale=1.0">

   <title>Docker Communication Demo</title>

</head>

<body>

   <h1>{{ message }}</h1>

</body>

</html>
```

6. **Build and run the frontend Docker container:**

```
docker build -t frontend-app .

docker run -p 5001:5001 --link backend frontend-app
```

Docker-compose File

Create a docker-compose.yml file in your project directory along with frontend and backed directory **with the following content:**

```
version: '3'

services:

 backend:

   build:

     context: ./docker_communication_demo

   ports:

     - "5000:5000"
 frontend:

   build:

     context: ./frontend-app

   ports:

     - "5001:5001"

   depends_on:

     - backend
```

Run command:-

docker-compose up

Exp :- 37

Create a docker image of simple login form using Flask on port 7000.

Step 1:-

Create a file named `app.py` with the following code for a simple Flask login form:

```
# app.py

from flask import Flask, render_template, request



app = Flask(__name__)



@app.route('/')

def index():

   return render_template('login.html')
```

```python
@app.route('/login', methods=['POST'])
def login():
    username = request.form['username']
    password = request.form['password']

    # Add your login logic here (for simplicity, we'll just print the credentials)
    print(f"Username: {username}, Password: {password}")

    return 'Login successful!'

if __name__ == '__main__':
    app.run(debug=True, host='0.0.0.0', port=7000)
```

Step 2: Create HTML Template Create a folder named `templates` and inside it, create a file named `login.html` with the following content:

```html
<!-- templates/login.html -->
<!DOCTYPE html>
<html>
<head>
    <title>Login</title>
</head>
<body>
    <h2>Login Form</h2>
    <form action="/login" method="post">
        <label for="username">Username:</label>
        <input type="text" id="username" name="username" required><br>

        <label for="password">Password:</label>
```

```
       <input type="password" id="password" name="password" required><br>

       <input type="submit" value="Login">
   </form>
</body>
</html>
```

Step 3: Create a Dockerfile Create a file named `Dockerfile` in the same directory as your `app.py` with the following content:

```
# Dockerfile
FROM python:3.8

WORKDIR /app

COPY requirements.txt .

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

COPY . .

EXPOSE 7000

CMD ["python", "app.py"]
```

Step 4: Create a requirements.txt file in the same directory as your `app.py` Create a file named `requirements.txt` with the following content:

```
Flask>=2.0.1
Werkzeug>=2.0.1
```

Step 5: Build the Docker Image Open a terminal, navigate to the directory containing your `Dockerfile`, `app.py`, `templates`, and `requirements.txt` files, and run the following command to build the Docker image:

```
docker build -t flask-login-app .
```

Step 6: Run the Docker Container After building the image, run the Docker container with the following command:

```
docker run -p 7000:7000 flask-login-app
```

Now, you should be able to access the simple login form at `http://localhost:7000` in your web browser.

Exp :- 38

Create a docker image of simple login form using django on port 6000.

Step 1: Create a Django Project

```
# Create a directory for your project
mkdir simple_login_django

# Navigate to the project directory
cd simple_login_django

# Create a virtual environment (optional but recommended)
python3 -m venv venv
source venv/bin/activate  # On Windows, use `venv\Scripts\activate`

# Install Django
pip install django

# Create a Django project
django-admin startproject simplelogin
```

Step 2: Create a Django App

# Navigate to the project directory
cd simplelogin

# Create a Django app
python manage.py startapp loginapp

Step 3: Update `loginapp/views.py`

Create a file named `views.py` inside the `loginapp` directory with the following content:

```
from django.shortcuts import render
from django.http import HttpResponse

def login(request):
   return render(request, 'loginapp/login.html', {})

def success(request):
   return HttpResponse("Successful Login!")
```

Step 4: Create `loginapp/templates/loginapp/login.html`

Create a `templates` directory inside the `loginapp` directory, and inside it, create a file named `login.html` with the following content:

```
<!DOCTYPE html>
<html>
<head>
   <title>Login Page</title>
</head>
<body>
   <h2>Login</h2>
   <form action="/success/" method="post">
       {% csrf_token %}
       <label for="username">Username:</label>
       <input type="text" name="username" id="username" required>
       <br>
```

```
        <label for="password">Password:</label>
        <input type="password" name="password" id="password" required>
        <br>
        <input type="submit" value="Login">
    </form>
</body>
</html>
```

Step 5: Update `loginapp/urls.py`

Create a file named `urls.py` inside the `loginapp` directory with the following content:

```
from django.urls import path

from . import views



urlpatterns = [

    path('login/', views.login, name='login'),

    path('success/', views.success, name='success'),

]
```

Step 6: Update `simplelogin/urls.py`

Update the `urls.py` file inside the `simplelogin` directory with the following content:

```
from django.contrib import admin
from django.urls import include, path

urlpatterns = [
    path('admin/', admin.site.urls),
    path('', include('loginapp.urls')),
]
```

Update in the setting.py file with following content:-

```
TEMPLATES = [
    {
        'BACKEND': 'django.template.backends.django.DjangoTemplates',
        'DIRS': [BASE_DIR / 'loginapp' / 'templates'],
        'APP_DIRS': True,
        'OPTIONS': {
            'context_processors': [
                'django.template.context_processors.debug',
                'django.template.context_processors.request',
                'django.contrib.auth.context_processors.auth',
                'django.contrib.messages.context_processors.messages',
            ],
        },
    },
]
```

Step 8: Dockerize the Application

Create a `Dockerfile` in the project root in the level of manage.py file with the following content:

```
# Use an official Python runtime as a parent image
FROM python:3.8-slim

# Set the working directory to /app
WORKDIR /app

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

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

# Make port 6000 available to the world outside this container
EXPOSE 6000

# Define environment variable
ENV NAME simplelogin
```

```
# Run app.py when the container launches
CMD ["python", "manage.py", "runserver", "0.0.0.0:6000"]
```

Step 9: Create a `requirements.txt` file

Create a file named `requirements.txt` in the project root in the level of manage.py file with the following content:

```
Django==3.2.5
```

Step 10: Build and Run the Docker Image

# Build the Docker image
docker build -t simple-login-django .

# Run the Docker container
docker run -p 8000:6000 simple-login-django

Open your web browser and navigate to http://localhost:8000/login/. You should see the login page. Enter any username and password, and you'll be redirected to the success page.

Verify Directory Structure:

Ensure that your directory structure is correct. The `templates` directory should be inside the `loginapp` directory.

```
simple_login_django/
├── loginapp/
│   ├── templates/
│   │   └── loginapp/
│   │    └── login.html
│   ├── __init__.py
│   ├── admin.py
│   ├── apps.py
│   ├── migrations/
│   ├── models.py
│   ├── tests.py
│   └── views.py
├── simplelogin/
│   ├── __init__.py
│    ├── asgi.py
│    ├── settings.py
│    ├── urls.py
│    └── wsgi.py
├── venv/
└── Dockerfile
```

Exp:-39
Create a container with ngnix web server and create one more container with mysql.

1. Create the Nginx Container:

Step 1: Create an Nginx Dockerfile

Create a file named `Dockerfile.nginx` with the following content:

```
# Dockerfile.nginx

FROM nginx:latest

# Copy custom Nginx configuration

COPY nginx.conf /etc/nginx/nginx.conf

# Expose port 80

EXPOSE 80

# Start Nginx

CMD ["nginx", "-g", "daemon off;"]
```

Step 2: Create an Nginx Configuration File

Create a file named `nginx.conf` with your custom Nginx configuration. For simplicity, you can start with a basic configuration:

```
# nginx.conf
user  nginx;
worker_processes  1;
error_log  /var/log/nginx/error.log warn;
pid        /var/run/nginx.pid;
events {
   worker_connections  1024;
}
http {
   include       /etc/nginx/mime.types;
   default_type  application/octet-stream;
   log_format  main '$remote_addr - $remote_user [$time_local] "$request"'
                     '$status $body_bytes_sent "$http_referer" '
                     '"$http_user_agent" "$http_x_forwarded_for"';
   access_log  /var/log/nginx/access.log  main;
   sendfile        on;
   keepalive_timeout  65;
   include /etc/nginx/conf.d/*.conf;
}
```

Step 3: Build and Run the Nginx Container

docker build -t nginx-container -f Dockerfile.nginx .
docker run -d -p 80:80 --name nginx-container nginx-container

2. Create the MySQL Container:

Step 1: Create a MySQL Dockerfile

Create a file named `Dockerfile.mysql` with the following content:

```
# Dockerfile.mysql

FROM mysql:latest

# Set environment variables

ENV MYSQL_ROOT_PASSWORD=root_password \

   MYSQL_DATABASE=my_database \

   MYSQL_USER=my_user \

   MYSQL_PASSWORD=my_password

# Expose port 3306

EXPOSE 3306

# Start MySQL

CMD ["mysqld"]
```

Step 2: Build and Run the MySQL Container

docker build -t mysql-container -f Dockerfile.mysql .
docker run -d -p 3306:3306 --name mysql-container mysql-container

Verify Containers

You can access the Nginx welcome page by visiting `http://localhost` in your web browser.

View Running Containers

docker ps

docker inspect mysql-container

docker exec -it mysql-container bash

mysql -u root -p
password= `root_password`

Exp:-40
Create a simple web form to insert the records in mysql data base.

Step 1: Create a New Directory

Create a new directory for your project. For example:

mkdir lamp-web-form
cd lamp-web-form

Step 2: Create Dockerfile for PHP and Apache

Create a file named `Dockerfile` in the project directory:

```
# Dockerfile

FROM php:7.4-apache

# Install MySQLi extension

RUN docker-php-ext-install mysqli

COPY src/ /var/www/html/

EXPOSE 80
```

Step 3: Create the Source Directory

Create a directory named `src` in the project directory:

mkdir src

Step 4: Create PHP Script with Web Form

Inside the `src` directory, create a file named `index.php` with the following content:

```
<!-- src/index.php -->
<!DOCTYPE html>
<html>
<head>
   <title>Simple PHP Web Form</title>
</head>
<body>
   <h1>Web Form to Insert Records</h1>
   <form action="insert.php" method="post">
       <label for="name">Name:</label>
       <input type="text" id="name" name="name" required><br>

       <label for="email">Email:</label>
       <input type="email" id="email" name="email" required><br>
       <input type="submit" value="Submit">
   </form>
```

```
</body>
</html>
```

Inside the `src` directory, create a file named `insert.php` with the following content:

```
<!-- src/insert.php -->
<?php
$host = 'mysql';
$user = 'my_user';
$password = 'my_password';
$database = 'my_database';
$conn = new mysqli($host, $user, $password, $database);
if ($conn->connect_error) {
    die("Connection failed: " . $conn->connect_error);
}
if ($_SERVER["REQUEST_METHOD"] == "POST") {
    $name = $_POST["name"];
    $email = $_POST["email"];
    $sql = "INSERT INTO users (name, email) VALUES ('$name', '$email')";
    if ($conn->query($sql) === TRUE) {
        echo "<p>New record inserted successfully</p>";
    } else {
        echo "Error: " . $sql . "<br>" . $conn->error;
    }
}

$conn->close();

?>
```

Step 5: Create Dockerfile for MySQL

Create a file named `Dockerfile.mysql` in the project directory:

```
# Dockerfile.mysql

FROM mysql:latest

# Set environment variables

ENV MYSQL_ROOT_PASSWORD=root_password

ENV MYSQL_DATABASE=my_database

ENV MYSQL_USER=my_user

ENV MYSQL_PASSWORD=my_password

# Copy initialization SQL script

COPY init.sql /docker-entrypoint-initdb.d/

# Expose the MySQL port

EXPOSE 3306
```

Create a file named `init.sql` in the same directory as your `Dockerfile.mysql` with the following content:

```
-- init.sql

CREATE DATABASE IF NOT EXISTS my_database;

USE my_database;

CREATE TABLE IF NOT EXISTS users (
   id INT AUTO_INCREMENT PRIMARY KEY,

   name VARCHAR(255) NOT NULL,

   email VARCHAR(255) NOT NULL

);
```

Step 6: Create Docker Compose File

Create a file named `docker-compose.yml` in the project directory:

```
version: '3'

services:
 web:
   build:
     context: .
     dockerfile: Dockerfile
   ports:
     - "8080:80"
   depends_on:
     - mysql
   environment:
     MYSQL_HOST: mysql
     MYSQL_USER: root
     MYSQL_PASSWORD: root_password
     MYSQL_DATABASE: my_database

 mysql:
   build:
     context: .
     dockerfile: Dockerfile.mysql
   ports:
     - "3306:3306"

 phpmyadmin:
   image: phpmyadmin/phpmyadmin
   ports:
     - "8081:80"
```

```
    environment:
      PMA_HOST: mysql
      PMA_USER: root
      PMA_PASSWORD: root_password
```

Step 7: Build and Run the Docker Containers

Run the following commands to build and run the Docker containers:

docker-compose build

docker-compose up -d

Visit `http://localhost:8080` in your web browser to access the web form

Visit http://localhost:8081 in your web browser to access the phpMyAdmin to see your data is inserted or not

Exp:-42

Write a Docker File to pull the Ubuntu with open jdk and write any java application.

Step 1: Create the Java Application

Create a directory for your Java application and add a file named `MyApp.java`:

```
// MyApp.java

public class MyApp {

    public static void main(String[] args) {

        System.out.println("Hello, Docker!");

    }
}
```

Step 2: Create Dockerfile

In the same directory as your Java application, create a file named `Dockerfile`:

```
# Use the official Ubuntu base image
FROM ubuntu:latest
# Install OpenJDK
RUN apt-get update && \
   apt-get install -y openjdk-11-jdk
# Set the working directory
WORKDIR /app
# Copy the Java application into the container
COPY MyApp.java .
# Compile the Java application
RUN javac MyApp.java
# Define the command to run the application
CMD ["java", "MyApp"]
```

Step 3: Build the Docker Image

docker build -t my-java-app .

Step 4: Run the Docker Container

docker run my-java-app

43. **Run a LAMP Stack Container at port 8080 and host media wiki site on native machine.**

1] create docker-compose file:-

```
# MediaWiki with MySQL

version: '3'

services:

 mediawiki:

   image: mediawiki:1.38

   restart: always

   networks:

     - docker_network

   ports:

     - 8080:80

   # volumes:

   #   - ./LocalSettings.php:/var/www/html/LocalSettings.php

# After initial setup, download LocalSettings.php to the same directory as

# this yaml and uncomment the following line and use compose to restart

# the mediawiki service

 database:

   image: mysql:8.0.29

   restart: always

   networks:

     - docker_network
   environment:

     MYSQL_DATABASE: wiki_db

     MYSQL_ROOT_PASSWORD: root

     MYSQL_USER: wikimedia

     MYSQL_PASSWORD: wikimedia

   volumes:

     - /var/lib/mysql

 # phpmyadmin

 phpmyadmin:

   depends_on:

     - database

   image: phpmyadmin/phpmyadmin

   restart: always

   ports:

     - '8000:80'

   environment:

     PMA_HOST: database

     MYSQL_ROOT_PASSWORD: root

     UPLOAD_LIMIT: 64M

   networks:

     - docker_network

networks:

 docker_network:
    driver: bridge
```

2. Follow the installation instruction

While database configuration

Change database host:-

Localhost to database

Change database name:-

wiki_db

Password:-

root

When we install docker, docker info command will not run and give the following error. So to fix it write the command:

ERROR: permission denied while trying to connect to the Docker daemon socket at unix:///var/run/docker.sock: Get "http://%2Fvar%2Frun%2Fdocker.sock/v1.24/info": dial unix /var/run/docker.sock: connect: permission denied

Command: sudo chmod 666 /var/run/docker.sock

If docker-compose not found: Then run following command:

```
sudo curl -L
https://github.com/docker/compose/releases/download/1.21.0/docker-compose-$(uname -s)-$(uname -m) -o /usr/local/bin/docker-compose

sudo chmod +x /usr/local/bin/docker-compose
```

23. With the help of Docker-compose deploy the ‘Wordpress’ and ‘Mysql’ container and access the front end of ‘Wordpress’

Docker Compose file to be written for this experiment:

```
version: '3'

services:
 # Database services for wordpress we use mysql
 mysql_db:
   container_name: mysql_container
   image: mysql:8.2
   restart: always
   environment:
     MYSQL_ROOT_PASSWORD: it
     MYSQL_DATABASE: wordpress_db
     MYSQL_USER: Ankur
     MYSQL_PASSWORD: Ankur2003@
   volumes:
     - mysql:/var/lib/mysql
  wordpress:
   depends_on:
     - mysql_db
   image: wordpress:latest
   restart: always
   ports:
     - "8080:80"
   environment:
     WORDPRESS_DB_HOST: mysql_db:3306
     WORDPRESS_DB_USER: Ankur
     WORDPRESS_DB_PASSWORD: Ankur2003@
     WORDPRESS_DB_NAME: wordpress_db
   volumes:
     - "./:/var/www/html"

volumes:
 mysql: {}
```

Command: sudo docker-compose up
To Open Website: localhost

24. **Create a simple Hello-world python flask application and create the docker image of that Flask application. Run application on port 5000.**

Make A directory Named: Docker_Flask.
Make 3 files: app.py, Dockerfile, requirements.txt

app.py:

```
from flask import Flask
import os

app = Flask(__name__)

@app.route("/")
def hello():
   return "Flask inside Docker!!"


if __name__ == "__main__":
   port = int(os.environ.get("PORT", 5000))
   app.run(debug=True,host='0.0.0.0',port=port)
```

requirements.txt

```
flask
```

Dockerfile:

```
FROM python:3.6
COPY . /app
WORKDIR /app
RUN pip install -r requirements.txt
ENTRYPOINT ["python"]
CMD ["app.py"]
```

Then Run two commands:
docker build -t simple-flask-app:latest .

docker run -d -p 5000:5000 simple-flask-app
Link: localhost:5000

21. **Pull the LAMP Stack container from docker hub and host a web application of your own. Push that image back to repository. Make use of database.**

https://github.com/raptor-2001/php-dockerized-form

28. **Write a python program to perform arithmetic operations and create Docker image accordingly.**

Create a Directory: Python-App.
A file app.py with content:

```
print("Hello World")
```

Change the program with arithmetic operations program.

Dockerfile:

```
FROM python:3.9
WORKDIR /app
COPY . /app
EXPOSE 80
ENV NAME World
CMD ["python", "app.py"]
```

Build the image:
docker build -t my-python-app .
docker run -p 4000:80 my-python-app

25. **Create the ‘nginx’ container from ‘nginx’ image. And create the load balancing so that if we go to the address of ‘nginx ‘ it can redirect it to the above created applications (Flask and Wordpress).**

In this experiment, we need to perform load balancing between two applications/image, {wordpress, flask application}.

Directory Structure:

```
Root Directory:
        flask_app
                app.py
                Dockerfile
                requirements.txt
        docker-compose.yaml
        nginx.conf
```

Command to make application work: docker-compose up
localhost:5000 -> Flask Application
localhost:8080 -> Wordpress Application
localhost -> Any application depending upon balancer.

Create Flask Application similar to that of experiment 24.

Content of Dockerfile:

```
events {}

http {
   upstream backend {
       server flask:5000;
       server wordpress:80;
   }

   server {
       listen 80;

       location / {
           proxy_pass http://backend;
           proxy_set_header Host $host;
           proxy_set_header X-Real-IP $remote_addr;
           proxy_set_header X-Forwarded-For
$proxy_add_x_forwarded_for;
           proxy_set_header X-Forwarded-Proto $scheme;
       }
   }
}
```

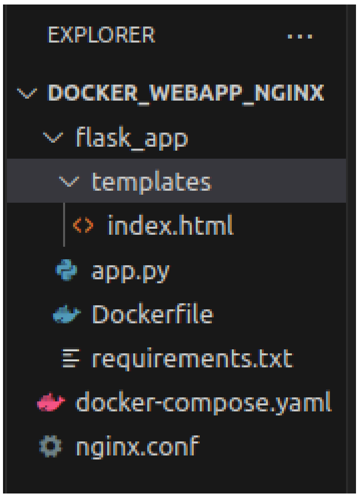
Content of docker-compose.yaml:

```
version: '3'

services:
 nginx:
   image: nginx:latest
   ports:
     - "80:80"
   volumes:
     - ./nginx.conf:/etc/nginx/nginx.conf
   depends_on:
     - flask
     - wordpress

 flask:
   build:
     context: ./flask_app
   ports:
     - "5000:5000"

 mysql_db:
   container_name: mysql_container
   image: mysql:8.2
   restart: always
   environment:
     MYSQL_ROOT_PASSWORD: it
     MYSQL_DATABASE: wordpress_db
     MYSQL_USER: Ankur
     MYSQL_PASSWORD: Ankur2003@
   volumes:
     - mysql:/var/lib/mysql
  wordpress:
   depends_on:
     - mysql_db
   image: wordpress:latest
   restart: always
   ports:
     - "8080:80"
   environment:
     WORDPRESS_DB_HOST: mysql_db:3306
     WORDPRESS_DB_USER: Ankur
     WORDPRESS_DB_PASSWORD: Ankur2003@
     WORDPRESS_DB_NAME: wordpress_db
   volumes:
     - "./:/var/www/html"

volumes:
 mysql: {}
```

Command to run this experiment:
docker-compose up -d
Write localhost to access site.

31. Create a web application with simple web page containing login details and create a docker image of the application.(Use Ngnix Web server)
We need to build a flask application with login details and using nginx web server, we need to create image.

Directory Structure:



```
EXPLORER ...
DOCKER_WEBAPP_NGINX
  flask_app
    templates
      index.html
    app.py
    Dockerfile
    requirements.txt
  docker-compose.yaml
  nginx.conf
```

Content of flask application similar to that of experiment 24. Some changes in app.py and templates folder is added.

app.py:

```
from flask import Flask, render_template
import os

app = Flask(__name__)

@app.route('/')
def index():
   return render_template('index.html')

if __name__ == '__main__':
   port = int(os.environ.get("PORT", 5000))
   app.run(debug=True,host='0.0.0.0',port=port)
```

Index.html:

```
<!-- templates/index.html -->
<!DOCTYPE html>
<html lang="en">
<head>
   <meta charset="UTF-8">
   <meta name="viewport" content="width=device-width, initial-
scale=1.0">
   <title>Login Page</title>
```

```
</head>
<body>
    <h2>Login</h2>
    <form action="/login" method="post">
        <label for="username">Username:</label>
        <input type="text" id="username" name="username" required>
        <br>
        <label for="password">Password:</label>
        <input type="password" id="password" name="password" required>
        <br>
        <input type="submit" value="Login">
    </form>
</body>
</html>
```

nginx.conf file:

```
events {}

http {
    upstream backend {
        server flask:5000;
    }

    server {
        listen 80;

        location / {
            proxy_pass http://backend;
            proxy_set_header Host $host;
            proxy_set_header X-Real-IP $remote_addr;
            proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;
            proxy_set_header X-Forwarded-Proto $scheme;
        }
    }
}
```

docker-compose.yaml:

```
version: '3'

services:
 nginx:
   image: nginx:latest
   ports:
     - "80:80"
   volumes:
     - ./nginx.conf:/etc/nginx/nginx.conf
   depends_on:
     - flask

 flask:
   build:
     context: ./flask_app
   ports:
     - "5000:5000"
```

Experiment 19: Docker communication

1. Create a back-end server in flask or NodeJs or any other :

```
const http=require("http");
const hostname="0.0.0.0";
const port=3000;
const server=http.createServer((req,res)=>{
   console.log("Request of "+req.url,+" by "+req.method);
     res.end("Hello User from ProjectI");

})
server.listen(port,hostname,()=>{
    console.log(`Server listening at +${hostname}:${port}`);
})
```

2. Dockerize it using Dockerfile:

```
# Use an official Node.js image as a base image
FROM node:latest

# Set the working directory in the container
WORKDIR /usr/src/app

# Copy the application code to the container
COPY . .

# Install npm dependencies
RUN npm install


# Specify the command to run on container start
CMD ["npm", "start"]

EXPOSE 3000
```

3. **After dockerizing it :**
use below command to get container id:

```
docker ps -a
```

use below command to get container ip_adress:

```
docker inspect ${container_id}
```

4. **Create another container in which image running should be alpine.**
Use wget -qO- 172.17.0.2:3000
If message is displayed then assignment is completed .

Experiment No. 20 Youtrack :
In this experiment, we need to get a open source code and make a docker file of it and run it.
https://github.com/uniplug/youtrack-docker.git

The above is the link I have used to take reference of open source code i.e youtrack.

From the above link you will get the docker image, u need to run the docker image .
On running a container, we get a token on the terminal and that token is used on running container IP address and our Youtrack is configured and ready to be used .
e.g. 172.17.0.2

Docker Installation

1. for pkg in docker.io docker-doc docker-compose docker-compose-v2 podman-docker containerd runc; do sudo apt-get remove $pkg; done
2. sudo apt-get update
3. sudo apt-get install ca-certificates curl gnupg
4. sudo install -m 0755 -d /etc/apt/keyrings
5. curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo gpg --dearmor -o /etc/apt/keyrings/docker.gpg
6. sudo chmod a+r /etc/apt/keyrings/docker.gpg
7.
   ```
   echo \
   "deb [arch=$(dpkg --print-architecture) signed-by=/etc/apt/keyrings/docker.gpg]
   https://download.docker.com/linux/ubuntu \
     $(. /etc/os-release && echo "$VERSION_CODENAME") stable" | \
   sudo tee /etc/apt/sources.list.d/docker.list > /dev/null
   ```
8. sudo apt-get update
9. sudo apt-get install docker-ce docker-ce-cli containerd.io docker-buildx-plugin docker-compose-plugin

Verify that the Docker Engine installation is successful by running the `hello-world` image.

10. sudo docker run hello-world

Create Docker image:

1. Go the the directory where the application files exists.
2. Create docker file
gedit Dockerfile
3. Write this in Dockerfile

```
FROM ubuntu
COPY . .
CMD ["echo","Hello,there"]
```

It means that the ubuntu is used as a VM to create the docker image.
COPY . . means it copies the entire content of the current directory to the current directory of the docker images. So, this copies everything present in our directory to the VM
CMD is used to give any instructions in the docker file

4. To build Docker image
   Sudo docker build -t mydocker .
5. To run docker image
   Sudo docker run mydocker
6. To see all docker images
Sudo docker images

7. To open terminal of the docker image
Sudo docker run -it mydocker bash

It means interactive mode

If we want to build our dockerfile on a base images eg. nginx

1. Write this in dockerfile

It shows the location in the images where to copy

2. Then build Docker image
   Sudo docker build -t mydocker .
3. Run docker container from docker image
   Sudo docker run -d -p 8080:80 mydocker
   8080 is the host machine's port from where we can access our application using web browser. It maps port 8080 in host to port 80 in container.
4. We can access our application from the web browser
   localhost:8080
   And download our file by localhost:8080/1.py

Docker Experiment example
Create a web application with simple web page containing login details and create a docker image of the application.(Use Apache Web server) Run the Docker container from recently created image and run the container at port number 80 in host system.

1. Create HTML Form
2. Create docker file
   FROM httpd:latest
   COPY index.html /usr/local/apache2/htdocs/
3. Build docker image
   docker build -t simple-web-app .
4. Run docker container
   docker run -d -p 80:80 simple-web-app
5. Access the form from
   localhost:80

FTP

1. sudo apt update

2. sudo apt install vsftpd
3. Sudo service vsftpd status
4. Sudo nano /etc/vsftpd.conf
   Uncomment write_enable=YES
   ADD
   user_sub_token=$USER
   local_root=/home/$USER/ftp
   pasv_min_port=10000
   pasv_max_port=10100
   userlist_enable=YES
   userlist_file=/etc/vsftpd.userlist
   userlist_deny=NO

5. sudo ufw allow from any to any port 20,21,10000:10100 proto tcp
6. sudo adduser ftpuser1
   password : abcd
7. sudo mkdir /home/ftpuser1/ftp
8. sudo chown nobody:nogroup /home/ftpuser1/ftp
9. sudo chmod a-w /home/ftpuser1/ftp
10. sudo mkdir /home/ftpuser1/ftp/upload
11. sudo chown ftpuser1:ftpuser1 /home/ftpuser1/ftp/upload
12. echo "My FTP Server" | sudo tee /home/ftpuser1/ftp/upload/demo.txt
13. sudo ls -la /home/ftpuser1/ftp
14. echo "Adwait" | sudo tee -a /etc/vsftpd.userlist
15. sudo systemctl restart vsftpd
16. ifconfig
    Take first ip address (inet ke baju ka)
17. Go to Other Locations on the PC and write ftp://your-ip-address
18. Login from the created ftpuser1
19. We see the files of the ftpuser1

Telnet

1. In one machine/terminal, configure the server for telnet
   ```
   sudo apt install telnetd xinetd
   ```
2. Check if it is running
   ```
   sudo systemctl status xinetd.service
   ```
3. If is not active/running
   ```
   sudo systemctl start xinetd.service
   ```
4. Create Telnet file
   ```
   sudo nano /etc/xinetd.d/telnet
   ```

   Write below in the file
   ```
   service telnet

   {

   disable = no
   flags = REUSE
   socket_type = stream
   wait = no
   user = root
   server = /usr/sbin/in.telnetd
   log_on_failure += USERID

   }
   ```
5. Then save and close the file and restart xinetd.service as follows:
   ```
    sudo systemctl restart xinetd.service
   ```
6. Telnet server uses port 23 for listening to the incoming connections. Therefore, you will need to open this port in your firewall. Run the command below to do so :

   ```
   sudo ufw allow 23
   ```

7. Note the ip address ->10.10.13.226 //in my case
8. Open new terminal which would be the client
   Now you can connect to your Telnet server from another machine (where the Telnet client is installed). On your client machine, use the following command syntax to connect to the Telnet server:
   ```
   telnet 10.10.13.226
   ```

NFS

Letters a,b,c,d tell us the order of executing steps

Open 2 separate terminals for client and server

A Server

```
1.sudo apt update
2.sudo apt install nfs-kernel-server
3.sudo mkdir -p /mnt/nfs_share
4.sudo chown -R nobody:nogroup /mnt/nfs_share/
5.sudo chmod 777 /mnt/nfs_share/
6.sudo nano /etc/exports
7.sudo exportfs -a
8.sudo systemctl restart nfs-kernel-server
9.sudo ufw allow from 10.10.13.133 to any port nfs
10.udo ufw enable
11.sudo ufw status
```

B client

```
1.sudo apt update
2.sudo apt install nfs-common
3.sudo mkdir -p /mnt/nfs_clientshare
4.sudo mount 10.10.13.133:/mnt/nfs_share /mnt/nfs_clientshare
```

C server

```
1.cd /mnt/nfs_share
2.touch file1.txt file2.txt file3.txt
```

D client

```
1.ls -l /mnt/nfs_clientshare/
```

SVN

SVN stands for Subversion. It is an open-source centralized version control system written in Java, licensed under Apache. Software developers use Subversion to maintain current and historical versions of files such as source code.

Step 1: Install Apache2

- sudo apt update
- sudo apt install apache2 apache2-utils

We have installed Apache2 now let’s start and enable it.

- sudo systemctl start apache2.service
- sudo systemctl enable apache2.service

We have successfully set-up and enable the HTTP web server. Let’s install SVN now.

Step 2: Install SVN

- sudo apt-get install subversion libapache2-mod-svn subversion-tools libsvn-dev

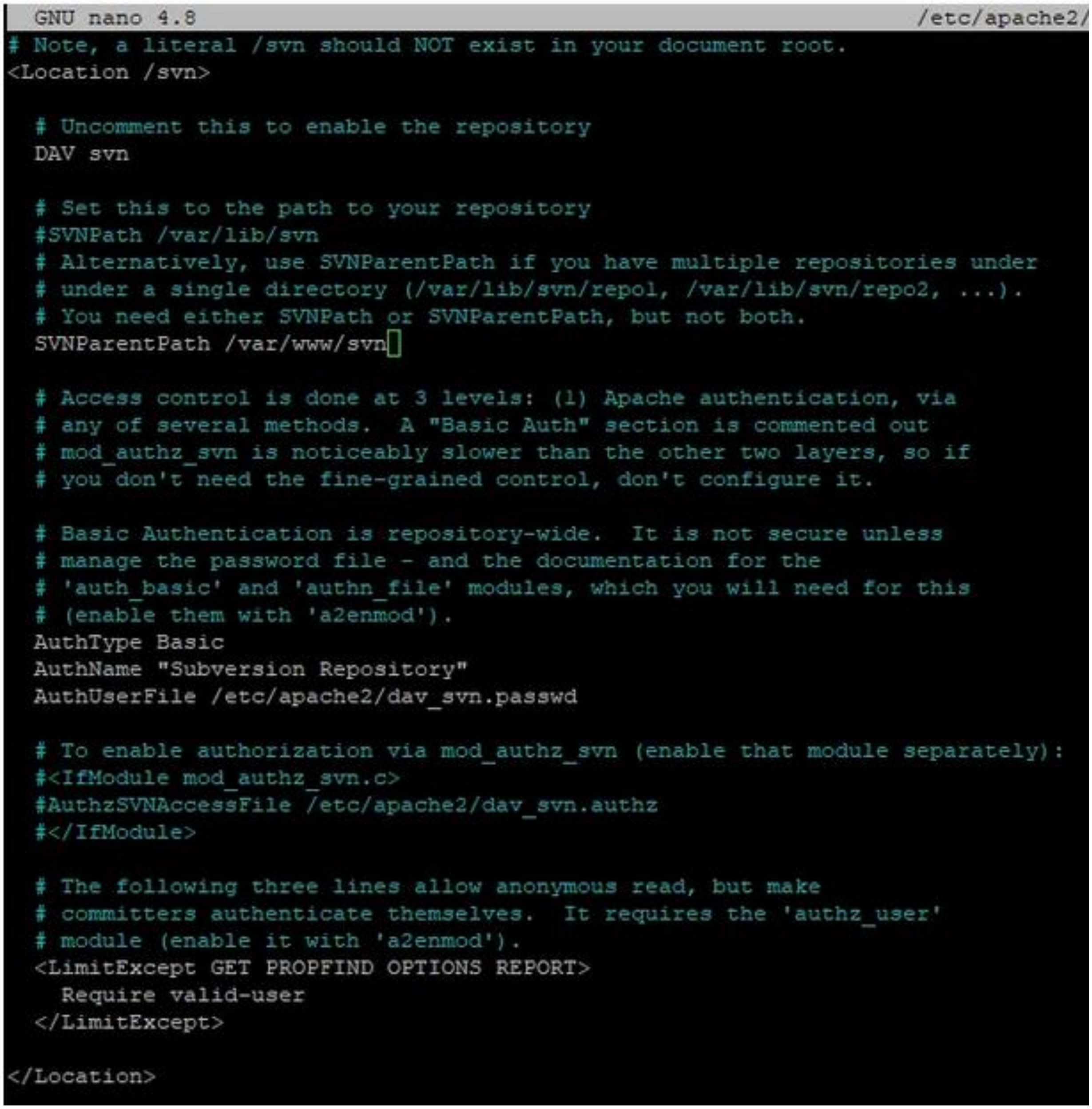
SVN and all dependencies are installed. Now enable Apache2 modules to run SVN to function.

- sudo a2enmod dav
- sudo a2enmod dav_svn
- sudo service apache2 restart

Step 3: Configure Apache2 with SVN

- sudo nano /etc/apache2/mods-enabled/dav_svn.conf

Make mentioned Changes/un-comment lines in the file.



```
  GNU nano 4.8                                                /etc/apache2/
# Note, a literal /svn should NOT exist in your document root.
<Location /svn>

  # Uncomment this to enable the repository
  DAV svn

  # Set this to the path to your repository
  #SVNPath /var/lib/svn
  # Alternatively, use SVNParentPath if you have multiple repositories under
  # under a single directory (/var/lib/svn/repo1, /var/lib/svn/repo2, ...).
  # You need either SVNPath or SVNParentPath, but not both.
  SVNParentPath /var/www/svn

  # Access control is done at 3 levels: (1) Apache authentication, via
  # any of several methods.  A "Basic Auth" section is commented out
  # mod_authz_svn is noticeably slower than the other two layers, so if
  # you don't need the fine-grained control, don't configure it.

  # Basic Authentication is repository-wide.  It is not secure unless
  # manage the password file - and the documentation for the
  # 'auth_basic' and 'authn_file' modules, which you will need for this
  # (enable them with 'a2enmod').
  AuthType Basic
  AuthName "Subversion Repository"
  AuthUserFile /etc/apache2/dav_svn.passwd

  # To enable authorization via mod_authz_svn (enable that module separately):
  #<IfModule mod_authz_svn.c>
  #AuthzSVNAccessFile /etc/apache2/dav_svn.authz
  #</IfModule>

  # The following three lines allow anonymous read, but make
  # committers authenticate themselves.  It requires the 'authz_user'
  # module (enable it with 'a2enmod').
  <LimitExcept GET PROPFIND OPTIONS REPORT>
    Require valid-user
  </LimitExcept>

</Location>
```

Let’s Create Repository Now

- sudo mkdir /var/www/svn
- sudo svnadmin create /var/www/svn/project
- sudo chown -R www-data:www-data /var/www/svn
- sudo chmod -R 775 /var/www/svn

Step 4: Create SVN User Accounts

Use the below command to create a new SVN user(admin).

- sudo htpasswd -cm /etc/apache2/dav_svn.passwd admi**n**

If you wish to create more users then use the below command

- sudo htpasswd -m /etc/apache2/dav_svn.passwd awais

We have successfully Installed and configure SVN let's restart the Apache2 server and Test it. Restart Apache2 server with the below command.

- sudo systemctl restart apache2.service

Let's Test It

Open your browser and write the following in your URL bar.

- localhost/svn/project

{to remove anything from www folder

```
sudo rm -R /var/www/wordpress/wp-content/themes/myFolder/*
```

-R to recursively remove anything inside it (and deeper).

This also removes files (not just directories).

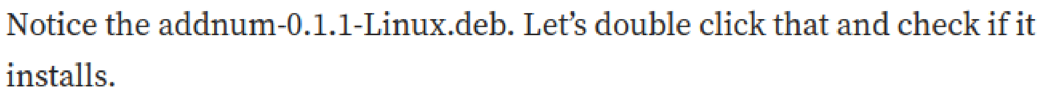
ex.sudo rm -R /var/www/svn/project

}

Debian Package

https://karthikkalyanaraman.medium.com/creating-debian-packages-cmake-e519a0186e87

Note: build the directory structure with extreme care



Notice the addnum-0.1.1-Linux.deb. Let's double click that and check if it installs.

after double clicking extract the data.tar.gz file and u'll be able to see home folder inside that folder there will bw app

Wordpress