OSS All Experiments

1,4,40,56

Orange = theory
Yellow = Available
red= not available

1	7	13	19	25	31	37	43	28	34	40	46	52	58
2	8	14	20	26	32	38	23	29	35	41	47	53	59
3	9	15	21	27	33	39	24	30	36	42	48	54	60
4	10	16	22	28	34	40	25	31	37	43	49	55	
5	11	17	23	29	35	41	26	32	38	44	50	56	
6	12	18	24	30	36	42	27	33	39	45	51	57	

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1. **VCS: Demonstrate to use of Version Control System (Git offline: on local machine with multiple user and connect to online vcs/github/bitbucket). Multiuser usage with team leader role and coder role/Merge/fork (branching)/diff/versions/commit/pull/push on repository. Compare it with svn. (on answer sheet)**
2. ***VCS: Demonstrate to use of Version Control System using git containers (Git offline: on local machine with multiple user and connect to online vcs/github/bitbucket). Multiuser usage with team leader role and coder role/Merge/fork (branching)/diff/versions/commit/pull/push on repository. Compare it with svn. (on answer sheet)**

1. Step1: Create new folder

12.Create packages: Create of Debian packages.
Take utility source code (Multiple modules/code packaging of python,C/C++/Java etc) of any open source you like and contribute in terms removing error/bug or adding feature to it.
Demonstrate the package on suitable OS and upload at its repository.
Compare it with RPM package manager (on answer sheet)

Step 1: Set Up the Directory Structure

```
calc
└── calculator
    ├── DEBIAN
    │   └── control
    ├── usr
    │   └── bin
    │       └── executable_file i.e cpp code
```

Open a terminal and navigate to the location where you want to create the Debian package. Inside this sample folder create another folder , name it DEBIAN (Inside calc dir)

```
# Create a directory named "calculator"
    --mkdir calculator

# Navigate to the " calculator " directory
    --cd calculator

# Create a directory named "DEBIAN" inside " calculator "
 --mkdir  DEBIAN
```

Step 2: Create the Control File
Now, create the control file inside the DEBIAN directory. You can use a text editor like nano or vim. Here, I'm using nano:

--nano DEBIAN/control

Inside the text editor, add the following control file information:

Package: calculator
Version: 1.0
Section: custom
Priority: optional
Architecture: all
Essential: no
Installed-Size: 1024
Maintainer: SupriyaPawar
Description: Display String.

Step 3: Create Additional Directories
Now, create the additional directories required for the Debian package:

Inside "sample" directory, create "usr" directory
mkdir -p usr/bin

Step 4: Write a Simple cpp Program
Inside the usr/bin directory, you can create a simple cpp program. Let's create a file named calc:
nano usr/bin/calc.cpp

Write a simple cpp program in the editor:

```
#include <iostream>
using namespace std;

int main() {
        char operation;
        float num1, num2;

        cout << "Enter operator (+, -, *, /): ";
        cin >> operation;
```

```
        cout << "Enter two numbers: ";
        cin >> num1 >> num2;
          switch (operation) {
        case '+':
        cout << "Result: " << num1 << " + " << num2 << " = " << num1 +
num2;
        break;
        case '-':
        cout << "Result: " << num1 << " - " << num2 << " = " << num1 -
num2;
        break;
        case '*':
        cout << "Result: " << num1 << " * " << num2 << " = " << num1 *
num2;
        break;
        case '/':
        if (num2 != 0)
                cout << "Result: " << num1 << " / " << num2 << " = " << num1 /
num2;
        else
                cout << "Error! Division by zero is not allowed.";
        break;
        default:
        cout << "Error! Invalid operator.";
        break;
        }

        return 0;
}
```

Save and exit the text editor.

Step 5: Compile and run the cpp Program
Compile the cpp program using the command:
g++ calc.cpp -o calc
./calc

Step 6: Create the Debian Package
Now, it's time to create the Debian package using the dpkg-deb command. Ensure that the build-essential package is installed on your system:

sudo apt-get install build-essential

Then, build the Debian package:

dpkg-deb --build calculator

Step 7: Install the Debian Package
Once the package is built, you can install it on your system:

sudo dpkg -i calculator.deb

Step 8: Run the Program
After installation, you can run your program: You can run the program from anywhere.
Calc

13. Create packages: Create of Debian packages.
(multiple modules/code packaging of java/c/cpp).
Take utility source code of any open source in c/cpp/ajava/python/shell script you like.
Demonstrate the package on suitable OS and upload at its repository.
Compare it with RPM package manager (on answer sheet)
Note: 12 & 13 are the same ..just repeated by mistake ig

14. Project Management tool: Demonstrate the use of Project Management tool: "SONAR" for managing projects.
Project planning and scheduling/ Product roadmap and release planning/ Task management and team collaboration/ Agile and Scrum/Time tracking,

cost reporting and budgeting/ Bug tracking on any suitable open source (code) from internet.
Compare it with other Project Management tool (on answer sheet)

15. *Project Management tool: Demonstrate the features of Project Management tool: "SONAR" for managing projects.
Demonstrate the code quality features of sonar for open source code (yours project code) c/cpp/java/python codes.
Compare it with other Project Management tool (on answer sheet)

16. Project Management tool: Demonstrate the features of Project Management tool: "Jira" for managing projects.
Demonstrate the code quality features of jira for open source code (yours project code) c/cpp/java/python codes.
Compare it with other Project Management tool (on answer sheet)

Jira is a widely used project management tool developed by Atlassian. It offers a variety of features for managing projects, tracking issues, and facilitating collaboration among team members. Let's focus on the key features of Jira and how it handles code quality for open source projects written in C, C++, Java, and Python.

Jira Features:
Issue Tracking:

Jira provides a robust issue tracking system. You can create, prioritize, assign, and track issues throughout the development process.
Issues can be customized to fit various project needs, including bugs, new features, tasks, and improvements.
Agile Boards:

Jira supports Agile methodologies through Scrum and Kanban boards. It allows teams to plan, track, and release software iteratively.
Custom Workflows:

Tailor workflows to match your team's processes. For example, you can set up stages like "To Do," "In Progress," "Code Review," and "Done."

Code Integration:

Jira seamlessly integrates with version control systems like Git, SVN, Mercurial, allowing you to associate code changes with specific issues.
Code Reviews:

For code quality, Jira integrates with Bitbucket, Atlassian's Git repository management solution.
You can create and review pull requests directly within Jira, ensuring code quality before merging changes.
Build and Deployment Integration:

Integrates with continuous integration and deployment tools, such as Jenkins, Bamboo, and others.
Automatically triggers builds and deployments based on code changes.
Reporting and Dashboards:

Jira provides a range of pre-built and customizable reports and dashboards to monitor project progress, team performance, and other metrics.
Code Quality in Jira:
Code Reviews:

Facilitates peer code reviews, ensuring collaboration and maintaining code quality standards.
Code Metrics:

Integrates with plugins and extensions that offer code quality metrics, such as code complexity, test coverage, and adherence to coding standards.
Automated Testing:

Supports integration with testing tools to automate the testing process, helping catch bugs early in the development cycle.
Integration with Static Analysis Tools:

Jira can integrate with static code analysis tools to identify potential issues and enforce coding standards.
Comparison with Other Project Management Tools (e.g., Trello, Asana):
Trello:

Trello is more lightweight and visually oriented, suitable for simpler projects.
Lacks advanced project management features compared to Jira.
Limited code quality and version control integrations.

Asana:

Asana is user-friendly and flexible, suitable for various project management styles.
It lacks the deep integration with code repositories and code review tools that Jira offers.
In summary, Jira excels in managing complex software development projects and ensures code quality through seamless integration with version control systems, code review tools, and continuous integration tools. Its flexibility and extensibility make it a preferred choice for many development teams.

17. Project Management tool: Demonstrate the features of Project Management tool: "Jira" for managing projects.
Demonstrate the code quality features of jira for open source code (yours project code) c/cpp/java/python codes.
Compare it with other Project Management tool (on answer sheet)

18. Bug Tracking: Demonstrate the use/features of Bug Tracking/management: "YouTrack".
Take source code of any open source you like and find minimum three bugs (mention their type on answer sheet) in terms removing error/bug or adding feature to it.
Bug tracking on any suitable open source (code) from internet.
Compare it with other Bug tracking tool. How bug tracking improves the quality of code (on answer sheet).

19. CMS: Demonstrate the use/features of CMS software: "Drupal". Create users and show how Drupal manages contents of web sites for a client. Also configure the working of core features of Drupal. Compare it with other CMS like Joomal/(on answer sheet)

Drupal is a powerful content management system (CMS) that allows users to build and manage websites with flexibility and scalability. Let's walk through some of the key features of Drupal and demonstrate how it manages content for a client.

Drupal Features:
User Management:

Drupal provides a robust user management system, allowing administrators to create and manage user accounts with different roles and permissions.
Users can have specific roles like anonymous user, authenticated user, editor, and administrator.
Content Types:

One of Drupal's strengths is its flexibility in handling different content types. You can define custom content types with specific fields and configurations.
For example, you can create content types for articles, blog posts, events, or any other type of content relevant to the website.
Content Creation and Editing:

Users with the appropriate permissions can easily create, edit, and manage content through a user-friendly interface.
The WYSIWYG editor allows content creators to format text, add media, and create engaging content without needing technical expertise.
Taxonomy:

Drupal includes a powerful taxonomy system that allows you to categorize and tag content. This enhances the organization and navigation of the site.
You can create vocabularies and attach them to content types, enabling a structured way to classify content.
Themes and Templates:

Drupal supports theming, allowing users to change the look and feel of the site easily.
Users can choose from a variety of themes or create custom themes to match the website's design requirements.
Modules and Extensions:

Drupal has a modular architecture, and users can extend its functionality by installing modules.
There are numerous contributed modules available to add features like SEO optimization, social media integration, and more.
Responsive Design:

Drupal is designed to create websites that are responsive and accessible

across various devices, ensuring a positive user experience.
Content Management in Drupal:
Create Users:

As an administrator, navigate to the user management section.
Add new users, assign roles, and configure permissions based on the user's responsibilities.
Create Content:

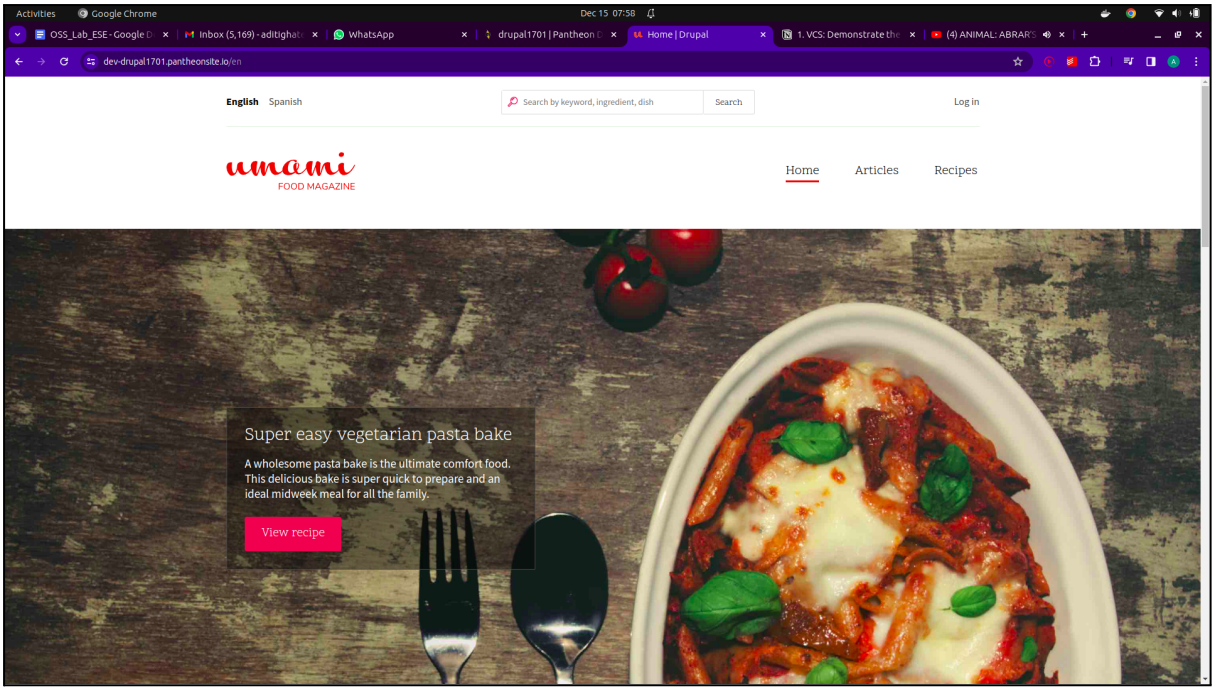
Define content types (e.g., articles, pages) and configure fields for each type.
Users can then create new content items, filling in the fields and using the WYSIWYG editor.
Manage Taxonomy:

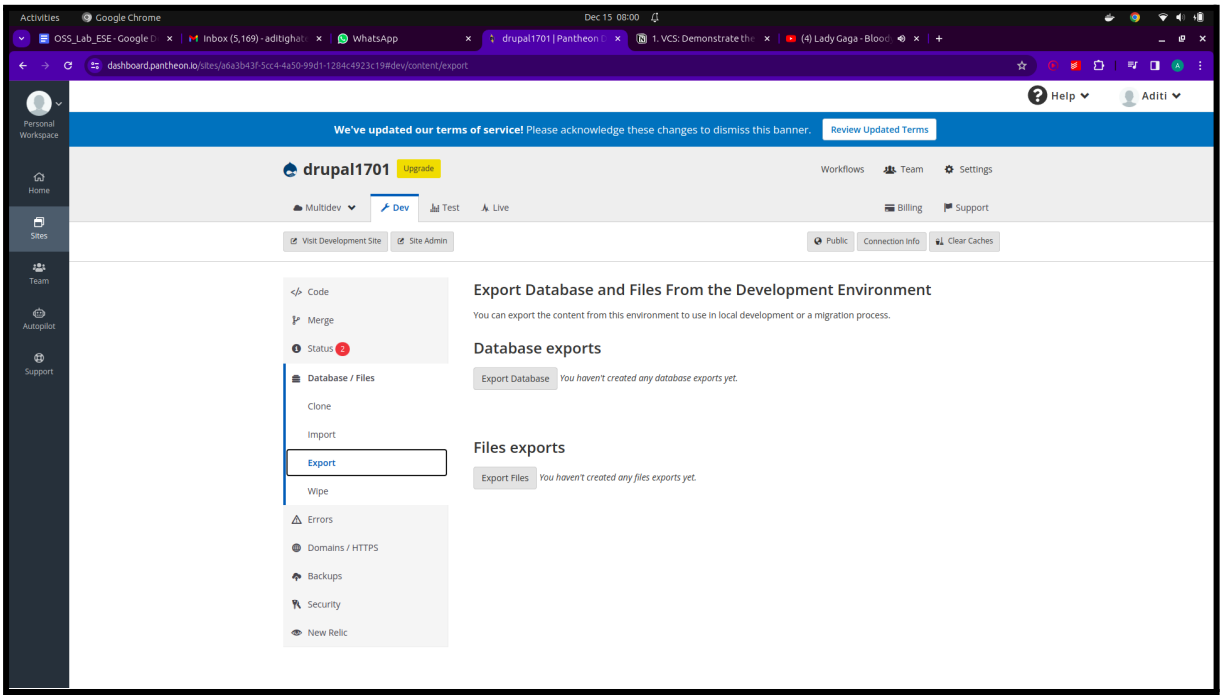
Create and manage vocabularies to classify content.
Assign taxonomy terms to content items to create a structured content organization.
Themes and Appearance:

Choose a theme or install a new one.
Customize the theme settings to match the website's branding and design requirements.
Comparison with Joomla:
Drupal:

Known for its flexibility and scalability, making it suitable for complex websites.
Strong developer community and extensive documentation.
Steeper learning curve but offers more customization options.
Joomla:

User-friendly and suitable for small to medium-sized websites.
Easier to learn for beginners.
Offers a balance between features and ease of use.
In summary, Drupal is a powerful CMS suitable for large and complex websites, offering extensive customization options and scalability. Joomla, on the other hand, is more user-friendly and suitable for smaller projects. The choice between them depends on the specific needs and technical expertise of the user or development team.





20. CMS: Demonstrate the use/features of CMS software: "Media Wiki" from bitnami or official website. Create users and show how wiki manages contents for a client. Also configure the working of core features of wiki. Can we use wiki as alternative to writing journal Compare it with other CMS (on answer sheet)

MediaWiki Features and Demonstration:

MediaWiki is a popular open-source wiki software known for being the engine behind Wikipedia. Let's explore its features and demonstrate how it manages content for a client:

User Management:

MediaWiki allows for the creation of user accounts with different access levels.
Users can be assigned roles such as anonymous users, registered users, and administrators.
Content Management:

MediaWiki is designed for collaborative content creation and editing.
Users can create, edit, and link pages easily using wiki markup or a WYSIWYG editor.
Version Control:

MediaWiki tracks revisions of each page, allowing users to view and revert to previous versions.
This feature is crucial for maintaining a history of changes and tracking contributions.
Categories and Tags:

Content organization is facilitated through categories and tags.
Users can categorize pages, making it easier to navigate and find relevant information.
Templates:

MediaWiki supports the use of templates, allowing users to create standardized content structures.
Templates enhance consistency and make it easier to update information across multiple pages.
Media Integration:

Users can easily embed images, videos, and other media into wiki pages.
This is useful for creating rich and visually engaging content.
Wiki Content Management:
Create Users:

Navigate to the user management section and create new user accounts.
Assign appropriate roles and permissions based on user requirements.
Create and Edit Pages:

Users can create new pages by simply linking to a non-existent page.
Edit existing pages using wiki markup or the visual editor.
Version History:

Each page maintains a history of revisions.
Users can compare versions and revert to previous states if needed.
Categories and Tags:

Categorize pages to organize content thematically.
Use tags to enhance searchability and content discoverability.
Templates:

Create templates for standardized content structures.
Insert templates into pages to maintain consistency across the wiki.
Wiki as an Alternative to Journal Writing:
Pros:

Collaborative Editing: Multiple users can contribute to a wiki, making it suitable for collaborative projects or journals.
Version Control: Keeps a detailed history of changes, allowing users to track edits over time.
Ease of Organization: Categories, tags, and templates make it easy to organize and structure content.
Cons:

Limited Formatting: Wiki markup may be limiting for users accustomed to more advanced formatting options.
Public Accessibility: Wikis are often designed for public access, which may not be suitable for private journaling.
Comparison with Other CMS:
MediaWiki vs. Confluence:

MediaWiki: Open-source, widely used, and free. Strong community support.
Confluence: Commercial product by Atlassian. Offers advanced features, tighter integration with Jira, and better support but comes with a cost.
MediaWiki vs. DokuWiki:

MediaWiki: Feature-rich, suitable for larger projects. More complex setup.
DokuWiki: Lightweight, simpler to set up and use. Better for smaller projects or personal use.

In summary, MediaWiki is a powerful and flexible wiki platform with features tailored for collaborative content creation. Its suitability as an alternative to journal writing depends on specific use cases and preferences.

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24. Project Management tool: Demonstrate the use/features of Project Management tool: "Open Atrium" for managing. Project planning and scheduling/ Product roadmap and release planning/ Task management and team collaboration/ Agile and Scrum/Time tracking, cost reporting and budgeting/ Bug tracking on any suitable open source (code) from internet. Compare it with other Project Management tool (on answer sheet)x`

Open Atrium Features:
Project Planning and Scheduling:

Open Atrium provides tools for creating project plans, defining milestones, and scheduling tasks.
Users can set due dates, assign tasks, and visualize project timelines.
Product Roadmap and Release Planning:

The platform supports the creation of product roadmaps, allowing teams to plan and communicate the strategic direction of their projects.
Release planning features help in organizing and scheduling product releases.
Task Management and Team Collaboration:

Open Atrium includes task management features where users can create, assign, and track the progress of tasks.
Collaboration tools, such as discussion forums, allow for team communication and sharing of ideas.
Agile and Scrum:

Open Atrium can be customized to support Agile and Scrum methodologies.
Features like task boards, user stories, and sprint planning can be implemented for Agile project management.
Time Tracking, Cost Reporting, and Budgeting:

Time tracking functionalities allow team members to log the time spent on tasks.
Cost reporting and budgeting tools help in monitoring project expenses and staying within budget.
Bug Tracking:

Open Atrium likely includes bug tracking features to log, prioritize, and track the resolution of software issues.
Demonstration on an Open Source Project:
To demonstrate the features of Open Atrium, you can use a suitable open-source project from platforms like GitHub. For example, select a project written in a programming language such as Python or JavaScript.
Here's how you might apply Open Atrium features:

Project Planning:

Create a project plan within Open Atrium, defining tasks, assigning responsibilities, and setting due dates.
Product Roadmap and Release Planning:

Use Open Atrium to create a visual representation of the product roadmap.
Plan and schedule upcoming releases, incorporating features and milestones.
Task Management and Collaboration:

Create tasks within Open Atrium for specific development or testing activities.
Assign tasks to team members and use collaboration features for discussions.
Agile and Scrum:

If the open-source project follows Agile or Scrum methodologies, adapt Open Atrium to support sprint planning, backlog management, and task boards.
Time Tracking and Budgeting:

Log time spent on tasks to demonstrate time tracking capabilities.
Utilize budgeting features to set project budgets and monitor expenses.
Bug Tracking:

Log and prioritize bugs within Open Atrium.
Track the resolution status, associated discussions, and any adjustments

made to the project plan.
Comparison with Other Project Management Tools:
Compare Open Atrium with other project management tools such as Jira, Asana, or Trello. Consider factors like:

Ease of use and user interface.
Integration capabilities with other tools and platforms.
Flexibility and customization options.
Pricing and licensing models.
Support for specific project management methodologies (Agile, Scrum, Kanban).
Selecting the right tool depends on the specific needs, preferences, and workflows of the project team. Always check the latest information and updates from official sources for the most accurate and current details.

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13. Configure and demonstrate the use of FTP and Telnet.
Show the imp steps and file name of configurations. (on answer sheet)

Step 1: Install and Configure FTP Server

Installation:

Install an FTP server software. For example, vsftpd (Very Secure FTP Daemon) on Linux.

bash
Copy code
sudo apt-get update
sudo apt-get install vsftpd
Configuration File:

Edit the vsftpd configuration file. The configuration file is typically located at /etc/vsftpd.conf.

bash
Copy code
sudo nano /etc/vsftpd.conf
Configure settings such as anonymous access, user permissions, etc.

Sample Configuration:

conf
Copy code
anonymous_enable=NO
local_enable=YES
write_enable=YES
chroot_local_user=YES
Save and exit the file.

Restart FTP Server:

Restart the FTP server to apply the changes.

bash
Copy code
sudo service vsftpd restart
Step 2: Create Users

Create Users:
Use the adduser command to create new users.

bash
Copy code
sudo adduser user1
sudo adduser user2
Follow the prompts to set passwords and additional information.

Step 3: Create Public Folder

Create Public Folder:

As the admin (root or a user with sudo privileges), create a shared folder. For example, /home/admin/public.

bash
Copy code

sudo mkdir /home/admin/public
Set permissions for the folder.

bash
Copy code
sudo chmod 755 /home/admin/public
sudo chown admin:admin /home/admin/public
Share Files:

Copy files to the public folder for sharing.

bash
Copy code
sudo cp /path/to/file.txt /home/admin/public
Adjust file permissions if necessary.

Step 4: Test FTP Access

FTP Client:

Use an FTP client (e.g., FileZilla) to connect to the FTP server.

Host: Your server's IP address or domain
Username: User1, User2, or any created user
Password: The password set during user creation
Port: Default is 21
Transfer Files:

Use the FTP client to upload/download files to/from the server.
These steps provide a basic configuration for FTP on a Linux server. Ensure that you adapt the instructions based on your specific server environment and requirements.

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
(Type ifconfig in terminal and get the IP ->)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

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

Step 1: **Create a New Directory**
Open your terminal and navigate to the location where you want to create the directory for your experiment.

Step 2: Create Flask Application
Create a file named app.py in the directory with the following content:

```
# app.py
from flask import Flask
app = Flask(__name__)
@app.route('/')
def hello_world():
    return 'Hello, Flask!'
```

Step 3: Create Dockerfile for Flask Application
Create a file named Dockerfile in the same directory with the following content:

```
# Dockerfile
FROM python:3.9-slim

WORKDIR /app

COPY . /app

RUN pip install --no-cache-dir Flask

EXPOSE 5000

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

Step 4: **Build Docker Image for Flask Application**
Build the Docker image for the Flask application:
docker build -t flask-hello-world .

Step 5: **Create Docker Network**
Create a Docker network to allow communication between containers:
docker network create my-network

Step 6**: Run Flask Application Container**
docker run -d --network my-network --name flask-app flask-hello-world

Step 7: **Pull and Run WordPress Container**
Pull the official WordPress image and run the WordPress container, connecting it to the same network:

docker pull wordpress
docker run -d --network my-network --name wordpress-container wordpress

Step 8**: Create Nginx Configuration**
Create a file named nginx.conf in the LoadBalancingExperiment directory with the following content:

```
# nginx.conf
events {}
http {
    upstream backend {
        server flask-app:5000; # Flask application
        server wordpress-container:80; # WordPress container
    }
    server {
        listen 80;
        location / {
            proxy_pass http://backend;
        }
    }
}
```

Step 9: Run Nginx Container

Run the Nginx container, linking it to the Flask and WordPress containers within the my-network network:

docker run -d --network my-network -p 80:80 --name nginx-container -v $(pwd)/nginx.conf:/etc/nginx/nginx.conf:ro nginx

Step 10: **Access Load-Balanced Application**
Visit http://localhost in your web browser. Nginx, acting as a reverse proxy, will distribute the requests between the Flask and WordPress applications.

Takeaway:

In this experiment, we learned how to create a simple Python Flask application, containerize it using Docker, and set up a Docker network. We extended the experiment by introducing a WordPress application and an Nginx container to act as a reverse proxy for load balancing between the Flask and WordPress containers. The step-by-step process involved creating Dockerfiles, building Docker images, running containers, and utilizing Docker networks to enable communication between containers. We also explored basic Nginx configuration for load balancing. This hands-on experience reinforced fundamental Docker concepts, such as containerization, networking, and the role of reverse proxies in orchestrating and distributing traffic across multiple applications. The experiment serves as a foundational exploration into the practical aspects of containerized application deployment and orchestration.

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43. Docker : Create a web application with a simple web page containing login details and create a docker image of the application.(Use Apache Web server)

Commands:

```
330  mkdir simple-web-app
331  cd simple-web-app/
332  touch index.html
333  cat > index.html
334  touch Dockerfile
335  cat > Dockerfile
336  docker build -t simple-web-app .
337  docker run -p 8080:80 simple-web-app
338  docker run -p 8888:80 simple-web-app
339  cat Dockerfile
340  cat > Dockerfile
341  docker build -t simple-web-app .
342  docker run -p 8888:80 simple-web-app
```

1. Create a directory simple-web-app
2. cd simple-web-app
3. Create a html file in the same folder.

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>
```

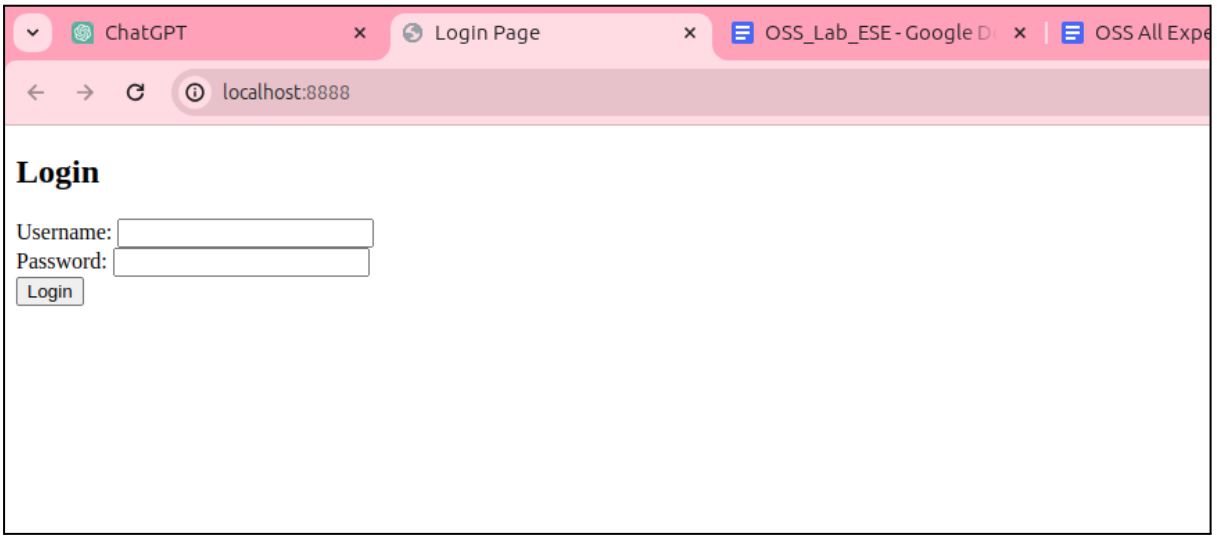
4. Create a Dockerfile in the same folder.

Dockerfile:

```
# Use the official Apache image as the base image
FROM httpd:2.4

# Copy the HTML file to the Apache web server's document root
COPY ./index.html /usr/local/apache2/htdocs/

# Suppress AH00558 warning
RUN echo "ServerName localhost" >> /usr/local/apache2/conf/httpd.conf
```

5. Build the docker image
   docker build -t simple-web-app
6. Run the application on available port
   docker run -p 8888-80 simple-web-app

```
aditi@lenovo3:~/Desktop/OSS/Problems with Pujari/simple-web-app$ docker build -t simple-web-app .
[+] Building 1.3s (8/8) FINISHED                          docker:desktop-linux
 => [internal] load build definition from Dockerfile                      0.0s
 => => transferring dockerfile: 311B                                      0.0s
 => [internal] load .dockerignore                                         0.0s
 => => transferring context: 2B                                           0.0s
 => [internal] load metadata for docker.io/library/httpd:2.4              1.1s
 => [internal] load build context                                         0.0s
 => => transferring context: 32B                                          0.0s
 => [1/3] FROM docker.io/library/httpd:2.4@sha256:b86890c7111273262f68325  0.0s
 => CACHED [2/3] COPY ./index.html /usr/local/apache2/htdocs/             0.0s
 => [3/3] RUN echo "ServerName localhost" >> /usr/local/apache2/conf/http  0.1s
 => exporting to image                                                    0.0s
 => => exporting layers                                                   0.0s
 => => writing image sha256:c38b06cb6195656828a48f383a59acc10cce8b425b323  0.0s
 => => naming to docker.io/library/simple-web-app                         0.0s

What's Next?
  1. Sign in to your Docker account → docker login
  2. View a summary of image vulnerabilities and recommendations → docker scout quickview
aditi@lenovo3:~/Desktop/OSS/Problems with Pujari/simple-web-app$ docker run -p 8888:80 simple-web-app
[Thu Dec 14 12:06:11.709272 2023] [mpm_event:notice] [pid 1:tid 140502903220096] AH00489: Apache/2.4.58 (Unix) configured -- resuming normal operations
[Thu Dec 14 12:06:11.709923 2023] [core:notice] [pid 1:tid 140502903220096] AH00094: Command line: 'httpd -D FOREGROUND'
172.17.0.1 - - [14/Dec/2023:12:06:27 +0000] "GET / HTTP/1.1" 200 579
172.17.0.1 - - [14/Dec/2023:12:06:27 +0000] "GET /favicon.ico HTTP/1.1" 404 196
172.17.0.1 - - [14/Dec/2023:12:07:19 +0000] "-" 408 -
[Thu Dec 14 12:08:08.259351 2023] [mpm_event:notice] [pid 1:tid 140502903220096] AH00492: caught SIGWINCH, shutting down gracefully
```



---

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

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

1. List out the available docker images on the device

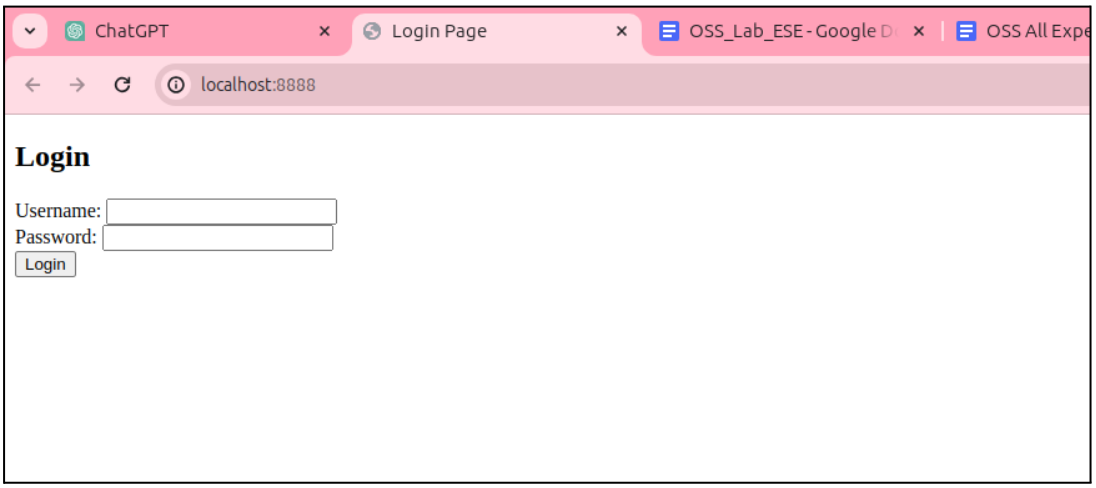
   docker images

```
aditi@lenovo3:~$ docker images
REPOSITORY          TAG       IMAGE ID       CREATED          SIZE
simple-web-app      latest    c38b06cb6195   16 minutes ago   174MB
<none>              <none>    bb161bbcd40e   19 minutes ago   174MB
<none>              <none>    81d18aabaddd   31 minutes ago   1.01GB
flask-hello-world   latest    04fd602e182e   6 hours ago      135MB
<none>              <none>    ea36b91634d4   6 hours ago      135MB
<none>              <none>    49e8f01dd19a   6 hours ago      125MB
hello-docker        latest    8250ed71bb11   19 hours ago     141MB
wordpress           latest    e6d24f82b89a   7 days ago       739MB
ubuntu              latest    b6548eacb063   13 days ago      77.8MB
nginx               latest    a6bd71f48f68   3 weeks ago      187MB
```

2. To run a Docker container from a recently created image and expose it on port 80(any available port) of the host system, you can use the following command.
   docker run -p 8081-80 simple-web-app

```
aditi@lenovo3:~$ docker run -p 8081:80 simple-web-app
[Thu Dec 14 12:15:47.625297 2023] [mpm_event:notice] [pid 1:tid 140457082206080]
 AH00489: Apache/2.4.58 (Unix) configured -- resuming normal operations
[Thu Dec 14 12:15:47.625411 2023] [core:notice] [pid 1:tid 140457082206080] AH00
094: Command line: 'httpd -D FOREGROUND'
172.17.0.1 - - [14/Dec/2023:12:16:18 +0000] "GET / HTTP/1.1" 200 579
172.17.0.1 - - [14/Dec/2023:12:16:18 +0000] "GET /favicon.ico HTTP/1.1" 404 196
172.17.0.1 - - [14/Dec/2023:12:17:10 +0000] "-" 408 -
^C[Thu Dec 14 12:22:52.510174 2023] [mpm_event:notice] [pid 1:tid 14045708220608
0] AH00491: caught SIGTERM, shutting down
```

3. Output: Same as above 43rd.



---

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

1. Create a directory where you want to perform the experiment.
   mkdir ExpB24
2. Create a python file

```
# calculator.py
def add(x, y):
    return x + y

def subtract(x, y):
    return x - y

def multiply(x, y):
```

```
    return x * y

def divide(x, y):
    if y == 0:
        return "Cannot divide by zero"
    return x / y

# Test the functions
num1 = 10
num2 = 5

print(f"Addition: {add(num1, num2)}")
print(f"Subtraction: {subtract(num1, num2)}")
print(f"Multiplication: {multiply(num1, num2)}")
print(f"Division: {divide(num1, num2)}")
```

3. Create a Dockerfile

```
# Dockerfile
FROM python:3.8

WORKDIR /app

COPY calculator.py .

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

This Dockerfile uses the official Python 3.8 image as the base image, sets the working directory to /app, copies the calculator.py script into the container, and specifies the command to run the Python script.

4. Build the docker image:

docker build -t calculator-app .

5. Run the docker container:

```
aditi@lenovo3:~/Desktop/OSS/Problems with Pujari/ExpB24$ docker build -t calculator-app .
[+] Building 7.0s (8/8) FINISHED                                docker:desktop-linux
 => [internal] load build definition from Dockerfile                           0.0s
 => => transferring dockerfile: 135B                                           0.0s
 => [internal] load .dockerignore                                              0.0s
 => => transferring context: 2B                                                0.0s
 => [internal] load metadata for docker.io/library/python:3.8                  3.4s
 => [1/3] FROM docker.io/library/python:3.8@sha256:7264a50439679c2868a99f      3.4s
 => => resolve docker.io/library/python:3.8@sha256:7264a50439679c2868a99f      0.0s
 => => sha256:7264a50439679c2868a99f71a5c9b9831cc082b1d3f 1.86kB / 1.86kB      0.0s
 => => sha256:3c3270c231ce82b081e2527c60734395b951c0d0c8b 2.01kB / 2.01kB      0.0s
 => => sha256:8a61cde23424d30d0050cf384b4700250bc5198ce17 7.51kB / 7.51kB      0.0s
 => => sha256:0a9c4786546c13ac4e6c2f770c6364aee71ca0cd4 17.28MB / 17.28MB      2.8s
 => => sha256:5575d20769f15dcea9755eb1473ed34381e479e294ab0cb 232B / 232B      0.5s
 => => sha256:4711d910ffa25756544938a346f48f59be0b2b66776 2.85MB / 2.85MB      1.3s
 => => extracting sha256:0a9c4786546c13ac4e6c2f770c6364aee71ca0cd483a848c      0.3s
 => => extracting sha256:5575d20769f15dcea9755eb1473ed34381e479e294ab0cb9      0.0s
 => => extracting sha256:4711d910ffa25756544938a346f48f59be0b2b66776faa90      0.1s
 => [internal] load build context                                              0.0s
 => => transferring context: 472B                                              0.0s
 => [2/3] WORKDIR /app                                                         0.1s
 => [3/3] COPY calculator.py .                                                 0.0s
 => exporting to image                                                         0.1s
 => => exporting layers                                                        0.0s
 => => writing image sha256:bc6fd17ba4d7b95b6c1912bce58bd74058f5bbb9ea170      0.0s
 => => naming to docker.io/library/calculator-app                              0.0s

What's Next?
  1. Sign in to your Docker account → docker login
  2. View a summary of image vulnerabilities and recommendations → docker scout quickview
aditi@lenovo3:~/Desktop/OSS/Problems with Pujari/ExpB24$ docker run calculator-app
Addition: 15
Subtraction: 5
Multiplication: 50
Division: 2.0
```

---

25. Docker: Run the Docker container with created image for c/java/python

1. Create a directory where you want to perform the experiment
   mkdir ExpB25
2. Create a C-program:

```
#include <stdio.h>

int main() {
    printf("Hello from C!\n");
    return 0;
}
```

3. Create a Dockerfile

```
# Dockerfile for C program
FROM gcc:latest

WORKDIR /app

COPY hello.c .

RUN gcc -o hello hello.c

CMD ["./hello"]
```

4. Build the docker image
   docker build -t c-program -f Dockerfile-c .
5. Run the docker container.
   docker run c-program

```
aditi@lenovo3:~/Desktop/OSS/Problems with Pujari/ExpB25$ docker build -t c-program -f Dockerfile-
[+] Building 26.3s (9/9) FINISHED                    docker:desktop-linux
 => [internal] load .dockerignore                                    0.0s
 => => transferring context: 2B                                      0.0s
 => [internal] load build definition from Dockerfile-c               0.0s
 => => transferring dockerfile: 155B                                 0.0s
 => [internal] load metadata for docker.io/library/gcc:latest        3.2s
 => [1/4] FROM docker.io/library/gcc:latest@sha256:2d3db8f38ffd8f2  22.4s
 => => resolve docker.io/library/gcc:latest@sha256:2d3db8f38ffd8f2a  0.0s
 => => sha256:54bb24238cbde884e09d012e01064a4dc77 16.75kB / 16.75kB  1.1s
 => => sha256:b104e636fcaa42224aaec98cd82727cf 145.04MB / 145.04MB  18.7s
 => => sha256:e96b3c55ca81e32eba03385365e5a3b881010 2.18kB / 2.18kB  0.0s
 => => sha256:fa6a958db254bb250cae0221e6a9d7dcd5cb8 7.44kB / 7.44kB  0.0s
 => => sha256:0b94567c7bfdfdbd8511587338e50f749ac5e 9.55kB / 9.55kB  0.4s
 => => sha256:2d3db8f38ffd8f2a90d5b9b509d9c15a1eb96 5.61kB / 5.61kB  0.0s
 => => sha256:6240281536254a2284c217ee915884a294228 1.80kB / 1.80kB  1.1s
 => => extracting sha256:54bb24238cbde884e09d012e01064a4dc7788d9b51  0.0s
 => => extracting sha256:b104e636fcaa42224aaec98cd82727cf26cc541e85  3.5s
 => => extracting sha256:0b94567c7bfdfdbd8511587338e50f749ac5ef5f6f  0.0s
 => => extracting sha256:6240281536254a2284c217ee915884a29422899652  0.0s
 => [internal] load build context                                    0.0s
 => => transferring context: 114B                                    0.0s
 => [2/4] WORKDIR /app                                               0.1s
 => [3/4] COPY hello.c .                                             0.0s
 => [4/4] RUN gcc -o hello hello.c                                   0.4s
 => exporting to image                                               0.1s
 => => exporting layers                                              0.1s
 => => writing image sha256:bf70740c3a99451d2ff681a252456393816ff3c  0.0s
 => => naming to docker.io/library/c-program                         0.0s

What's Next?
  1. Sign in to your Docker account → docker login
  2. View a summary of image vulnerabilities and recommendations → docker scout quickview
aditi@lenovo3:~/Desktop/OSS/Problems with Pujari/ExpB25$ docker run c-program
Hello from C!
```

---

26. Docker: Create a simple web application using LAMP Stack on docker container.

1. Create a directory where you want to perform the experiment.
   mkdir ExpB26
   cd ExpB26
2. Create a Dockerfile for Apache/PHP Container.

```
# Dockerfile for Apache/PHP
FROM php:7.4-apache

# Install mysqli extension for PHP
RUN docker-php-ext-install mysqli
```

3. Create a Dockerfile for the MySQL container.

```
# Dockerfile for MySQL
FROM mysql:5.7

# Environment variables for MySQL
ENV MYSQL_ROOT_PASSWORD=root
ENV MYSQL_DATABASE=mydatabase
ENV MYSQL_USER=myuser
ENV MYSQL_PASSWORD=mypassword
```

4. Create a **docker-compose.yml** File.
   This Docker Compose file defines two services: web (Apache/PHP) and db (MySQL).

```
version: '3'

services:
  web:
    build: .
    ports:
      - "8080:80"
    volumes:
      - ./html:/var/www/html
    depends_on:
      - db

  db:
```

```
  build:
    context: .
    dockerfile: Dockerfile-mysql
  ports:
    - "3306:3306"
  environment:
    MYSQL_ROOT_PASSWORD: root
    MYSQL_DATABASE: mydatabase
    MYSQL_USER: myuser
    MYSQL_PASSWORD: mypassword
```

The volumes section mounts the ./html directory from your host into the /var/www/html directory in the container. This is where your PHP files can be placed.

5. Create a PHP file.

```
<?php
$conn = new mysqli("db", "myuser", "mypassword",
"mydatabase");

if ($conn->connect_error) {
    die("Connection failed: " . $conn->connect_error);
}

echo "Connected to MySQL successfully";

$conn->close();
?>
```

6. Build and run the Docker Containers.

---

27. Docker :Create a web application with a simple web page containing login details and create a docker image of the application.(Use Ngnix Web server).

1. **Create a directory for your project and navigate into it:**
   mkdir ExpB27

cd ExpB27
mkdir web-app
cd web-app

2. Create a web application
   index.html:

```
<!-- 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>
   <h1>Login Page</h1>
   <form>
      <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>
```

3. Create a Dockerfile

```
# Dockerfile
FROM nginx:latest

COPY . /usr/share/nginx/html
```

   This Dockerfile uses the official Nginx image and copies the contents of the current directory into the default Nginx web root.

4. Build the Docker image

docker build -t my-web-app .

5. Run the Docker Container.
   docker run -p 8034:80 my-web-app
   http://localhost:8034

---

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

36. *Docker: A. Create a simple Hello-world python flask application and create the docker image of that Flask application.

Step 1: Install Docker on Ubuntu
Make sure Docker is installed on your Ubuntu system. If not, you can install it using the following commands:
sudo apt update
sudo apt install docker.io
sudo systemctl start docker
sudo systemctl enable docker
Step 2: Create a Simple Flask Application
Create a directory for your Flask application and navigate into it:
mkdir flask_hello_world
cd flask_hello_world

Now, create a file named app.py with the following content:

```
from flask import Flask
```

```
app = Flask(__name__)
@app.route('/')
def hello_world():
    return 'Hello, World!'
if __name__ == '__main__':
    app.run(host='0.0.0.0', port=5000)
```

Step 3: Create a Dockerfile
In the same directory, create a file named Dockerfile without any file extension. This file will define the Docker image configuration:

```
# Use the official Python image as the base image
FROM python:3.9-slim

# Set the working directory
WORKDIR /app

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

# Install Flask
RUN pip install --no-cache-dir Flask

# Make port 5000 available to the world outside this container
EXPOSE 5000

# Define environment variable
ENV NAME World

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

Step 4: Build the Docker Image
Now, in the same directory where your Dockerfile is located, build the Docker image using the following command:
docker build -t flask-hello-world .

This command will use the Dockerfile to create an image named flask-hello-world.

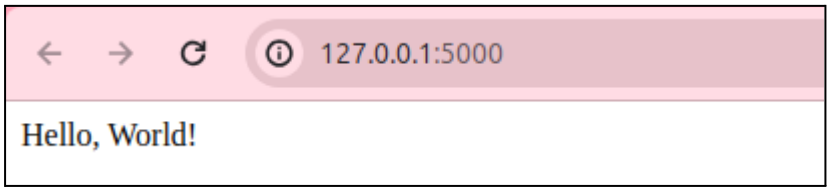
Step 5: Run the Docker Container
After the image is built, you can run a container based on that image:
docker run -p 5000:5000 flask-hello-world

Step 6: Access the Flask Application
Open a web browser and navigate to:
http://localhost:5000

You should see the "Hello, World!" message.
That's it! You've successfully created a simple Hello World Python Flask application and created a Docker image for it on Ubuntu.

Output:

```
aditi@lenovo3:~/Desktop/OSS/Docker/Docker2A$ docker build -t flask-hello-world .
[+] Building 13.0s (9/9) FINISHED
 => [internal] load .dockerignore
 => => transferring context: 2B
 => [internal] load build definition from Dockerfile
 => => transferring dockerfile: 473B
 => [internal] load metadata for docker.io/library/python:3.9-slim
 => [1/4] FROM docker.io/library/python:3.9-slim@sha256:65c30624fbccb71feb59df4740a4cc1db6e588aa68da8b8206a509ca5cf7d043
 => [internal] load build context
 => => transferring context: 499B
 => CACHED [2/4] WORKDIR /app
 => [3/4] COPY . /app
 => [4/4] RUN pip install --no-cache-dir Flask
 => exporting to image
 => => exporting layers
 => => writing image sha256:ea36b91634d47c2a10d3384cdc2c7b56def5f152e737b0ed034942f7fc9799d2
 => => naming to docker.io/library/flask-hello-world

What's Next?
  1. Sign in to your Docker account → docker login
  2. View a summary of image vulnerabilities and recommendations → docker scout quickview
aditi@lenovo3:~/Desktop/OSS/Docker/Docker2A$ docker run -p 5000:5000 flask-hello-world
 * Serving Flask app 'app'
 * Debug mode: off
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
 * Running on all addresses (0.0.0.0)
 * Running on http://127.0.0.1:5000
 * Running on http://172.17.0.2:5000
Press CTRL+C to quit
172.17.0.1 - - [14/Dec/2023 06:19:48] "GET / HTTP/1.1" 200 -
172.17.0.1 - - [14/Dec/2023 06:19:48] "GET /favicon.ico HTTP/1.1" 404 -
```



Takeaway:

In this exercise, we learned how to create a simple "Hello, World!" Python Flask application and containerize it using Docker. We started by writing a basic Flask app in the app.py file, then created a Dockerfile specifying the Python base image, setting the working directory, copying the application

files, and installing Flask. We built a Docker image using the docker build command and ran a Docker container with the docker run command, exposing the application on port 5000. We accessed the running Flask application by visiting http://localhost:5000 in the browser. This hands-on experience introduced the fundamental concepts of creating Docker images for Python applications, handling dependencies, and running applications in isolated containers, emphasizing the importance of creating production-ready configurations for real-world deployments.

---

30. Run the docker container from recently created image and run that docker container to 5000 port of host system.
32. Docker: Create a Docker image of simple web application from using HTTP web server at port 5000 in host.
36 B. Run the docker container from recently created image and run that docker container to 5000 port of host system.

Certainly! If you've already built the Docker image named flask-hello-world, you can follow these steps to run a container from that image and map the container's port 5000 to the host system's port 5000:

1. Open a Terminal Window.
2.Navigate to the Project Directory:
Change the current working directory to the one where your Dockerfile and app.py are located

Run the Docker container
docker run -p 5000:5000 flask-hello-world

This command runs a new container from the flask-hello-world image and maps the container's port 5000 to the host system's port 5000.
The Flask application inside the container should now be accessible at http://localhost:5000 on your host system.
Keep in mind that if the container with the same name is already running or the port 5000 on your host system is in use, you might need to stop the existing container or choose a different port.

To stop the container, you can open a new terminal and use the following command:

docker ps.
This command will display a list of running containers along with their container IDs. Identify the container ID associated with your Flask application and use the following command to stop it:
docker stop <container_id>

Replace <container_id> with the actual container ID. Once the existing container is stopped, you can re-run the docker run command to start a new container.

Output:

Takeaway:

In this exercise, we learned how to run a Docker container from a previously created image for a simple Python Flask application. We used the docker run command to start the container, mapping port 5000 from the container to port 5000 on the host system. This allowed us to access the Flask application by visiting http://localhost:5000 in a web browser. The hands-on experience reinforced the fundamental concepts of containerization, emphasizing the portability and isolation of applications encapsulated within Docker containers. We also observed how to interact with Docker containers using basic terminal commands, such as starting and stopping containers.

---

31. Docker: Pull the LAMP Stack container from docker hub and host a web application of your own.

1. Pull LAMP Stack Container:

Open a terminal and run the following command to pull the LAMP stack container from Docker Hub:

docker pull bitnami/lamp:latest

---

35. With the help of Docker-compose deploy the 'Wordpress' and 'Mysql' container and access the front end of 'Wordpress'

Below are step-by-step instructions to deploy WordPress and MySQL containers using Docker Compose and access the WordPress frontend:

Step 1: **Install Docker and Docker Compose**
Make sure you have Docker and Docker Compose installed on your system. You can download and install them from the official Docker website.
Make sure Docker is installed on your Ubuntu system. If not, you can install it using the following commands:

```
sudo apt update
sudo apt install docker.io
sudo systemctl start docker
sudo systemctl enable docker
```

Step 2: **Create a Docker Compose file**
Create a file named docker-compose.yml in a directory of your choice. This file will define the services and their configurations.

```
version: '3.8'

services:
  wordpress:
    image: wordpress
    ports:
      - "8080:80"
    environment:
      WORDPRESS_DB_HOST: mysql
      WORDPRESS_DB_USER: wordpress
      WORDPRESS_DB_PASSWORD: password
      WORDPRESS_DB_NAME: wordpress
    depends_on:
      - mysql
    networks:
```

```
    - my_network

  mysql:
    image: mysql:5.7
    environment:
      MYSQL_ROOT_PASSWORD: root_password
      MYSQL_DATABASE: wordpress
      MYSQL_USER: wordpress
      MYSQL_PASSWORD: password
    volumes:
      - mysql_data:/var/lib/mysql
    networks:
      - my_network

networks:
  my_network:
    driver: bridge

volumes:
  mysql_data:
```

Step 3: **Run Docker Compose**
Open a terminal and navigate to the directory where your docker-compose.yml file is located. Run the following command:
sudo docker-compose up -d

This command will download the necessary images and start the containers in detached mode.

Step 4: **Access WordPress Frontend**
Once the containers are up and running, you can access the WordPress frontend by opening a web browser and navigating to:
http://localhost:8080

You should see the WordPress setup page. Follow the on-screen instructions to complete the WordPress installation.

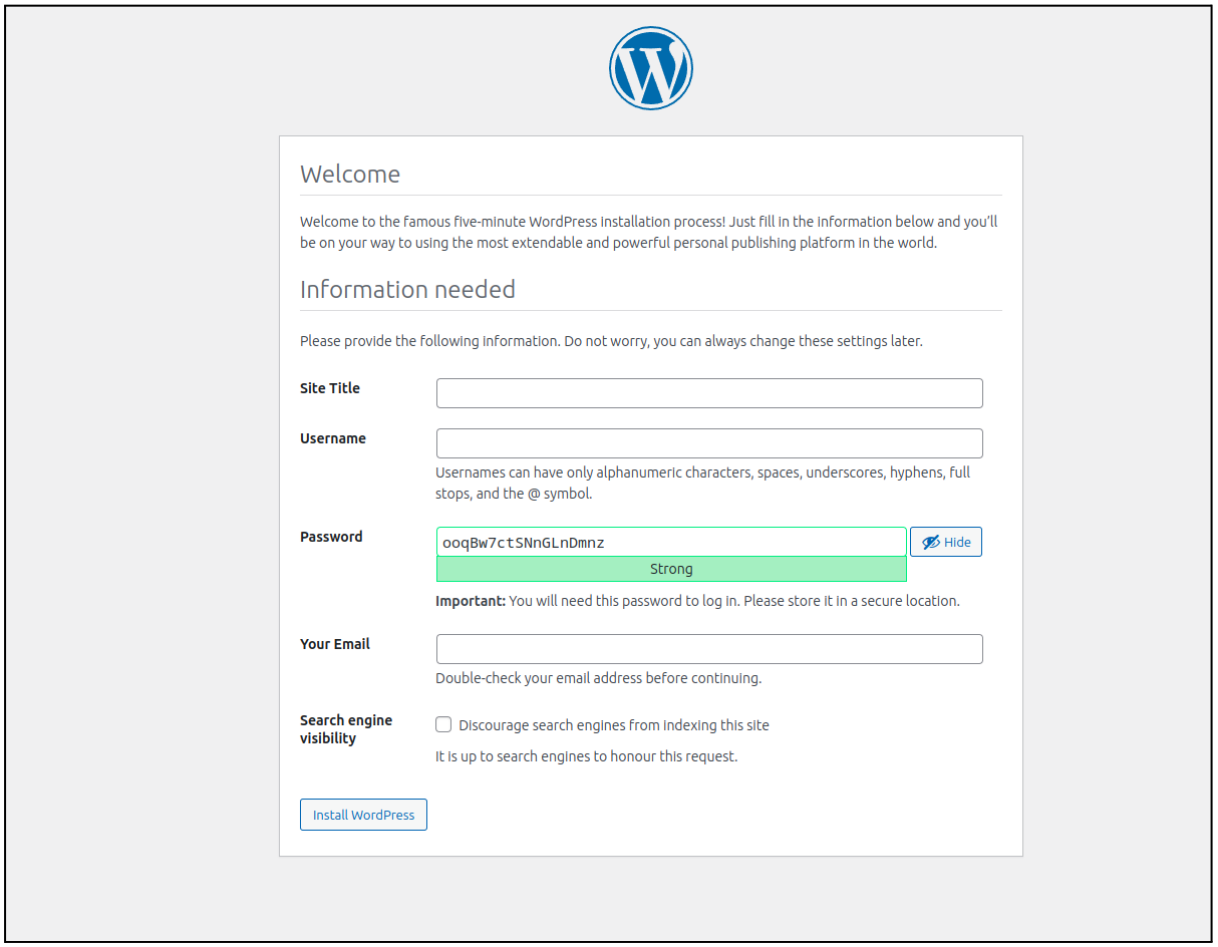
Step 5: **Clean Up**

To stop and remove the containers, you can run the following command in the same directory as your docker-compose.yml file:
docker-compose down

This will stop and remove the containers, but it will keep the data volumes intact. If you want to remove the volumes as well, add the -v option:
docker-compose down -v

That's it! You have successfully deployed WordPress and MySQL containers using Docker Compose and accessed the WordPress frontend.

Output:



Takeaway:

In this experiment, you utilized Docker Compose to orchestrate the deployment of a WordPress application and a MySQL database within containers. The docker-compose.yml file defined the services, their

configurations, and established dependencies between them. Through the docker-compose up -d command, the containers were started in detached mode, with WordPress accessible at http://localhost:8080. You learned about configuring networks, volumes for data persistence, and encountered and resolved the "permission denied" error by adding the user to the docker group. This hands-on experience demonstrated the simplicity of managing multi-container applications and introduced fundamental concepts of containerization, emphasizing the importance of security considerations and data persistence in real-world scenarios.