Report: Docker Compose LAMP Stack Implementation

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Contents

Objective

The objective of this assignment was to deepen my understanding of Docker Compose by creating a comprehensive LAMP (Linux, Apache, MySQL, PHP) stack. The exercise covered configuring inter-container networking, volume management for data persistence, and basic PHP scripting to interact with a MySQL database.

Task 1: Environment Setup and Docker Compose File

Project Directory Structure

- Created a folder named "lamp-project."
- Inside "lamp-project," created two subfolders: "www" for PHP files and "mysql" for database persistence.

Docker Compose File Creation

- Created a file named "docker-compose.yml" within the "lamp-project" directory.

```
Microsoft Windows [Version 10.0.19045.4170]
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C:\Users\Neil Duraiswami>mkdir lamp-project

C:\Users\Neil Duraiswami>cd lamp-project

C:\Users\Neil Duraiswami\lamp-project>mkdir www

C:\Users\Neil Duraiswami\lamp-project>mkdir mysql

C:\Users\Neil Duraiswami\lamp-project>dir
 Volume in drive C is OS
 Volume Serial Number is 82EC-6617

 Directory of C:\Users\Neil Duraiswami\lamp-project

03/24/2024  08:05 PM    <DIR>          .
03/24/2024  08:05 PM    <DIR>          ..
03/24/2024  08:05 PM    <DIR>          mysql
03/24/2024  08:05 PM    <DIR>          www
               0 File(s)              0 bytes
               4 Dir(s)  105,495,318,528 bytes free
```
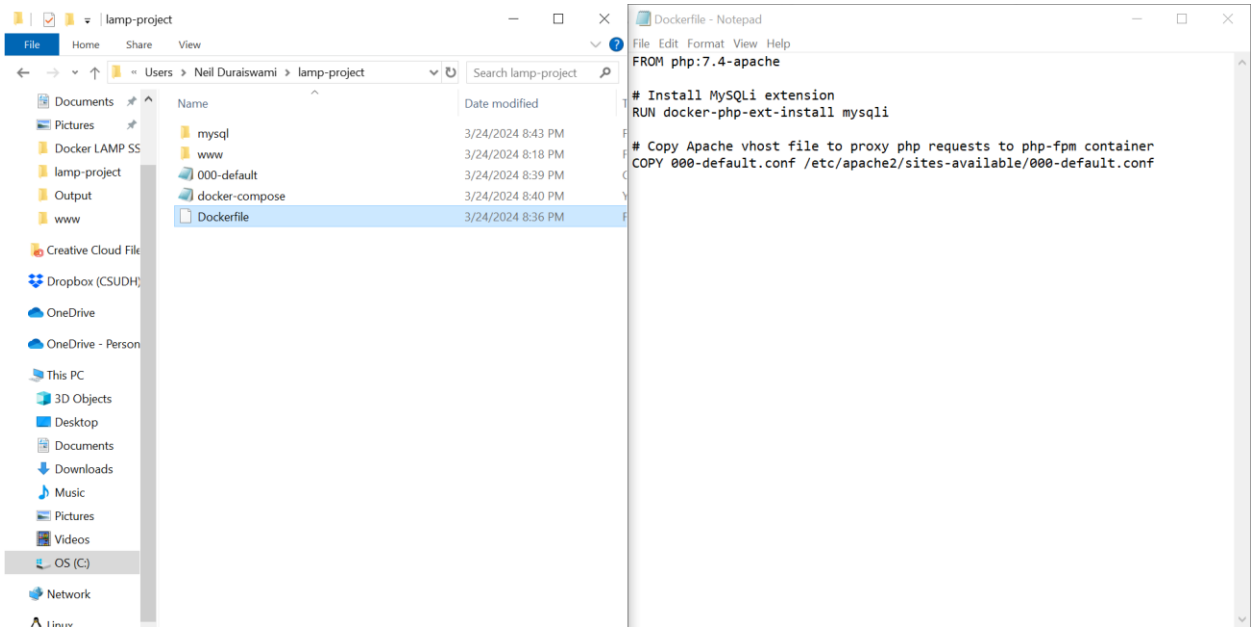
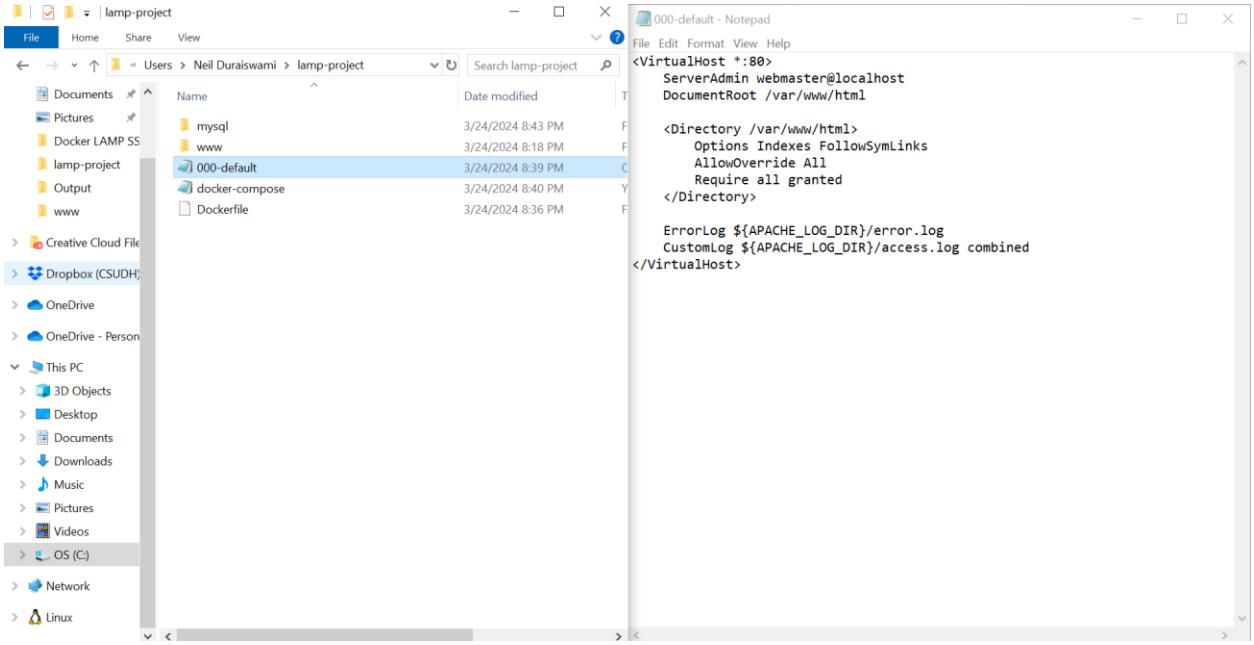
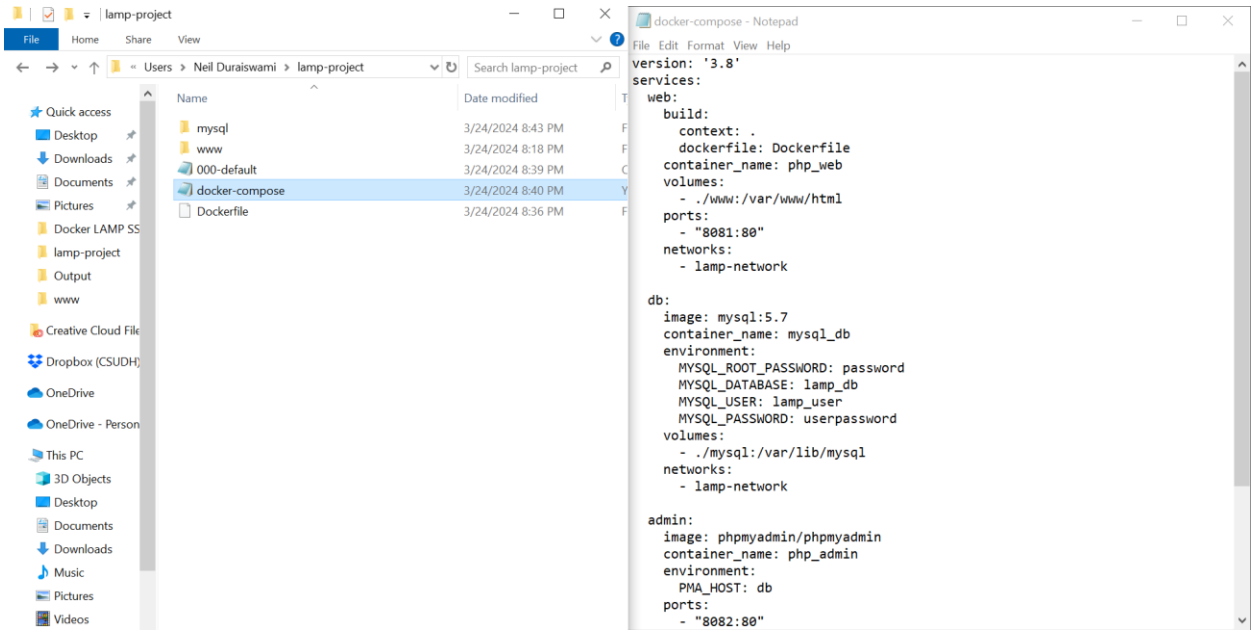

Defined services

- "web" using the php:7.4-apache image.
- "db" using the mysql:5.7 image, with specified environment variables.
- "admin" using the phpmyadmin/phpmyadmin image, linked to the "db" service.
- Configured a custom network named "lamp-network" for inter-container communication.
- Set up volumes for the "www" directory (linked with Apache's document root) and the "mysql" directory (for database data persistence).


lamp-project
File Home Share View
Users › Neil Duraiswami › lamp-project
Search lamp-project
Documents
Pictures
Docker LAMP SS
lamp-project
Output
www
Creative Cloud File
Dropbox (CSUDH)
OneDrive
OneDrive - Person
This PC
3D Objects
Desktop
Documents
Downloads
Music
Pictures
Videos
OS (C:)
Network
Name
Date modified
mysql 3/24/2024 8:43 PM
www 3/24/2024 8:18 PM
000-default 3/24/2024 8:39 PM
docker-compose 3/24/2024 8:40 PM
Dockerfile 3/24/2024 8:36 PM
Dockerfile - Notepad
File Edit Format View Help
FROM php:7.4-apache
Install MySQLi extension
RUN docker-php-ext-install mysqli
Copy Apache vhost file to proxy php requests to php-fpm container
COPY 000-default.conf /etc/apache2/sites-available/000-default.conf

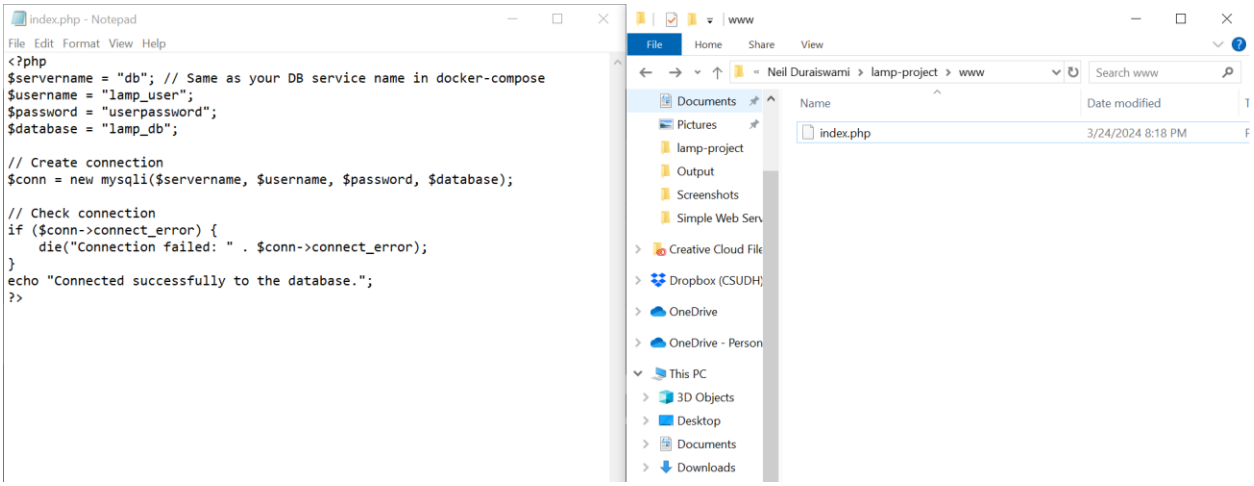

lamp-project
File Home Share View
Users › Neil Duraiswami › lamp-project
Search lamp-project
Documents
Pictures
Docker LAMP SS
lamp-project
Output
www
Creative Cloud File
Dropbox (CSUDH)
OneDrive
OneDrive - Person
This PC
3D Objects
Desktop
Documents
Downloads
Music
Pictures
Videos
OS (C:)
Network
Linux
Name
Date modified
mysql 3/24/2024 8:43 PM
www 3/24/2024 8:18 PM
000-default 3/24/2024 8:39 PM
docker-compose 3/24/2024 8:40 PM
Dockerfile 3/24/2024 8:36 PM
000-default - Notepad
File Edit Format View Help
<VirtualHost *:80>
ServerAdmin webmaster@localhost
DocumentRoot /var/www/html
<Directory /var/www/html>
Options Indexes FollowSymLinks
AllowOverride All
Require all granted
</Directory>
ErrorLog ${APACHE_LOG_DIR}/error.log
CustomLog ${APACHE_LOG_DIR}/access.log combined
</VirtualHost>



Task 2: Creating a PHP Script

PHP Script

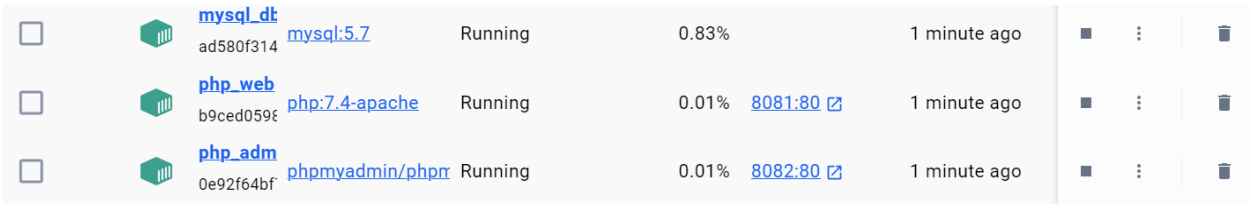
- Created a file named "index.php" inside the "www" folder.
- Developed a PHP script to connect to the MySQL database and display a message on success or failure.



Task 3: Running and Testing Your LAMP Stack

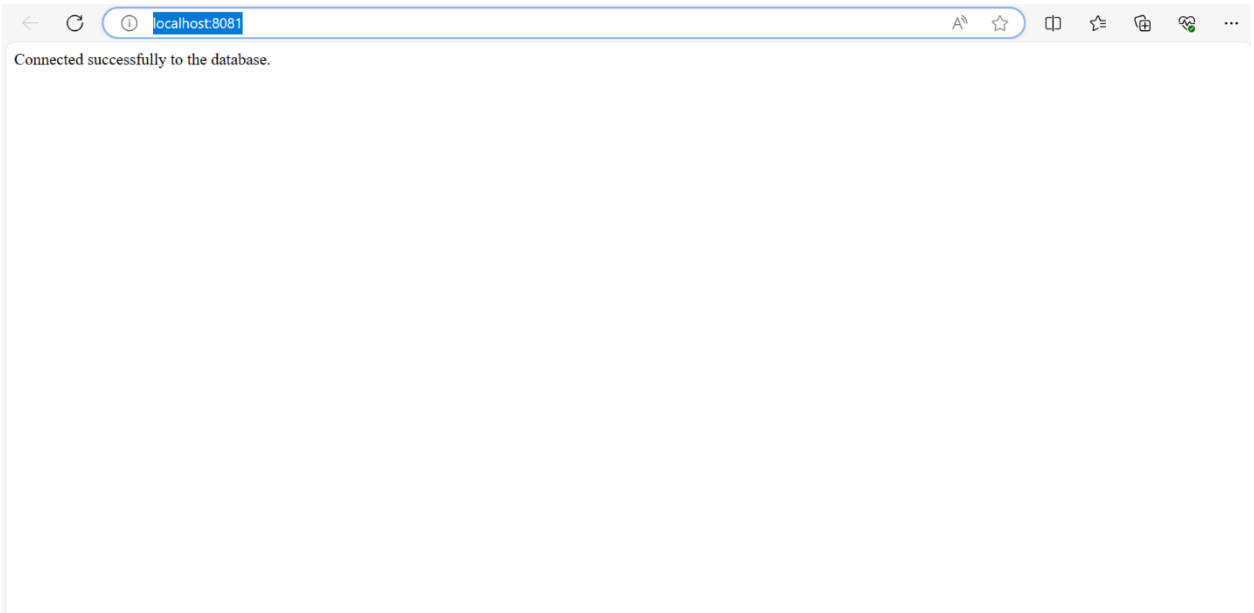
Starting the LAMP Stack

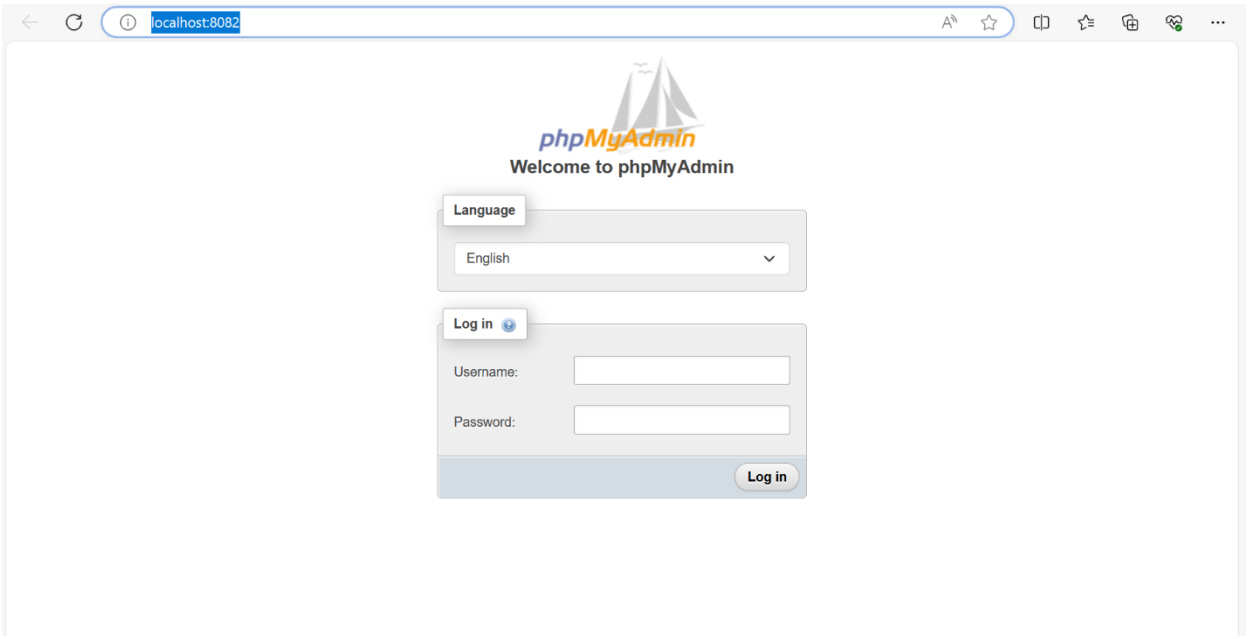
- **Navigated to the project directory ("lamp-project") and started the LAMP stack using docker-compose up -d.**
- **Verified all containers were running properly using docker-compose ps.**

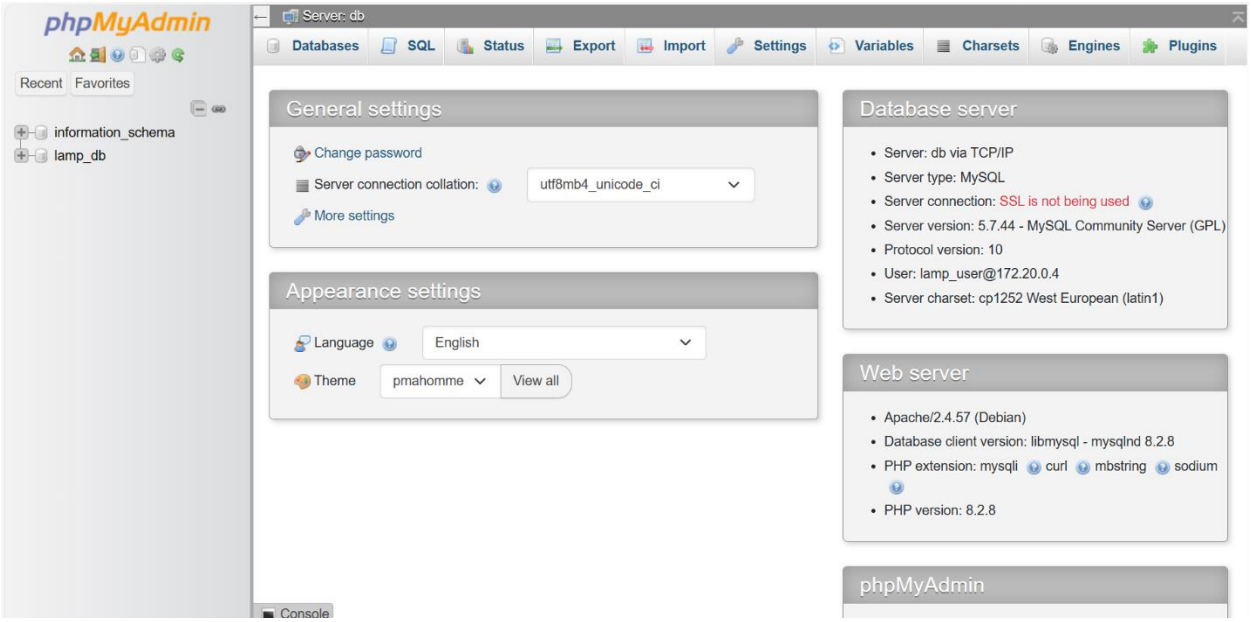


Testing

- Accessed the PHP application at http://localhost:8081.
- Accessed phpMyAdmin at http://localhost:8082 and logged in using MySQL credentials.



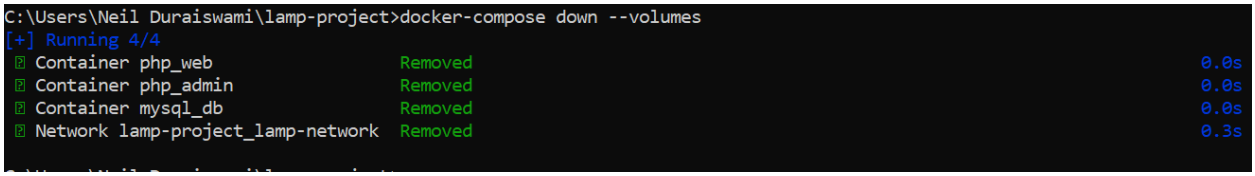




Task 4: Cleanup

Stopping Services and Cleanup

- Brought down services using docker-compose down --volumes to stop containers and remove associated networks and volumes.



Missing MySQLi Extension Error

- Initially I encountered an error related to the missing MySQLi extension when attempting to connect PHP to MySQL database.
- Solution: Engaged with an external resource (OpenAI's ChatGPT) to troubleshoot the issue. Identified that MySQLi extension needed to be enabled in the PHP Docker container. Created a custom Dockerfile to install the MySQLi extension and resolved the issue.

Conclusion

The assignment provided valuable hands-on experience in setting up a LAMP stack using Docker Compose, configuring inter-container networking, managing volumes for data persistence, and developing basic PHP scripts to interact with a MySQL database. Overcoming challenges further enhanced understanding and problem-solving skills in Docker and containerized application development.