Git Cherry Pick

Scenario:

- You have two branches: `branch-A` and `branch-B`.
- You made a bug fix commit on `branch-A` that you now want to apply to `branch-B` without merging all changes from `branch-A` into `branch-B`.

Steps:
Identify the Commit:
First, find the commit hash of the bug fix commit on `branch-A`:

```
git log --oneline branch-A
```

1. Suppose the commit hash is `abcdef1234567890`.

Switch to `branch-B`:
Ensure you are on `branch-B` where you want to apply the bug fix:

```
git checkout branch-B
```

2.

Cherry-pick the Commit:
Apply the bug fix commit from `branch-A` to `branch-B`:

```
git cherry-pick abcdef1234567890
```

3. This command applies the changes introduced by the commit `abcdef1234567890` onto `branch-B`.

Resolve Conflicts (if any):

```
git cherry-pick --continue
```

4.

Commit the Cherry-picked Changes:
After resolving conflicts (if any), commit the cherry-picked changes on `branch-B`:

```
git commit
```

5. This creates a new commit on `branch-B` that includes the changes from `branch-A`'s selected commit.

Git Stash

Step 1: Initialize a Git Repository

First, create a new directory for your project and initialize a Git repository:

```
mkdir git-stash-example
cd git-stash-example
git init
```

Step 2: Add and Commit Files

Create some files and add content to them:

```
echo "This is file1.txt" > file1.txt
echo "This is file2.txt" > file2.txt
```

Add these files to the staging area and commit them:

```
git add file1.txt file2.txt
git commit -m "Initial commit - Added file1.txt and file2.txt"
```

Step 3: Modify Files

Make some changes to `file1.txt`:

```
echo "Updated content in file1.txt" >> file1.txt
```

Step 4: Use `git stash`

Now, let's use `git stash` to temporarily store the changes in `file1.txt` without committing them:

```
git stash save "WIP: Work in progress changes"
```

This command saves your changes (in this case, the update to `file1.txt`) to a stash with a message "WIP: Work in progress changes".

Step 5: Verify Stash

You can verify the stash list using:

```
git stash list
```

It should show something like:

```
stash@{0}: On master: WIP: Work in progress changes
```

Step 6: Check Working Directory Status

Check the status of your working directory:

```
git status
```

It should indicate that your working directory is clean (no changes).

Step 7: Apply Stashed Changes

Let's apply the stashed changes back into your working directory:

```
git stash pop
```

Step 8: Verify Changes

Check the changes in `file1.txt`:

```
cat file1.txt
```

Step 9: Commit Stashed Changes

If you are satisfied with the changes, commit them:

```
git add file1.txt
git commit -m "Updated file1.txt with stashed changes"
```

Docker Project 01

Project Overview

In this project, you'll go through all three lifecycles of Docker: pulling an image and creating a container, modifying the container and creating a new image, and finally, creating a Dockerfile to build and deploy a web application.

Part 1: Creating a Container from a Pulled Image

Objective: Pull the official Nginx image from Docker Hub and run it as a container.

Steps:

Pull the Nginx Image:

```
docker pull nginx
```

1.

Run the Nginx Container:

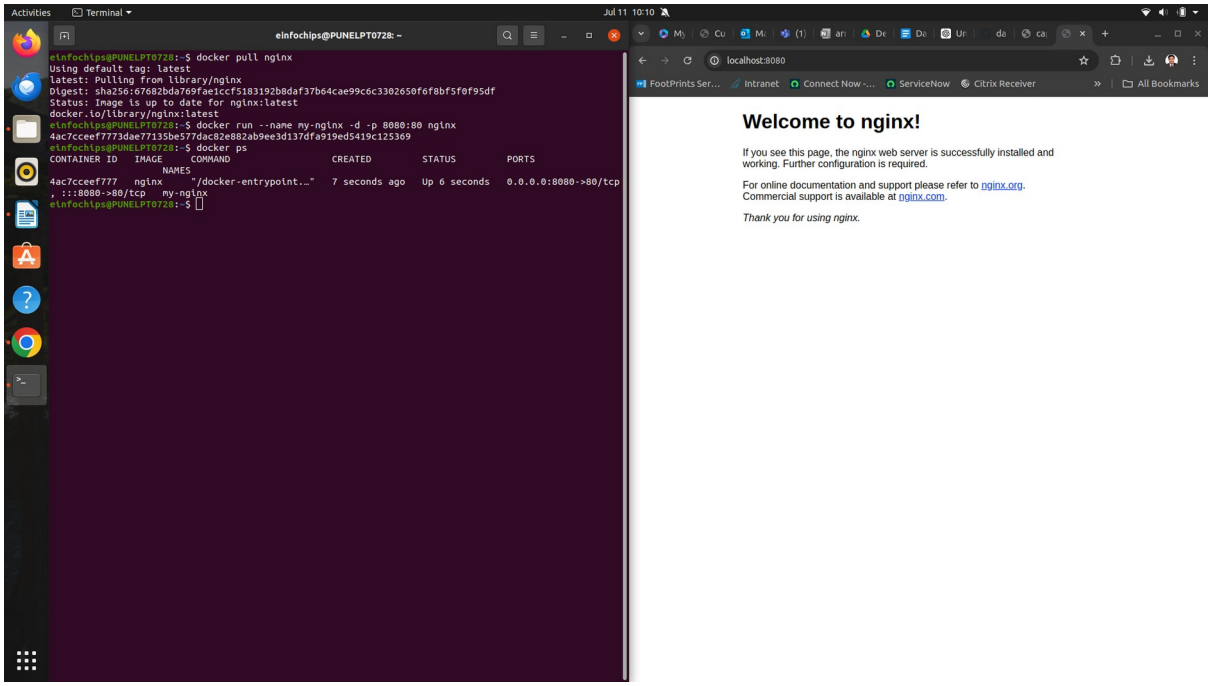
```
docker run --name my-nginx -d -p 8080:80 nginx
```

2.
   - `--name my-nginx`: Assigns a name to the container.
   - `-d`: Runs the container in detached mode.
   - `-p 8080:80`: Maps port 8080 on your host to port 80 in the container.

Verify the Container is Running:

```
docker ps
```

3.
   - Visit `http://localhost:8080` in your browser. You should see the Nginx welcome page.



Part 2: Modifying the Container and Creating a New Image

Objective: Modify the running Nginx container to serve a custom HTML page and create a new image from this modified container.

Steps:

Access the Running Container:

```
docker exec -it my-nginx /bin/bash
```

1.

Create a Custom HTML Page:

```
echo "<html><body><h1>Hello from Docker!</h1></body></html>" >
/usr/share/nginx/html/index.html
```

2.

Exit the Container:

```
exit
```

3.

Commit the Changes to Create a New Image:

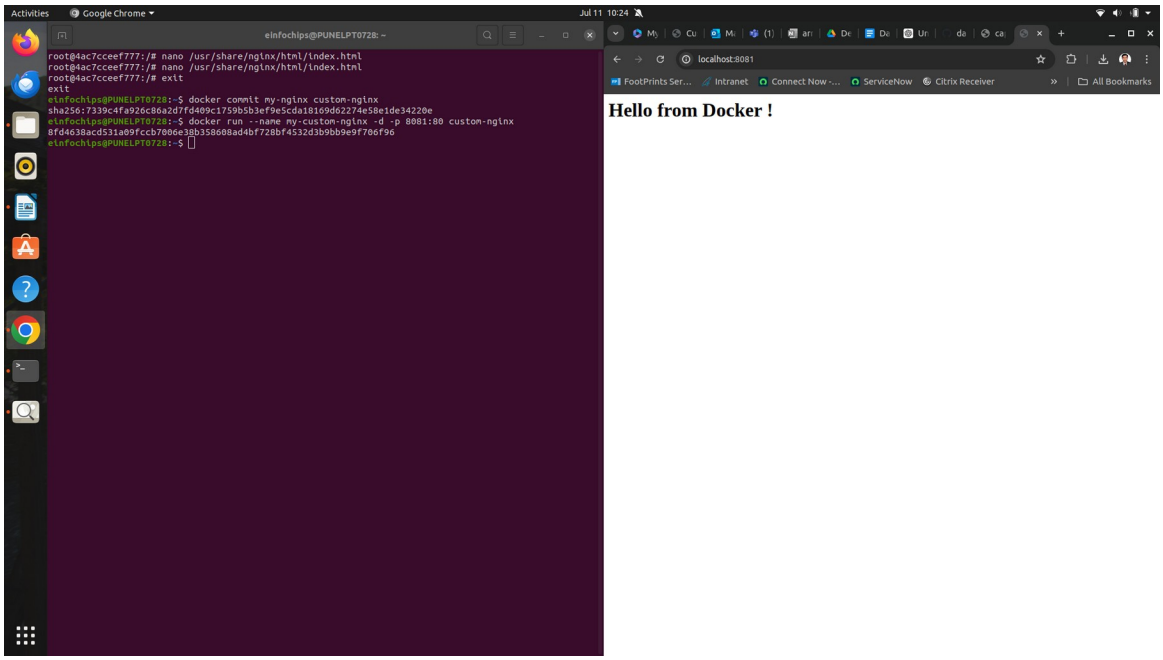
```
docker commit my-nginx custom-nginx
```

4.

Run a Container from the New Image:

```
docker run --name my-custom-nginx -d -p 8081:80 custom-nginx
```

5.
6. **Verify the New Container:**
    - Visit http://localhost:8081 in your browser. You should see your custom HTML page.



Part 3: Creating a Dockerfile to Build and Deploy a Web Application

Objective: Write a Dockerfile to create an image for a simple web application and run it as a container.

Steps:

Create a Project Directory:

```
mkdir my-webapp
cd my-webapp
```

1.
2. **Create a Simple Web Application:**

Create an index.html file:

```
<!DOCTYPE html>
<html>
<body>
   <h1>Hello from My Web App!</h1>
</body>
</html>
```

   -
   - Save this file in the my-webapp directory.
3. **Write the Dockerfile:**

Create a Dockerfile in the my-webapp directory with the following content:

```
# Use the official Nginx base image
```

```
FROM nginx:latest

# Copy the custom HTML file to the appropriate location
COPY index.html /usr/share/nginx/html/

# Expose port 80
EXPOSE 80
```

-

Build the Docker Image:

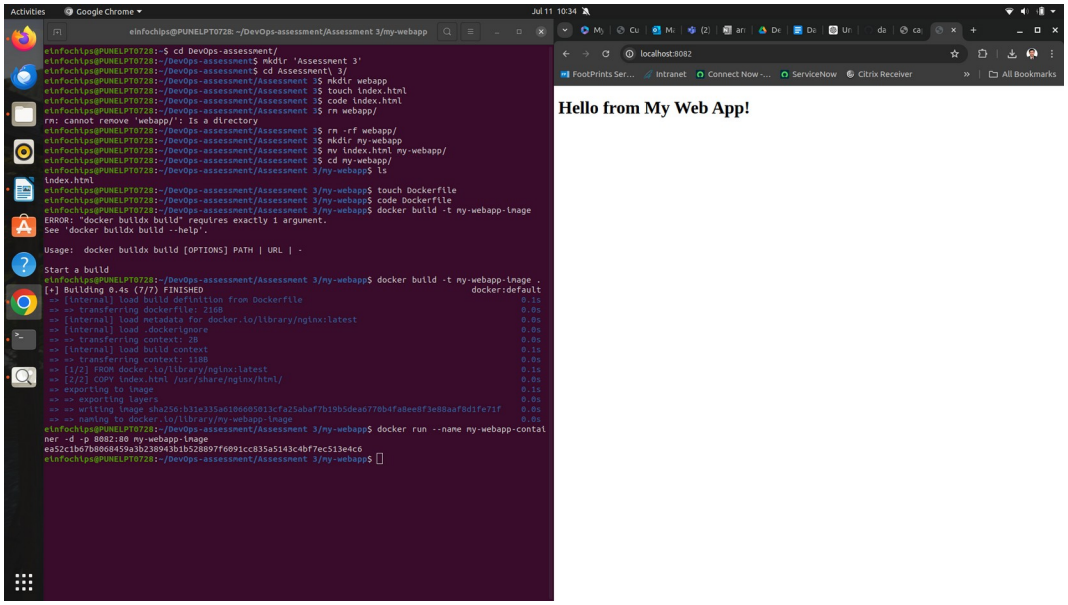
```
docker build -t my-webapp-image .
```

4.

Run a Container from the Built Image:

```
docker run --name my-webapp-container -d -p 8082:80 my-webapp-image
```

5.
6. **Verify the Web Application:**
   - Visit http://localhost:8082 in your browser. You should see your custom web application.



Part 4: Cleaning Up

Objective: Remove all created containers and images to clean up your environment.

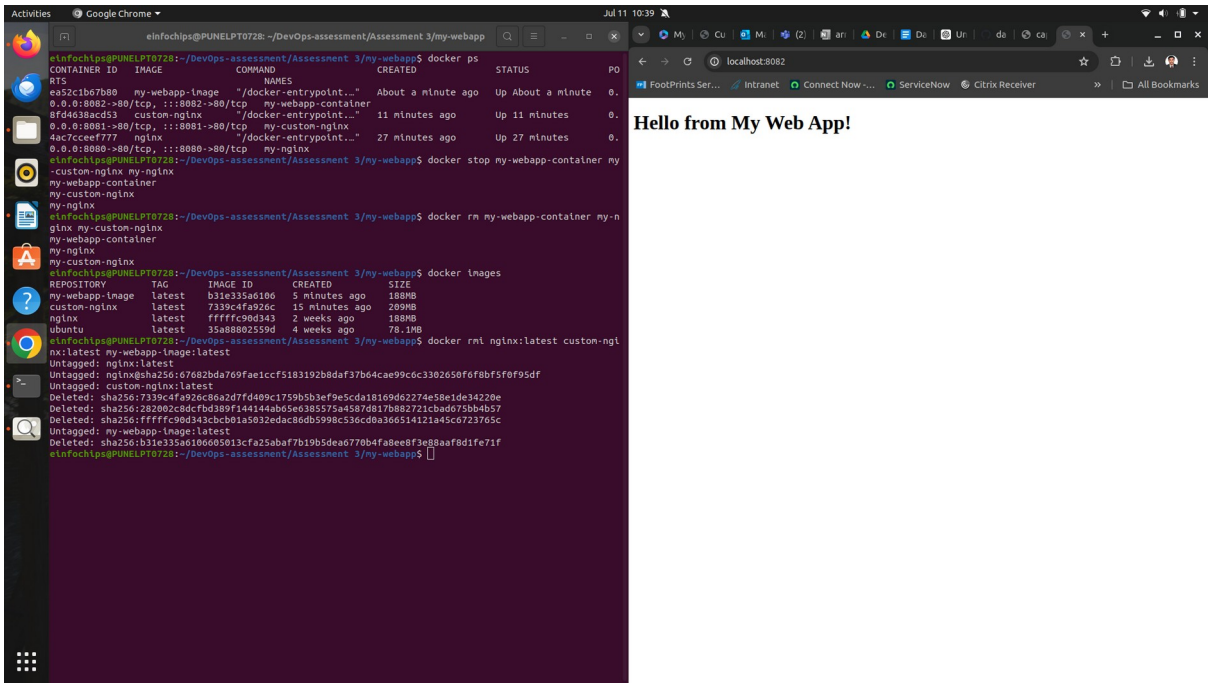
Steps:

Stop and Remove the Containers:

```
docker stop my-nginx my-custom-nginx my-webapp-container
docker rm my-nginx my-custom-nginx my-webapp-container
```

1. **Remove the Images:**

   ```
   docker rmi nginx custom-nginx my-webapp-image
   ```



Docker Project 02

Project Overview

In this advanced project, you'll build a full-stack application using Docker. The application will consist of a front-end web server (Nginx), a back-end application server (Node.js with Express), and a PostgreSQL database. You will also set up a persistent volume for the database and handle inter-container communication. This project will take more time and involve more detailed steps to ensure thorough understanding.

Part 1: Setting Up the Project Structure

Objective: Create a structured project directory with necessary configuration files.

Steps:

Create the Project Directory:

```
mkdir fullstack-docker-app
cd fullstack-docker-app
```

1.

Create Subdirectories for Each Service:

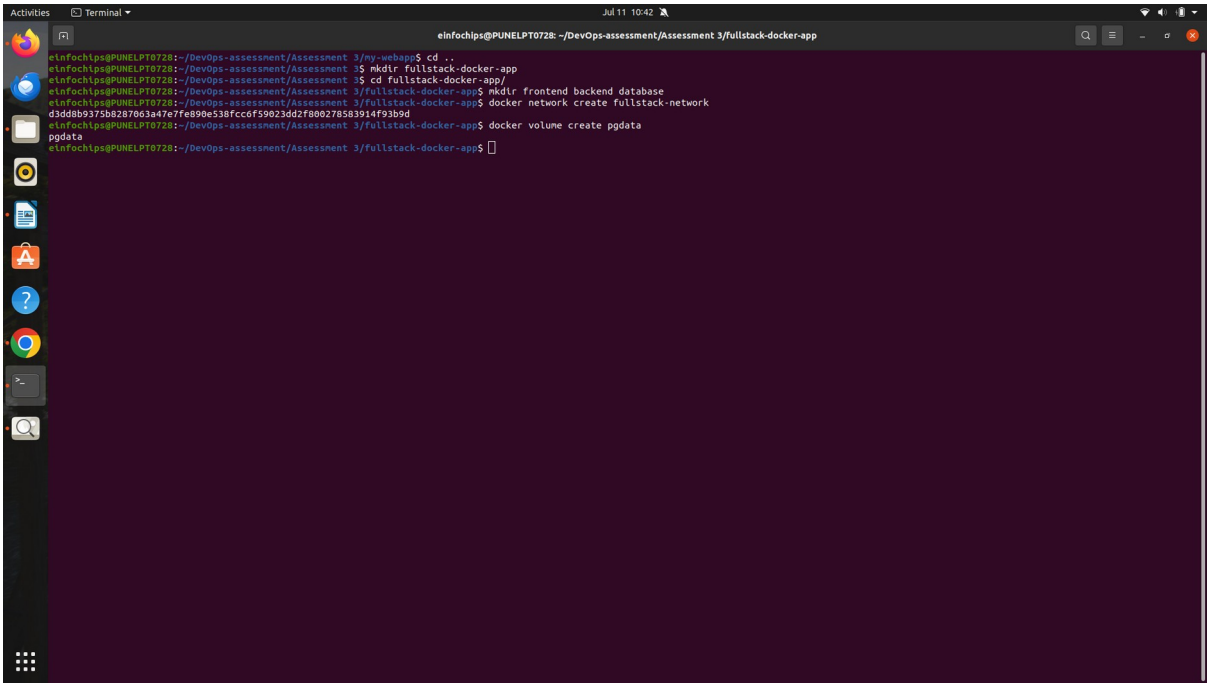
```
mkdir frontend backend database
```

2. **Create Shared Network and Volume:**
   - Docker allows communication between containers through a shared network.

```
docker network create fullstack-network
```

3.
   - Create a volume for the PostgreSQL database.

```
docker volume create pgdata
```



Part 2: Setting Up the Database

Objective: Set up a PostgreSQL database with Docker.

Steps:

1. **Create a Dockerfile for PostgreSQL:**

In the database directory, create a file named Dockerfile with the following content:

```
FROM postgres:latest
ENV POSTGRES_USER=user
ENV POSTGRES_PASSWORD=password
ENV POSTGRES_DB=mydatabase
```

○

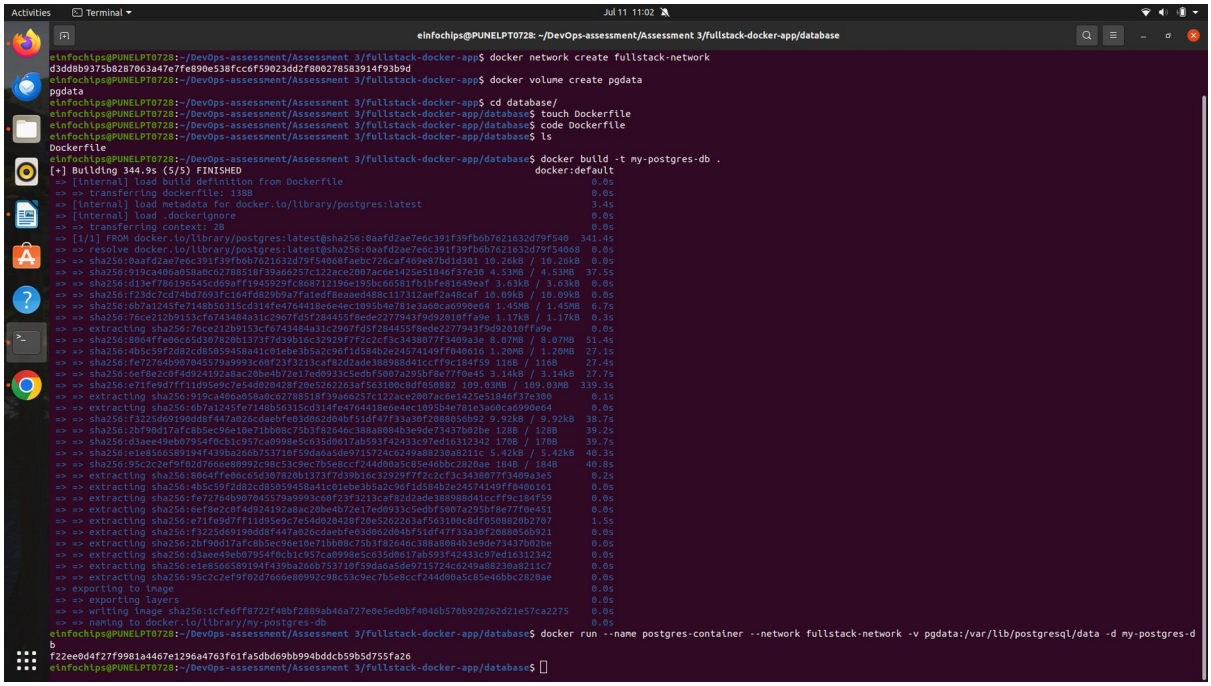
Build the PostgreSQL Image:

```
cd database
docker build -t my-postgres-db .
cd ..
```

2.

Run the PostgreSQL Container:

```
docker run --name postgres-container --network fullstack-network -v
pgdata:/var/lib/postgresql/data -d my-postgres-db
```



Part 3: Setting Up the Backend (Node.js with Express)

Objective: Create a Node.js application with Express and set it up with Docker.

Steps:

Initialize the Node.js Application:

```
cd backend
npm init -y
```

1.

Install Express and pg (PostgreSQL client for Node.js):

```
npm install express pg
```

2.
3. **Create the Application Code:**

In the backend directory, create a file named index.js with the following content:

```
const express = require('express');
const { Pool } = require('pg');
const app = express();
const port = 3000;

const pool = new Pool({
  user: 'user',
  host: 'postgres-container',
  database: 'mydatabase',
  password: 'password',
  port: 5432,
});

app.get('/', (req, res) => {
  res.send('Hello from Node.js and Docker!');
});

app.get('/data', async (req, res) => {
  const client = await pool.connect();
  const result = await client.query('SELECT NOW()');
  client.release();
  res.send(result.rows);
});

app.listen(port, () => {
  console.log(`App running on http://localhost:${port}`);
});
```

4. **Create a Dockerfile for the Backend:**

In the backend directory, create a file named Dockerfile with the following content:

```
FROM node:latest

WORKDIR /usr/src/app

COPY package*.json ./
RUN npm install

COPY . .

EXPOSE 3000
CMD ["node", "index.js"]
```

○

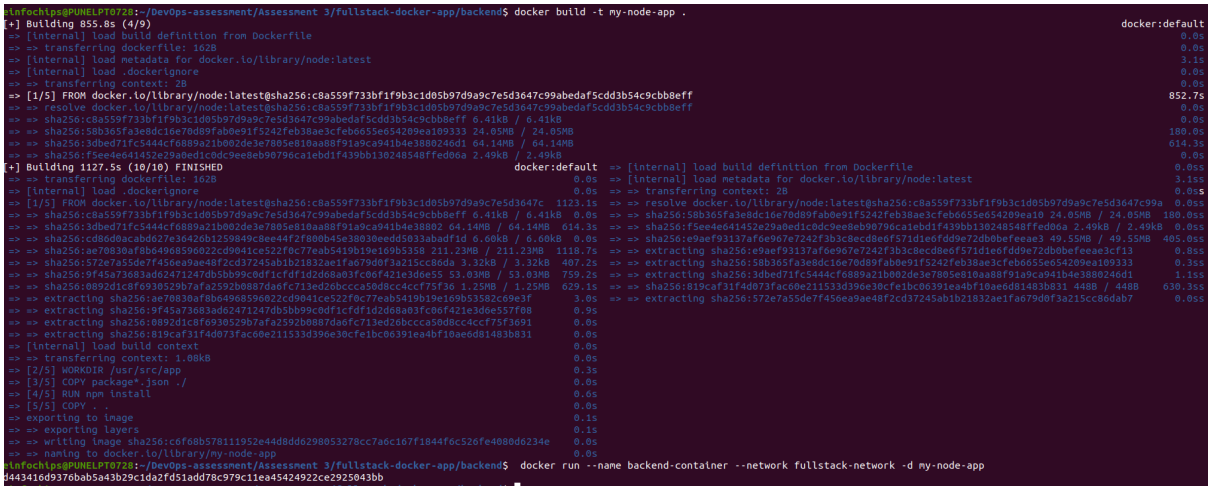
Build the Backend Image:

```
docker build -t my-node-app .
cd ..
```

5.

Run the Backend Container:

```
docker run --name backend-container --network fullstack-network -d my-node-app
```



Part 4: Setting Up the Frontend (Nginx)

Objective: Create a simple static front-end and set it up with Docker.

Steps:

1. **Create a Simple HTML Page:**

In the frontend directory, create a file named index.html with the following content:

```
<!DOCTYPE html>
<html>
<body>
   <h1>Hello from Nginx and Docker!</h1>
   <p>This is a simple static front-end served by Nginx.</p>
</body>
</html>
```

   -

2. **Create a Dockerfile for the Frontend:**

In the frontend directory, create a file named Dockerfile with the following content:

```
FROM nginx:latest
COPY index.html /usr/share/nginx/html/index.html
```

   -

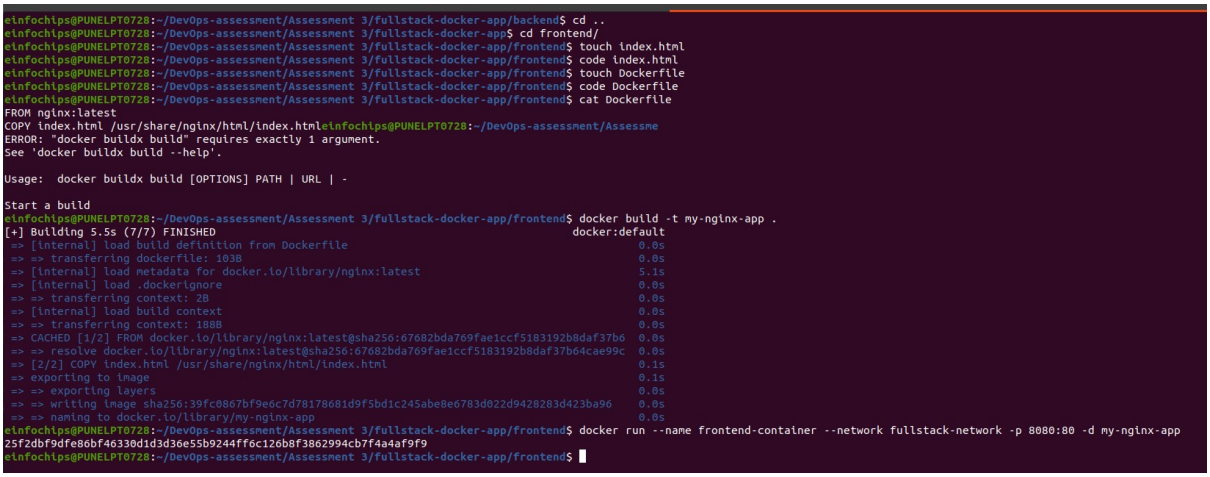
Build the Frontend Image:

```
cd frontend
docker build -t my-nginx-app .
cd ..
```

3.

Run the Frontend Container:

```
docker run --name frontend-container --network fullstack-network -p 8080:80 -d my-nginx-app
```



Part 5: Connecting the Backend and Database

Objective: Ensure the backend can communicate with the database and handle data requests.

Steps:

1. **Update Backend Code to Fetch Data from PostgreSQL:**
   - Ensure that the `index.js` code in the backend handles `/data` endpoint correctly as written above.
2. **Verify Backend Communication:**

Access the backend container:

```
docker exec -it backend-container /bin/bash
```

Test the connection to the database using `psql`:

```
apt-get update && apt-get install -y postgresql-client
psql -h postgres-container -U user -d mydatabase -c "SELECT NOW();"
```

Exit the container:

```
exit
```

3. **Test the Backend API:**
   - Visit `http://localhost:3000` to see the basic message.
   - Visit `http://localhost:3000/data` to see the current date and time fetched from PostgreSQL.

```
einfochips@PUNELPT0728:~/DevOps-assessment/Assessment 3/fullstack-docker-app/backend$ ls
Dockerfile  index.js  node_modules  package.json  package-lock.json
einfochips@PUNELPT0728:~/DevOps-assessment/Assessment 3/fullstack-docker-app/backend$ docker exec -it backend-container /bin/bash
root@6222bf8f1682:/usr/src/app# sudo apt-get update
bash: sudo: command not found
root@6222bf8f1682:/usr/src/app# apt-get update
Get:1 http://deb.debian.org/debian bookworm InRelease [151 kB]
Get:2 http://deb.debian.org/debian bookworm-updates InRelease [55.4 kB]
Get:3 http://deb.debian.org/debian-security bookworm-security InRelease [48.0 kB]
Get:4 http://deb.debian.org/debian bookworm/main amd64 Packages [8788 kB]
Get:5 http://deb.debian.org/debian bookworm-updates/main amd64 Packages [13.8 kB]
Get:6 http://deb.debian.org/debian-security bookworm-security/main amd64 Packages [168 kB]
Fetched 9224 kB in 26s (356 kB/s)
Reading package lists... Done
root@6222bf8f1682:/usr/src/app# apt-get install -y postgresql-client
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  postgresql-client-15 postgresql-client-common
Suggested packages:
  postgresql-15 postgresql-doc-15
The following NEW packages will be installed:
  postgresql-client postgresql-client-15 postgresql-client-common
0 upgraded, 3 newly installed, 0 to remove and 10 not upgraded.
Need to get 1744 kB of archives.
After this operation, 8244 kB of additional disk space will be used.
Get:1 http://deb.debian.org/debian bookworm/main amd64 postgresql-client-common all 248 [35.1 kB]
Get:2 http://deb.debian.org/debian bookworm/main amd64 postgresql-client-15 amd64 15.7-0+deb12u1 [1699 kB]
Get:3 http://deb.debian.org/debian bookworm/main amd64 postgresql-client all 15+248 [10.1 kB]
Fetched 1744 kB in 10s (169 kB/s)
debconf: delaying package configuration, since apt-utils is not installed
Selecting previously unselected package postgresql-client-common.
(Reading database ... 23243 files and directories currently installed.)
Preparing to unpack .../postgresql-client-common_248_all.deb ...
Unpacking postgresql-client-common (248) ...
Selecting previously unselected package postgresql-client-15.
Preparing to unpack .../postgresql-client-15_15.7-0+deb12u1_amd64.deb ...
Unpacking postgresql-client-15 (15.7-0+deb12u1) ...
Selecting previously unselected package postgresql-client.
Preparing to unpack .../postgresql-client_15+248_all.deb ...
Unpacking postgresql-client (15+248) ...
Setting up postgresql-client-common (248) ...
Setting up postgresql-client-15 (15.7-0+deb12u1) ...
update-alternatives: using /usr/share/postgresql/15/man/man1/psql.1.gz to provide /usr/share/man/man1/psql.1.gz (psql.1.gz) in auto mode
Setting up postgresql-client (15+248) ...
root@6222bf8f1682:/usr/src/app# psql -h postgres-container -U user -d mydatabase -c "SELECT NOW();"
Password for user user:
              now
-------------------------------
 2024-07-11 06:35:07.42013+00
(1 row)
```

Part 6: Final Integration and Testing

Objective: Ensure all components are working together and verify the full-stack application.

Steps:

1. **Access the Frontend:**
   - Visit http://localhost:8080 in your browser. You should see the Nginx welcome page with the custom HTML.
2. **Verify Full Integration:**

Update the index.html to include a link to the backend:

```
<!DOCTYPE html>
<html>
<body>
   <h1>Hello from Nginx and Docker!</h1>
   <p>This is a simple static front-end served by Nginx.</p>
   <a href="http://localhost:3000/data">Fetch Data from Backend</a>
</body>
</html>
```

-

Rebuild and Run the Updated Frontend Container:

```
cd frontend
```

```
docker build -t my-nginx-app .
docker stop frontend-container
docker rm frontend-container
docker run --name frontend-container --network fullstack-network -p 8080:80 -d my-nginx-app
cd ..
```

```
einfochips@PUNELPT0728:~/DevOps-assessment/Assessment 3/fullstack-docker-app/backend$ ls
Dockerfile  index.js  node_modules  package.json  package-lock.json
einfochips@PUNELPT0728:~/DevOps-assessment/Assessment 3/fullstack-docker-app/backend$ docker exec -it backend-container /bin/bash
root@6222bf8f1682:/usr/src/app# sudo apt-get update
bash: sudo: command not found
root@6222bf8f1682:/usr/src/app# apt-get update
Get:1 http://deb.debian.org/debian bookworm InRelease [151 kB]
Get:2 http://deb.debian.org/debian bookworm-updates InRelease [55.4 kB]
Get:3 http://deb.debian.org/debian-security bookworm-security InRelease [48.0 kB]
Get:4 http://deb.debian.org/debian bookworm/main amd64 Packages [8788 kB]
Get:5 http://deb.debian.org/debian bookworm-updates/main amd64 Packages [13.8 kB]
Get:6 http://deb.debian.org/debian-security bookworm-security/main amd64 Packages [168 kB]
Fetched 9224 kB in 26s (356 kB/s)
Reading package lists... Done
root@6222bf8f1682:/usr/src/app# apt-get install -y postgresql-client
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  postgresql-client-15 postgresql-client-common
Suggested packages:
  postgresql-15 postgresql-doc-15
The following NEW packages will be installed:
  postgresql-client postgresql-client-15 postgresql-client-common
0 upgraded, 3 newly installed, 0 to remove and 10 not upgraded.
Need to get 1744 kB of archives.
After this operation, 8244 kB of additional disk space will be used.
Get:1 http://deb.debian.org/debian bookworm/main amd64 postgresql-client-common all 248 [35.1 kB]
Get:2 http://deb.debian.org/debian bookworm/main amd64 postgresql-client-15 amd64 15.7-0+deb12u1 [1699 kB]
Get:3 http://deb.debian.org/debian bookworm/main amd64 postgresql-client all 15+248 [10.1 kB]
Fetched 1744 kB in 10s (169 kB/s)
debconf: delaying package configuration, since apt-utils is not installed
Selecting previously unselected package postgresql-client-common.
(Reading database ... 23243 files and directories currently installed.)
Preparing to unpack .../postgresql-client-common_248_all.deb ...
Unpacking postgresql-client-common (248) ...
Selecting previously unselected package postgresql-client-15.
Preparing to unpack .../postgresql-client-15_15.7-0+deb12u1_amd64.deb ...
Unpacking postgresql-client-15 (15.7-0+deb12u1) ...
Selecting previously unselected package postgresql-client.
Preparing to unpack .../postgresql-client_15+248_all.deb ...
Unpacking postgresql-client (15+248) ...
Setting up postgresql-client-common (248) ...
Setting up postgresql-client-15 (15.7-0+deb12u1) ...
update-alternatives: using /usr/share/postgresql/15/man/man1/psql.1.gz to provide /usr/share/man/man1/psql.1.gz (psql.1.gz) in auto mode
Setting up postgresql-client (15+248) ...
root@6222bf8f1682:/usr/src/app# psql -h postgres-container -U user -d mydatabase -c "SELECT NOW();"
Password for user user:
             now
-------------------------------
 2024-07-11 06:35:07.42013+00
(1 row)
```

3. **Final Verification:**
   - Visit http://localhost:8080 and click the link to fetch data from the backend.

Part 7: Cleaning Up

Objective: Remove all created containers, images, networks, and volumes to clean up your environment.

Steps:

Stop and Remove the Containers:

```
docker stop frontend-container backend-container postgres-container
docker rm frontend-container backend-container postgres-container
```

1.

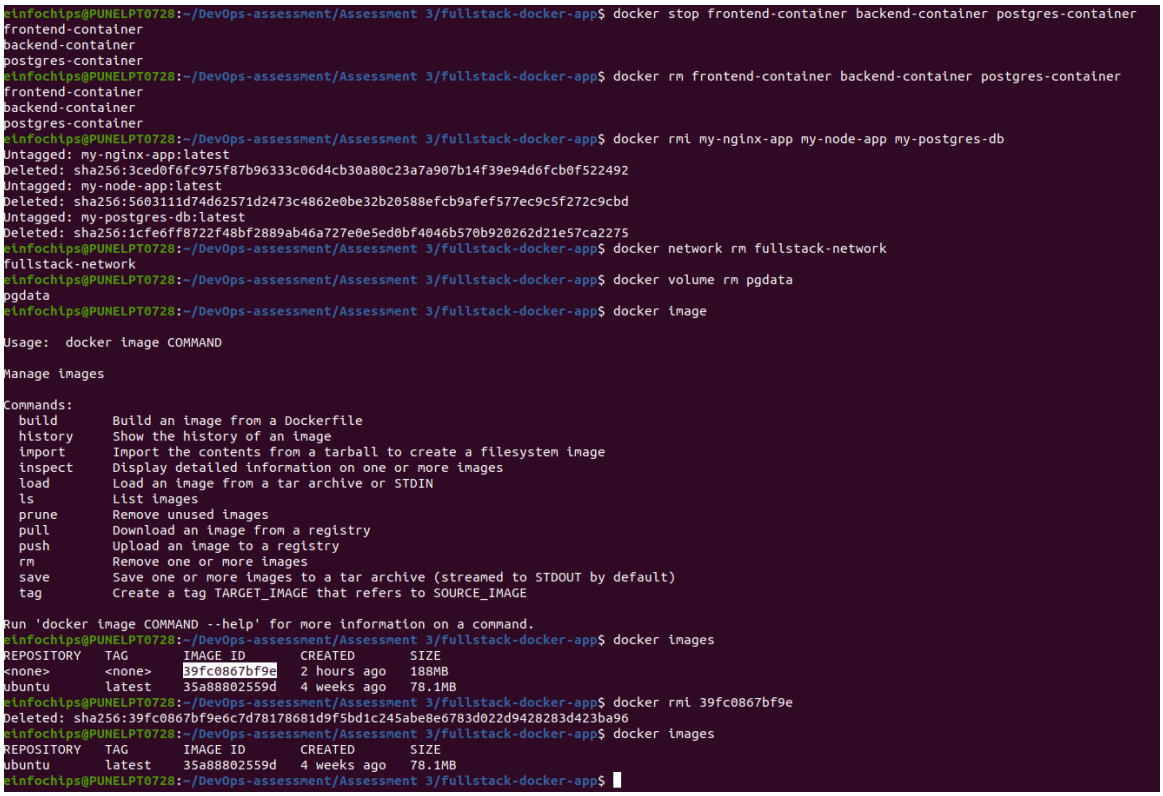
Remove the Images:

```
docker rmi my-nginx-app my-node-app my-postgres-db
```

2.

Remove the Network and Volume:

```
docker network rm fullstack-network
docker volume rm pgdata
```



```
einfochips@PUNELPT0728:~/DevOps-assessment/Assessment 3/fullstack-docker-app$ docker stop frontend-container backend-container postgres-container
frontend-container
backend-container
postgres-container
einfochips@PUNELPT0728:~/DevOps-assessment/Assessment 3/fullstack-docker-app$ docker rm frontend-container backend-container postgres-container
frontend-container
backend-container
postgres-container
einfochips@PUNELPT0728:~/DevOps-assessment/Assessment 3/fullstack-docker-app$ docker rmi my-nginx-app my-node-app my-postgres-db
Untagged: my-nginx-app:latest
Deleted: sha256:3ced0f6fc975f87b96333c06d4cb30a80c23a7a907b14f39e94d6fcb0f522492
Untagged: my-node-app:latest
Deleted: sha256:5603111d74d62571d2473c4862e0be32b20588efcb9afef577ec9c5f272c9cbd
Untagged: my-postgres-db:latest
Deleted: sha256:1cfe6ff8722f48bf2889ab46a727e0e5ed0bf4046b570b920262d21e57ca2275
einfochips@PUNELPT0728:~/DevOps-assessment/Assessment 3/fullstack-docker-app$ docker network rm fullstack-network
fullstack-network
einfochips@PUNELPT0728:~/DevOps-assessment/Assessment 3/fullstack-docker-app$ docker volume rm pgdata
pgdata
einfochips@PUNELPT0728:~/DevOps-assessment/Assessment 3/fullstack-docker-app$ docker image

Usage:  docker image COMMAND

Manage images

Commands:
  build       Build an image from a Dockerfile
  history     Show the history of an image
  import      Import the contents from a tarball to create a filesystem image
  inspect     Display detailed information on one or more images
  load        Load an image from a tar archive or STDIN
  ls          List images
  prune       Remove unused images
  pull        Download an image from a registry
  push        Upload an image to a registry
  rm          Remove one or more images
  save        Save one or more images to a tar archive (streamed to STDOUT by default)
  tag         Create a tag TARGET_IMAGE that refers to SOURCE_IMAGE

Run 'docker image COMMAND --help' for more information on a command.
einfochips@PUNELPT0728:~/DevOps-assessment/Assessment 3/fullstack-docker-app$ docker images
REPOSITORY   TAG       IMAGE ID       CREATED       SIZE
<none>       <none>    39fc0867bf9e   2 hours ago   188MB
ubuntu       latest    35a88802559d   4 weeks ago   78.1MB
einfochips@PUNELPT0728:~/DevOps-assessment/Assessment 3/fullstack-docker-app$ docker rmi 39fc0867bf9e
Deleted: sha256:39fc0867bf9e6c7d78178681d9f5bd1c245abe8e6783d022d9428283d423ba96
einfochips@PUNELPT0728:~/DevOps-assessment/Assessment 3/fullstack-docker-app$ docker images
REPOSITORY   TAG       IMAGE ID       CREATED       SIZE
ubuntu       latest    35a88802559d   4 weeks ago   78.1MB
einfochips@PUNELPT0728:~/DevOps-assessment/Assessment 3/fullstack-docker-app$
```