Lab Exercise 3: Working with Docker Volumes

Objective:

- Learn how to create and manage Docker volumes.
- Understand how Docker volumes can be used to persist data across container restarts.
- Practice mounting Docker volumes to containers.

Prerequisites:

- Docker installed on your system.
- Basic understanding of Docker commands and container concepts.

Step 1: Create a Docker Volume

Create a new Docker volume:

```
docker volume create my_data_volume
```

```
[(base) aryanbansal@Aryans-MacBook-Air-6 ~ % docker volume create myvol
 myvol
```

This command creates a Docker volume named my_data_volume.

Verify that the volume was created:

```
docker volume ls
```

```
[(base) aryanbansal@Aryans-MacBook-Air-6 ~ % docker volume ls
DRIVER              VOLUME NAME
local               20f0e7d22860b5777a0a43eb6c3bc422cfc13a4ed46fd4bbe6ecfa1f7a0e2f8e
local               294fd0c72636f1a77f619ae52b796a7e680ed7e4f88be790522366fb21d5a3be
local               Aryan
local               my_vol
local               myvol
(base) aryanbansal@Aryans-MacBook-Air-6 ~ %
```

You should see my_data_volume listed among the volumes.

Step 2: Run a Container with the Volume Mounted

Run an Nginx container with the volume mounted:

```
docker run -d --name my_nginx -v my_data_volume:/usr/share/nginx/html -p
8008:80 nginx
```

```
(base) aryanbansal@Aryans-MacBook-Air-6 ~ % docker run -d --name my_nginx -v myvol:/usr/share/nginx/html -p 8008:80 nginx
cb521749b193108e069646a1c2d88bce749812bc4bb25eff06e1d37ff3633c07
```
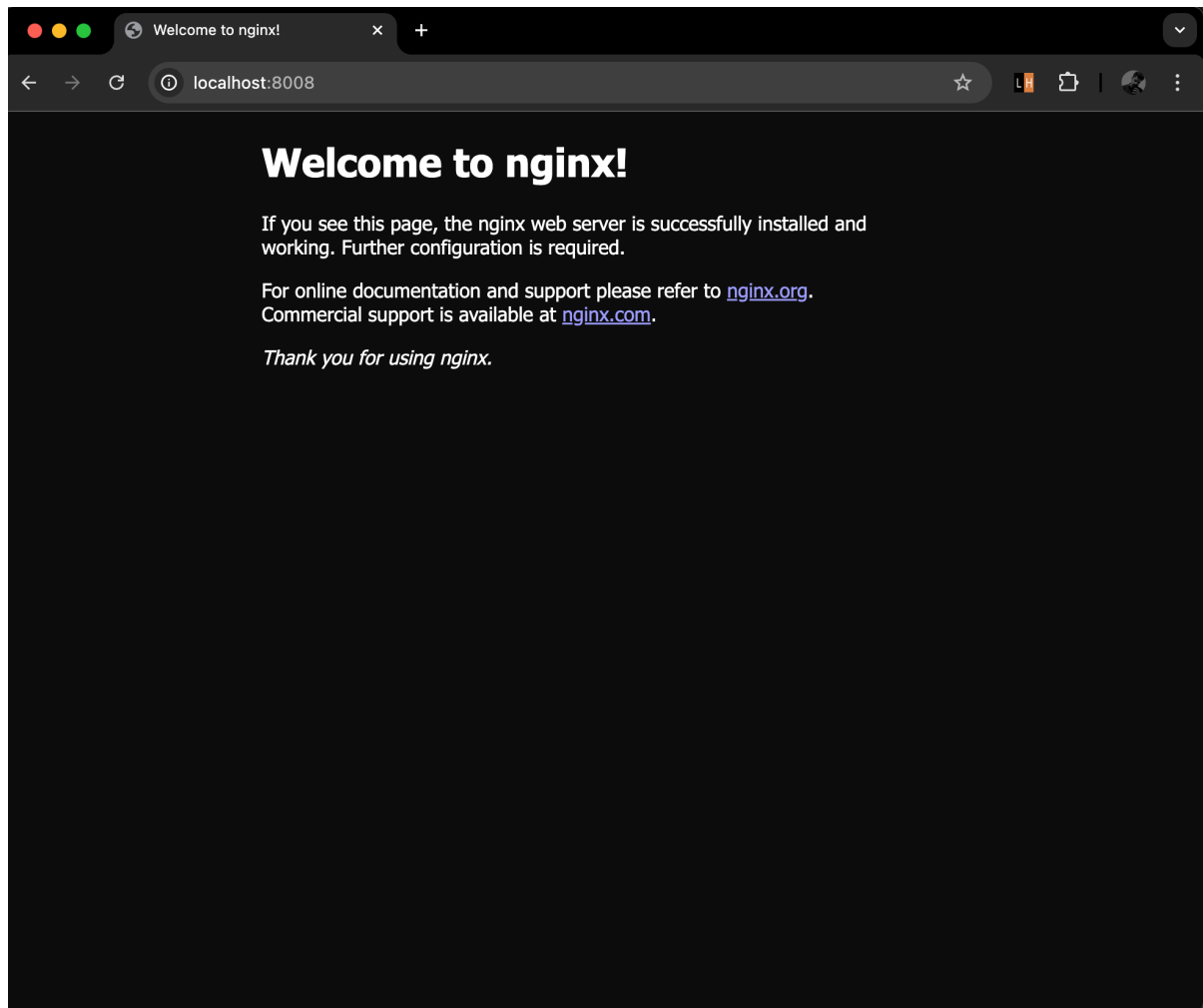
This command starts an Nginx container named my_nginx and mounts the my_data_volume volume to the /usr/share/nginx/html directory inside the container.

Verify that the container is running:

```
docker ps
```

```
(base) aryanbansal@Aryans-MacBook-Air-6 ~ % docker ps
CONTAINER ID   IMAGE     COMMAND                  CREATED          STATUS          PORTS                    NAMES
cb521749b193   nginx     "/docker-entrypoint.…"   50 seconds ago   Up 49 seconds   0.0.0.0:8008->80/tcp     my_nginx
34fd16c4d60f   nginx     "/docker-entrypoint.…"   10 minutes ago   Up 10 minutes   80/tcp                   my_container
(base) aryanbansal@Aryans-MacBook-Air-6 ~ %
```

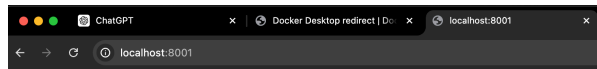You should see my_nginx listed as one of the running containers.

Step 3: Interact with the Volume

Create a simple HTML file in the volume:

```
docker exec -it my_nginx bash

echo "<h1>Hello, Docker Volume</h1>" > /usr/share/nginx/html/index.html
```

```
exit
```


Hello, Docker Volume

```
(base) aryanbansal@Aryans-MacBook-Air-6 ~ % docker exec -t my_nginx bash
root@cb521749b193:/# echo "<h1>Hello, Docker Volume</h1>" > /usr/share/nginx/html/index.html
root@cb521749b193:/# exit
```

This command creates an HTML file inside the /usr/share/nginx/html directory, which is backed by my_data_volume.

Access the Nginx server to see your file: Open a browser and navigate to http://localhost:8008. You should see the message "Hello, Docker Volume!" displayed on the page.

Step 4: Test Data Persistence

Stop and remove the container:

```
docker stop my_nginx

docker rm my_nginx
```

Run a new Nginx container using the same volume:

```
(base) aryanbansal@Aryans-MacBook-Air-6 ~ % docker stop my_nginx
my_nginx
(base) aryanbansal@Aryans-MacBook-Air-6 ~ % docker ps
CONTAINER ID    IMAGE      COMMAND                  CREATED         STATUS          PORTS       NAMES
34fd16c4d60f    nginx      "/docker-entrypoint.…"   30 minutes ago  Up 30 minutes   80/tcp      my_container
(base) aryanbansal@Aryans-MacBook-Air-6 ~ %
```

```
[(base) aryanbansal@Aryans-MacBook-Air-6 ~ % docker rm my_nginx
my_nginx
(base) aryanbansal@Aryans-MacBook-Air-6 ~ %
```

```
docker run -d -p 8011:80 -v my_data_volume:/usr/share/nginx/html nginx
```

Access the Nginx server again: Navigate to http://localhost in your browser. You should still see the "Hello, Docker Volume!" message, demonstrating that the data persisted across container instances.

```
(base) aryanbansal@Aryans-MacBook-Air-6 ~ % docker run -d -p 8011:80 -v myvol1:/usr/share/nginx/html nginx
26d18ecb5a10cb8d66b2a996c49b829b4962174c2b23ce3e04998bf7cd435f74
```

Step 5: Clean Up

Stop and remove the container:

```
docker stop new_nginx

docker rm new_nginx
```

```
(base) aryanbansal@Aryans-MacBook-Air-6 ~ % docker stop 26d18ec
26d18ec
(base) aryanbansal@Aryans-MacBook-Air-6 ~ % docker stop 34fd16c
34fd16c
(base) aryanbansal@Aryans-MacBook-Air-6 ~ % docker ps -a
CONTAINER ID    IMAGE           COMMAND                 CREATED          STATUS                    PORTS        NAMES
26d18ecb5a10    nginx           "/docker-entrypoint..."  25 minutes ago   Exited (0) 15 seconds ago              trusting_mirzakhani
34fd16c4d60f    nginx           "/docker-entrypoint..."  57 minutes ago   Exited (0) 4 seconds ago               my_container
0f086fcb8ce7    redis           "docker-entrypoint.s..." 2 days ago       Exited (0) 2 days ago                  redis-server
0383a11a871a    ubuntu          "/bin/bash"              9 days ago       Exited (0) 9 days ago                  upbeat_kepler
dcb7776521fa    ubuntu:latest   "/bin/bash"              9 days ago       Exited (0) 9 days ago                  clever_sutherland
afabae50f7a5    ubuntu          "/bin/bash"              9 days ago       Exited (0) 9 days ago                  crazy_mclean
(base) aryanbansal@Aryans-MacBook-Air-6 ~ % docker volume rm myvol1
Error response from daemon: remove myvol1: volume is in use - [26d18ecb5a10cb8d66b2a996c49b829b4962174c2b23ce3e04998bf7cd435f74]
(base) aryanbansal@Aryans-MacBook-Air-6 ~ % docker rm 26d18
26d18
(base) aryanbansal@Aryans-MacBook-Air-6 ~ % docker rm 34fd16
34fd16
```

Remove the Docker volume:

```
docker volume rm my_data_volume
```

```
34fd16
[(base) aryanbansal@Aryans-MacBook-Air-6 ~ % docker volume rm myvol1
 myvol1
```

Verify that the volume is removed:

```
docker volume ls
```

```
[(base) aryanbansal@Aryans-MacBook-Air-6 ~ % docker volume ls
DRIVER           VOLUME NAME
local            20f0e7d22860b5777a0a43eb6c3bc422cfc13a4ed46fd4bbe6ecfa1f7a0e2f8e
local            294fd0c72636f1a77f619ae52b796a7e680ed7e4f88be790522366fb21d5a3be
local            Aryan
local            my_vol
local            myvol
(base) aryanbansal@Aryans-MacBook-Air-6 ~ %
```

Ensure that my_data_volume is no longer listed.