Assignment: Containerization with Docker Report

Personal

- Name: Zackaria Osman
- ID: 000885686
- Email:
  - Primary: cobalt.zr86@gmail.com
  - Secondary: zackaria.osman@edu.sait.ca

Links

GitHub repository: https://github.com/ZackariaOsman/docker-challenge-template

Basic introduction of Docker

Why is it important for me, in the context of software development?

- Consistency
  - Ensures applications behave consistently across different environments.
- Isolation
  - Encapsulates applications and dependencies, enhancing security and reliability.
- Efficiency
  - Lightweight containers enable faster deployment and scaling.
- Portability

        - Runs on any system supporting Docker, simplifying deployment and collaboration.
    - Version Control
        - Images are versioned and shareable, ensuring reproducibility and consistency.

Challenge 1 - Simple static page server

Docker Commands Used

*** '.' = current working directory ***

- `docker build`
  - Builds an image from a Dockerfile in the current directory.
- `docker images`
  - Lists all available Docker images.
- `docker build -t <repository_name>`
  - Builds an image and tags it with a repository name.
- `docker run -d -p <host_port>:<container_port> <image_id>`
  - Runs a container in detached mode, mapping ports between host and container.
- `docker ps`
  - Lists running containers.
- `docker stop <container_id> or docker stop <container_name>:`
  - Stops a running container.
- `docker ps -a`
  - Lists all containers (both running and stopped).
- `docker rm <container_id> or docker rm <container_name>`
  - Removes a container.
- `docker rmi <image_id> or docker rmi <image_name>`
  - Removes an image.

Steps To Make It Work

Installation

Install Docker

- Downloaded the Docker Engine from the Docker website followed the instructions for the installation process.

Configuration

Creating a DockerFile:

```
# To use the Nginx image from Docker Hub
FROM nginx:alpine

# Copy  contents of  public folder to Nginx html directory
COPY public/ /usr/share/nginx/html/

# Expose port 80 but it is not mandatory
#EXPOSE 80

# Start Nginx when container starts
#Also not mandatory
#CMD ["nginx", "-g", "daemon off;"]

#For Nginx in debug mode
#CMD ["nginx-debug", "-g", "daemon off;"]
```

Building an Image:

- Use `docker build .` to build an image from a Dockerfile located in the current directory (.).
- Optionally, you can tag the image with a repository name using
    - `docker build -t <repository_name> ..`

Listing Images

- After building, use `docker images` to list all locally available Docker images.

Creation of Files

Creating and Running Containers:

- Create a container from an image with `docker run`:
  - Use `docker run -d -p <host_port>:<container_port> <image_id>` to run a container in detached mode (`-d`) and map ports (`-p`). Replace `<host_port>` and `<container_port>` with appropriate values.
    - Example: `docker run -d -p 80:80 8b0a2c43a149` runs a container from image `8b0a2c43a149`, mapping host port 80 to container port 80.

Managing Containers:

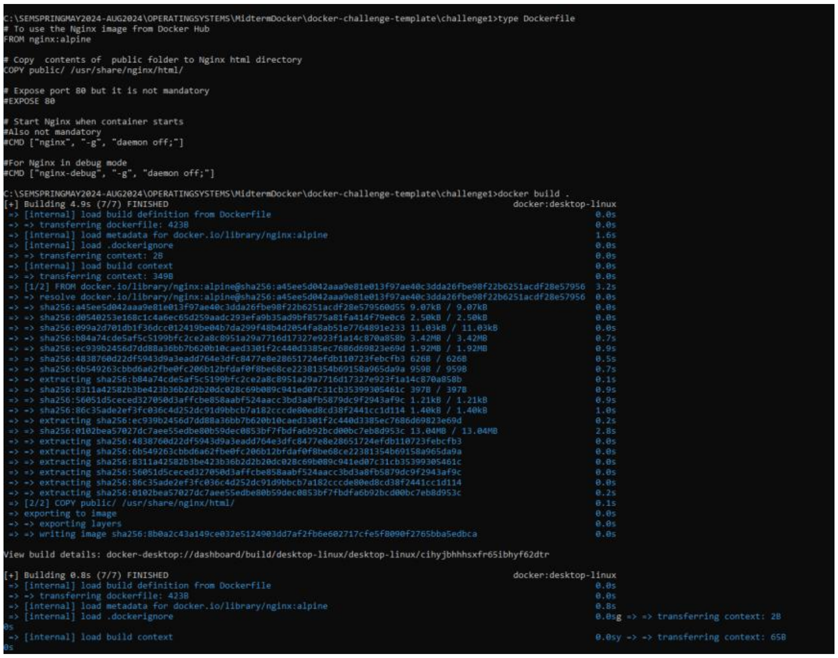
- View running containers with
  - `docker ps`.
- Stop a container using
  - `docker stop <container_id>` or `docker stop <container_name>`.
- List all containers (including stopped ones) with
  - `docker ps -a`.
- Remove a container with
  - `docker rm <container_id>` or `docker rm <container_name>`.

Managing Images:

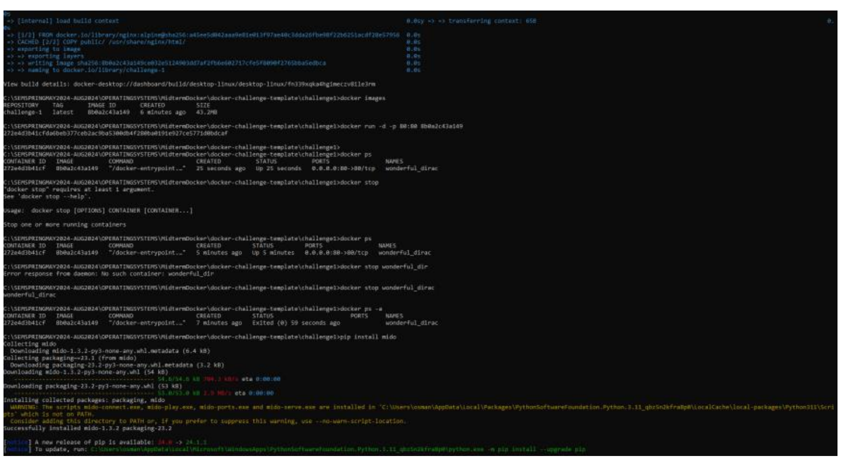
- Remove an image using
  - `docker rmi <image_id>` or `docker rmi <image_name>`.

Screenshots

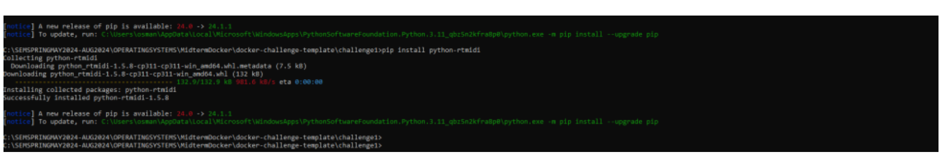
Png1:



Png2:



Png3:



Result:

Lessons learned

No, nothing went wrong, but this is what I learned:

- Docker Installation and Set up
- Creating Dockerfiles
- Building Images
- Managing Containers and Images

References

- YouTube:
  - https://www.youtube.com/watch?v=SnSH8Ht3MIc&list=LL&index=7&t=929s
- LinkedIn
  - https://www.linkedin.com/pulse/why-every-software-engineer-should-learn-docker-s-gouse-basha-2amxe/

Challenge 2 - NodeJS application

Docker Commands Used

*** '.' = current working directory ***

```
#to build the image
#docker build .

#to list the images
#docker images

#to add a tag to the image
#docker-compose build

#to create a container
#docker-compose up

#See the running containers
#docker-compose ps
```

Steps To Make It Work

Configuration

Creating a DockerFile:

```
# To use the Nginx image from Docker Hub
FROM nginx:alpine


# Use the Node.js image from Docker Hub
FROM node:14.17.0-alpine3.13

WORKDIR /app

# Copy application dependency manifests to the container image.
COPY package*.json ./

# Install application dependencies.
RUN npm install

# Bundle app source
```

```
COPY . .

# Expose the port the app runs on
EXPOSE 3000

# Start the Node.js app
CMD ["npm", "start"]
```

Creating a Docker-Compose:

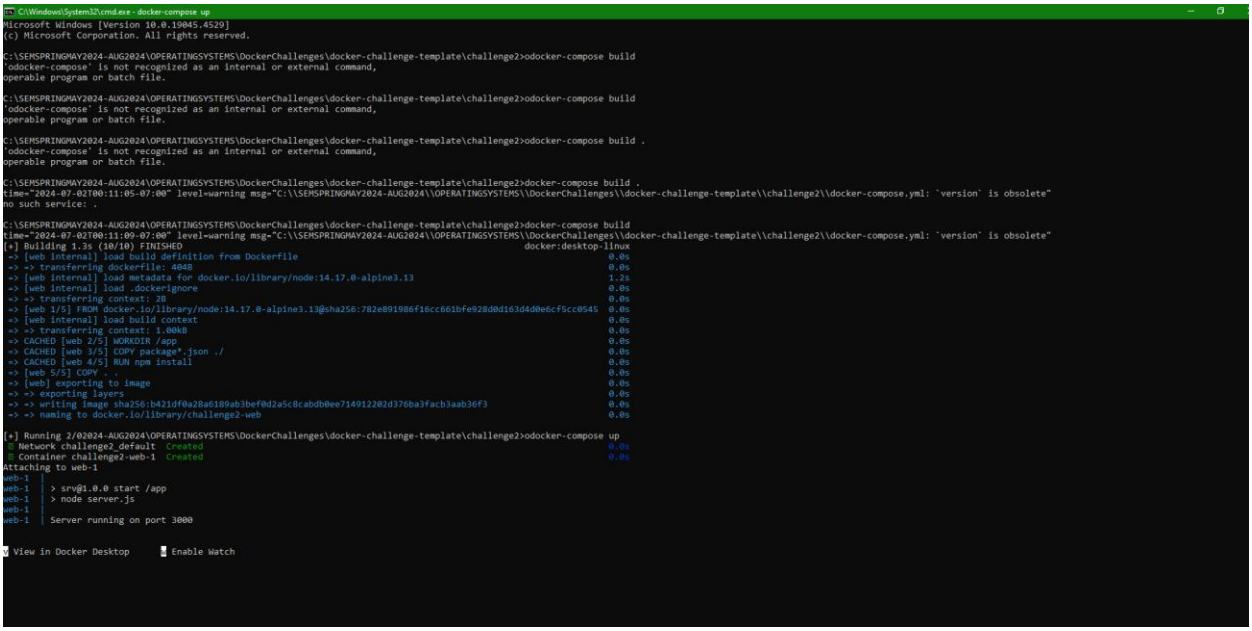
```
version: '3'

services:
  web:
    build:
      context: .
      dockerfile: Dockerfile
    ports:
      - "8080:3000"
```

Steps to Build and Run

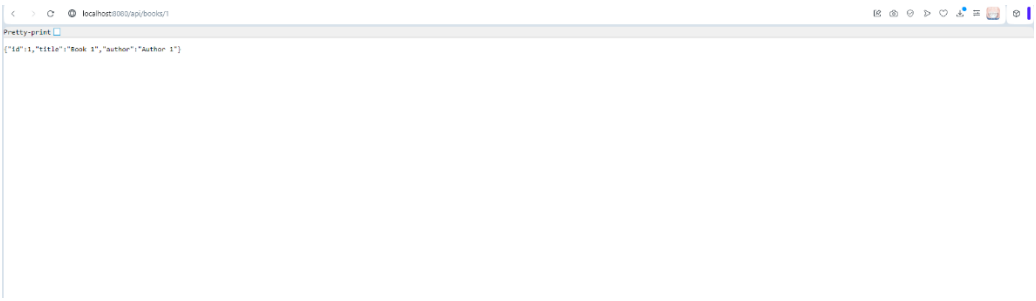
1. **Navigate to the challenge2 Directory and open CMD**
2. **Build Docker Images**:
    - docker-compose build
3. **Run Docker Containers**
    - docker-compose up
4. **Check Running Containers**:
    - docker-compose ps
5. **Open your web browser and navigate to**:
    - http://localhost:8080/api/books to get a JSON message with all books.
    - http://localhost:8080/api/books/1 to get a JSON message with the book of ID 1.

Screenshots

Png1:



Result1:



Result2:

Lessons learned

Again No, nothing went wrong, but this is what I learned:

- Docker Compose

- YouTube:
    - https://www.youtube.com/watch?v=0B2raYYH2fE
    - https://www.youtube.com/watch?v=hXhI2ZLDgQM