PROJECT REPORT

Containerization Using Docker and Deployment on AWS EC2

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1. Introduction

In today's software industry, applications are expected to run reliably in different environments such as development, testing, and production. One common problem developers face is that an application works on one system but fails on another due to environment differences. Docker helps solve this problem by packaging the application along with all its required dependencies into a container.

Cloud computing platforms like Amazon Web Services (AWS) provide virtual machines that allow applications to be deployed and accessed from anywhere over the internet. AWS EC2 is a widely used service that offers scalable and cost-effective virtual servers.

In this project, a simple static website is created and containerized using Docker with the Nginx web server. The Docker container is first tested locally and then deployed on an AWS EC2 instance running Ubuntu Linux. Finally, the application is made publicly accessible using the EC2 instance's public IP address. This project demonstrates the basic concepts of Docker containerization and cloud deployment, which are essential skills in DevOps.

2. Objective

The objectives of this project are:

- To containerize a website using Docker
- To deploy the Docker container on AWS EC2
- To access the deployed application using a public IP

3. Tools and Technologies Used

- Docker
- Nginx
- AWS EC2
- Ubuntu 22.04 LTS
- Windows 11
- HTML
- SSH

4. Project Architecture

The project follows this workflow:

1. Create a simple HTML website
2. Write a Dockerfile using Nginx
3. Build a Docker image
4. Launch an AWS EC2 instance
5. Install Docker on EC2
6. Transfer project files to EC2
7. Build and run Docker container on EC2
8. Access the website using public IP

5. Implementation

Step 1: Website Creation

A simple HTML file was created to display a webpage.

index.html

File Edit View

```
<!DOCTYPE html>
<html>
<head>
    <meta charset="UTF-8">
    <title>My Portfolio</title>
    <link rel="stylesheet" href="styles.css">
</head>
<body>
    <h1>Hello, I am learning DevOps 🚀</h1>
    <p>This website is running inside Docker.</p>
</body>
</html>
```

Figure 1.1 : Index.html file

Step 2: Dockerfile Creation

A Dockerfile was created to use Nginx and copy website files into the container.

Dockerfile

File Edit View H1

```
FROM nginx:alpine

COPY . /usr/share/nginx/html

EXPOSE 80
```

Figure 1.2 : Dockerfile

Step 3: Docker Image Build on AWS

The Docker image was built on the AWS EC2 instance using the Dockerfile.

docker build -t portfolio-website .

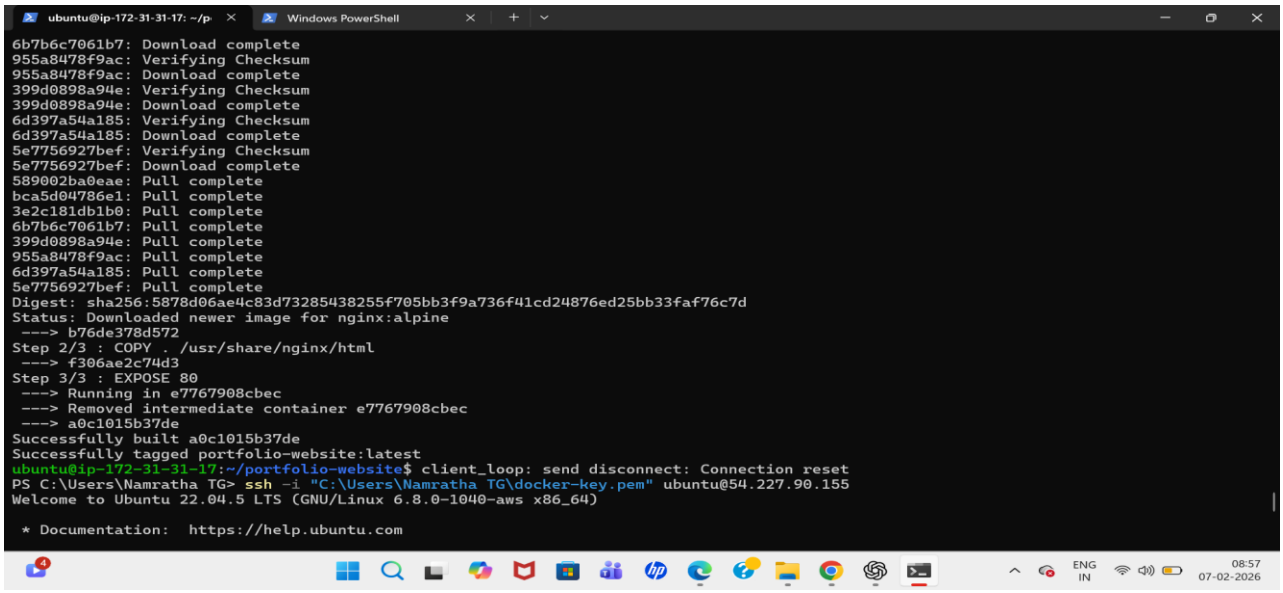

Figure 1.3 : Image was built

Step 4: Run Docker Container on AWS

The Docker container was started and exposed on port 80.

docker run -d -p 80:80 portfolio-website

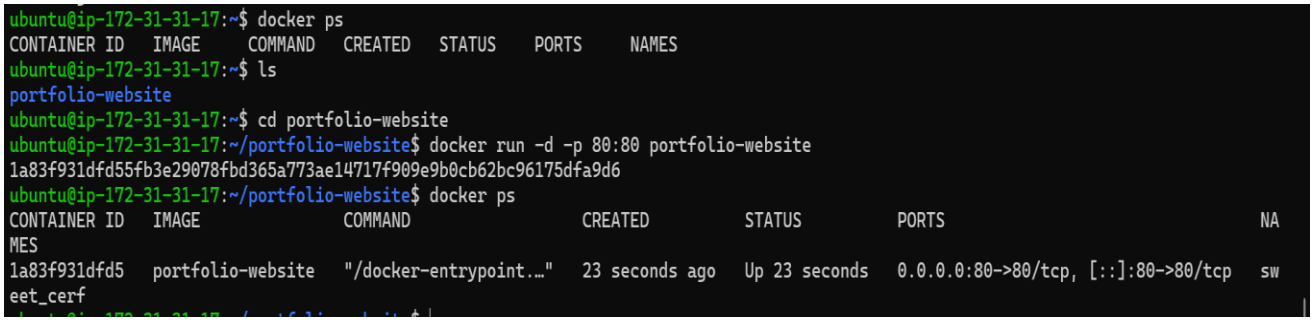

Figure 1.4 : Docker ps

Step 5: Access Website Using Public IP

The website was accessed using the public IPv4 address of the EC2 instance.

http://54.227.90.155/

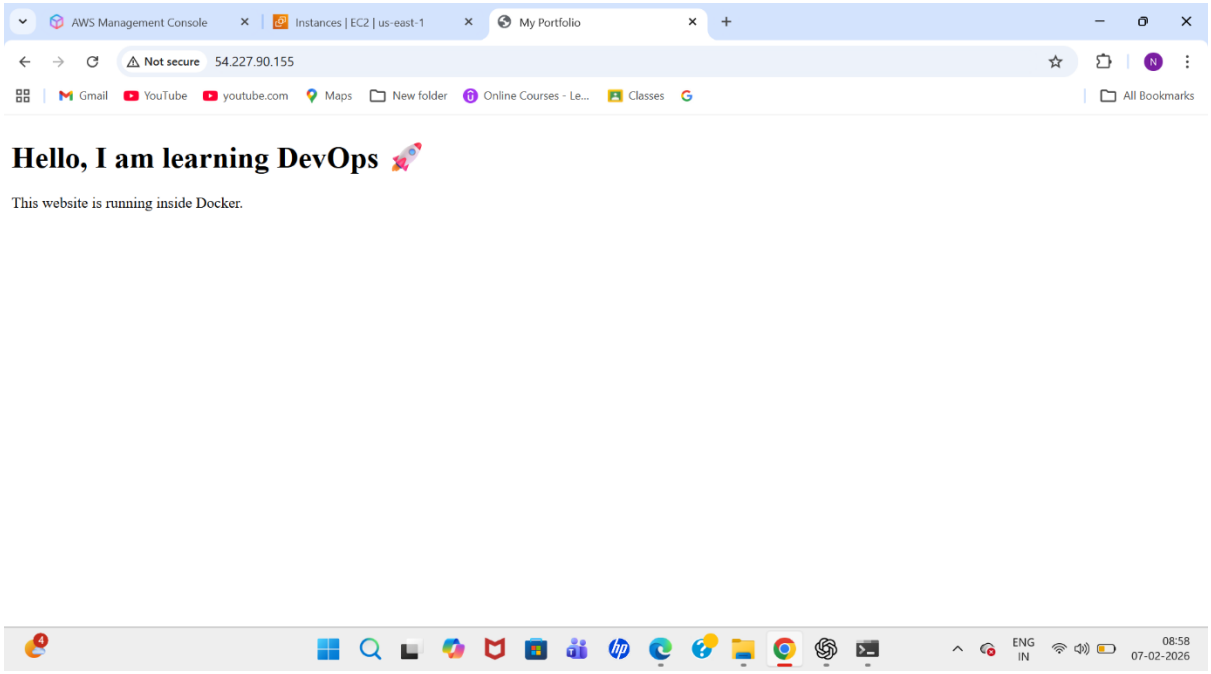

Figure 1.5: Website Running

6. AWS EC2 Configuration

- Instance Type: t2.micro
- Operating System: Ubuntu 22.04 LTS
- Security Groups:
  - SSH (Port 22) – Enabled
  - HTTP (Port 80) – Enabled

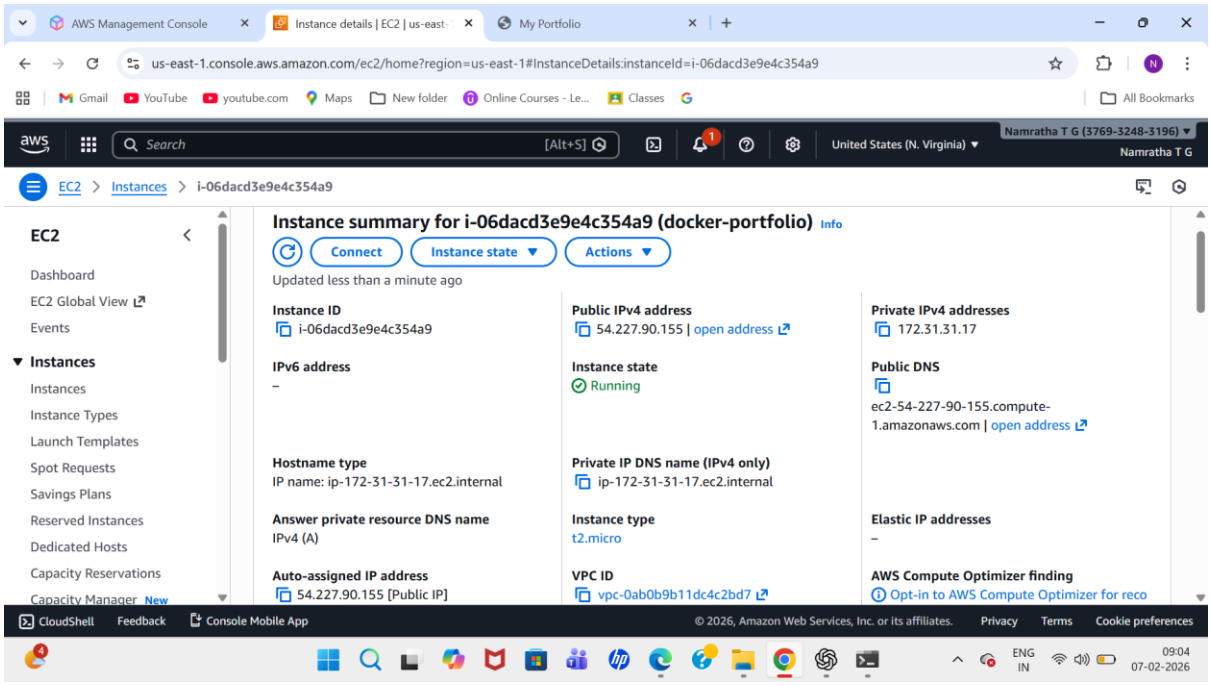

Figure 1.6 : EC2 Instance

7. Result

The website was successfully deployed inside a Docker container on AWS EC2 and accessed using a public IP address.

8. Conclusion

This project demonstrates Docker containerization and cloud deployment using AWS EC2. It provides hands-on experience with real-world DevOps tools and workflows.