DevOps Pipeline for Java Spring Boot using Jenkins, Docker, and AWS EC2

Overview

This project demonstrates setting up a Continuous Integration/Continuous Deployment (CI/CD) pipeline using Jenkins to automate building, testing, and deploying a Java Spring Boot application. Docker is used for containerization, and the final application is deployed on an AWS EC2 instance.

Tools and Technologies Used

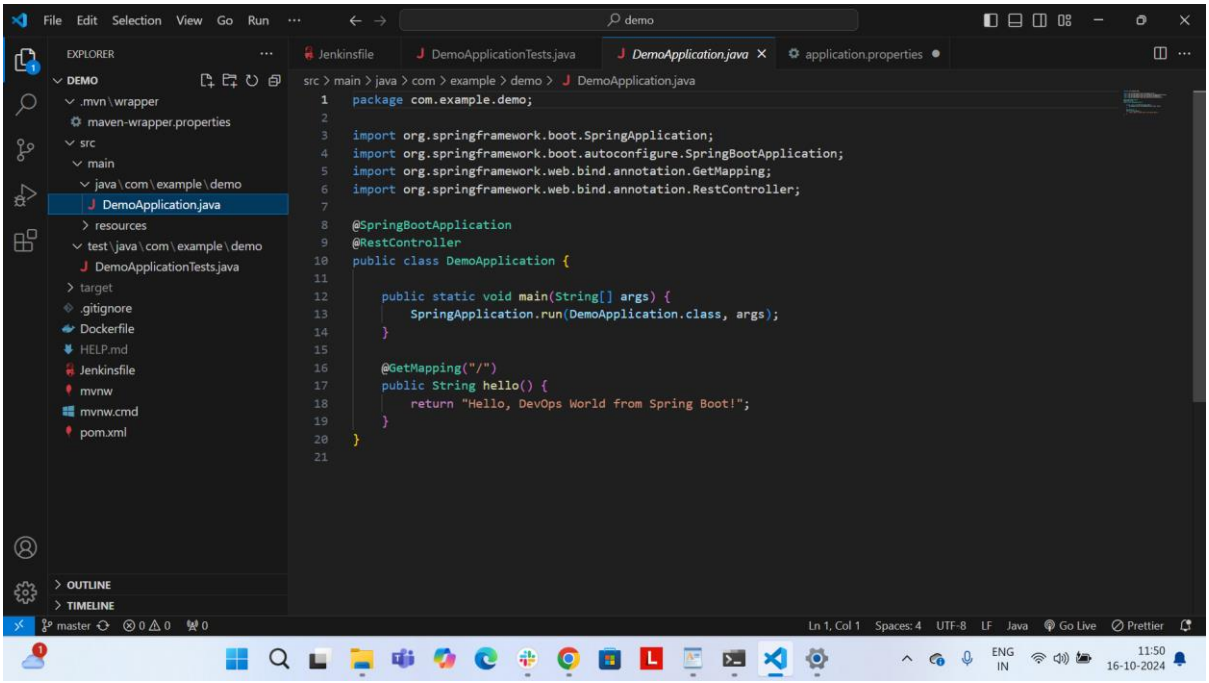
- **Java Spring Boot**: Web application framework.
- **Jenkins**: For automating the CI/CD process.
- **Docker**: Containerization tool.
- **GitHub**: For source code management.
- **AWS EC2**: Deployment platform for hosting the application.
- **Maven**: Build tool for the Java project.
- **YAML**: Optional for Jenkins pipeline configuration.
- **Git**: Version control system.

Step-by-Step Implementation

Step 1: Create a Simple Spring Boot Application

1. **Generate the Project**
    a. Use Spring Initializr with the following configuration:
        i. **Project**: Maven
        ii. **Language**: Java
        iii. **Spring Boot**: 2.7.x or latest
        iv. **Packaging**: Jar
        v. **Dependency**: Spring Web

2. **Create the Basic Application Code**

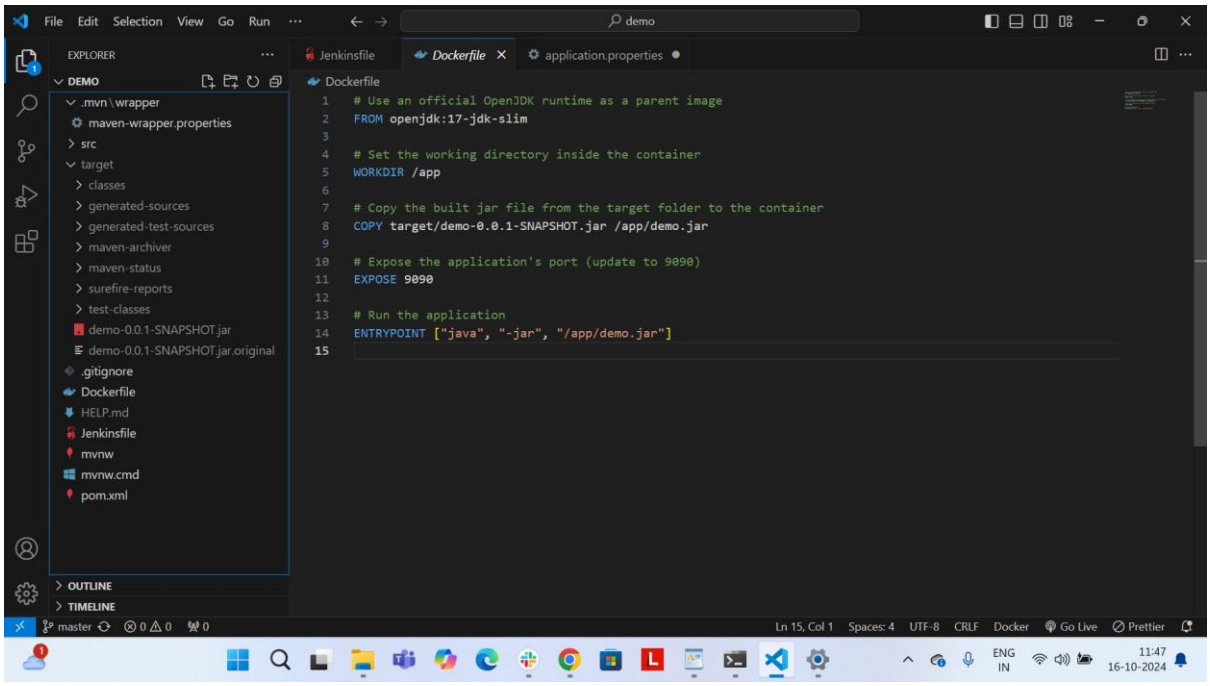


3. **Build the Project**
   In the project root, run:

   ./mvnw clean package

Step 2: Containerize the Spring Boot Application with Docker

1. **Create a Dockerfile**



2. Build and Test Docker Image

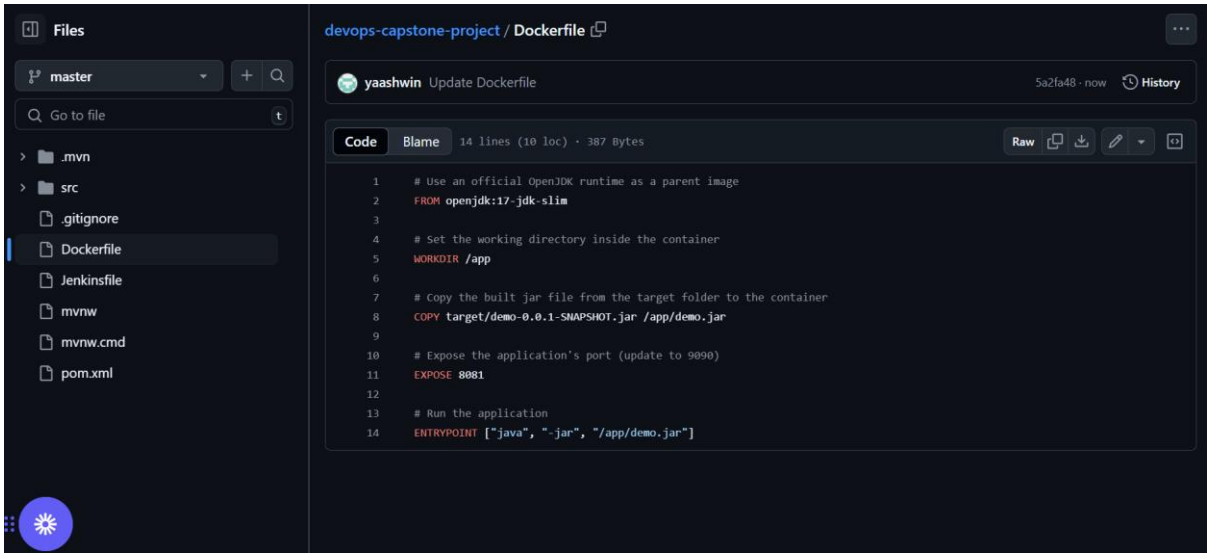
   docker build -t spring-boot-demo .
   docker run -p 8080:9090 spring-boot-demo

3. **Verify Application**
   Visit http://localhost:9090 to see:
   "Hello DevOps World!"

Step 3: Push Code to GitHub

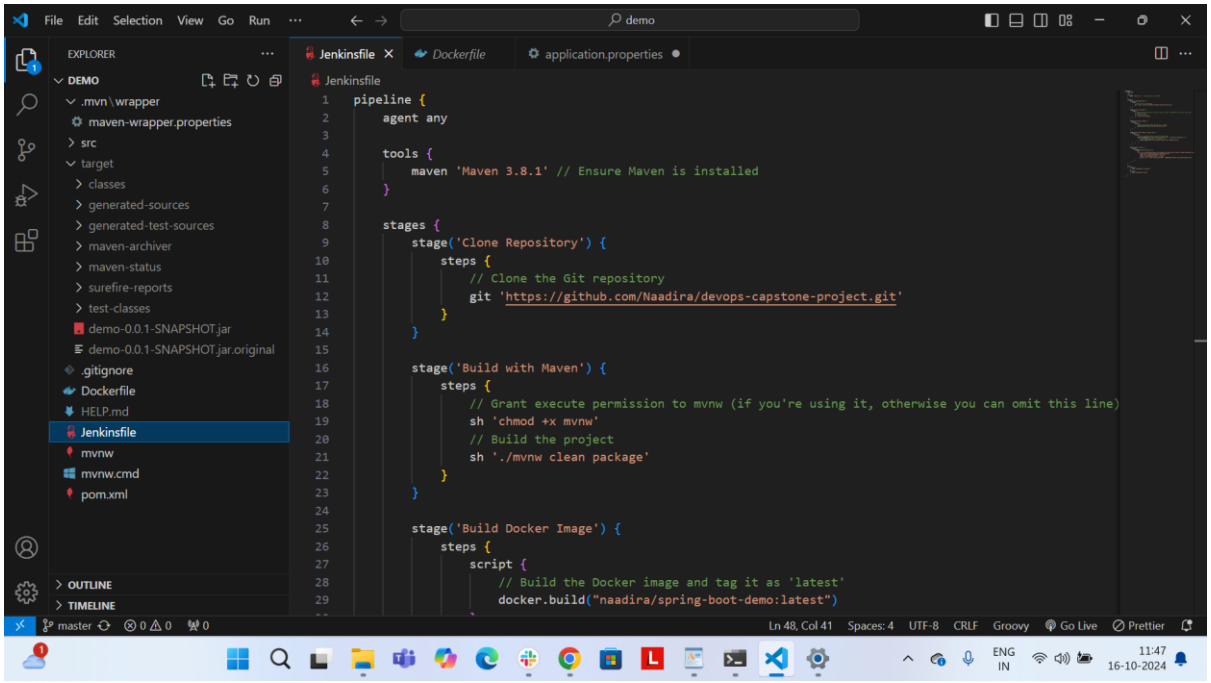
1. Initialize Git and Push Code

```
git init
git add .
git commit -m "Initial commit"
git remote add origin GuviProject
git push -u origin master
```



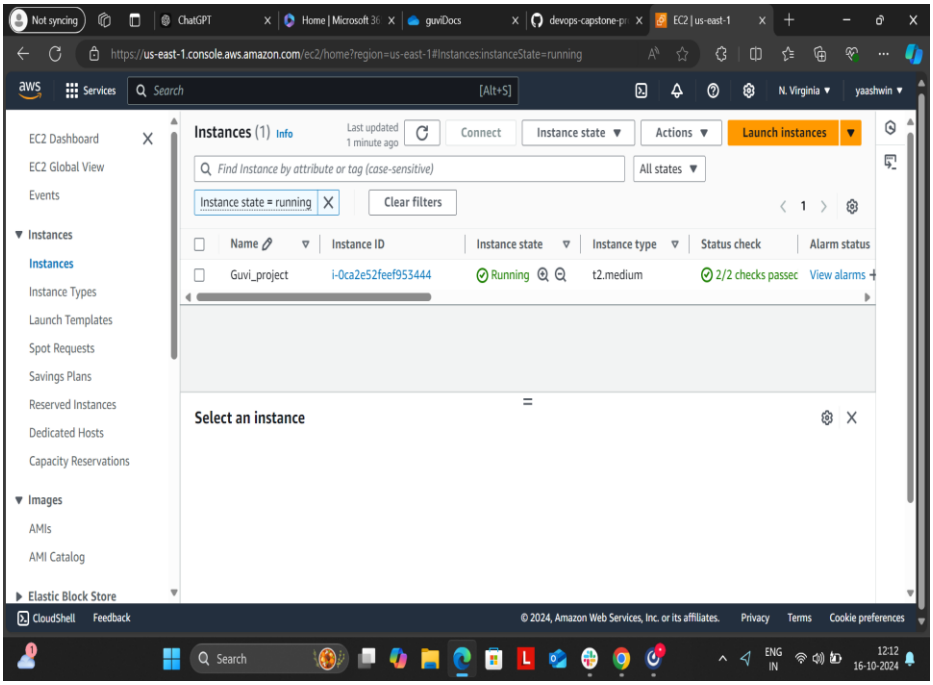
Step 4: Set Up Jenkins for CI/CD

1. Install Jenkins
   a. Install Jenkins on your local machine instance.
2. Configure Jenkins
   a. Install Docker, Maven, and the following Jenkins plugins:
      i. **Git Plugin**
      ii. **Maven Integration Plugin**
      iii. **Docker Pipeline Plugin**
3. Create a Jenkins Pipeline Job



Step 5: Deploy the Application on AWS EC2

1. **Create an EC2 Instance**
    a. Use Amazon Linux or Ubuntu for the instance.



2. **Install Docker on EC2**

SSH into the EC2 instance and run:

```
sudo yum update -y
sudo yum install docker -y
```

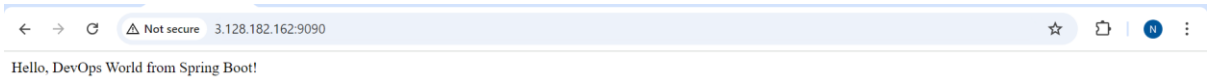
```
sudo service docker start
sudo usermod -aG docker ec2-user
```

3. **Configure SSH Access in Jenkins**

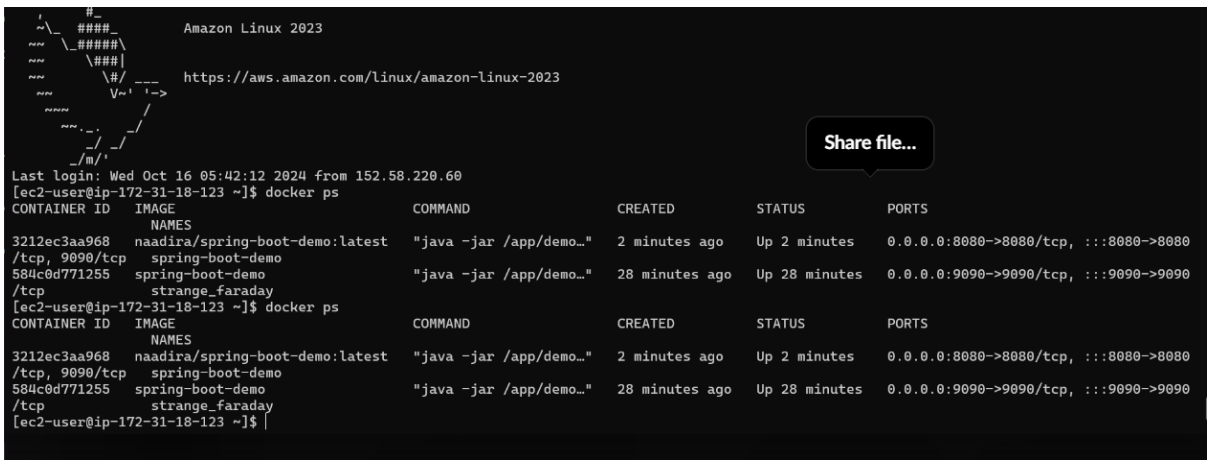
- Add your EC2 SSH key to Jenkins using the SSH Agent plugin.

Step 6: Monitor the Application

1. **Access the Deployed Application**
    a. Visit:
    b. http://<ec2-instance-ip>:9090



Step 7: Build the jenkins pipeline and check the container in EC2:



Project Recap

- **Java Spring Boot**: Developed a simple RESTful API.
- **Docker**: Used for containerization.
- **GitHub**: Managed source code.
- **Jenkins**: Automated build, test, and deployment.
- **AWS EC2**: Hosted the application in the cloud.