CI/CD Pipeline with GitHub Actions and Docker

Abstract

This project shows how to set up a Continuous Integration and Continuous Deployment (CI/CD) pipeline using GitHub Actions and Docker. The pipeline builds a Spring Boot application, runs tests, packages it into a Docker image, pushes the image to Docker Hub, and finally deploys it on Play with Docker (PWD) for testing. The aim is to automate software delivery without needing paid cloud services.

Introduction

CI/CD is a modern DevOps approach that allows faster and more reliable delivery of applications. In this project, we created a CI/CD pipeline to automate the build, test, and deployment stages of a sample Spring Boot application. We used GitHub Actions for automation, Docker for containerization, and Play with Docker for deployment. The goal was to gain hands-on experience in automation and deployment without relying on cloud resources.

Tools Used

- GitHub Actions: For workflow automation.

- Maven: For building and testing the Spring Boot application.

- Docker: For creating and running container images.

- Docker Hub: To store and distribute built images.

- Play with Docker (PWD): For deployment and testing on a free VM.

Steps

1. Created a Spring Boot project with a simple REST API.

2. Wrote a Dockerfile to containerize the application.

3. Created a GitHub Actions workflow (YAML) to automate the build, test, and Docker image creation.

4. Configured GitHub Secrets for Docker Hub credentials.

5. On every push to the main branch, the pipeline built and tested the app and then pushed the image to Docker Hub.

6. Logged into Play with Docker (PWD) and pulled the Docker image.

7. Accessed the deployed application through the browser on port 8080.

Conclusion

This project successfully showed how to use CI/CD with GitHub Actions and Docker without relying on cloud services. The automation pipeline cut down on manual work, ensured code reliability, and deployed the application smoothly. This hands-on project highlighted the value of CI/CD in today's software development practices.