DevOps

Day – 2

Assignment

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Roll No:22CSR037

Project Setup:

- Define the application architecture (e.g., microservices, monolith).

- Write application code and organize it into repositories.

Create Dockerfiles:

- Write Dockerfile for each service to define how containers should be built.

- Include necessary dependencies and configurations.

Docker Compose:

- Create a docker-compose.yml file to manage multiple services using Docker Compose.

Containerization:

- Build Docker images using docker build.

- Run containers using docker run.

Version Control:

- Use Git for source code management and maintain Dockerfile versions.

CI/CD Pipeline:

- Configure CI/CD pipelines using tools like Jenkins, GitLab CI, or GitHub Actions to automate builds, tests, and deployments.

Container Registry:

- Push Docker images to Docker Hub, AWS ECR, or other container registries.

Orchestration:

- Use Kubernetes or Docker Swarm to manage and orchestrate containers in production.

Monitoring and Logging:

- Integrate tools like Prometheus, Grafana, or ELK Stack for container monitoring and logging.

Scaling and Management:

- Implement load balancing and scaling using Kubernetes or other container orchestration tools.

Commands :

Build Docker image:

docker build -t my-app .

Create Docker Compose File

```yaml
version: '3.8'
services:
  web:
    build: .
    ports:
      - "5000:5000"
    environment:
      - ENV=development
    volumes:
      - .:/app
    restart: always
docker-compose up
```

Container Management

Check running containers:

docker ps

Stop containers:

docker-compose down

Restart containers:

docker-compose restart

Version Control

git init

git add .

git commit -m "Initial commit"

git branch -M main

git remote add origin <repo-url>

git push -u origin main

Setup CI/CD Pipeline

Install Jenkins using Docker:

```
docker run -d -p 8080:8080 -p 50000:50000 jenkins/jenkins:lts
```

Configure pipeline using Jenkinsfile.

If using GitHub Actions:
Create .github/workflows/docker.yml

```
 name: Docker Build and Push


on:
  push:
    branches:
      - main


jobs:
  build:
    runs-on: ubuntu-latest
    steps:
      - name: Checkout Code
        uses: actions/checkout@v4


      - name: Build Docker Image
        run: docker build -t my-app:latest .


      - name: Login to Docker Hub

        run: echo "${{ secrets.DOCKER_PASSWORD }}" | docker login -u "${{ secrets.DOCKER_USERNAME }}" --password-stdin


      - name: Push Docker Image

        run: docker tag my-app:latest my-dockerhub-user/my-app:latest && docker push my-dockerhub-user/my-app:latest
```
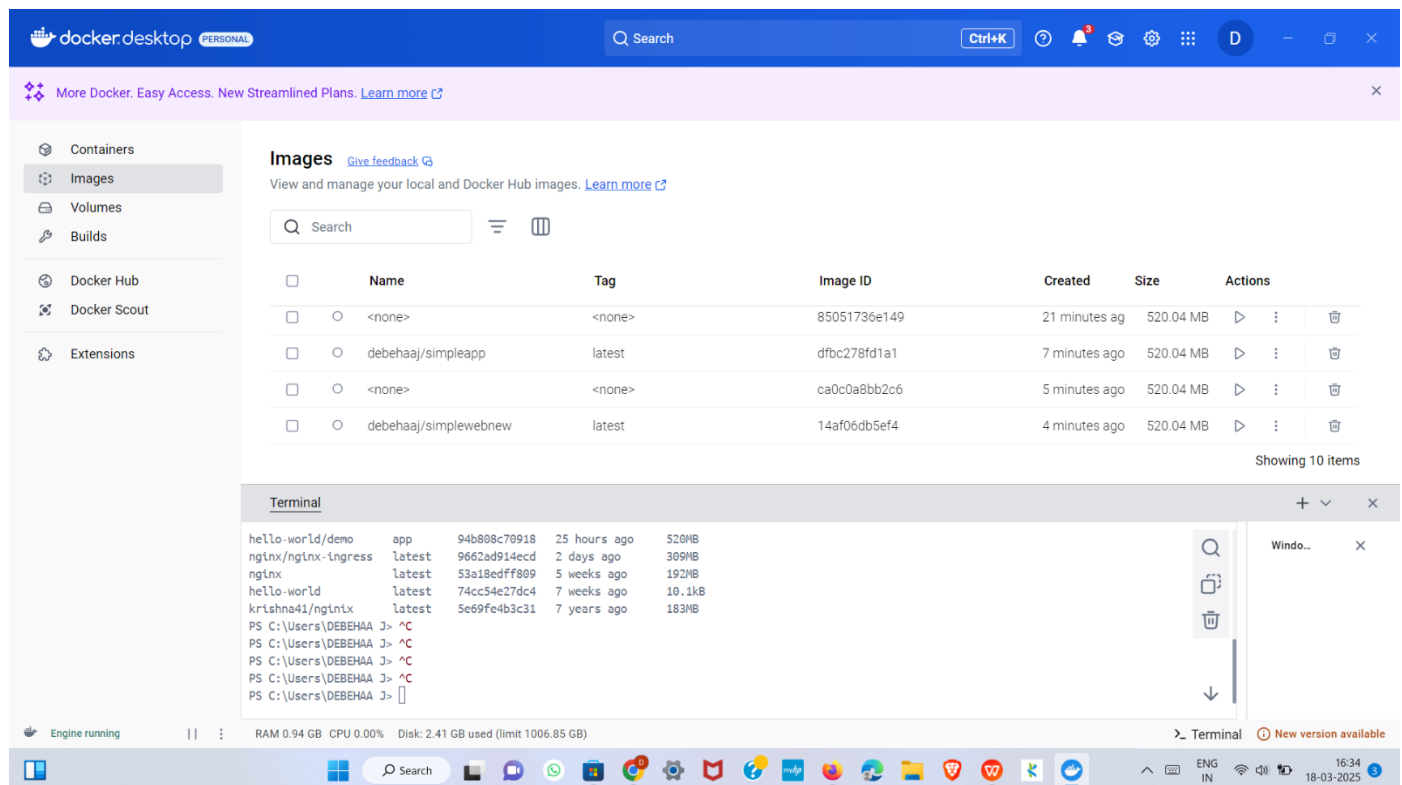
Push to Docker Hub

Login to Docker Hub:

   docker login

Tag the image:

   docker tag my-app my-dockerhub-user/my-app:latest

Push to Docker Hub:

   docker push my-dockerhub-user/my-app:latest

Jenkins

Q 🛡 1 👤 Debehaa ∨ log out

Dashboard > simpleapp > #7

✓ **Console Output**

⬇ Download · 📋 Copy · View as plain text

```
Started by user Debehaa
[Pipeline] Start of Pipeline
[Pipeline] node
Running on Jenkins in C:\ProgramData\Jenkins\.jenkins\workspace\simpleapp
[Pipeline] {
[Pipeline] stage
[Pipeline] { (SCM)
[Pipeline] git
The recommended git tool is: NONE
No credentials specified
 > git.exe rev-parse --resolve-git-dir C:\ProgramData\Jenkins\.jenkins\workspace\simpleapp\.git # timeout=10
Fetching changes from the remote Git repository
 > git.exe config remote.origin.url https://github.com/anto096/simple-web-app.git # timeout=10
Fetching upstream changes from https://github.com/anto096/simple-web-app.git
 > git.exe --version # timeout=10
 > git --version # 'git version 2.44.0.windows.1'
 > git.exe fetch --tags --force --progress -- https://github.com/anto096/simple-web-app.git +refs/heads/*:refs/remotes/origin/* # timeout=10
 > git.exe rev-parse "refs/remotes/origin/main^{commit}" # timeout=10
Checking out Revision 4bad788b7240260fe12e302bdf75fa479c854f4d (refs/remotes/origin/main)
 > git.exe config core.sparsecheckout # timeout=10
 > git.exe checkout -f 4bad788b7240260fe12e302bdf75fa479c854f4d # timeout=10
```

Jenkins

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Dashboard > simpleapp > #7

✓ **#7 (Mar 18, 2025, 4:30:55 PM)**

✏ Add description · Keep this build forever

Started by user Debehaa

This run spent:

- 12 ms waiting;
- 35 sec build duration;
- 35 sec total from scheduled to completion.

Started 42 sec ago
Took 35 sec

git
Revision: 4bad788b7240260fe12e302bdf75fa479c854f4d
Repository: https://github.com/anto096/simple-web-app.git

- refs/remotes/origin/main

No changes.

Sidebar (both views):
- Status
- Changes
- Console Output
- Edit Build Information
- Delete build '#7'
- Timings
- Git Build Data
- Pipeline Overview
- Pipeline Console
- Restart from Stage
- Replay
- Pipeline Steps
- Workspaces
- Previous Build

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localhost:7070/job/simple-web/1/console

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Dashboard > simple-web > #1

Status

Changes

Console Output

Edit Build Information

Delete build '#1'

Timings

Git Build Data

Pipeline Overview

Pipeline Console

Restart from Stage

Replay

Pipeline Steps

Workspaces

✅ **Console Output**   ⬇ Download   📋 Copy   View as plain text

```
Started by user Debehaa
[Pipeline] Start of Pipeline
[Pipeline] node
Running on Jenkins in C:\ProgramData\Jenkins\.jenkins\workspace\simple-web
[Pipeline] {
[Pipeline] stage
[Pipeline] { (SCM)
[Pipeline] git
The recommended git tool is: NONE
Warning: CredentialId "DEBEHAA" could not be found.
Cloning the remote Git repository
Cloning repository https://github.com/anto096/simple-web-app.git
 > git.exe init C:\ProgramData\Jenkins\.jenkins\workspace\simple-web # timeout=10
Fetching upstream changes from https://github.com/anto096/simple-web-app.git
 > git.exe --version # timeout=10
 > git --version # 'git version 2.44.0.windows.1'
 > git.exe fetch --tags --force --progress -- https://github.com/anto096/simple-web-app.git +refs/heads/*:refs/remotes/origin/* # timeout=10
 > git.exe config remote.origin.url https://github.com/anto096/simple-web-app.git # timeout=10
 > git.exe config --add remote.origin.fetch +refs/heads/*:refs/remotes/origin/* # timeout=10
Avoid second fetch
 > git.exe rev-parse "refs/remotes/origin/main^{commit}" # timeout=10
```

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Jenkins

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Dashboard > simple-web > #1

Status

Changes

Console Output

Edit Build Information

Delete build '#1'

Timings

Git Build Data

Pipeline Overview

Pipeline Console

Restart from Stage

Replay

Pipeline Steps

Workspaces

✅ **#1 (Mar 18, 2025, 2:43:19 PM)**   ✏ Add description   Keep this build forever

⏱ Started by user Debehaa   Started 1 min 50 sec ago
                                                              Took 1 min 26 sec
⏲ This run spent:

      • 74 ms waiting;
      • 1 min 26 sec build duration;
      • 1 min 26 sec total from scheduled to completion.

◆ git **Revision:** 4bad788b7240260fe12e302bdf75fa479c854f4d
       Repository: https://github.com/anto096/simple-web-app.git

           • refs/remotes/origin/main

</>   No changes.

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