

CI/CD Pipeline with GitHub Actions & Docker

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DevOps Internship Project Report

1. Introduction

This project demonstrates how to build a complete CI/CD pipeline using GitHub Actions and Docker. It focuses on automating the software deployment process from the point of code push to a running container image, ensuring smoother workflows and faster release cycles.

2. Abstract

The goal of this project was to containerize a simple Python Flask application and automate its deployment using GitHub Actions. Every time new code is pushed to the main branch, a GitHub Actions workflow is triggered. It installs dependencies, builds a Docker image, logs in to Docker Hub using secrets, and pushes the built image to Docker Hub. This setup offers a consistent and repeatable DevOps pipeline with minimal manual effort.

3. Tools Used

- GitHub for version control and repository hosting
- GitHub Actions for workflow automation
- Docker for containerization
- Docker Hub for image storage and distribution
- Python (Flask) for the application
- PowerShell for local development and terminal commands

4. Steps Involved

1. Created a Flask app with a single route.
2. Defined dependencies in requirements.txt.
3. Created a Dockerfile to containerize the app.
4. Initialized a Git repository and pushed it to GitHub.
5. Created a .github/workflows/ci-cd.yml GitHub Actions workflow file.
6. Added Docker Hub credentials as GitHub secrets.
7. Each push triggered a build that:

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- Installed Python and Flask
- Built the Docker image
- Logged in to Docker Hub
- Pushed the image to Docker Hub repository

5. Conclusion

This project showcased how to automate the build and deployment process using open-source tools without any cloud infrastructure. The workflow offers an efficient and reliable process for CI/CD and demonstrates a real-world DevOps setup.

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Screenshot: Screenshot (141).png

```
Windows PowerShell
PS E:\> mkdir E:\devops-project-1

Directory: E:\

Mode                LastWriteTime         Length Name
----                -
d-----          4/24/2025  11:38 PM             devops-project-1

PS E:\> cd E:\devops-project-1
PS E:\devops-project-1> pwd

Path
---
E:\devops-project-1

PS E:\devops-project-1> notepad app.py
PS E:\devops-project-1> notepad requirements.txt
PS E:\devops-project-1> notepad Dockerfile
PS E:\devops-project-1> git init
Initialized empty Git repository in E:/devops-project-1/.git/
PS E:\devops-project-1> git remote add origin https://github.com/Omerofficial/devops-project-1.git
PS E:\devops-project-1> git add .
PS E:\devops-project-1> git commit -m "Initial commit"
>>
[master (root-commit) 4c9d8c3] Initial commit
 3 files changed, 18 insertions(+)
 create mode 100644 Dockerfile.txt
 create mode 100644 app.py
 create mode 100644 requirements.txt
PS E:\devops-project-1> git branch -M main
PS E:\devops-project-1> git push -u origin main
Enumerating objects: 5, done.
Counting objects: 100% (5/5), done.
Delta compression using up to 4 threads
Compressing objects: 100% (4/4), done.
Writing objects: 100% (5/5), 559 bytes | 186.00 KiB/s, done.
Total 5 (delta 0), reused 0 (delta 0), pack-reused 0 (from 0)
To https://github.com/Omerofficial/devops-project-1.git
 * [new branch]      main -> main
```

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Screenshot: Screenshot (142).png

The screenshot displays a web browser window with the URL `github.com/Omerofficial/devops-project-1/actions/runs/14649046202/job/41110212410`. The browser's address bar and tabs are visible at the top. The main content area shows the GitHub Actions interface for a workflow named 'build'. The job status is 'failed 1 minute ago in 6s'. The left sidebar contains navigation links: 'Summary', 'Jobs', 'Run details', 'Usage', and 'Workflow file'. The 'Jobs' section is expanded, showing the 'build' job with a red 'x' icon. The job details are displayed in a dark-themed panel. The job steps are listed on the right, with the 'Build Docker image' step highlighted in red, indicating failure. The logs for this step are shown in the main area, detailing the Docker build process and the error message: 'ERROR: failed to solve: failed to read dockerfile: open Dockerfile: no such file or directory'. The logs also show the command used: 'Run docker build -t ***/devops-project-1 .' and the exit code 1.

build
failed 1 minute ago in 6s

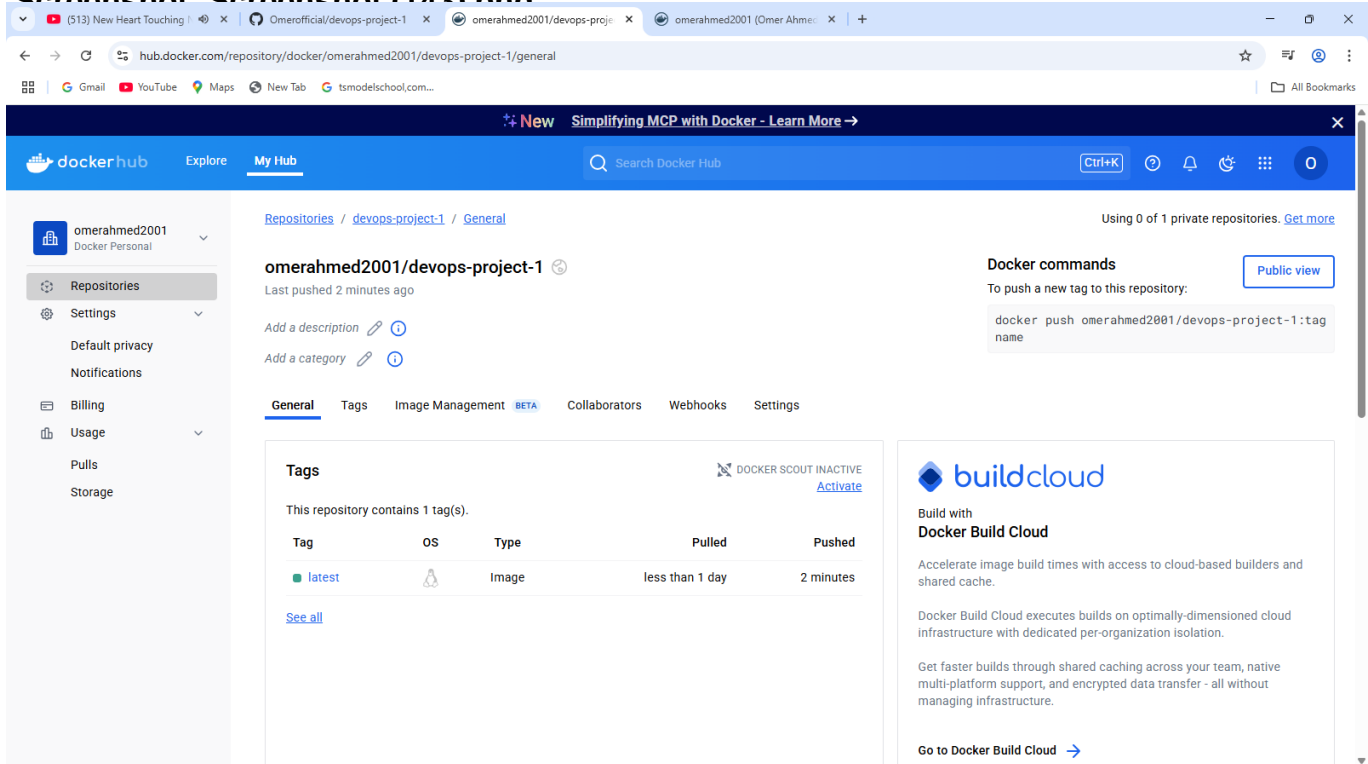
Search logs

- > Set up job 1s
- > Checkout Code 1s
- > Set up Python 0s
- > Install dependencies 1s
- > Run tests 0s
- > **Build Docker image 1s**
- > Log in to Docker Hub 0s
- > Push Docker image 0s
- > Post Set up Python 0s
- > Post Checkout Code 0s
- > Complete job 0s

```
1 ▶ Run docker build -t ***/devops-project-1 .
11 ## building with "default" instance using docker driver
12
13 #1 [internal] load build definition from Dockerfile
14 #1 transferring dockerfile: 2B done
15 #1 DONE 0.0s
16 ERROR: failed to solve: failed to read dockerfile: open Dockerfile: no such file or directory
17 Error: Process completed with exit code 1.
```

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Screenshot: Screenshot (143).png



The screenshot shows a web browser window with multiple tabs. The active tab is 'hub.docker.com/repository/docker/omerahmed2001/devops-project-1/general'. The browser's address bar shows the URL. The Docker Hub interface is displayed, featuring a sidebar with navigation options like 'Repositories', 'Settings', 'Default privacy', 'Notifications', 'Billing', 'Usage', 'Pulls', and 'Storage'. The main content area shows the repository 'omerahmed2001/devops-project-1' with a 'General' tab selected. It indicates the repository was last pushed 2 minutes ago and provides links to 'Add a description' and 'Add a category'. A table titled 'Tags' shows one tag, 'latest', with an OS icon, type 'Image', pulled 'less than 1 day', and pushed '2 minutes' ago. A 'DOCKER SCOUT INACTIVE' notice with an 'Activate' link is also present. On the right, there's a 'Docker commands' section with a 'Public view' button and a code block showing the push command: 'docker push omerahmed2001/devops-project-1:tag name'. At the bottom right, there's a 'buildcloud' advertisement for 'Docker Build Cloud' with a 'Go to Docker Build Cloud' link.

Repositories / devops-project-1 / General

Using 0 of 1 private repositories. [Get more](#)

omerahmed2001/devops-project-1

Last pushed 2 minutes ago

[Add a description](#)

[Add a category](#)

General Tags Image Management BETA Collaborators Webhooks Settings

Tags [Activate](#)

This repository contains 1 tag(s).

Tag	OS	Type	Pulled	Pushed
latest		Image	less than 1 day	2 minutes

[See all](#)

Docker commands [Public view](#)

To push a new tag to this repository:

```
docker push omerahmed2001/devops-project-1:tag name
```

buildcloud

Build with
Docker Build Cloud

Accelerate image build times with access to cloud-based builders and shared cache.

Docker Build Cloud executes builds on optimally-dimensioned cloud infrastructure with dedicated per-organization isolation.

Get faster builds through shared caching across your team, native multi-platform support, and encrypted data transfer - all without managing infrastructure.

[Go to Docker Build Cloud](#) →