

Project Documentation: Nginx Reverse Proxy + Docker Compose

Project Overview

We created a Docker Compose-based microservices setup with:

- Golang Service (Service 1)
- Python Flask Service (Service 2)
- Nginx Reverse Proxy

Where:

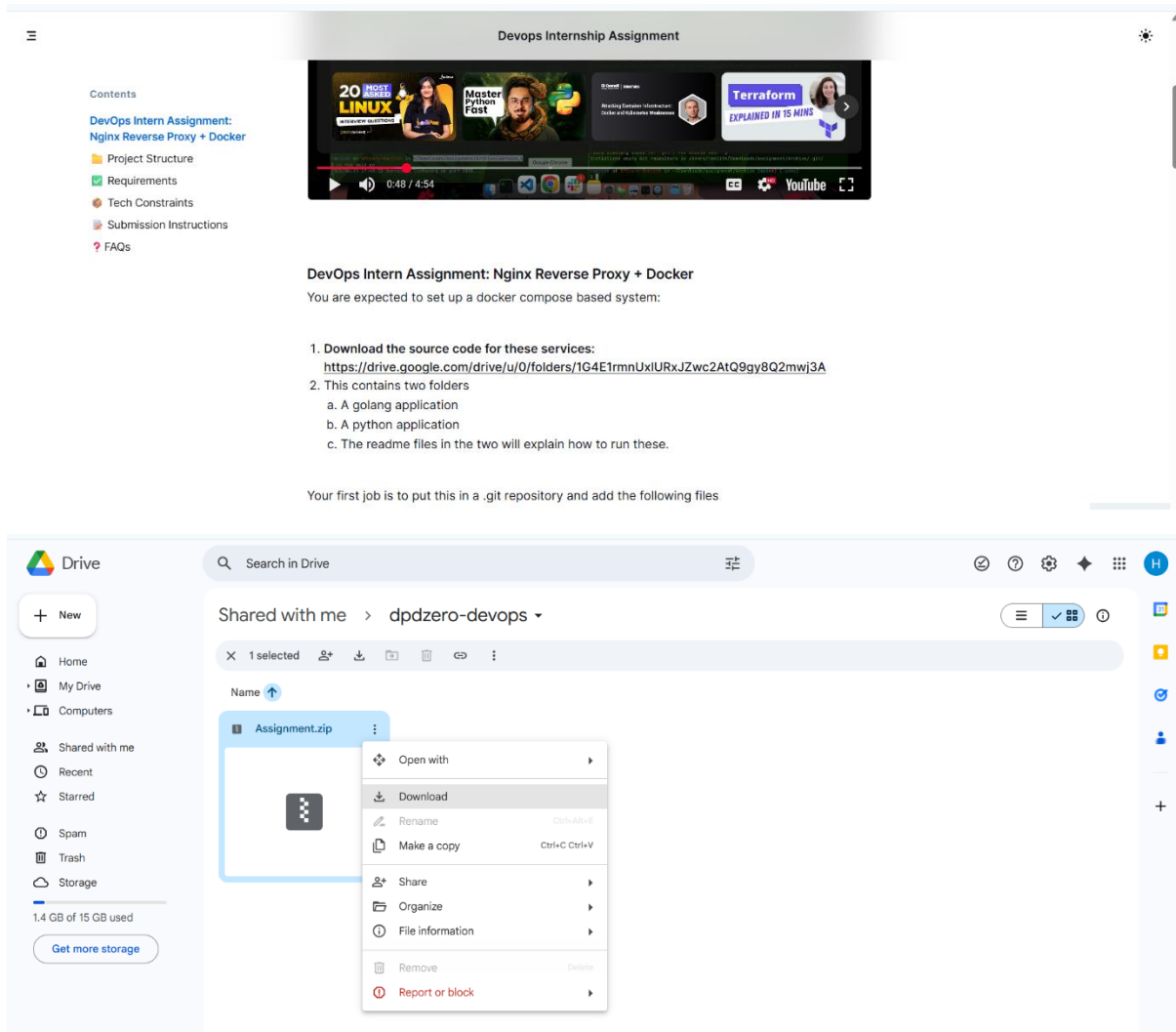
- Requests to /service1 are routed to Service 1 (port 8001)
- Requests to /service2 are routed to Service 2 (port 8002)
- All services are accessible via a single port (8080) on an AWS EC2 instance.

Tech Stack

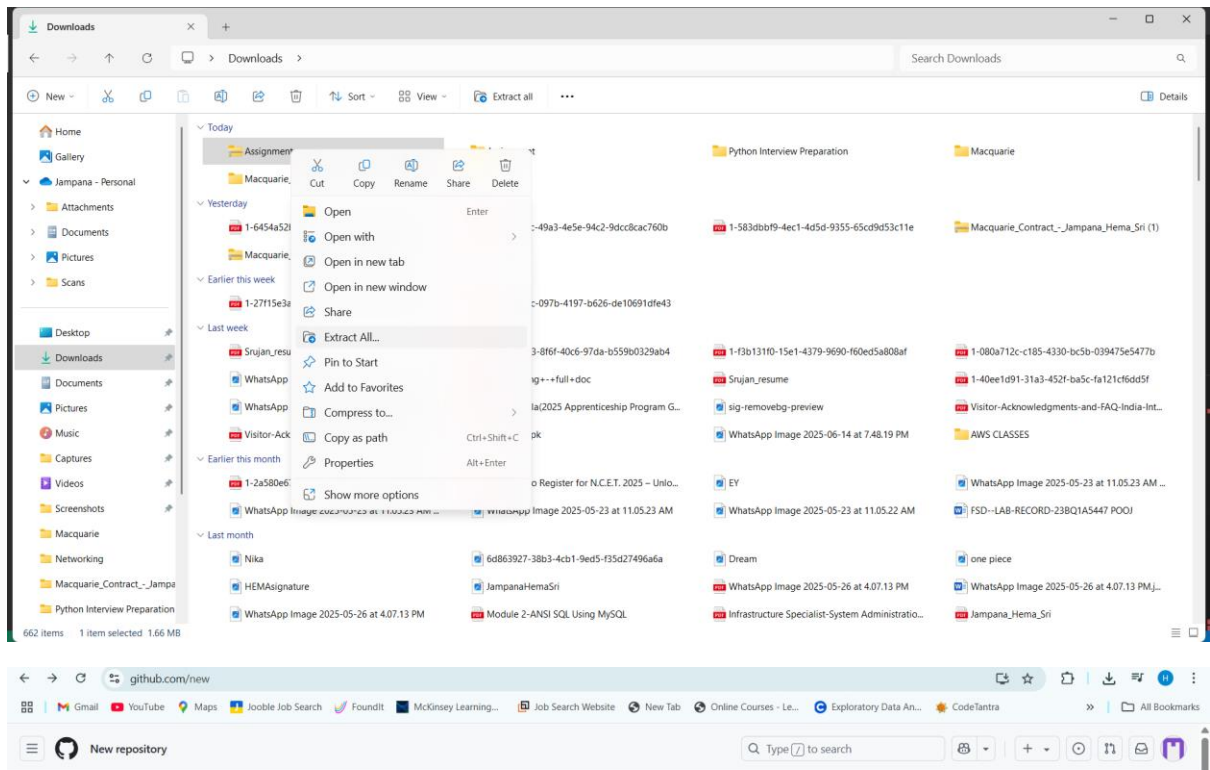
- AWS EC2 (Ubuntu 22.04)
- Docker
- Docker Compose
- Golang
- Python + Flask
- Nginx (in Docker)
- SSH for GitHub (using SSH keys)

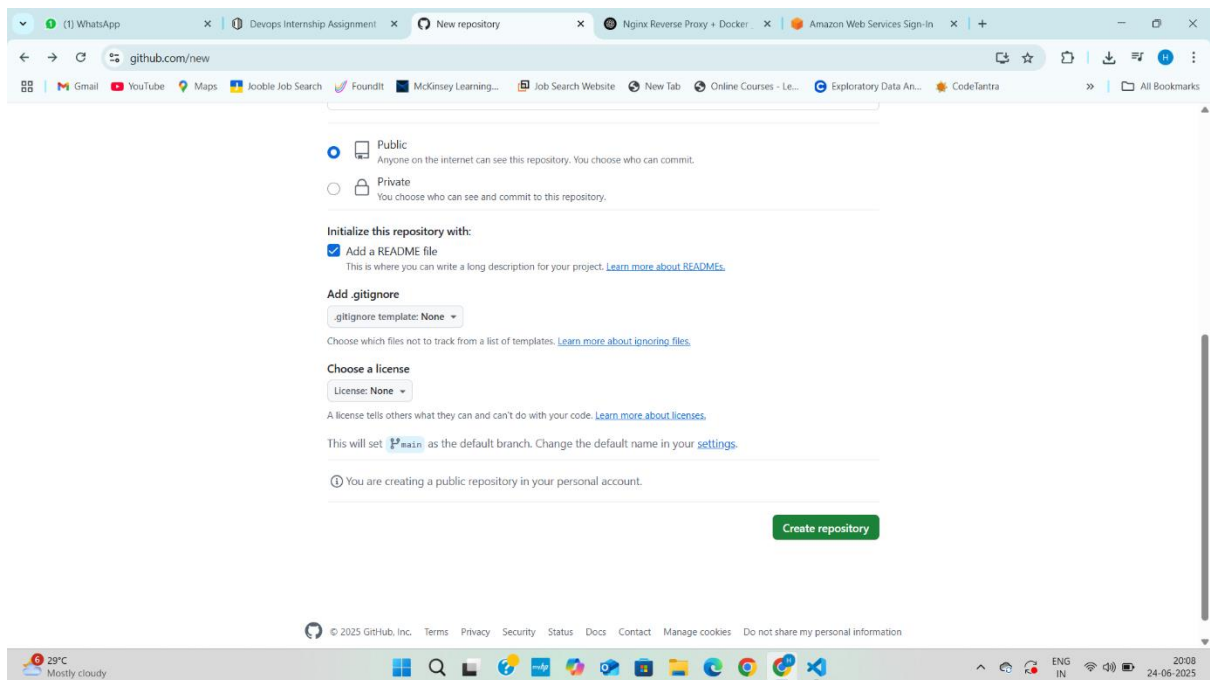
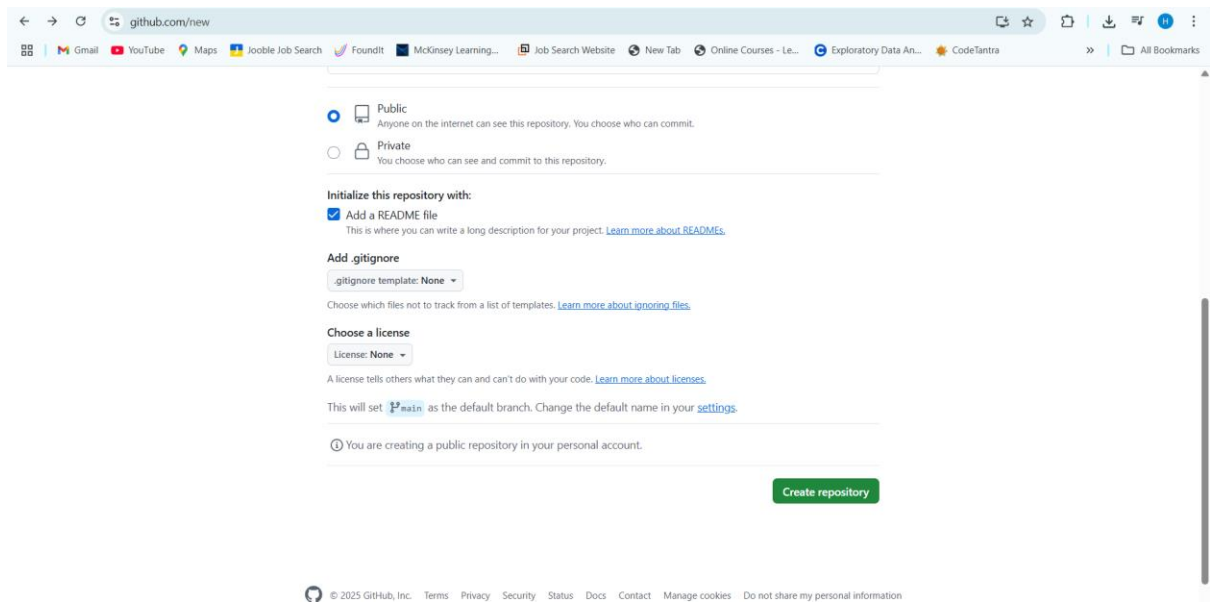
Step-by-Step Process

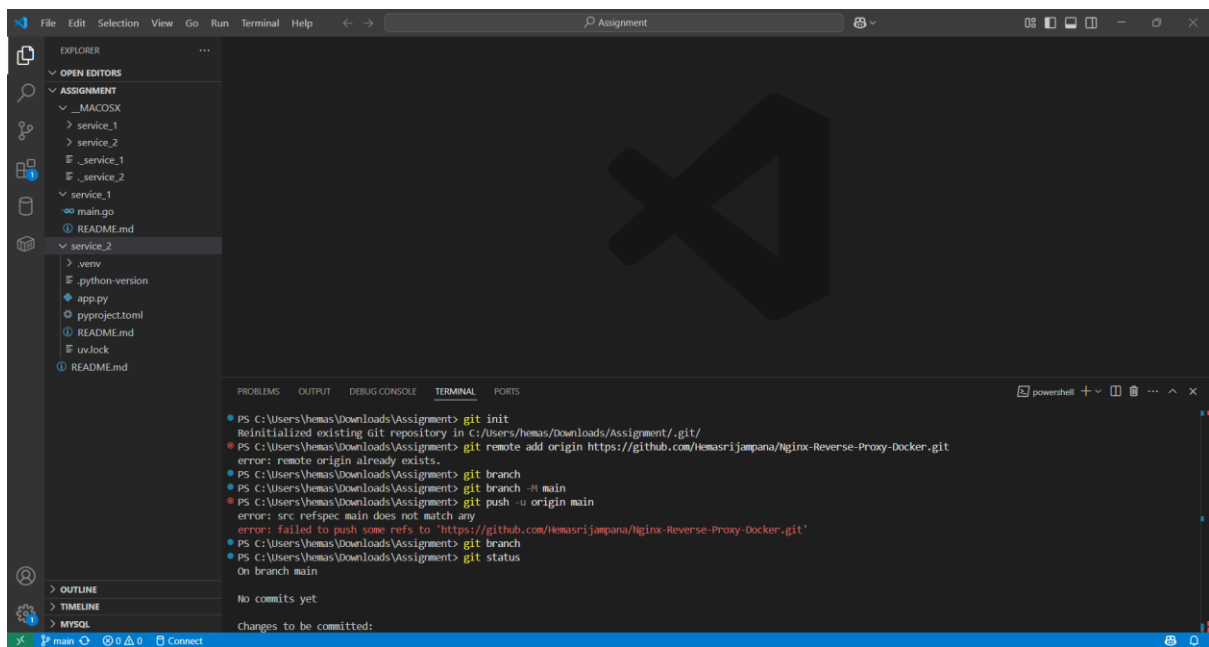
STEP 1 : Extracting the file, creating a Git Repository and Pushing the file into GitHub



The image shows two screenshots. The top screenshot is a webpage titled "DevOps Internship Assignment". It features a video player with a thumbnail showing "20 MOST LINUX", "Master Python Fast", and "Terraform EXPLAINED IN 15 MINS". Below the video, the title "DevOps Intern Assignment: Nginx Reverse Proxy + Docker" is displayed. The text states: "You are expected to set up a docker compose based system:". It then lists two tasks: 1. Download the source code for these services: <https://drive.google.com/drive/u/0/folders/1G4E1rmnUx1URxJZwc2AtQ9gy8Q2mwj3A>; 2. This contains two folders: a. A golang application, b. A python application, c. The readme files in the two will explain how to run these. Below this, it says: "Your first job is to put this in a .git repository and add the following files". The bottom screenshot shows a Google Drive interface. The "Shared with me" section is active, showing a folder named "dpdzero-devops". Inside this folder, a file named "Assignment.zip" is selected. A context menu is open over the file, showing options: "Open with", "Download", "Rename", "Make a copy", "Share", "Organize", "File information", "Remove", and "Report or block".



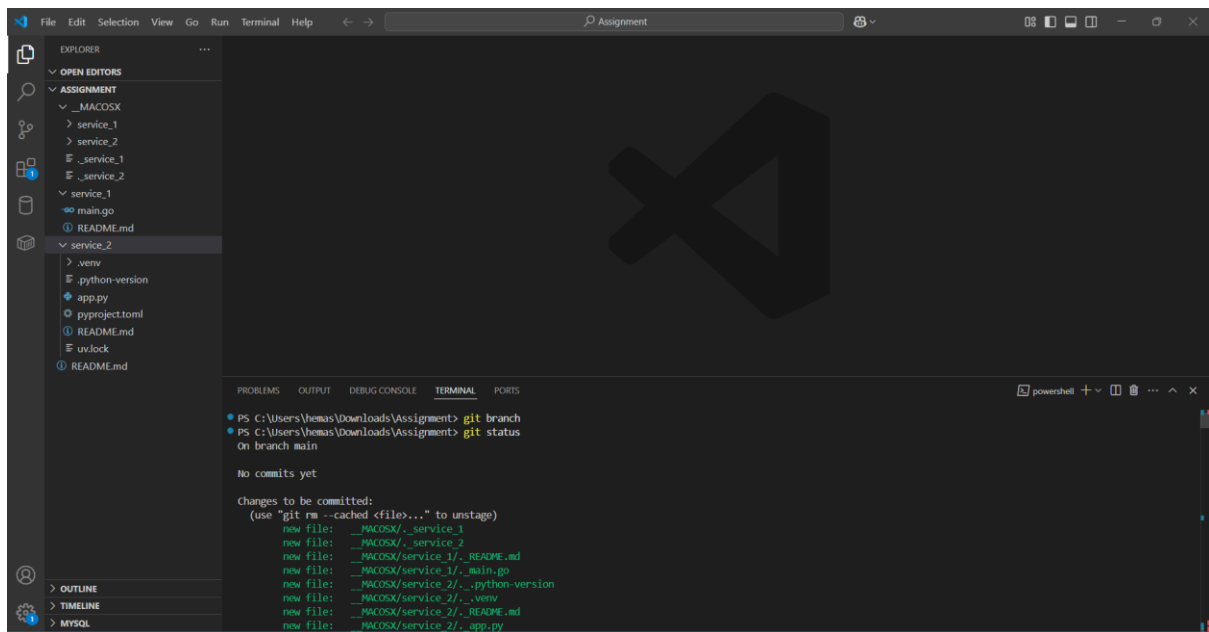




```
PS C:\Users\hemas\Downloads\Assignment> git init
Reinitialized existing git repository in c:/Users/hemas/Downloads/Assignment/.git/
PS C:\Users\hemas\Downloads\Assignment> git remote add origin https://github.com/hemasrijaipana/nginx-Reverse-Proxy-docker.git
error: remote origin already exists.
PS C:\Users\hemas\Downloads\Assignment> git branch
error: no current branch
PS C:\Users\hemas\Downloads\Assignment> git branch -M main
error: src refspec main does not match any
PS C:\Users\hemas\Downloads\Assignment> git push -u origin main
error: failed to push some refs to 'https://github.com/hemasrijaipana/nginx-Reverse-Proxy-docker.git'
PS C:\Users\hemas\Downloads\Assignment> git branch
error: no current branch
PS C:\Users\hemas\Downloads\Assignment> git status
On branch main

No commits yet

Changes to be committed:
```



```
PS C:\Users\hemas\Downloads\Assignment> git branch
error: no current branch
PS C:\Users\hemas\Downloads\Assignment> git status
On branch main

No commits yet

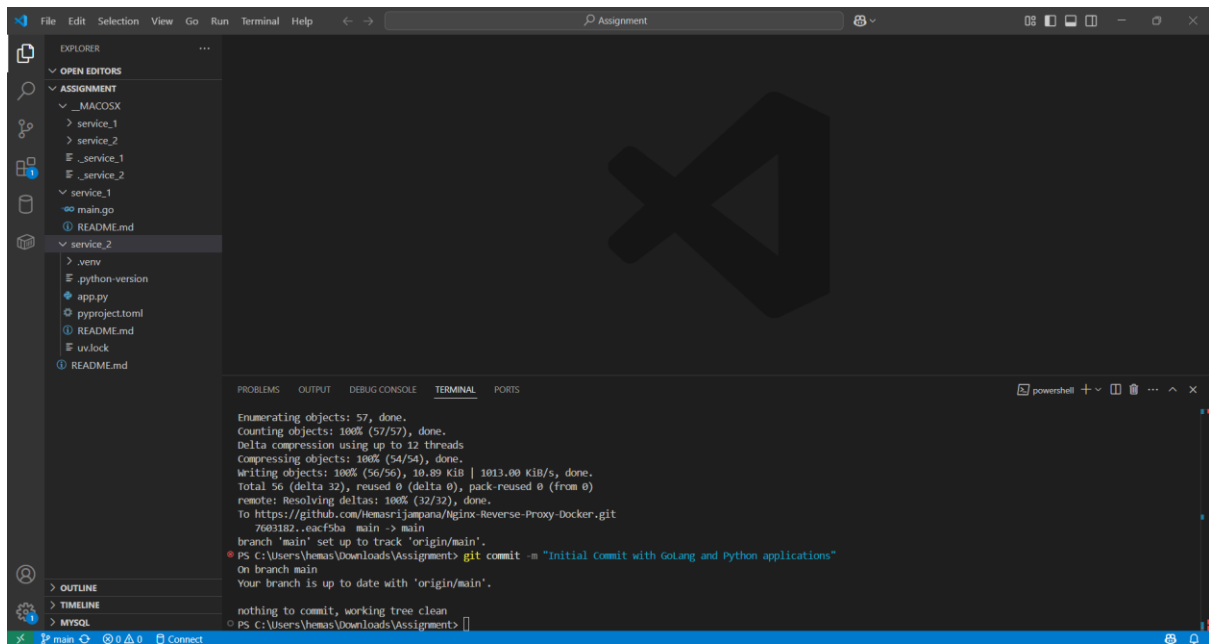
Changes to be committed:
  (use "git rm --cached <file>..." to unstage)
        new file:   _MACOSX/_service_1
        new file:   _MACOSX/_service_2
        new file:   _MACOSX/service_1/.README.md
        new file:   _MACOSX/service_1/.main.go
        new file:   _MACOSX/service_2/.python-version
        new file:   _MACOSX/service_2/.venv
        new file:   _MACOSX/service_2/.README.md
        new file:   _MACOSX/service_2/.app.py
```

This screenshot shows the initial state of a project in VS Code. The Explorer sidebar on the left displays the file structure: a root directory 'Assignment' containing a '_MACOSX' folder, two subdirectories 'service_1' and 'service_2', and a 'main.go' file. The 'service_2' directory is expanded, showing files like '.venv', 'python-version', 'app.py', 'pyproject.toml', 'README.md', and 'uv.lock'. The main editor area is empty, displaying a large, faint GitHub logo. The bottom panel shows the 'TERMINAL' tab with the following output:

```
new file: service_2/uv.lock
PS C:\Users\hemas\Downloads\Assignment> git add .
PS C:\Users\hemas\Downloads\Assignment> git commit -m "Initial Commit"
[main (root-commit) 50653ba] Initial commit
370 files changed, 275 insertions(+)
create mode 100644 _MACOSX/.service_1
create mode 100644 _MACOSX/.service_2
create mode 100644 _MACOSX/service_1/.README.md
create mode 100644 _MACOSX/service_1/.main.go
create mode 100644 _MACOSX/service_2/.python-version
create mode 100644 _MACOSX/service_2/.venv
create mode 100644 _MACOSX/service_2/.README.md
create mode 100644 _MACOSX/service_2/.app.py
create mode 100644 _MACOSX/service_2/.pyproject.toml
create mode 100644 _MACOSX/service_2/.uv.lock
```

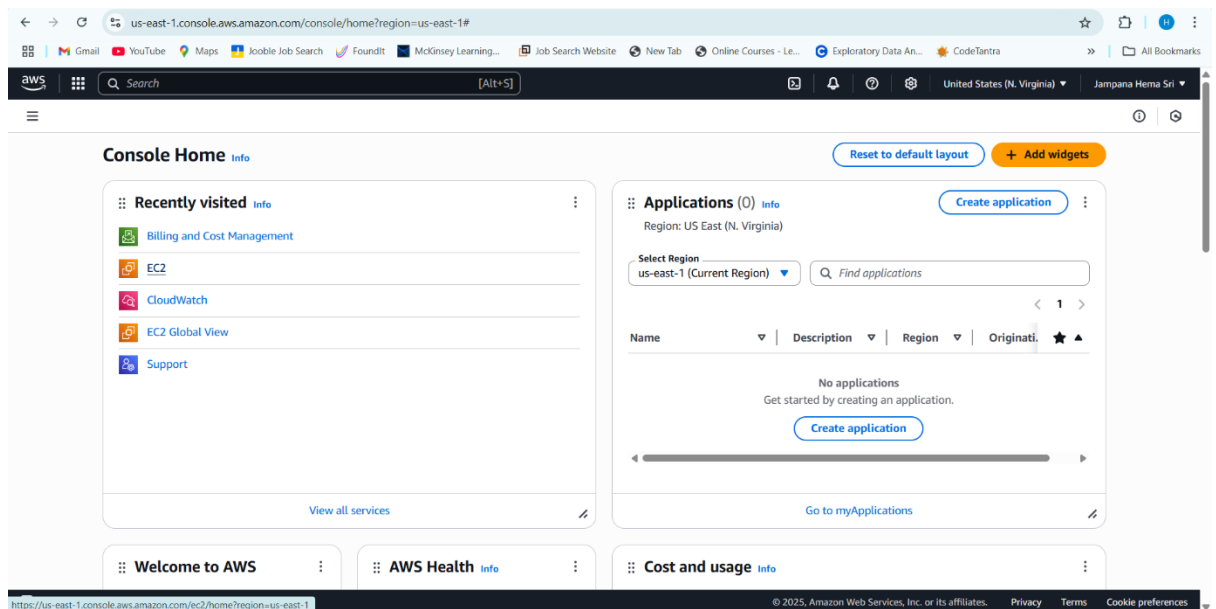
This screenshot shows the same VS Code interface after a git pull and push operation. The Explorer sidebar remains the same. The main editor area still shows the GitHub logo. The bottom panel shows the 'TERMINAL' tab with the following output:

```
hint: See the 'Note about Fast-forwards' in 'git push --help' for details.
PS C:\Users\hemas\Downloads\Assignment> git pull origin main --rebase
From https://github.com/hemasrijaipana/nginx-Reverse-Proxy-Docker
* branch      main      -> FETCH_HEAD
Successfully rebased and updated refs/heads/main.
PS C:\Users\hemas\Downloads\Assignment> git push -u origin main
Enumerating objects: 57, done.
Counting objects: 100% (57/57), done.
Delta compression using up to 12 threads
Compressing objects: 100% (54/54), done.
Writing objects: 100% (56/56), 10.89 KiB | 1013.00 KiB/s, done.
Total 56 (delta 32), reused 0 (delta 0), pack-reused 0 (from 0)
remote: Resolving deltas: 100% (32/32), done.
To https://github.com/hemasrijaipana/nginx-Reverse-Proxy-Docker.git
7603182..eacf5ba main -> main
branch 'main' set up to track 'origin/main'.
```



Launch an AWS EC2 Instance

- Ubuntu 22.04 or latest version
- Open inbound ports: 22 (SSH) and 8080 (for Nginx proxy) in the EC2 security group.



us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#Instances:instanceState=running

EC2 > Instances

Instances info

Find Instance by attribute or tag (case-sensitive)

Instance state = running X Clear filters

All states

No matching instances found

Select an instance

CloudShell Feedback

us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#LaunchInstances

Launch an instance

Success
Successfully initiated launch of instance (i-0557afd284452395e)

► Launch log

Next Steps
What would you like to do next with this instance, for example "create alarm" or "create backup"

Create billing and free tier usage alerts
To manage costs and avoid surprise bills, set up email notifications for billing and free tier usage thresholds.
[Create billing alerts](#)

Connect to your instance
Once your instance is running, log into it from your local computer.
[Connect to instance](#)
[Learn more](#)

Connect an RDS database
Configure the connection between an EC2 instance and a database to allow traffic flow between them.
[Connect an RDS database](#)
[Create a new RDS database](#)
[Learn more](#)

Create EBS snapshot policy
Create a policy that automates the creation, retention, and deletion of EBS snapshots.
[Create EBS snapshot policy](#)

us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#Instances:instanceId=i-093603d9ec8420405

EC2 > Instances

Instances (1/1) info

Find Instance by attribute or tag (case-sensitive)

Instance ID = i-093603d9ec8420405 X Clear filters

All states

Ngix Reverse ... i-093603d9ec8420405 Running t2.micro Initializing View alarms + us-east-1a ec2-54-91-1

i-093603d9ec8420405 (Ngix Reverse Proxy + Docker)

Details Status and alarms Monitoring Security Networking Storage Tags

▼ Instance summary info

Instance ID
i-093603d9ec8420405

IPv6 address
-

Hostname type
ID name is 172.31.84.87 ec2:internal

Public IPv4 address
54.91.147.79 | [open address](#)

Instance state
Running

Private IP4 addresses
172.31.84.83

Public DNS
ec2-54-91-147-79.compute-1.amazonaws.com | [open address](#)

Private IP4 DNS name (IPv4 only)
ip-172-31-84-83.ec2.internal

❏ Install Docker & Docker Compose

```
sudo apt update
```

```
sudo apt install docker.io -y
```

```
sudo systemctl start docker
```

```
sudo systemctl enable docker
```

```
# Install docker-compose v2.x
```

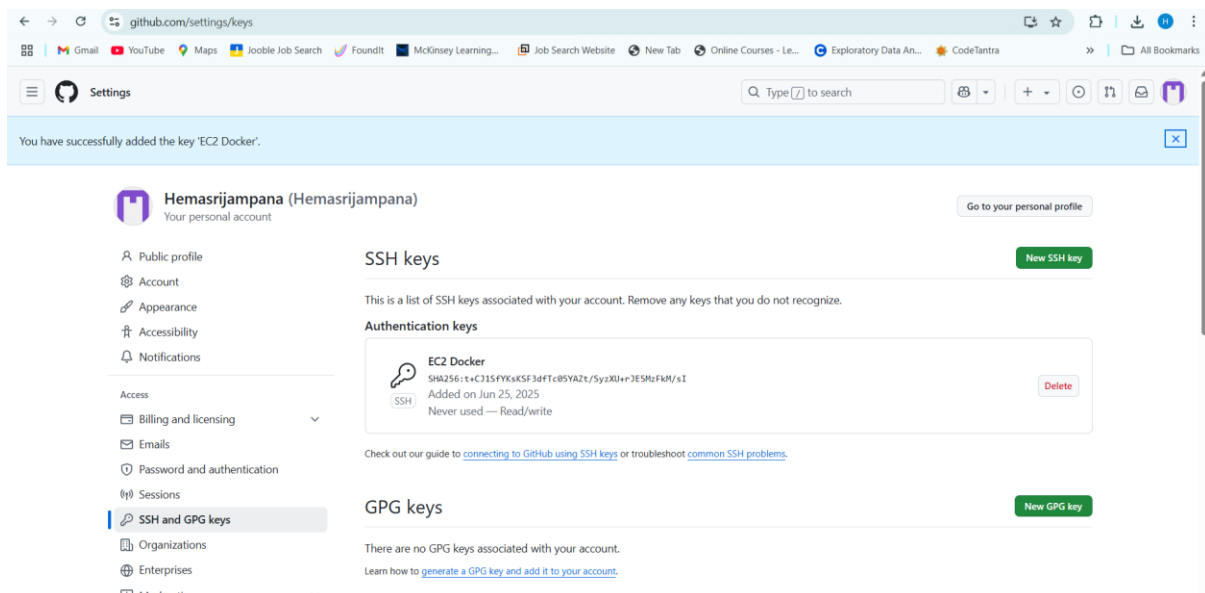
```
sudo curl -fsSL
```

```
https://github.com/docker/compose/releases/download/v2.24.6/docker-  
compose-linux-x86_64 -o /usr/local/bin/docker-compose
```

```
sudo chmod +x /usr/local/bin/docker-compose
```

```
docker-compose --version
```

❏ Set Up SSH Key for GitHub



Generate SSH Key:

```
ssh-keygen -t rsa -b 4096 -C your-email@example.com
```

Add SSH public key to GitHub

```
cat ~/.ssh/id_rsa.pub
```

Test SSH Access

```
ssh -T git@github.com
```

Should respond:
Hi <username>! You've successfully authenticated, but GitHub does not provide shell access.

Clone Repository via SSH

```
git clone git@github.com:username/repository.git
```

📁 Project Directory Structure

```
.
├── docker-compose.yml
├── nginx
│   ├── Dockerfile
│   └── nginx.conf
├── service_1
│   ├── Dockerfile
│   └── main.go
├── service_2
│   ├── Dockerfile
│   └── app.py
└── README.md
```

Create Dockerfiles :

service_1/Dockerfile :

```
FROM golang:1.22-alpine
WORKDIR /app
COPY . .
RUN go build -o service1 main.go
EXPOSE 8001
CMD ["/service1"]
```

service_2/Dockerfile :

```
FROM python:3.12-slim
WORKDIR /app
COPY . .
RUN pip install --no-cache-dir flask
EXPOSE 8002
CMD ["python", "app.py"]
```

nginx/Dockerfile

```
FROM nginx:latest
COPY nginx.conf /etc/nginx/nginx.conf
```

❑ Create Nginx Configuration

nginx.conf

```
events {}
```

```
http {
```

```
    server {
```

```
        listen 80;
```

```
        location /service1/ {
```

```
            proxy_pass http://service1:8001/;
```

```
        }
```

```
        location /service2/ {
```

```
            proxy_pass http://service2:8002/;
```

```
        }
```

```
    }
```

```
}
```

❑ Create Docker Compose File

docker-compose.yml

```
services:
```

```
    service1:
```

```
        build: ./service_1
```

```
        container_name: service1
```

ports:

- "8001:8001"

healthcheck:

test: ["CMD", "curl", "-f", "http://localhost:8001/ping"]

interval: 10s

retries: 3

service2:

build: ./service_2

container_name: service2

ports:

- "8002:8002"

healthcheck:

test: ["CMD", "curl", "-f", "http://localhost:8002/ping"]

interval: 10s

retries: 3

nginx:

build: ./nginx

container_name: nginx

ports:

- "8080:80"

depends_on:

- service1

- service2


```
us-east-1.console.aws.amazon.com/ec2-instance-connect/ssh/home?addressFamily=ipv4&connType=standard&instanceId=i-093603d9ec8420405&osUser=ubuntu&region=us-east-1&sshPort=...
aws Search [Alt+S] United States (N. Virginia) Jampna Hema Sri

=> sha256:192971aeb101e6d1f5c759e2cc23bdc76c34c09f356f428f4296e04039cef2 16.70MB / 16.70MB 0.6s
=> extracting sha256:3b7062d09e028c442f2b05e76286341d9b23a69a42b9ecd3d226911a5200bc66 0.2s
=> extracting sha256:fb746e72516f99f0b4f5204c47f8c2aa325a4a9d075769800c42548fe722b25d 0.0s
=> extracting sha256:a9ff9baf1741d1f2a4a5dflb44b2f09931318cb1a9201f23a01cb295e0274768 0.0s
=> extracting sha256:2c127093dfc748d5aae28bdf3d96936deb033e69cb643eeb75d6070e4333f7c4 0.0s
=> extracting sha256:63dda2adf85bd92ed611cdalb94324396ae5afe0b7b39a72b4ea6362c40552 0.0s
=> extracting sha256:b55ed7db2def46fd4870c4bb5743rfd31dae1da58fdd9789397eb789c62943 0.0s
=> extracting sha256:92971aeb101e6d1f5c759e2cc23bdc76c34c09f356f428f4296e04039cef2 0.6s
=> [nginx 2/2] COPY nginx.conf /etc/nginx/nginx.conf 0.1s
=> [nginx] exporting to image 0.0s
=> exporting layers 0.0s
=> writing image sha256:a2b6978a72da65aca690d94d84756805da639c06692aba6d0f3bd8d0a26cc6a9 0.0s
=> naming to docker.io/library/nginx-reverse-proxy-docker-nginx 0.0s
=> [nginx] resolving provenance for metadata file 0.0s
(*) Building 3/3
✓ nginx Built 0.0s
✓ service1 Built 0.0s
✓ service2 Built 0.0s
ubuntu@ip-172-31-84-83:~/Nginx-Reverse-Proxy-Docker$ sudo docker-compose up -d
WARN[0000] /home/ubuntu/Nginx-Reverse-Proxy-Docker/docker-compose.yml: the attribute 'version' is obsolete, it will be ignored, please remove it to avoid potential confusion
(*) Running 4/4
✓ Network nginx-reverse-proxy-docker_default Created 0.1s
✓ Container service2 Started 0.8s
✓ Container service1 Started 0.8s
✓ Container nginx Started 1.2s
ubuntu@ip-172-31-84-83:~/Nginx-Reverse-Proxy-Docker$
```

i-093603d9ec8420405 (Nginx Reverse Proxy + Docker)
PublicIPs: 54.91.147.79 PrivateIPs: 172.31.84.83

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8 Build and Run Containers

sudo docker-compose build

sudo docker-compose up -d

Check running containers:

sudo docker ps

```
us-east-1.console.aws.amazon.com/ec2-instance-connect/ssh/home?addressFamily=ipv4&connType=standard&iinstanceId=i-093603d9ec8420405&osUser=ubuntu&region=us-east-1&sshPort...
aws
Q Search [Alt+S]
United States (N. Virginia) Jampana Hema Sri

ubuntu@ip-172-31-84-83:~/Nginx-Reverse-Proxy-Docker$ sudo docker-compose up -d
[+] Running 3/3
  Container service2 Started
  Container service1 Started
  Container nginx Running
ubuntu@ip-172-31-84-83:~/Nginx-Reverse-Proxy-Docker$ sudo docker ps
CONTAINER ID   IMAGE                                COMMAND                  CREATED        STATUS        PORTS
96bbd37fb024   nginx-reverse-proxy-docker-service1 "/.service1"            19 seconds ago Up 8 seconds (health: starting) 0.0.0.0:8001->8001/tcp, :::8001->8001/tcp
87999101cfec   nginx-reverse-proxy-docker-service2 "python app.py"          19 seconds ago Up 8 seconds (health: starting) 0.0.0.0:8002->8002/tcp, :::8002->8002/tcp
8b0c78f04110   nginx-reverse-proxy-docker-nginx    "/docker-entrypoint..." 16 minutes ago Up 16 minutes                    0.0.0.0:8080->80/tcp, [::]:8080->80/tcp
ubuntu@ip-172-31-84-83:~/Nginx-Reverse-Proxy-Docker$ sudo docker ps
CONTAINER ID   IMAGE                                COMMAND                  CREATED        STATUS        PORTS
96bbd37fb024   nginx-reverse-proxy-docker-service1 "/.service1"            36 seconds ago Up 25 seconds (healthy) 0.0.0.0:8001->8001/tcp, :::8001->8001/tcp
87999101cfec   nginx-reverse-proxy-docker-service2 "python app.py"          36 seconds ago Up 25 seconds (healthy) 0.0.0.0:8002->8002/tcp, :::8002->8002/tcp
8b0c78f04110   nginx-reverse-proxy-docker-nginx    "/docker-entrypoint..." 17 minutes ago Up 17 minutes                    0.0.0.0:8080->80/tcp, [::]:8080->80/tcp
ubuntu@ip-172-31-84-83:~/Nginx-Reverse-Proxy-Docker$

i-093603d9ec8420405 (Nginx Reverse Proxy + Docker)
PublicIPs: 54.91.147.79 PrivateIPs: 172.31.84.83

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```

Test the Services

From **EC2 terminal**:

`http://<ec2-public-ip>:8080/service1/ping`

`http://<ec2-public-ip>:8080/service2/ping`

Expected Response:

```
{"status":"ok","service":"1"}
```

```
{"status":"ok","service":"2"}
```


Conclusion

- ✓ Successfully deployed two microservices using Docker Compose
- ✓ Reverse proxied with Nginx container
- ✓ Deployed and tested everything on AWS EC2
- ✓ Configured GitHub SSH cloning for secure deployment

Github link : <https://github.com/Hemasrijampana/Nginx-Reverse-Proxy-Docker>