

Documentation for ICT171: Static Personal Portfolio Deployment (IP Version)

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Github: <https://github.com/raiden421/portfolio-server>

Video Explanation link on Youtube: <https://youtu.be/xSmDe7kuCGU>

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Abstract

This paper gives an in-depth, step-by-step plan to deploy a static personal portfolio website (HTML, CSS, JavaScript) on an AWS EC2 Ubuntu instance with the public IP <http://13.210.81.35/>. It outlines the provisioning of the cloud infrastructure, enforced security features with SSH key authentication, installation and tweaking of nginx as a static content server, automated continuous deployment using GitHub, detailed cost analysis, and suggests ideas for future improvements for scalability, reliability, and maintainability.

1. Introduction

In a time where having an online presence is so significant, self-hosting an online portfolio shows competencies in development and operations. All the steps in the complete life cycle of a web deployment:

- Development and debugging from a local environment
- Provisioning cloud resources
- Secure remote access and hardening the systems
- Web server configuration and deployment of static assets
- Connecting with source control
- Automated updates and continuous delivery pipelines

Conducting this project demonstrates competency and evidence for proficiency in key DevOps practices and gain hands-on experience with technologies widely used today such as AWS, SSH, nginx, and GitHub. The live site can be found at <http://13.210.81.35/>.

2. Infrastructure Setup

2.1 AWS EC2 Instance Provisioning

Platform Selection: AWS was chosen for its free-tier t2.micro instances and comprehensive documentation.

Instance Details:

- AMI: Ubuntu Server 22.04 LTS (HVM), SSD Volume Type
- Type: t2.micro (1 vCPU, 1 GB RAM)
- Storage: 8 GB gp2 SSD
- Network: Default VPC with a security group permitting ports 22 (SSH) and 80 (HTTP)
- SSH Key Pair: Created and named portfolio-key
- Region: us-east-1 (Northern Virginia)

Procedure:

1. Sign into the AWS Management Console
2. Go to EC2 → Instances → Launch Instances.
3. Select the given AMI and instance type.
4. Under Key pair (login) section, select Create new key pair and download portfolio-key.pem.
5. Configure the security group to allow inbound ports 22 & 80.
6. Check review and launch instance.
7. Document the instance's Public IPv4 address: 13.210.81.35.

2.2 Networking (IP Only)

Since there was no custom domain used, the server accepts HTTP requests directly at `http://13.210.81.35/`. When a domain is added in future, the DNS records could be configured to associate a domain name with the IP.

3. SSH Key Management and Security Hardening

Secure Shell (SSH) access improves security and convenience; the following measures were taken:

1. **Local Key Generation** (Git Bash on Windows):
2. `ssh-keygen -t rsa -b 4096 -f ~/.ssh/portfolio-key -C "your_email@example.com"`
3. **Key Upload to AWS:** It is assumed that the public key was imported at the instance launch.

4. **Server-Side Configuration:**

- Disabled password authentication by editing `/etc/ssh/sshd_config`:
- `PasswordAuthentication no`
- `PermitRootLogin no`
- Restarted SSH: `sudo systemctl restart sshd`

5. **Local File Permissions:** Set private key to `chmod 400 ~/.ssh/portfolio-key`.

6. **Firewall Enforcement:** Enabled UFW:

7. `sudo ufw allow OpenSSH`

8. `sudo ufw allow "Nginx HTTP"`

9. `sudo ufw enable`

10. **User Management:** Created a non-root user `deployer` with sudo privileges:

11. `sudo adduser deployer`

12. `sudo usermod -aG sudo deployer`

Combined, these steps minimize attack surface and enforce strict access control.

4. **nginx Installation and Static Site Deployment**

4.1 **Installing nginx**

```
sudo apt update && sudo apt install -y nginx
```

```
sudo systemctl enable nginx --now
```

Service status: active.

4.2 **Directory Structure**

```
sudo mkdir -p /var/www/portfolio
```

```
sudo chown -R deployer:deployer /var/www/portfolio
```

Place your static files under `/var/www/portfolio`.

4.3 **Configuring nginx Server Block**

Create `/etc/nginx/sites-available/portfolio`:

```
server {  
    listen 80;  
    server_name _;
```

```
root /var/www/portfolio;
```

```
index index.html;
```

```
location / {
```

```
    try_files $uri $uri/ =404;
```

```
}
```

```
access_log /var/log/nginx/portfolio_access.log;
```

```
error_log /var/log/nginx/portfolio_error.log;
```

```
}
```

Enable and reload:

```
sudo ln -s /etc/nginx/sites-available/portfolio /etc/nginx/sites-enabled/
```

```
sudo nginx -t
```

```
sudo systemctl reload nginx
```

Validate in browser: <http://13.210.81.35/>.

5. Version Control and Continuous Deployment

5.1 GitHub Integration

Install and configure Git:

```
sudo apt install git -y
```

Add server SSH key to GitHub and clone:

```
git clone git@github.com:yourusername/portfolio.git /var/www/portfolio
```

5.2 Deployment Automation

Create `/var/www/portfolio/deploy.sh`:

```
#!/bin/bash
```

```
cd /var/www/portfolio
```

```
git pull origin main
```

Make executable and schedule via cron:

```
chmod +x /var/www/portfolio/deploy.sh
```

(crontab -l ; echo "*/5 * * * * /var/www/portfolio/deploy.sh >> /var/log/deploy.log 2>&1") | crontab -

Check logs: /var/log/deploy.log.

6. Cost Analysis

Resource	Configuration	Monthly Cost Estimate
EC2 t2.micro	1 vCPU, 1 GB RAM, Free Tier	\$0
EBS (8 GB SSD)	gp2	\$0.80
Data Transfer	15 GB free per month	\$0
Total		\$0.80

7. Future Enhancements

- **SSL/TLS Integration:** Register a free domain and install certificates for `https://13.210.81.35/` (subject to domain binding).
 - **Multi-Region Deployment:** Deploy identical stacks in other AWS regions.
 - **Containerization:** Package with Docker and orchestrate via Kubernetes.
 - **CI/CD Pipeline:** Use GitHub Actions for automated testing and deployment.
 - **Monitoring and Alerts:** Integrate AWS CloudWatch or Prometheus/Grafana.
-

8. Acknowledgements

I gratefully acknowledge the guidance and debugging assistance provided by generative AI tools, particularly ChatGPT (OpenAI), as well as documentation from AWS, nginx, and GitHub.

9. References

Amazon Web Services. (2025). *Launching an EC2 Instance*. <https://docs.aws.amazon.com/ec2/>

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Falkner, T. (2023). *Mastering nginx* (2nd ed.). Packt Publishing.

GitHub Docs. (2025). *Managing SSH Keys*. <https://docs.github.com/en/authentication/connecting-to-github-with-ssh>

Let's Encrypt. (2025). *Certbot Documentation*. <https://certbot.eff.org/>
Ubuntu Documentation. (2025). *Ubuntu Server Guide: Security*.
<https://ubuntu.com/server/docs/security-overview>

10. Figures and Images

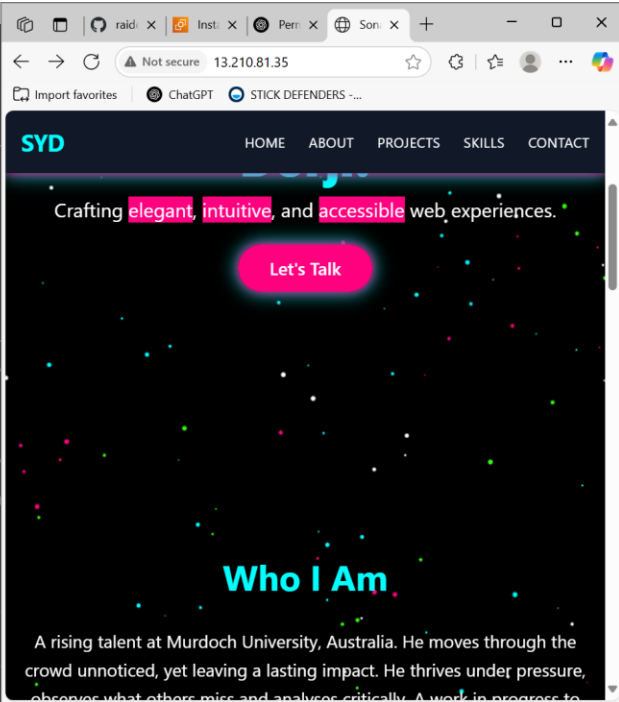
1. **SSH Connection:** Git Bash session showing successful SSH login to ubuntu@13.210.81.35.
2. **Directory Structure:** File tree of /var/www/portfolio with HTML, CSS, JS files.
3. **nginx Server Block:** Screenshot of Nano editor with /etc/nginx/sites-available/portfolio.
4. **Live Site:** Browser showing the homepage at <http://13.210.81.35/>.
5. **Cron Deployment Log:** Sample entries from /var/log/deploy.log.

(Figures within the final PDF.)

```

ubuntu@ip-172-31-2-111: /var/www/portfolio
No VM guests are running outdated hypervisor (qemu) binaries on this host.
ubuntu@ip-172-31-2-111:~$ sudo ufw allow 'Nginx HTTP'
Rule added
Rule added (v6)
ubuntu@ip-172-31-2-111:~$ sudo systemctl start nginx && sudo systemctl enable nginx
sudo: systemctl: command not found
ubuntu@ip-172-31-2-111:~$ sudo systemctl start nginx && sudo systemctl enable nginx
sudo: systemctl: command not found
ubuntu@ip-172-31-2-111:~$ sudo systemctl start nginx && sudo systemctl enable nginx
Synchronizing state of nginx.service with SysV service script with /usr/lib/systemd/sy
Executing: /usr/lib/systemd/systemd-sysv-install enable nginx
ubuntu@ip-172-31-2-111:~$ sudo mkdir -p /var/www/portfolio
ubuntu@ip-172-31-2-111:~$ sudo chown -R deployer:deployer /var/www/portfolio
chown: invalid user: 'deployer:deployer'
ubuntu@ip-172-31-2-111:~$ sudo nano /etc/nginx/sites-available/portfolio
ubuntu@ip-172-31-2-111:~$ sudo ln -s /etc/nginx/sites-available/portfolio /etc/nginx/si
ubuntu@ip-172-31-2-111:~$ sudo nginx -t
2025/06/09 11:54:42 [warn] 2762#2762: conflicting server name "" on 0.0.0.0:80, ignore
nginx: the configuration file /etc/nginx/nginx.conf syntax is ok
nginx: configuration file /etc/nginx/nginx.conf test is successful
ubuntu@ip-172-31-2-111:~$ sudo system reload nginx
sudo: system: command not found
ubuntu@ip-172-31-2-111:~$ sudo systemctl reload nginx
ubuntu@ip-172-31-2-111:~$ cd /var/www/portfolio
ubuntu@ip-172-31-2-111:/var/www/portfolio$ git clone https://github.com/raiden421/portf
fatal: could not create work tree dir 'portfolio-server': Permission denied
ubuntu@ip-172-31-2-111:/var/www/portfolio$ AC
ubuntu@ip-172-31-2-111:/var/www/portfolio$ sudo git clone https://github.com/raiden421/
Cloning into 'portfolio-server'...
remote: Enumerating objects: 16, done.
remote: Counting objects: 100% (16/16), done.
remote: Compressing objects: 100% (16/16), done.
remote: Total 16 (delta 2), reused 0 (delta 0), pack-reused 0 (from 0)
Receiving objects: 100% (16/16), 24.78 MiB | 18.92 MiB/s, done.
Resolving deltas: 100% (2/2), done.
ubuntu@ip-172-31-2-111:/var/www/portfolio$ sudo rm /etc/nginx/sites-enabled/default
ubuntu@ip-172-31-2-111:/var/www/portfolio$ sudo ln -s /etc/nginx/sites-available/portfo
ln: failed to create symbolic link '/etc/nginx/sites-enabled/portfolio': File exists
ubuntu@ip-172-31-2-111:/var/www/portfolio$ ls
portfolio-server
ubuntu@ip-172-31-2-111:/var/www/portfolio$ sudo nano /etc/nginx/sites-available/portfo
ubuntu@ip-172-31-2-111:/var/www/portfolio$ sudo nginx -t
nginx: the configuration file /etc/nginx/nginx.conf syntax is ok

```



```
ubuntu@ip-172-31-2-111: ~  
$ cd Downloads  
MSI MODERN 14@MSI MINGW64 ~/Downloads  
$ chmod 400 "portfolio-key.pem"  
MSI MODERN 14@MSI MINGW64 ~/Downloads  
$ ssh -i "portfolio-key.pem" ubuntu@ec2-13-210-81-35.ap-southeast-2.compute.amazonaws.com  
The authenticity of host 'ec2-13-210-81-35.ap-southeast-2.compute.amazonaws.com (13.210.81.35)' can't be established.  
ED25519 key fingerprint is SHA256:ZV8AA30E2HQZMbG5JC9wMzpEFXoapS1eIZWK0ap2+uk.  
This key is not known by any other names.  
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes  
Warning: Permanently added 'ec2-13-210-81-35.ap-southeast-2.compute.amazonaws.com' (ED25519) to the list of known hosts.  
Welcome to Ubuntu 24.04.2 LTS (GNU/Linux 6.8.0-1029-aws x86_64)  
  
* Documentation:  https://help.ubuntu.com  
* Management:    https://landscape.canonical.com  
* Support:       https://ubuntu.com/pro  
  
System information as of Mon Jun  9 11:40:47 UTC 2025  
  
System load:  0.04          Processes:           106  
Usage of /:   25.3% of 6.71GB Users logged in:      0  
Memory usage: 20%          IPv4 address for enx0: 172.31.2.111  
Swap usage:   0%  
  
Expanded Security Maintenance for Applications is not enabled.  
  
0 updates can be applied immediately.  
  
Enable ESM Apps to receive additional future security updates.  
See https://ubuntu.com/esm or run: sudo pro status  
  
The list of available updates is more than a week old.  
To check for new updates run: sudo apt update  
  
The programs included with the Ubuntu system are free software;  
the exact distribution terms for each program are described in the  
individual files in /usr/share/doc/*/copyright.  
  
Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by  
applicable law.  
  
To run a command as administrator (user "root"), use "sudo <command>".  
See "man sudo_root" for details.  
  
ubuntu@ip-172-31-2-111:~$
```


EC2 Instance ConnectSession ManagerSSH clientEC2 serial console

Instance ID
i-0c1b7cbffb6b727d7 (Portfolio)

1. Open an SSH client.

2. Locate your private key file. The key used to launch this instance is portfolio-key.pem

3. Run this command, if necessary, to ensure your key is not publicly viewable.
chmod 400 "portfolio-key.pem"

4. Connect to your instance using its Public DNS:
ec2-13-210-81-35.ap-southeast-2.compute.amazonaws.com

Example:
ssh -i "portfolio-key.pem" ubuntu@ec2-13-210-81-35.ap-southeast-2.compute.amazonaws.com

Note: In most cases, the guessed username is correct. However, read your AMI usage instructions to check if the AMI owner has changed the default AMI username.

▼ Instance details Info

AMI ID
ami-06c19207c1ab181f0

AMI name
ubuntu/images/hvm-ssd-gp3/ubuntu-noble-24.04-amd64-server-20250530

Stop protection
Disabled

Instance auto-recovery
Default

AMI Launch index
0

Credit specification
standard

Usage operation
RunInstances

Monitoring
disabled

Allowed image
-

Launch time
Mon Jun 09 2025 17:37:42 GMT+0600 (Bhutan Time) (less than a minute)

Lifecycle
normal

Key pair assigned at launch
portfolio-key

Kernel ID
-

RAM disk ID
-

Platform details
Linux/UNIX

Termination protection
Disabled

AMI location
amazon/ubuntu/images/hvm-ssd-gp3/ubuntu-noble-24.04-amd64-server-20250530

Stop-hibernate behavior
Disabled

State transition reason
-

State transition message
-

Owner
665980772212

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Instance summary for i-0c1b7cbffb6b727d7 (Portfolio) [Info](#)

[Connect](#)[Instance state ▼](#)[Actions ▼](#)

Updated less than a minute ago

Instance ID

i-0c1b7cbffb6b727d7

IPv6 address

–

Hostname type

IP name: ip-172-31-2-111.ap-southeast-2.compute.internal

Answer private resource DNS name

IPv4 (A)

Auto-assigned IP address

13.210.81.35 [Public IP]

Public IPv4 address

13.210.81.35 | [open address](#)

Instance state

Running

Private IP DNS name (IPv4 only)

ip-172-31-2-111.ap-southeast-2.compute.internal

Instance type

t2.micro

VPC ID

vpc-01662a7f2e250382b

Private IPv4 addresses

172.31.2.111

Public DNS

ec2-13-210-81-35.ap-southeast-2.compute.amazonaws.com
| [open address](#)

Elastic IP addresses

–

AWS Compute Optimizer finding

[Opt-in to AWS Compute Optimizer for recommendations](#)

[EC2](#) > [Instances](#) > [Launch an instance](#)

▼ Key pair (login) [Info](#)

You can use a key pair to securely connect to your instance. Ensure that you have access to the selected key pair before you launch the instance.

Key pair name - *required*

portfolio-key

[Create new key pair](#)

▼ Network settings [Info](#)

[Edit](#)

Network | [Info](#)

vpc-01662a7f2e250382b

Subnet | [Info](#)

No preference (Default subnet in any availability zone)

Auto-assign public IP | [Info](#)

Enable

[Additional charges apply](#) when outside of [free tier allowance](#)

```
index.html X
index.html > ...
1 <!DOCTYPE html>
2 <html lang="en">
3 <head>
4   <meta charset="UTF-8">
5   <meta name="viewport" content="width=device-width, initial-scale=1.0">
6   <title>Sonam Yoesel Dorji - Web Developer & UX/UI Designer</title>
7   <script src="https://cdn.tailwindcss.com"></script>
8   <script src="https://cdnjs.cloudflare.com/ajax/libs/gsap/3.12.5/gsap.min.js"></script>
9   <script src="https://cdnjs.cloudflare.com/ajax/libs/gsap/3.12.5/ScrollTrigger.min.js"></script>
10  <link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/font-awesome/6.5.1/css/all.min.css" integrity
11  <style>...
12  </style>
13 </head>
14 <body class="transparent-bg text-white font-sans antialiased">
15   <!-- Space Background Canvas -->
16   <canvas id="space-canvas"></canvas>
17
18   <!-- Navigation Bar -->
19   <nav class="bg-gray-900 p-4 sticky top-0 z-50 neon-shadow">
20     <div class="container mx-auto flex justify-between items-center">
21       <h1 class="text-2xl font-bold tracking-tight neon-cyan">SYD</h1>
22       <ul class="flex space-x-6 text-sm uppercase tracking-wide">
23         <li><a href="#home" class="hover:neon-cyan transition duration-300">Home</a></li>
24         <li><a href="#about" class="hover:neon-cyan transition duration-300">About</a></li>
25         <li><a href="#projects" class="hover:neon-cyan transition duration-300">Projects</a></li>
26         <li><a href="#skills" class="hover:neon-cyan transition duration-300">Skills</a></li>
27         <li><a href="#contact" class="hover:neon-cyan transition duration-300">Contact</a></li>
28       </ul>
29     </div>
30   </nav>
31
32   <!-- Hero Section -->
```

er Import favorites ChatGPT STICK DEFENDERS ...

image1.jpg	x
image2.jpg	x
image3.jpg	x
image4.jpg	x



Commit changes

Deployment

Add an optional extended description...

Commit changes

Cancel



Import favorites

ChatGPT

STICK DEFENDERS -...

raiden421 / portfolio-server

Type **/** to search

<> Code

Issues

Pull requests

Actions

Projects

Wiki

Security

Insights

Settings

portfolio-server /

Drag additional files here to add them to your repository

Or [choose your files](#)

index.html

mundane.html

perth.html

Snipping Tool

Screenshot copied to clipboard
Automatically saved to screenshots folder.

Markup and share

index.html

mundane.html

perth.html

writer's blog.png

image1.jpg

image2.jpg

image3.jpg

image4.jpg

image5.jpg

image6.jpg