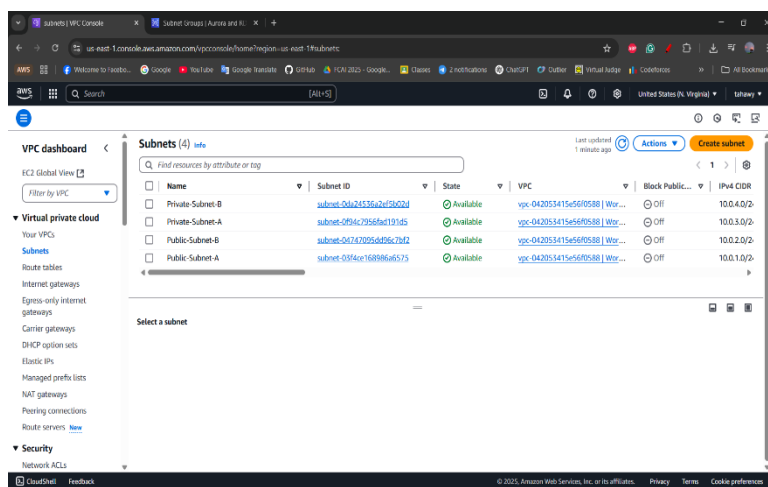
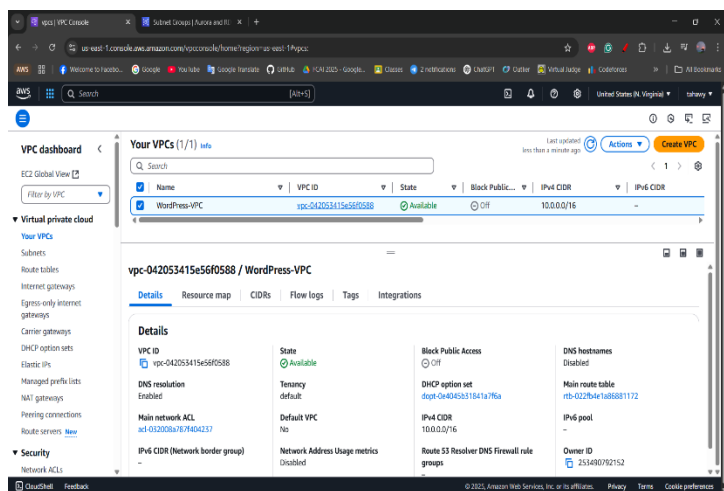


Task 1: Deploy a Scalable WordPress Website Using EC2, RDS, ALB, and ASG (Dynamic Site)

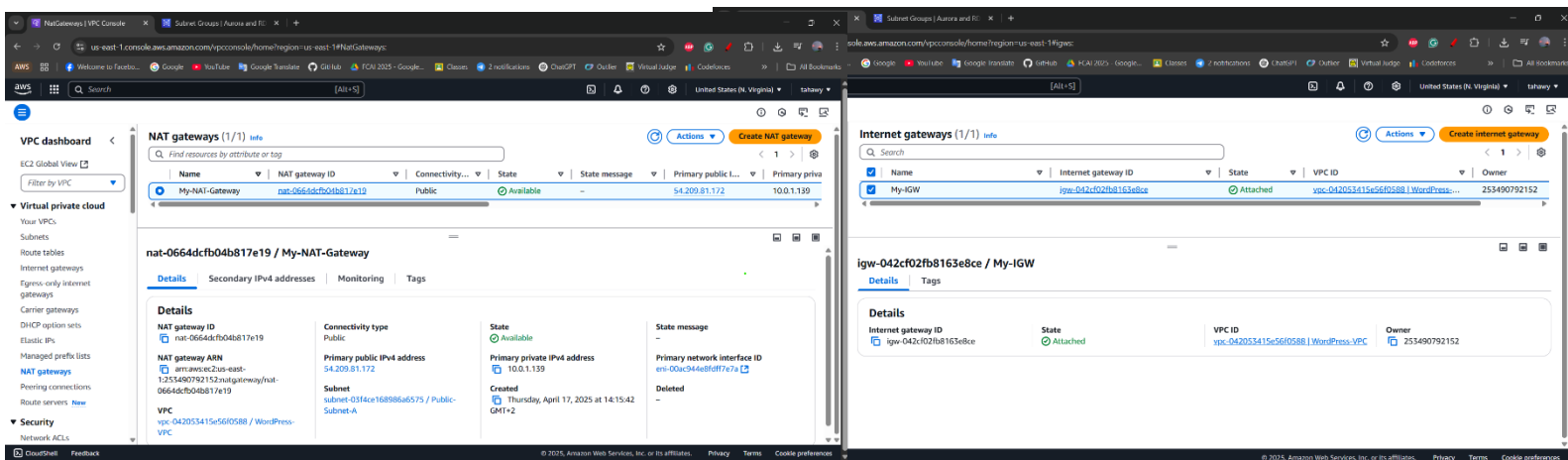
VPC and Subnets:

Creating a VPC to have our own private network inside the cloud for our WordPress website and four subnets (two public and two private) by placing subnets in **two different AZs** to ensure that if one AZ experiences an outage, the application remains available in the other AZ.



IGW and NGW:

The IGW is to allow resources in a **public subnet** to communicate directly with the internet. The NGW is to allow resources in **private subnets** to initiate outbound traffic without exposing them to inbound internet traffic.



Route Tables:

Route Tables are used to control the routing of network traffic within VPC. They determine how packets are directed between subnets, the internet, and other network resources.

Added a route to direct traffic destined for the internet (0.0.0.0/0) to the Internet Gateway (IGW). This allows resources in the public subnet to access the internet. Also, there was added a route for internet-bound traffic (0.0.0.0/0) to the NAT Gateway. This allows instances in private subnets to access the internet for updates and patches, but they remain inaccessible from the internet.

The image displays two side-by-side screenshots of the AWS VPC console, illustrating the configuration of route tables for a VPC.

Left Screenshot: Public Route Table

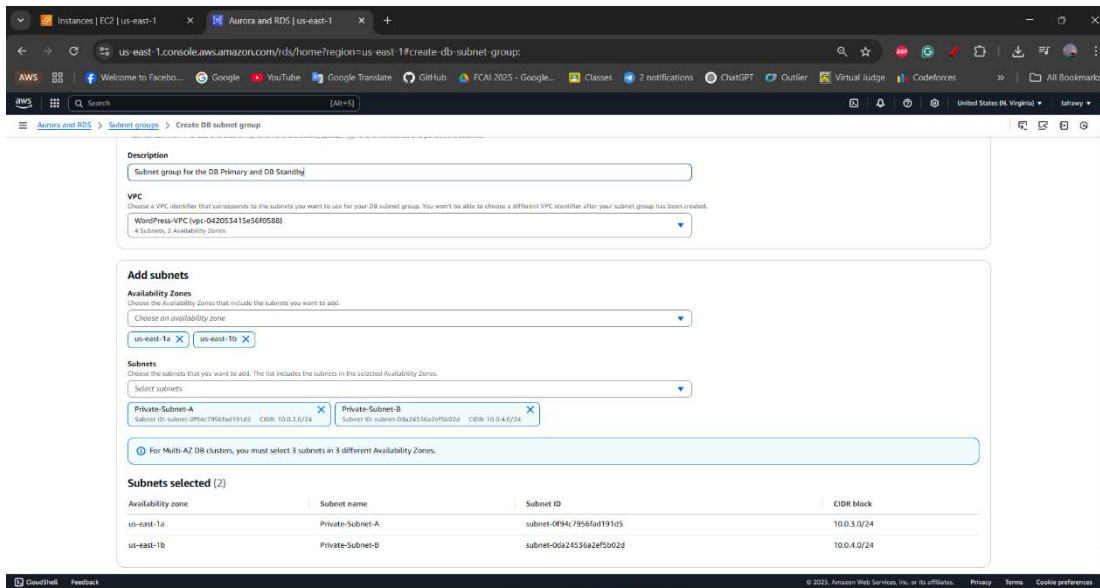
- Route tables (1/2):** A table listing route tables. The 'Public Route Table' (rtb-022fb4e1a86881172) is selected, showing it is associated with 2 subnets and has a main route table status of 'Yes'.
- rtb-022fb4e1a86881172 / Public Route Table:** The 'Subnet associations' tab is active, showing two associations: 'Public-Subnet-B' (subnet-04747095d495c7bf2) with IPv4 CIDR 10.0.2.0/24, and 'Public-Subnet-A' (subnet-03f4c168986a6575) with IPv4 CIDR 10.0.1.0/24.
- Subnets without explicit associations (0):** A section indicating no subnets are currently without explicit associations.

Right Screenshot: Private Route Table

- Route tables (1/2):** A table listing route tables. The 'Private Route Table' (rtb-0bcce4a36140116e) is selected, showing it is associated with 2 subnets and has a main route table status of 'No'.
- rtb-0bcce4a36140116e / Private Route Table:** The 'Subnet associations' tab is active, showing two associations: 'Private-Subnet-B' (subnet-04a24536a2af5b02d) with IPv4 CIDR 10.0.4.0/24, and 'Private-Subnet-A' (subnet-0f54c7956f6d19145) with IPv4 CIDR 10.0.3.0/24.
- Subnets without explicit associations (0):** A section indicating no subnets are currently without explicit associations.

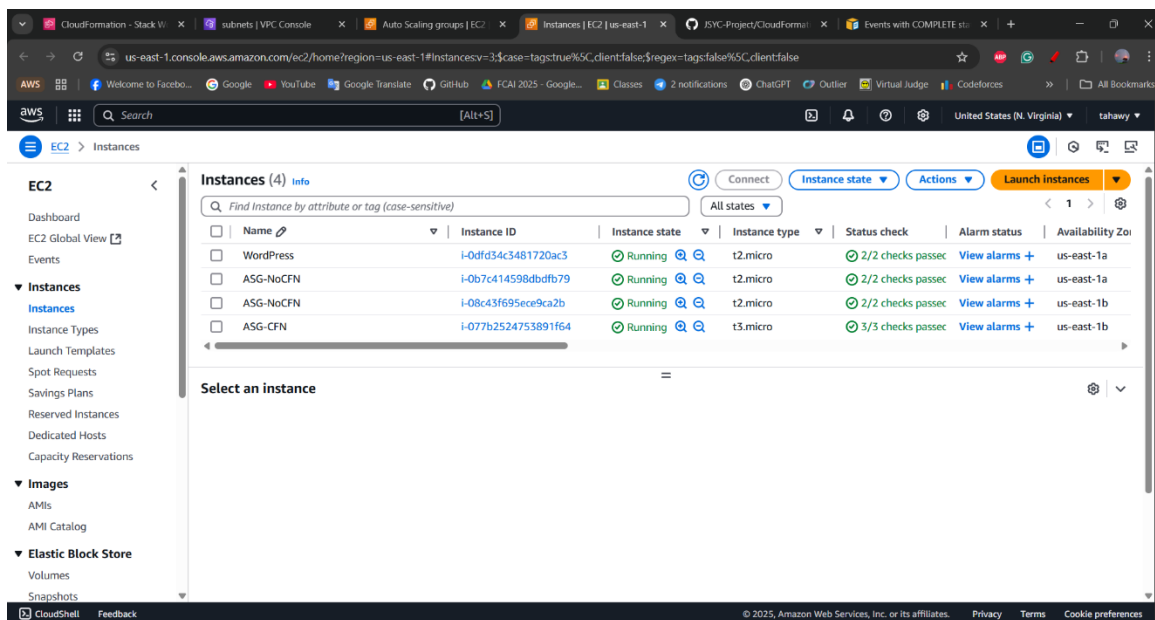
RDS Subnet Group:

This is a subnet group for RDS that has two private subnets, they are two for high availability and security, and when setting up **Amazon RDS** for WordPress project, AWS requires you to create a **DB Subnet Group** with **at least two private subnets in different Availability Zones (AZs)**.



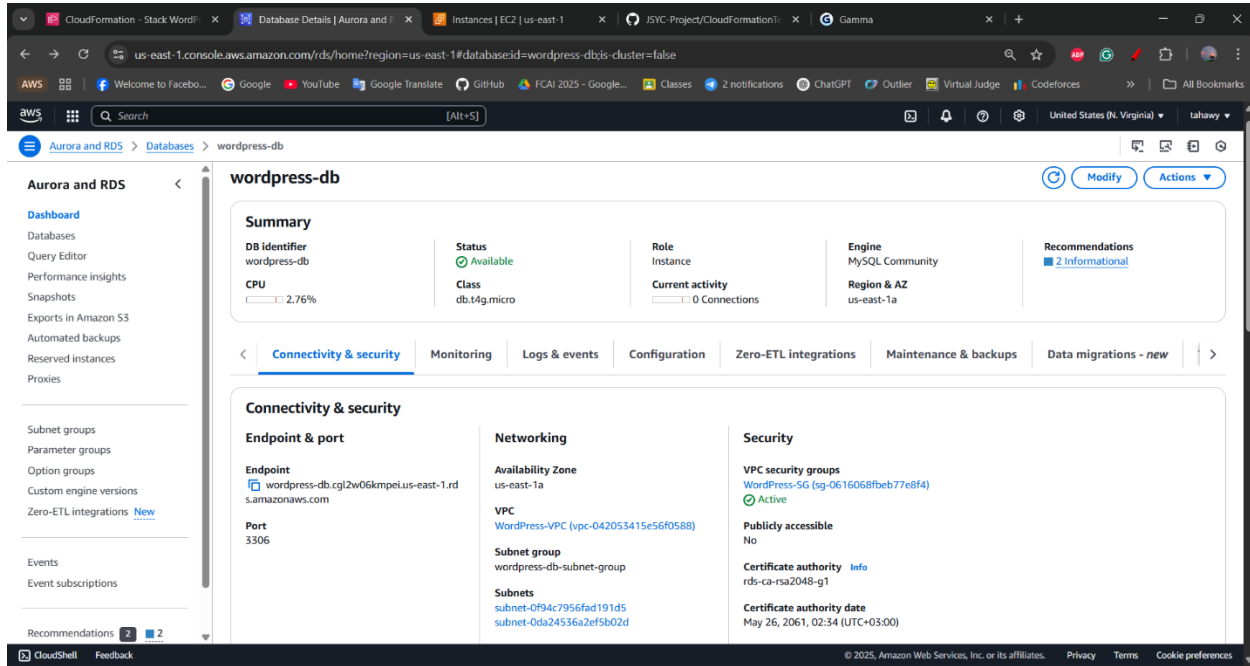
Instances:

The instances created that the WordPress Site has deployed in them either manually or using CloudFormation.



RDS:

This is the database that was created for WordPress because it is a dynamic content management system that stores and retrieves content from a database. Without a database, WordPress cannot manage content or maintain user data, making it non-functional. It's connected to the two private subnets.



Installation of WordPress in Instance Manually:

Those are screenshots of installing Apache and PHP which are required first to install WordPress later. Also, the installation of the DB which is required for WordPress.

```
ec2-user@ip-10-0-1-10: ~$ sudo yum install httpd
Installing : httpd-2.4.62-1.amzn2.0.2.x86_64
Verifying : apr-1.7.2-1.amzn2.0.1.x86_64
Verifying : apr-util-bdb-1.6.3-1.amzn2.0.1.x86_64
Verifying : httpd-2.4.62-1.amzn2.0.2.x86_64
Verifying : mod_http2-1.15.10-1.amzn2.0.2.x86_64
Verifying : apr-util-1.6.3-1.amzn2.0.1.x86_64
Verifying : mailcap-2.1.41-2.amzn2.noarch
Verifying : generic-logos-httpd-10.0-0-amzn2.noarch
Verifying : httpd-tools-2.4.62-1.amzn2.0.2.x86_64
Verifying : httpdfilesystem-2.4.62-1.amzn2.0.2.noarch
Installing :
httpd.x86_64 0:2.4.62-1.amzn2.0.2

Dependency Installed:
apr.x86_64 0:1.7.2-1.amzn2.0.1          apr-util.x86_64 0:1.6.3-1.amzn2.0.1          apr-util-bdb.x86_64 0:1.6.3-1.amzn2.0.1
generic-logos-httpd.noarch 0:10.0-0-amzn2      httpdfilesystem.noarch 0:2.4.62-1.amzn2.0.2      httpd-tools.x86_64 0:2.4.62-1.amzn2.0.2
mailcap.noarch 0:2.1.41-2.amzn2

Complete!
[ec2-user@ip-10-0-1-10 ~]$ sudo systemctl start httpd
[ec2-user@ip-10-0-1-10 ~]$ sudo systemctl enable httpd
Created symlink from /etc/systemd/system/multi-user.target.wants/httpd.service to /usr/lib/systemd/system/httpd.service.
[ec2-user@ip-10-0-1-10 ~]$ sudo systemctl status httpd
* httpd.service - The Apache HTTP Server
Loaded: loaded (/usr/lib/systemd/system/httpd.service; enabled; vendor preset: disabled)
Active: active (running) Since Thu 2023-04-17 13:25:01 UTC; 9s ago
Docs: man:httpd.service(8)
Main PID: 12580 (httpd)
Status: "1/1s Requests: 0; Idle/Busy workers 100/0;Requests/sec: 0; Bytes served/sec: 0 B/sec"
CGroup: /system.slice/httpd.service
├─12580 /usr/sbin/httpd -DFOREGROUND
├─12585 /usr/sbin/httpd -DFOREGROUND
├─12586 /usr/sbin/httpd -DFOREGROUND
├─12587 /usr/sbin/httpd -DFOREGROUND
├─12588 /usr/sbin/httpd -DFOREGROUND
└─12589 /usr/sbin/httpd -DFOREGROUND

Apr 17 13:25:01 ip-10-0-1-10.ec2.internal systemd[1]: Starting The Apache HTTP Server...
Apr 17 13:25:01 ip-10-0-1-10.ec2.internal systemd[1]: Started The Apache HTTP Server.
[ec2-user@ip-10-0-1-10 ~]$
```

```
ec2-user@ip-10-0-1-10: ~$ sudo yum install php
Running transaction check
Running transaction test
Transaction test succeeded
Running transaction
Installing : libzip-1.3.2-1.amzn2.0.1.x86_64
Installing : php-common-8.0.30-1.amzn2.x86_64
Installing : php-curl-8.0.30-1.amzn2.x86_64
Installing : php-pdo-8.0.30-1.amzn2.x86_64
Installing : oniguruma-3.9.6-1.amzn2.0.7.x86_64
Installing : libxml2-1.1.28-6.amzn2.0.4.x86_64
Installing : php-xml-8.0.30-1.amzn2.x86_64
Installing : php-strings-8.0.30-1.amzn2.x86_64
Installing : php-mysqlnd-8.0.30-1.amzn2.x86_64
Installing : php-gd-8.0.30-1.amzn2.x86_64
Verifying : php-strings-8.0.30-1.amzn2.x86_64
Verifying : php-curl-8.0.30-1.amzn2.x86_64
Verifying : php-pdo-8.0.30-1.amzn2.x86_64
Verifying : php-common-8.0.30-1.amzn2.x86_64
Verifying : libxml2-1.1.28-6.amzn2.0.4.x86_64
Verifying : php-gd-8.0.30-1.amzn2.x86_64
Verifying : php-xml-8.0.30-1.amzn2.x86_64
Verifying : oniguruma-3.9.6-1.amzn2.0.7.x86_64
Verifying : php-mysqlnd-8.0.30-1.amzn2.x86_64
Verifying : libzip-1.3.2-1.amzn2.0.1.x86_64
Installing :
php.x86_64 0:8.0.30-1.amzn2      php-gd.x86_64 0:8.0.30-1.amzn2      php-strings.x86_64 0:8.0.30-1.amzn2      php-mysqlnd.x86_64 0:8.0.30-1.amzn2
php-curl.x86_64 0:8.0.30-1.amzn2

Dependency Installed:
libxml2.x86_64 0:1.1.28-6.amzn2.0.4      libzip.x86_64 0:1.3.2-1.amzn2.0.1      oniguruma.x86_64 0:3.9.6-1.amzn2.0.7      php-curl.x86_64 0:8.0.30-1.amzn2
php-common.x86_64 0:8.0.30-1.amzn2

Complete!
[ec2-user@ip-10-0-1-10 ~]$ php -v
PHP 8.0.30 (cli) (built: Aug 24 2023 20:32:38) ( NTS )
Copyright (c) The PHP Group
Zend Engine v4.0.30, Copyright (c) Zend Technologies
[ec2-user@ip-10-0-1-10 ~]$
```

```
ec2-user@ip-10-0-1-10:~$ mysql -u root -p
... Success!

Normally, root should only be allowed to connect from 'localhost'. This
ensures that someone cannot guess at the root password from the network.

Disallow root login remotely? [Y/n] y
... Success!

By default, MariaDB comes with a database named 'test' that anyone can
access. This is also intended only for testing, and should be removed
before moving into a production environment.

Remove test database and access to it? [Y/n] y
- Dropping test database...
... Success!
- Removing privileges on test database...
... Success!

Reloading the privilege tables will ensure that all changes made so far
will take effect immediately.

Reload privilege tables now? [Y/n] y
... Success!

Cleaning up...

All done! If you've completed all of the above steps, your MariaDB
installation should now be secure.

Thanks for using MariaDB!
[ec2-user@ip-10-0-1-10 ~]$ mysql -u root -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 10
Server version: 5.5.68-MariaDB MariaDB Server

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> |
```

```
ec2-user@ip-10-0-1-10:~$ mysql -h wordpress-db.cgl2w06kmpci.us-east-1.rds.amazonaws.com -u admin -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MySQL connection id is 36
Server version: 8.0.40 Source distribution

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MySQL [(none)]> CREATE DATABASE wordpress_db;
Query OK, 1 row affected (0.01 sec)

MySQL [(none)]> |
```

```
ec2-user@ip-10-0-1-10:~$ sudo yum install -y php php-gd php-mbstring php-xml php-mysqlnd
Verifying : libxslt-1.1.28-6.amzn2.0.4.x86_64 5/11
Verifying : php-gd-8.0.30-1.amzn2.x86_64 6/11
Verifying : php-xml-8.0.30-1.amzn2.x86_64 7/11
Verifying : php-mysqlnd-8.0.30-1.amzn2.x86_64 8/11
Verifying : oniguruma-6.9.0-1.amzn2.0.7.x86_64 9/11
Verifying : php-8.0.30-1.amzn2.x86_64 10/11
Verifying : libzip-1.3.2-1.amzn2.0.1.x86_64 11/11

Installed:
php.x86_64 0:8.0.30-1.amzn2      php-gd.x86_64 0:8.0.30-1.amzn2      php-mbstring.x86_64 0:8.0.30-1.amzn2      php-mysqlnd.x86_64 0:8.0.30-1.amzn2
php-xml.x86_64 0:8.0.30-1.amzn2

Dependency Installed:
libxslt.x86_64 0:1.1.28-6.amzn2.0.4      libzip.x86_64 0:1.3.2-1.amzn2.0.1      oniguruma.x86_64 0:6.9.0-1.amzn2.0.7      php-cli.x86_64 0:8.0.30-1.amzn2
php-common.x86_64 0:8.0.30-1.amzn2      php-pdo.x86_64 0:8.0.30-1.amzn2

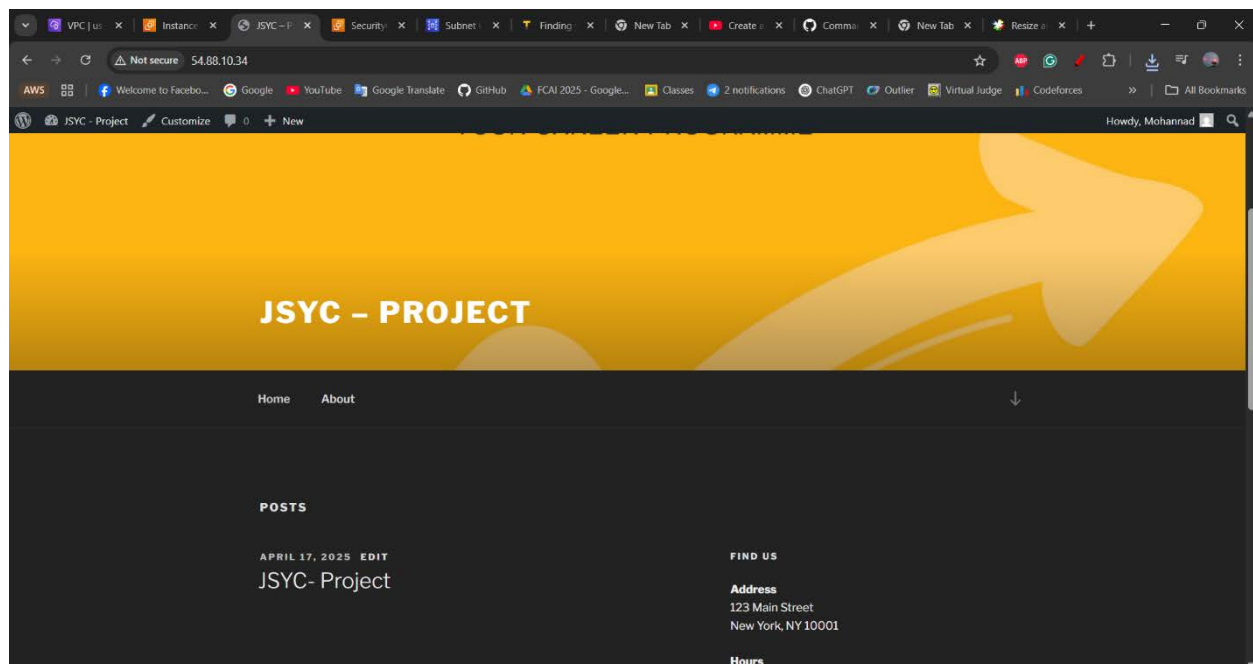
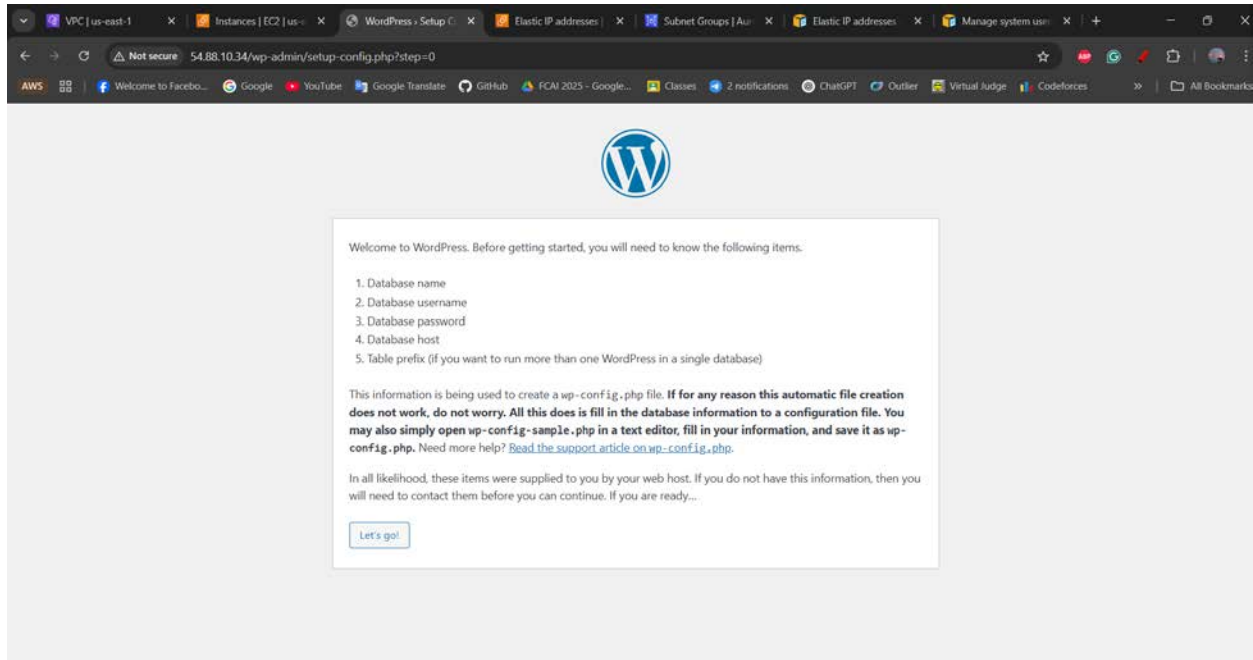
Complete!
[ec2-user@ip-10-0-1-10 ~]$ php -v
PHP 8.0.30 (cli) (built: Aug 24 2023 20:32:30) ( NTS )
Copyright (c) The PHP Group
Zend Engine v4.0.30, Copyright (c) Zend Technologies
[ec2-user@ip-10-0-1-10 ~]$ sudo systemctl restart httpd
[ec2-user@ip-10-0-1-10 ~]$ sudo rm -rf /var/www/html/* 66 \
> wget https://wordpress.org/latest.tar.gz 66 \
> tar -xzf latest.tar.gz 66 \
> sudo cp -r wordpress/* /var/www/html/ 66 \
> sudo chown -R apache:apache /var/www/html 66 \
> sudo chmod -R 755 /var/www/html 66 \
> sudo systemctl restart httpd
--2025-04-17 13:30:19-- https://wordpress.org/latest.tar.gz
Resolving wordpress.org (wordpress.org)... 198.143.164.252
Connecting to wordpress.org (wordpress.org)|198.143.164.252|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 26921903 (26M) [application/octet-stream]
Saving to: 'latest.tar.gz.1'

100%[=====] 26,921,903 49.2MB/s in 0.5s

2025-04-17 13:30:20 (49.2 MB/s) - 'latest.tar.gz.1' saved [26921903/26921903]

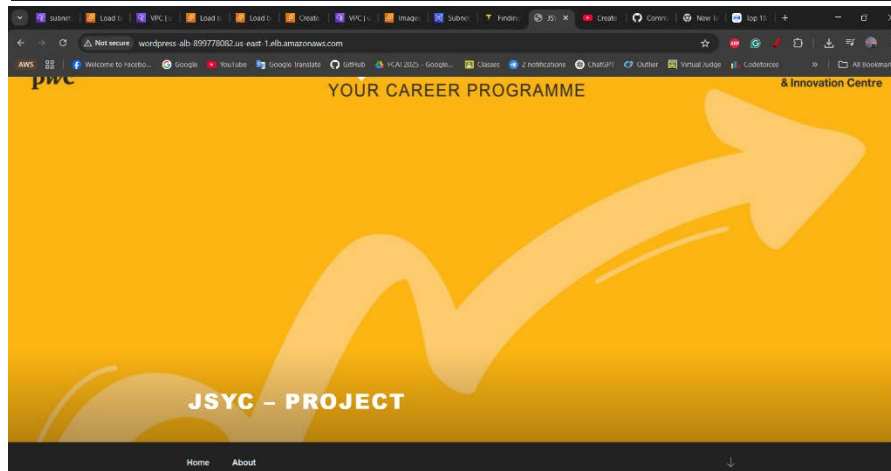
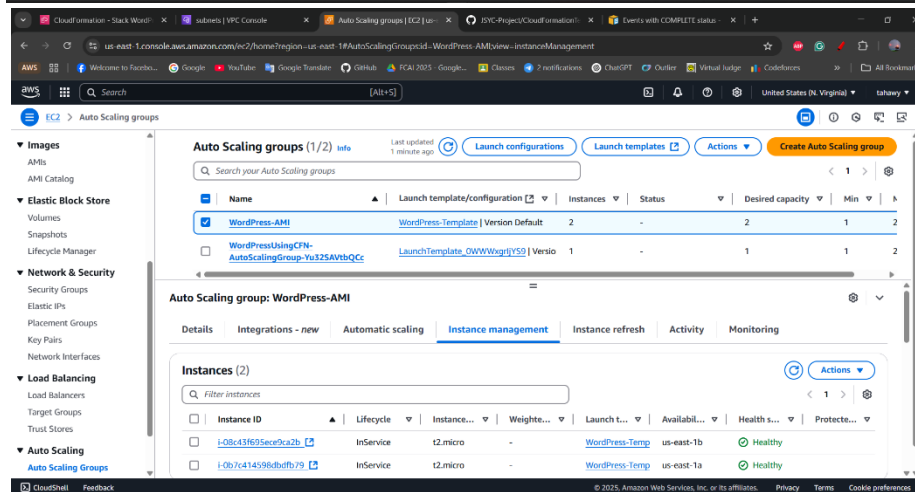
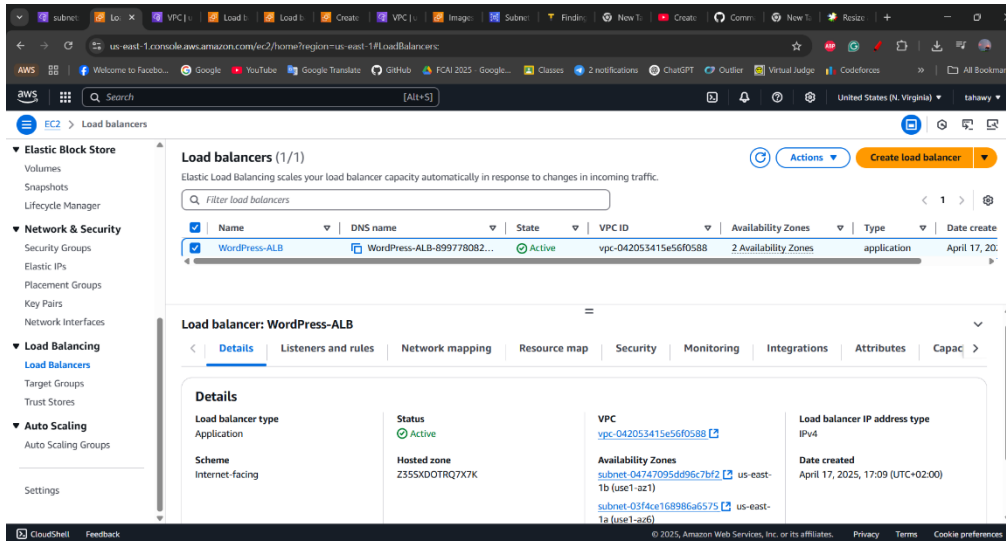
[ec2-user@ip-10-0-1-10 ~]$
```

Installation of WordPress from Website:



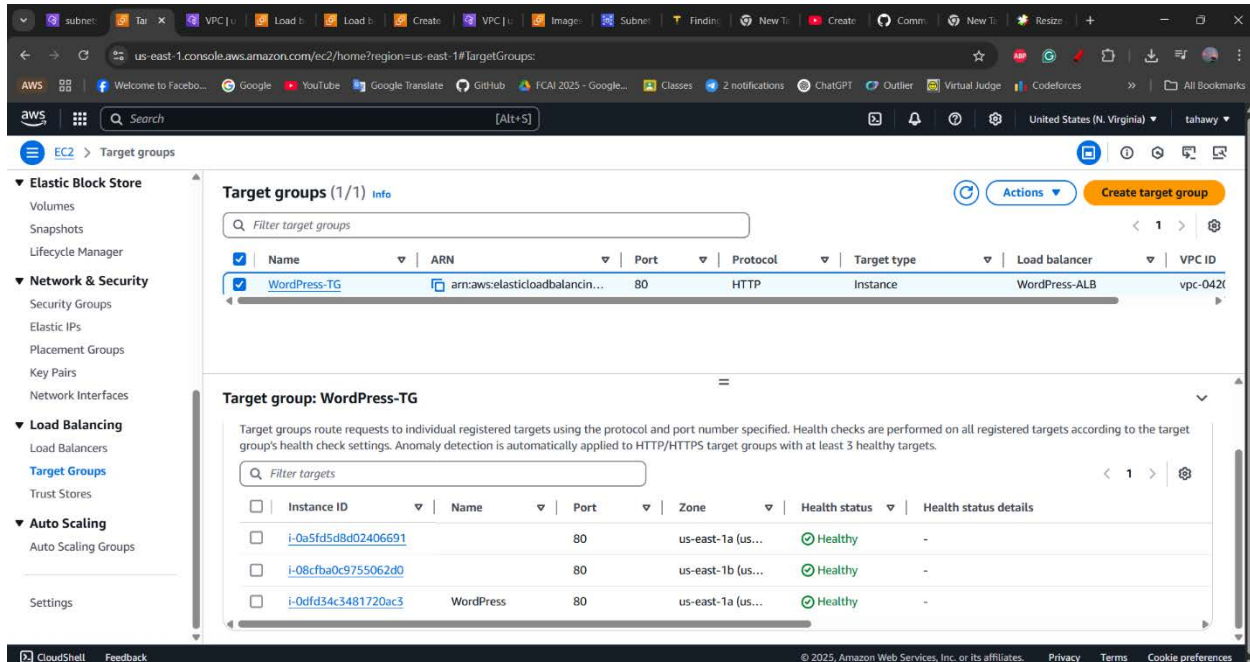
ALB & ASG:

ALB helps in distributing incoming traffic across multiple EC2 instances, Ensuring high availability and fault tolerance. While ASG automatically adds or removes EC2 instances based on demand, Ensuring the right number of instances are always running.



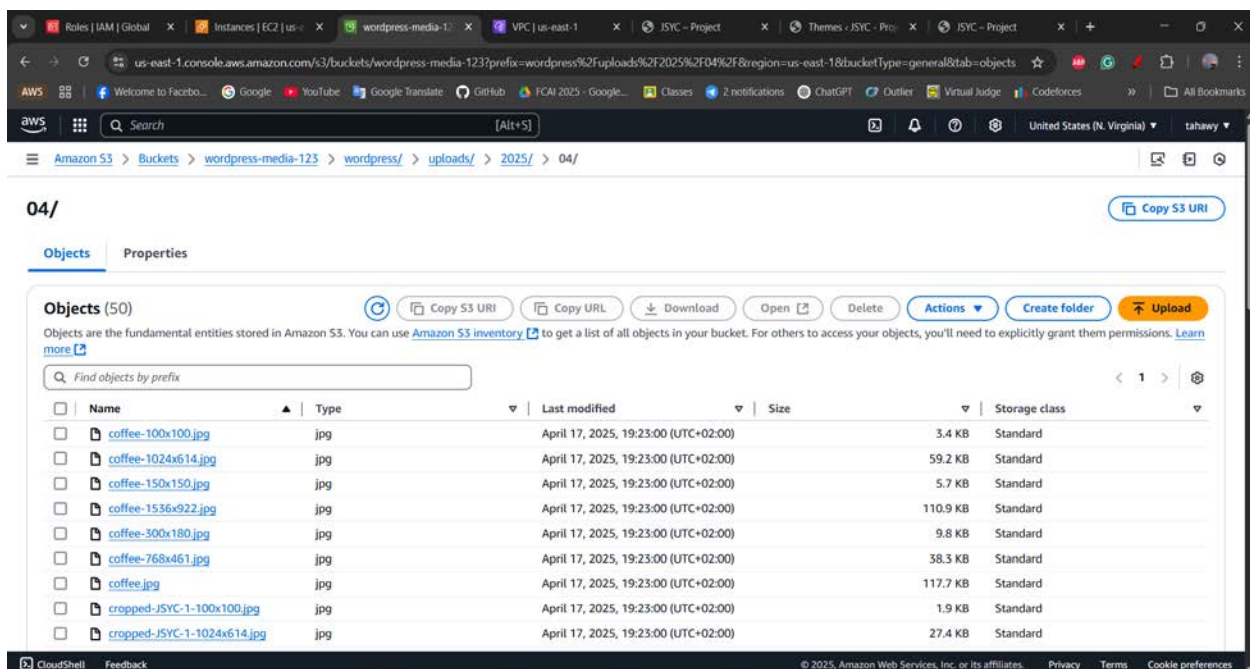
Accessing Website from ALB DNS

This is a Target Group screenshot, Target Group routes traffic from the ALB to registered EC2 instances or other targets.



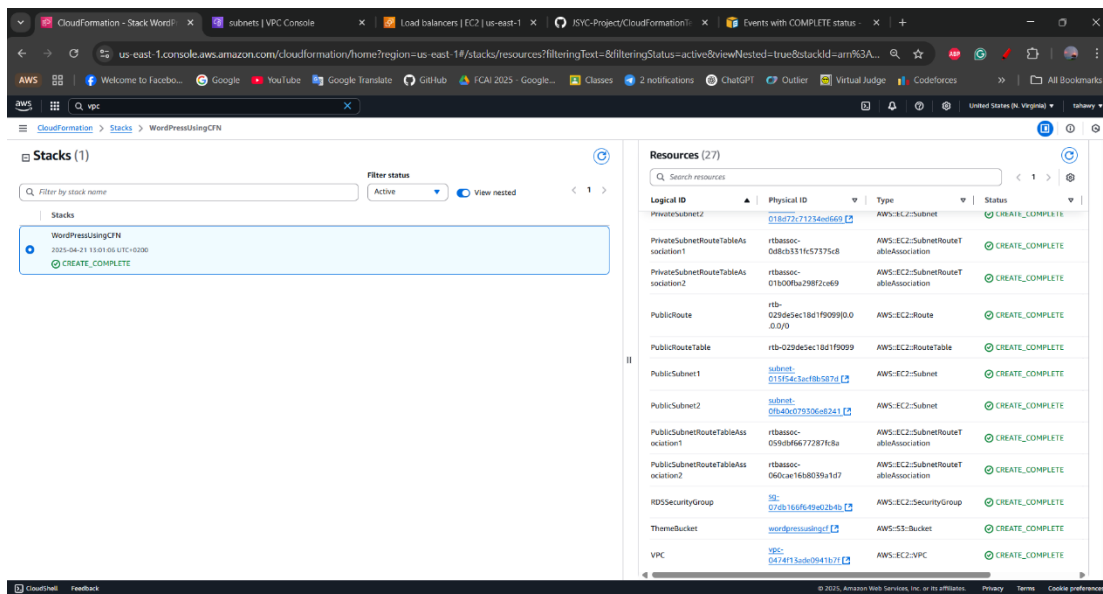
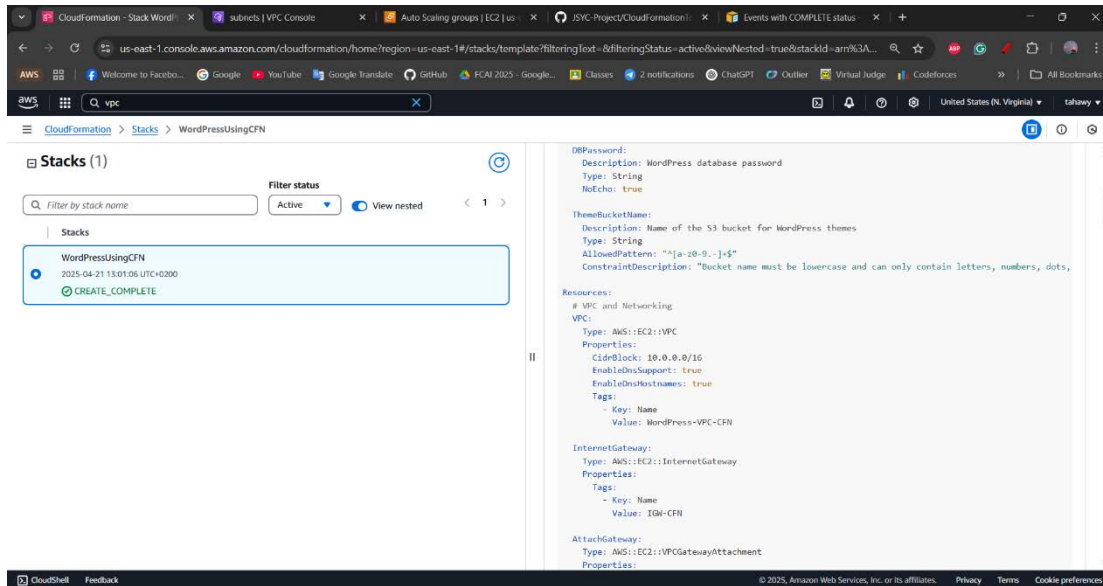
S3 Bucket:

Helpful in Storing static website content like HTML, CSS, JavaScript, and media files. But here I saved all the website photos.

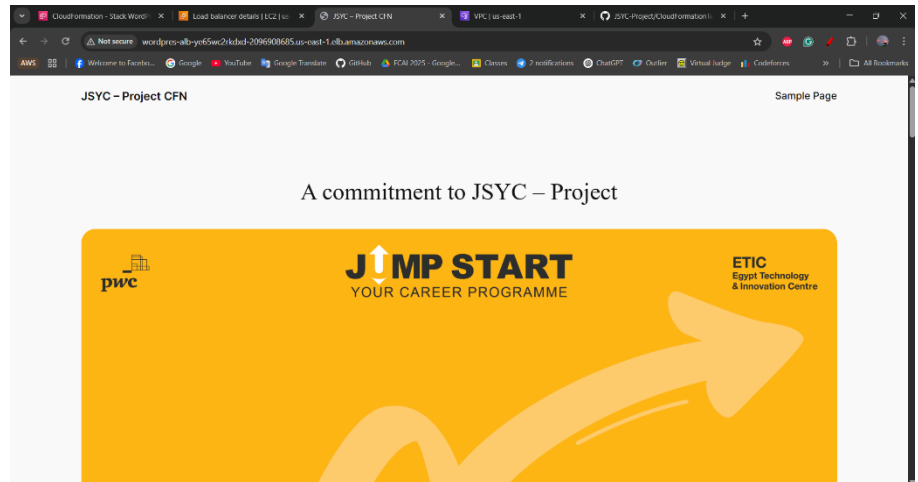


CloudFormation:

I switched to using CloudFormation after realizing that creating and deleting AWS resources manually was time-consuming and error prone. With CloudFormation, I can define all my infrastructure in a single template, which automates the entire process whether it's launching or tearing down a complete stack. This not only saves a lot of time but also ensures consistency and reduces the chances of missing any resources.



Using CFN ALB
DNS:



Using CFN Instance IP
Address:

