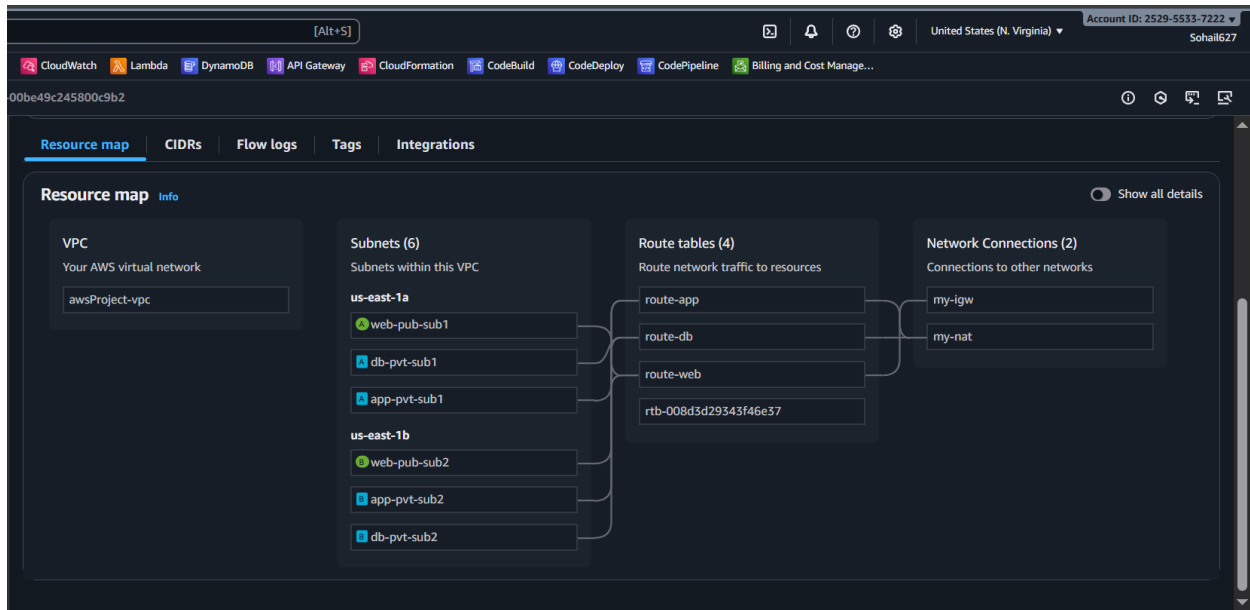


AWS Challenge

(Designing Robust Web Application on AWS)

Part 1 :- VPC Construct



Part 2 :- Ec2 Instances

The screenshot shows the AWS Management Console 'Instances' page. The table below lists the instances:

Name	Instance ID	Instance State	Instance Type	Status Check	Alarm status	Availability Zone	Public IP	Public IP	Elastic IP	IPv6 IPs	Monitoring
app-server2	i-0973b03e...	Running	t2.micro	2/2 checks passed	View alarms	us-east-1b	-	-	-	-	disabled
app-server1	i-0123299...	Running	t2.micro	2/2 checks passed	View alarms	us-east-1a	-	-	-	-	disabled
jump-server	i-06a69a22...	Running	t2.micro	2/2 checks passed	View alarms	us-east-1a	-	54.175.171...	-	-	disabled

The screenshot shows the AWS Management Console 'Instances' page with detailed information for the instances:

Public IP	IPv6 IPs	Monitoring	Security group name	Key name	Launch time	Platform	Managed	Operator
-	-	disabled	app-sg	projectkey	2025/08/31 14:20 GMT+5:30	Linux/UNIX	false	-
-	-	disabled	app-sg	projectkey	2025/08/31 14:19 GMT+5:30	Linux/UNIX	false	-
-	-	disabled	jump-sg	projectkey	2025/08/31 14:13 GMT+5:30	Linux/UNIX	false	-

Part 3 :- Server configuration

1. Copy the private key in your jump-server instance

```
SOHAIL@SOHAIL MINGW64 /e
$ scp -i projectkey.pem projectkey.pem ec2-user@54.175.171.131:/home/ec2-user/
projectkey.pem 100% 1674 0.9KB/s 00:01
```

```
[ec2-user@ip-20-0-1-40 ~]$ ls
[ec2-user@ip-20-0-1-40 ~]$ pwd
/home/ec2-user
[ec2-user@ip-20-0-1-40 ~]$ ls
projectkey.pem
[ec2-user@ip-20-0-1-40 ~]$ chmod 400 projectkey.pem
[ec2-user@ip-20-0-1-40 ~]$ |
```

2. **Now ssh into app-server1 and run the below commands**

```
[ec2-user@ip-20-0-1-40 ~]$ ssh -i projectkey.pem ec2-user@20.0.3.30  
The authenticity of host '20.0.3.30 (20.0.3.30)' can't be established.  
ED25519 key fingerprint is SHA256:1++68a+ZodsJTO4PUlvzbzBCIjJgIIkL+a9It+rEIsI.  
This key is not known by any other names  
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes  
Warning: Permanently added '20.0.3.30' (ED25519) to the list of known hosts.
```

```
#_~\#####Amazon Linux 2023\n#####_\n\\\####|\n\\###| \n\\#/\nV~'-> https://aws.amazon.com/linux/amazon-linux-2023\n~~~\n~~~~.\n~/m/'-/
```

```
[ec2-user@ip-20-0-3-30 ~]$
```

```
# Update the system
```

```
>> sudo yum update -y
```

```
[ec2-user@ip-20-0-3-30 ~]$ sudo yum update -y
Amazon Linux 2023 Kernel Livepatch repository 123 kB/s | 19 kB    00:00
Dependencies resolved.
Nothing to do.
Complete!
```

```
# Install PHP 8.2
```

```
>> sudo dnf install php8.2
```

```
[ec2-user@ip-20-0-3-30 ~]$ sudo dnf install php8.2
Last metadata expiration check: 0:00:20 ago on Sun Aug 31 09:14:42 2025.
Dependencies resolved.
```

```
=====
Package                Arch      Version                               Repository      Size
=====
Installing:
php8.2                 x86_64    8.2.29-1.amzn2023.0.1               amazonlinux     9.7 k
Installing dependencies:
```

```
>> sudo yum install php8.2-mysqlnd
```

```
[ec2-user@ip-20-0-3-30 ~]$ sudo yum install php8.2-mysqlnd
Last metadata expiration check: 0:00:57 ago on Sun Aug 31 09:14:42 2025.
Dependencies resolved.
```

Package	Arch	Version	Repository	Size
Installing:				
php8.2-mysqlnd	x86_64	8.2.29-1.amzn2023.0.1	amazonlinux	148 k

Transaction Summary

```

=====
Install 1 Package

```

Total download size: 148 k

Installed size: 442 k

Is this ok [y/N]: y

Downloading Packages:

Install Apache Web Server

```
>> sudo yum install -y httpd
# Start and Enable Apache
>> sudo systemctl start httpd
>> sudo systemctl enable httpd
>> sudo systemctl is-enabled httpd
```

```
[ec2-user@ip-20-0-3-30 ~]$ sudo yum install -y httpd
Last metadata expiration check: 0:01:20 ago on Sun Aug 31 09:14:42 2025.
Package httpd-2.4.64-1.amzn2023.0.1.x86_64 is already installed.
Dependencies resolved.
Nothing to do.
Complete!
[ec2-user@ip-20-0-3-30 ~]$ sudo systemctl start httpd
[ec2-user@ip-20-0-3-30 ~]$ sudo systemctl enable httpd
Created symlink /etc/systemd/system/multi-user.target.wants/httpd.service → /usr/lib/systemd/system/httpd.service.
[ec2-user@ip-20-0-3-30 ~]$ sudo systemctl is-enabled httpd
enabled
```

Add User to Apache Group

```
>> sudo usermod -a -G apache ec2-user
# Change Ownership and Permissions for Web Directory
>> sudo chown -R ec2-user:apache /var/www
>> sudo chmod 2775 /var/www && find /var/www -type d -exec sudo chmod 2775 {} \;
>> find /var/www -type f -exec sudo chmod 0664 {} \;
```

```
[ec2-user@ip-20-0-3-30 ~]$ sudo usermod -a -G apache ec2-user
[ec2-user@ip-20-0-3-30 ~]$ sudo chown -R ec2-user:apache /var/www
[ec2-user@ip-20-0-3-30 ~]$ sudo chmod 2775 /var/www && find /var/www -type d -exec sudo chmod 2775 {} \;
[ec2-user@ip-20-0-3-30 ~]$ find /var/www -type f -exec sudo chmod 0664 {} \;
[ec2-user@ip-20-0-3-30 ~]$
```

Install Additional PHP Modules

```
>> sudo yum install php-mbstring php-xml -y
>> sudo yum install php-fpm
```

```
[ec2-user@ip-20-0-3-30 ~]$ sudo yum install php-mbstring php-xml -y
Last metadata expiration check: 1:00:08 ago on Sun Aug 31 09:14:42 2025.
Package php8.2-mbstring-8.2.29-1.amzn2023.0.1.x86_64 is already installed.
Package php8.2-xml-8.2.29-1.amzn2023.0.1.x86_64 is already installed.
Dependencies resolved.
Nothing to do.
Complete!
[ec2-user@ip-20-0-3-30 ~]$ sudo yum install php-fpm
Last metadata expiration check: 1:00:20 ago on Sun Aug 31 09:14:42 2025.
Package php8.2-fpm-8.2.29-1.amzn2023.0.1.x86_64 is already installed.
Dependencies resolved.
Nothing to do.
Complete!
[ec2-user@ip-20-0-3-30 ~]$
```

Restart Apache and PHP-FPM

```
>> sudo systemctl restart httpd
>> sudo systemctl restart php-fpm
```

```
[ec2-user@ip-20-0-3-30 ~]$ sudo systemctl restart httpd
[ec2-user@ip-20-0-3-30 ~]$ sudo systemctl restart php-fpm
```

Download and Set Up phpMyAdmin

```
>> cd /var/www/html
>> wget https://www.phpmyadmin.net/downloads/phpMyAdmin-latest-all-languages.tar.gz
```

```
[ec2-user@ip-20-0-3-30 ~]$ cd /var/www/html
[ec2-user@ip-20-0-3-30 html]$ wget https://www.phpmyadmin.net/downloads/phpMyAdmin-latest-all-languages.tar.gz
--2025-08-31 10:16:44-- https://www.phpmyadmin.net/downloads/phpMyAdmin-latest-all-languages.tar.gz
Resolving www.phpmyadmin.net (www.phpmyadmin.net)... 79.127.206.207, 79.127.206.234, 2a02:6ea0:c400::53, ...
Connecting to www.phpmyadmin.net (www.phpmyadmin.net)|79.127.206.207|:443... connected.
HTTP request sent, awaiting response... 302 Found
```

```
[ec2-user@ip-20-0-3-30 html]$ mkdir phpMyAdmin && tar -xvzf phpMyAdmin-latest-  
all-languages.tar.gz -C phpMyAdmin --strip-components 1  
phpMyAdmin-5.2.2-all-languages/.rtlcssrc.json  
phpMyAdmin-5.2.2-all-languages/CONTRIBUTING.md  
phpMyAdmin-5.2.2-all-languages/ChangeLog  
phpMyAdmin-5.2.2-all-languages/LICENSE  
phpMyAdmin-5.2.2-all-languages/README  
phpMyAdmin-5.2.2-all-languages/RELEASE-DATE-5.2.2  
phpMyAdmin-5.2.2-all-languages/babel.config.json  
phpMyAdmin-5.2.2-all-languages/composer.json  
phpMyAdmin-5.2.2-all-languages/composer.lock  
phpMyAdmin-5.2.2-all-languages/config.sample.inc.php  
phpMyAdmin-5.2.2-all-languages/doc/  
phpMyAdmin-5.2.2-all-languages/doc/html/  
>> rm phpMyAdmin-latest-all-languages.tar.gz
```

Create a Test Page and Test the Server

```
>> curl http://localhost
```

3. Now ssh into app-server2 and run the below commands

```
#_
##### Amazon Linux 2023
#####
####|
#/#
V~'-'-> https://aws.amazon.com/linux/amazon-linux-2023
~~~~~
~~~~~
~~~~~
~/m/'- -
```

[ec2-user@ip-20-0-4-6 ~]\$ |

```
>> sudo yum update -y
```

Install PHP 8.2

```
[ec2-user@ip-20-0-4-6 ~]$ sudo dnf install php8.2
Last metadata expiration check: 0:00:12 ago on Sun Aug 31 10:24:35 2025.
Dependencies resolved.
```

Package	Arch	Version	Repository	Size
Installing:				
php8.2	x86_64	8.2.29-1.amzn2023.0.1	amazonlinux	9.7 k
Installing dependencies:				
apr	x86_64	1.7.5-1.amzn2023.0.4	amazonlinux	129 k

>> sudo yum install php8.2-mysqlnd

```
[ec2-user@ip-20-0-4-6 ~]$ sudo yum install php8.2-mysqlnd
Last metadata expiration check: 0:00:31 ago on Sun Aug 31 10:24:35 2025.
Dependencies resolved.
```

Package	Arch	Version	Repository	Size
=====				
Installing:				
php8.2-mysqlnd	x86_64	8.2.29-1.amzn2023.0.1	amazonlinux	148 k
Transaction Summary				
=====				
Install 1 Package				
Total download size: 148 k				
Installed size: 442 k				
Is this ok [y/N]: y				
Downloading Packages:				

Install Apache Web Server

>> sudo yum install -y httpd

Start and Enable Apache

>> sudo systemctl start httpd

>> sudo systemctl enable httpd

>> sudo systemctl is-enabled httpd

```
[ec2-user@ip-20-0-4-6 ~]$ sudo yum install -y httpd
Last metadata expiration check: 0:02:01 ago on Sun Aug 31 10:24:35 2025.
Package httpd-2.4.64-1.amzn2023.0.1.x86_64 is already installed.
Dependencies resolved.
Nothing to do.
Complete!
[ec2-user@ip-20-0-4-6 ~]$ sudo systemctl start httpd
[ec2-user@ip-20-0-4-6 ~]$ sudo systemctl enable httpd
Created symlink /etc/systemd/system/multi-user.target.wants/httpd.service → /usr/lib/systemd/system/httpd.service.
[ec2-user@ip-20-0-4-6 ~]$ sudo systemctl is-enabled httpd
enabled
[ec2-user@ip-20-0-4-6 ~]$
```

Add User to Apache Group

>> sudo usermod -a -G apache ec2-user

Change Ownership and Permissions for Web Directory

>> sudo chown -R ec2-user:apache /var/www

>> sudo chmod 2775 /var/www && find /var/www -type d -exec sudo chmod 2775 {} \;

>> find /var/www -type f -exec sudo chmod 0664 {} \;

```
[ec2-user@ip-20-0-4-6 ~]$ sudo usermod -a -G apache ec2-user
[ec2-user@ip-20-0-4-6 ~]$ sudo chown -R ec2-user:apache /var/www
[ec2-user@ip-20-0-4-6 ~]$ sudo chmod 2775 /var/www && find /var/www -type d -e
xec sudo chmod 2775 {} \;
[ec2-user@ip-20-0-4-6 ~]$ find /var/www -type f -exec sudo chmod 0664 {} \;
[ec2-user@ip-20-0-4-6 ~]$
```

Install Additional PHP Modules

>> sudo yum install php-mbstring php-xml -y

>> sudo yum install php-fpm

Restart Apache and PHP-FPM

>> sudo systemctl restart httpd

>> sudo systemctl restart php-fpm

```
[ec2-user@ip-20-0-4-6 ~]$ sudo yum install php-mbstring php-xml -y
Last metadata expiration check: 0:04:19 ago on Sun Aug 31 10:24:35 2025.
Package php8.2-mbstring-8.2.29-1.amzn2023.0.1.x86_64 is already installed.
Package php8.2-xml-8.2.29-1.amzn2023.0.1.x86_64 is already installed.
Dependencies resolved.
Nothing to do.
Complete!
[ec2-user@ip-20-0-4-6 ~]$ sudo yum install php-fpm
Last metadata expiration check: 0:04:30 ago on Sun Aug 31 10:24:35 2025.
Package php8.2-fpm-8.2.29-1.amzn2023.0.1.x86_64 is already installed.
Dependencies resolved.
Nothing to do.
Complete!
[ec2-user@ip-20-0-4-6 ~]$ sudo systemctl restart httpd
[ec2-user@ip-20-0-4-6 ~]$ sudo systemctl restart php-fpm
[ec2-user@ip-20-0-4-6 ~]$
```

Download and Set Up phpMyAdmin

```
>> cd /var/www/html
```

```
>> wget https://www.phpmyadmin.net/downloads/phpMyAdmin-latest-all-languages.tar.gz
```

```
[ec2-user@ip-20-0-4-6 ~]$ cd /var/www/html
[ec2-user@ip-20-0-4-6 html]$ wget https://www.phpmyadmin.net/downloads/phpMyAdmin-latest-all-languages.tar.gz
--2025-08-31 10:30:55-- https://www.phpmyadmin.net/downloads/phpMyAdmin-latest-all-languages.tar.gz
Resolving www.phpmyadmin.net (www.phpmyadmin.net)... 79.127.206.207, 79.127.206.234, 2a02:6ea0:c400::54, ...
Connecting to www.phpmyadmin.net (www.phpmyadmin.net)|79.127.206.207|:443... connected.
HTTP request sent, awaiting response... 302 Found
Location: https://files.phpmyadmin.net/phpMyAdmin/5.2.2/phpMyAdmin-5.2.2-all-languages.tar.gz [following]
--2025-08-31 10:30:55-- https://files.phpmyadmin.net/phpMyAdmin/5.2.2/phpMyAdmin-5.2.2-all-languages.tar.gz
Resolving files.phpmyadmin.net (files.phpmyadmin.net)... 109.61.91.230, 109.61.91.195, 109.61.91.197, ...
Connecting to files.phpmyadmin.net (files.phpmyadmin.net)|109.61.91.230|:443..
```

```
>> mkdir phpMyAdmin && tar -xvzf phpMyAdmin-latest-all-languages.tar.gz -C
```

```
phpMyAdmin --strip-components 1
```

```
[ec2-user@ip-20-0-4-6 html]$ mkdir phpMyAdmin && tar -xvzf phpMyAdmin-latest-all-languages.tar.gz -C phpMyAdmin --strip-components 1
phpMyAdmin-5.2.2-all-languages/.rtlcssrc.json
phpMyAdmin-5.2.2-all-languages/CONTRIBUTING.md
phpMyAdmin-5.2.2-all-languages/ChangeLog
phpMyAdmin-5.2.2-all-languages/LICENSE
phpMyAdmin-5.2.2-all-languages/README
phpMyAdmin-5.2.2-all-languages/RELEASE-DATE-5.2.2
phpMyAdmin-5.2.2-all-languages/babel.config.json
phpMyAdmin-5.2.2-all-languages/composer.json
phpMyAdmin-5.2.2-all-languages/composer.lock
phpMyAdmin-5.2.2-all-languages/config.sample.inc.php
phpMyAdmin-5.2.2-all-languages/doc/
phpMyAdmin-5.2.2-all-languages/doc/html/
```

```
>> rm phpMyAdmin-latest-all-languages.tar.gz
```

Create a Test Page and Test the Server

```
>> echo "PHP server 2" > /var/www/html/index.html
```

```
>> curl http://localhost
```

```
[ec2-user@ip-20-0-4-6 html]$ rm phpMyAdmin-latest-all-languages.tar.gz
[ec2-user@ip-20-0-4-6 html]$ echo "PHP server 2" > /var/www/html/index.html
[ec2-user@ip-20-0-4-6 html]$ curl http://localhost
PHP server 2
[ec2-user@ip-20-0-4-6 html]$
```

4. Create the Target groups:

app-tg

Actions

Details

arn:aws:elasticloadbalancing:us-east-1:252955337222:targetgroup/app-tg/3c7d3e1af2b2c2f3

Target type

Instance

Protocol : Port

HTTP: 80

Protocol version

HTTP1

VPC

vpc-00be49c245800c9b2

IP address type

IPv4

Load balancer

project-alb

2

Total targets

2

Healthy

0

Anomalous

0

Unhealthy

0

Unused

0

Initial

0

Draining

Distribution of targets by Availability Zone (AZ)

Select values in this table to see corresponding filters applied to the Registered targets table below.

Targets

Monitoring

Health checks

Attributes

Tags

Registered targets (2)

Info

Anomaly mitigation: Not applicable

Deregister

Register targets

Target groups route requests to individual registered targets using the protocol and port number specified. Health checks are performed on all registered targets according to the target group's health check settings. Anomaly detection is automatically applied to HTTP/HTTPS target groups with at least 3 healthy targets.

Filter targets

Instance ID

Name

Port

Zone

Health status

Health status details

Admini...

Overrid...

Launch...

Anomaly detectio...

I-0973b03e6448974de

app-server2

80

us-east-1b (us...

Healthy

-

No override.

No overrid...

August 31...

Normal

I-01232991e2a6be2b8

app-server1

80

us-east-1a (use...

Healthy

-

No override.

No overrid...

August 31...

Normal

5. Create Application Load Balancer

project-alb

Actions

Details

Load balancer type

Application

Status

Active

VPC

vpc-00be49c245800c9b2

Load balancer IP address type

IPv4

Scheme

Internet-facing

Hosted zone

Z35SXDOTRQ7X7K

Availability Zones

subnet-05e9916122e328f00 us-east-1a (use1-az2)
subnet-0e9eddceb68cc87f0 us-east-1b (use1-az4)

Date created

August 31, 2025, 16:21 (UTC+05:30)

Load balancer ARN

arn:aws:elasticloadbalancing:us-east-1:252955337222:loadbalancer/app/project-alb/af73e970789da802

DNS name Info

project-alb-1759809495.us-east-1.elb.amazonaws.com (A Record)

Listeners and rules

Network mapping

Resource map

Security

Monitoring

Integrations

Attributes

Capacity

Tags

Listeners and rules (1)

Info

Manage rules

Manage listener

Add listener

A listener checks for connection requests on its configured protocol and port. Traffic received by the listener is routed according to the default action and any additional rules.

Filter listeners

Protocol:Port

Default action

Rules

ARN

Security policy

Default SSL/TLS certificate

mTLS

Trust sto

HTTP:80

Forward to target group
app-tg: 1 (100%)
Target group stickiness: Off

1 rule

ARN

Not applicable

Not applicable

Not applicable

Not appl

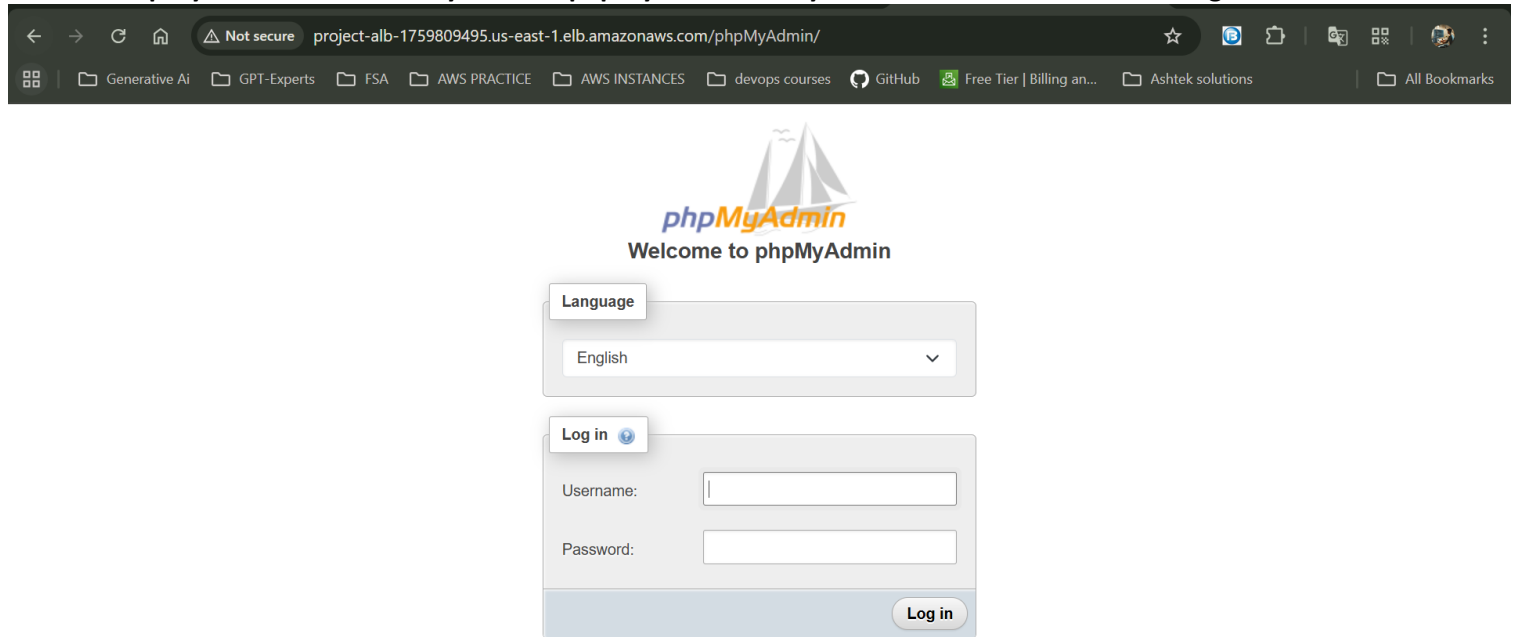
6. Test the Load balancer : Now take the load balancer DNS and past it on chrome browser you should see PHP Server 1 and when you refresh the page it should show PHP Server 2 that means your load balancing is working as expected

A screenshot of a web browser window. The address bar shows the URL "project-alb-1759809495.us-east-1.elb.amazonaws.com" with a "Not secure" warning. The browser's bookmark bar is visible with various folders like "Generative Ai", "GPT-Experts", "FSA", "AWS PRACTICE", "AWS INSTANCES", "devops courses", "GitHub", "Free Tier | Billing an...", "Ashtek solutions", and "All Bookmarks". The main content area of the browser displays the text "PHP server 1".

Refract the page:

A screenshot of the same web browser window after a page refresh. The address bar and bookmark bar are identical to the previous image. However, the main content area of the browser now displays the text "PHP server 2", demonstrating that the load balancer is distributing traffic between different servers.

7. Check PhpMyAdmin :- And when you write phpMyAdmin after your domain name it should navigate to



Part 4 :- Database configurations

Now copy the Endpoint of RDS cluster and ssh into app-server1 instance and app-server2 instance

```
>>cd /var/www/html/phpMyAdmin
>> mv config.sample.inc.php config.inc.php
>> nano config.inc.php
```

```
[ec2-user@ip-20-0-4-6 html]$ cd /var/www/html/phpMyAdmin
[ec2-user@ip-20-0-4-6 phpMyAdmin]$ ls
CONTRIBUTING.md      composer.lock          libraries              templates
ChangeLog            config.sample.inc.php  locale                themes
LICENSE              doc                   package.json          url.php
README               examples              robots.txt            vendor
RELEASE-DATE-5.2.2   favicon.ico           setup                 yarn.lock
babel.config.json    index.php             show_config_errors.php
composer.json         js                    sql
[ec2-user@ip-20-0-4-6 phpMyAdmin]$ mv config.sample.inc.php config.inc.php
[ec2-user@ip-20-0-4-6 phpMyAdmin]$ nano config.inc.php

GNU nano 8.3 config.inc.php Modified
*/
$i = 0;

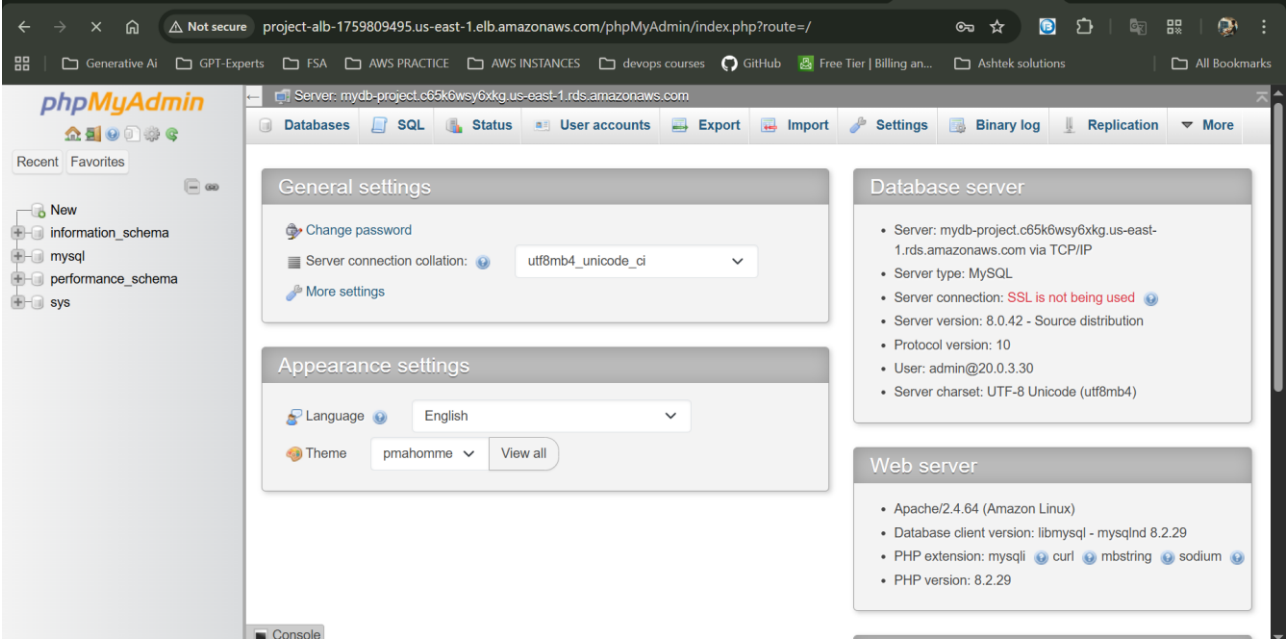
/**
 * First server
 */
$i++;
/* Authentication type */
$config['Servers'][$i]['auth_type'] = 'cookie';
/* Server parameters */
$config['Servers'][$i]['host'] = 'mydb-project.c65k6wsy6xkg.us-east-1.rds.amazonaws.com';
$config['Servers'][$i]['compress'] = false;
$config['Servers'][$i]['AllowNoPassword'] = false;

/**
 * phpMyAdmin configuration storage settings.
 */

/* User used to manipulate with storage */
// $config['Servers'][$i]['controlhost'] = '';
// $config['Servers'][$i]['controlport'] = '';

AG Help      AO Write Out  AF Where Is  AK Cut       AT Execute   AC Location
AX Exit      AR Read File  AN Replace   AU Paste     AJ Justify   AL Go To Line
```


Once you enter your username and password:



The end