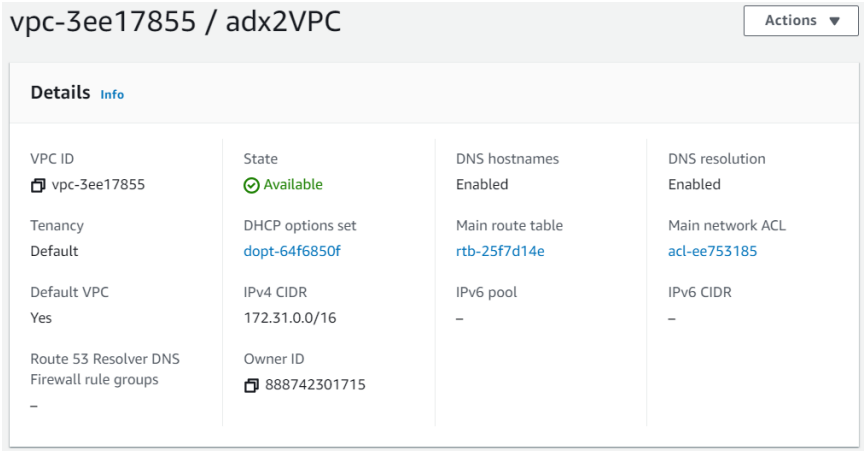
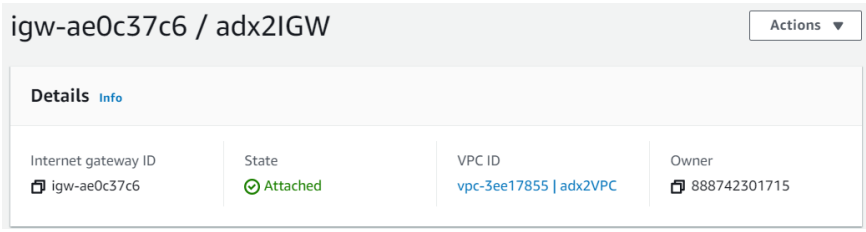
Configuring a virtual server and deploying of the web application

1. Provision of a Virtual Server

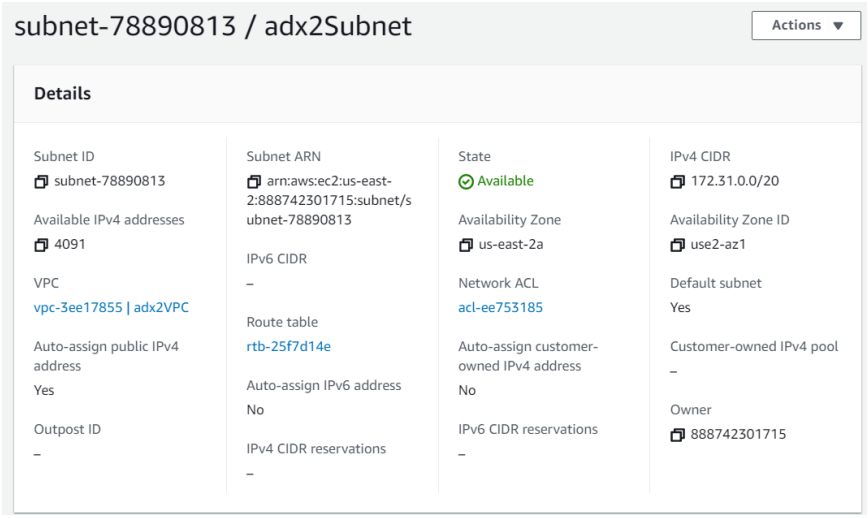
- Configure the VPC
    - Use the default VPC vpc-3ee17855
    - Add tag: Key: Name, Value: adx2VPC



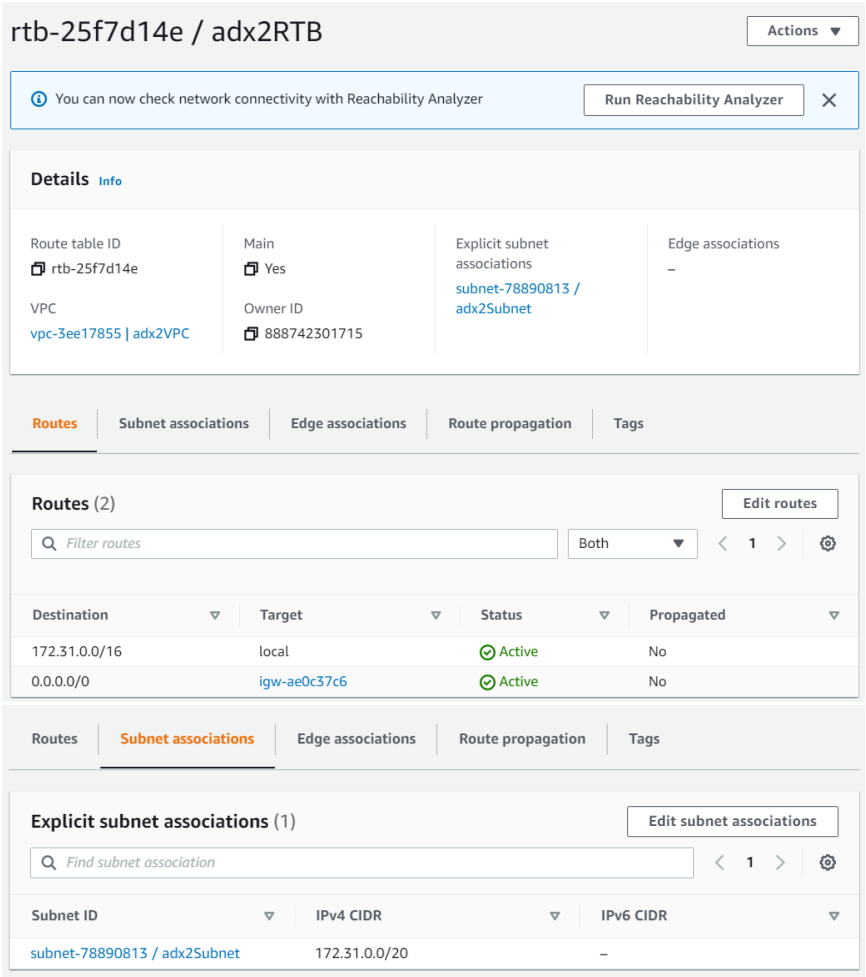
- Configure the Internet Gateway
    - Use the default Internet Gateway igw-ae0c37c6
    - Add tag: Key: Name, Value: adx2IGW



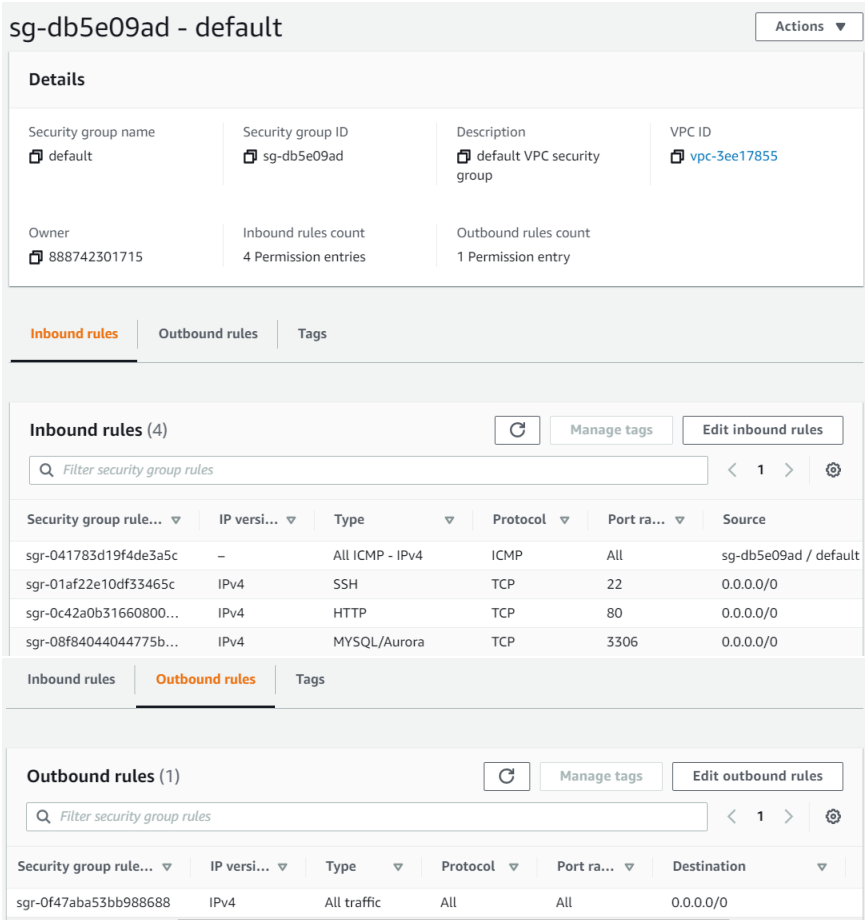
- Configure the Subnet
    - Use the default subnet: subnet-78890813
    - Add tag: Key: Name, Value: adx2Subnet



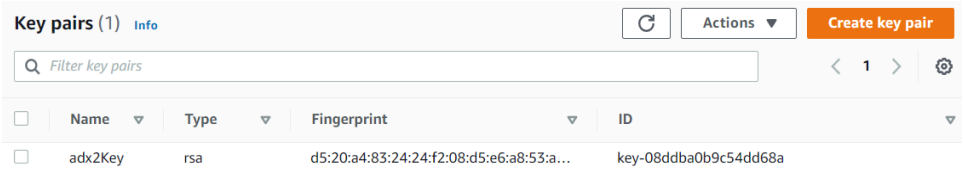
- Configure the Route Table
    - Use the default route table: rtb-25f7d14e
    - Add tag: Key: Name, Value: adx2RTB
    - The route table is automatically connected to adx2VPC and adx2IGW
    - Subnet associations: select: adx2Subnet



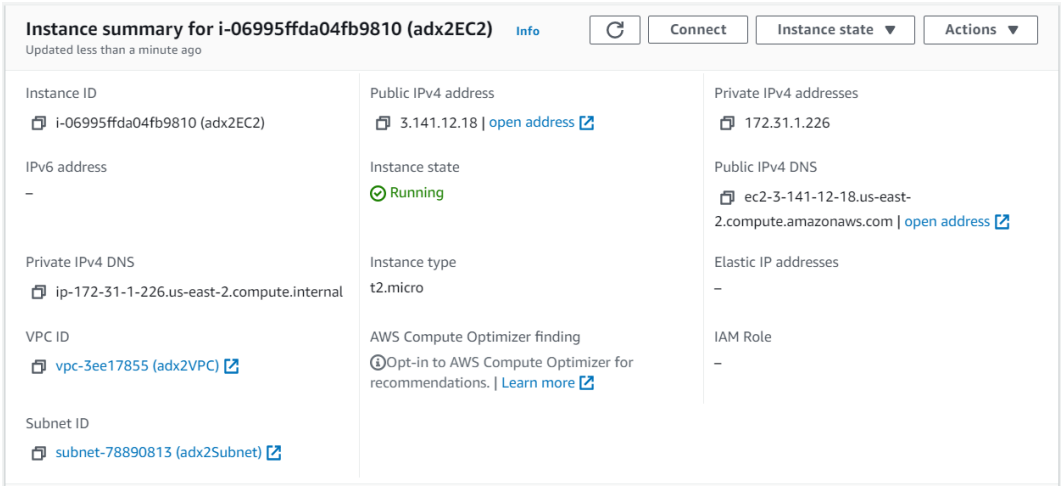
- Configure the Security Group
    - Use the default security group: sg-db5e09ad
    - Add tag: Key: Name, Value: adx2SEG
    - Inbound rules:
        - HTTP Protocol TCP Port 80 Source 0.0.0.0/0
        - SSH Protocol TCP Port 22 Source 0.0.0.0/0
        - MYSQL/Aurora Protocol ICMP Port 3306 Source 0.0.0.0/0
        - All ICMP-IPv4 Protocol ICMP Port All Source sg-db5e09ad / default
    - Outbound rules:
        - All traffic Protocol All Port All Destination 0.0.0.0/0



- Create an EC2 key pair
    - Navigate to EC2 Dashboard, click “Key Pairs”, “Create key pair”
    - Name: adx2Key, Type: RSA, Format: .ppk



- Launch an EC2 instance:
    - Nagivate to EC2 Dashboard, click “Instances”, “Launch instance”
    - Step 1: Select: Amazon Linux 2 AMI (HVM), SSD Volume Type 64-bit (x86)
    - Step 2: Choose an Instance Type: t2.micro
    - Step 3: Configure Instance Details
        - Network: adx2VPC
        - Subnet: adx2Subnet
    - Step 4: Add Storage: 8GiB General Purpose SSD (gp2)
    - Step 5: Add tags: Key: Name, Value: adx2EC2
    - Step 6: Select an existing security group: sg-db5e09ad / default
    - Step 7: Review Instance Launch
    - Select the key pair: adx2Key
    - Launch the adx2EC2



2. OS Update and Database

- Accessing adx2EC2 via SSH PuTTY using adx2EC2 public IPv4: ec2-user@3.141.12.18
- Update the OS

```
sudo su
yum update -y
```

```
root@ip-172-31-1-226:/home/ec2-user
Using username "ec2-user".
Authenticating with public key "adx2Key"
Last login: Fri Sep 17 06:01:14 2021 from 1.144.110.180

       __|  __|_  )
       _|  (     /   Amazon Linux 2 AMI
      ___|\___|___|

https://aws.amazon.com/amazon-linux-2/
[ec2-user@ip-172-31-1-226 ~]$ sudo su
[root@ip-172-31-1-226 ec2-user]# yum update -y
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
amzn2-core                                               | 3.7 kB     00:00
No packages marked for update
[root@ip-172-31-1-226 ec2-user]#
```

- Install a web server application

```
yum install httpd
systemctl start httpd
systemctl enable httpd
systemctl status httpd
```

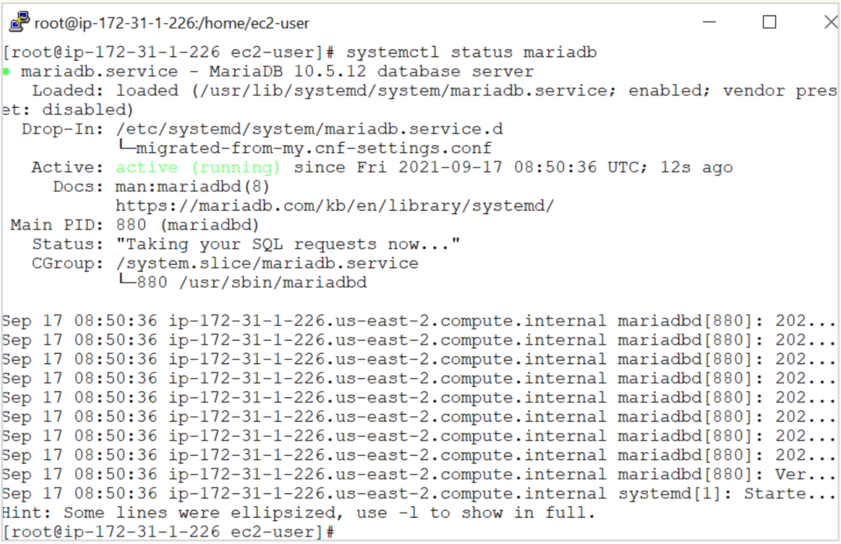
```
root@ip-172-31-1-226:/home/ec2-user
[root@ip-172-31-1-226 ec2-user]# systemctl enable httpd
Created symlink from /etc/systemd/system/multi-user.target.wants/httpd.service t
o /usr/lib/systemd/system/httpd.service.
[root@ip-172-31-1-226 ec2-user]# systemctl status httpd
● httpd.service - The Apache HTTP Server
   Loaded: loaded (/usr/lib/systemd/system/httpd.service; enabled; vendor preset
: disabled)
   Active: active (running) since Fri 2021-09-17 08:47:37 UTC; 16s ago
     Docs: man:httpd.service(8)
 Main PID: 760 (httpd)
   Status: "Total requests: 0; Idle/Busy workers 100/0;Requests/sec: 0; Bytes se
rved/sec:   0 B/sec"
   CGroup: /system.slice/httpd.service
           ├─760 /usr/sbin/httpd -DFOREGROUND
           ├─761 /usr/sbin/httpd -DFOREGROUND
           ├─762 /usr/sbin/httpd -DFOREGROUND
           ├─763 /usr/sbin/httpd -DFOREGROUND
           ├─764 /usr/sbin/httpd -DFOREGROUND
           └─765 /usr/sbin/httpd -DFOREGROUND

Sep 17 08:47:36 ip-172-31-1-226.us-east-2.compute.internal systemd[1]: Starti...
Sep 17 08:47:37 ip-172-31-1-226.us-east-2.compute.internal systemd[1]: Starte...
Hint: Some lines were ellipsized, use -l to show in full.
[root@ip-172-31-1-226 ec2-user]#
```

- Check Maria DB availability and add the official RPM repository

```
sudo amazon-linux-extras | grep mariadb
sudo tee /etc/yum.repos.d/mariadb.repo<<EOF
[mariadb]
name = MariaDB
baseurl = http://yum.mariadb.org/10.5/centos7-amd64
gpgkey=https://yum.mariadb.org/RPM-GPG-KEY-MariaDB
gpgcheck=1
EOF
```

- Update OS package cache index, confirm available repositories and install MariaDB

```
sudo yum makecache
sudo yum repolist
sudo yum install MariaDB-server MariaDB-client
systemctl start mariadb
systemctl enable mariadb
systemctl status mariadb
```



```
root@ip-172-31-1-226:/home/ec2-user
[root@ip-172-31-1-226 ec2-user]# systemctl status mariadb
● mariadb.service - MariaDB 10.5.12 database server
   Loaded: loaded (/usr/lib/systemd/system/mariadb.service; enabled; vendor pres
et: disabled)
  Drop-In: /etc/systemd/system/mariadb.service.d
           └─migrated-from-my.cnf-settings.conf
   Active: active (running) since Fri 2021-09-17 08:50:36 UTC; 12s ago
     Docs: man:mariadbd(8)
           https://mariadb.com/kb/en/library/systemd/
 Main PID: 880 (mariadbd)
   Status: "Taking your SQL requests now..."
   CGroup: /system.slice/mariadb.service
           └─880 /usr/sbin/mariadbd

Sep 17 08:50:36 ip-172-31-1-226.us-east-2.compute.internal mariadbd[880]: 202...
Sep 17 08:50:36 ip-172-31-1-226.us-east-2.compute.internal mariadbd[880]: 202...
Sep 17 08:50:36 ip-172-31-1-226.us-east-2.compute.internal mariadbd[880]: 202...
Sep 17 08:50:36 ip-172-31-1-226.us-east-2.compute.internal mariadbd[880]: 202...
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Sep 17 08:50:36 ip-172-31-1-226.us-east-2.compute.internal mariadbd[880]: 202...
Sep 17 08:50:36 ip-172-31-1-226.us-east-2.compute.internal mariadbd[880]: 202...
Sep 17 08:50:36 ip-172-31-1-226.us-east-2.compute.internal mariadbd[880]: Ver...
Sep 17 08:50:36 ip-172-31-1-226.us-east-2.compute.internal systemd[1]: Starte...
Hint: Some lines were ellipsized, use -l to show in full.
[root@ip-172-31-1-226 ec2-user]#
```

- Run the database and set password

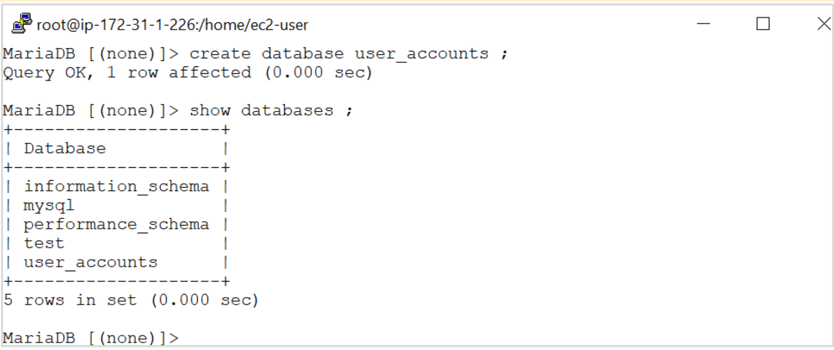
```
sudo mysql_secure_installation
// enter password: root
```

- Confirm I can log in as root user with the set password

```
mysql -u root -p
```

- Create and show the databases

```
create database user_accounts ;
show databases ;
```



```
root@ip-172-31-1-226:/home/ec2-user
MariaDB [(none)]> create database user_accounts ;
Query OK, 1 row affected (0.000 sec)

MariaDB [(none)]> show databases ;
+--------------------+
| Database           |
+--------------------+
| information_schema |
| mysql              |
| performance_schema |
| test               |
| user_accounts      |
+--------------------+
5 rows in set (0.000 sec)

MariaDB [(none)]>
```

- Install PHP and PHP-MySQLi

```
yum install php
yum install php-mysqli
systemctl stop httpd
systemctl start httpd
systemctl status httpd
```

```
root@ip-172-31-1-226:/home/ec2-user
[root@ip-172-31-1-226 ec2-user]# 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 Fri 2021-09-17 09:01:19 UTC; 5s ago
     Docs: man:httpd.service(8)
 Main PID: 1094 (httpd)
   Status: "Processing requests..."
   CGroup: /system.slice/httpd.service
           ├─1094 /usr/sbin/httpd -DFOREGROUND
           ├─1095 /usr/sbin/httpd -DFOREGROUND
           ├─1096 /usr/sbin/httpd -DFOREGROUND
           ├─1097 /usr/sbin/httpd -DFOREGROUND
           ├─1098 /usr/sbin/httpd -DFOREGROUND
           └─1099 /usr/sbin/httpd -DFOREGROUND

Sep 17 09:01:19 ip-172-31-1-226.us-east-2.compute.internal systemd[1]: Starti...
Sep 17 09:01:19 ip-172-31-1-226.us-east-2.compute.internal systemd[1]: Starte...
Hint: Some lines were ellipsized, use -l to show in full.
[root@ip-172-31-1-226 ec2-user]#
```

- Update the Dynamic Extensions in php.ini

```
find / -name php.ini
cd /etc
vi php.ini
/.extension=
// Remove ; in front of extension=msql.so and press ESC+Shift+ZZ to save
vim php.ini
```

```
;;;;;;;;;;;;;;;;;;;;;
; Dynamic Extensions ;
;;;;;;;;;;;;;;;;;;;;;

; If you wish to have an extension loaded automatically, use the following
; syntax:
;
;   extension=modulename.extension
;
; For example, on Windows:
;
;   extension=msql.dll
;
; ... or under UNIX:
;
extension=msql.so
;
; ... or with a path:
;
;   extension=/path/to/extension/msql.so
```

- Change DirectoryIndex in 'httpd.conf' to point to the web application

```
cd /etc/httpd/conf
vi httpd.conf
/.DirectoryIndex
// Change 'index.html' to 'login.php' and press ESC+Shift+ZZ to save
vim httpd.conf
```

```
</Directory>

#
# DirectoryIndex: sets the file that Apache will serve if a directory
# is requested.
#
<IfModule dir_module>
    DirectoryIndex login.php
</IfModule>
```

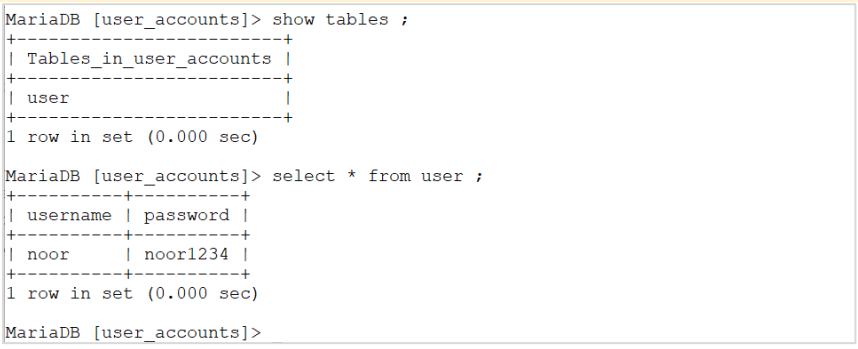
3. Database Files from GitHub

- Download the web application and database files from GitHub

```
wget https://github.com/nooruzaman/CSE2ADX_A2/raw/main/Web_Application_CSE2ADX.zip
mv *.zip /var/www/html
cd /var/www/html
unzip Web_Application_CSE2ADX
cd Web_Application_CSE2ADX
mv *.* /var/www/html
wget https://github.com/nooruzaman/CSE2ADX_A2/raw/main/user_accounts.sql
```

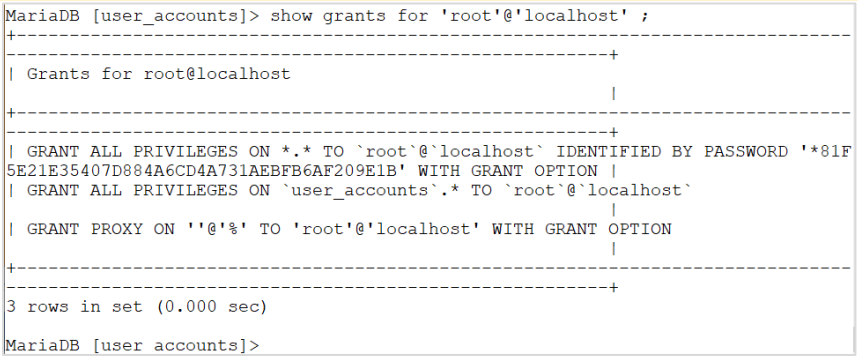
- Restore data from the database file to the MariaDB database

```
mysql -u root -p user_accounts < user_accounts.sql
mysql -u root -p
use user_accounts ;
show tables ;
select * from user ;
```



- Grant all privileges for the user ‘root’ to access the database ‘user_accounts’

```
grant all privileges on user_accounts.* to 'root'@'localhost' identified via mysql_native_password
using password('root') ;
show grants for 'root'@'localhost' ;
```

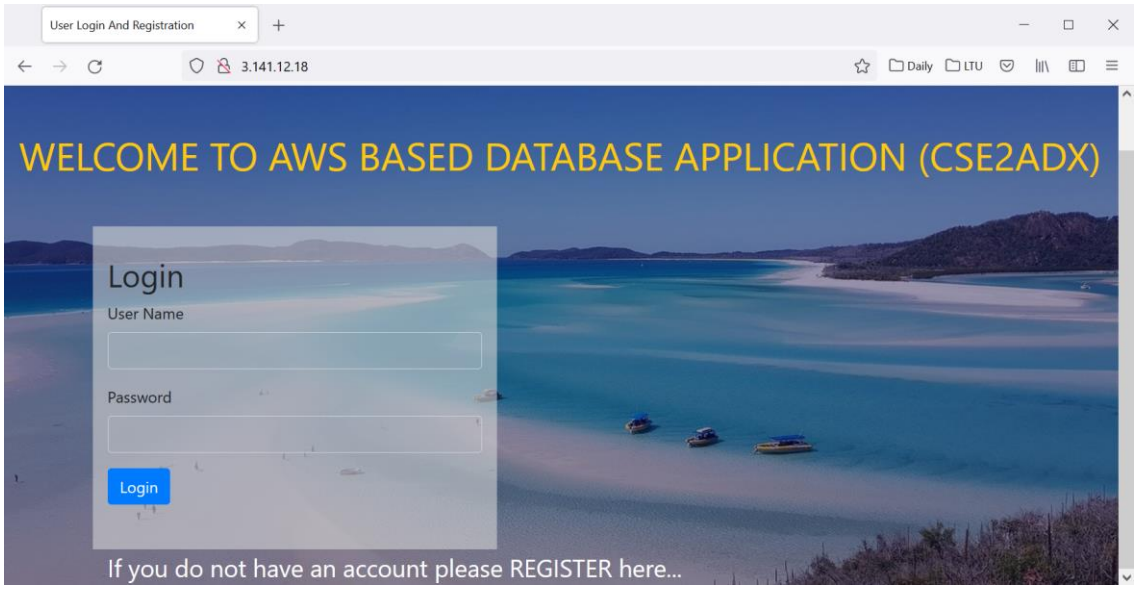


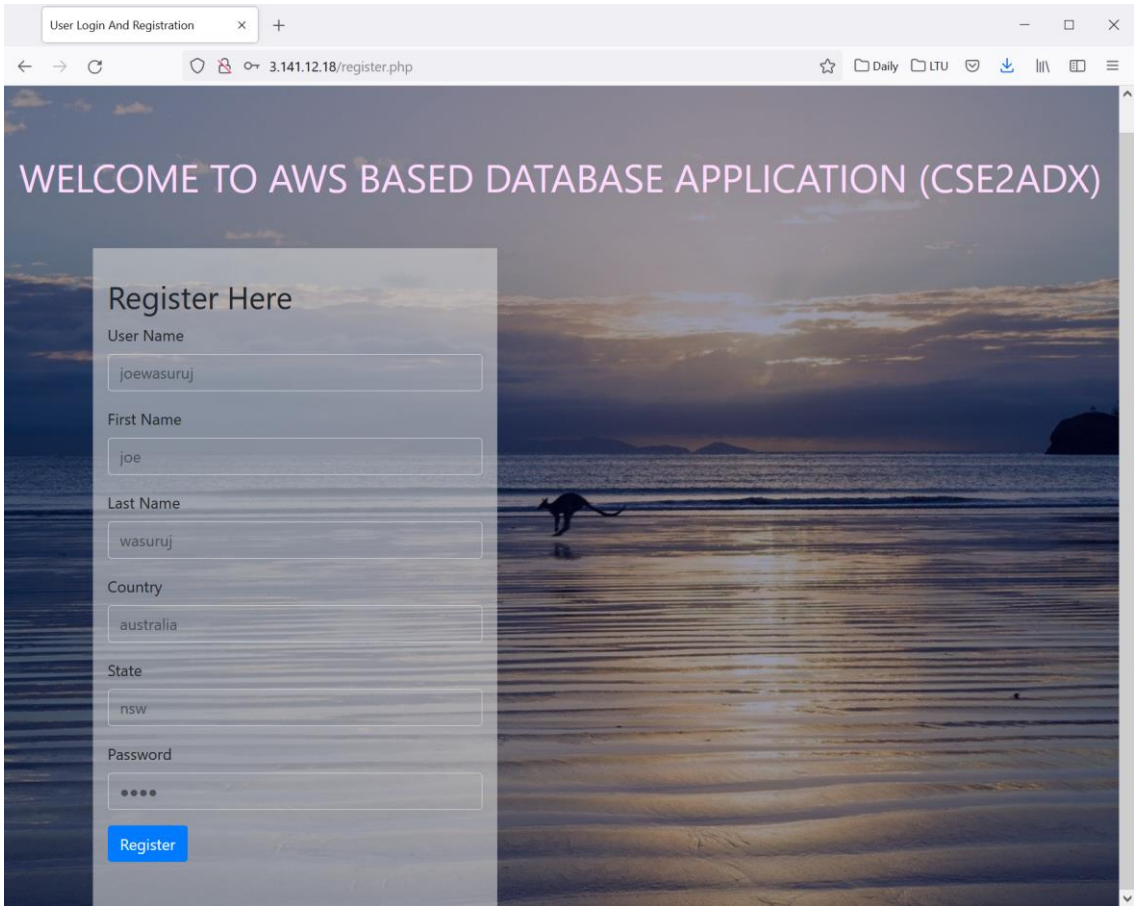
- Restart PHP

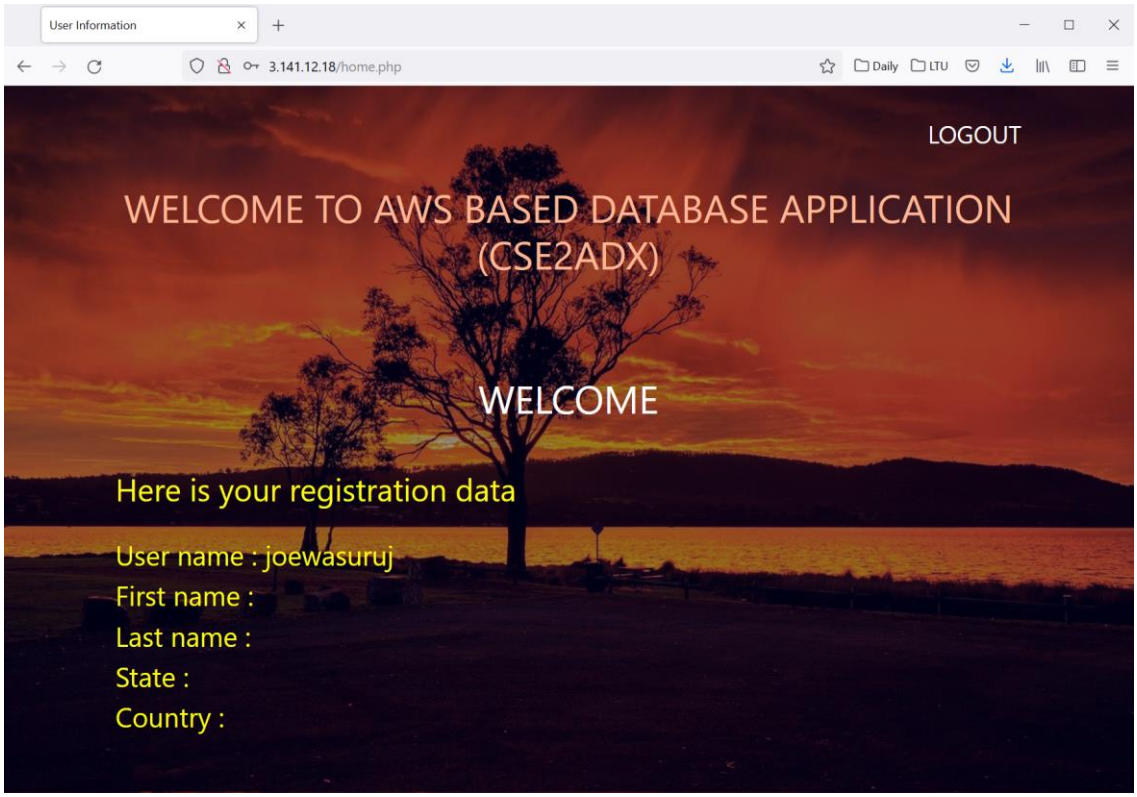
```
systemctl restart httpd
```

Task 3.4 Application Testing

- Test the web application by opening the adx2EC2 public IPv4 address 3.141.12.18 in a browser







Task 3.5 Create Golden AMI

- Create an AMI of the adxEC2 instance in the EC2 Dashboard
    - Click: Instances, adxEC2, Actions, Image and templates, Create image
    - Image name: adx2AMI