DevOps PBL Project 1 Report

Darey.io - DevOps Project Based Learning Project 1 Documentation

JULY 2022

LAMP STACK IMPLEMENTATION

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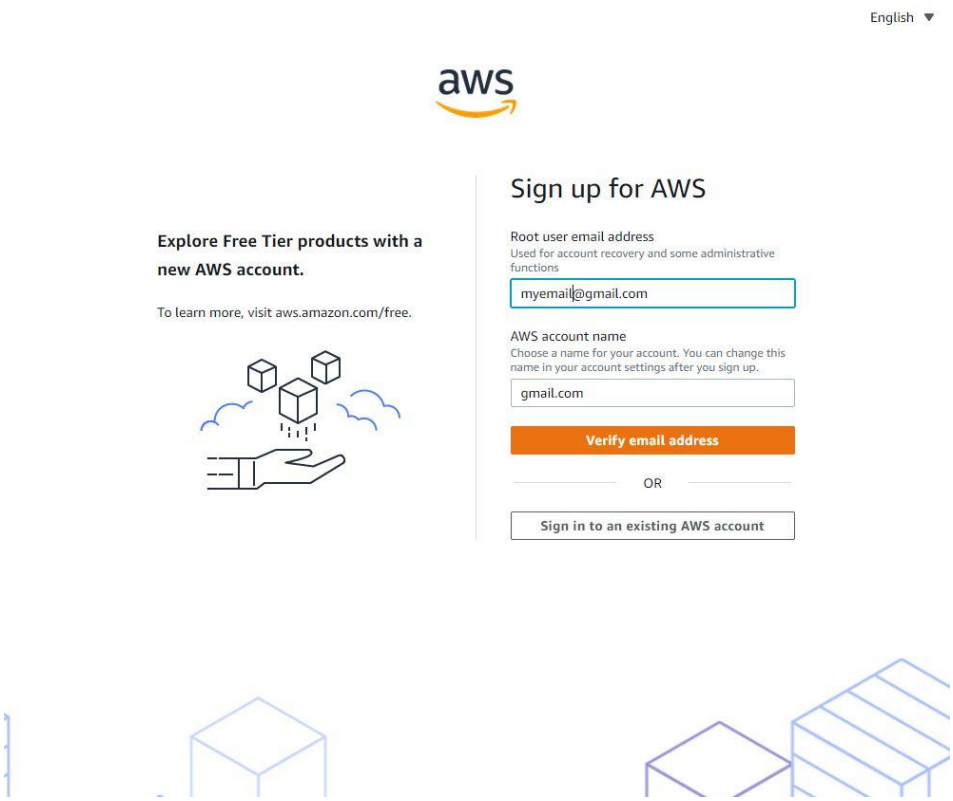
STEP 0 – Web Stack Implementation (LAMP Stack) in AWS

A technology stack is a set of frameworks and tools used to develop a software product. This set of frameworks and tools are very specifically chosen to work together in creating a well-functioning software. They are acronymns for individual technologies used together for a specific technology product. some examples are…

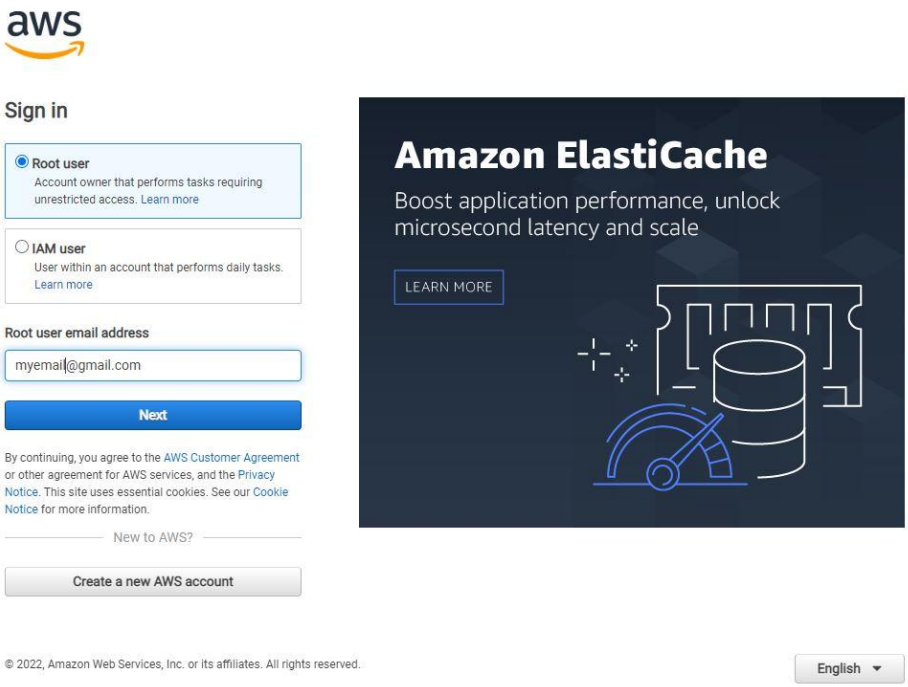
- **LAMP** (Linux, Apache, MySQL, PHP or Python, or Perl)
- **LEMP** (Linux, Nginx, MySQL, PHP or Python, or Perl)
- **MERN** (MongoDB, ExpressJS, ReactJS, NodeJS)
- **MEAN** (MongoDB, ExpressJS, AngularJS, NodeJS

Our goal in this section is to:

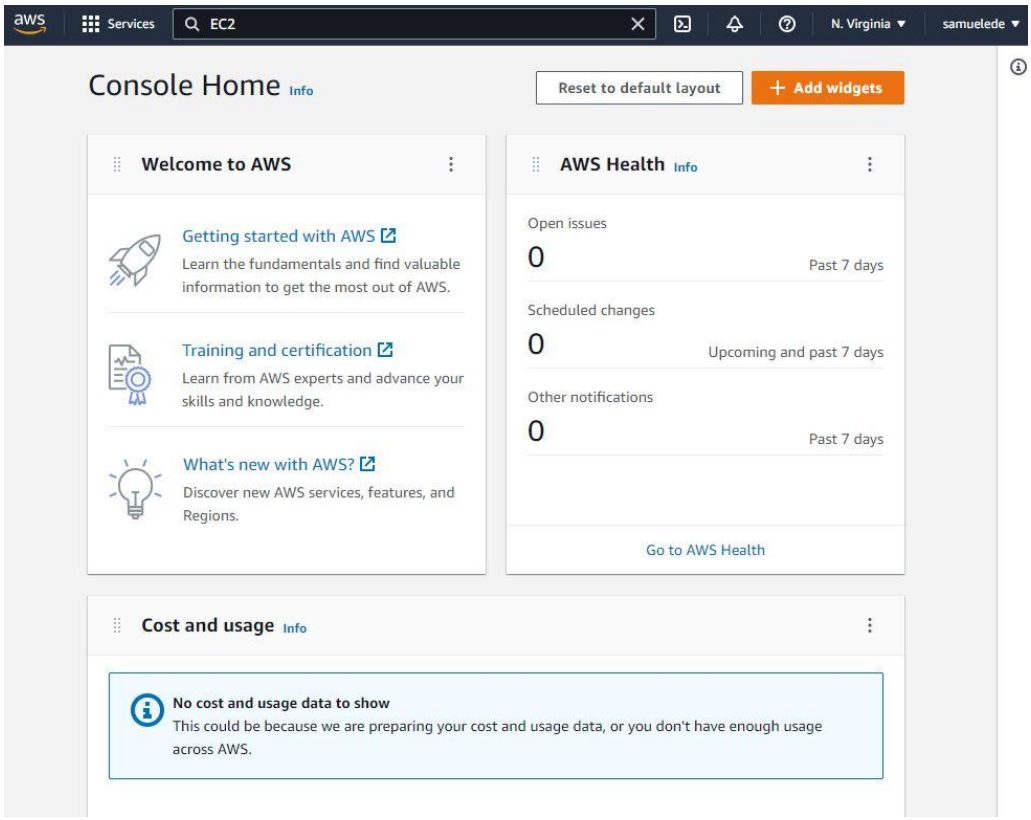
1. Register and setup a FREE AWS account.
2. Create a new AWS EC2 Instance
3. Setup and Provision an Ubuntu Server
4. Connect to an EC2 instance



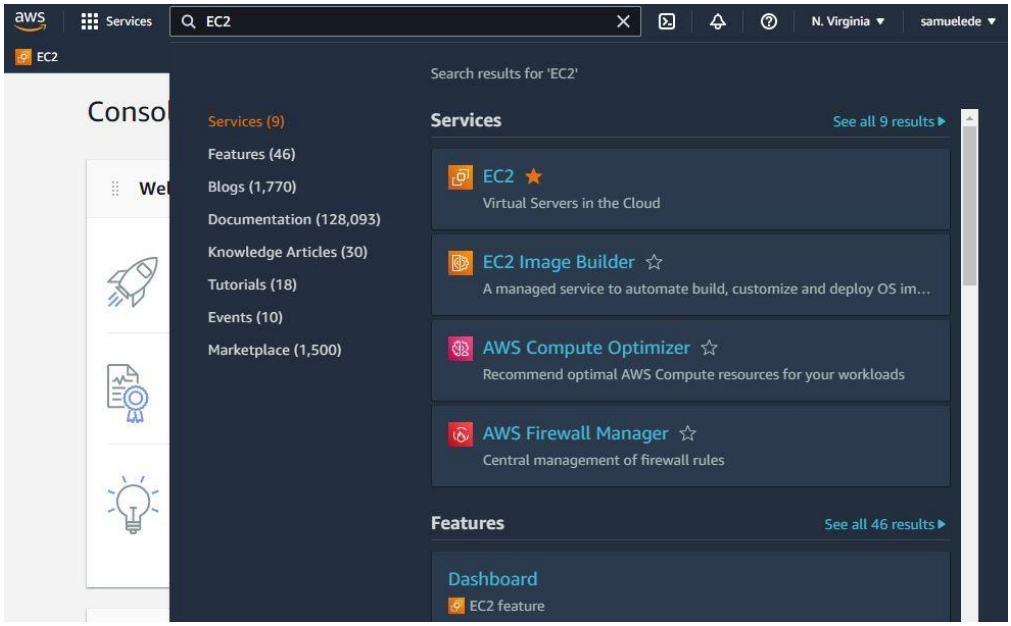
Step 0 of 1 - Creating an aws account. Type in an email address and suitable AWS console name and click verify email address. Sign in to the email account and verify your account.



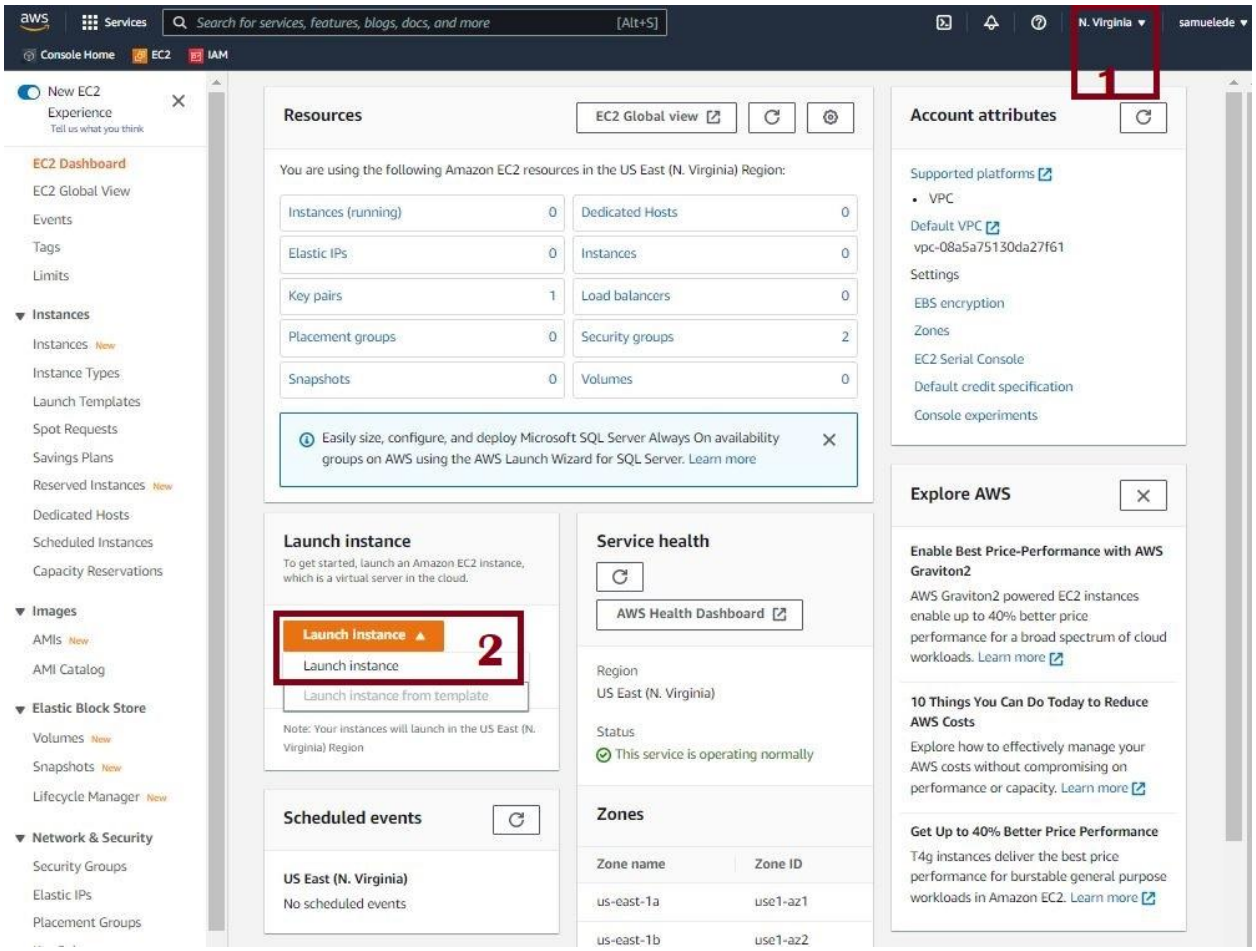
Step 0 of 2 - sign in to AWS account using new root user email after clicking the sign in link



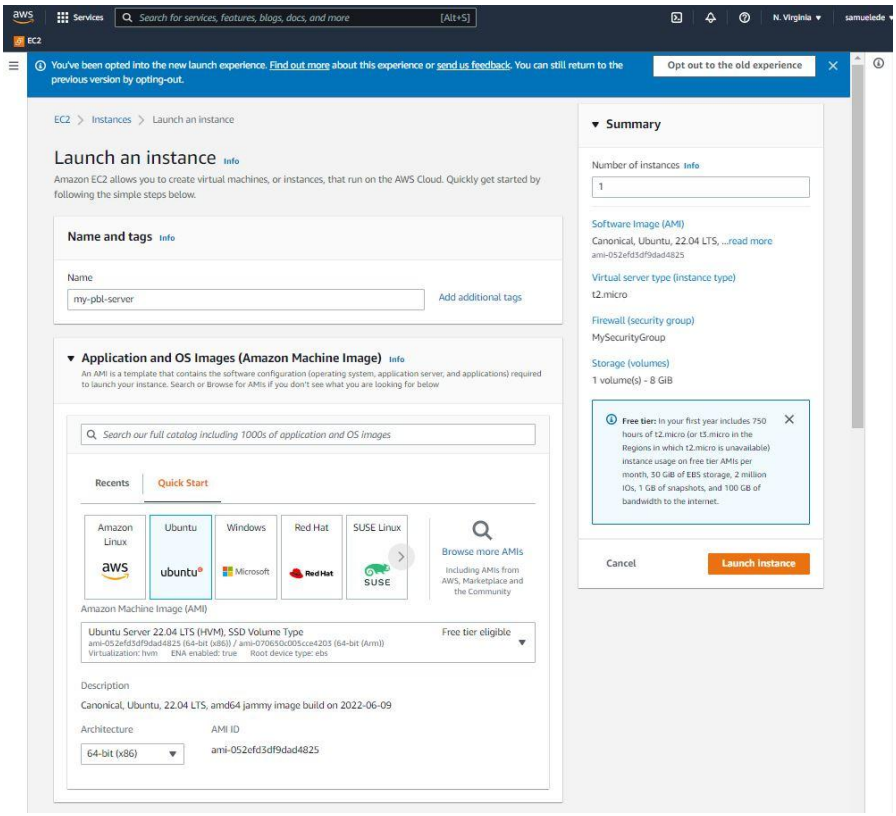
Step 0 of 3 - Overview of the AWS console, Regions, Cost and usage, and other settings. In this case we type in **EC2** in the search bar to find and create a new AWS instance.



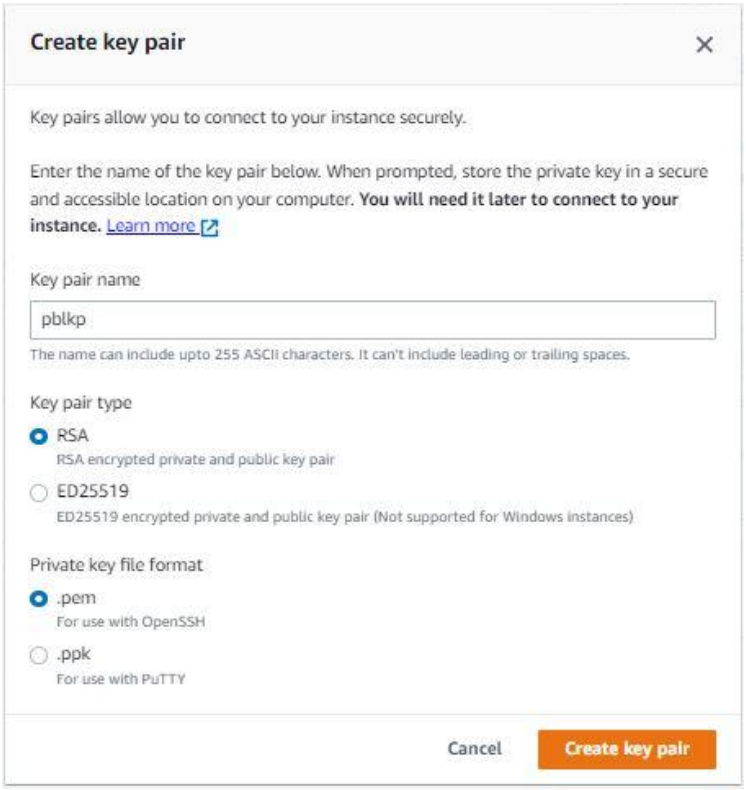
Step 0 of 4 - Select the EC2 instance and also check the star icon to add it to the favorite section of the console homepage.



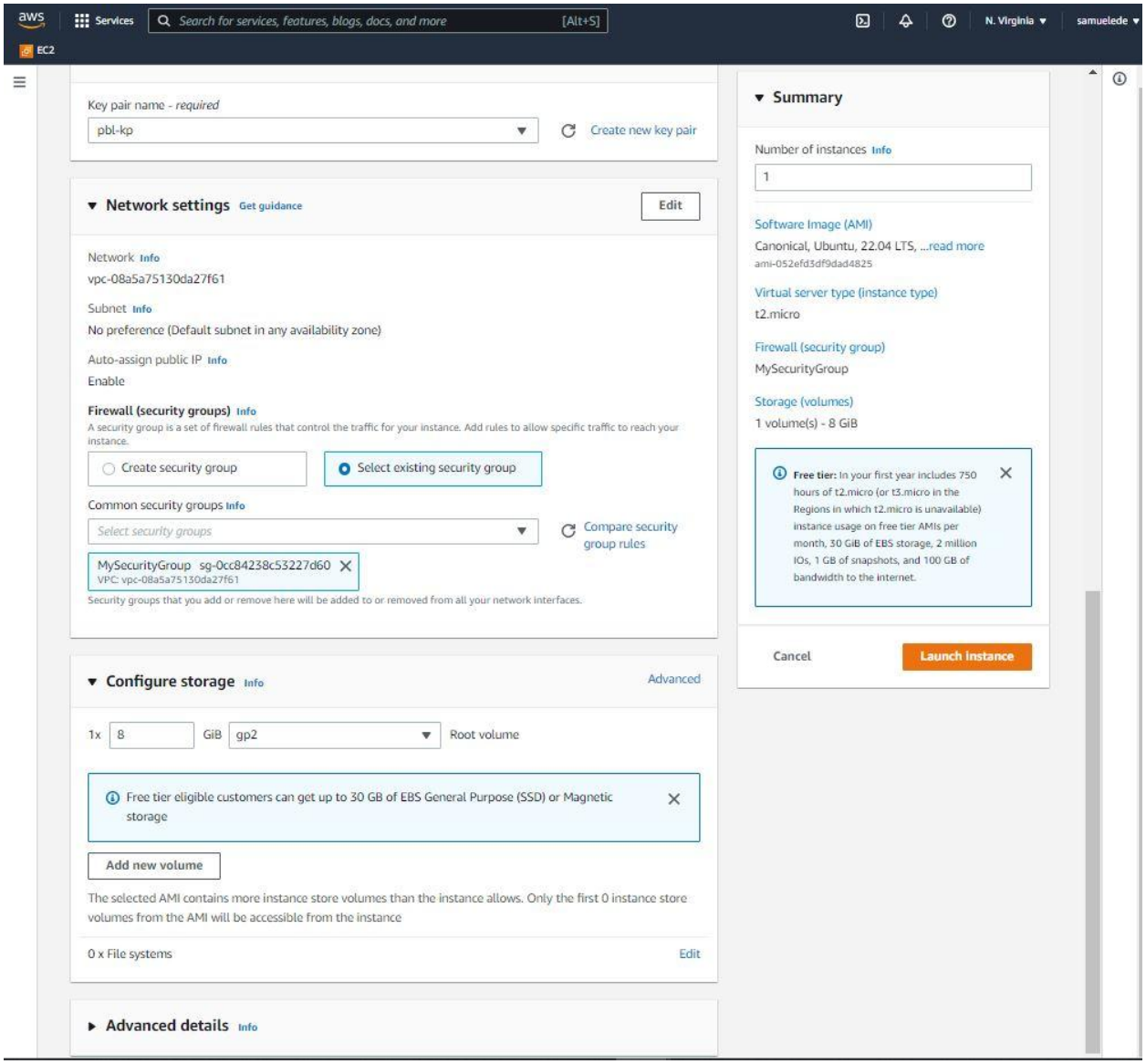
Step 0 of 5 - Select a preferred region as highlighted in the top right above to select a preferable region and/or change. Next click and select Launch instance as shown in 2.



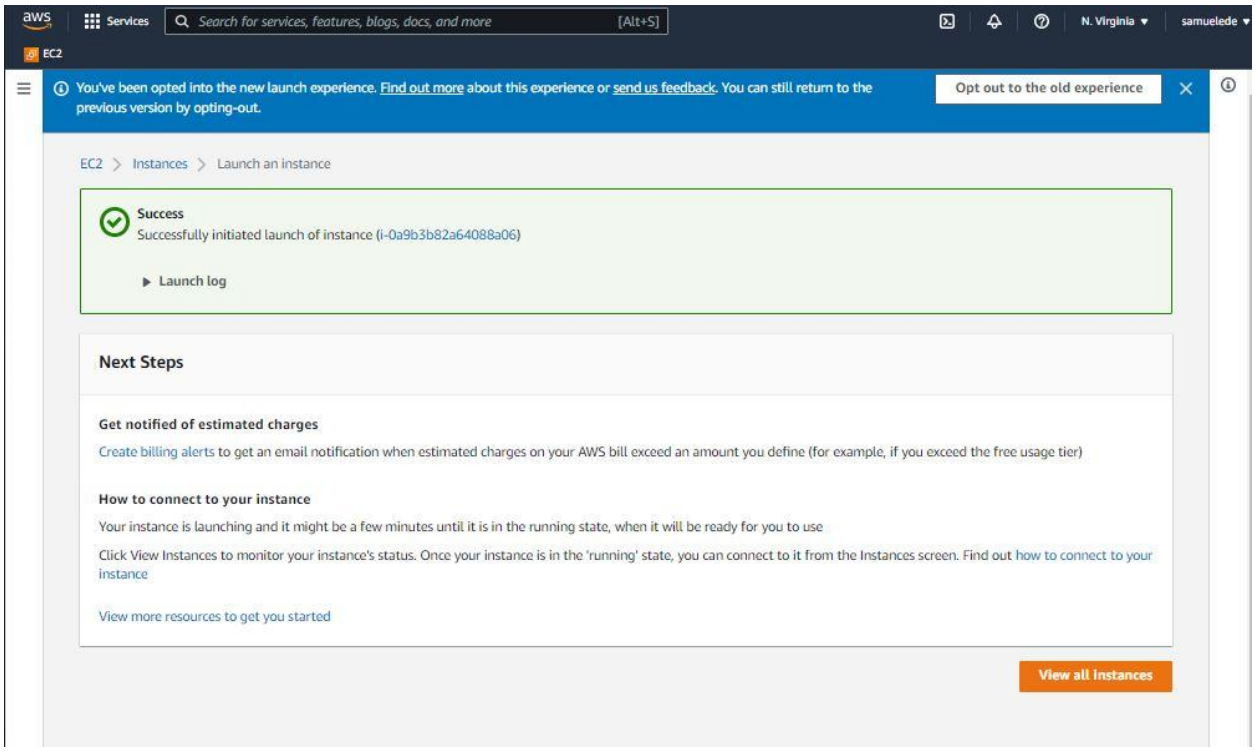
Step 0 of 6 - Type in a preferred instane name and in the Applications and OS Images section select Ubuntu and the ubuntu server 22.04



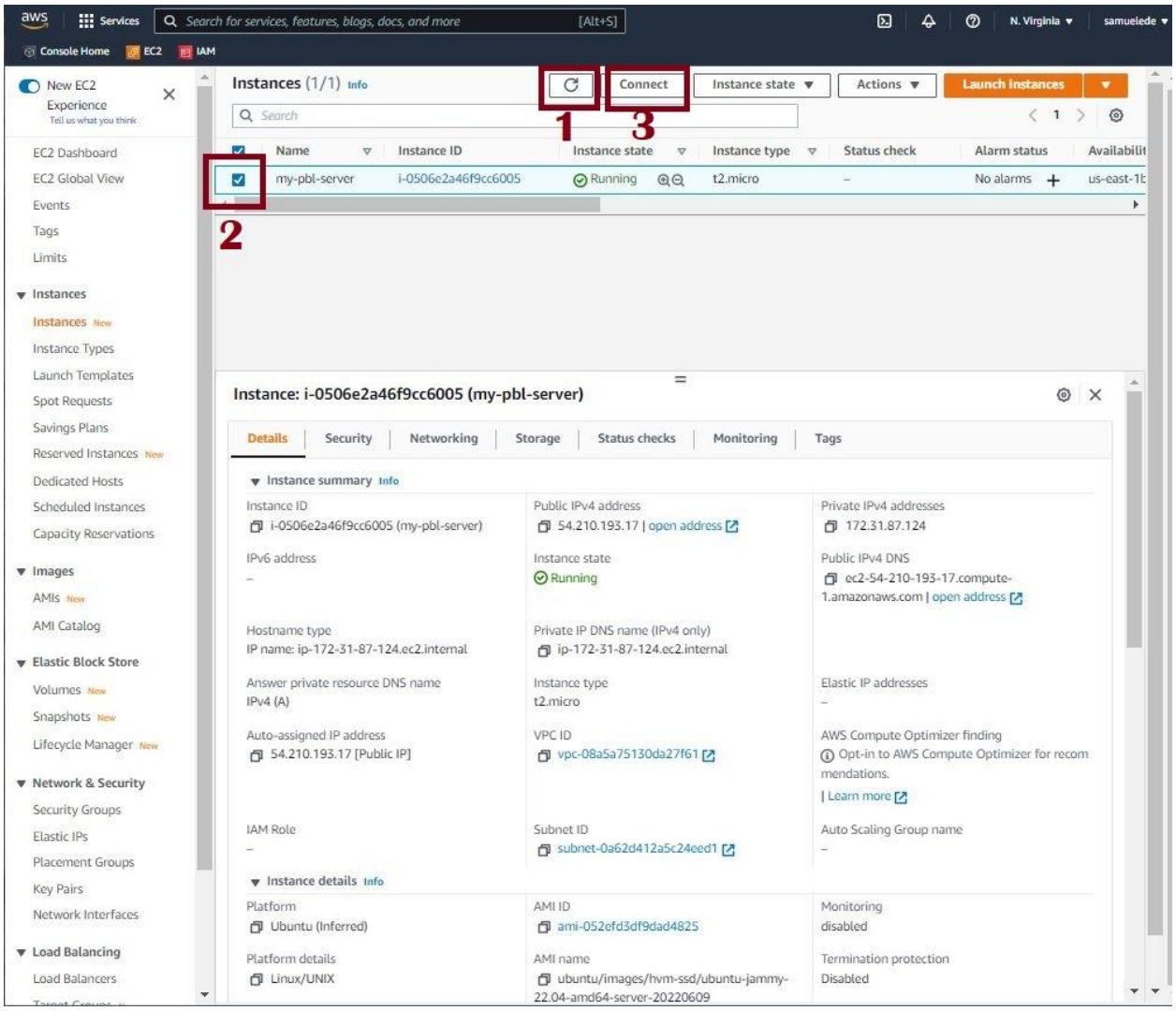
Next, click create a key pair and type a key name, select RSA and .pem private key option.



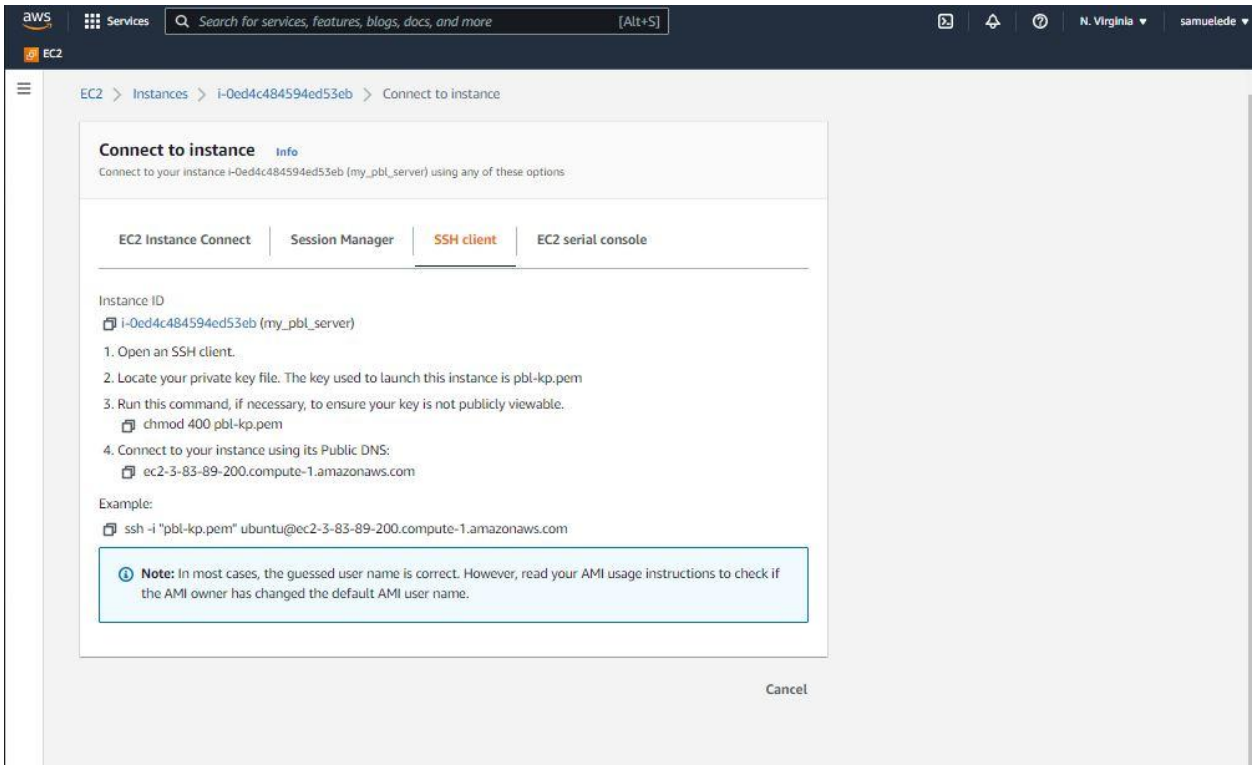
Step 0 of 7 - Click create new key pair and save the file in your downloads folder and In the Network Settings, click select existing security group previously created from the common security groups drop down, then finally click on Launch Instance.



Step 0 of 8 - After clicking Lauch instance, the above page should show up. Next, click View all instances.



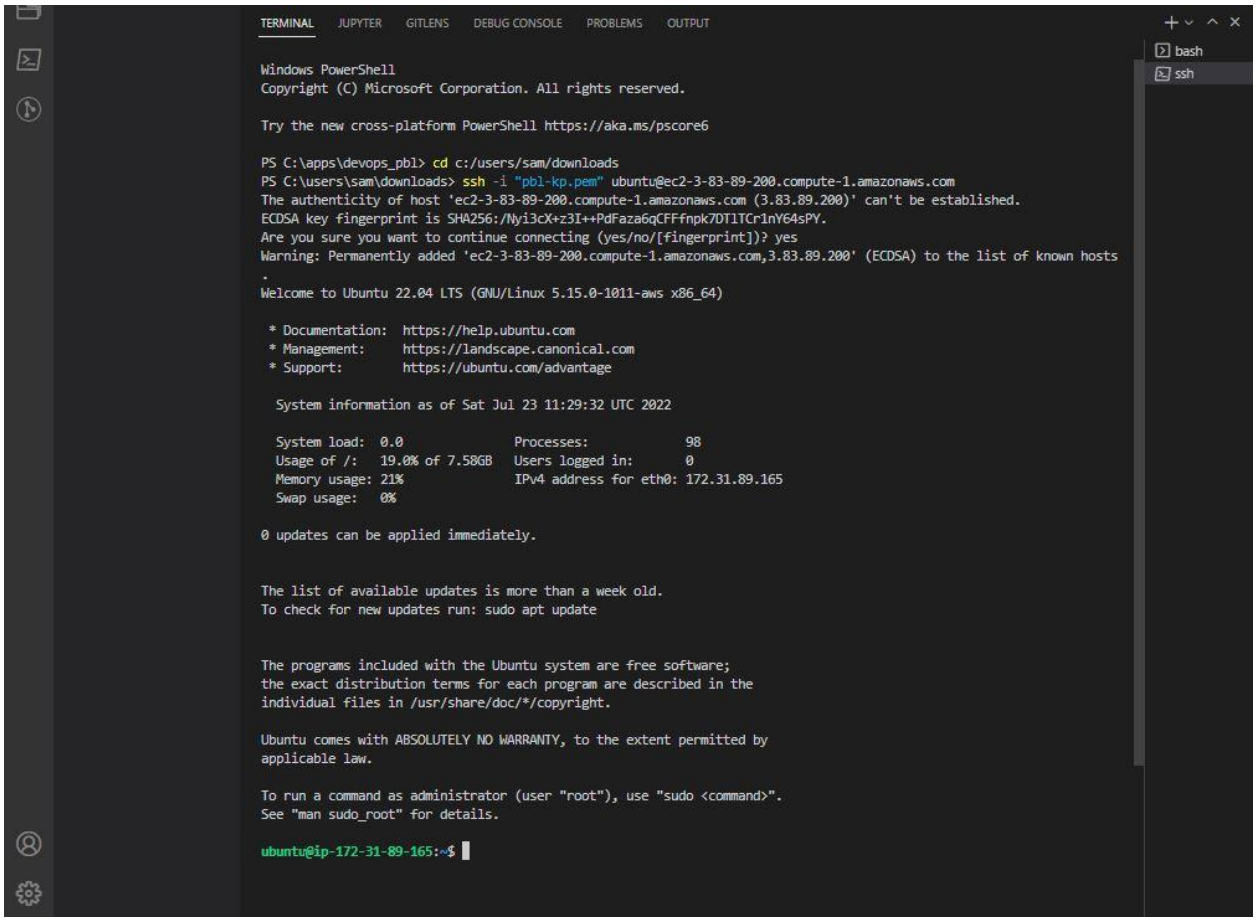
Step 0 of 9 - The above image shoes the resulting features. To check the status of the server, click on the refresh button as in 1, then click the checkbox as in 2 above to view the server details below and finally click **connect** as in 3 above to to connect to the Server.



Step 0 of 10 - After clicking connect, select the SSH client tab. The above details would b visible. Click on the copy icon beside

`ssh - i "<yourpemkeyname.pem" ubuntu@ec2-<ip address>.compute-1.amazon.com`

This is used in our ssh client to connect remotely to our server.



Step 0 of 11 - Open your preferred terminal and change directory to your stored .pem key location as shown above, if stored in the downloads folder type command `Cd c:/users/<pcname>/downloads` and hit enter. Then type the command `ssh - i "<yourpemkeyname.pem" ubuntu@ec2-<ip address>.compute-1.amazon.com` On the command line and hit enter. A green prompt with our server ip should pop up as shown in the above image.

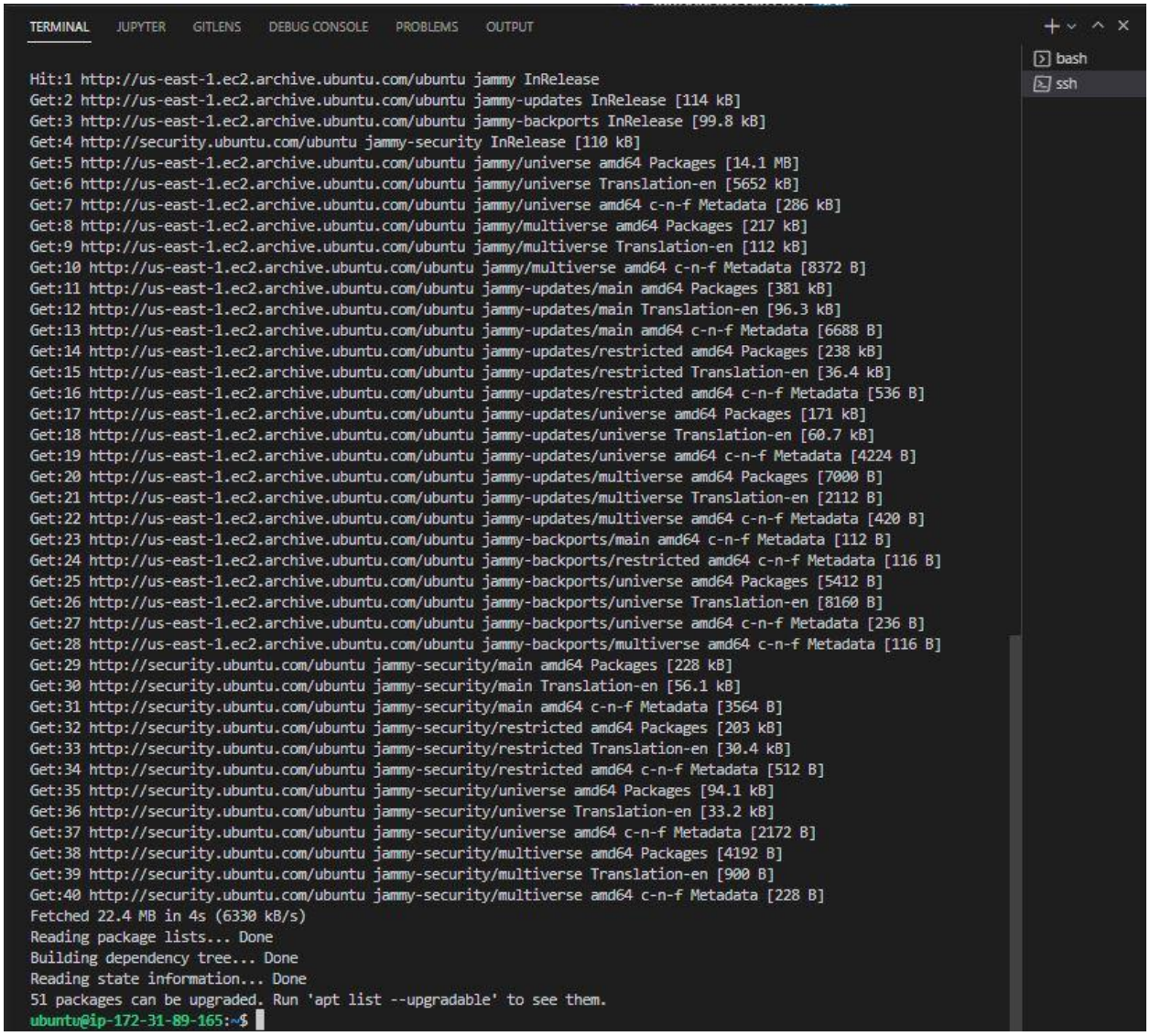
The objective of these steps are to setup our server environment to enable us install the necessary prerequisites, application software, databases and other software deployment tools to be used for deployment and hosting of our websites or software applications.

Step 1 – Installing apache and updating firewall

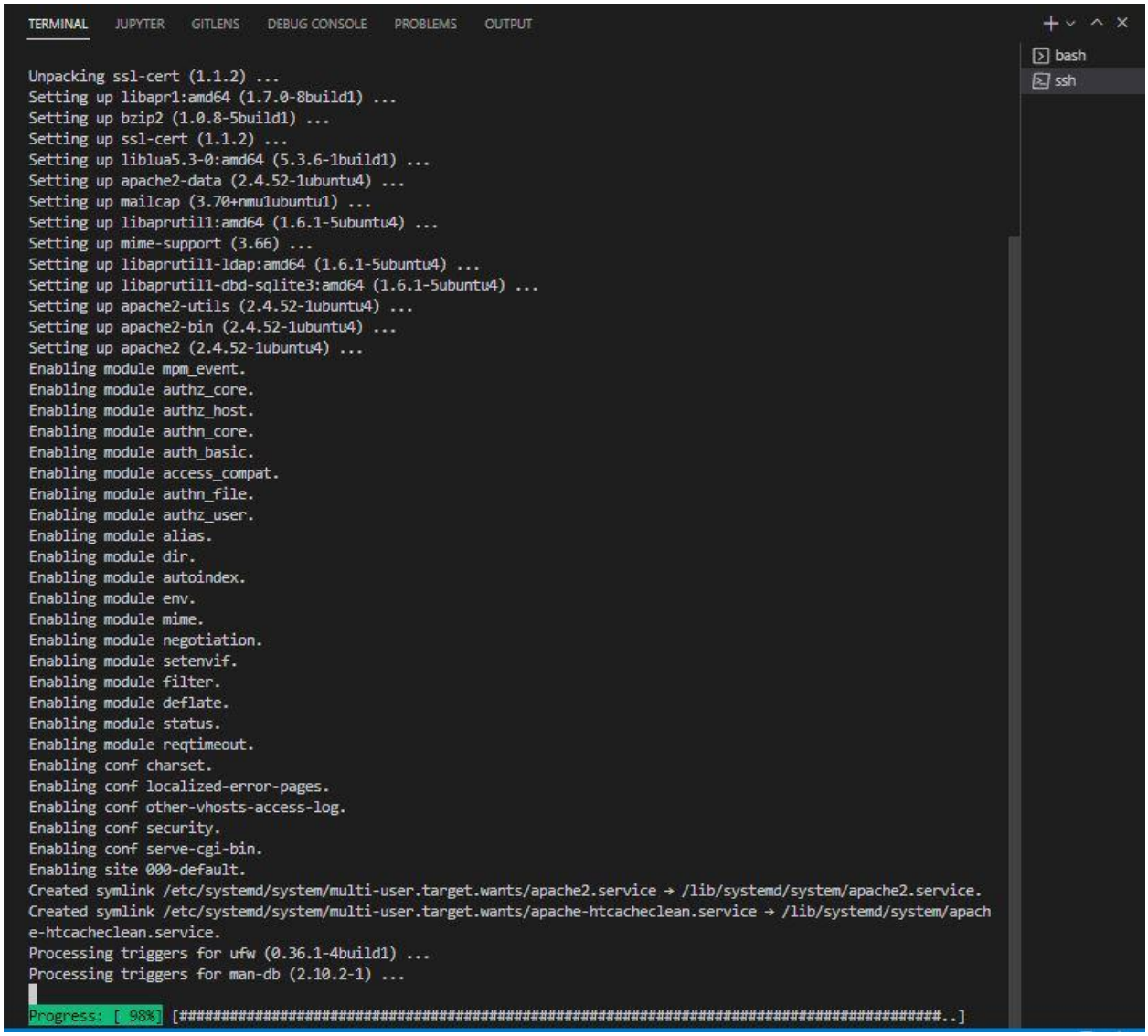
Apache HTTP Server is the most widely used web server software. Developed and maintained by Apache Software Foundation, Apache is an open source software available for free. It runs on 67% of all webservers in the world.

Our goal with this installation is to:

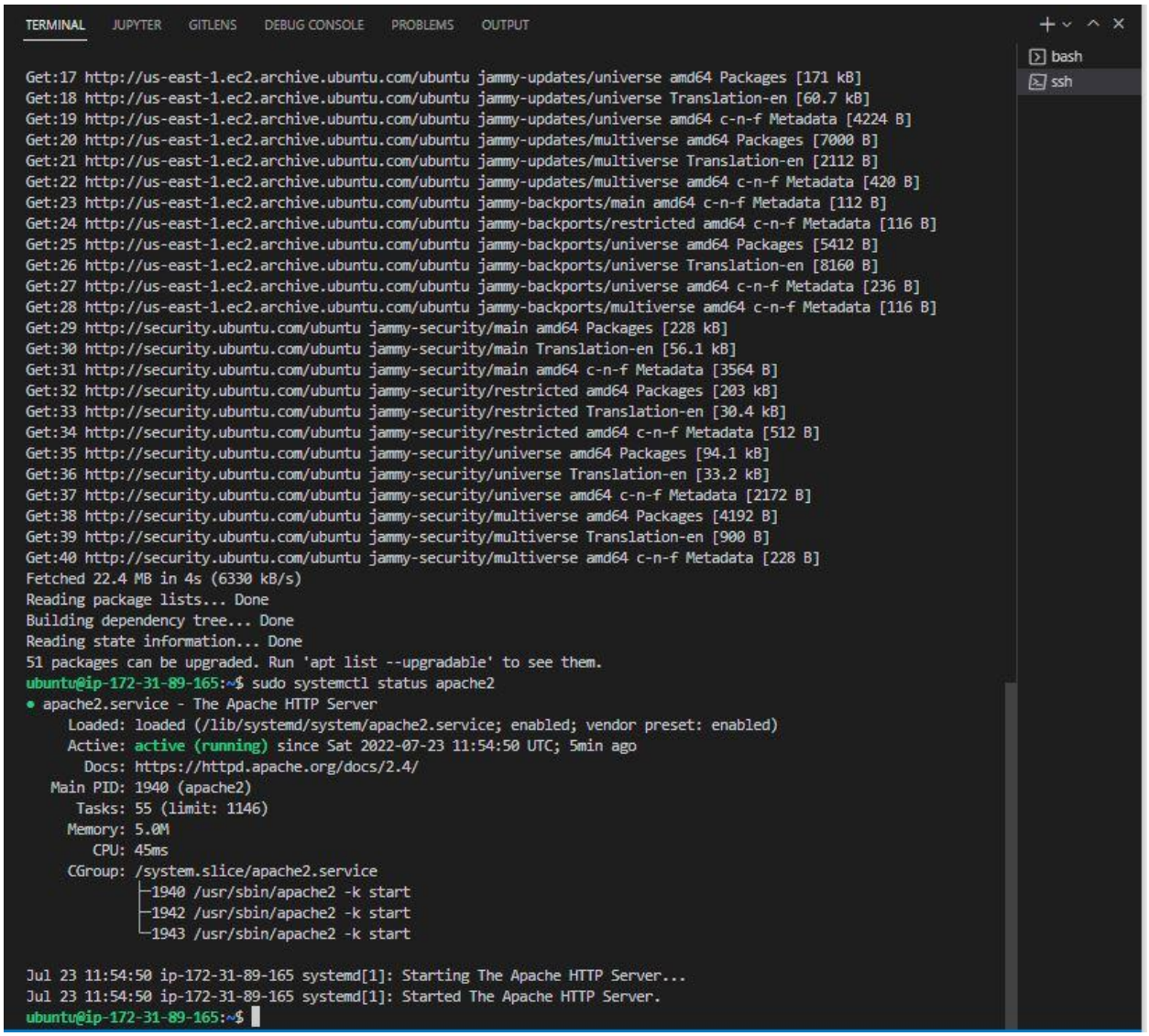
1. Install an apache server on our ubuntu virtual machine
2. Configure the server and set firewall rules



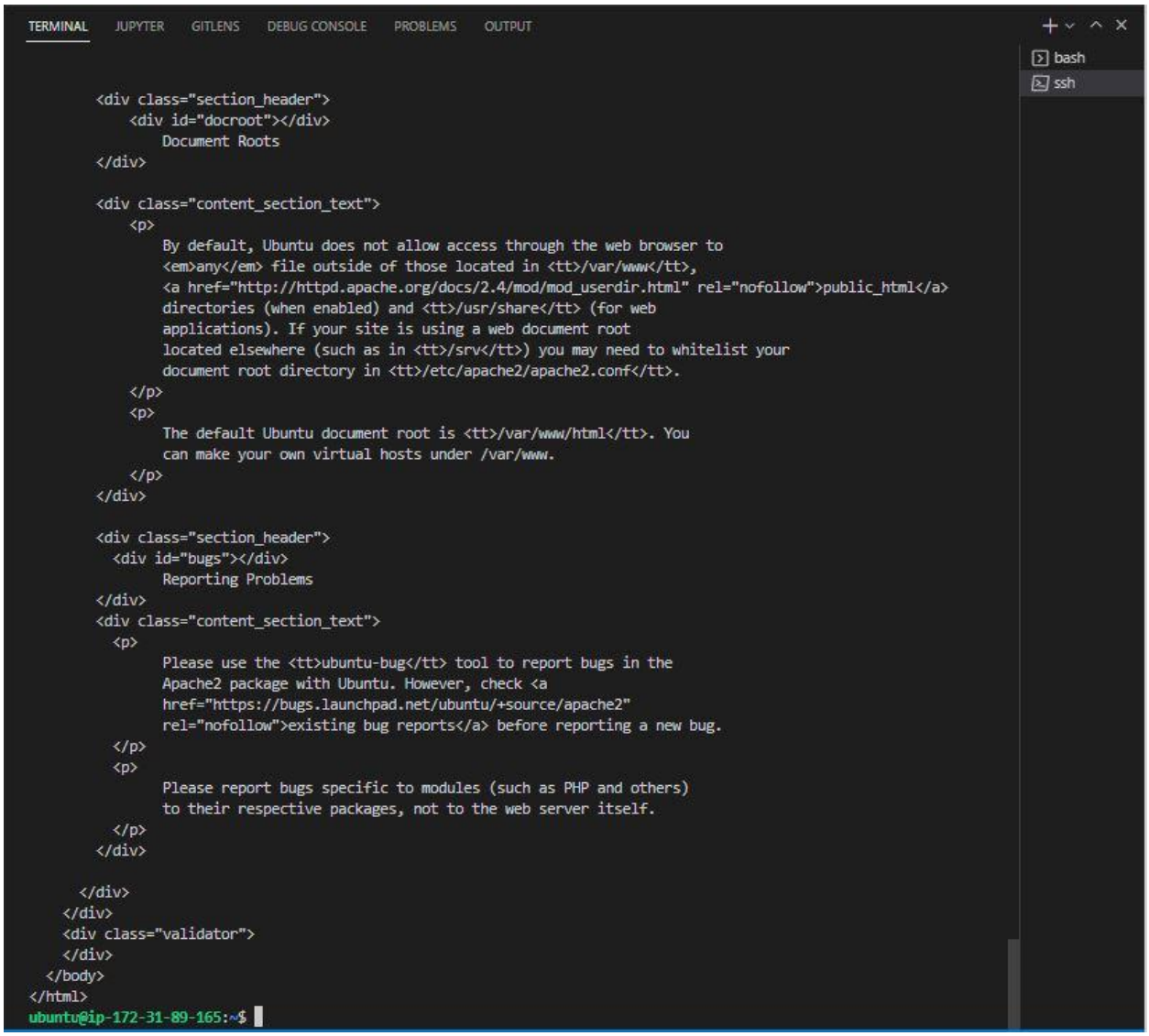
Step 1 of 1 - Type the following in your recently launched command line `sudo apt update` this would update the list of packages available in our ubuntu box as shown above.



Step 1 of 2 - Next type in `sudo apt install apache2` and hit enter. The resulting page should look like tha above image.



Step 1 of 3 - Next type `systemctl status apache2` to verify the status of the running apache service. A green active status would confirm the status of our installed apache server in the cloud.

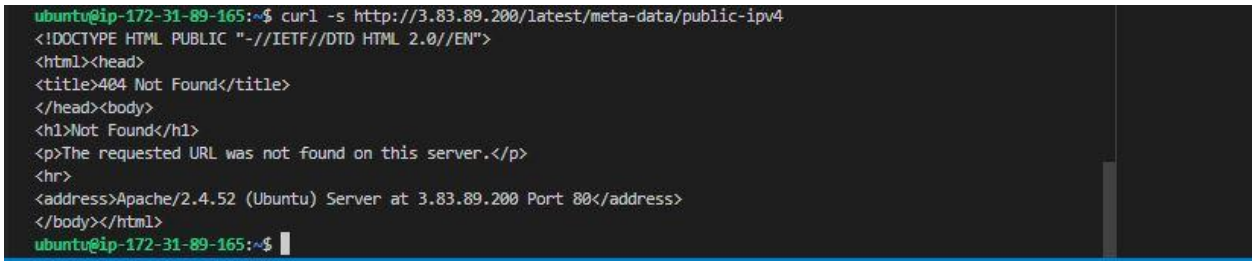


Step 1 of 4 - To verify and access out server locally on our ubuntu command line, type the following:

`curl http://localhost:80 or  curl http://127.0.0.1:80`

The above image shows the content of the resulting html file that can be viewed publicly. The 'curl' command indicates to our apache http server on port 80 to request for the server default page.

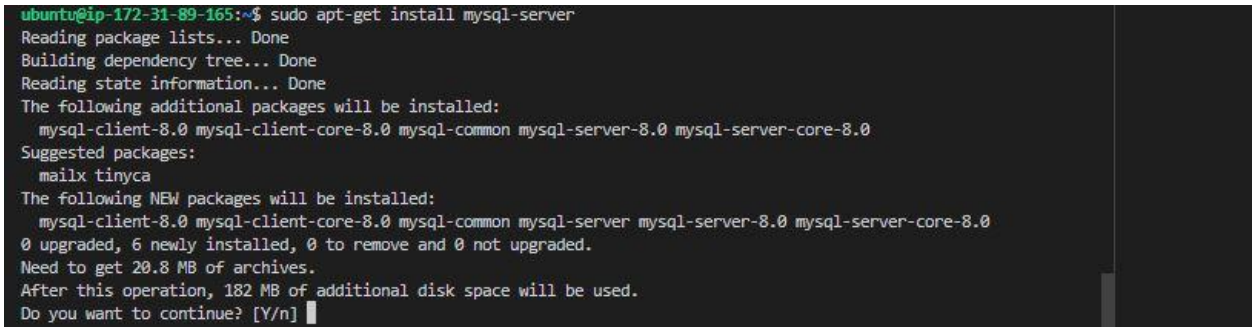
Step 1 of 5 - to test our server default page on a browser, open a browser and type in `http://<public-ip-address>: 80` using the ip address provided after our instance was created. The 80 means the default port used by browsers to connect to our apache web server. The resulting page should look like the image above.



Step 1 of 6 - Another way to check our ip address rather than through the aws console is to type in `curl -s http://<ip-address>/latest/meta-data/public-ipv4` As shown above.

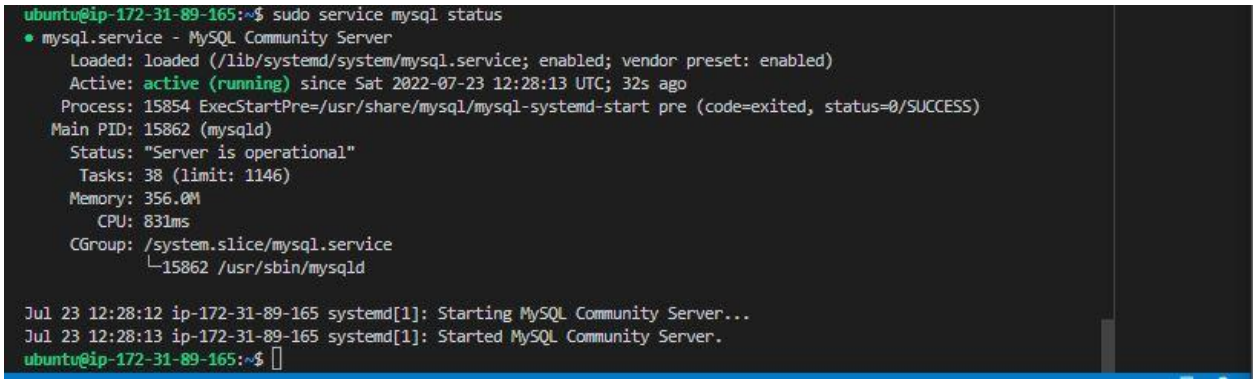
Step 2 – Installing MySQL

In step 2 we will install a Database Management System (DBMS) to be able to store and manage data for your site in a relational database. MySQL is a popular relational database management system used within PHP environments, so we will use it in our project.



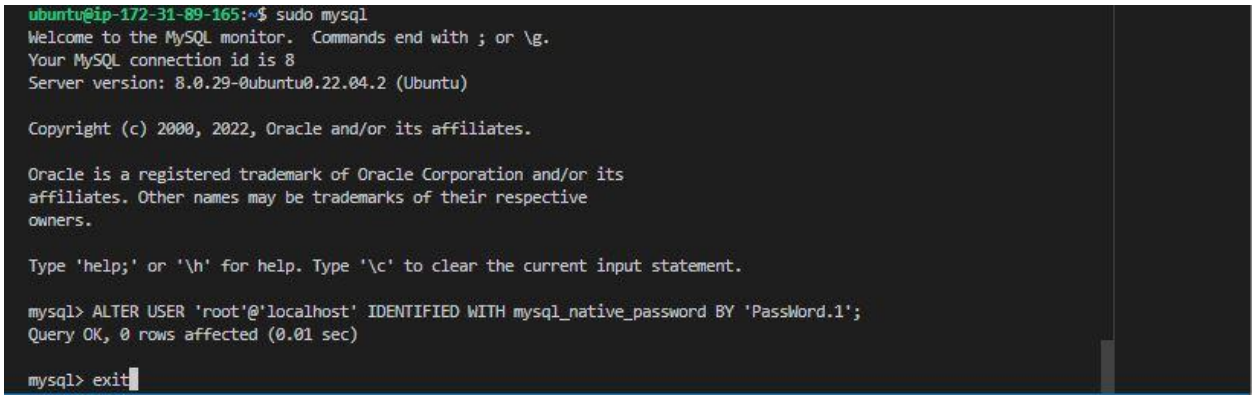
Step 2 of 1 - type in the following command to begin installation of mysql server `sudo apt install mysql-server`

A prompt will ask to confirm the installation process, type y to proceed.

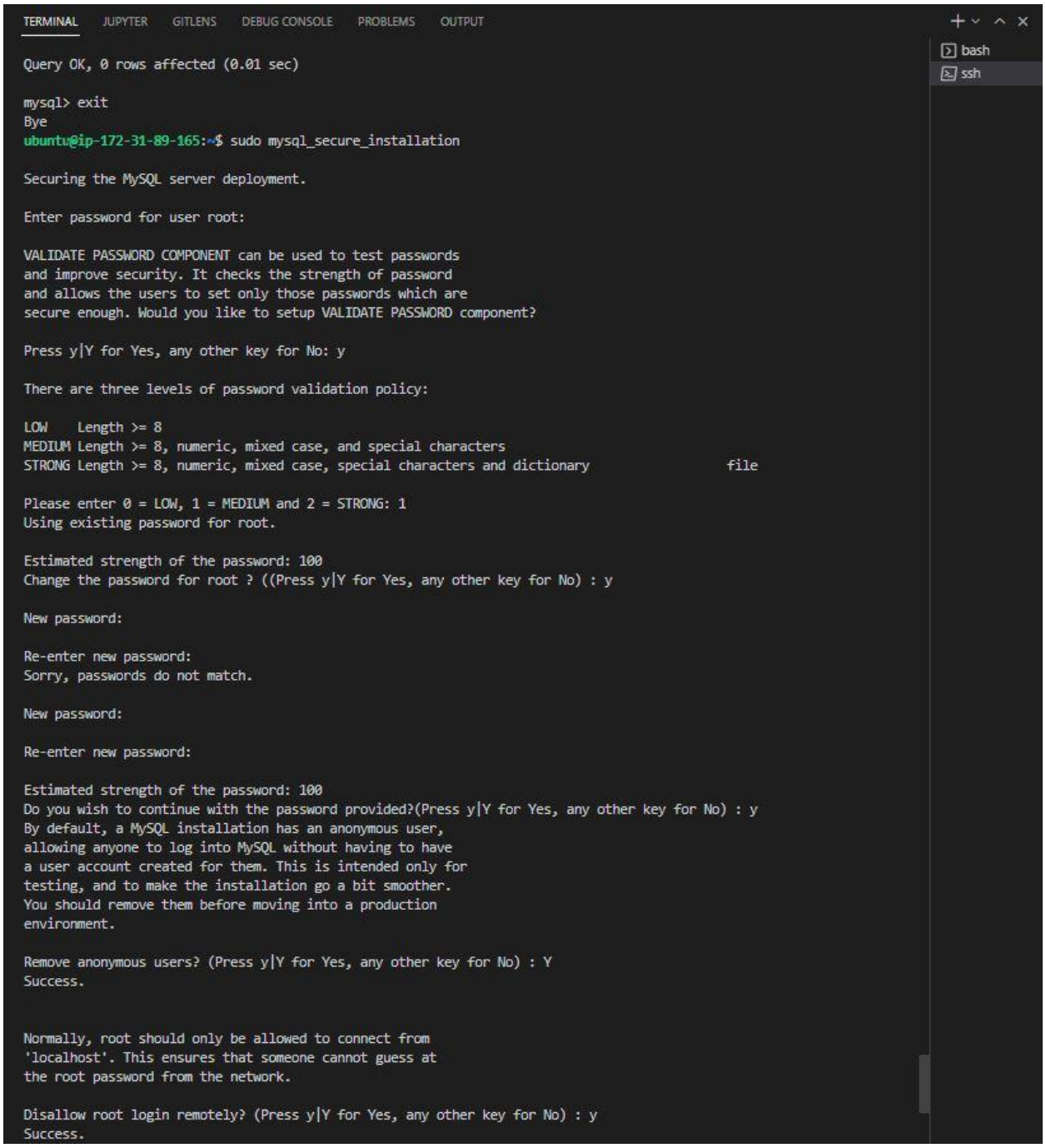


Step 2 of 2 - type the following command after the installation is complete to confirm mysql server running status. `sudo service mysql status`

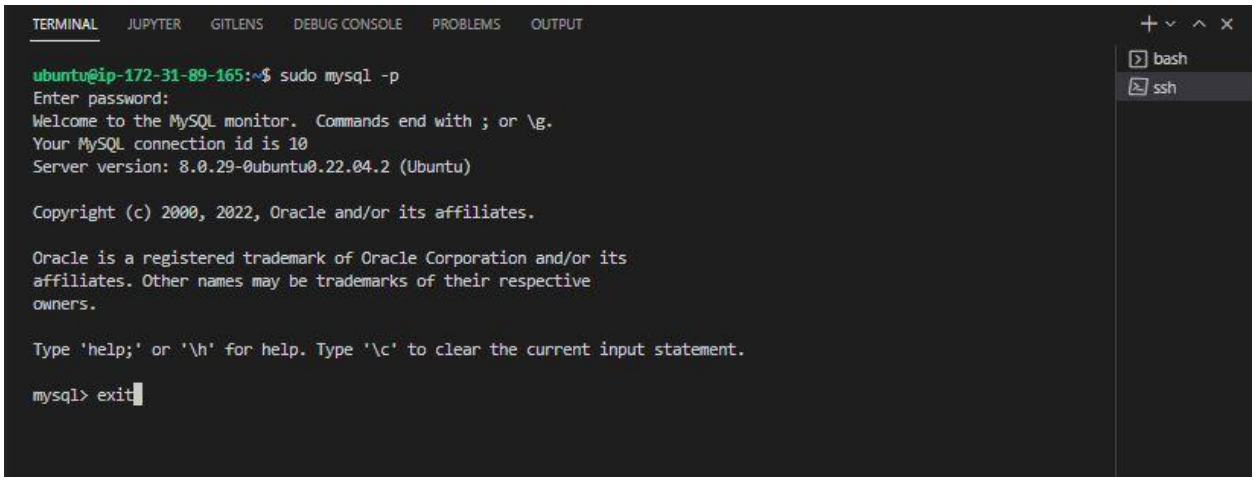
A green active status confirms our mysql server installation in the above diagram.



Step 2 of 3 - to login to our installed mysql database server, type `sudo mysql` in the terminal prompt. The above image shows the resulting output and new mysql> prompt. Type `exit` to exit the mysql shell.



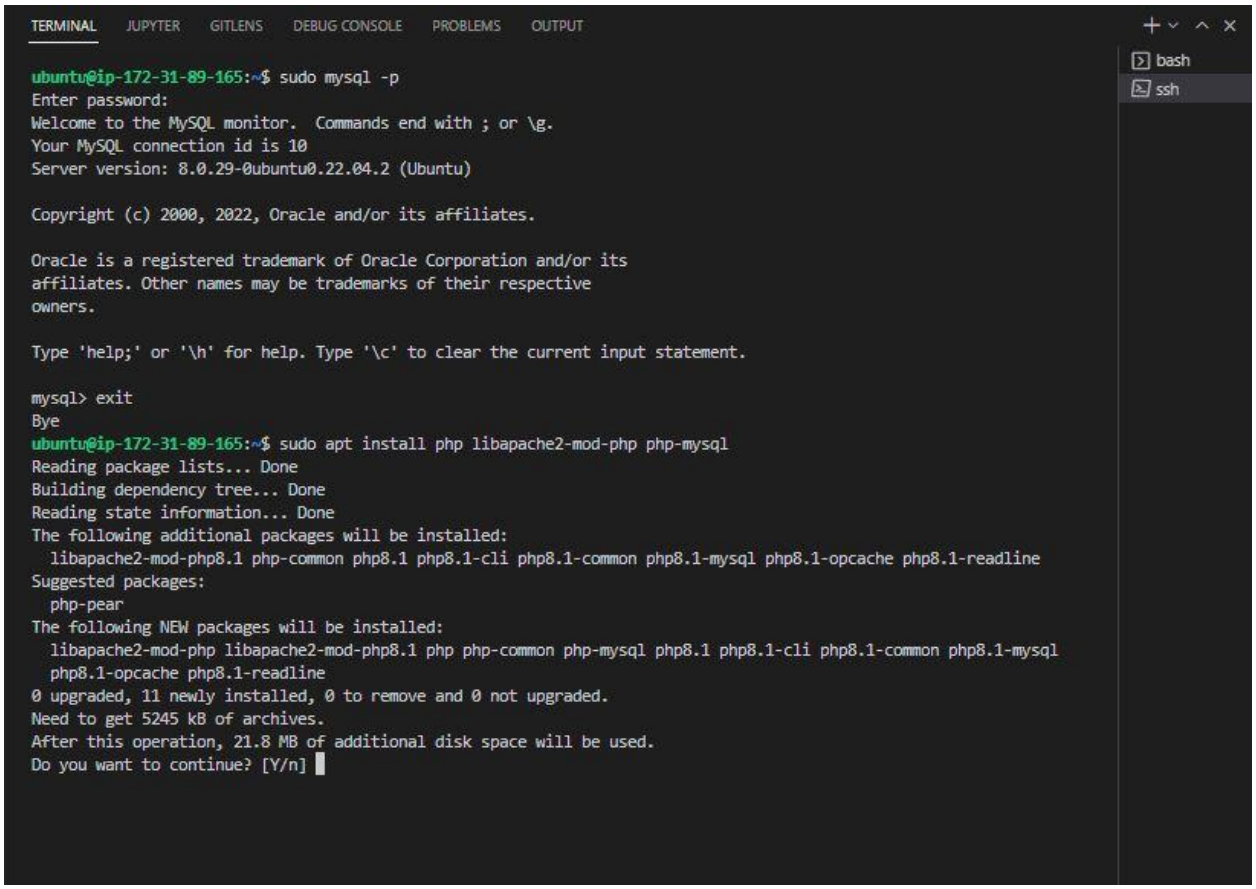
Step 2 of 4 - To make our sql server more secure with a password, we use the following command to achieve this. `sudo mysql_secure installation`
Answer `y` for yes and/or anything else. Follow the prompts and type in a secure password to complete the process as shown above.



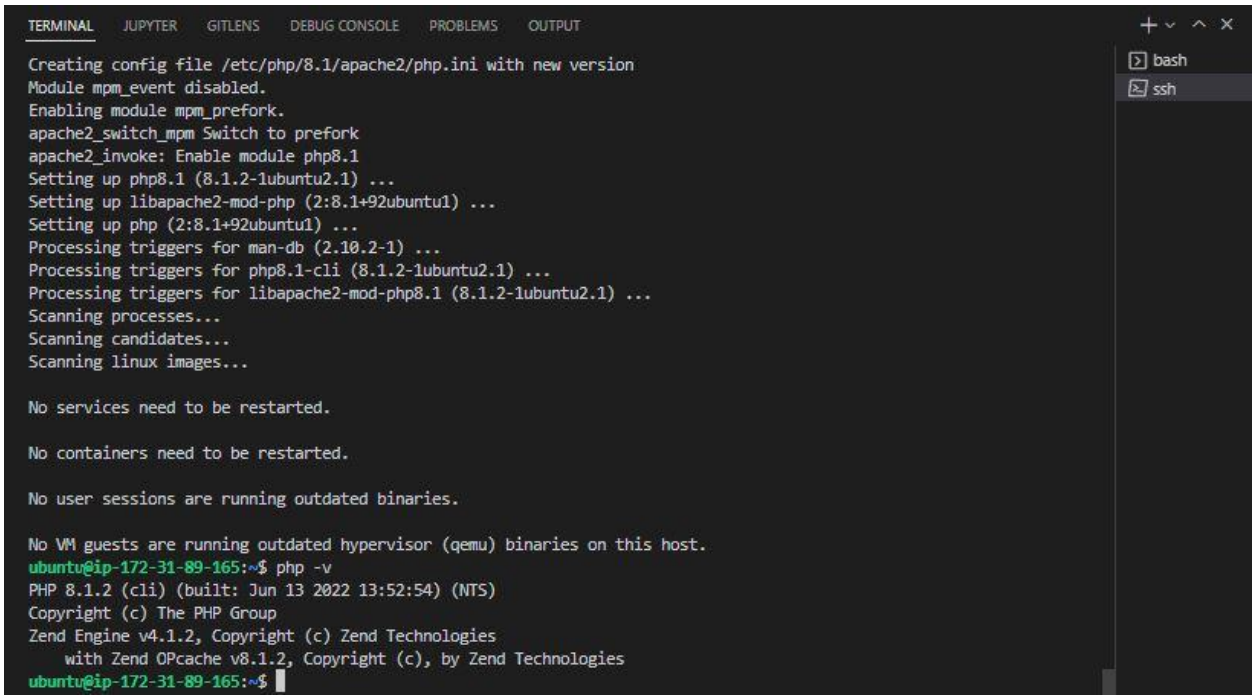
Step 2 of 5 - To login securely to our mysql console, type sudo `mysql -p` in the command line and type in the newly specified password. The above shows the result of the command. Type exit to close the mysql console.
This would always prompt for a password everytime we want to access the mysql console.

Step 3 – Installing PHP

Now that we have Apache installed to serve your content and MySQL installed to store and manage your data. PHP is the component of our setup that will process code to display dynamic content to the end user. In addition to the `php` package, you'll need `php-mysql`, a PHP module that allows PHP to communicate with MySQL-based databases. You'll also need `libapache2-mod-php` to enable Apache to handle PHP files. Core PHP packages will automatically be installed as dependencies.



Step 3 of 1 - To install php type the following command `sudo apt install php libapache2-mod-php php-mysql` in the ssh prompt to begin the installation process. The above shows the next steps, type `y` at the prompt to confirm yes and proceed.



Step 3 of 2 - Once the installation is complete type `php -v` to confirm the php version as shown above.

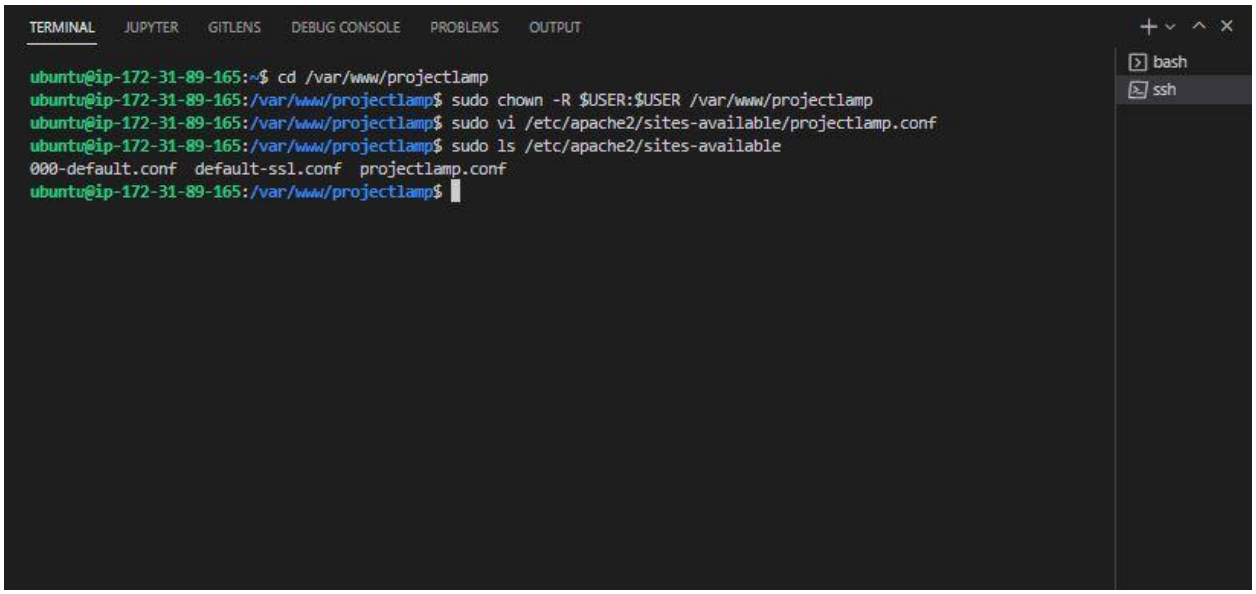
After this, we would have successfully installed all components of the LAMP (Linux, Apache, MySQL, PHP) stack.

Step 4 – Creating a Website Virtual Host using APACHE

In step 4, we will set up a domain called `projectlamp`, but you can replace this with any domain of your choice.

Apache on Ubuntu 20.04 has one server block enabled by default that is configured to serve documents from the **/var/www/html** directory.

We will leave this configuration as is and will add our own directory next next to the default one.



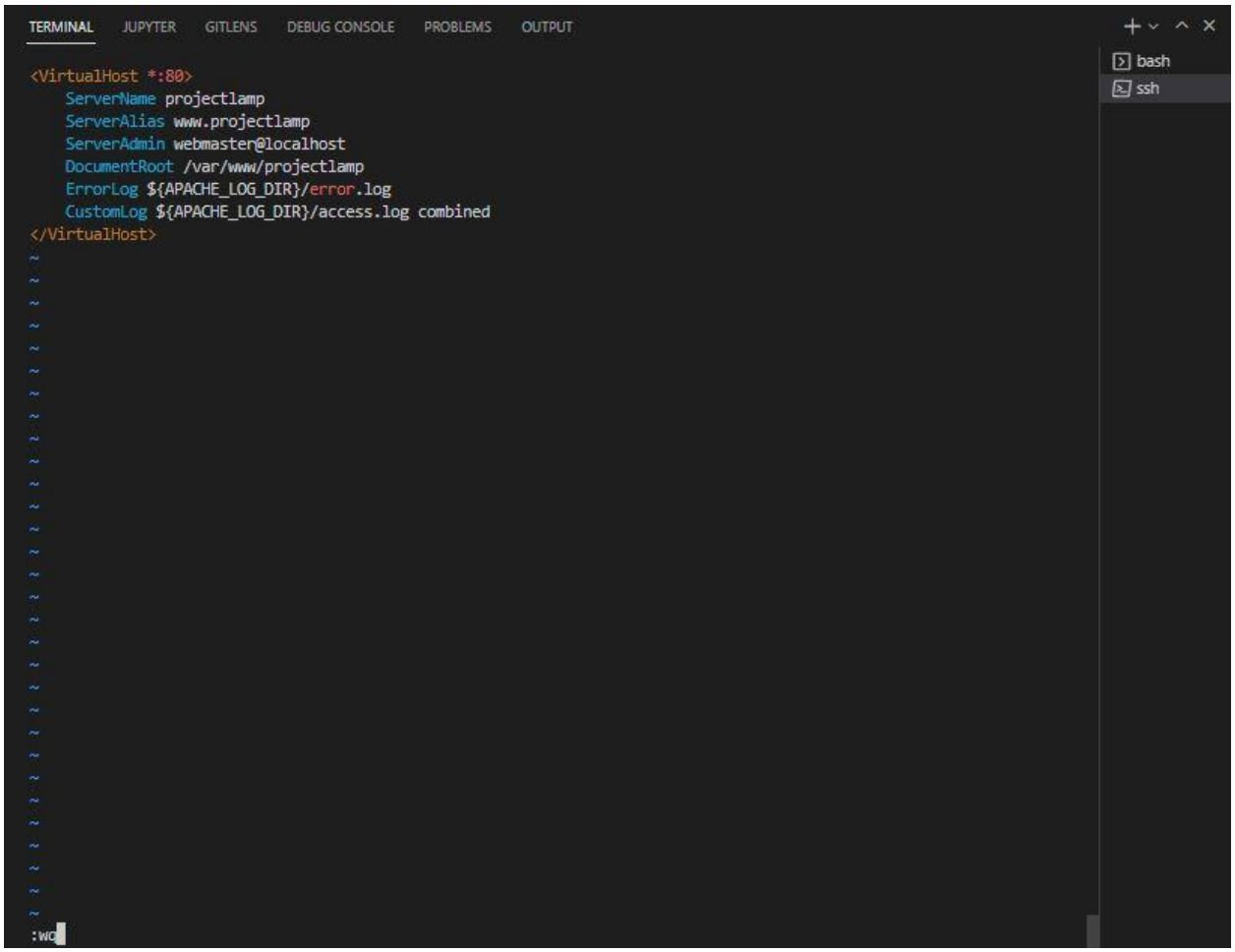
Step 4 of 1 - Type in the command sudo `mkdir /var/www/projectlamp` to create a new directory/folder in our php installation. The command mkdir in linux creates a folder followed by the path of the new folder location.

Next, type `cd /var/www/projectlamp` to change directory to the new folder location as shown above. To assign ownership of the directory, also type

```
sudo chown -R $USER:$USER /var/www/projectlamp
```

The we create a new configuration file in apache's sites-available directory with the following command, `sudo vi /etc/apache2/sites-available/projectlamp.conf`

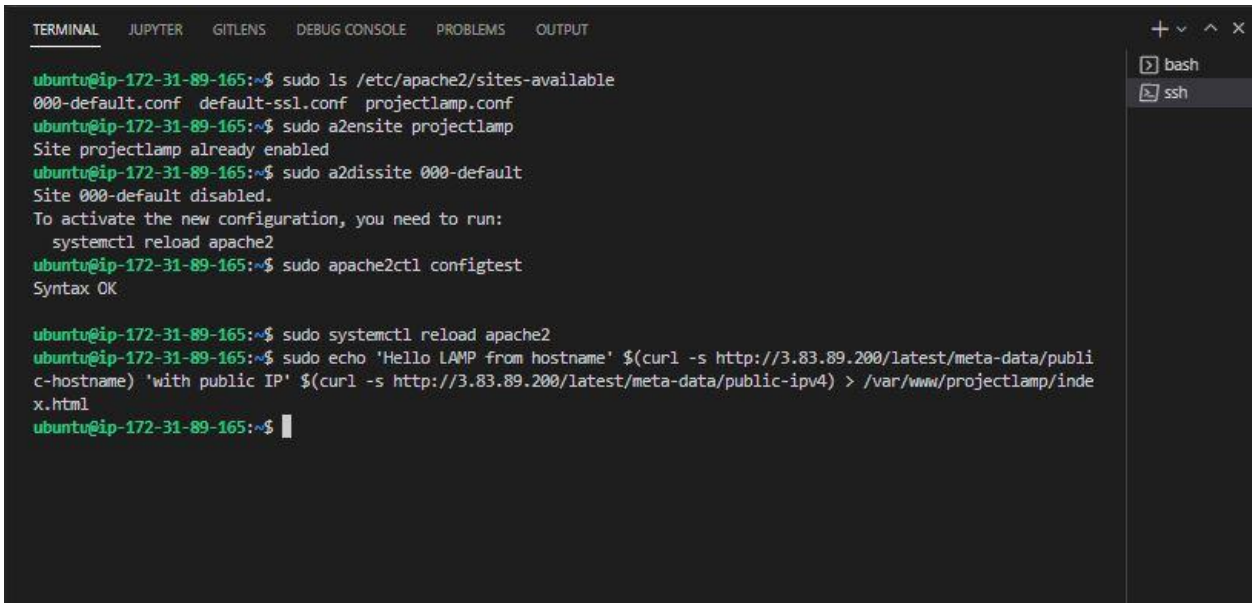
After running the above command, a blank file is created and opened as shown below.



Step 4 of 2 - Type `i` and paste the following code into the configuration file as show in the image above:

```
<VirtualHost *:80>
    ServerName projectlamp
    ServerAlias www.projectlamp
    ServerAdmin webmaster@localhost
    DocumentRoot /var/www/projectlamp
    ErrorLog ${APACHE_LOG_DIR}/error.log
    CustomLog ${APACHE_LOG_DIR}/access.log combined
</VirtualHost>
```

Next, hit `esc` , type `:` , and type `wq` **w** for *write* and **q** to *quit* and then finally hit `enter` to save the file.



Step 4 of 3 - Next type `sudo ls /etc/apache2/sites-available` to show the available files in the directory as shown above.

The following `000-default.conf  default-ssl.conf  projectlamp.conf` displays confirming the newly created file and other files as shown in the image above.

Next, we type `sudo a2ensite projectlamp` to enable our projectlamp as our virtual host and the root directory of our web application as shown above.

Next, type `sudo a2dissite 000-default` to disable abache's default website

Next, type `sudo apache2ctl configtest` to confirm our configuratoin file is syntax error free

Finally, type `sudo systemctl reload apache2` to reload apache for changes to take effect.

Next we need to create a new file for our empty web root location. We create an index.html file for this purpose. Copy and pase the following command to perform this task as shown in the image above.

```
sudo echo 'Hello LAMP from hostname' $(curl -s http://169.254.169.254/latest/meta-data/public-hostname) 'with public IP' $(curl -s http://169.254.169.254/latest/meta-data/public-ipv4) > /var/www/projectlamp/index.html
```

Next, in our browser, we type the following to see the changes.

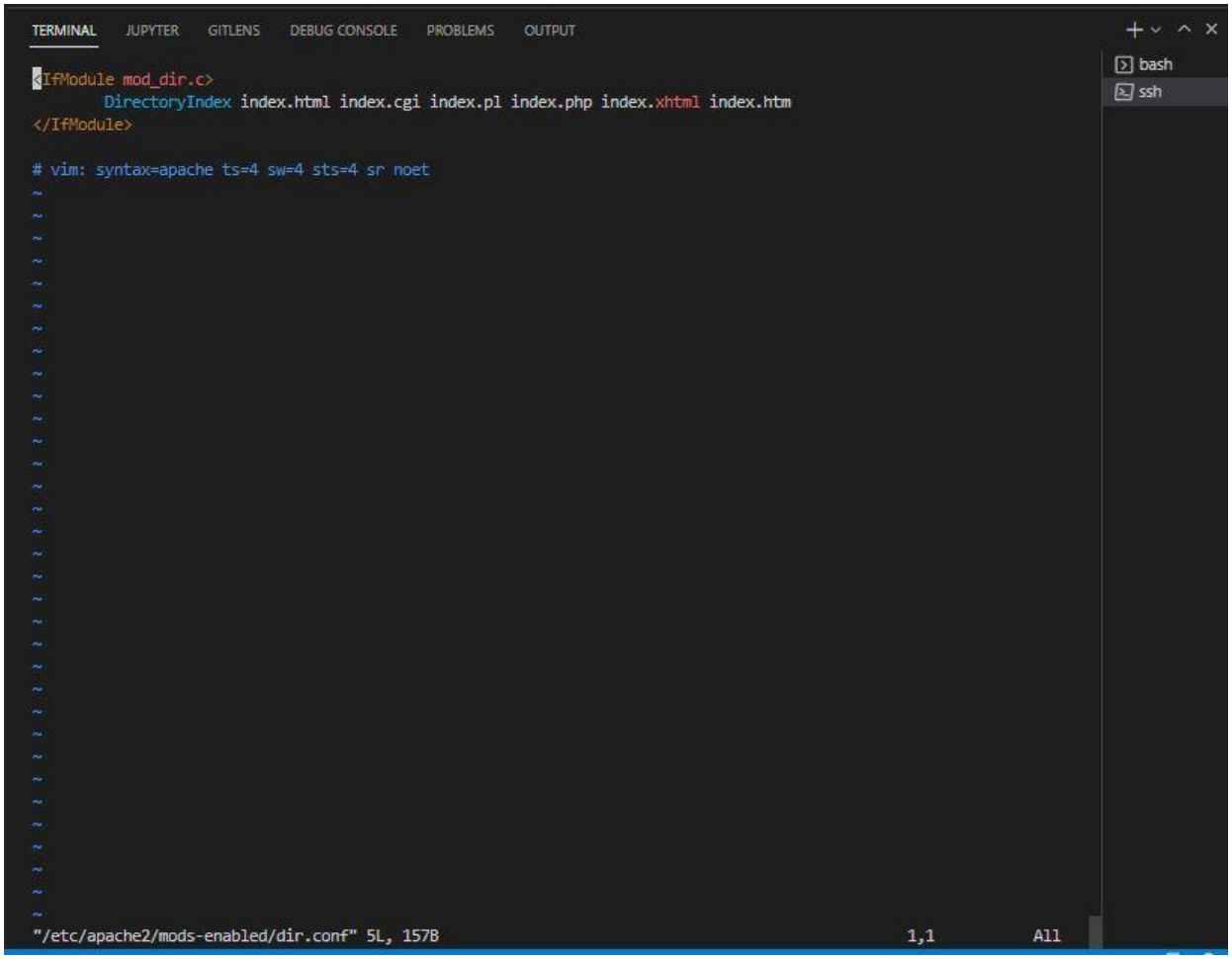
`http://<Public-IP-Address>:80`

Our html page shows successfully as shown in the above image. This will be the temporary default page until we install an application with an index.php page to replace it.

Step 5 – Enable PHP on the Website

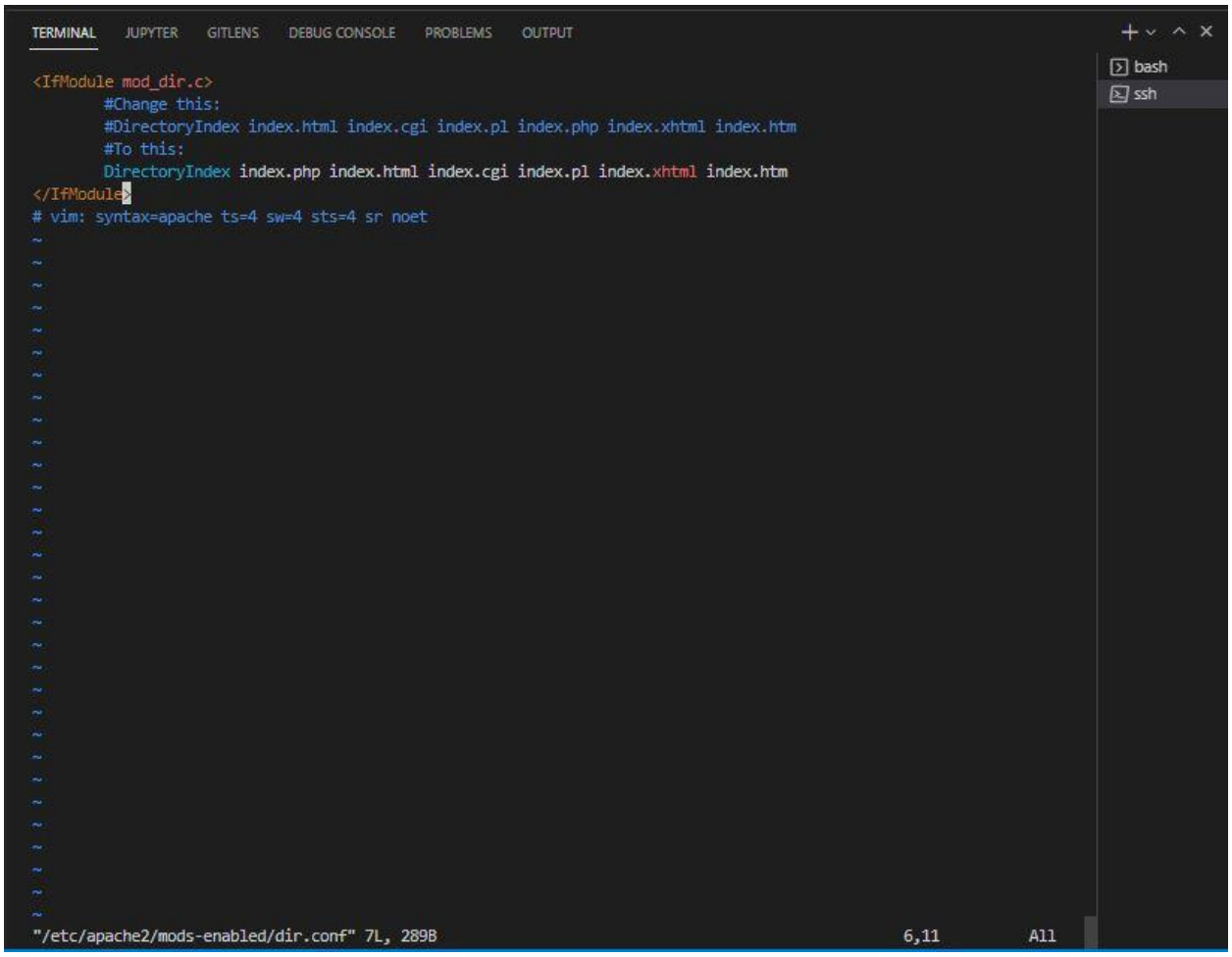
The default **DirectoryIndex** settings on Apache, a file named `index.html` will always take precedence over an `index.php` file. This is useful for setting up maintenance pages in PHP applications, by creating a temporary `index.html` file containing an informative message to visitors.

In case you want to change this behavior, you'll need to edit the */etc/apache2/mods-enabled/dir.conf* file and change the order in which the *index.php* file is listed within the DirectoryIndex directive:



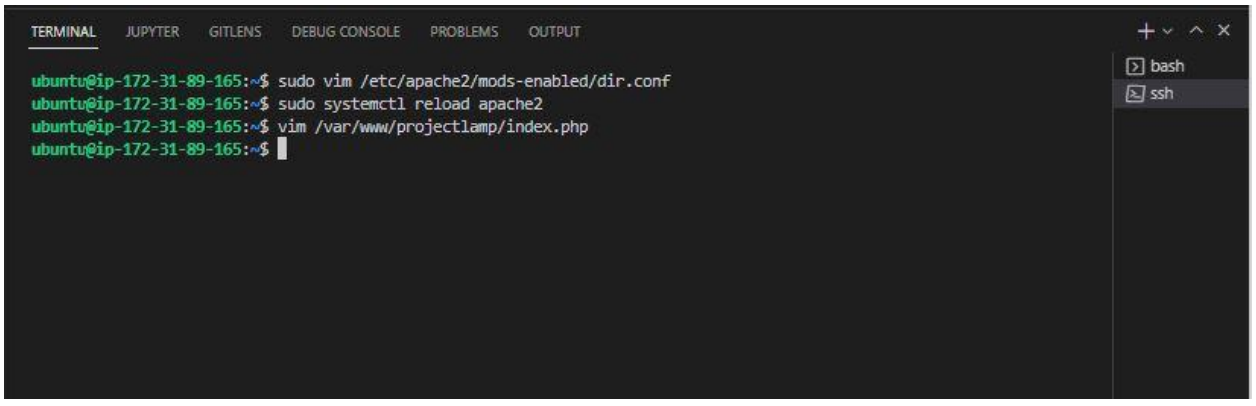
Step 5 of 1 - In the command line, type in `sudo vim /etc/apache2/mods-enabled/dir.conf`

The above diagram is the resulting output.



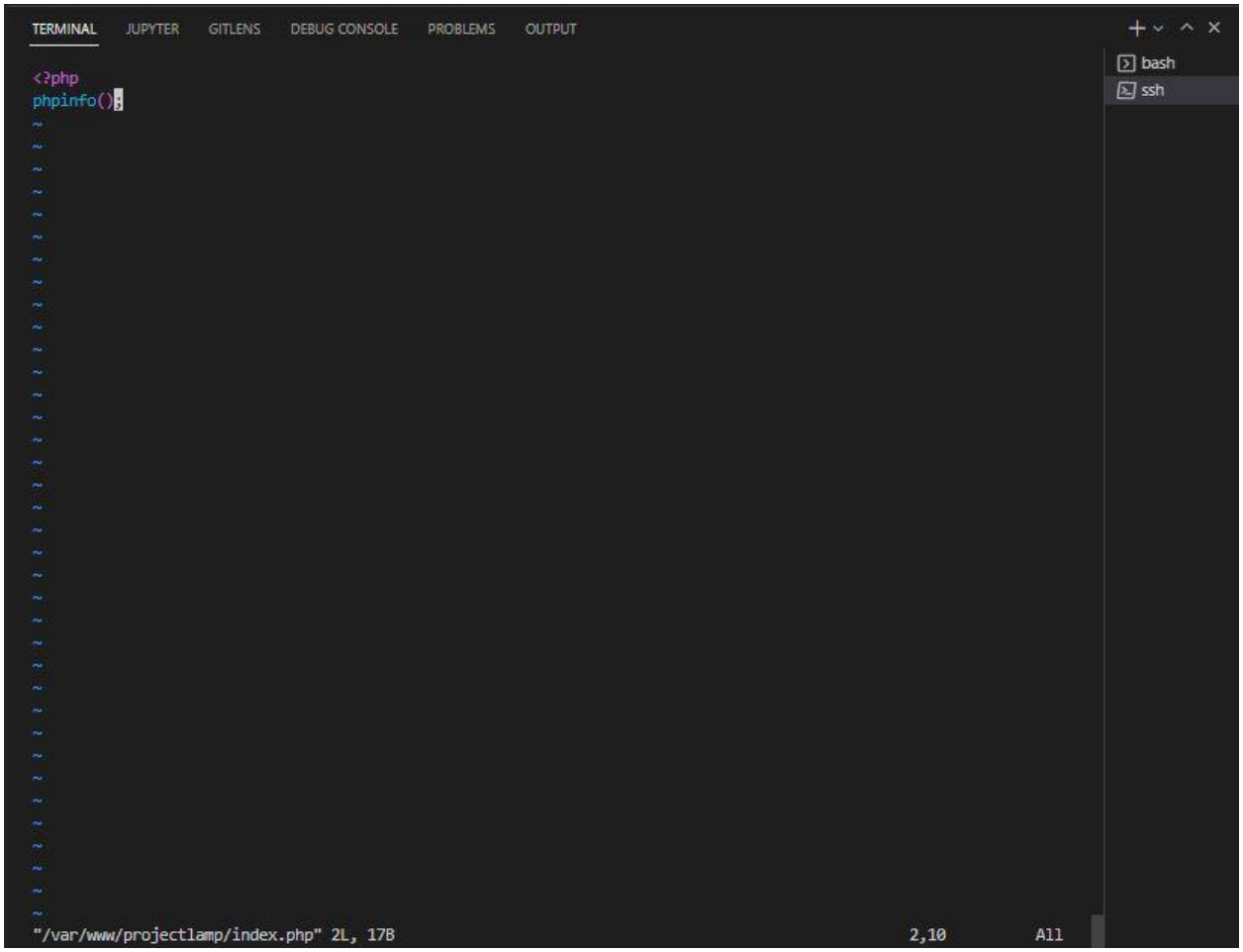
Step 5 of 2 - Copy the following and replace the above content with this:

```
<IfModule mod_dir.c>
        #Change this:
        #DirectoryIndex index.html index.cgi index.pl index.php index.xhtml index.htm
        #To this:
        DirectoryIndex index.php index.html index.cgi index.pl index.xhtml index.htm
</IfModule>
```



Step 5 of 3 - After saving the file, close and refresh the server using the following command to effect the changes. `sudo systemctl reload apache2`

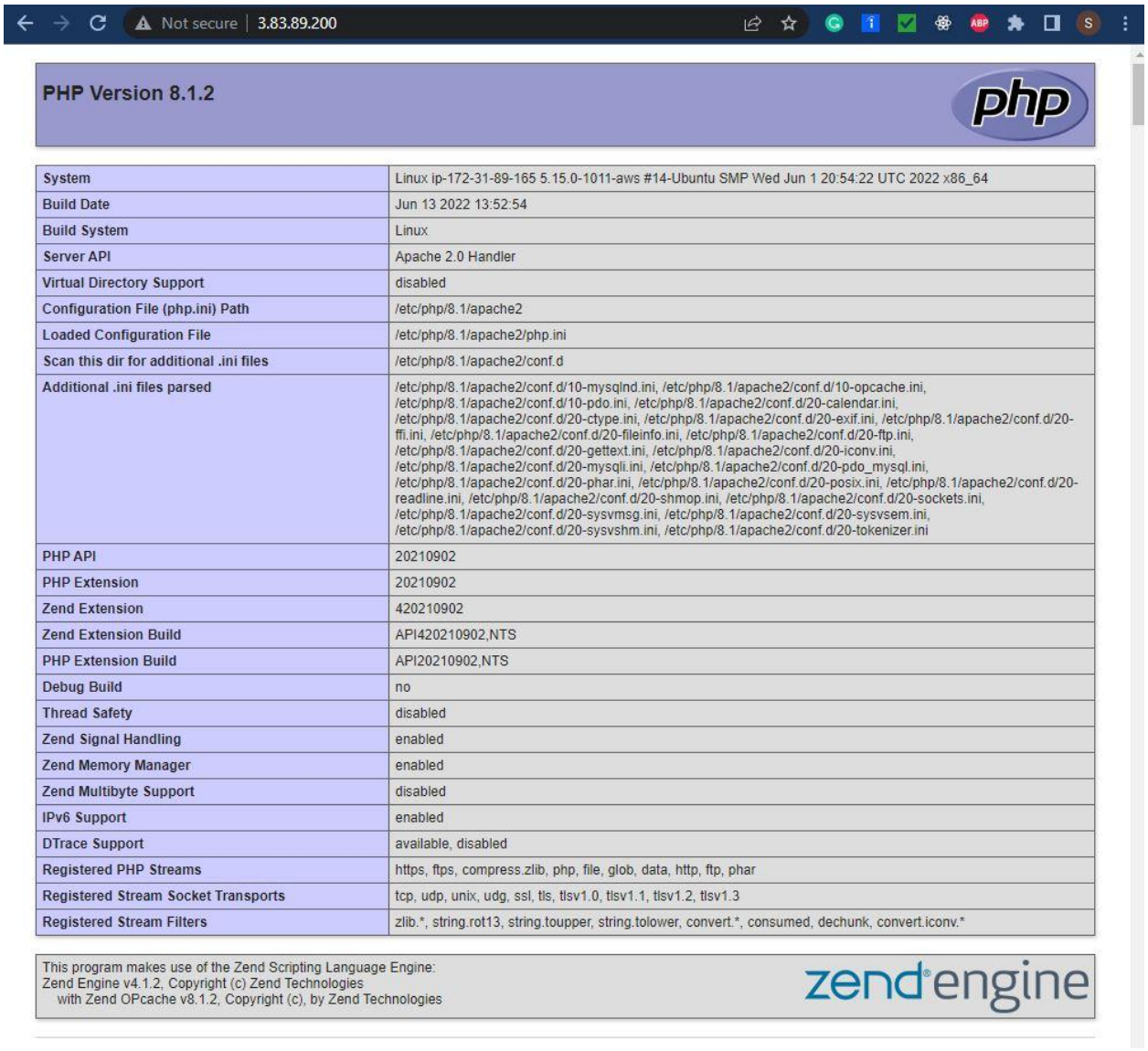
Next, we will create a PHP script to test our PHP configurations are run correctly.



Step 5 of 4 - To create a new PHP file, type `vim /var/www/projectlamp/index.php` this will open a blank file. Add the following code to the file.

```
<?php
phpinfo();
```

Save and close the file.



Step 5 of 5 - Then refresh the page in the browser to see the changes. The above page appears in our browser and provides the PHP information on our server, used for debugging and ensuring the settings are up to speed.

Step 5 of 6 - After checking the PHP settings, we need to remove the file because it contains critical server information about our PHP envronment.

Use the `rm` command to remove the file by typing the following:

```
sudo rm /var/www/projectlamp/index.php
```

This completes all the requirements for our project 1.