**Develop Cost Effective Web Applications Using Features of Amazon**

**Aim**

The set up includes a Linux server running on EC2.

 Create a Database server using Amazon Relational Database Service and connect the

instance to it.

 Now, install Drupal on the application server and configure your test application.

 Make sure that the application is publically accessible by configuring Security Groups.

 For high availability, create an Auto Scaling group. This Auto Scaling group spans

multiple availability zones to protect against the potential failure of a single availability

zone.

 The load balancer distributes traffic evenly among the EC2 instances. When the Auto

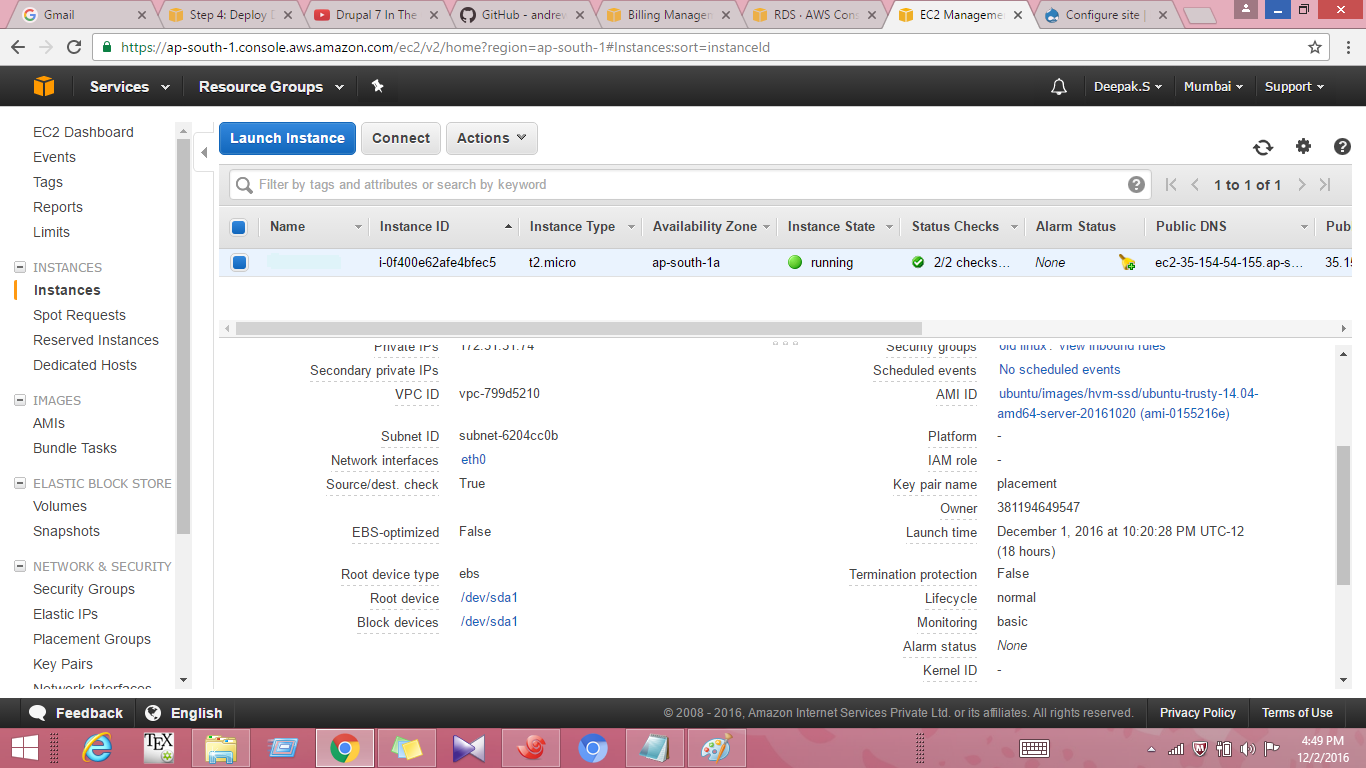
Scaling group launches or terminates instances based on load, the load balancer

automatically adjusts accordingly.**PREREQUISITES**

Launching ec2 instance , Configuring Autoscailing with ELB ,Launching an RDS instance and Basic knowledge of linux and php commands

**STEPS**

1.Create an instance t2 micro (web) with Ubuntu 14.04



2.ssh in to the machine in Xshell5 and type the following commands

sudo su

apt-get update

apt-get upgrade -y

apt-get dist-upgrade -y

apt-get autoremove -y

apt-get install apache2 php5 php5-cli php5-fpm php5-gd libssh2-php libapache2-mod-php5 php5-mcrypt php5-mysql git unzip zip postfix php5-curl mailutils php5-json -y

a2enmod rewrite headers

php5enmod mcrypt

nano /etc/apache2/sites-enabled/000-default.conf

<VirtualHost \*:80>

#ServerName example.com

#ServerAlias www.example.com

DocumentRoot /var/www/drupal

<Directory /var/www/drupal>

Options -Indexes

AllowOverride All

Order allow,deny

Allow from all

</Directory>

</VirtualHost>

cd /var/www

wget http://ftp.drupal.org/files/projects/drupal-7.36.zip

unzip drupal-7.36.zip

mv drupal-7.36 drupal

cd drupal

chmod -R 744 .

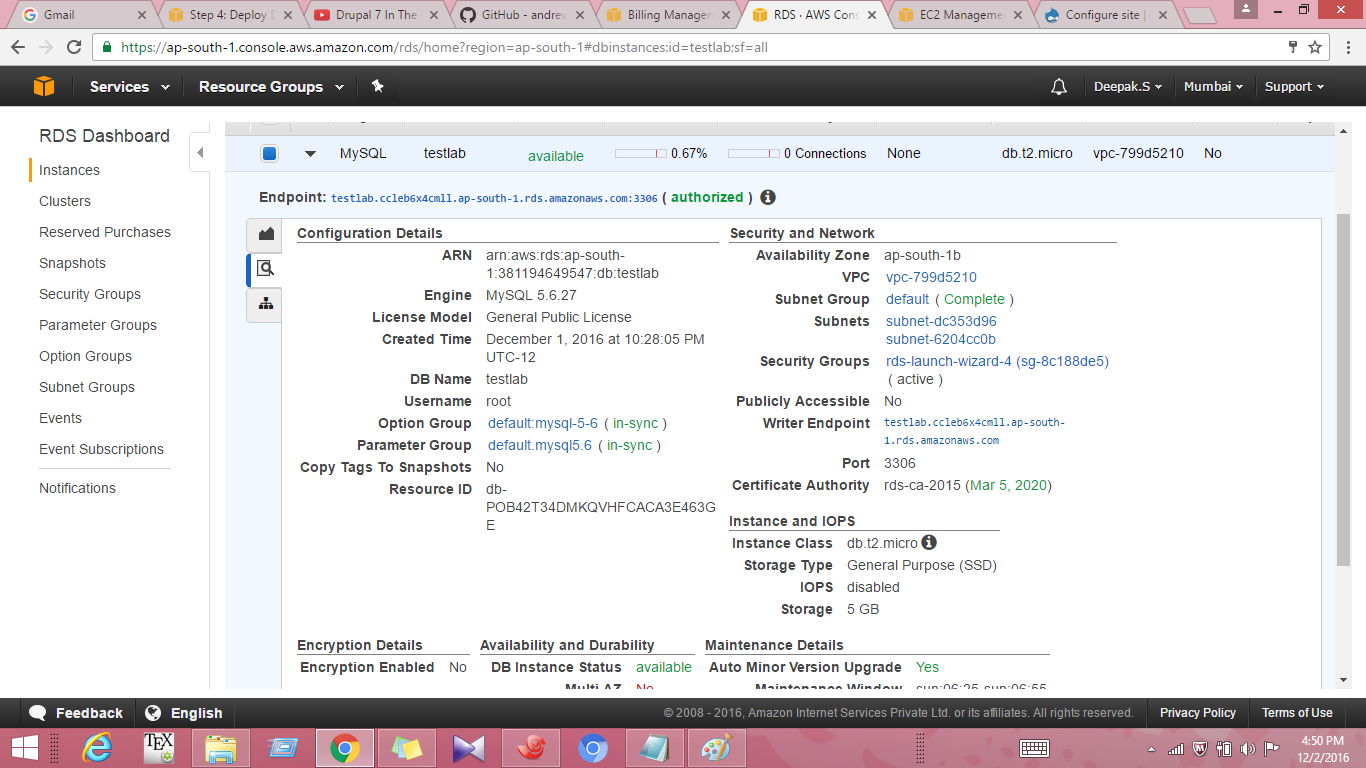
chown -R www-data:www-data .

service apache2 restart

apt-get install mysql-client-core-5.6 -y

service apache2 restart

3.Create an RDS-MySQL DB with **MultiAZ** Deployment with the specifications as in the screenshot below



4.Connect to drupal with the publicDNS of ec2 instance and Provide Configuration settings to install Drupal

such as DB Servername, user, password and database name.

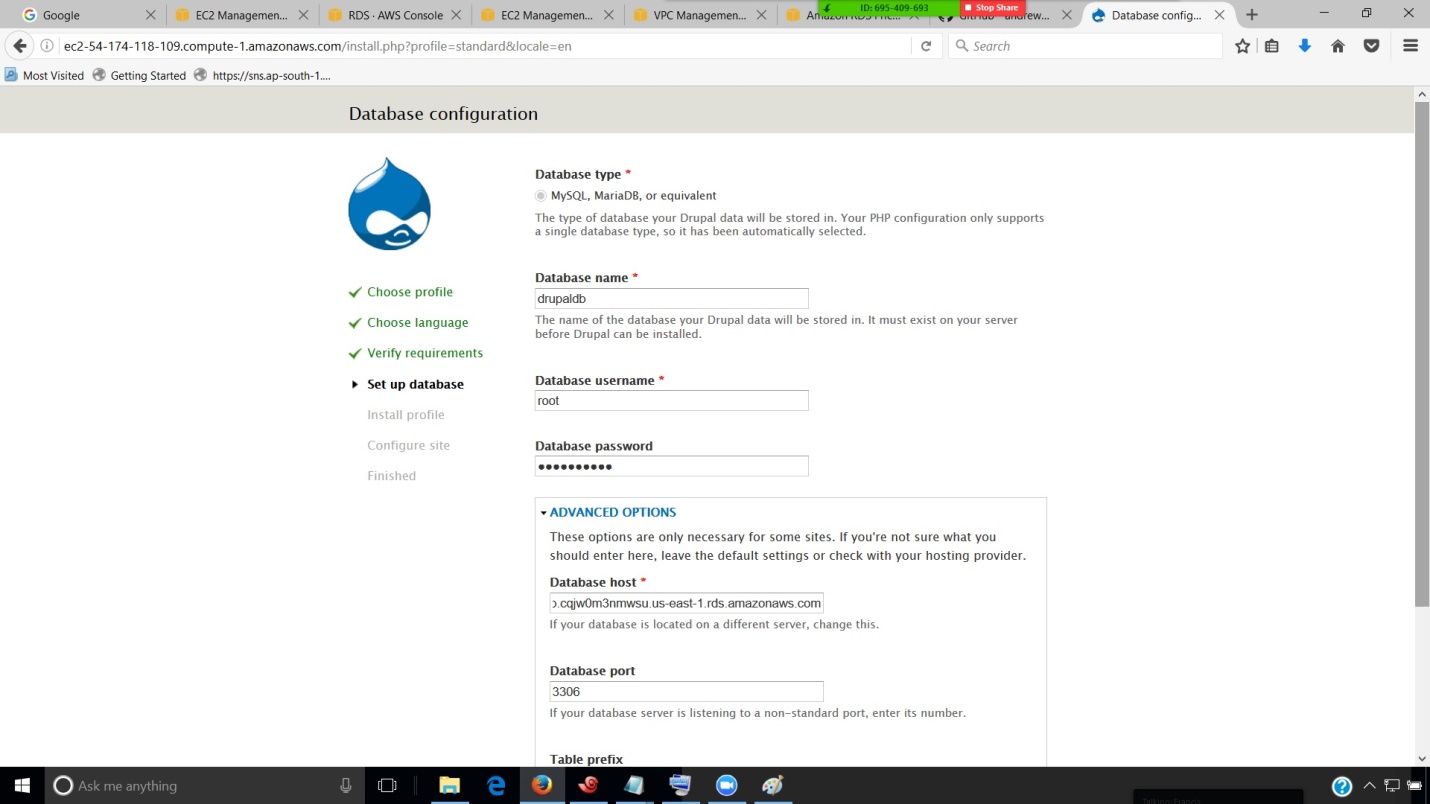
**RDS Details :-**

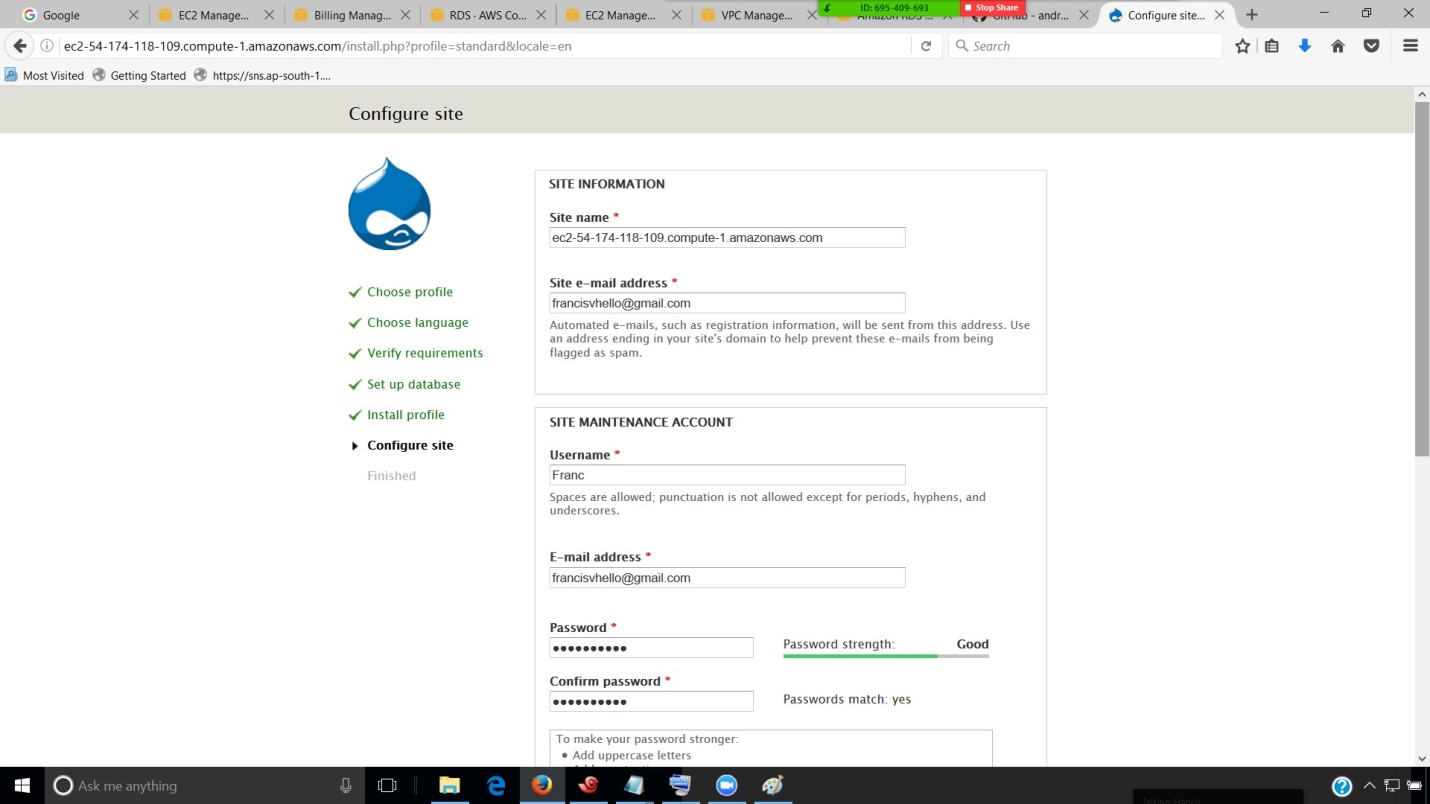
**RDS Endpoint : drupaldb.cqjw0m3nmwsu.us-east-1.rds.amazonaws.com**

**User : root ,pass : welcome123**

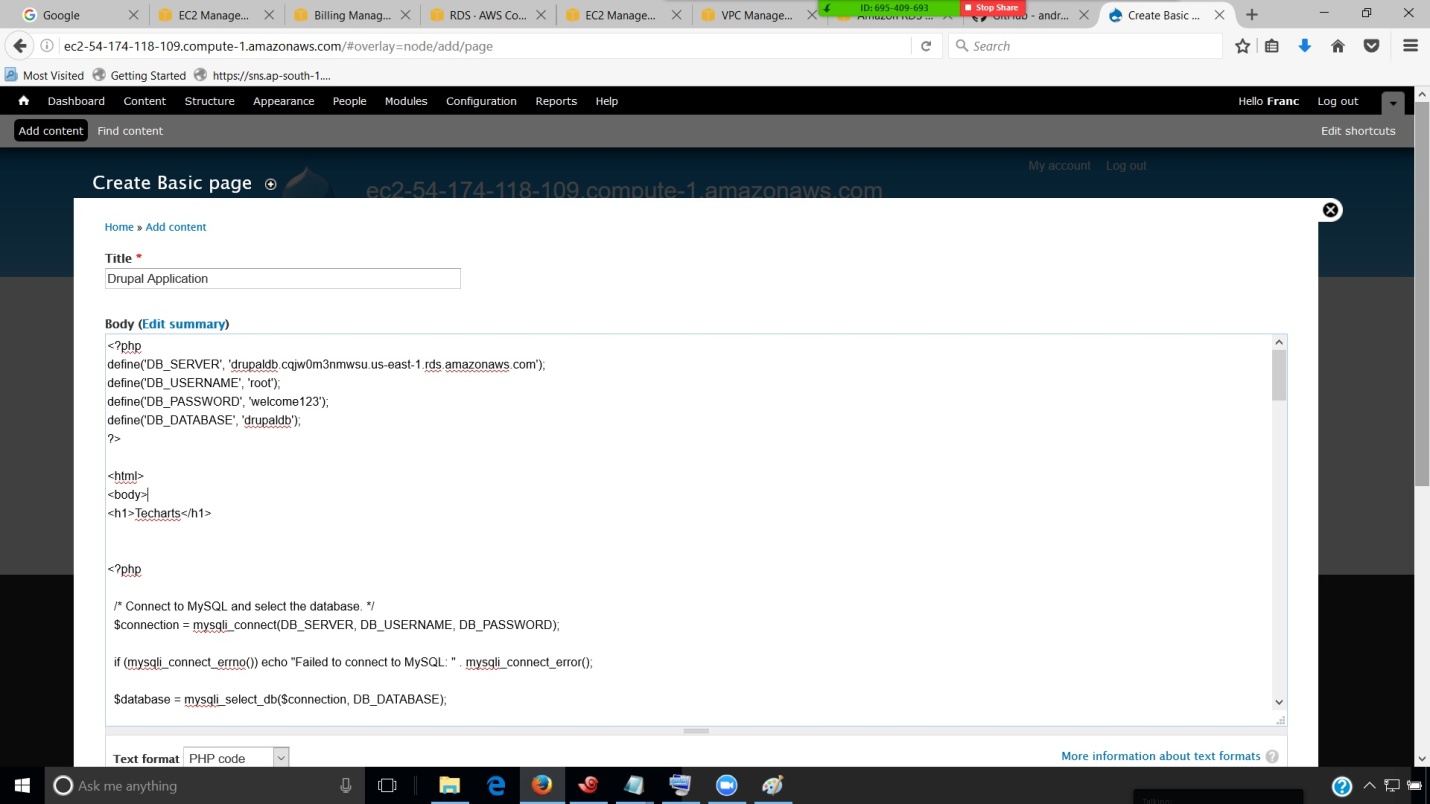
**Dbname : drupaldb**

DB server name will be the endpoint of RDS-MYSQL instance





**Configuring Drupal to Run PHP:-**



We need to Enable PHP filter module to run PHP Code.

1. Click on Module >>> Scroll down to the PHP filter module >>> Select the Check box against PHP filter.

2.. Click on Save Configuration.

3. "Use the PHP code text format" and it's checkbox for the Administrator should be checked.

3. Scroll down again to PHP filter module >>> Click on Permissions >>> Scroll down to the Filter >>

Select the last Check boxes against "Use the PHP code text format" in the Filter Section.

( Check boxes for authenticated user & administrator for "Use the PHP code text format" in Filter. )

4. Scroll down until the end and Click on Save Permissions.

**Creating custom Block to run PHP Code:-**

1. To begin, create a custom Block by navigating to the Add Block page found at [your site]/admin/structure/block/add or on the Drupal 7 menu: Administration > Structure > Blocks > Add Block.

( ie Click on Structure >>> Blocks >>>> Add Block )

2. Give a Block Title. ( MyPHP )

3. Give Block Description. ( PHPBlock)

4. In the Place of Block Body give the PHP Code as follows:-

Hello

<p>Welcome!</p>

Today's date is:

<?php

echo date('m/d/Y');

?>

5. Scroll Down and Select the Text Format as "PHP Code"

6. Leave all other setting as default and Click on Save Block.

/// A message will be displayed The Block has been created with a Tick mark.

7. Close the Blocks Section.

8. Click on Add new Content Link on your Homepage ( Close all open windows and refresh your browser tab for drupal. )

9. Click on Basic Page.

10. Give Title Drupal Application.

12. Copy and Paste PHP Code below into Body part.

<?php

define('DB\_SERVER', 'mysql-rds.cpqsf00brjcy.ap-south-1.rds.amazonaws.com');

define('DB\_USERNAME', 'root');

define('DB\_PASSWORD', 'drupal123');

define('DB\_DATABASE', 'drupaldb');

?>

<html>

<body>

<h1>Techarts</h1>

<?php

/\* Connect to MySQL and select the database. \*/

$connection = mysqli\_connect(DB\_SERVER, DB\_USERNAME, DB\_PASSWORD);

if (mysqli\_connect\_errno()) echo "Failed to connect to MySQL: " . mysqli\_connect\_error();

$database = mysqli\_select\_db($connection, DB\_DATABASE);

/\* Ensure that the Employees table exists. \*/

VerifyEmployeesTable($connection, DB\_DATABASE);

/\* If input fields are populated, add a row to the Employees table. \*/

$employee\_name = htmlentities($\_POST['Name']);

$employee\_address = htmlentities($\_POST['Address']);

if (strlen($employee\_name) || strlen($employee\_address)) {

AddEmployee($connection, $employee\_name, $employee\_address);

}

?>

<!-- Input form -->

<form action="<?PHP echo $\_SERVER['SCRIPT\_NAME'] ?>" method="POST">

<table border="0">

<tr>

<td>Name</td>

<td>Address</td>

</tr>

<tr>

<td>

<input type="text" name="Name" maxlength="45" size="30" />

</td>

<td>

<input type="text" name="Address" maxlength="90" size="60" />

</td>

<td>

<input type="submit" value="Add Data" />

</td>

</tr>

</table>

</form>

<!-- Display table data. -->

<table border="1" cellpadding="2" cellspacing="2">

<tr>

<td>ID</td>

<td>Name</td>

<td>Address</td>

</tr>

<?php

$result = mysqli\_query($connection, "SELECT \* FROM Employees");

while($query\_data = mysqli\_fetch\_row($result)) {

echo "<tr>";

echo "<td>",$query\_data[0], "</td>",

"<td>",$query\_data[1], "</td>",

"<td>",$query\_data[2], "</td>";

echo "</tr>";

}

?>

</table>

<!-- Clean up. -->

<?php

mysqli\_free\_result($result);

mysqli\_close($connection);

?>

</body>

</html>

<?php

/\* Add an employee to the table. \*/

function AddEmployee($connection, $name, $address) {

$n = mysqli\_real\_escape\_string($connection, $name);

$a = mysqli\_real\_escape\_string($connection, $address);

$query = "INSERT INTO `Employees` (`Name`, `Address`) VALUES ('$n', '$a');";

if(!mysqli\_query($connection, $query)) echo("<p>Error adding employee data.</p>");

}

/\* Check whether the table exists and, if not, create it. \*/

function VerifyEmployeesTable($connection, $dbName) {

if(!TableExists("Employees", $connection, $dbName))

{

$query = "CREATE TABLE `Employees` (

`ID` int(11) NOT NULL AUTO\_INCREMENT,

`Name` varchar(45) DEFAULT NULL,

`Address` varchar(90) DEFAULT NULL,

PRIMARY KEY (`ID`),

UNIQUE KEY `ID\_UNIQUE` (`ID`)

) ENGINE=InnoDB AUTO\_INCREMENT=1 DEFAULT CHARSET=latin1";

if(!mysqli\_query($connection, $query)) echo("<p>Error creating table.</p>");

}

}

/\* Check for the existence of a table. \*/

function TableExists($tableName, $connection, $dbName) {

$t = mysqli\_real\_escape\_string($connection, $tableName);

$d = mysqli\_real\_escape\_string($connection, $dbName);

$checktable = mysqli\_query($connection,

"SELECT TABLE\_NAME FROM information\_schema.TABLES WHERE TABLE\_NAME = '$t' AND TABLE\_SCHEMA = '$d'");

if(mysqli\_num\_rows($checktable) > 0) return true;

return false;

}

?>

13. Change the values for DB\_SERVER, DB\_USERNAME, DB\_PASSWORD, DB\_DATABASE as required. ( ie. Give your RDS Details)

14. Scroll Down and Select the Text Format as "PHP Code"

15. In URL path settings set URL alias as 'front-page' and Click on Save button.

15. Leave all other setting as default and Click on Save.

( Now drupal created a page with some title and content and url is yoursitename/front-page )

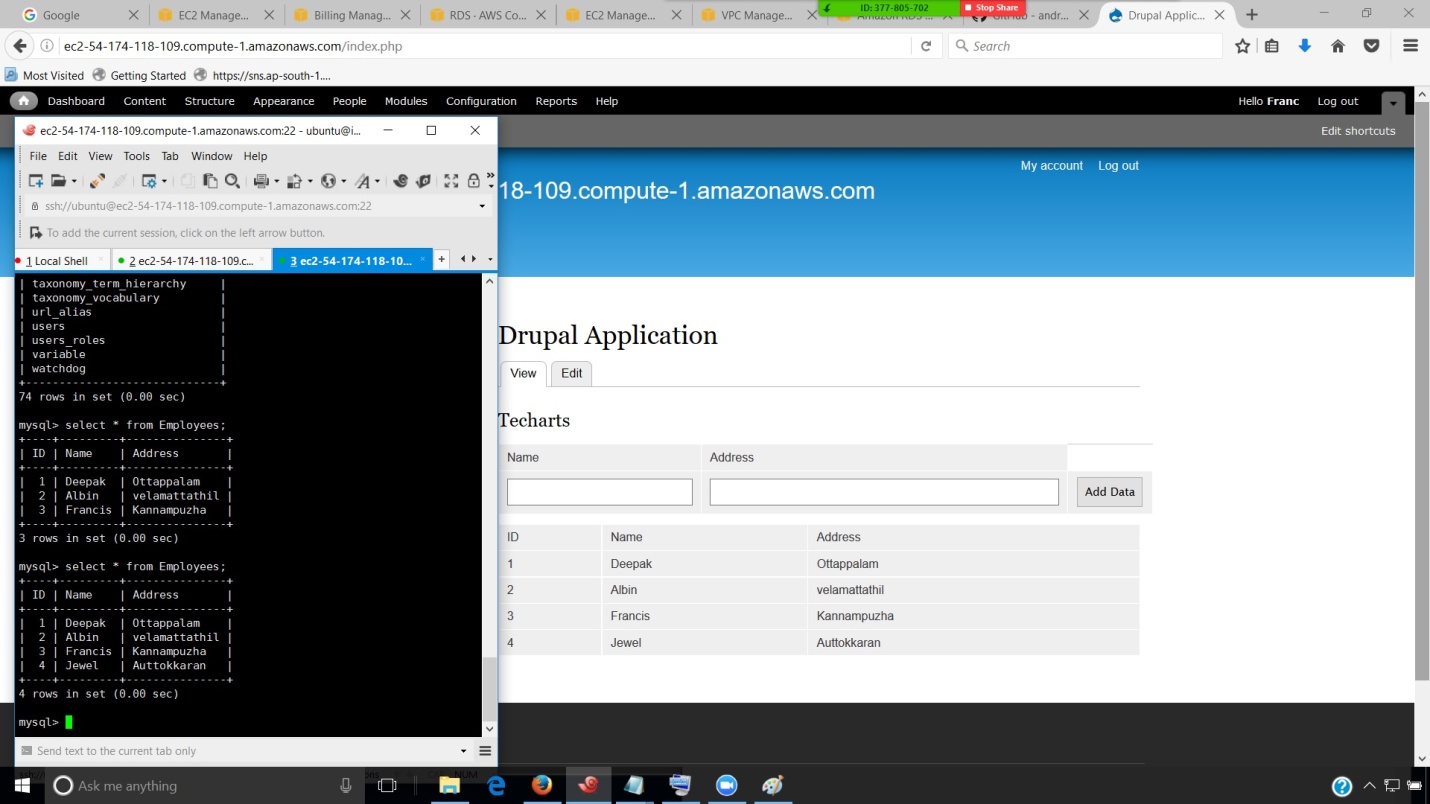
16. Go to configuration >>> site information (under system on right side ) >>> FRONT PAGE-> Default front page

In text box enter the URL alias of your front page as 'front-page'.

17. Scroll down and Save Configuration.

18. Load your Frontpage as (Public DNS of EC2)/front-page

19. Enter data into the Text Boxes and Press Submit Button.



**Autoscailing with ELB for drupal web application**

**STEPS:**

1. Click on Load Balancer in EC2 Dashboard

2. Click on Create Load Balancer.

3. Select Classic Load Balancer and click on Continue.

4. On the Define Load Balancer Basic Configuration Page:-

Give Load Balancer Name : webserver

5. Create LB Inside : Select your VPC

5.1. Select Advanced VPC

6. Under Select Subnets you must select two Subnets in different Azones.

Click on + sign against each subnet to select both subnets in two Azones.

Click on Next: Assign Security Groups.

7. Very NB: You have to define same security group as EC2 , Same VPC.

Select your security group and Click on Next: Configure Security Settings

8. Click on Next: Configure Health Check

9. Ping Protocol : HTTP

Ping Port : 80

Ping Path : /

Response Timeout : 5

Interval : 30

Unhealthy Threshold : 2

Healthy Threshold : 10

Click on Next: Add EC2 Instances

10. On the Add EC2 Instances Page, Do not add EC2 if you want to do Auto scaling.

With Auto Scaling you have option to add instances.

If Auto scaling is not there ( Normal ELB ) you can select Instances.

Check the option : Enable Cross-Zone Load Balancing

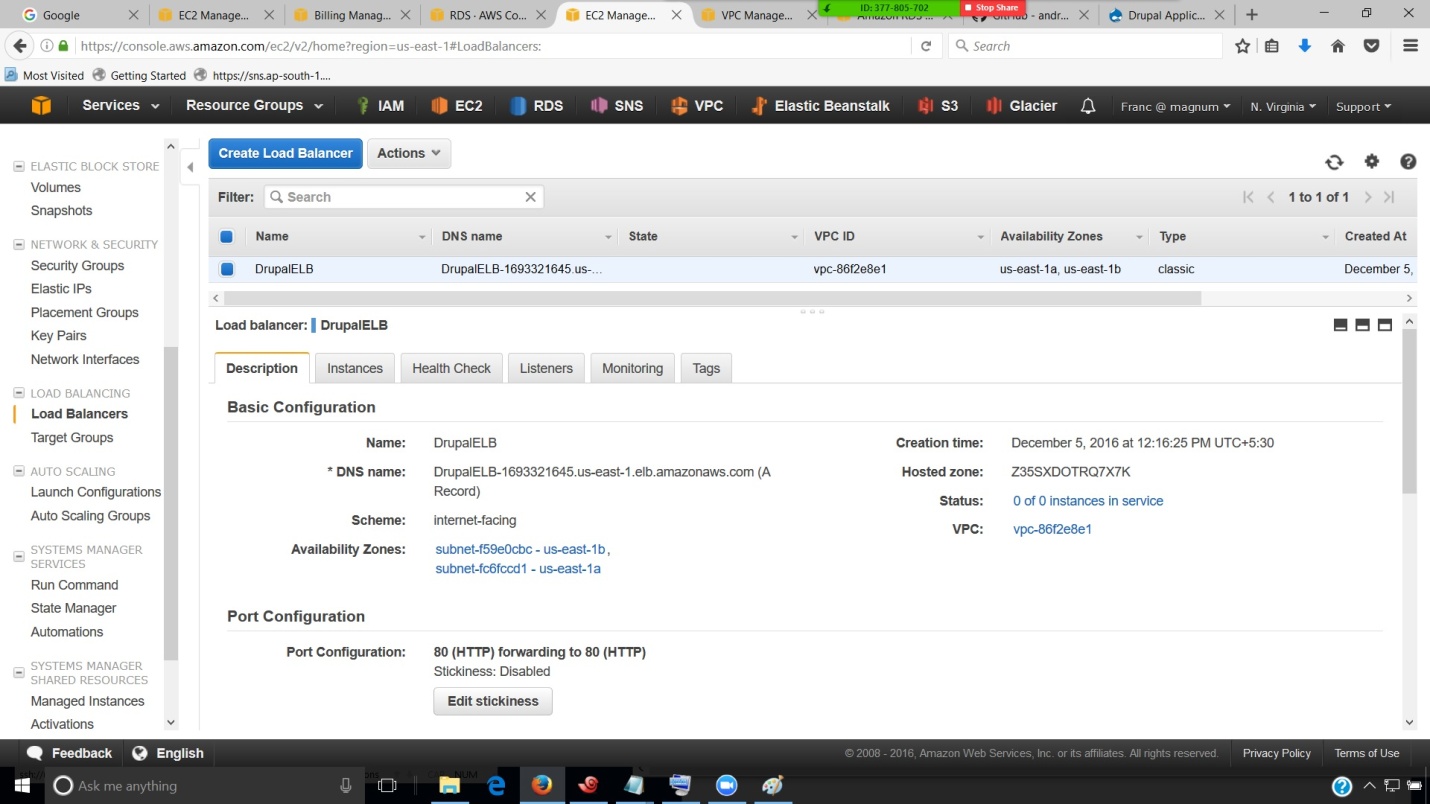
Click on Next: Add Tags

11. on Add Tags page, Give name for Key and test as value

12. Click on Review and Create.

13. on Review page click on Create. /// Message will come successfully created load balancer.

14. Click on the name of the Load balancer. /// It will take you to Load Balancers tab on EC2 Dashboard.



15. Click on Instances Tab.

16. click on Launch Configurations under Auto Scaling in the Navigation pane.

17. Click on Create Auto Scaling Group

18. Click on Create Launch Configuration.

19. Select My AMIs in Create Launch Configuration page.

20. Select your AMI ( Dev-test-web - ami-7f4b971f )

21. Select t2.micro and click on Next: configure Details.

22. Give name for Launch Configuration ( webserver1 )

23. Expand Advanced Details and Select IP Address Type as : Assign A Public IP Address to every Instance.

Click on Next: Add Storage

24. Click on Next: Configure Security Group.

25. Select your Security Group ( webserver )

Click on Review.

26. Click on Create Launch Configuration.

27. Provide your Key pair. and click on Create Launch Configuration.

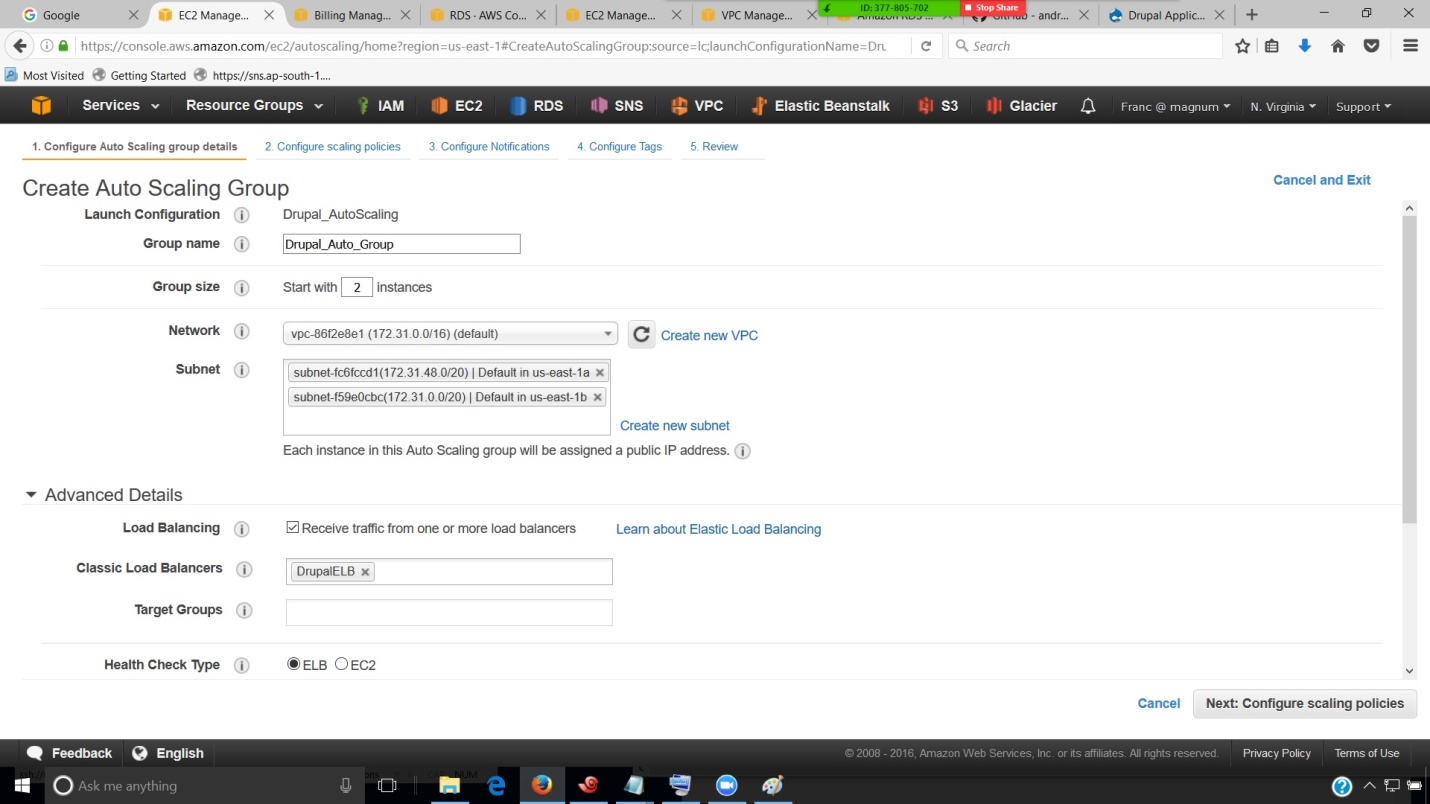
28. On create Auto Scaling Group page,

Give Group name ( webserver12 )

Group Size : Start with 2 Instances

Network : Same VPC ( yours )

Subnet : Select Both Subnets in Different Azones



Expand Advanced Details Tab:-

Load Balancing : Select Option " Receive traffic from one or more Load Balancers "

Classic Load Balancers : Click on the Textbox and select your Load Balancer.

Health Check Type : Select ELB

Instance Protection : Select Protect From Scale In

Finally Click on Next: Configure Scaling Policies.

29. Select " Use Scaling Policies to adjust the capacity of this group "

Under Increase Group Size:-

30. Click on Add new Alarm Link against Execute policy when:

31. Select your SNS Topic

Whenever Average of CPU Utilization IS >= 80 Percent

For at least 1 con. periods of 1 Min

Click on Create Alarm.

32. Take Action : Add 1 instances when 80 <= CPU Uti.

Under Decrease Group Size:-

33. Click on Add new Alarm Link against Execute policy when:

Select Same SNS Topic used before.

Whenever Average of CPU Utilization

IS >= 20 Percent

For at least 1 Cons. periods of 1 mins

Click on Create Alarm.

34. Take Action : Remove 1 instances when 20 <= CPU Uti.

35. Click on Next: Configure Notifications

36. click on Add Notification

Send a Notification to : Same SNS Topic

Whenever Instances ( Select All ) Launch, Terminate, Fail to Launch, Fail to Terminate

37. Click on Next: Configure Tags

38. Give name to Auto Scaling Group :

Key : name and Value : testwebserver

click on review.

39. Click on Create Auto Scaling Group

Message will come " Successfully created Auto Scaling Group

40. Click on View Creation Log.

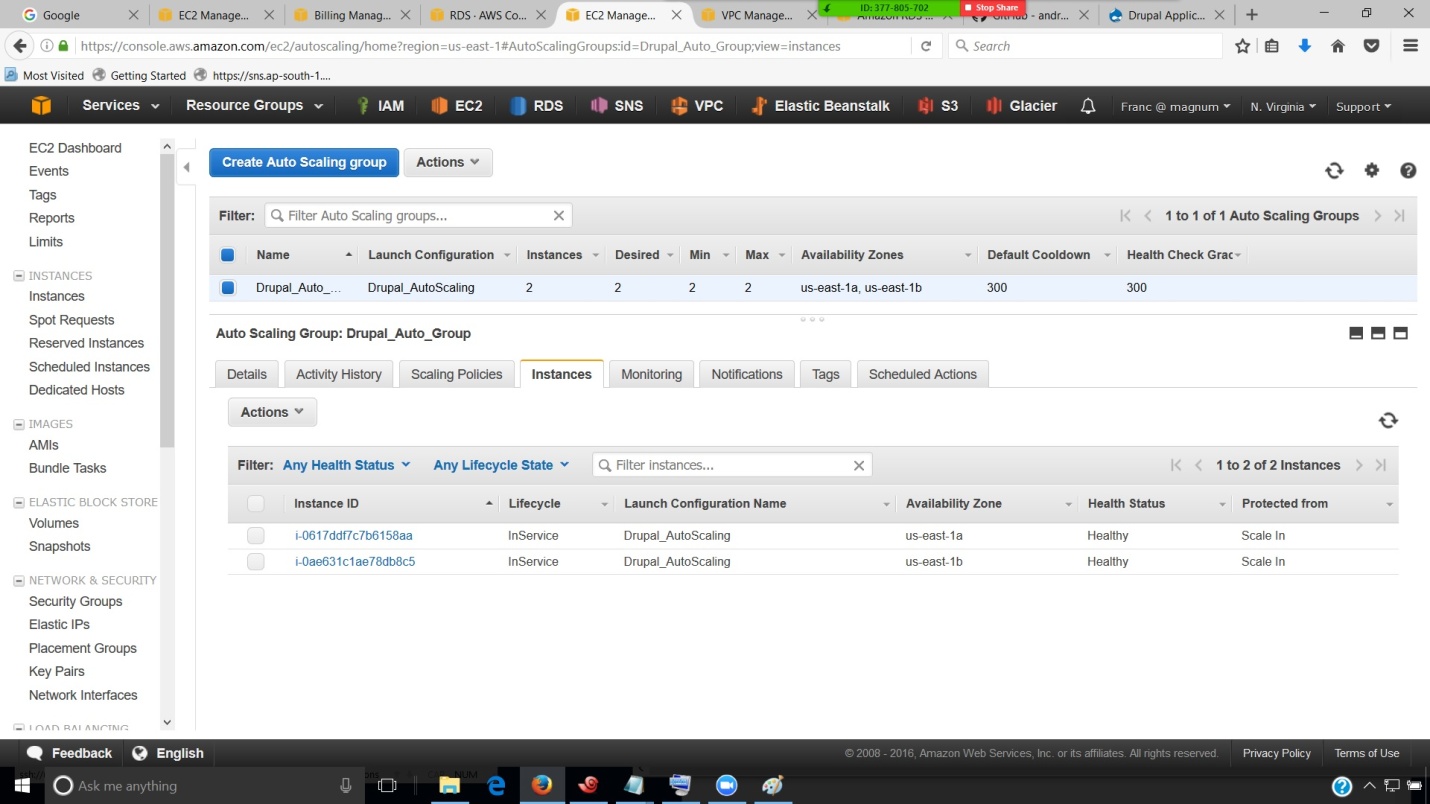
41. Click on View your Auto Scaling Groups.

42. Go to Instances Tab on EC2 Dashboard and check whether instances are starting.

43. Click on Load Balancers Tab under Autoscaling in EC2 Dashboard.

44. Select your Load Balancer and Click on Instance Tab.

( There will be no instances listed in Details pane )



Click on Refresh button, and then you can see Instances listed

The staus of the Instances will be " Out of Service " first and then it will change to,

In service ( you have to Refresh )( when instances creation completed and they have added successfully. )

45. Select Description Tab under Load Balancer ( In Load Balancers window )

46. Endpoint URL of Load Balancer will be provided against DNS Name.

47. Copy it and save it a notepad.

48. Provide the Endpoint URL of Load Balancer in browser and Drupal will be displayed.as below.

ELB DNS : DrupalELB-1693321645.us-east-1.elb.amazonaws.com

ELB DrupalELB

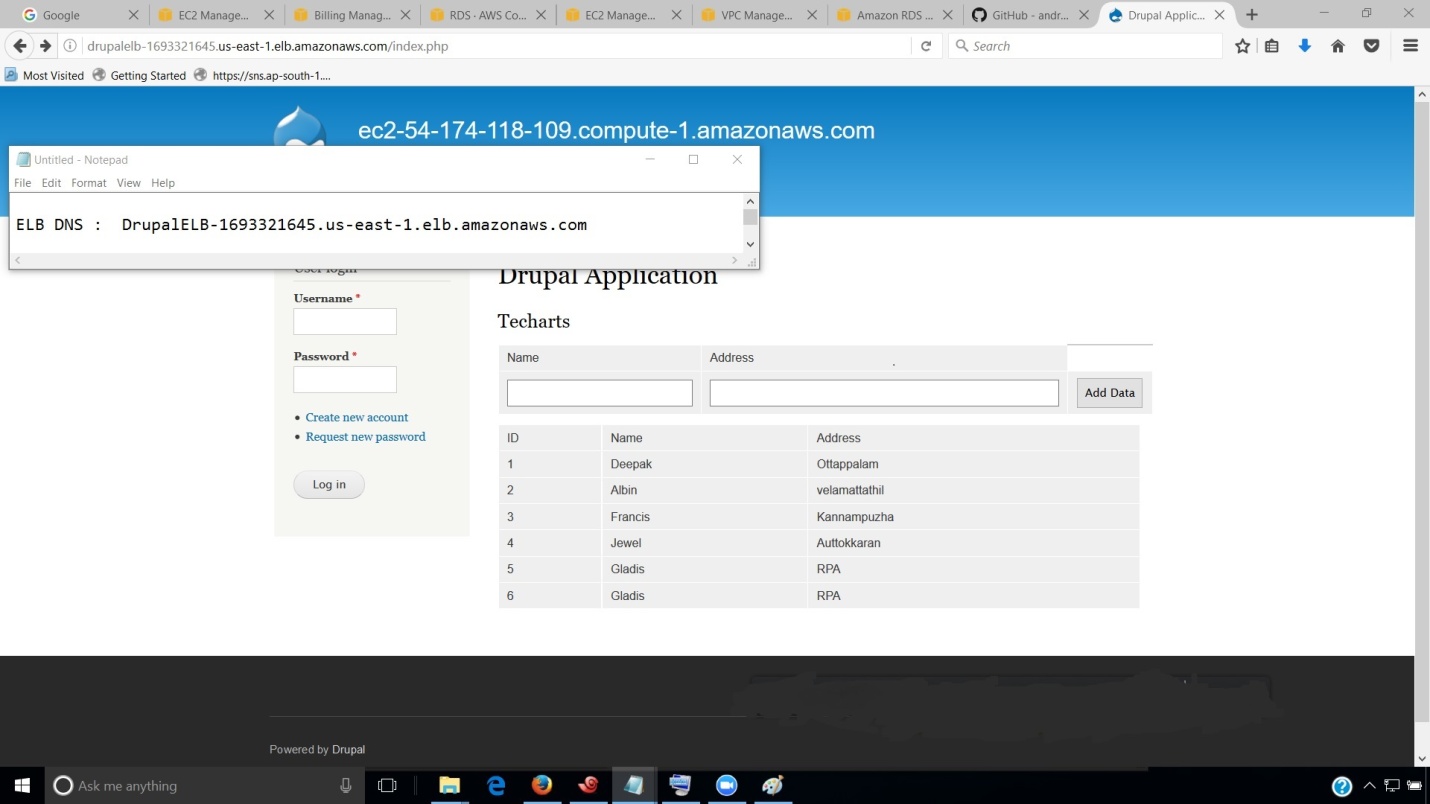
Drup\_1\_Webserver : ec2-52-201-243-174.compute-1.amazonaws.com

ssh ubuntu@ec2-52-201-243-174.compute-1.amazonaws.com

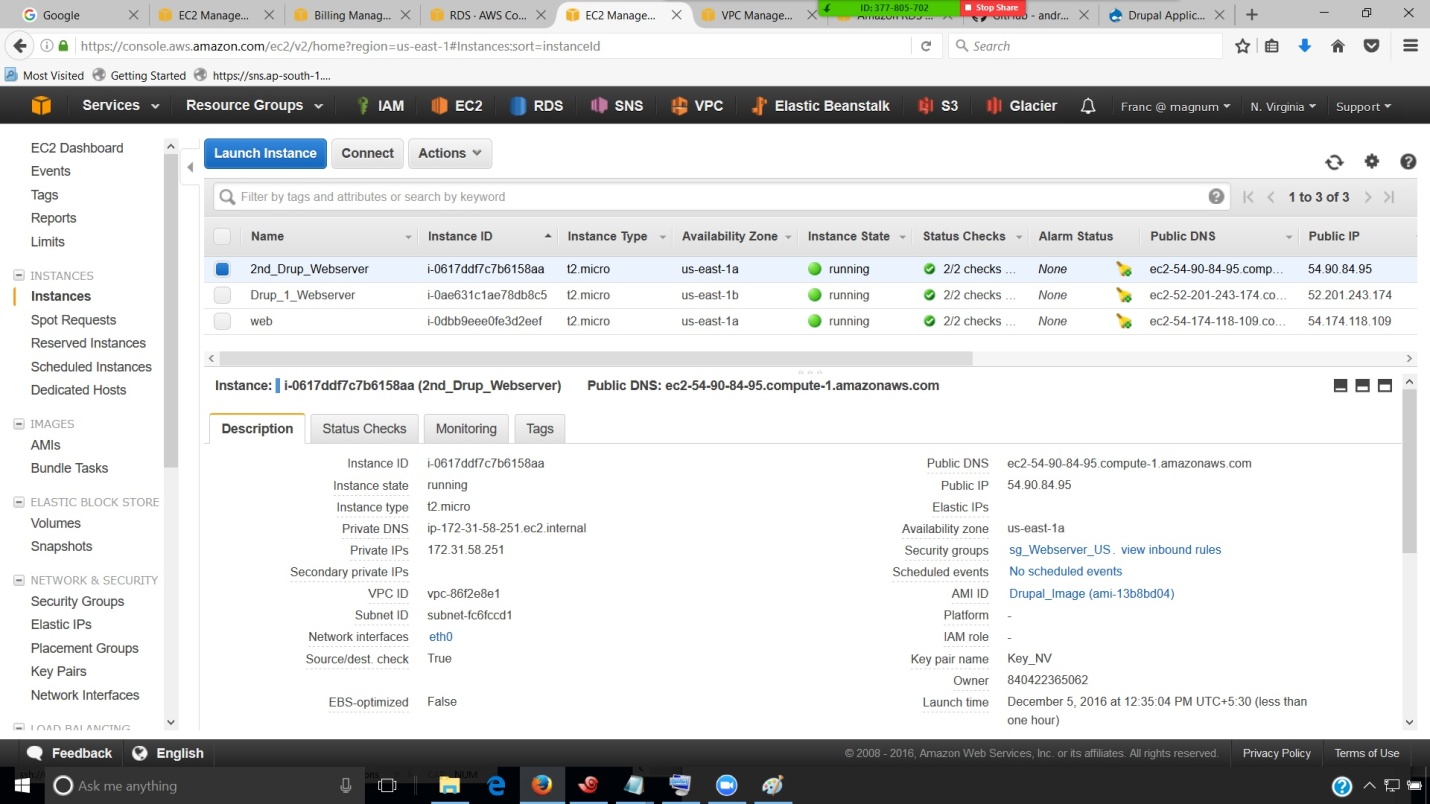
2nd\_Drup\_Webserver : ec2-54-90-84-95.compute-1.amazonaws.com

ssh ubuntu@ec2-54-90-84-95.compute-1.amazonaws.com

Webserver EC2 DNS: ec2-54-174-118-109.compute-1.amazonaws.com

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**49. Go to EC2 Dashboard and provide different names for each instances ( webservers ) launched into the Auto Scaling group.**

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**Ssh in to the webserver 2 in Xshell5**

. On Webserver 2, give command sudo service apache2 stop

. Check the Endpoint URL of ELB Refresh at times. You can see that Webserver 2 has become unavailable.

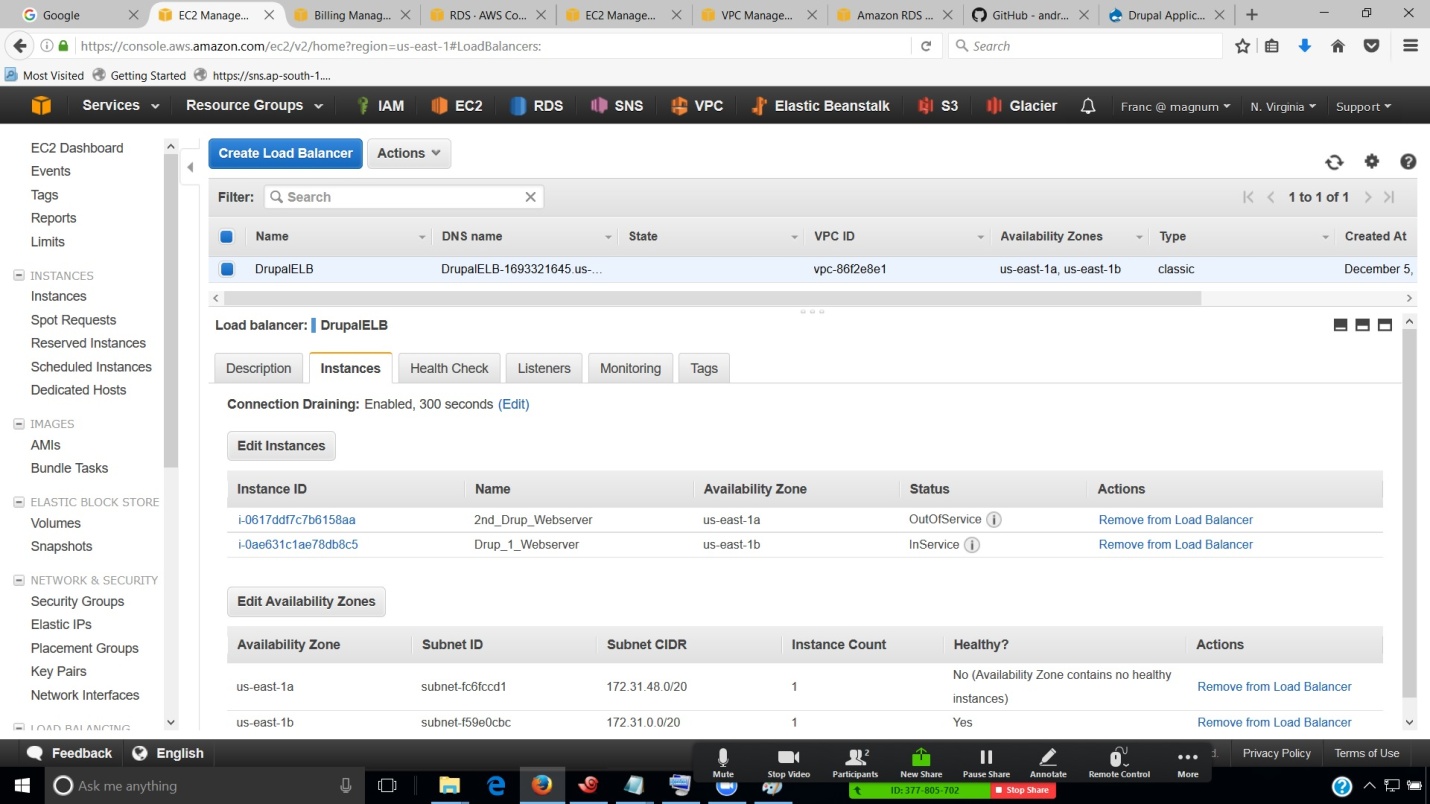
. If you watch the ELB page, ( Refresh the page )

After some time the status of the Webserver2 will change to Out of Service.

. Start apache2 again in On Webserver 2, by giving the command sudo service apache2 start

. Check the Endpoint URL of ELB Refresh at times. Wait for a minute by refreshing some times it will not start working

Check the Webserver 2 Public DNS by giving in the browser. You can see that it is working.

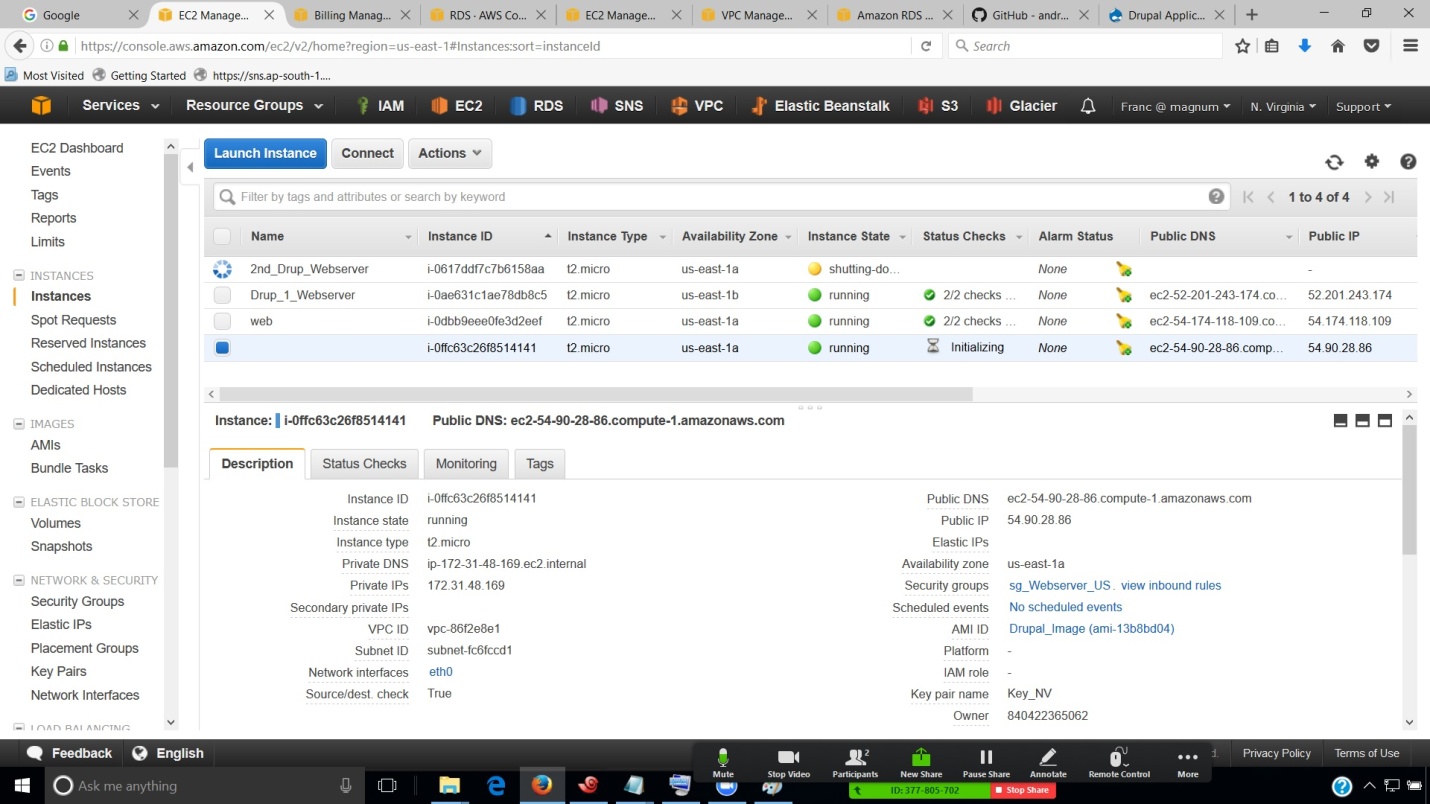


. But you can see that the Webserver 2 got removed from Load Balancer ( when you refresh Load Balancer page only Webserver 1 will get displayed. )

If You try to add Webserver 2 again, ( Click on Edit Instance on ELB page ) It will not be available to add.

Because Autoscaling detected that Webserver 2 has become unavilable for 1 min. Then it terminated the Instance.

Another Instance will be getting launched in its place. ( new webserver will be Initializing )

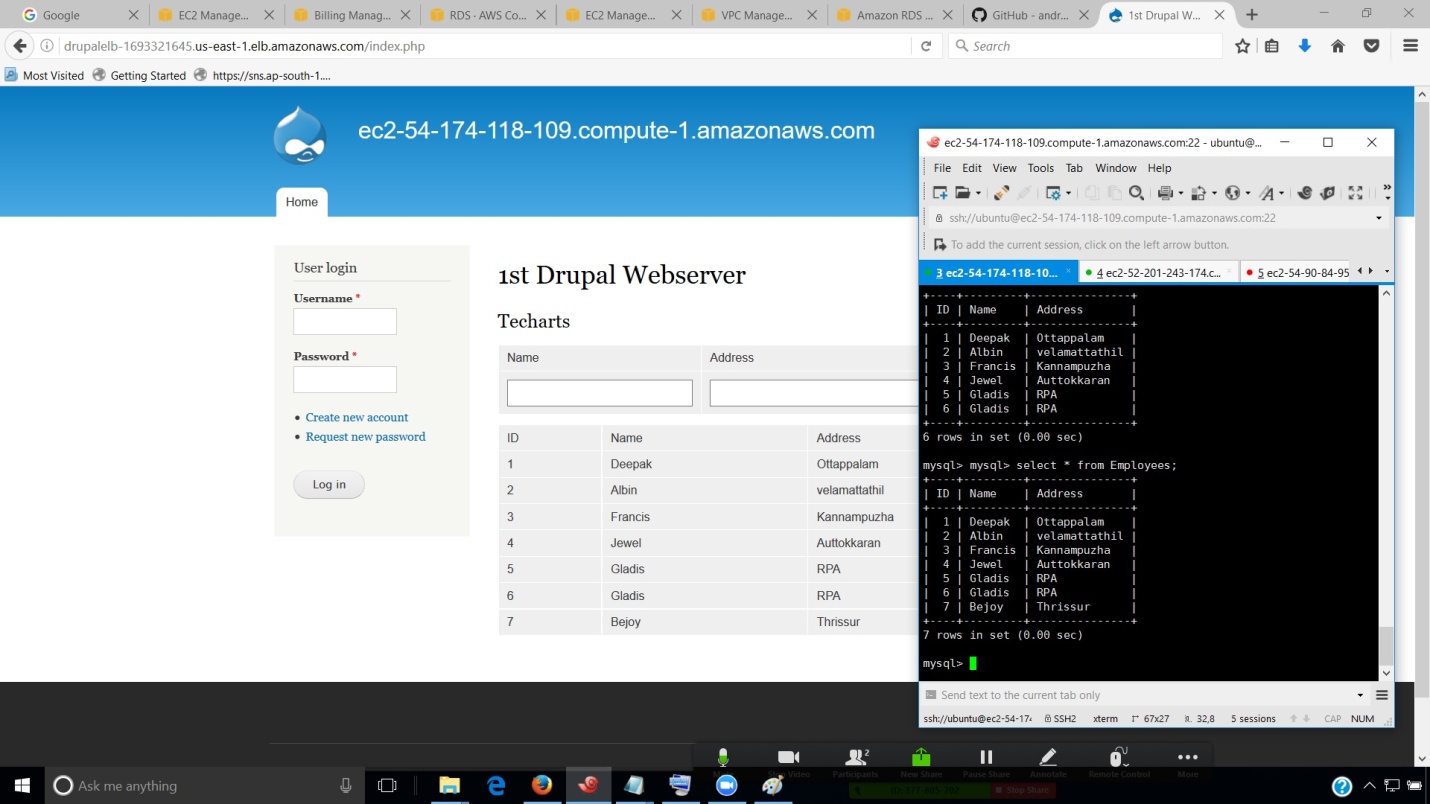


Go to EC2 Dashboard and you can see that Webserver 2 (old Instance) has terminated.

( And new webserver will be Initializing in its place. Rename newly initializing instance as Webserver 2 )

Again check the Endpoint URL of ELB ( in browser ) Refresh at times, you can see that new Webserver 2 has become available to share the load

When you refresh you can see that both webservers will be coming and sharing the load simultaniously.

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**RESULT**

**1.Drupal was successfully configured on the Ubuntu14.04 webserver**

**2.A webapplication was sucessfuly deployed using drupal also the webapplication was connected to a RDS-MYSQL database in baground for storing data. The MySQL DB was deployed in MultiAZ**

**3.** **For high availability, Auto Scaling group was created and This Auto Scaling group spans multiple availability zones to protect against the potential failure of a single availability zone.**

**4.** **The load balancer distributed traffic evenly among the EC2 instances. When the AutoScaling group launches or terminates instances based on load, the load balancer automatically adjusted accordingly**

**5.The features of Amazon such as ELB,AUTOSCAILING,RDS was incorporated to produce a Web application at 0$ in Amazon free\_tier(North Virginia)**

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