

CMPE 281 – CLOUD TECHNOLOGIES

Lab #1 Assignment – Playing with Amazon's EC2

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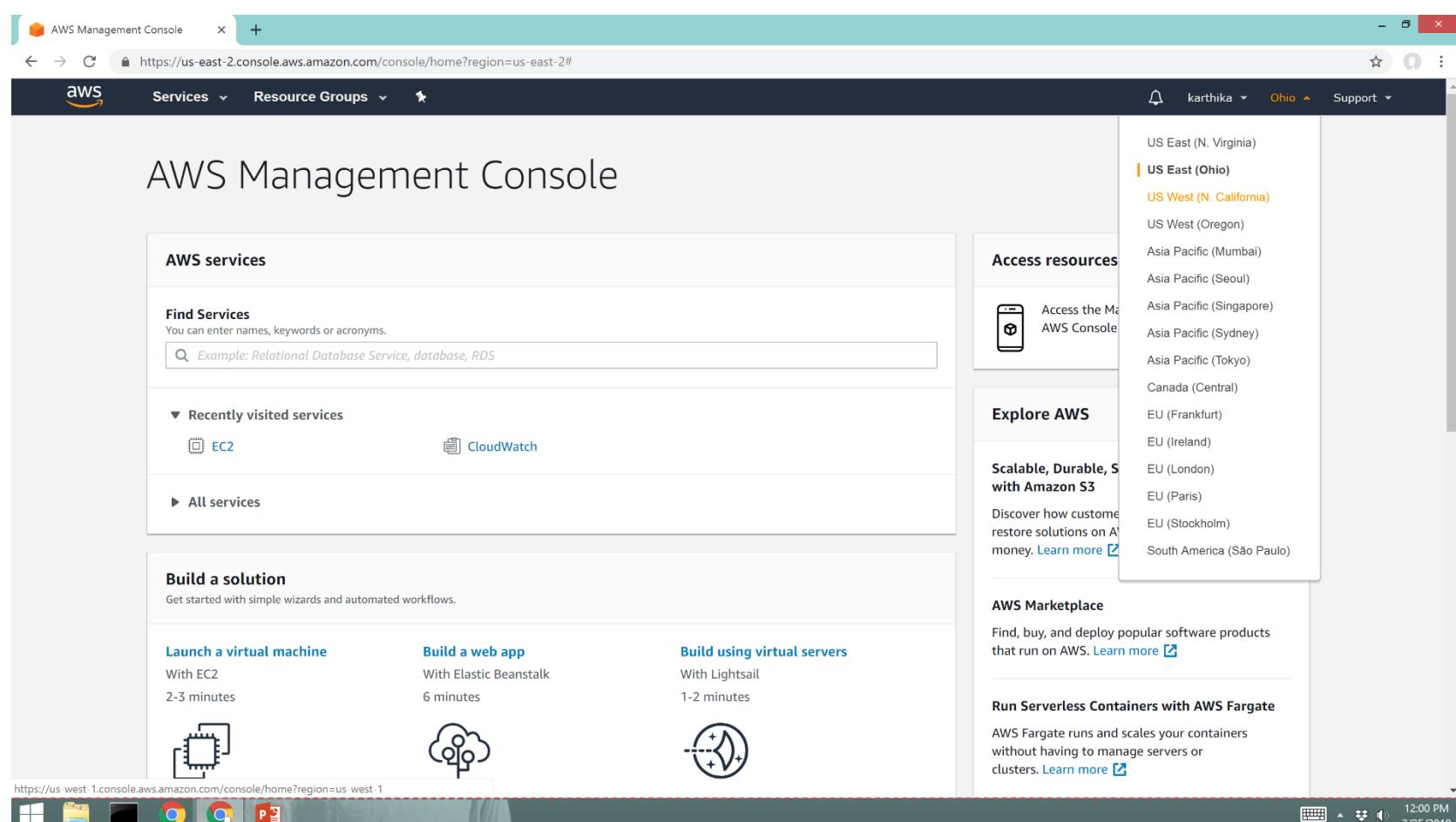
Semester: Spring, 2019

Objective

This document contains step by step demonstration of Amazon Web Services registration, EC2 instance configuration, deploying development environment (LAMP Stack), sample project creation and deployment along with report on metrics from Cloud watch Monitor..

Creating and Launching EC2 instance

1. Login to AWS Console and choose location of our choice in top right corner to host the EC2 instance.



2. Under EC2 services, click Launch instance

The screenshot shows the AWS EC2 Management Console dashboard. On the left, there's a sidebar with navigation links for EC2 Dashboard, Instances, Images, and Network & Security. The main content area displays 'Resources' and 'Service Health'. 'Resources' includes metrics like 0 Running Instances, 0 Dedicated Hosts, etc. 'Service Health' shows the status of US West (N. California) and various availability zones. On the right, there's an 'Account Attributes' section with details like VPC (vpc-90ecdaf7), Default VPC, and Resource ID length management. Below that is an 'Additional Information' section with links to Getting Started Guide, Documentation, and forums. A 'AWS Marketplace' section is also present.

3. Choose AMI of our choice. I chose Ubuntu 18.4 to setup Lamp stack for running PHP application over EC2 instance.

The screenshot shows the 'Step 1: Choose an Amazon Machine Image (AMI)' page of the EC2 Launch Instance Wizard. It lists several AMIs under 'Community AMIs':

- Amazon Linux AMI 2018.03.0 (HVM), SSD Volume Type - ami-0ec6517f6edbf8044**
Root device type: ebs Virtualization type: hvm
Select button (64-bit (x86))
- Red Hat Enterprise Linux 7.5 (HVM), SSD Volume Type - ami-18726478**
Root device type: ebs Virtualization type: hvm
Select button (64-bit (x86))
- SUSE Linux Enterprise Server 15 (HVM), SSD Volume Type - ami-0be4d33b23ba37935**
Root device type: ebs Virtualization type: hvm
Select button (64-bit (x86))
- Ubuntu Server 18.04 LTS (HVM), SSD Volume Type - ami-063aa838bd7631e0b**
Root device type: ebs Virtualization type: hvm
Select button (64-bit (x86))

A note at the bottom encourages launching a database instance using Amazon RDS.

4. Choose an instance type. (chosen t2.micro free tier instance)

Step 2: Choose an Instance Type

Amazon EC2 provides a wide selection of instance types optimized to fit different use cases. Instances are virtual servers that can run applications. They have varying combinations of CPU, memory, storage, and networking capacity, and give you the flexibility to choose the appropriate mix of resources for your applications. [Learn more](#) about instance types and how they can meet your computing needs.

	Family	Type	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance	IPv6 Support
<input type="checkbox"/>	General purpose	t2.nano	1	0.5	EBS only	-	Low to Moderate	Yes
<input checked="" type="checkbox"/>	General purpose	t2.micro	1	1	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	General purpose	t2.small	1	2	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	General purpose	t2.medium	2	4	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	General purpose	t2.large	2	8	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	General purpose	t2.xlarge	4	16	EBS only	-	Moderate	Yes
<input type="checkbox"/>	General purpose	t2.2xlarge	8	32	EBS only	-	Moderate	Yes
<input type="checkbox"/>	General purpose	t3.nano	2	0.5	EBS only	Yes	Up to 5 Gigabit	Yes
<input type="checkbox"/>	General purpose	t3.micro	2	1	EBS only	Yes	Up to 5 Gigabit	Yes

Currently selected: t2.micro (Variable ECUs, 1 vCPUs, 2.5 GHz, Intel Xeon Family, 1 GiB memory, EBS only)

Filter by: All instance types Current generation Show/Hide Columns

Cancel Previous Review and Launch Next: Configure Instance Details

5. Configure Instance details.

- Enabled Auto assign Public Ip
- Enabled Cloud watch Monitoring

Step 3: Configure Instance Details

Configure the instance to suit your requirements. You can launch multiple instances from the same AMI, request Spot instances to take advantage of the lower pricing, assign an access management role to the instance, and more.

Number of instances	1	Launch into Auto Scaling Group
Purchasing option	<input type="checkbox"/> Request Spot instances	
Network	vpc-90ecdaf7 (default)	Create new VPC
Subnet	No preference (default subnet in any Availability Zone)	Create new subnet
Auto-assign Public IP	Enable	
Placement group	<input type="checkbox"/> Add instance to placement group	
Capacity Reservation	Open	Create new Capacity Reservation
IAM role	None	Create new IAM role
Shutdown behavior	Stop	
Enable termination protection	<input type="checkbox"/> Protect against accidental termination	
Monitoring	<input checked="" type="checkbox"/> Enable CloudWatch detailed monitoring Additional charges apply.	
Tenancy	Shared - Run a shared hardware instance	

Additional charges will apply for dedicated tenancy.

Cancel Previous Review and Launch Next: Add Storage

6.Add Storage

Step 4: Add Storage

Your instance will be launched with the following storage device settings. You can attach additional EBS volumes and instance store volumes to your instance, or edit the settings of the root volume. You can also attach additional EBS volumes after launching an instance, but not instance store volumes. [Learn more](#) about storage options in Amazon EC2.

Volume Type	Device	Snapshot	Size (GiB)	Volume Type	IOPS	Throughput (MB/s)	Delete on Termination	Encrypted
Root	/dev/sda1	snap-054671a8afb061e5e	8	General Purpose SSD (gp2)	100 / 3000	N/A	<input checked="" type="checkbox"/>	Not Encrypted

Add New Volume

Free tier eligible customers can get up to 30 GB of EBS General Purpose (SSD) or Magnetic storage. [Learn more](#) about free usage tier eligibility and usage restrictions.

Cancel Previous Review and Launch Next: Add Tags

6. Set Name Tag for the Instance

Step 5: Add Tags

A tag consists of a case-sensitive key-value pair. For example, you could define a tag with key = Name and value = Webserver.
A copy of a tag can be applied to volumes, instances or both.
Tags will be applied to all instances and volumes. [Learn more](#) about tagging your Amazon EC2 resources.

Key	(127 characters maximum)	Value	(255 characters maximum)	Instances	Volumes
Name		Lab1AwsEc2		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Add another tag (Up to 50 tags maximum)

Cancel Previous Review and Launch Next: Configure Security Group

7. Configure Security Group for the Instance

- I added HTTP rule with port 80(to host web application of my choice) along with default SSH 22.

Step 6: Configure Security Group

A security group is a set of firewall rules that control the traffic for your instance. On this page, you can add rules to allow specific traffic to reach your instance. For example, if you want to set up a web server and allow Internet traffic to reach your instance, add rules that allow unrestricted access to the HTTP and HTTPS ports. You can create a new security group or select from an existing one below. [Learn more](#) about Amazon EC2 security groups.

Assign a security group: Create a new security group
 Select an existing security group

Security group name: awcec2
Description: exploring ec2

Type	Protocol	Port Range	Source	Description
SSH	TCP	22	My IP 76.14.6.91/32	e.g. SSH for Admin Desktop
HTTP	TCP	80	My IP 76.14.6.91/32	e.g. SSH for Admin Desktop

Add Rule

Cancel Previous Review and Launch

8. Review and Launch the Instance.

Step 7: Review Instance Launch

Please review your instance launch details. You can go back to edit changes for each section. Click **Launch** to assign a key pair to your instance and complete the launch process.

AMI Details

Ubuntu Server 18.04 LTS (HVM), SSD Volume Type - ami-063aa838bd7631e0b
Free tier eligible
Ubuntu Server 18.04 LTS (HVM), EBS General Purpose (SSD) Volume Type. Support available from Canonical (<http://www.ubuntu.com/cloud/services>).
Root Device Type: ebs Virtualization type: hvm

Instance Type

Instance Type	ECUs	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance
t2.micro	Variable	1	1	EBS only	-	Low to Moderate

Security Groups

Security group name: awcec2
Description: exploring ec2

Type	Protocol	Port Range	Source	Description
SSH	TCP	22	76.14.6.91/32	
HTTP	TCP	80	76.14.6.91/32	

Instance Details

Cancel Previous Launch

9. Create a new key pair and download the one time key generated.

The screenshot shows the AWS EC2 Management Console in a browser window. The URL is <https://us-west-1.console.aws.amazon.com/ec2/v2/home?region=us-west-1#LaunchInstanceWizard>. The page is titled "Step 7: Review Instance Launch". The "7. Review" tab is selected. On the left, there are sections for "AMI Details" (Ubuntu Server 18.04 LTS (HVM), SSD Volume), "Instance Type" (t2.micro), and "Security Groups" (awsec2). A modal dialog box is centered over the page, titled "Select an existing key pair or create a new key pair". It contains a dropdown menu set to "Create a new key pair", a text input field for "Key pair name" containing "awsec2", and a "Download Key Pair" button. Below the button is a message: "You have to download the **private key file (*.pem file)** before you can continue. **Store it in a secure and accessible location.** You will not be able to download the file again after it's created." At the bottom of the modal are "Cancel" and "Launch Instances" buttons. The status bar at the bottom of the browser window shows "awsec2.pem" and the date "2/25/2019".

10. Launch the Instance.

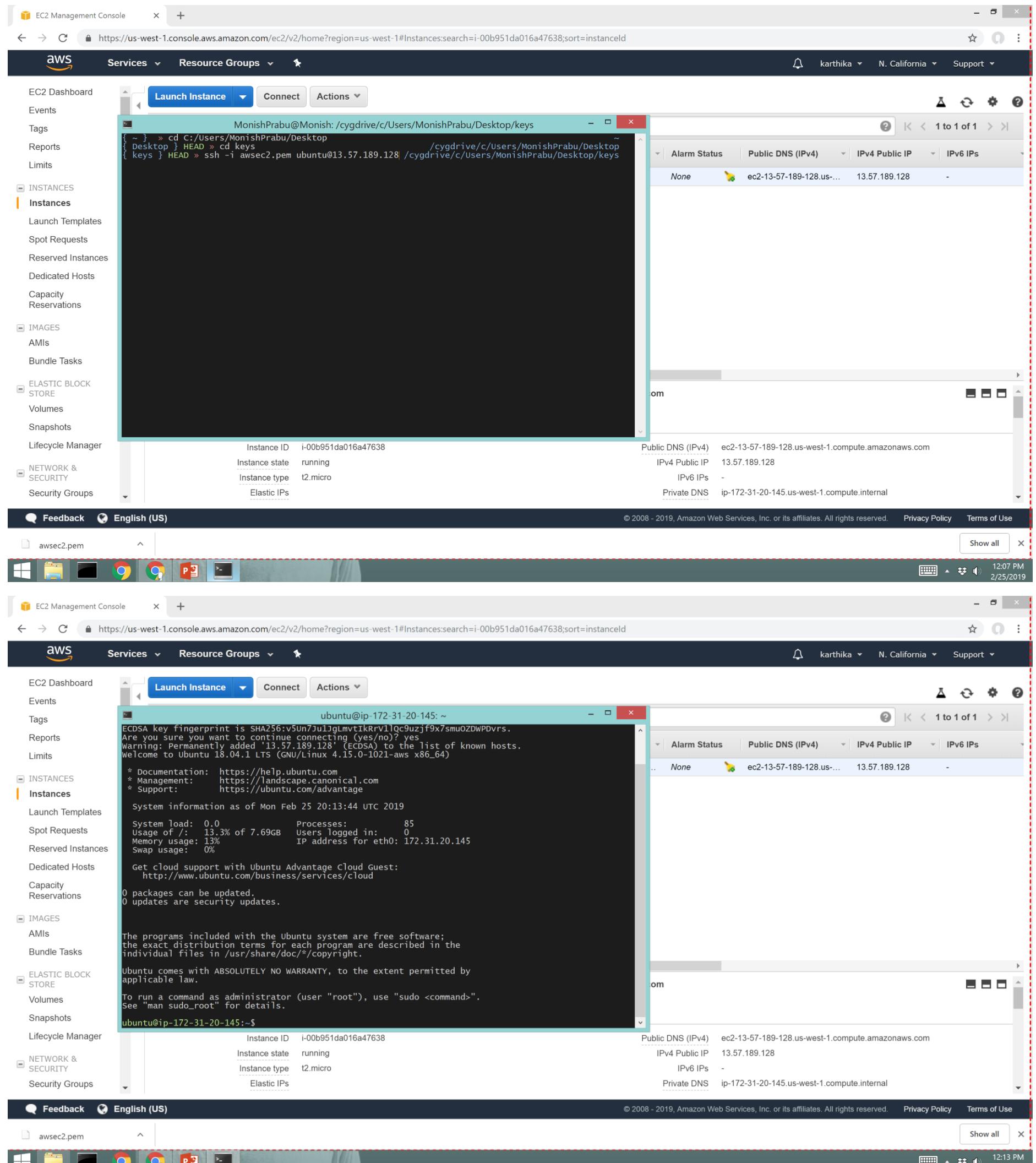
The screenshot shows the AWS EC2 Management Console in a browser window. The URL is <https://us-west-1.console.aws.amazon.com/ec2/v2/home?region=us-west-1#LaunchInstanceWizard>. The page is titled "Launch Status". It features a green success message box: "Your instances are now launching" followed by the tracking ID "i-00b951da016a47638" and a link to "View launch log". Below this is a blue info message box: "Get notified of estimated charges" with a sub-note about creating billing alerts. Further down, there's a section titled "How to connect to your instances" with tips on connecting to Linux instances and managing security groups. The status bar at the bottom shows "awsec2.pem" and the date "2/25/2019".

11. Soon after the Instance has been launched, we could see our instance under the EC2 running instances list.

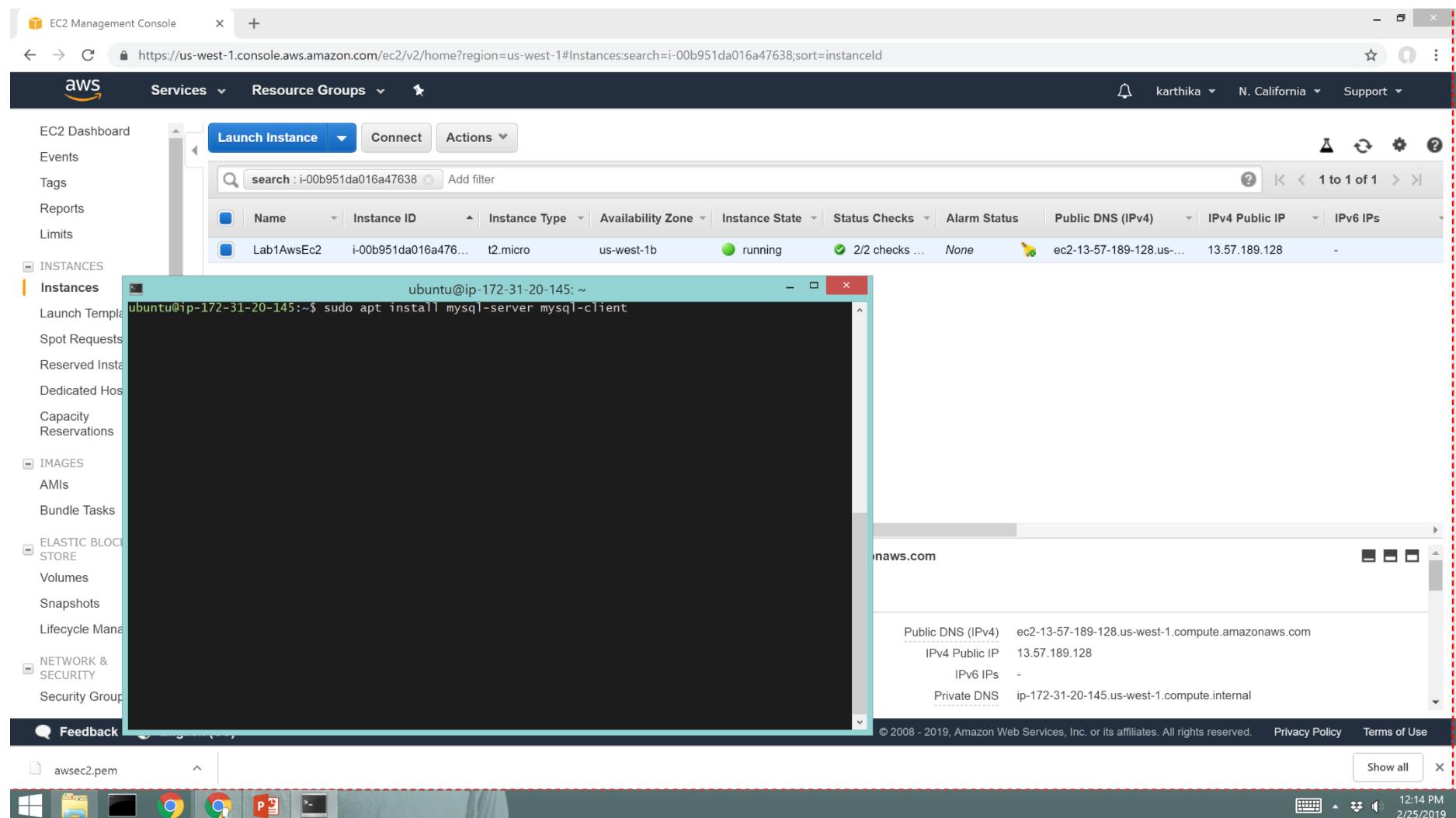
The screenshot shows the AWS EC2 Management Console interface. The left sidebar navigation bar includes links for EC2 Dashboard, Events, Tags, Reports, Limits, INSTANCES (with Instances selected), Launch Templates, Spot Requests, Reserved Instances, Dedicated Hosts, Capacity Reservations, IMAGES (AMIs, Bundle Tasks), ELASTIC BLOCK STORE (Volumes, Snapshots, Lifecycle Manager), and NETWORK & SECURITY (Security Groups). The main content area displays the 'Instances' list with a single entry: 'Lab1AwsEc2' (Instance ID: i-00b951da016a47638, Instance Type: t2.micro, Availability Zone: us-west-1b, Instance State: running, Status Checks: Initializing, Alarm Status: None, Public DNS (IPv4): ec2-13-57-189-128.us-west-1.compute.amazonaws.com, IPv4 Public IP: 13.57.189.128, IPv6 IPs: -). Below this, a detailed view for the selected instance shows its configuration: Instance ID (i-00b951da016a47638), Instance state (running), Instance type (t2.micro), and Public DNS (IPv4) (ec2-13-57-189-128.us-west-1.compute.amazonaws.com), IPv4 Public IP (13.57.189.128), IPv6 IPs (-), and Private DNS (ip-172-31-20-145.us-west-1.compute.internal). The bottom status bar shows the date and time (12:06 PM, 2/25/2019) and system icons.

Installing Lamp stack in our EC2 instance

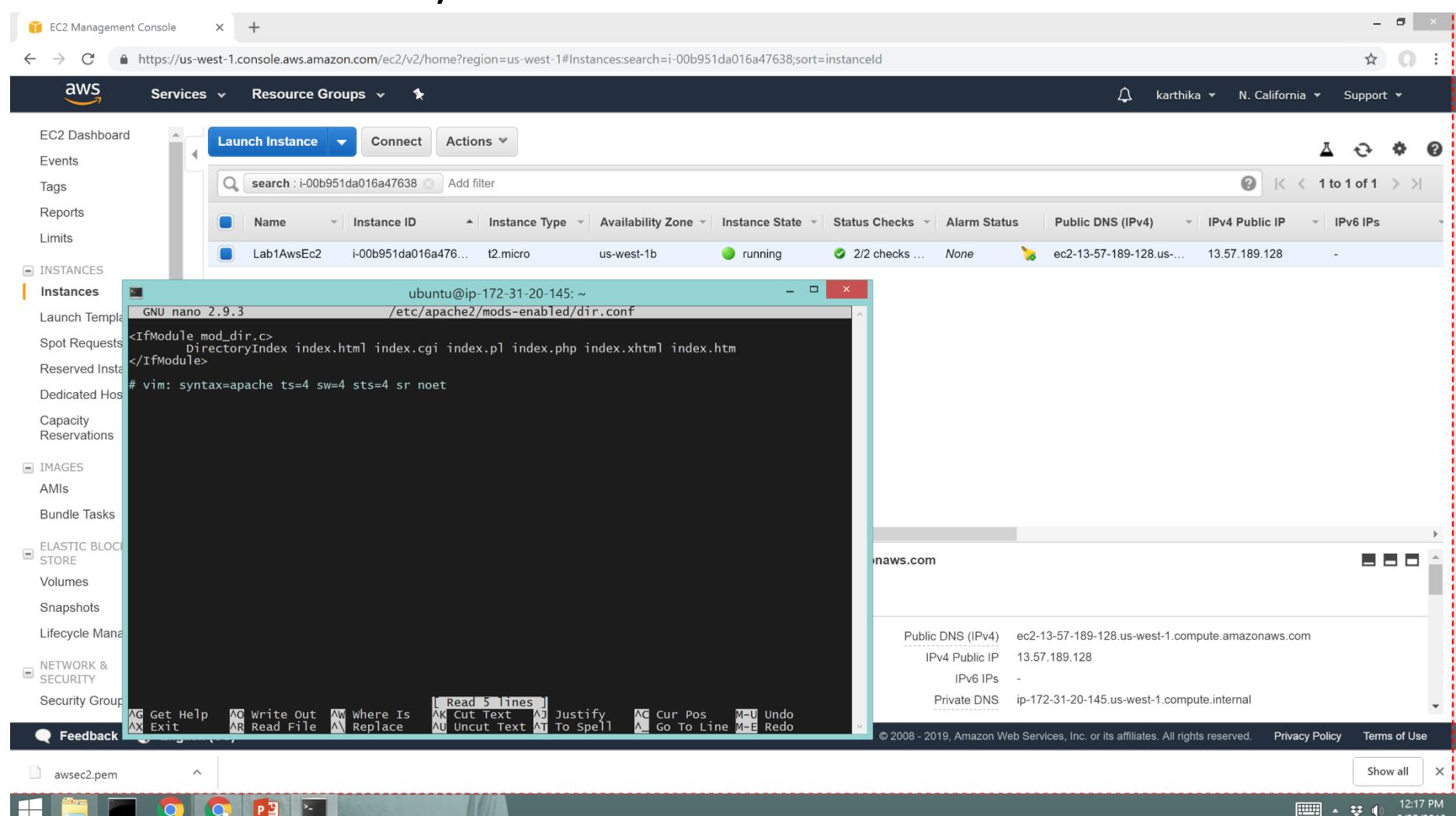
12. In babun Shell, ssh the created instance using the downloaded key pair.



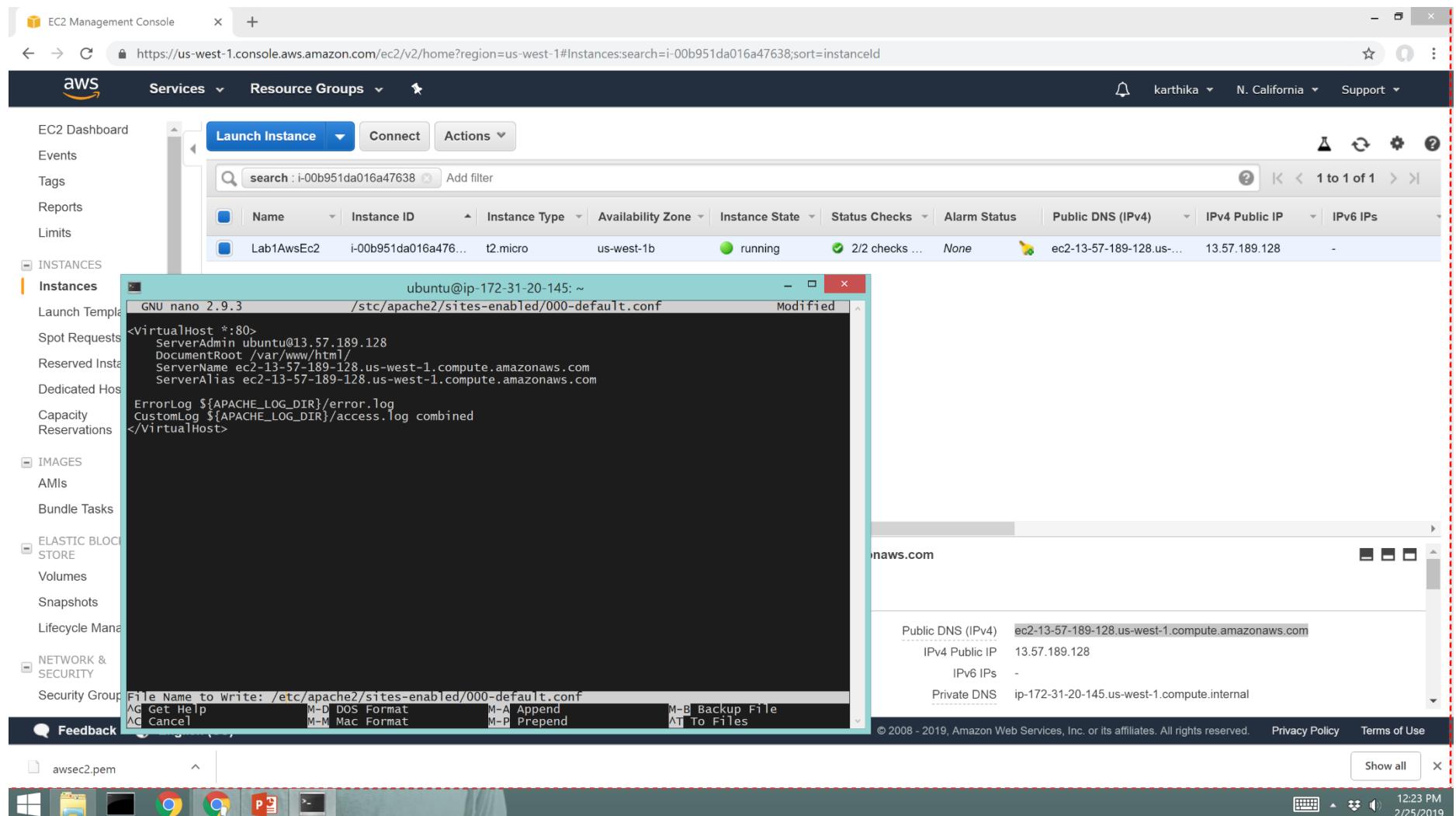
13. Install mySQL.



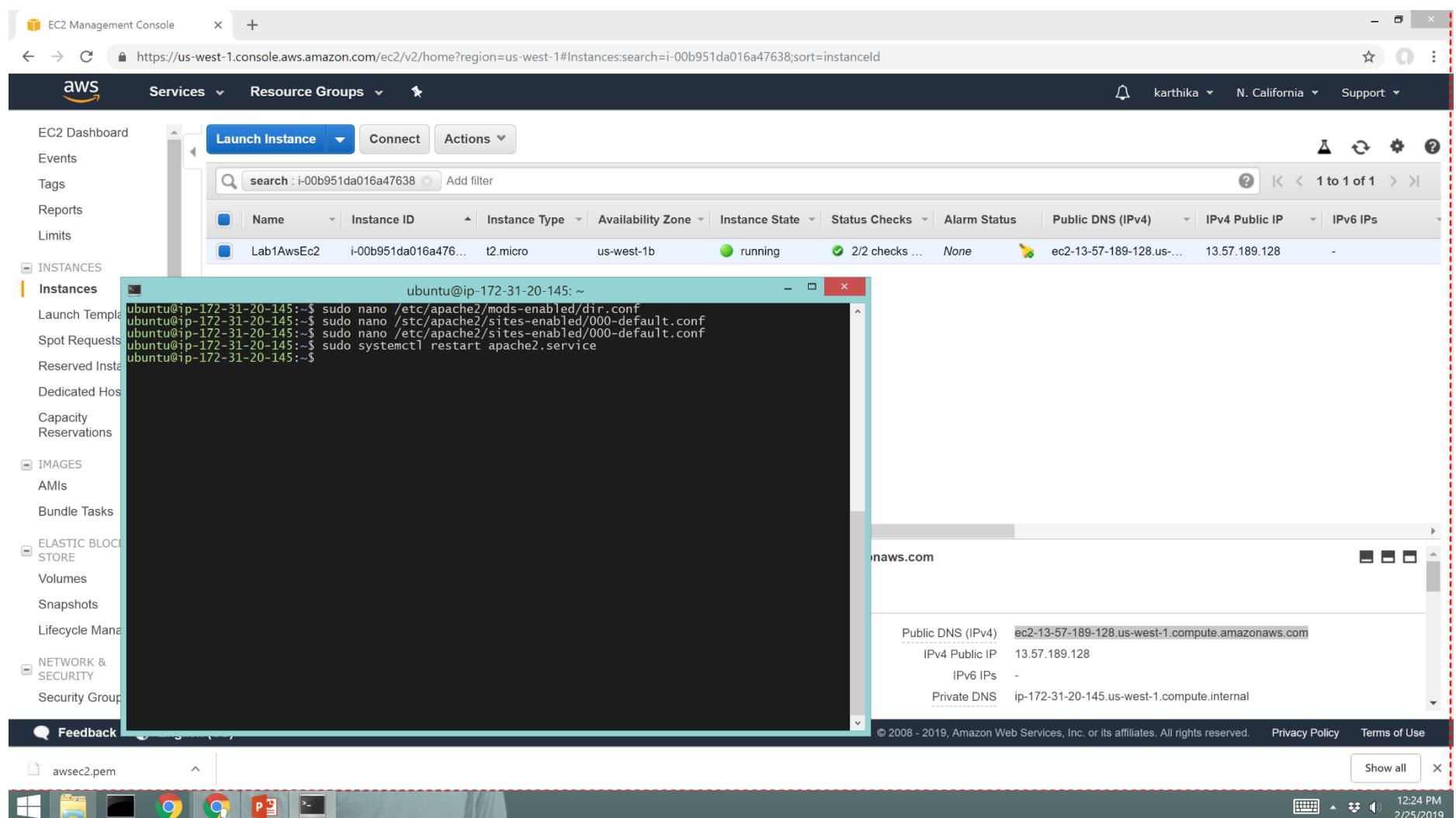
14. Install Apache2 HTTP server and verify whether index.php is defined as a Directory Index in the dir.conf file.



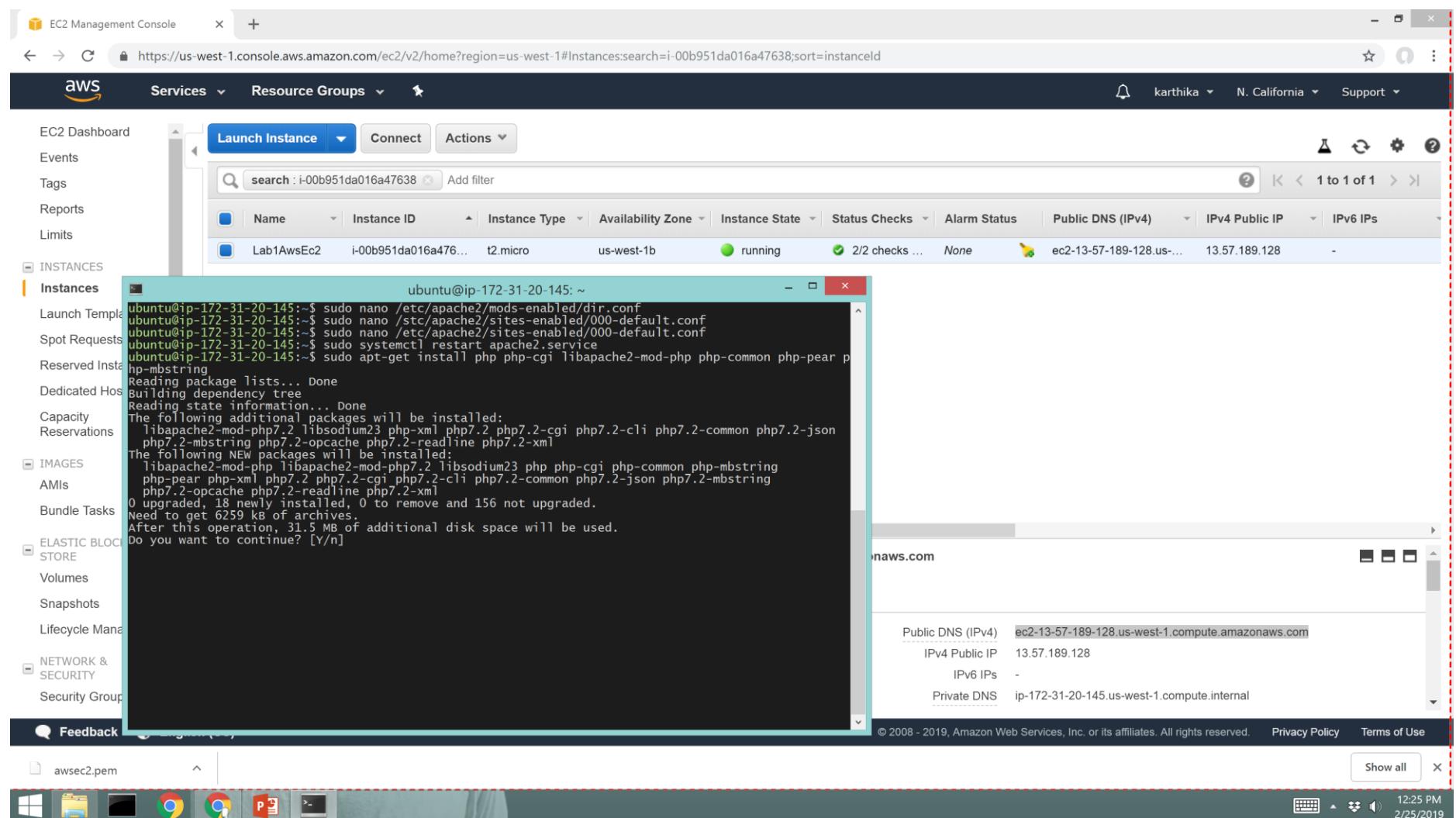
15. Configure Domain name(EC2 instance) for the web application.



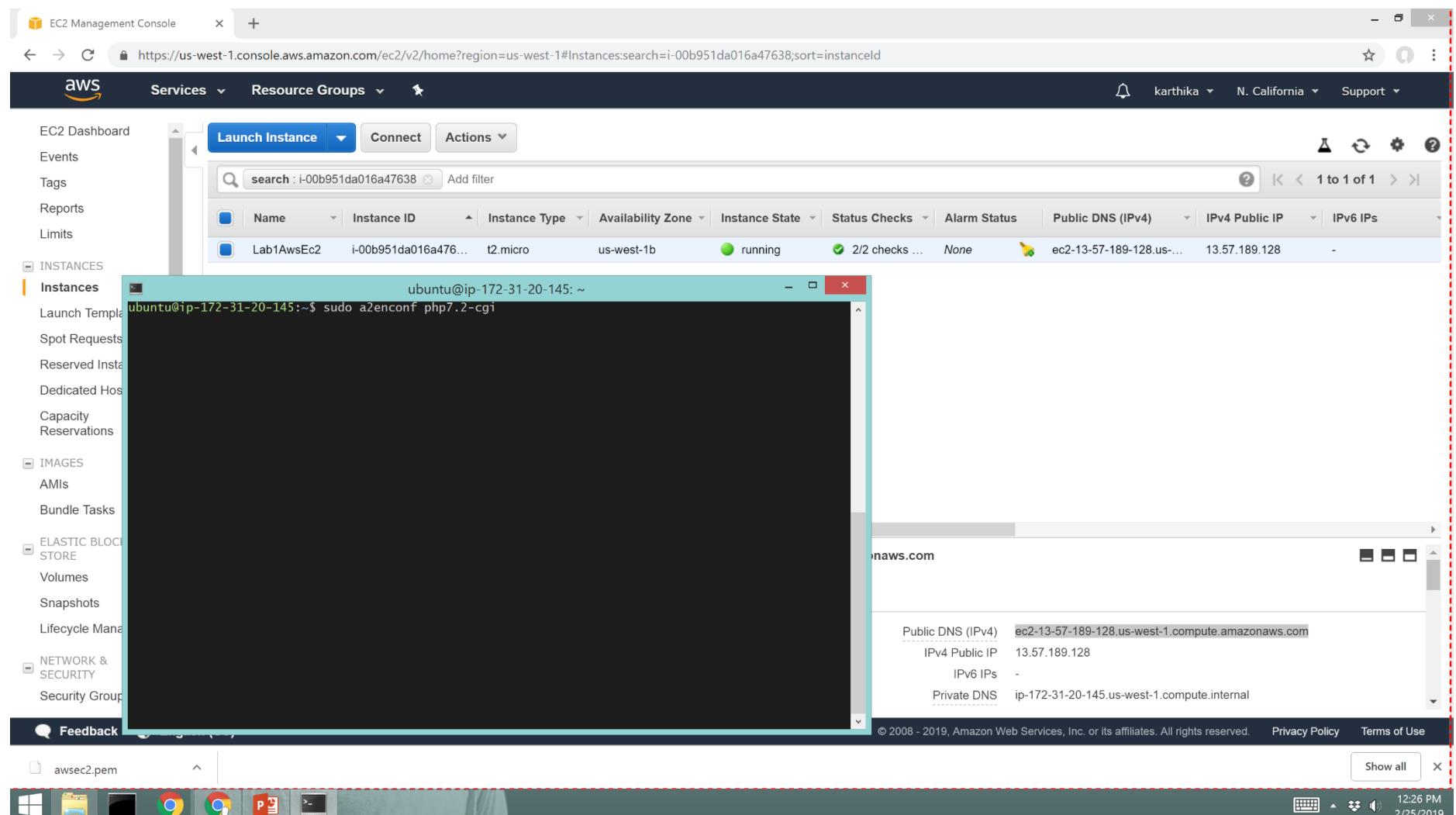
16. Restart Apache 2 service .



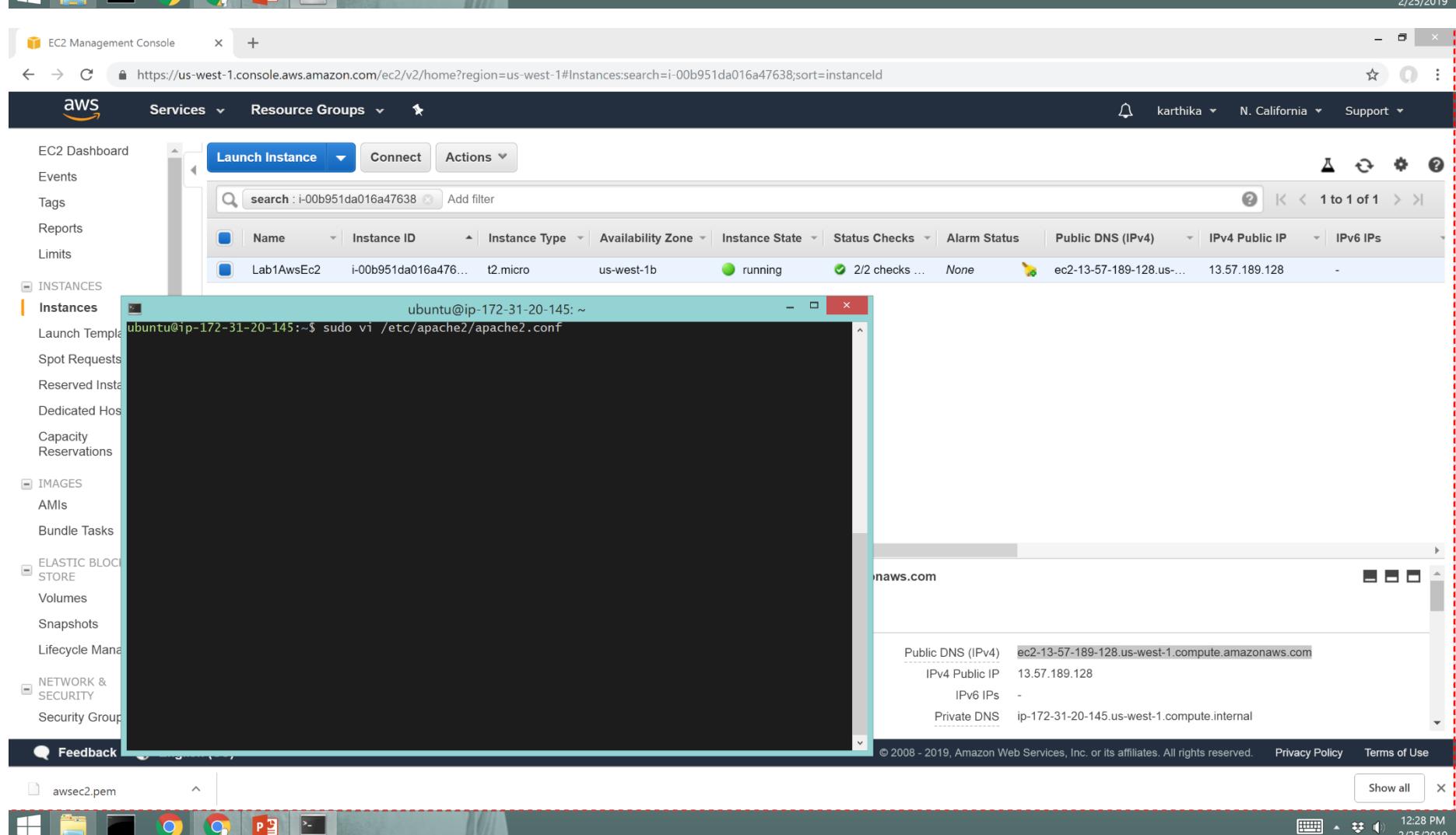
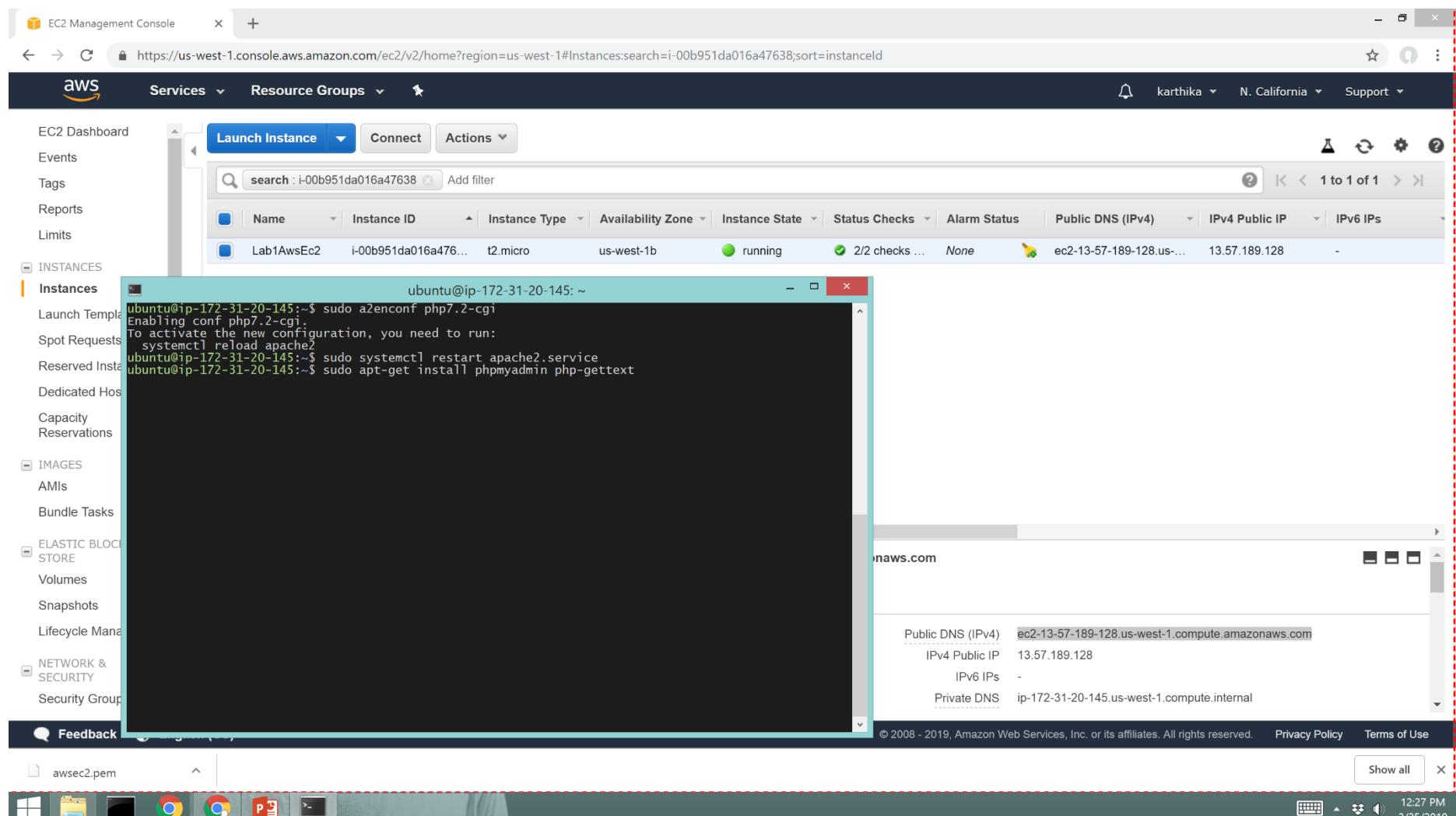
17. Install PHP and Related Modules.

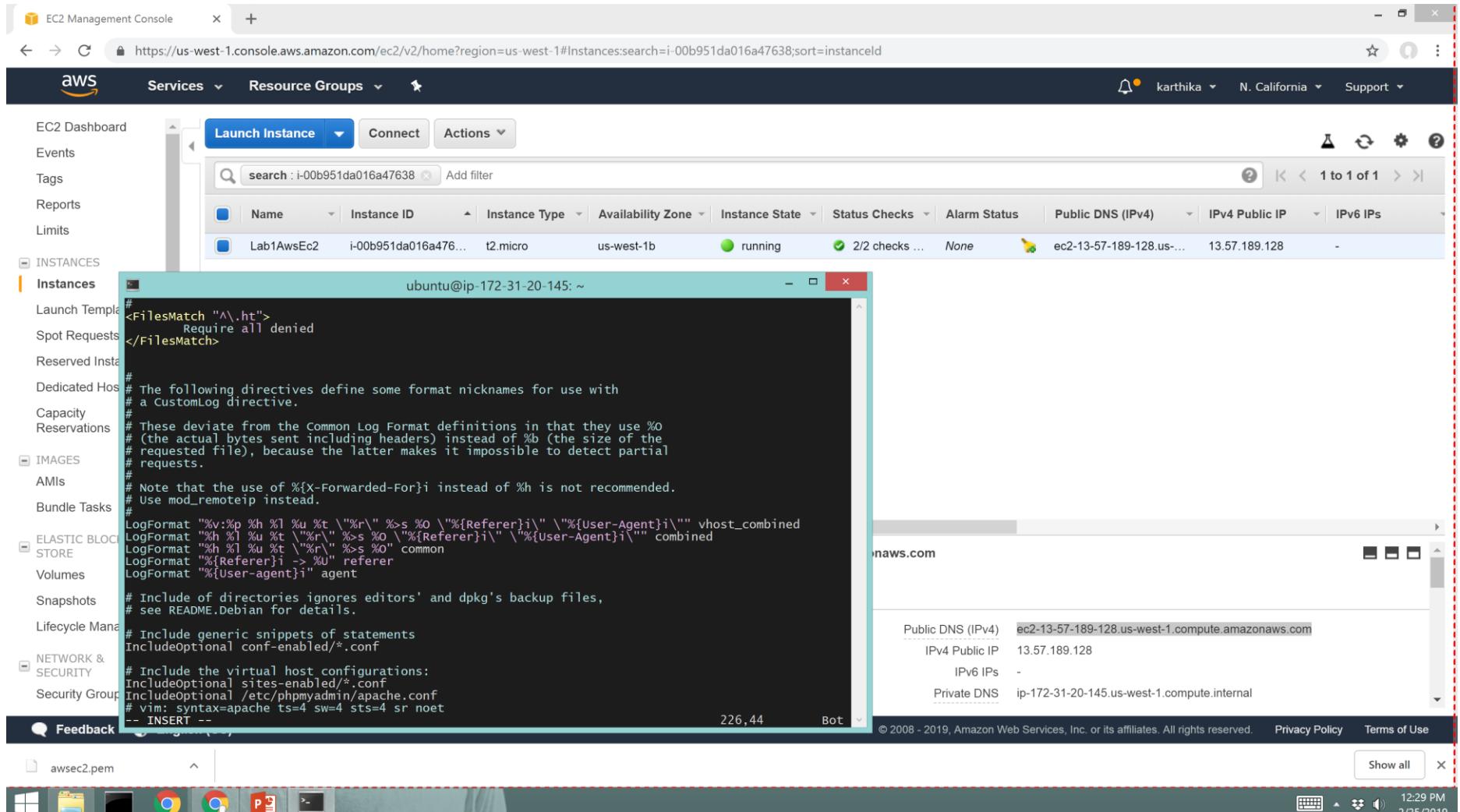


18. Configure Apache2 to use PHP and restart the Apache2 service.

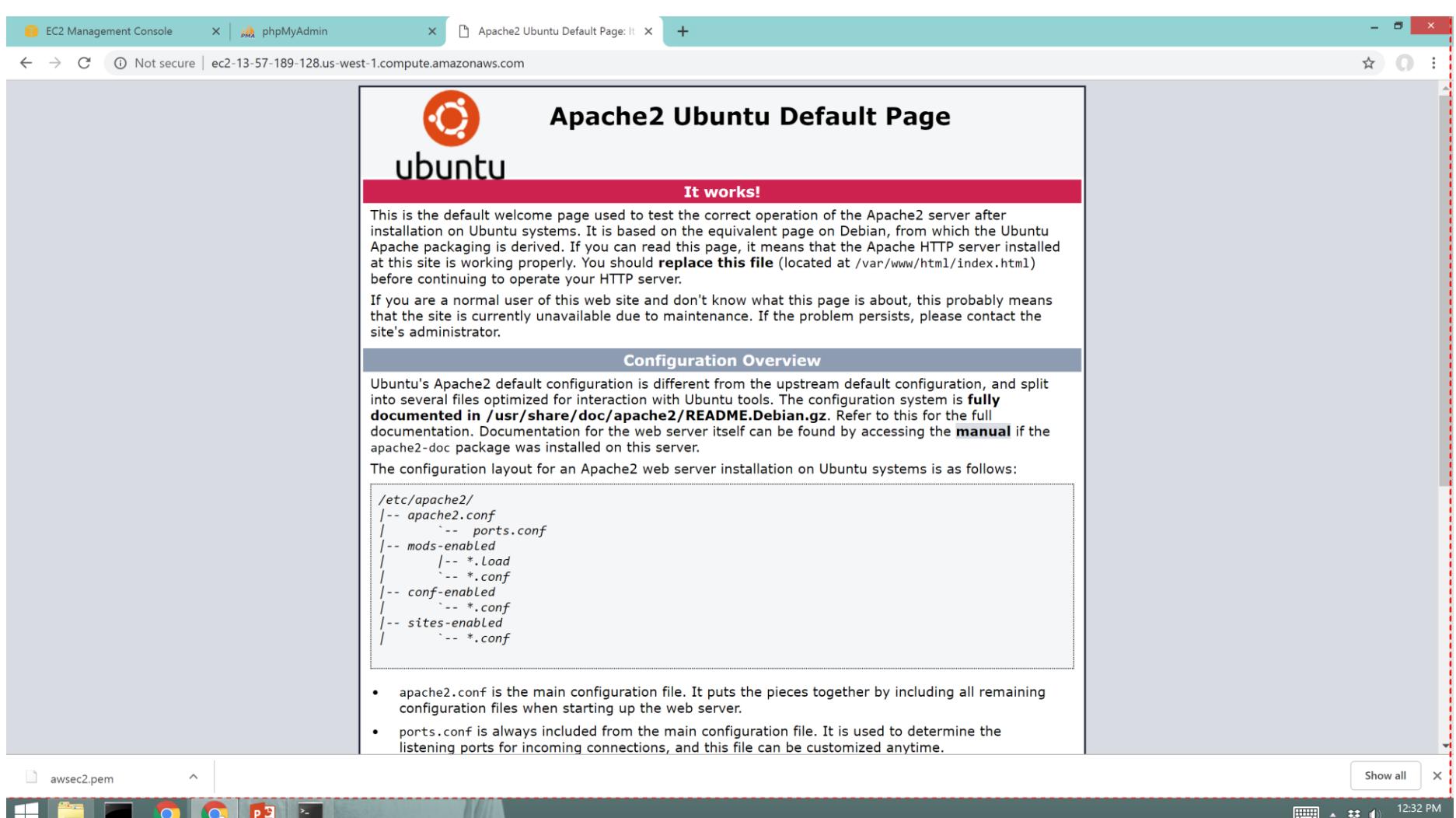


19. Install PHPMyadmin plugin to access the MySQL database through an interactive UI.



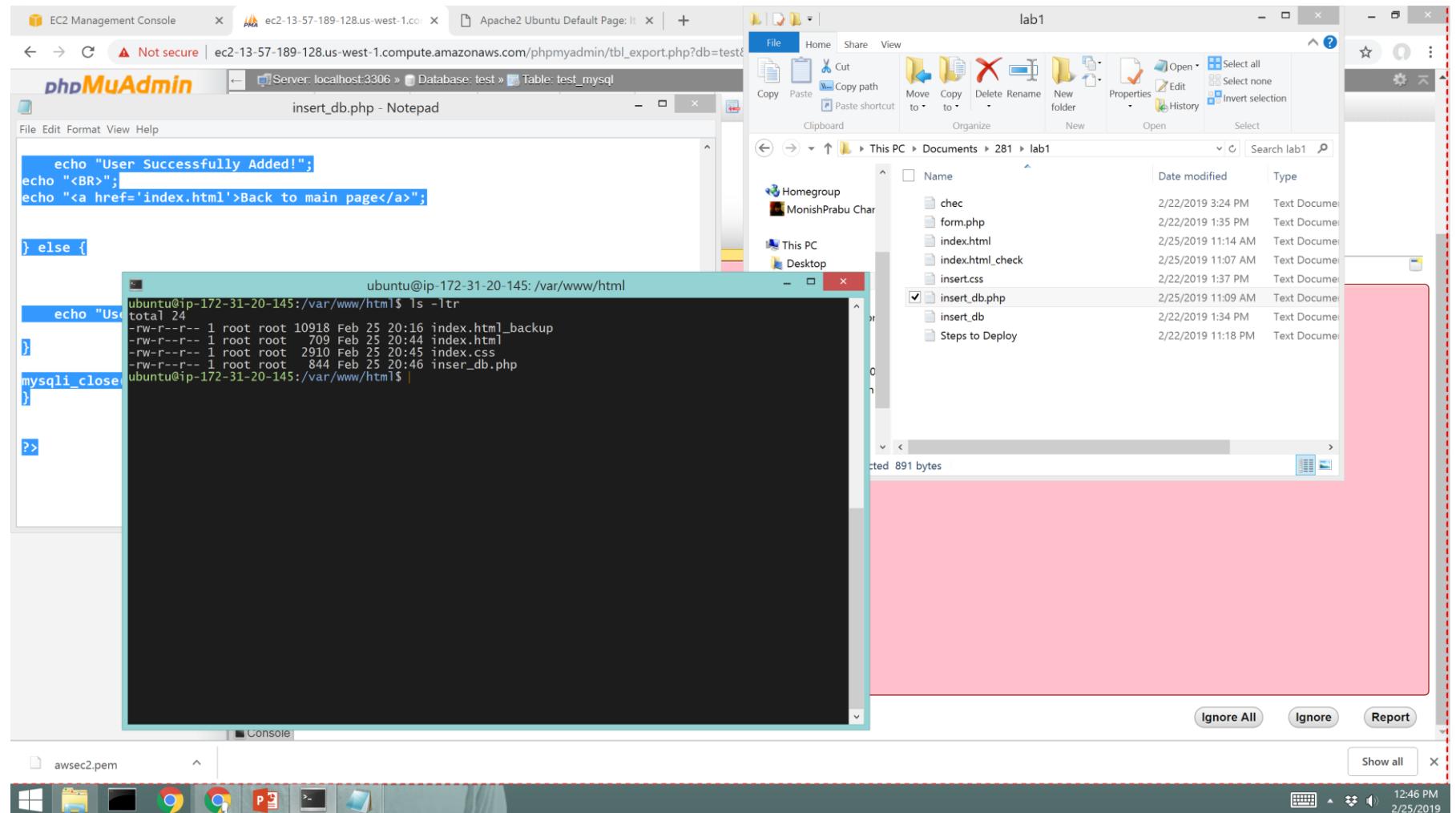


20. Launch the Webserver hosted on our ec2 instance.

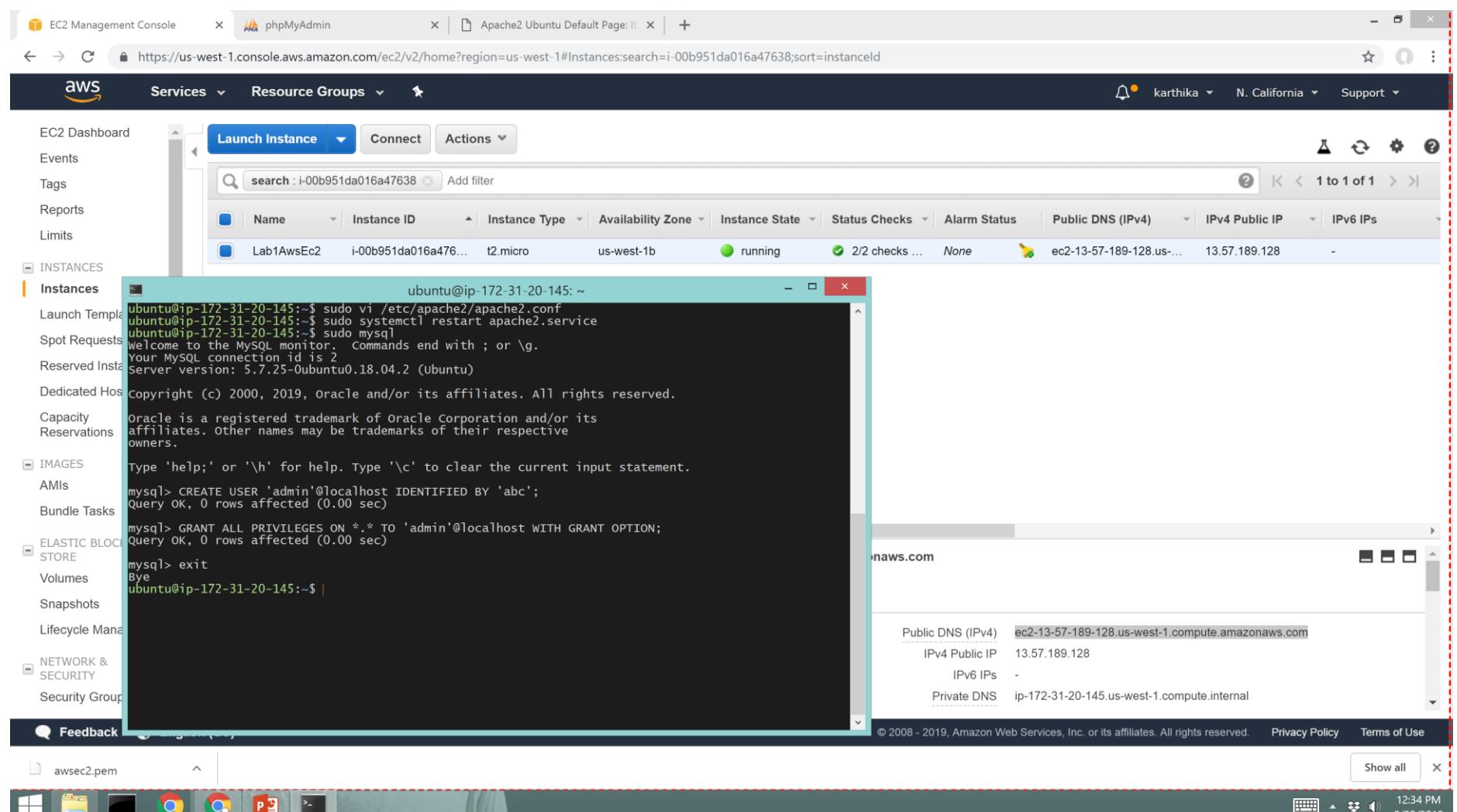


Deploying PHP application to create a User form to enter the User details in mySQL.

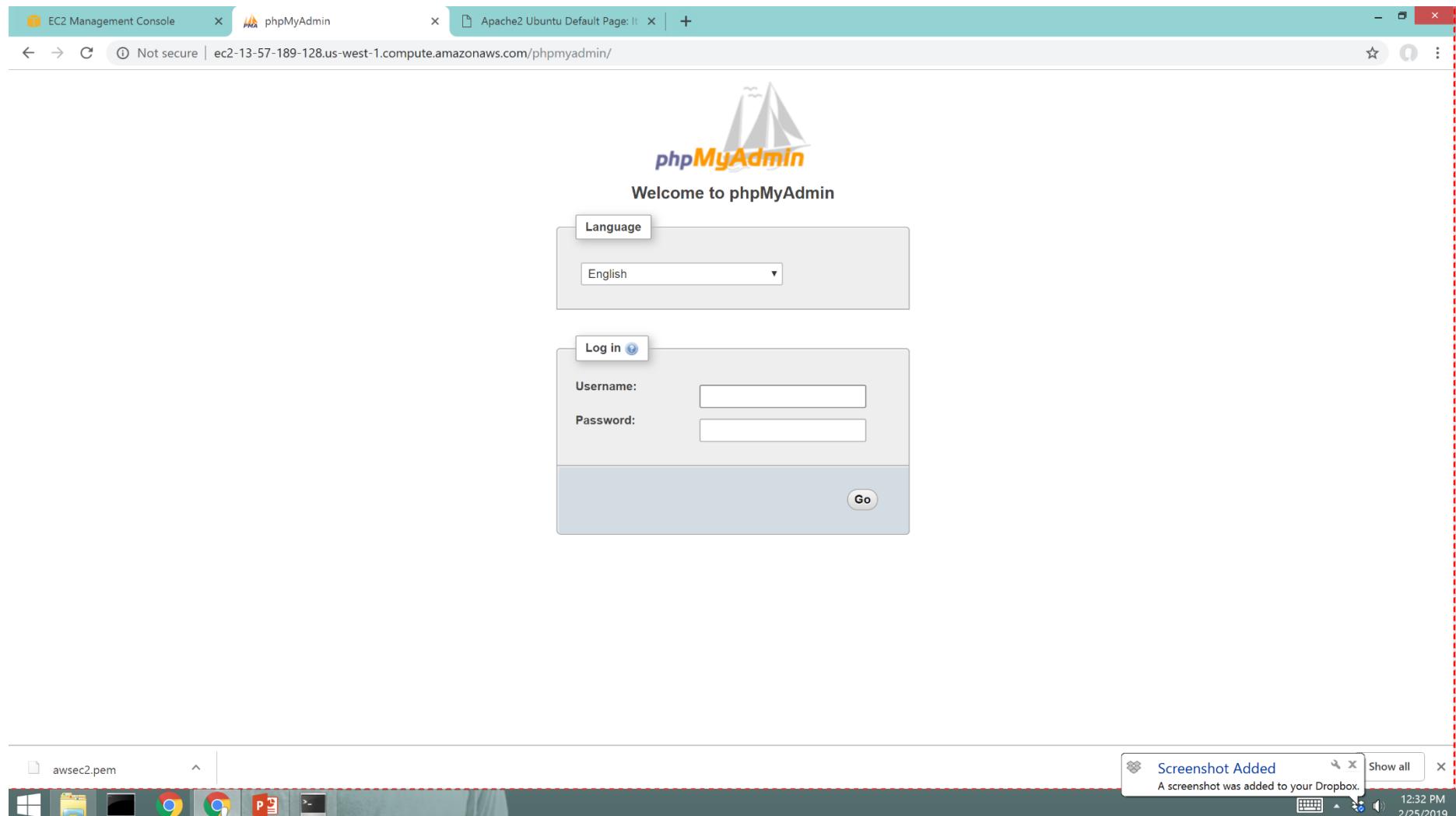
21. Place application files for creating User form and inserting the User details into the mySQL in the /var/www/html/ directory.



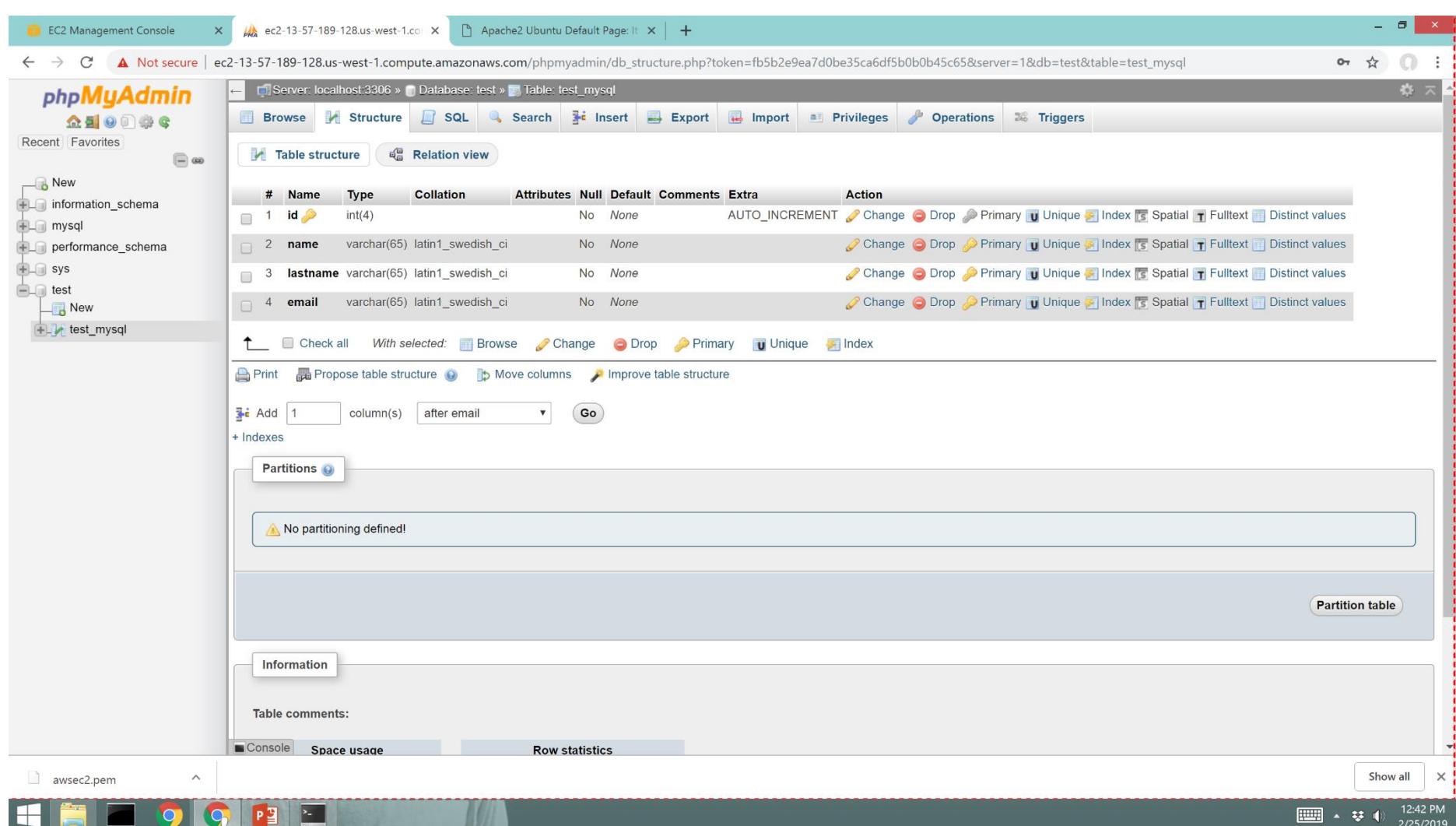
22. Create a User for MySQL and Grant privileges to that User.



23. Launch the PHPMyadmin (<http://ec2-instance//phpmyadmin>) and log in using the User details created in the previous step.

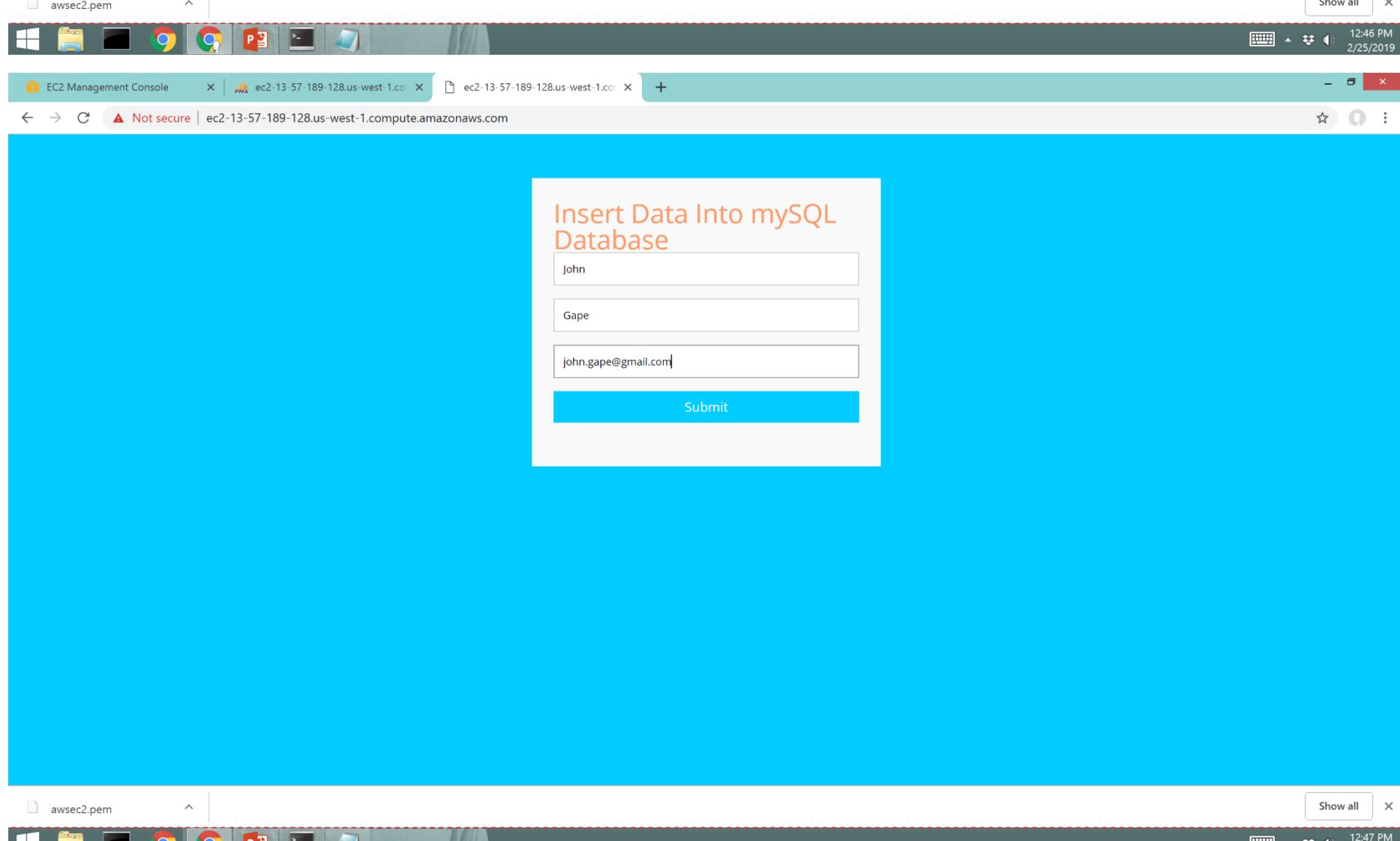
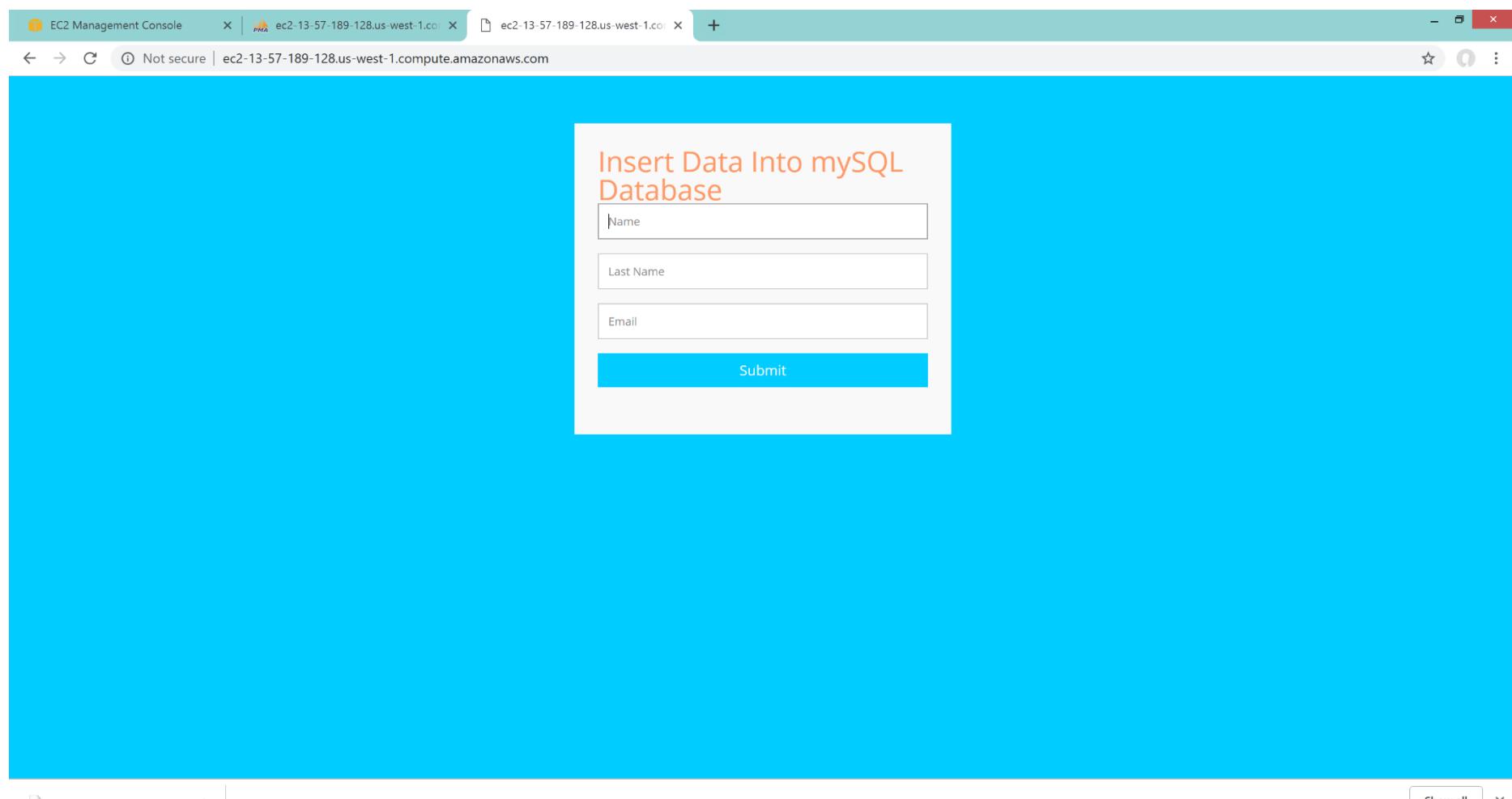


24. Create a Database named test and created a table name test_mysql with columns id,name,lastname and email.

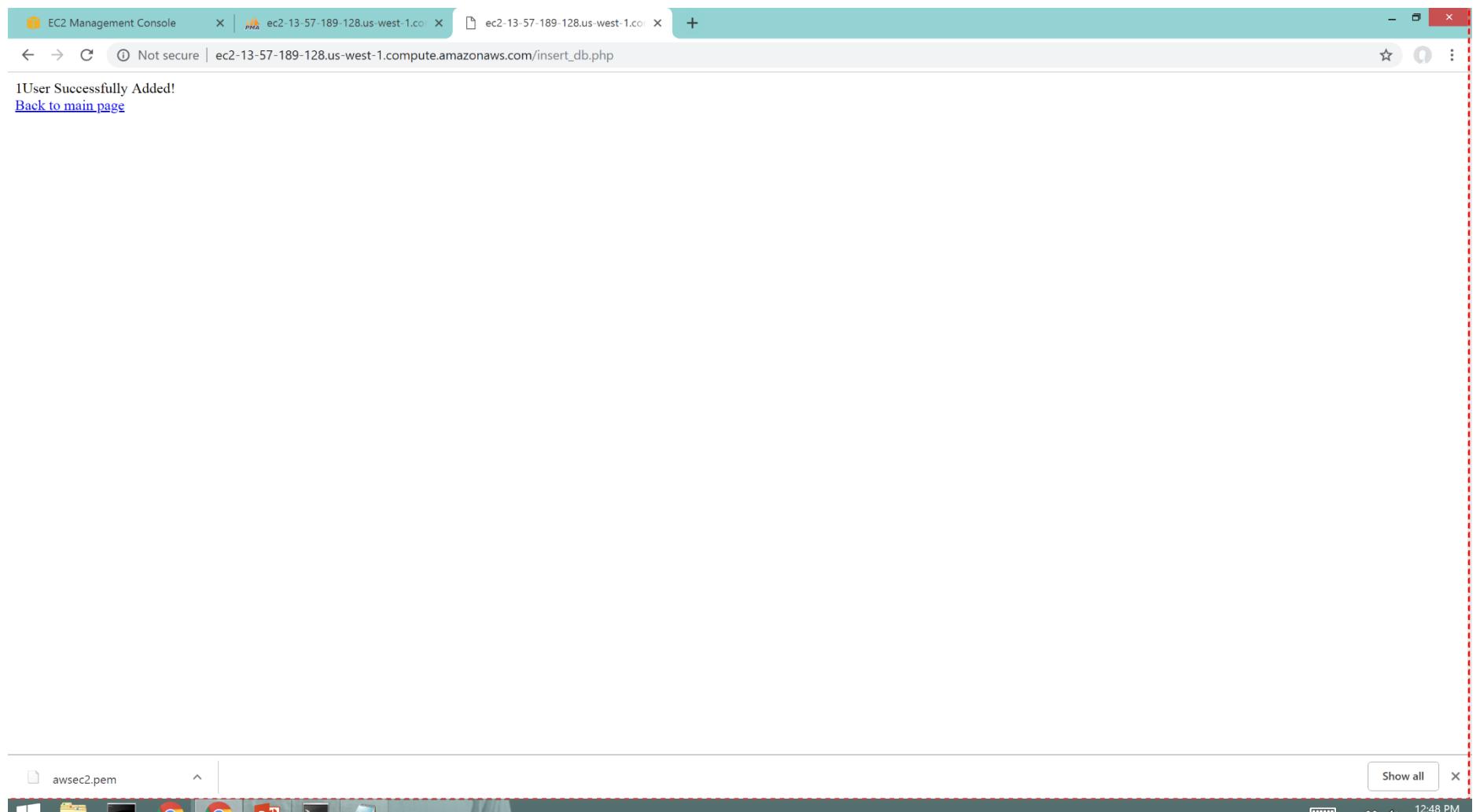


25. Launch the PHP application deployed over EC2 instance in the browser.

- Enter User details and submit to insert the Data in created database test.
- Verify the added User details in the DB by ‘Select *’ in phpmyadmin.



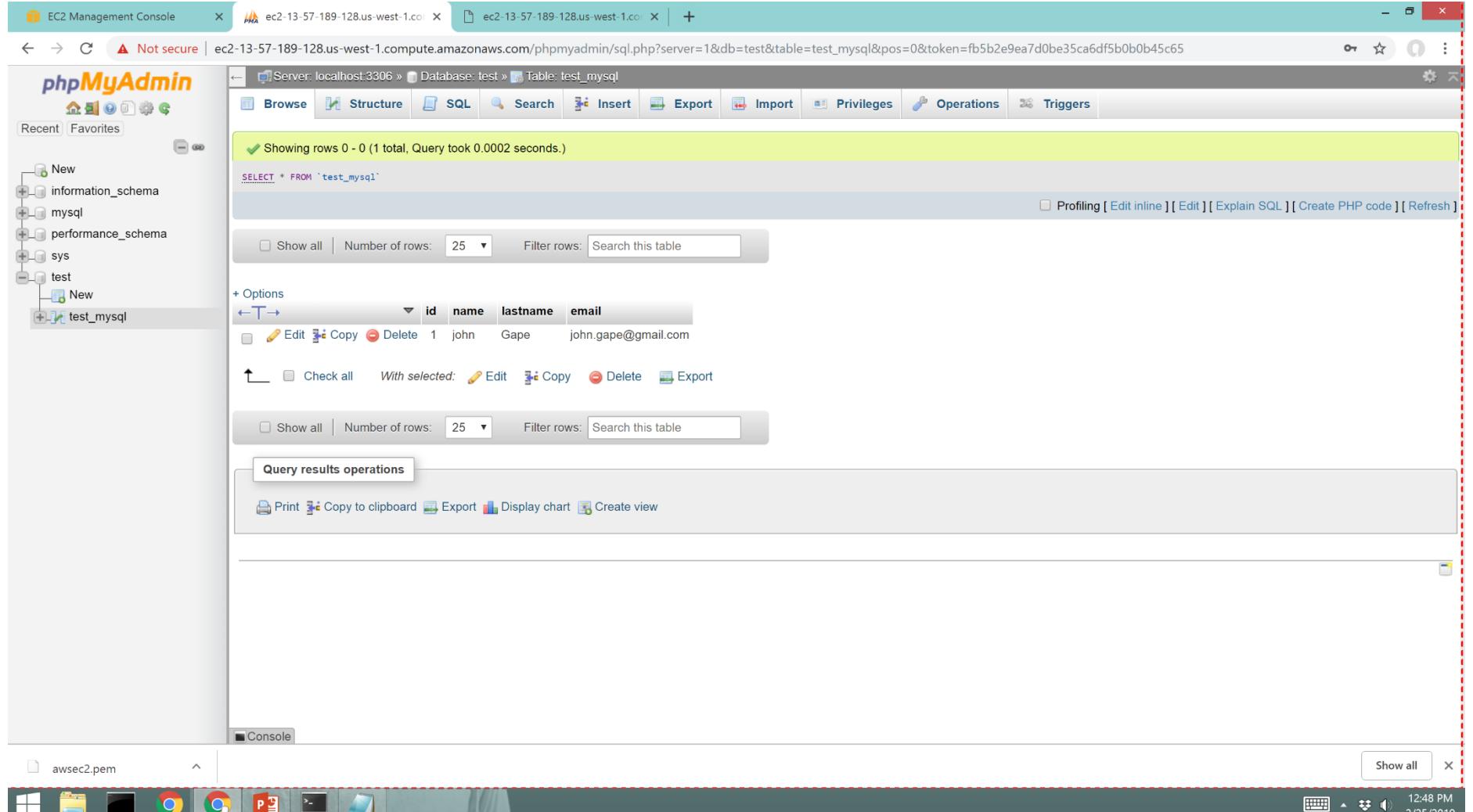
● User addition successful.



The screenshot shows a web browser window with three tabs. The active tab displays the message "User Successfully Added!" followed by a link "Back to main page".



The taskbar shows the file "awsec2.pem" is currently open.



The screenshot shows the EC2 Management Console with a message "User Successfully Added!" and a link "Back to main page". Below this, the PHPMyAdmin interface is visible, showing the "test" database and the "test_mysql" table with one row: id=1, name=john, lastname=Gape, email=john.gape@gmail.com.

PHPMyAdmin interface details:

- Server: localhost:3306
- Database: test
- Table: test_mysql
- SQL Query: SELECT * FROM `test_mysql`
- Result: Showing rows 0 - 0 (1 total, Query took 0.0002 seconds.)
- Data:

	id	name	lastname	email
	1	john	Gape	john.gape@gmail.com

- Operations:

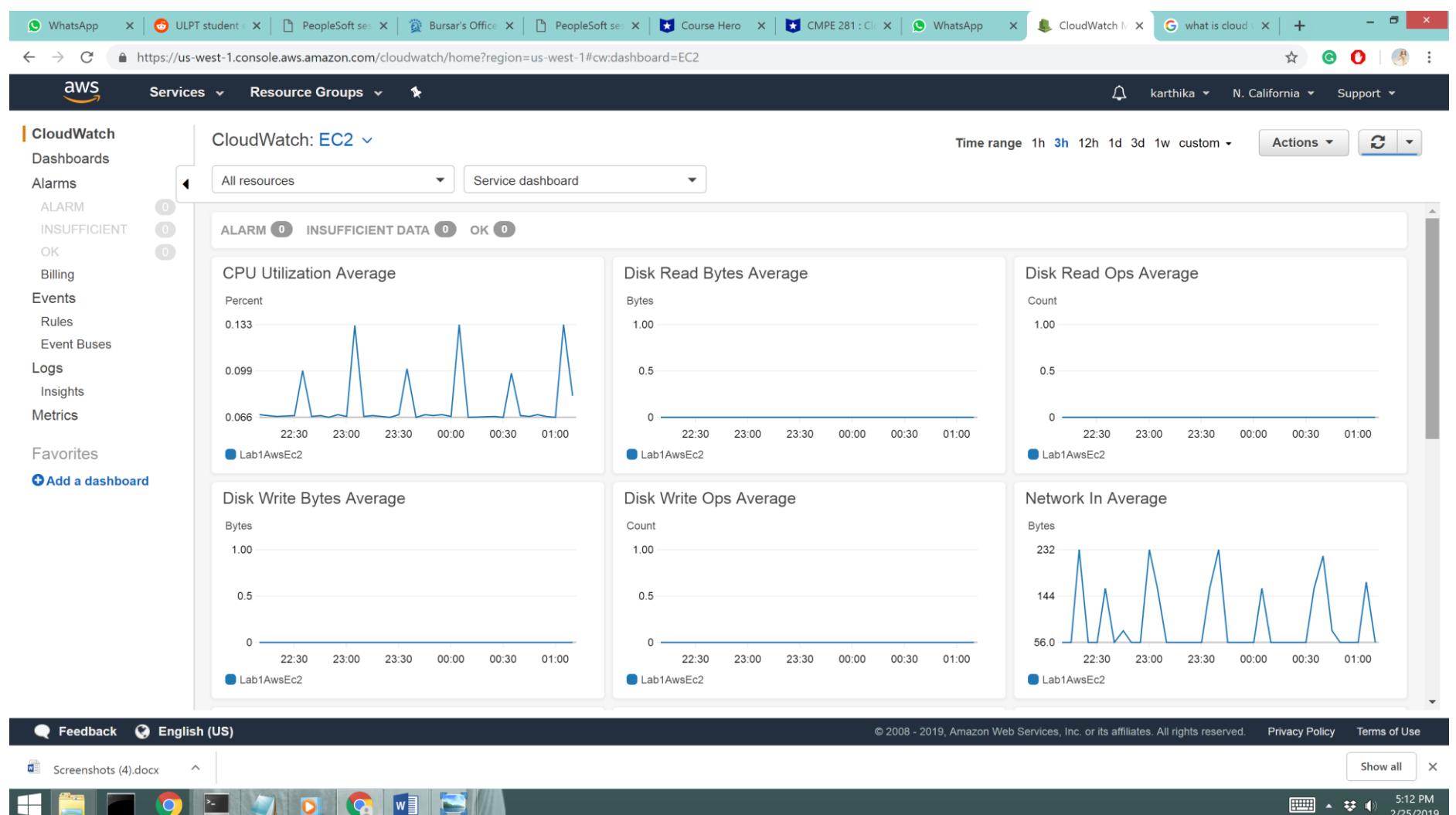
 - Print
 - Copy to clipboard
 - Export
 - Display chart
 - Create view

Cloud Watch Monitoring Report

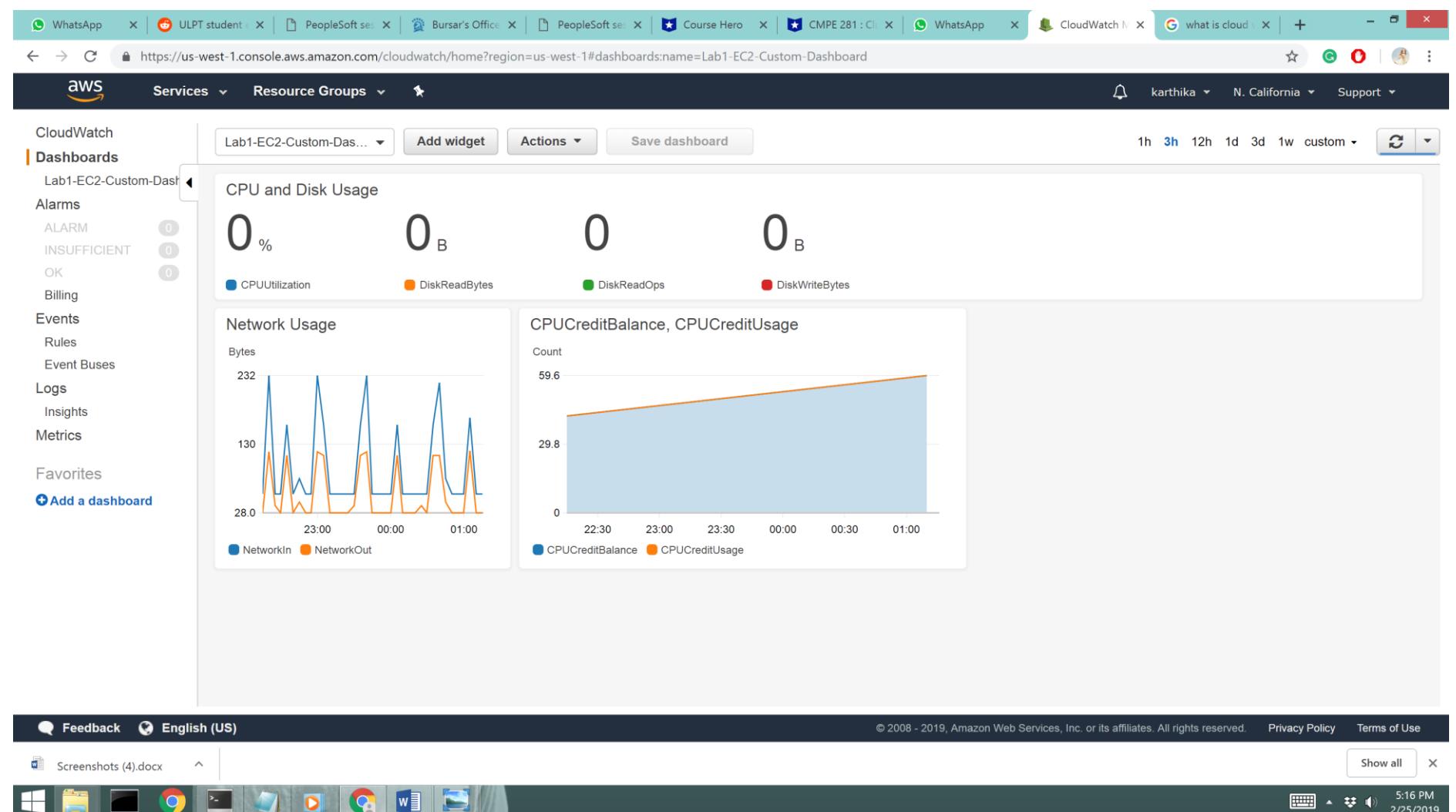
Amazon **CloudWatch** provides ways to collect and track metrics, collect and monitor log files, set alarms, and automatically react to changes in our resource usage for the AWS services configured in our account.

- For EC2 Instances, we can track around 64 metrics for each instance and all also we can track metrics in the over all instance level.

26. Cloud watch Monitor default metrics dashboard for running Instances.

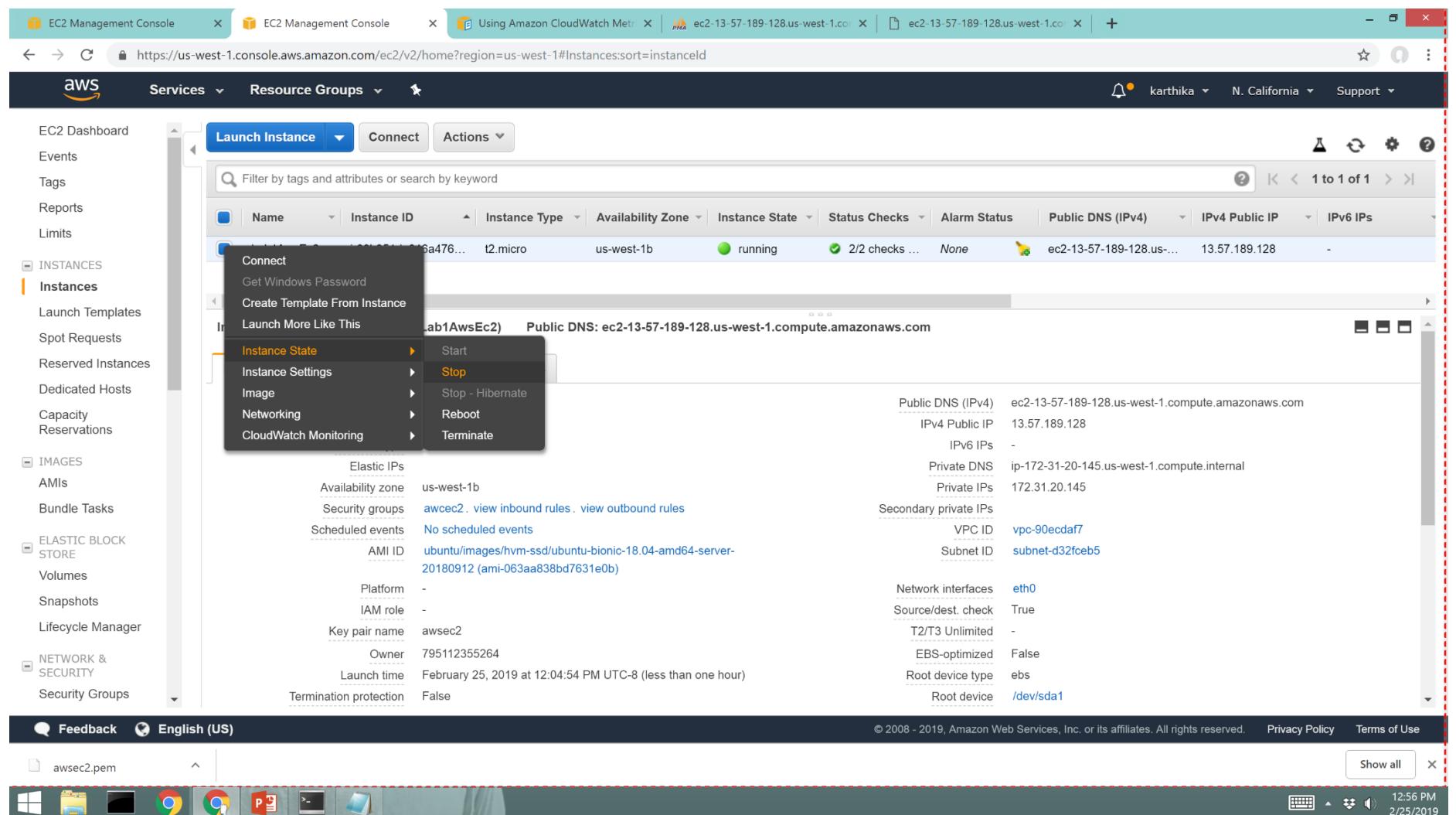


27. We can also create our own custom dashboards, alarms for our instances with metrics of our interest and to get notified with the alarm when it breaches the allowable usage with widgets of our choice.



26. When we use our application, Cloud watch provide us a live feed of resourusage usage and availability merics to undertsand our application performance hosted over the instansce. Mainly it's also help us to monitor and undertsand our billing as per the resource usage.

27. Finally we can stop(we can restart it later for usage) or terminate our instance (Permanent deletion).



Conclusion

AWS Elastic Compute Service or EC2 as IaaS(Infrastructure as a Service, it provides networking, storage, server and virtualization to the user in simple and intuitive steps. With the Infrastructure in hand, User only needs to plan to manage the Operating System, middleware, runtime, data and application, which limits the cost and also burden related to deploy and maintain own infrastructure.

