

Enterprise Standards and Best Practices for IT Infrastructure

Lab Report

Lab 01 - Creating an Amazon EBS-Backed Windows AMI

Lab 02 - Creating an Amazon EBS-Backed Linux AMI

Lab 03 - Creating an Amazon RDS Database

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WEEKEND IT



Sri Lanka Institute of Information Technology

B.Sc. Special (Honors) Degree in Information Technology

Specialized in Information Technology

Lab 01 - Creating an Amazon EBS-Backed Windows AMI

- ❖ Step 01: Select EC2 web service (virtual server in cloud) from Amazon web servers.

The screenshot shows the AWS Management Console homepage. The top navigation bar includes links for AWS, Services, Edit, Uthpala, Oregon, and Support. The main content area is titled "Amazon Web Services" and lists various services under categories such as Compute, Storage & Content Delivery, Database, and others. On the right side, there are sections for Resource Groups, Additional Resources (including Getting Started, AWS Console Mobile App, and AWS re:Invent Announcements), and Service Health. The bottom of the screen shows a taskbar with icons for File, Open, Save, Print, and other system functions, along with the date and time (11:53 AM, 7/12/2016).

- ❖ Step 02: Select the Launch Instance under Create Instance in main interface.

The screenshot shows the EC2 Management Console. The left sidebar has sections for EC2 Dashboard, Instances, Images, and Elastic Block Store. The main content area is titled "Resources" and shows statistics for Running Instances, Elastic IPs, Snapshots, and other resources. Below this is a "Create Instance" section with a "Launch Instance" button. To the right, there are sections for Account Attributes (Supported Platforms, VPC, Default VPC), Additional Information (Getting Started Guide, Documentation, All EC2 Resources, Forums, Pricing, Contact Us), and AWS Marketplace. The bottom of the screen shows a taskbar with icons for File, Open, Save, Print, and other system functions, along with the date and time (3:41 PM, 7/8/2016).

- ❖ **Step 03:** Choose an Amazon Machine image (AMI). Then Select Microsoft windows Server 2012 R2 Base.

Step 1: Choose an Amazon Machine Image (AMI)

Microsoft Windows Server 2012 R2 Base - ami-8d0acfed
Microsoft Windows 2012 R2 Standard edition with 64-bit architecture. [English]
Root device type: ebs Virtualization type: hvm

Select 64-bit

Microsoft Windows Server 2012 R2 with SQL Server Express - ami-4817d228
Microsoft Windows Server 2012 R2 Standard edition, 64-bit architecture, Microsoft SQL Server 2016 Express edition. [English]
Root device type: ebs Virtualization type: hvm

Select 64-bit

- ❖ **Step 04:** Choose an Instance type.

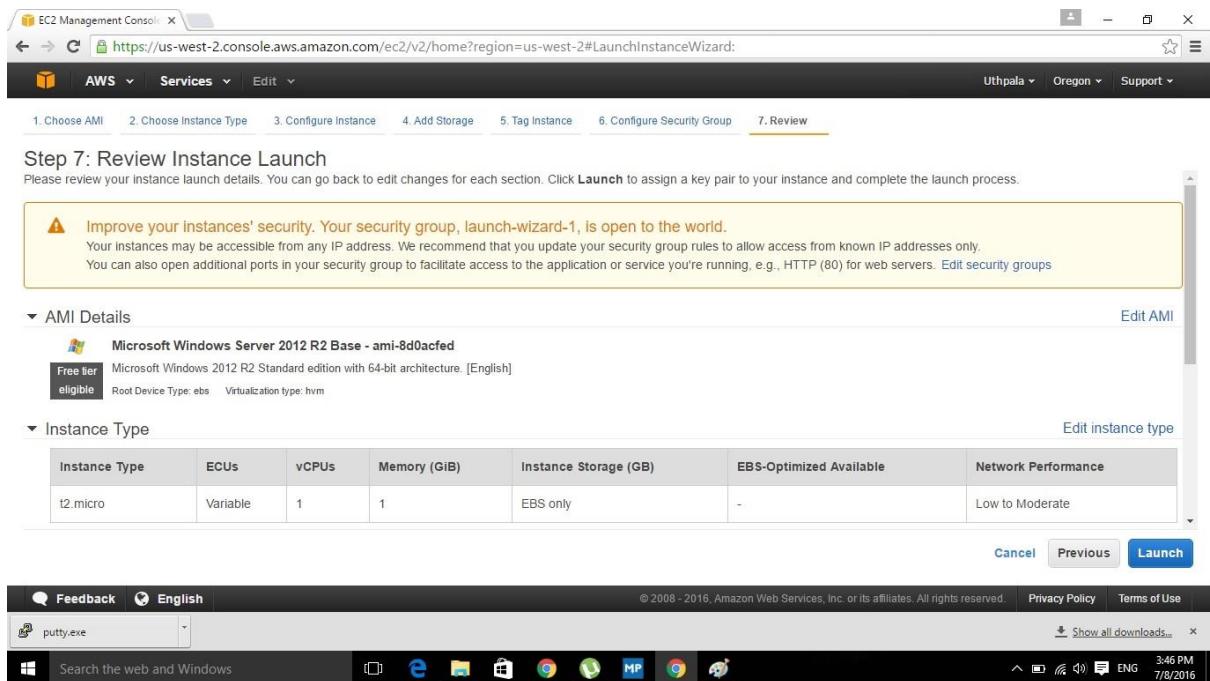
Step 2: Choose an Instance Type

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.

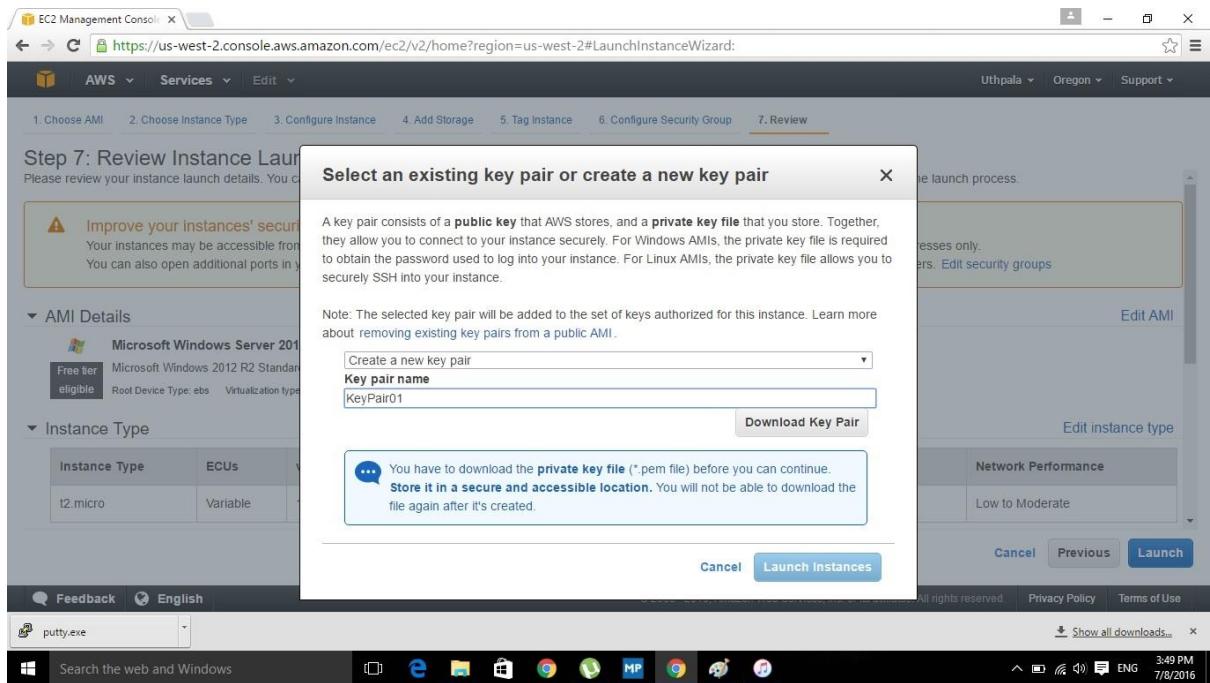
Family	Type	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance
General purpose	t2.nano	1	0.5	EBS only	-	Low to Moderate
General purpose	t2.micro <small>Free tier eligible</small>	1	1	EBS only	-	Low to Moderate
General purpose	t2.small	1	2	EBS only	-	Low to Moderate
General purpose	t2.medium	2	4	EBS only	-	Low to Moderate
General purpose	t2.large	2	8	EBS only	-	Low to Moderate

Review and Launch

❖ Step 05: Review Instance Launch.



❖ Step 06: After launch there is popup box which is to select an existing key pair or create new key pair. Select new key pair and download the key pair. After downloading the key pair click Launch Instance.



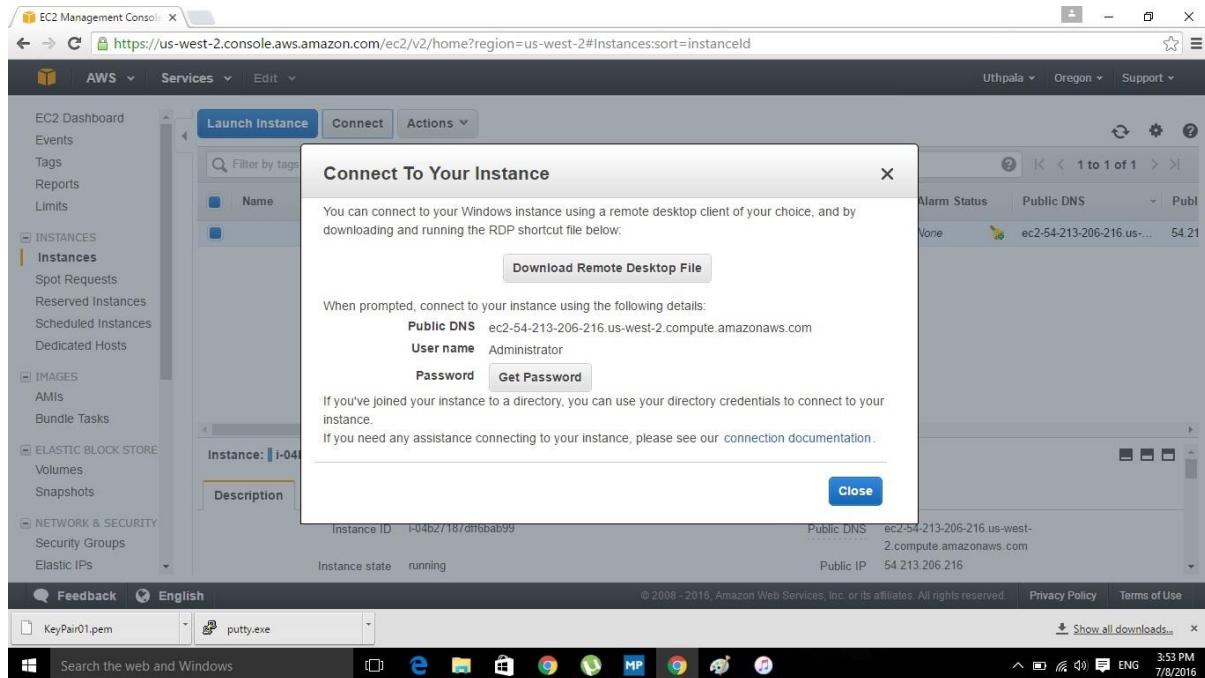
❖ Step 07: View instance after launching.

The screenshot shows the AWS EC2 Management Console at the URL <https://us-west-2.console.aws.amazon.com/ec2/v2/home?region=us-west-2#LaunchInstanceWizard>. The user is in the Oregon region. The page displays a green success message: "Your instances are now launching" with the instance ID i-04b27187dff6bab99 and a link to "View launch log". Below this, there's a tip about getting notified of estimated charges. A section titled "How to connect to your instances" provides instructions and links to resources like the User Guide and Discussion Forum. At the bottom, the browser toolbar shows "KeyPair01.pem" and "putty.exe" as tabs, along with the Windows taskbar.

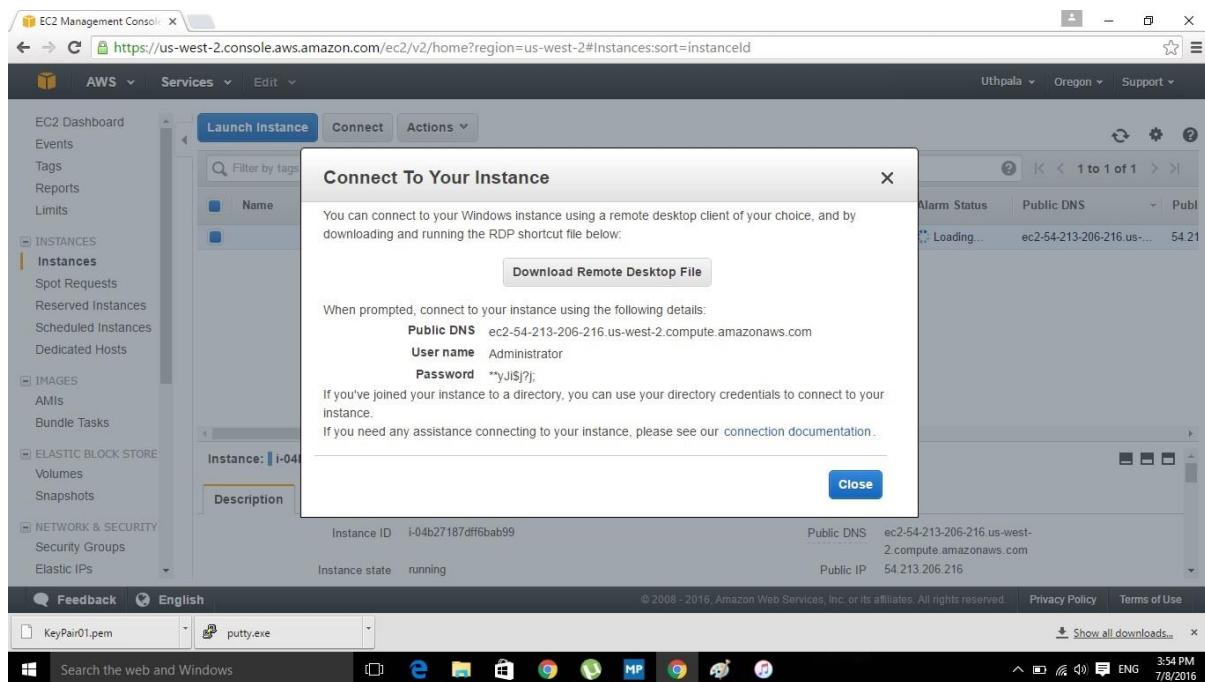
❖ Step 08: Select the created instance and then connect.

The screenshot shows the AWS EC2 Management Console at the URL <https://us-west-2.console.aws.amazon.com/ec2/v2/home?region=us-west-2#instances>. The user is in the Oregon region. The left sidebar shows navigation options like EC2 Dashboard, Events, Tags, Reports, Limits, Instances, Images, and Network & Security. The Instances section is selected. The main area displays a table of instances, with one row highlighted for the instance ID i-04b27187dff6bab99. Below the table, detailed information for this instance is shown, including its Public DNS (ec2-54-213-206-216.us-west-2.compute.amazonaws.com), Instance ID (i-04b27187dff6bab99), Instance State (running), and Public IP (54.213.206.216). The browser toolbar shows "KeyPair01.pem" and "putty.exe" as tabs, along with the Windows taskbar.

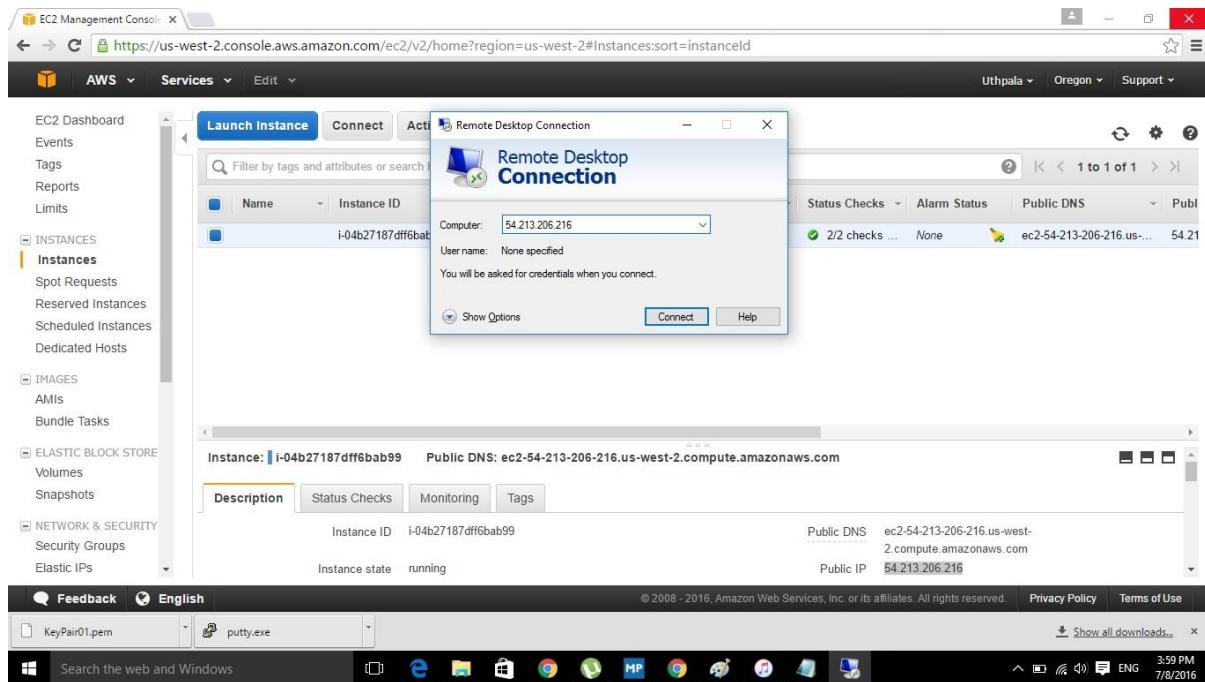
❖ **Step 09:** Get a password from Connect to Your Instance window.



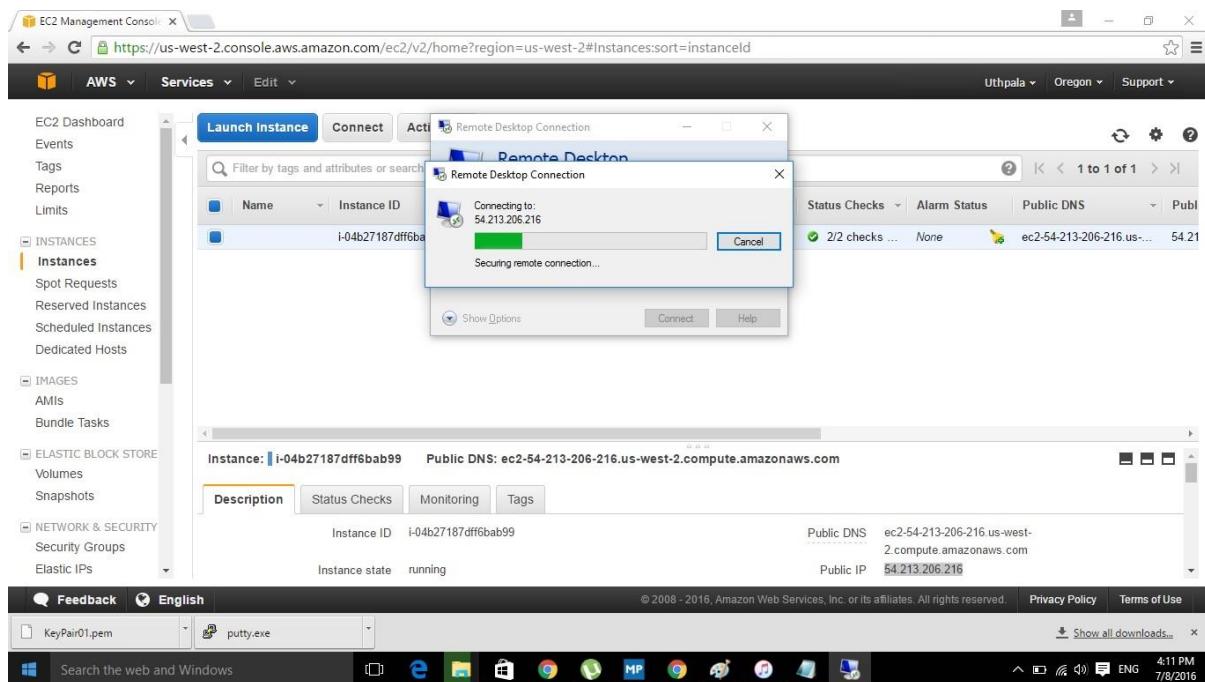
❖ **Step 10:** Decrypt the password. Note down the user name and the decrypted password.



- ❖ **Step 11:** Open Remote Desktop Connection. Provide the public IP of the launched instance.



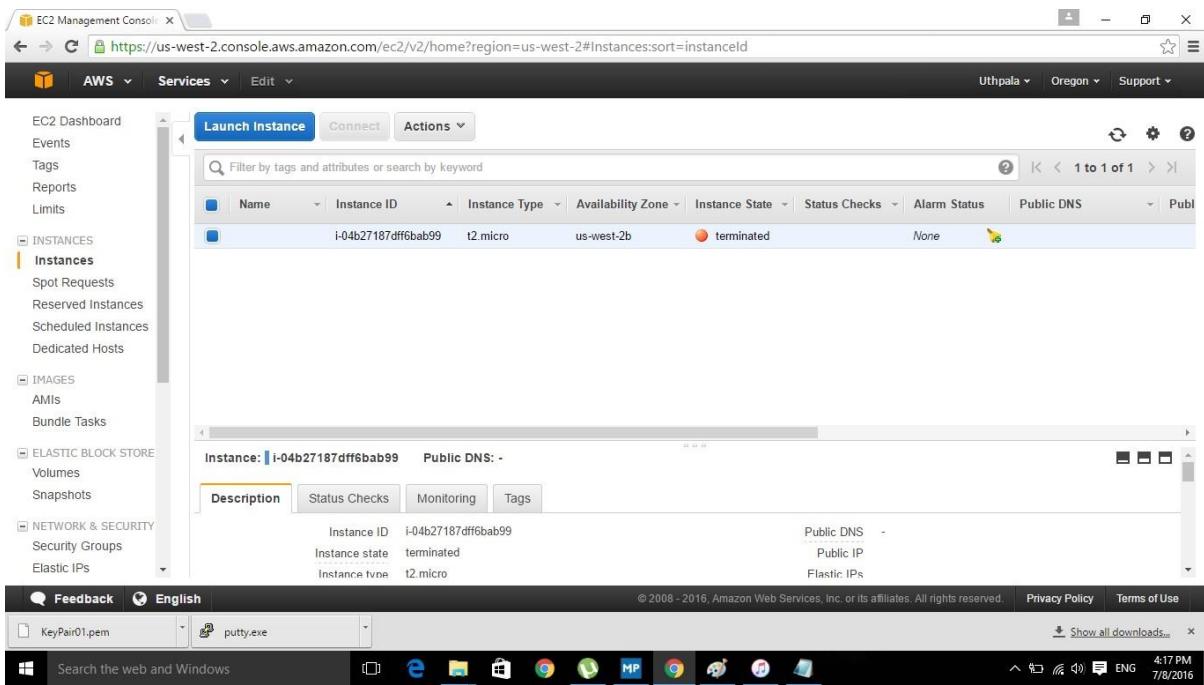
- ❖ **Step 12:** Connect to the created instance.



- ❖ **Step 13:** Log in to Windows Server 2012 R2 using the given user name and the decrypted password.



- ❖ **Step 14:** Right click on the created server instance and terminate it from the instance state. (Right click on instance -> Instance State -> Stop)



Lab 02 - Creating an Amazon EBS-Backed Linux AMI

- ❖ Step 01: Choose an Amazon Machine Image (AMI). Select Amazon Linux AMI 2016.03.3 (HVM), SSD Volume Type

Step 1: Choose an Amazon Machine Image (AMI)
An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. You can select an AMI provided by AWS, our user community, or the AWS Marketplace; or you can select one of your own AMIs.

Quick Start
My AMIs
AWS Marketplace
Community AMIs
<input type="checkbox"/> Free tier only ⓘ

Amazon Linux AMI 2016.03.3 (HVM), SSD Volume Type - ami-7172b611
The Amazon Linux AMI is an EBS-backed, AWS-supported image. The default image includes AWS command line tools, Python, Ruby, Perl, and Java. The repositories include Docker, PHP, MySQL, PostgreSQL, and other packages.
Root device type: ebs Virtualization type: hvm
Select 64-bit

Red Hat Enterprise Linux 7.2 (HVM), SSD Volume Type - ami-775e4f16
Red Hat Enterprise Linux version 7.2 (HVM), EBS General Purpose (SSD) Volume Type
Root device type: ebs Virtualization type: hvm
Select 64-bit

SUSE Linux Enterprise Server 12 SP1 (HVM), SSD Volume Type - ami-d2627db3
SUSE Linux Enterprise Server 12 Service Pack 1 (HVM), EBS General Purpose (SSD) Volume Type. Public Cloud, Advanced Systems Management, Web and Scripting, and Legacy modules enabled.
Select 64-bit



- ❖ Step 02: Choose an Instance Type. Then review and launch

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.

Filter by:	All instance types	Current generation	Show/Hide Columns				
Currently selected: t2.micro (Variable ECUs, 1 vCPUs, 2.5 GHz, Intel Xeon Family, 1 GiB memory, EBS only)							
	Family	Type	vCPUs ⓘ	Memory (GiB) ⓘ	Instance Storage (GB) ⓘ	EBS-Optimized Available ⓘ	Network Performance ⓘ
<input type="checkbox"/>	General purpose	t2.nano	1	0.5	EBS only	-	Low to Moderate
<input checked="" type="checkbox"/>	General purpose	t2.micro Free tier eligible	1	1	EBS only	-	Low to Moderate
<input type="checkbox"/>	General purpose	t2.small	1	2	EBS only	-	Low to Moderate
<input type="checkbox"/>	General purpose	t2.medium	2	4	EBS only	-	Low to Moderate
<input type="checkbox"/>	General purpose	t2.large	2	8	EBS only	-	Low to Moderate

Cancel **Previous** **Review and Launch** **Next: Configure Instance Details**

❖ Step 03: Review Instance Launch.

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

Amazon Linux AMI 2016.03.3 (HVM), SSD Volume Type - ami-7172b611

The Amazon Linux AMI is an EBS-backed, AWS-supported image. The default image includes AWS command line tools, Python, Ruby, Perl, and Java. The repositories include Docker, PHP, MySQL, PostgreSQL, and other packages.

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

Launch

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puttygen.exe KeyPair01.pem putty.exe

Search the web and Windows 4:44 PM 7/9/2016

❖ Step 04: Choose create a new key pair to download a new key pair. Then give a key pair name. Then select Launch Instance.

Select an existing key pair or create a new key pair

A key pair consists of a **public key** that AWS stores, and a **private key file** that you store. Together, they allow you to connect to your instance securely. For Windows AMIs, the private key file is required to obtain the password used to log into your instance. For Linux AMIs, the private key file allows you to securely SSH into your instance.

Note: The selected key pair will be added to the set of keys authorized for this instance. Learn more about [removing existing key pairs from a public AMI](#).

Create a new key pair

Key pair name

KeyPair02

Download Key Pair

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.

Launch Instances

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puttygen.exe KeyPair01.pem putty.exe

Search the web and Windows 4:44 PM 7/9/2016

❖ Step 05: View Instances after launching.

Your instances are now launching
The following instance launches have been initiated: i-02ecbc4cf693e07bf [View launch log](#)

Get notified of estimated charges
Create billing alerts to get an email notification when estimated charges on your AWS bill exceed an amount you define (for example, if you exceed the free usage tier).

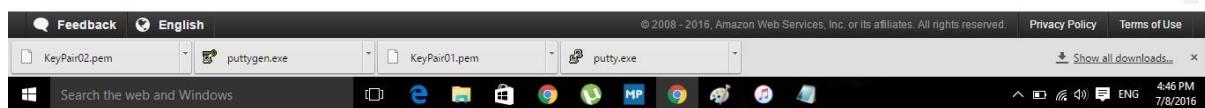
How to connect to your instances

Your instances are launching, and it may take a few minutes until they are in the **running** state, when they will be ready for you to use. Usage hours on your new instances will start immediately and continue to accrue until you stop or terminate your instances.

Click **View Instances** to monitor your instances' status. Once your instances are in the **running** state, you can **connect** to them from the Instances screen. Find out how to connect to your instances.

▼ Here are some helpful resources to get you started

- How to connect to your Linux instance
- Learn about AWS Free Usage Tier
- Amazon EC2: User Guide
- Amazon EC2: Discussion Forum



❖ Step 06: Open PUTTY Key Generator. Then browse and load the downloaded key pair file and save it as a private key.

Public key for pasting into OpenSSH authorized_keys file:

```
AAAAB3NzaC1yc2EAAAQABAAQCC5wjaeVW4DhYXh5JaFbFn4pCbp
+ZJ0fFH+10+M3mb4M2X7uEdh8/uBc3YtbeH0enZ5uhD5o:3F1VDMFQB
+Y6WVnqLjUuHdIuEaMvAysk3RIL4uV1O7GQ7V7u/...
```

Key fingerprint: b7:69:4d:2b:1a:3c:4d:1b:4b:7d:1a:3c:4d:1b:4b:7d

Key comment: Kick-Ass 2

Key pass: (empty)

Confirm pass: (empty)

Actions

Generate

Load an...

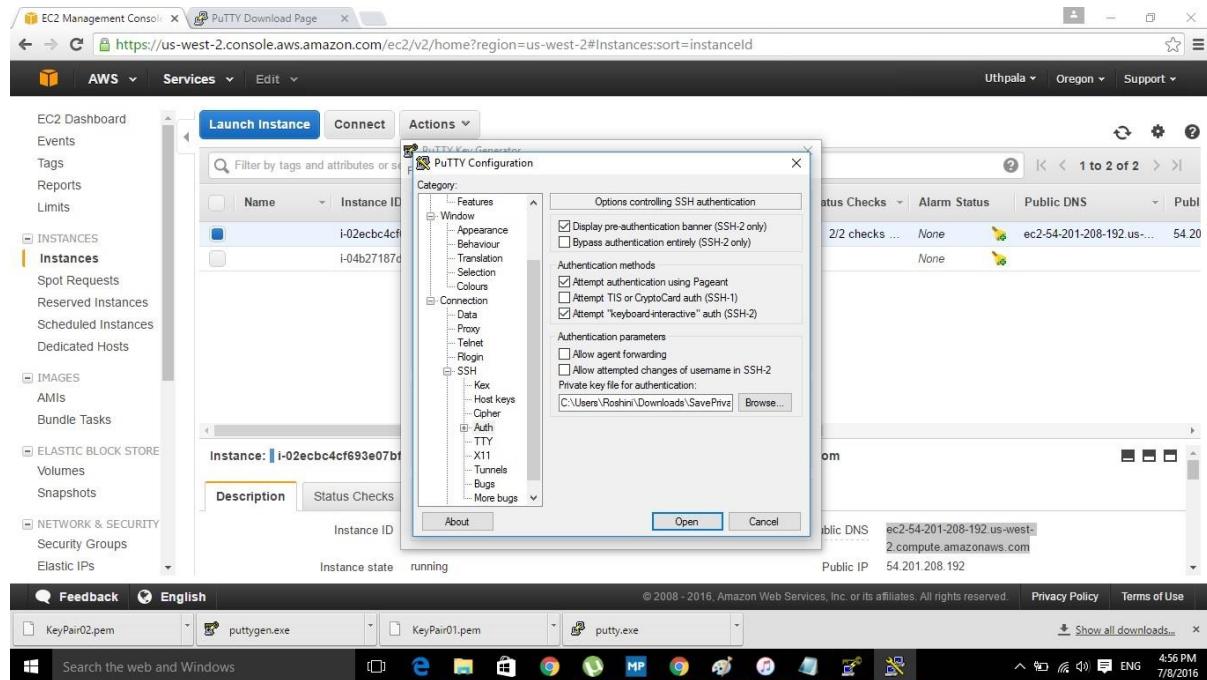
Save the generated key Save public key Save private key

Parameters

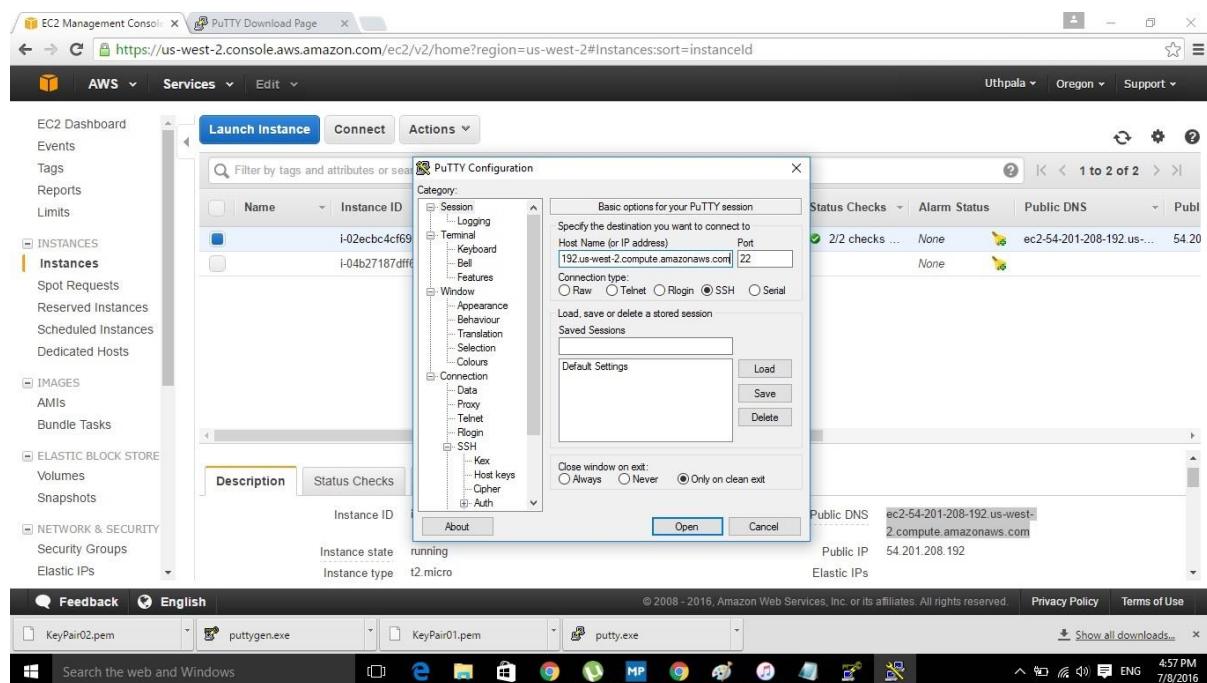
Type of key to generate: RSA DSA ED25519 SSH-1 (RSA)

Number of bits in a generated key: 2048

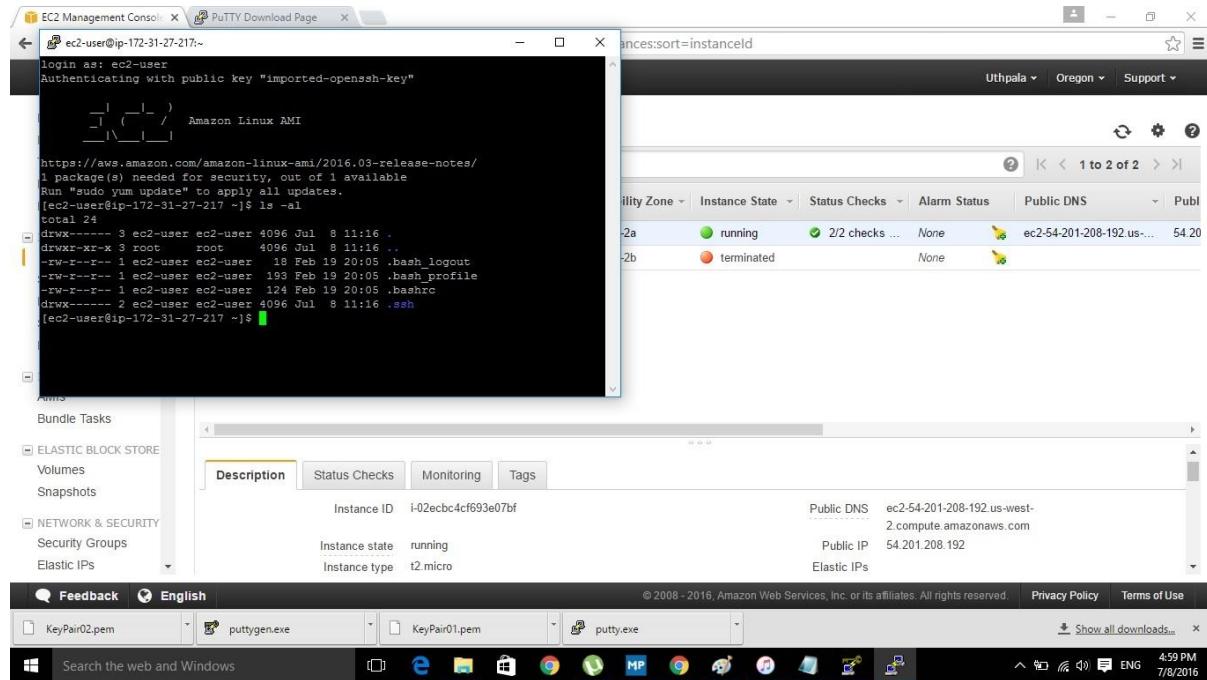
- ❖ **Step 07:** Open PUTTY Configuration. Go to Connection category for SSH authentication. (Connection -> SSH -> Auth) Then under authentication parameters browse saved private key and open.



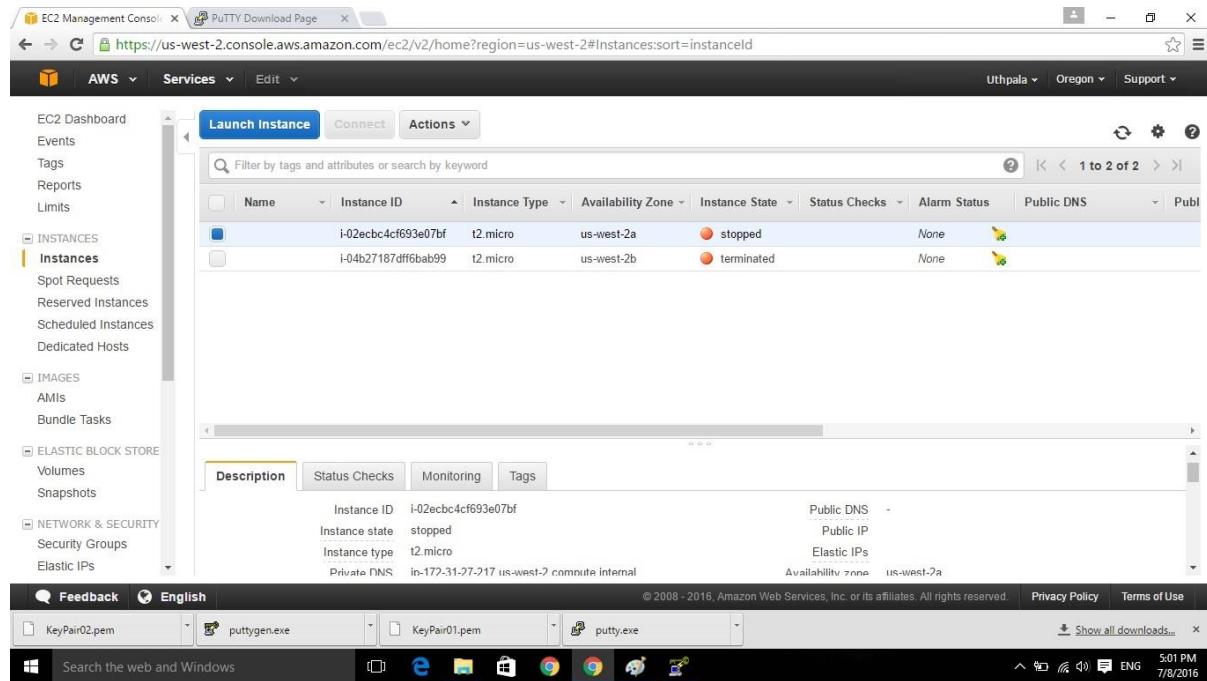
- ❖ **Step 08:** Go back to Session category in PUTTY Configuration. Copy the Public DNS of created instance and paste it under Host Name. Set Connection type to SSH and open.



- ❖ **Step 09:** Log in to Linux by giving user name in the kernel. (ec2-user). Type some Linux commands to check. (ls -al)

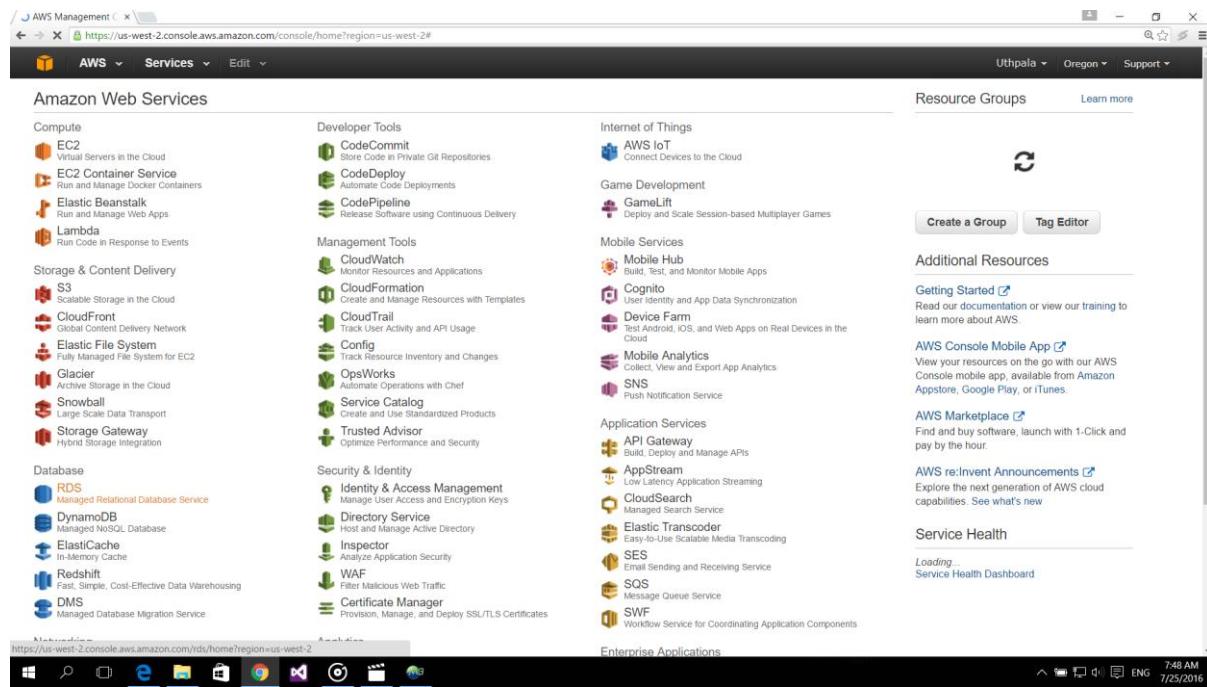


- ❖ **Step 10:** Terminate or stop the instance from instance state.(Right click on instance -> Instance State -> Terminate/ Stop).

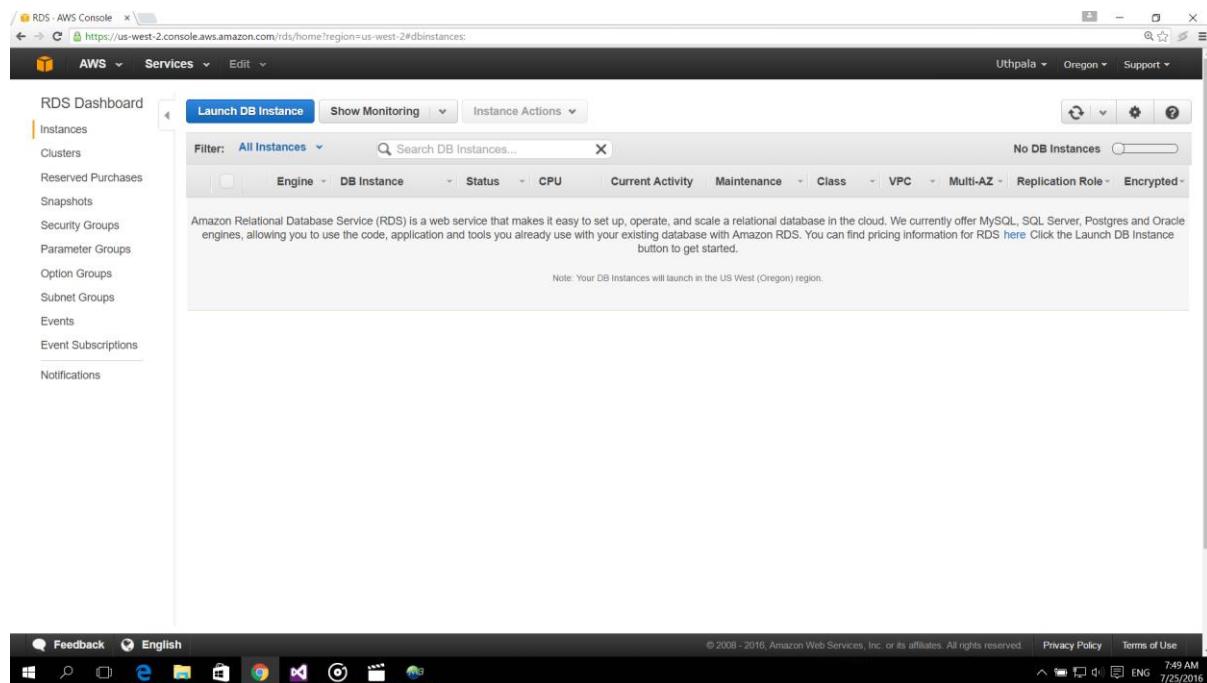


Lab 03 - Creating an Amazon RDS Database

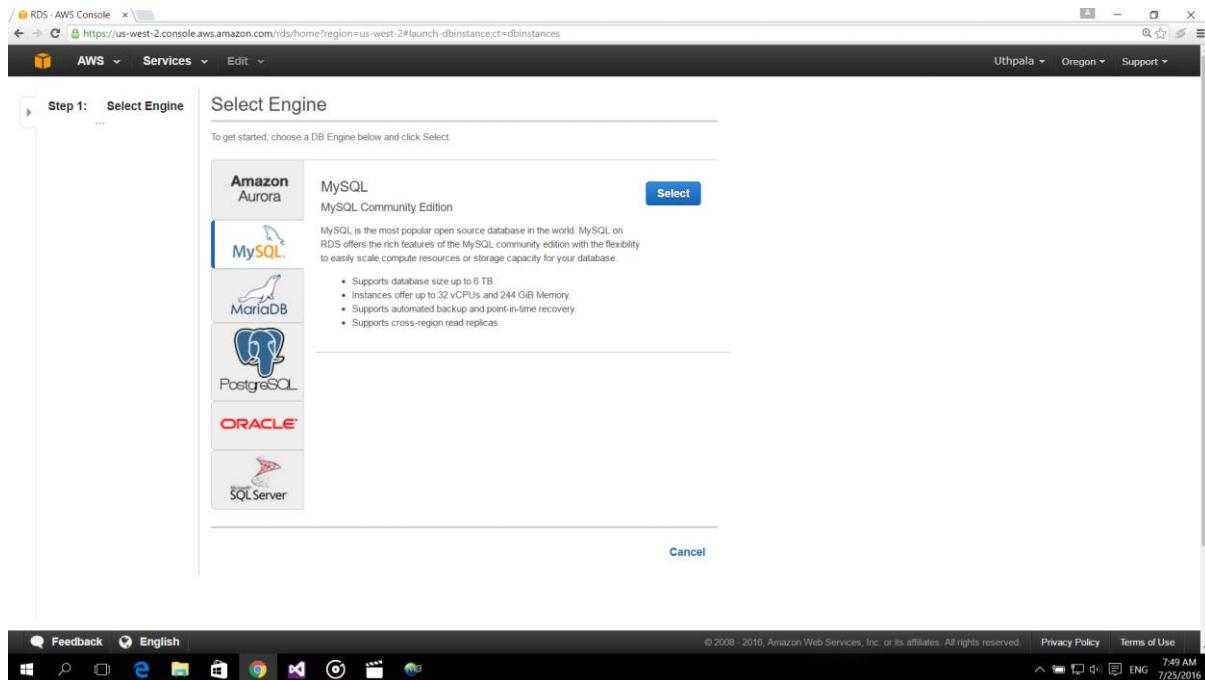
- ❖ Step 01: Select RDS from Amazon Web Services. (Services -> RDS)



- ❖ **Step 02:** Choose Instances from RDS Dashboard.
Select Launch DB Instance.

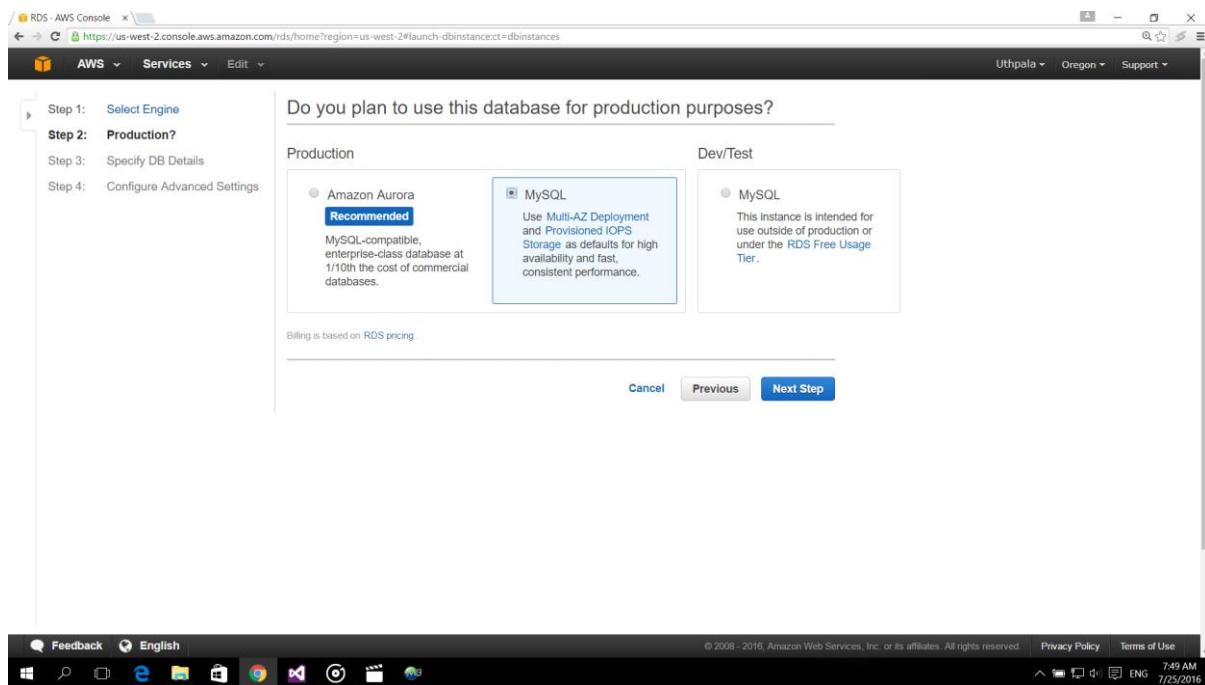


❖ **Step 03:** Choose MySQL from ‘Select Engine’ tab.



❖ **Step 04:** Select MySQL under ‘Production’ category.

Then proceed to next step.



❖ **Step 05:** Specify the DB details. (Instance Specifications and Settings)

License Model: general-public-license

DB Engine Version: 5.6.19a

DB Instance Class: db.t2.micro – 1 vCPU, 1 GiB RAM

Multi-AZ Deployment: No

Storage Type: General Purpose (SSD)

Allocated Storage: 15 GB

Provide a DB instance identifier, a master username and a master password.

The screenshot shows the 'Specify DB Details' step of the RDS instance creation wizard. On the left, a sidebar lists steps: Step 1: Select Engine, Step 2: Production?, Step 3: Specify DB Details (highlighted in blue), Step 4: Configure Advanced Settings. The main area is titled 'Specify DB Details' under 'Instance Specifications'. It shows the following configuration:

- DB Engine: mysql
- License Model: general-public-license
- DB Engine Version: 5.6.19a
- DB Instance Class: db.t2.micro — 1 vCPU, 1 GiB RAM
- Multi-AZ Deployment: No
- Storage Type: General Purpose (SSD)
- Allocated Storage: 15 GB

A warning message in a red-bordered box states: "Provisioning less than 100 GB of General Purpose (SSD) storage for high throughput workloads could result in higher latencies upon exhaustion of the initial General Purpose (SSD) IO credit balance. Click here for more details." Below this, the 'Settings' section contains fields for:

- DB Instance Identifier*: firstinstance
- Master Username*: firstinstance
- Master Password*

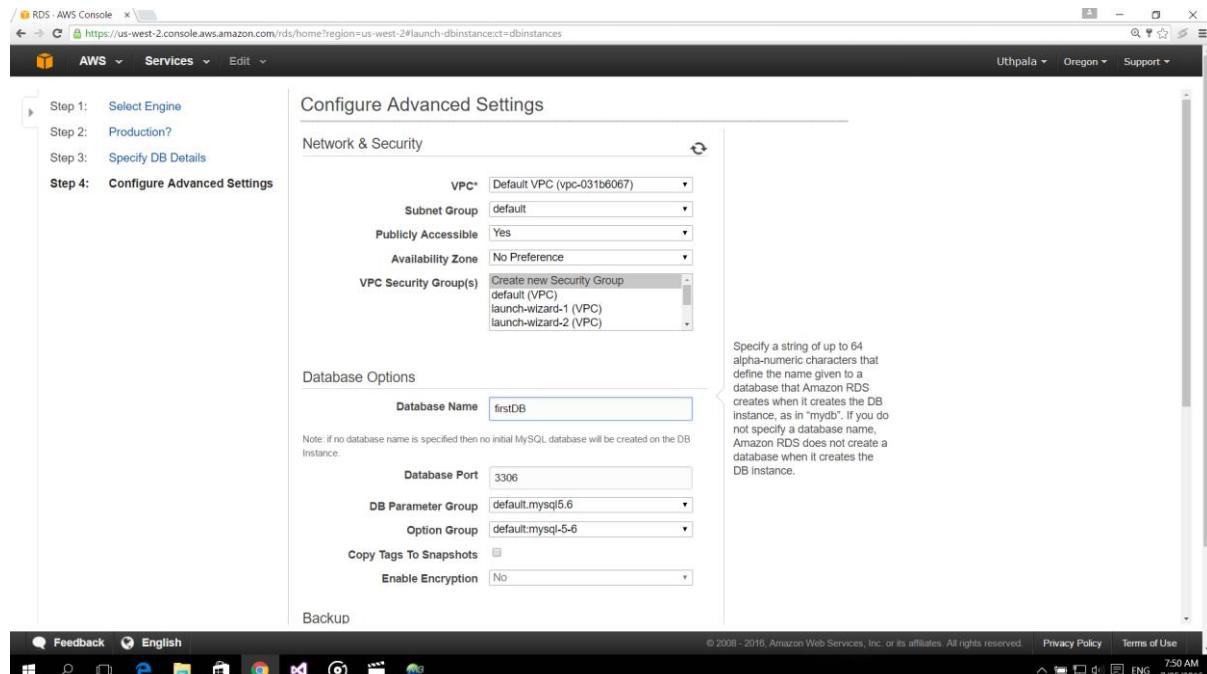
A note next to the password field says: "Retype the value you specified for Master Password."

This screenshot shows the same 'Specify DB Details' step as the previous one, but with different input values. The 'DB Instance Identifier*' field now contains 'firstinstance'. The 'Master Username*' field also contains 'firstinstance'. The 'Master Password*' and 'Confirm Password*' fields both contain '*****'. The rest of the configuration remains the same as in the previous screenshot.

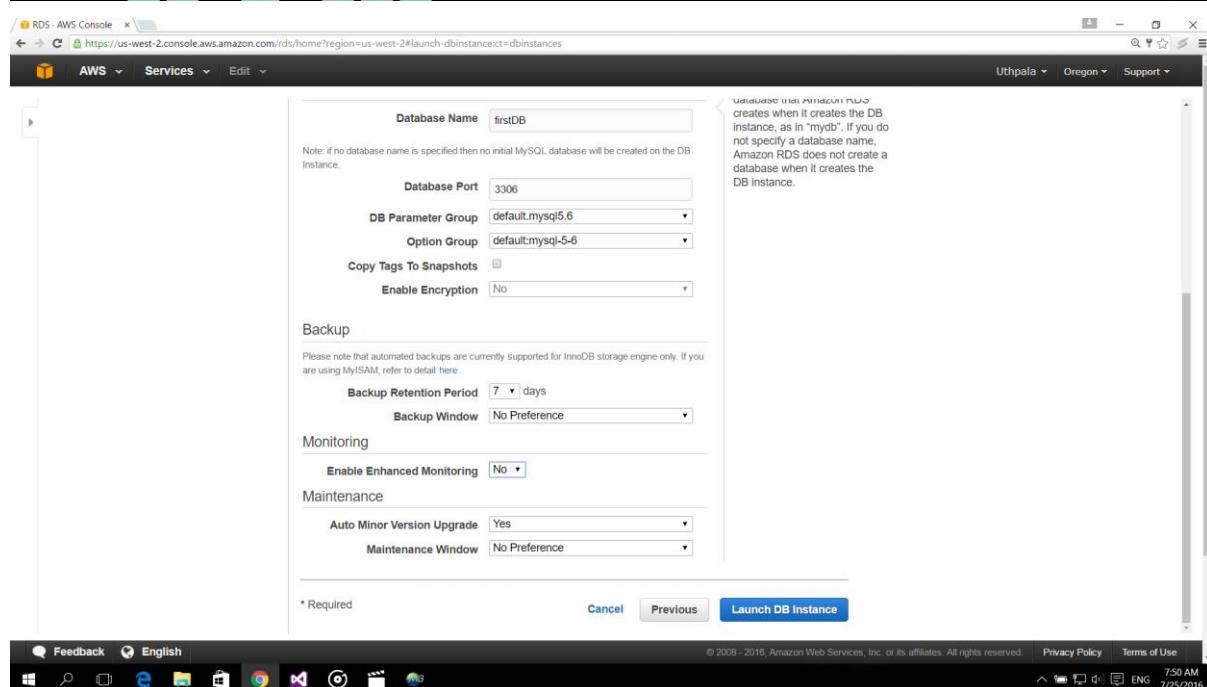
- ❖ **Step 06:** Give a database name in ‘Configure Advanced Settings’ tab. (Database Options)

Choose ‘No’ in Enable Enhanced Monitoring. (Monitoring)

Click ‘Launch DB Instance’.

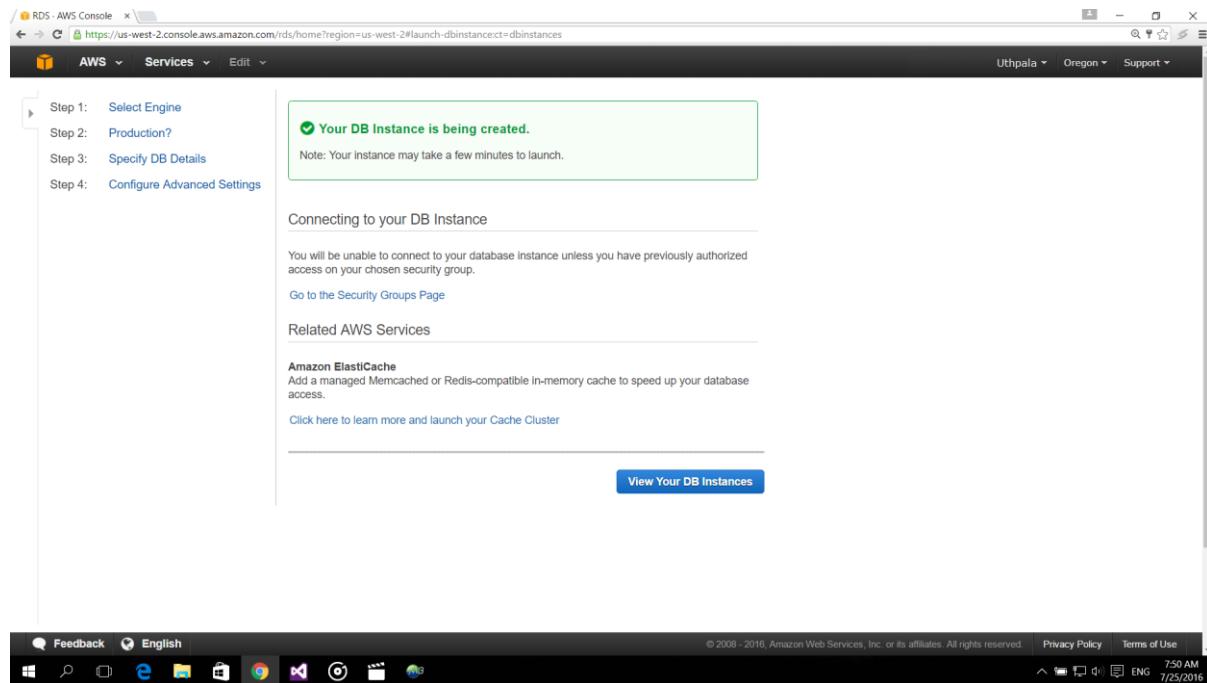


The screenshot shows the 'Configure Advanced Settings' step of the RDS instance creation wizard. The 'Database Options' section is visible, showing fields for Database Name (set to 'firstDB'), Database Port (set to 3306), DB Parameter Group (set to 'default.mysql5.6'), and Option Group (set to 'default:mysql-5.6'). A note indicates that if no database name is specified, an initial MySQL database will be created. The 'Enable Encryption' dropdown is set to 'No'. A detailed note on the right explains that specifying a database name creates it when the DB instance is launched, while not specifying it results in no database being created.



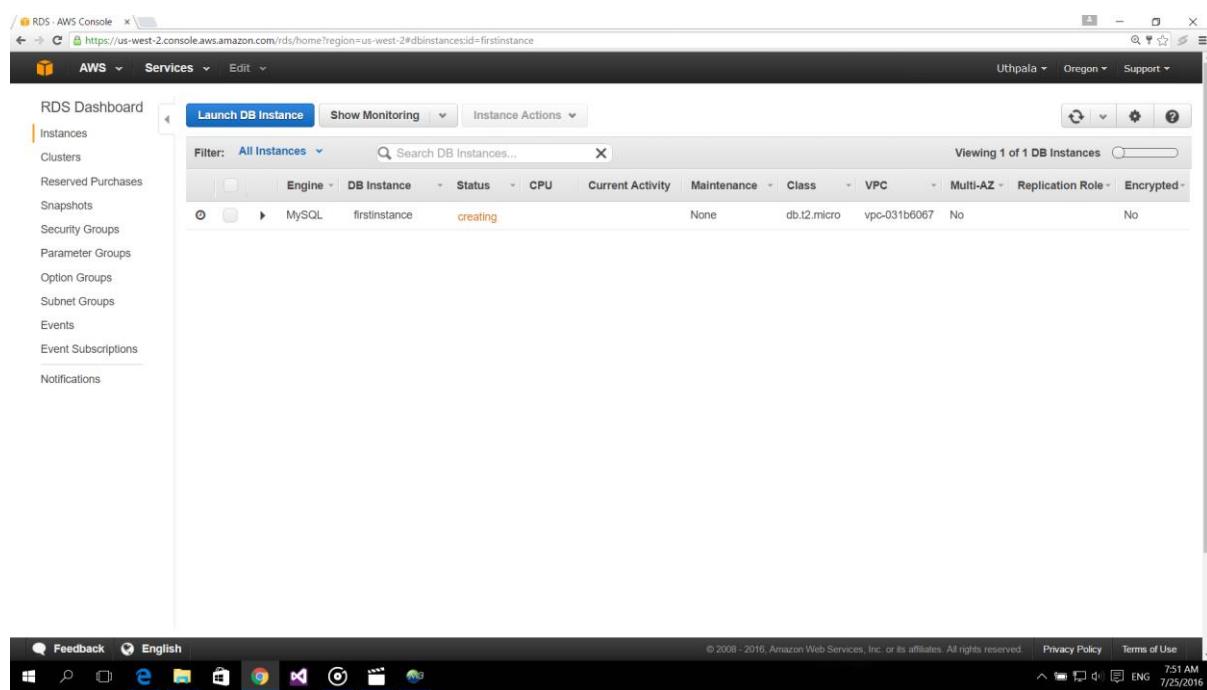
The screenshot shows the 'Configure Advanced Settings' step with the 'Monitoring' section expanded. The 'Enable Enhanced Monitoring' dropdown is set to 'No'. Other sections like 'Backup' and 'Maintenance' are also visible. At the bottom, there are 'Cancel', 'Previous', and 'Launch DB Instance' buttons. A note on the right reiterates the behavior regarding database creation.

❖ **Step 07:** Click ‘View Your DB Instances’ from next window.



❖ **Step 08:** Wait until the instance status change to ‘available’ from ‘creating’.

(Creating -> backing-up -> available)



The screenshot shows the AWS RDS console interface. On the left, there's a sidebar with options like Instances, Clusters, Reserved Purchases, Snapshots, Security Groups, Parameter Groups, Option Groups, Subnet Groups, Events, Event Subscriptions, and Notifications. The main area has tabs for Launch DB Instance, Show Monitoring, and Instance Actions. A search bar at the top says "Search DB Instances...". Below it is a table titled "Viewing 1 of 1 DB Instances". The table has columns for Engine, DB Instance, Status, CPU, Current Activity, Maintenance, Class, VPC, Multi-AZ, Replication Role, and Encrypted. One row is shown: Engine is MySQL, DB Instance is firstinstance, Status is "backing-up", Current Activity is None, Class is db.t2.micro, VPC is vpc-031b6067, Multi-AZ is No, and Encrypted is No. At the bottom of the browser window, there's a toolbar with icons for Feedback, English, and other browser controls, along with a status bar showing "© 2008-2016, Amazon Web Services, Inc. or its affiliates. All rights reserved." and "Privacy Policy Terms of Use 7:55 AM ENG 7/25/2016".

This screenshot is nearly identical to the one above, showing the AWS RDS console. The main difference is in the table data: the Status column for the MySQL instance "firstinstance" is now "available" instead of "backing-up". The rest of the interface, including the sidebar, table headers, and footer information, remains the same.

❖ Step 09: Expand the instance to view Endpoint.

Copy the Endpoint without the port number.

The screenshot shows the AWS RDS Dashboard. On the left, there's a sidebar with options like Instances, Clusters, Reserved Purchases, Snapshots, Security Groups, Parameter Groups, Option Groups, Subnet Groups, Events, Event Subscriptions, and Notifications. The main area displays a table for 'All Instances'. One row is selected for 'MySQL firstinstance', which is marked as 'available' with a CPU usage of 5.67%, 0 connections, and no maintenance scheduled. The instance is in the db.t2.micro class, VPC vpc-031b6067, and is not part of a Multi-AZ setup. Below the table, the 'Endpoint' is listed as 'firstinstance.c7jmmuufn.us-west-2.rds.amazonaws.com:3306 (authorized)'. A 'Monitoring' section shows current system metrics: CPU at 3% (threshold 3%), Memory at 558 MB (threshold 558 MB), Storage at 14,500 MB (threshold 14,500 MB), Read IOPS at 0.608/sec (threshold 0.608/sec), Write IOPS at 1.92/sec (threshold 1.92/sec), and Swap Usage at 0 MB (threshold 0 MB). At the bottom, there are 'Instance Actions', 'Tags', and 'Logs' buttons.

❖ Step 10: Open XAMPP Control Panel.

Start MySQL.

The screenshot shows the XAMPP Control Panel v3.2.1. In the 'Modules' tab, the MySQL service is listed with PID 11036 and Port 3306. The 'Actions' column for MySQL shows 'Stop' and 'Start' buttons. The 'Logs' section displays the following log entries:

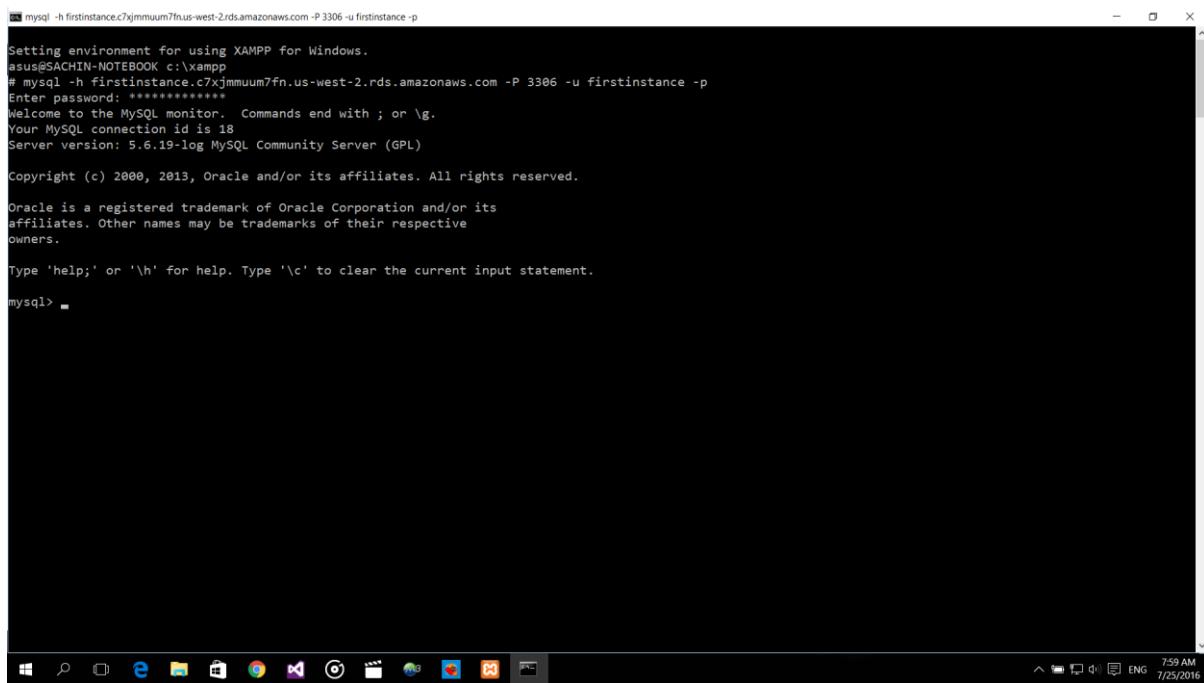
```
7:57:54 AM [Apache] Port 443 in use by "C:\Program Files (x86)\VMware\VMware Workstation\vmware-hostd.exe"
7:57:54 AM [Apache] Apache WILL NOT start without the configured ports free
7:57:54 AM [Apache] You need to uninstall/disable/reconfigure the blocking application
7:57:54 AM [Apache] or reconfigure Apache and the Control Panel to listen on a different port
7:57:54 AM [main] Starting Check-Timer
7:57:54 AM [main] Control Panel Ready
7:58:00 AM [mysql] Attempting to start MySQL app...
7:58:00 AM [mysql] Status change detected: running
```

Below the logs, there are 'Instance Actions', 'Tags', and 'Logs' buttons. The background shows the AWS RDS monitoring interface, identical to the one in the previous screenshot.

❖ **Step 11:** Go to the Shell in XAMPP Control Panel.

Type the command. (mysql -h <endpoint> -P <portnumber> -u <instancename> -p)

Enter master password.



```
mysql -h firstinstance.c7xjmmuum7fn.us-west-2.rds.amazonaws.com -P 3306 -u firstinstance -p
Setting environment for using XAMPP for Windows.
asus@SACHIN-NOTEBOOK c:\xampp
# mysql -h firstinstance.c7xjmmuum7fn.us-west-2.rds.amazonaws.com -P 3306 -u firstinstance -p
Enter password: *****
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 18
Server version: 5.6.19-log MySQL Community Server (GPL)

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affiliates. Other names may be trademarks of their respective
owners.

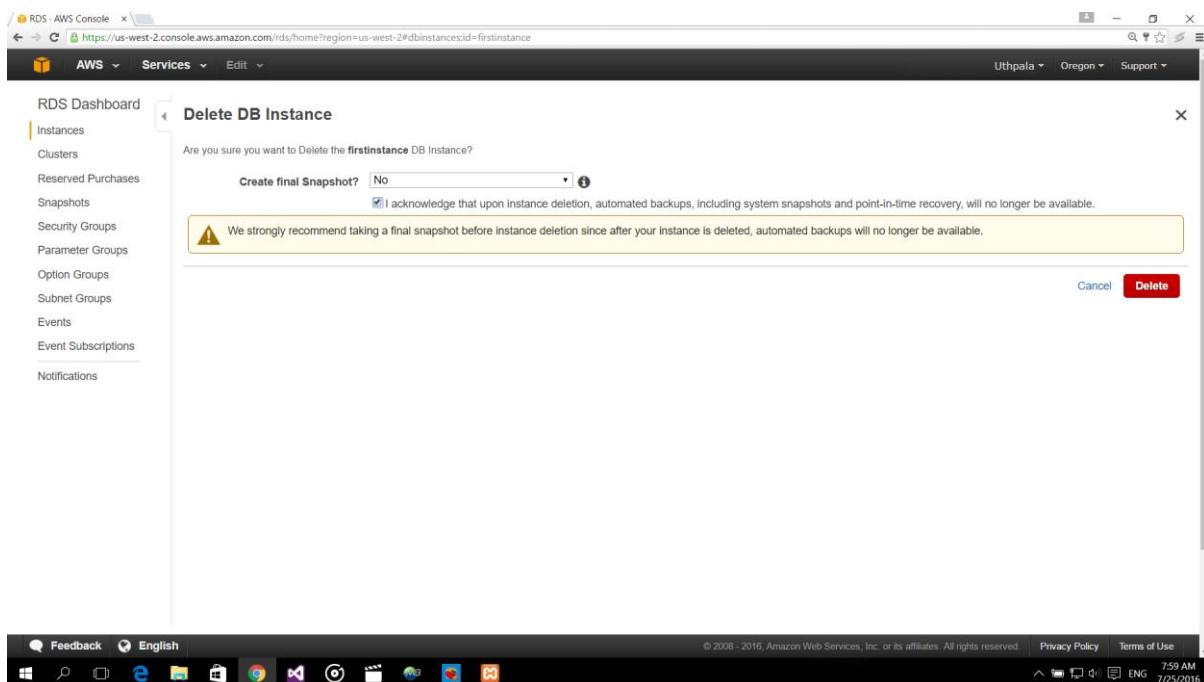
Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql>
```

❖ **Step 12:** Delete the created DB instance. (Instance Actions -> Delete)

Choose ‘No’ in Create final Snapshot.

Confirm delete by clicking ‘Delete’.



RDS Dashboard

Instances

Clusters

Reserved Purchases

Snapshots

Security Groups

Parameter Groups

Option Groups

Subnet Groups

Events

Event Subscriptions

Notifications

Launch DB Instance Show Monitoring Instance Actions

Filter: All Instances Search DB Instances... X

Viewing 1 of 1 DB Instances

Engine: MySQL DB Instance: firstinstance Status: deleting CPU: 1.17% Current Activity: 0 Connections Maintenance: None Class: db.t2.micro VPC: vpc-031b6067 Multi-AZ: No Replicati...

Endpoint: firstinstance.c7jmuau7fn.us-west-2.rds.amazonaws.com:3306 (authorized) i

Alarms and Recent Events

TIME (UTC+5:30)	EVENT
Jul 25 7:56 AM	Finished DB Instance backup
Jul 25 7:55 AM	Backing up DB instance
Jul 25 7:54 AM	DB instance created
Jul 25 7:54 AM	DB instance restarted

Monitoring

CURRENT VALUE	THRESHOLD	LAST HOUR	CURRENT VALUE	LAST HOUR
CPU	1.17%	[progress bar]	Read IOPS	0/sec
Memory	556 MB	[progress bar]	Write IOPS	0.2/sec
Storage	14,500 MB	[progress bar]	Swap Usage	0 MB

Instance Actions Tags Logs



RDS Dashboard

Instances

Clusters

Reserved Purchases

Snapshots

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Launch DB Instance Show Monitoring Instance Actions

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No DB Instances

Amazon Relational Database Service (RDS) is a web service that makes it easy to set up, operate, and scale a relational database in the cloud. We currently offer MySQL, SQL Server, Postgres and Oracle engines, allowing you to use the code, application and tools you already use with your existing database with Amazon RDS. You can find pricing information for RDS [here](#). Click the Launch DB Instance button to get started.

Note: Your DB Instances will launch in the US West (Oregon) region.

