What is AWS?

- AWS stands for **Amazon Web Services**.
- The AWS service is provided by the Amazon that uses distributed IT infrastructure to provide different IT resources available on demand. It provides different services such as infrastructure as a service (IaaS), platform as a service (PaaS) and packaged software as a service (SaaS).
- Amazon launched AWS, a cloud computing platform to allow the different organizations to take advantage of reliable IT infrastructure.

Uses of AWS

- A small manufacturing organization uses their expertise to expand their business by leaving their IT management to the AWS.
- A large enterprise spread across the globe can utilize the AWS to deliver the training to the distributed workforce.
- An architecture consulting company can use AWS to get the high-compute rendering of construction prototype.
- A media company can use the AWS to provide different types of content such as ebox or audio files to the worldwide files.

Pay-As-You-Go

Based on the concept of Pay-As-You-Go, AWS provides the services to the customers.

AWS provides services to customers when required without any prior commitment or upfront investment. Pay-As-You-Go enables the customers to procure services from AWS.

- Computing
- Programming models
- Database storage
- Networking

Advantages of AWS

1) Flexibility

- We can get more time for core business tasks due to the instant availability of new features and services in AWS.
- It provides effortless hosting of legacy applications. AWS does not require learning new technologies and migration of applications to the AWS provides the advanced computing and efficient storage.
- AWS also offers a choice that whether we want to run the applications and services together or not. We can also choose to run a part of the IT infrastructure in AWS and the remaining part in data centres.

2) Cost-effectiveness

AWS requires no upfront investment, long-term commitment, and minimum expense when compared to traditional IT infrastructure that requires a huge investment.

3) Scalability/Elasticity

Through AWS, autoscaling and elastic load balancing techniques are automatically scaled up or down, when demand increases or decreases respectively. AWS techniques are ideal for handling unpredictable or very high loads. Due to this

reason, organizations enjoy the benefits of reduced cost and increased user satisfaction.

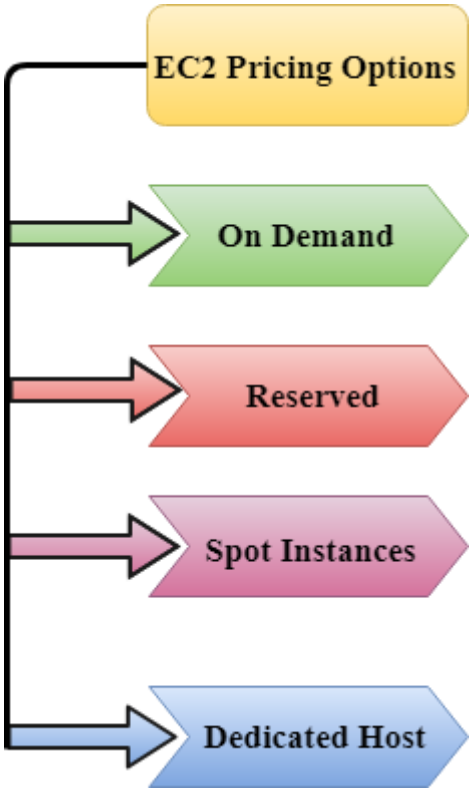
4) Security

- AWS provides end-to-end security and privacy to customers.
- AWS has a virtual infrastructure that offers optimum availability while managing full privacy and isolation of their operations.
- Customers can expect high-level of physical security because of Amazon's several years of experience in designing, developing and maintaining large-scale IT operation centers.
- AWS ensures the three aspects of security, i.e., Confidentiality, integrity, and availability of user's data.

What is EC2?

- EC2 stands for Amazon Elastic Compute Cloud.
- Amazon EC2 is a web service that provides resizable compute capacity in the cloud.
- Amazon EC2 reduces the time required to obtain and boot new user instances to minutes rather than in older days, if you need a server then you had to put a purchase order, and cabling is done to get a new server which is a very time-consuming process. Now, Amazon has provided an EC2 which is a virtual machine in the cloud that completely changes the industry.
- You can scale the compute capacity up and down as per the computing requirement changes.
- Amazon EC2 changes the economics of computing by allowing you to pay only for the resources that you actually use. Rather than you previously buy physical servers, you would look for a server that has more CPU capacity, RAM capacity and you buy a server over 5 year term, so you have to plan for 5 years in advance. People spend a lot of capital in such investments. EC2 allows you to pay for the capacity that you actually use.
- Amazon EC2 provides the developers with the tools to build resilient applications that isolate themselves from some common scenarios.

EC2 Pricing Options



On Demand

- It allows you to pay a fixed rate by the hour or even by the second with no commitment.
- Linux instance is by the second and windows instance is by the hour.
- On Demand is perfect for the users who want low cost and flexibility of Amazon EC2 without any up-front investment or long-term commitment.
- It is suitable for the applications with short term, spiky or unpredictable workloads that cannot be interrupted.
- It is useful for the applications that have been developed or tested on Amazon EC2 for the first time.
- On Demand instance is recommended when you are not sure which instance type is required for your performance needs.

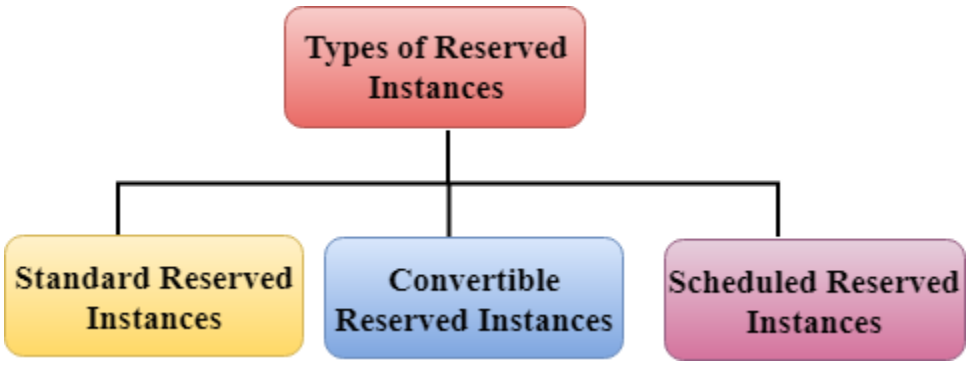
Reserved

- It is a way of making a reservation with Amazon or we can say that we make a contract with Amazon. The contract can be for 1 or 3 years in length.

- In a Reserved instance, you are making a contract means you are paying some upfront, so it gives you a significant discount on the hourly charge for an instance.
- It is useful for applications with steady state or predictable usage.
- It is used for those applications that require reserved capacity.
- Users can make up-front payments to reduce their total computing costs. For example, if you pay all your upfronts and you do 3 years contract, then only you can get a maximum discount, and if you do not pay all upfronts and do one year contract then you will not be able to get as much discount as you can get If you do 3 year contract and pay all the upfronts.

Types of Reserved Instances:

- Standard Reserved Instances
- Convertible Reserved Instances
- Scheduled Reserved Instances



Standard Reserved Instances

- It provides a discount of up to 75% off on demand. For example, you are paying all up-fronts for 3 year contract.
- It is useful when your Application is at the steady-state.

Convertible Reserved Instances

- It provides a discount of up to 54% off on demand.
- It provides the feature that has the capability to change the attributes of RI as long as the exchange results in the creation of Reserved Instances of equal or greater value.
- Like Standard Reserved Instances, it is also useful for the steady state applications.

Scheduled Reserved Instances

- Scheduled Reserved Instances are available to launch within the specified time window you reserve.
- It allows you to match your capacity reservation to a predictable recurring schedule that only requires a fraction of a day, a week, or a month.

Spot Instances

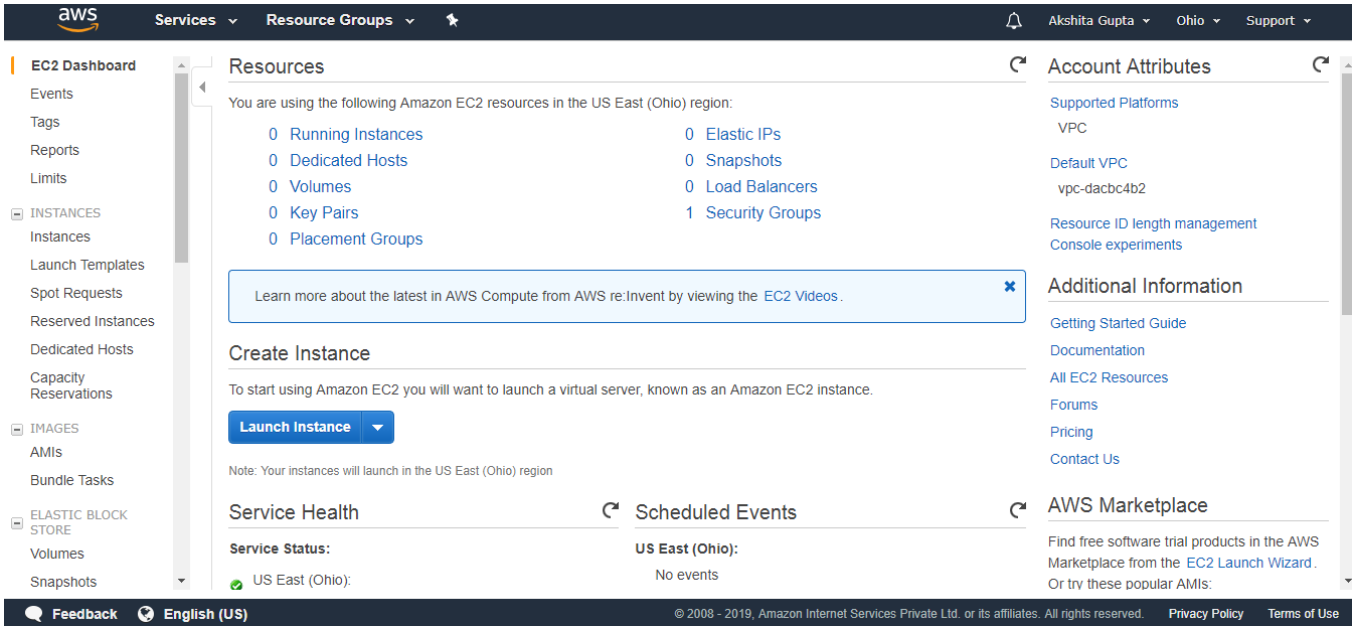
- It allows you to bid for a price whatever price that you want for instance capacity, and providing better savings if your applications have flexible start and end times.
- Spot Instances are useful for those applications that have flexible start and end times.
- It is useful for those applications that are feasible at very low compute prices.
- It is useful for those users who have an urgent need for large amounts of additional computing capacity.
- EC2 Spot Instances provide less discounts as compared to On Demand prices.
- Spot Instances are used to optimize your costs on the AWS cloud and scale your application's throughput up to 10X.
- EC2 Spot Instances will continue to exist until you terminate these instances.

Dedicated Hosts

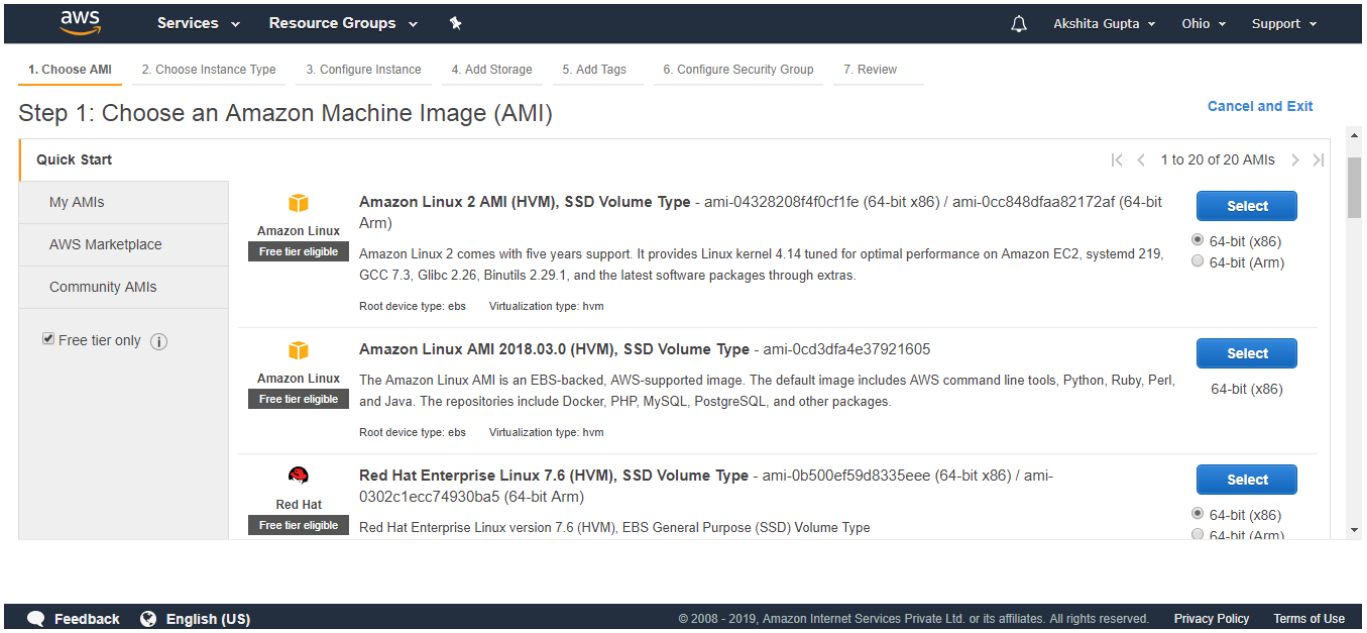
- A dedicated host is a physical server with EC2 instance capacity which is fully dedicated to your use.
- The physical EC2 server is the dedicated host that can help you to reduce costs by allowing you to use your existing server-bound software licenses. For example, Vmware, Oracle, SQL Server depending on the licenses that you can bring over to AWS and then they can use the Dedicated host.
- Dedicated hosts are used to address compliance requirements and reduces host by allowing to use your existing server-bound server licenses.
- It can be purchased as a Reservation for up to 70% off On-Demand price.

Creating an EC2 instance

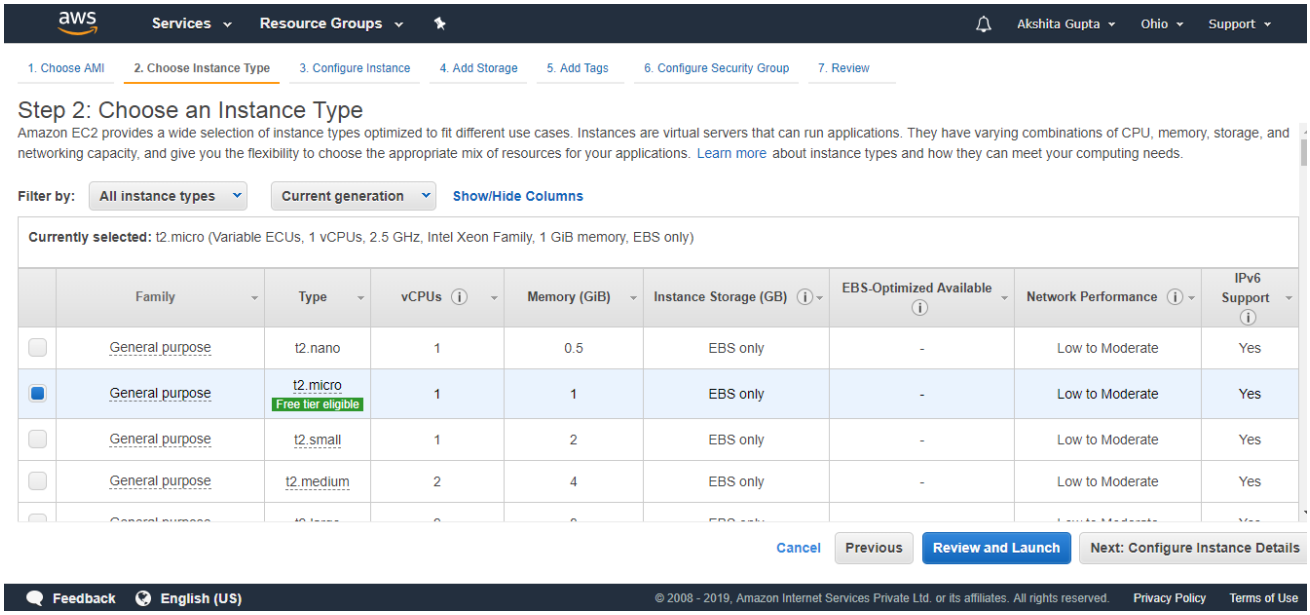
- Sign in to the AWS Management Console.
- Click on the EC2 service.
- Click on the **Launch Instance** button to create a new instance.



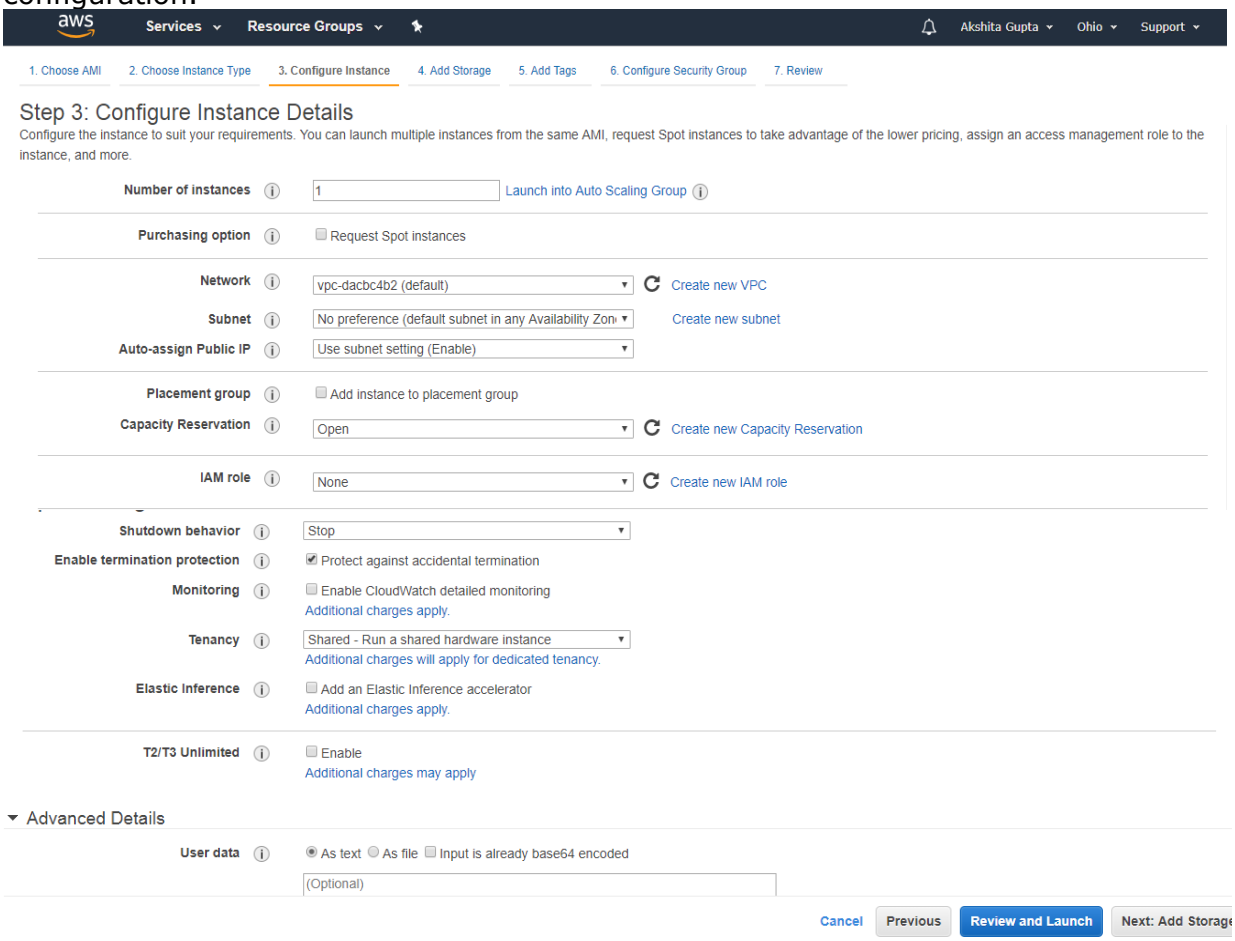
- Now, we have different Amazon Machine Images. These are the snapshots of different virtual machines. We will be using Amazon Linux AMI 2018.03.0 (HVM) as it has built-in tools such as java, python, ruby, perl, and especially AWS command line tools.



- Choose an Instance Type, and then click on the Next. Suppose I choose a t2.micro as an instance type.



- The main setup page of EC2 is shown below where we define setup configuration.



Where,

Number of Instances: It defines how many EC2 instances you want to create. I leave it as 1 as I want to create only one instance.

Purchasing Option: In the purchasing option, you need to set the price, request from, request to, and persistent request. Right now, I leave it as unchecked.

Tenancy: Click on the **Shared-Run a shared hardware instance** from the dropdown menu as we are sharing hardware.

Network: Choose your network, set it as default, i.e., **vpc-dacbc4b2 (default)** where vpc is a virtual private cloud where we can launch the AWS resources such as EC2 instances in a virtual cloud.

Subnet: It is a range of IP addresses in a virtual cloud. In a specified subnet, you can add new AWS resources.

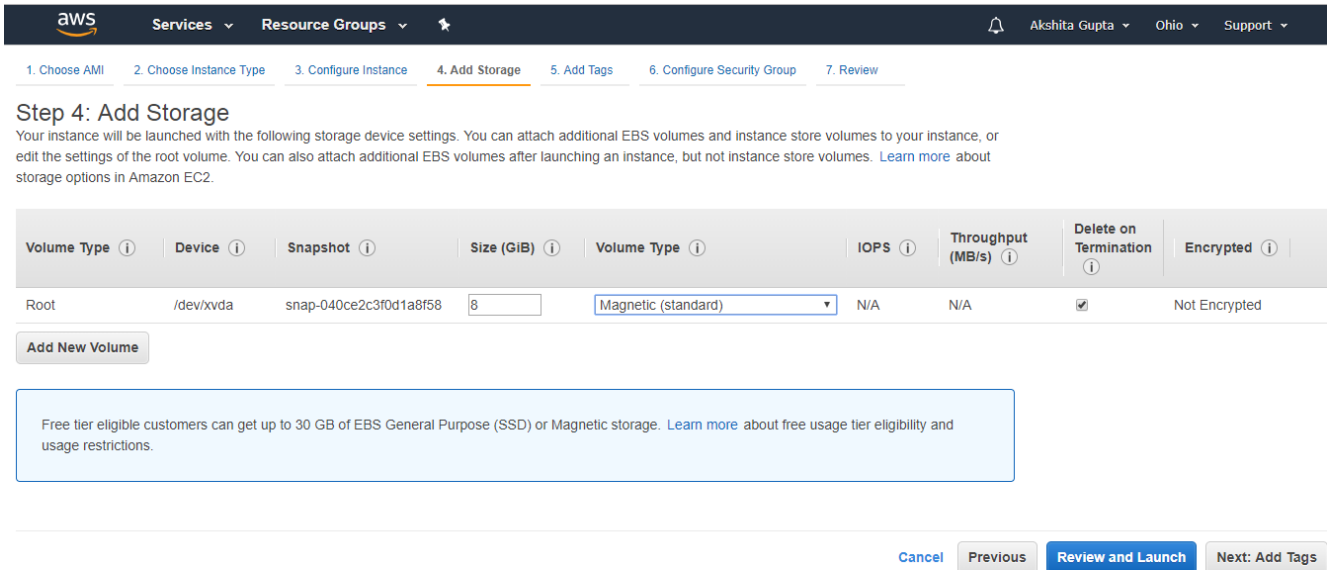
Shutdown behavior: It defines the behavior of the instance type. You can either stop or terminate the instance when you shut down the Linux machine. Now, I leave it as Stop.

Enable Termination Protection: It allows the people to protect against the accidental termination.

Monitoring: We can monitor things such as CPU utilization. Right now, I uncheck the Monitoring.

User data: In Advanced details, you can pass the bootstrap scripts to EC2 instance. You can tell them to download PHP, Apache, install the Apache, etc.

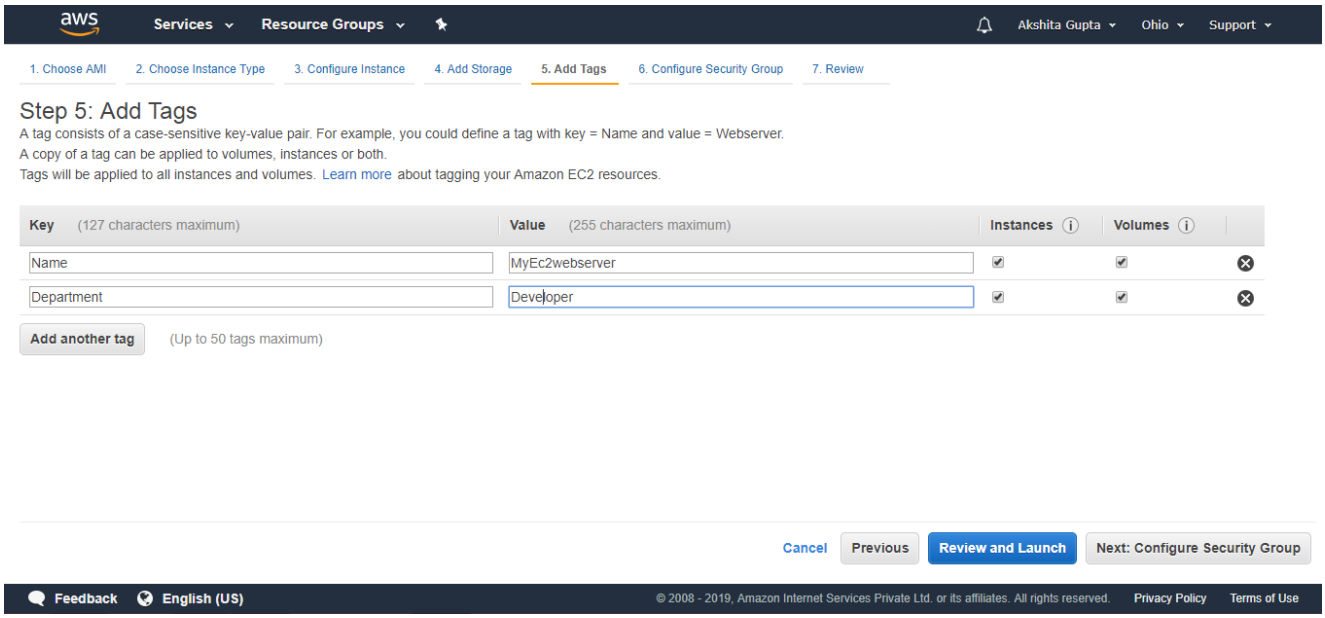
- Now, add the EBS volume and attach it to the EC2 instance. Root is the default EBS volume. Click on the **Next.**



Volume Type: We select the Magnetic (standard) as it is the only disk which is bootable.

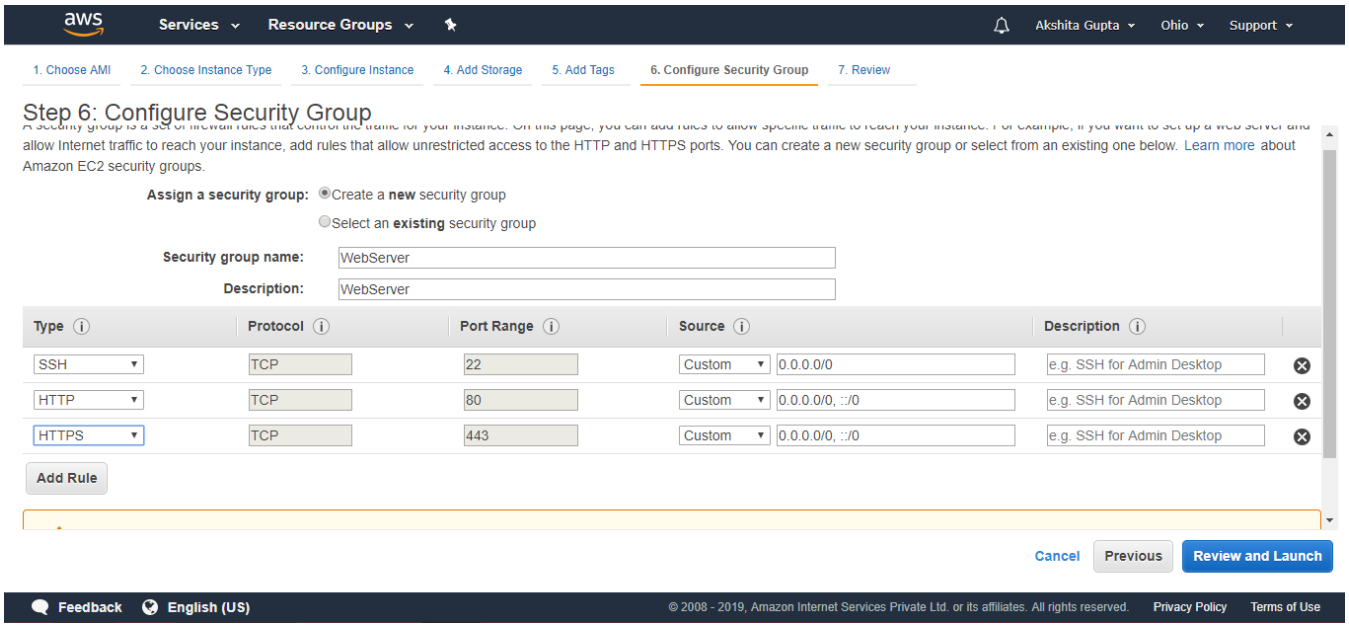
Delete on termination: It is checked means that the termination of an EC2 instance will also delete EBS volume.

- Now, Add the Tags and then click on the Next.

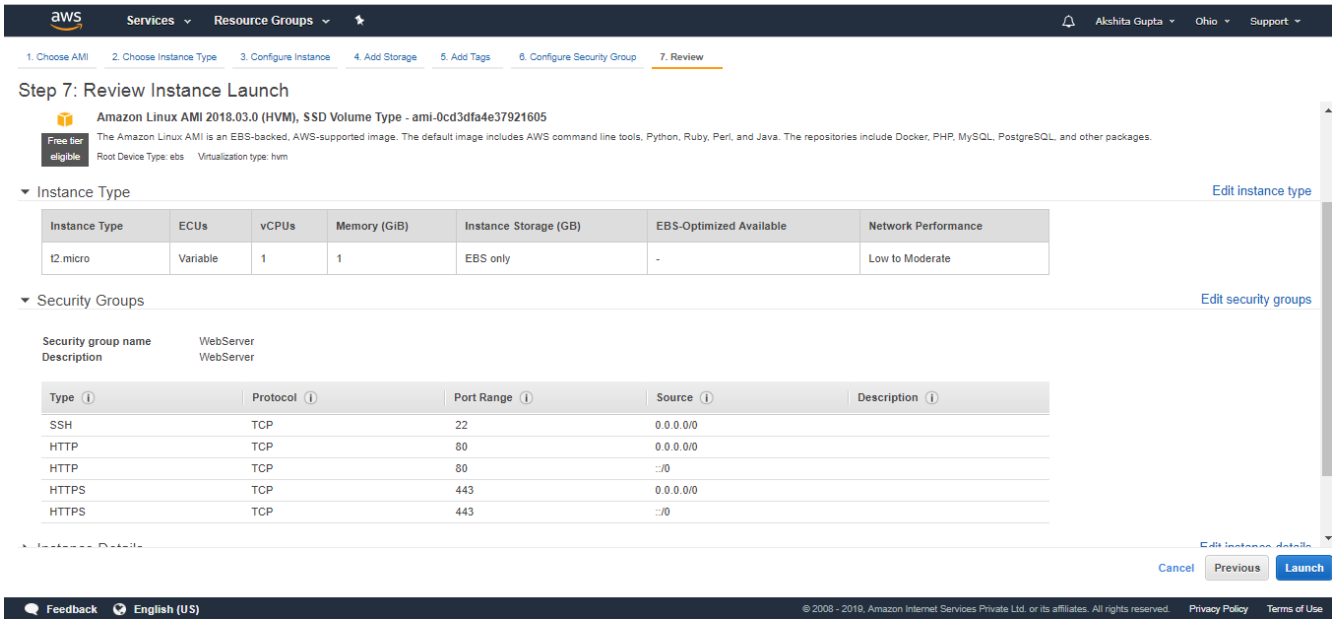


In the above screen, we observe that we add two tags, i.e., the name of the server and department. Create as many tags as you can as it reduces the overall cost.

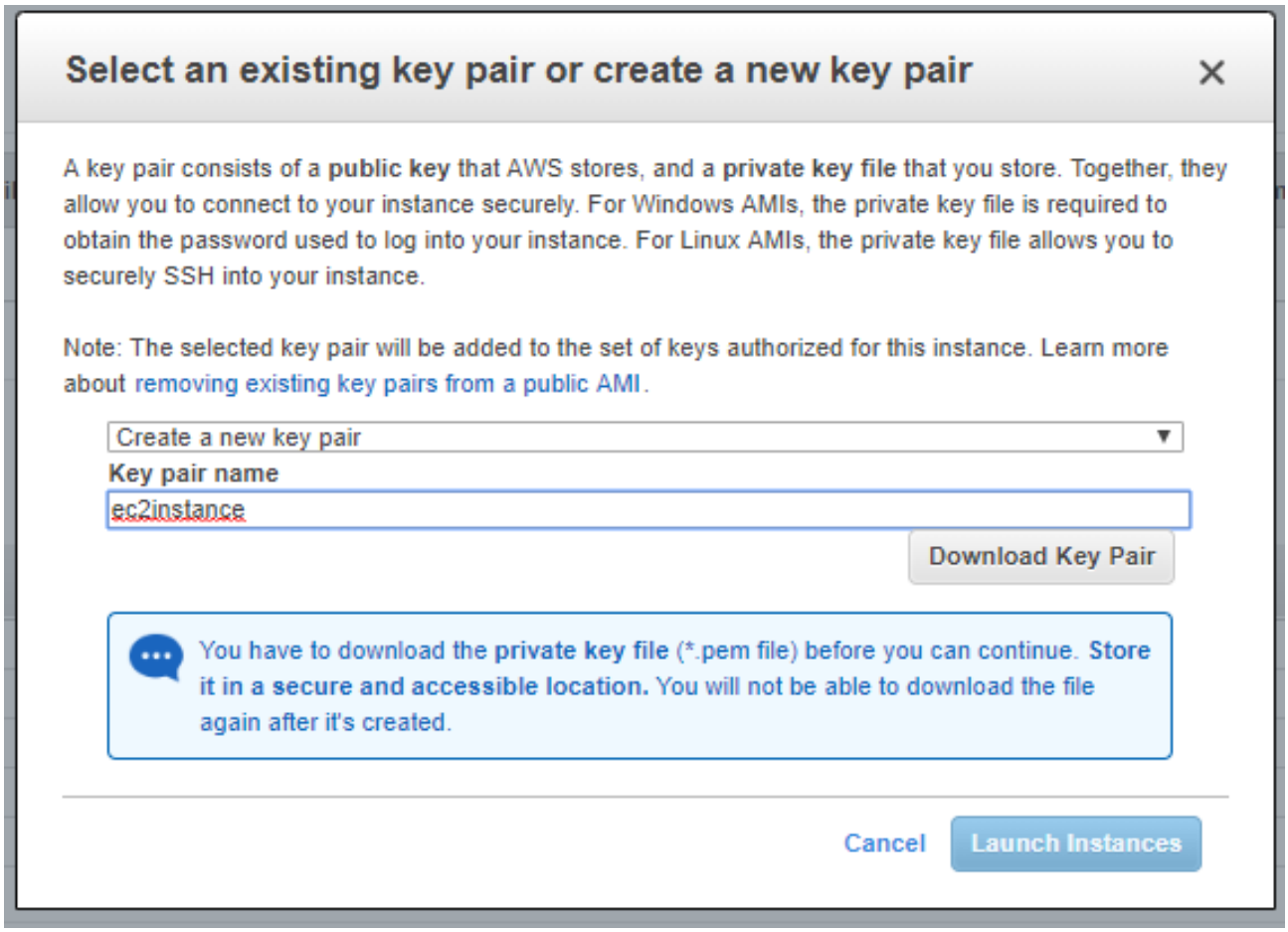
- Configure Security Group. The security group allows some specific traffic to access your instance.



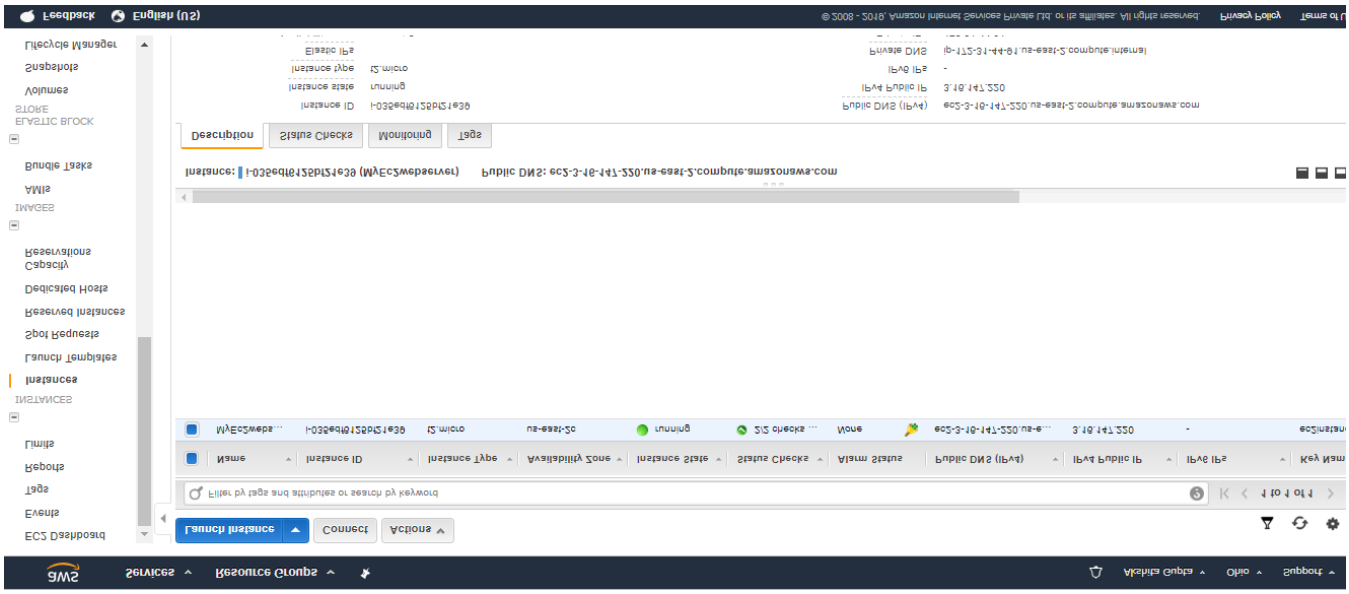
- Review an EC2 instance that you have just configured, and then click on the Launch button.



- Create a new key pair and enter the name of the key pair. Download the Key pair.



- Click on the Launch Instances button.



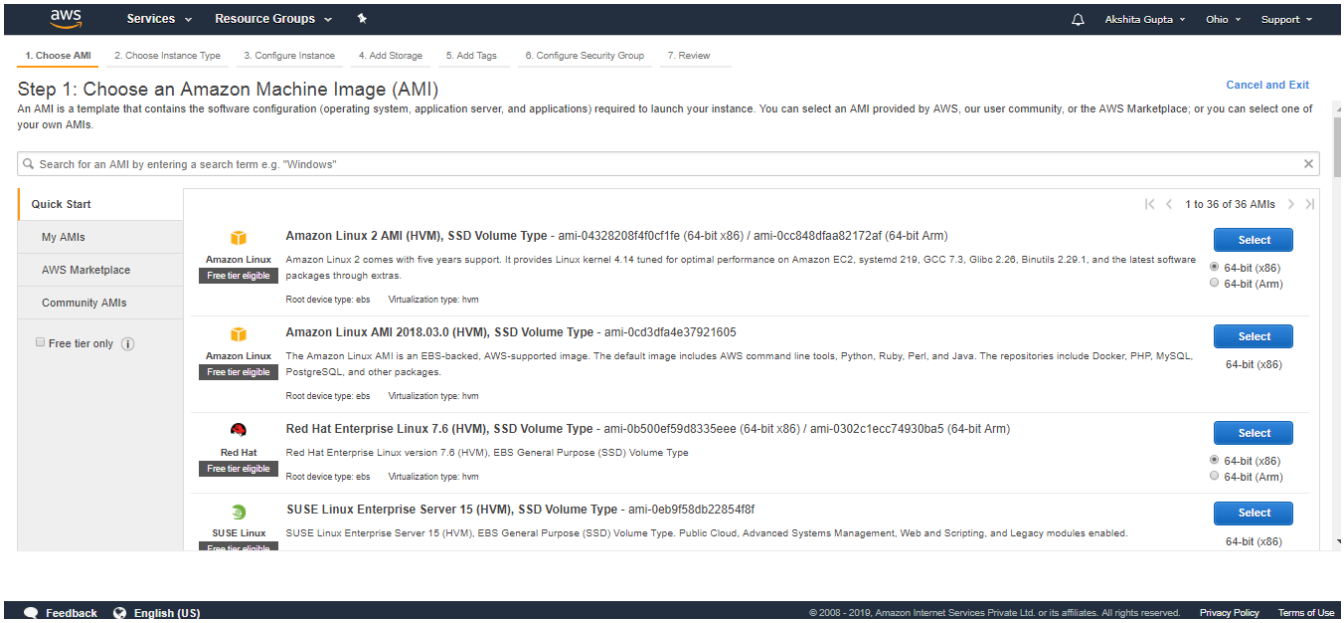
- To use an EC2 instance in Windows, you need to install both **Putty** and **PuttyKeyGen.**
- Download the **Putty** and **PuttyKeyGen.**

Security Group

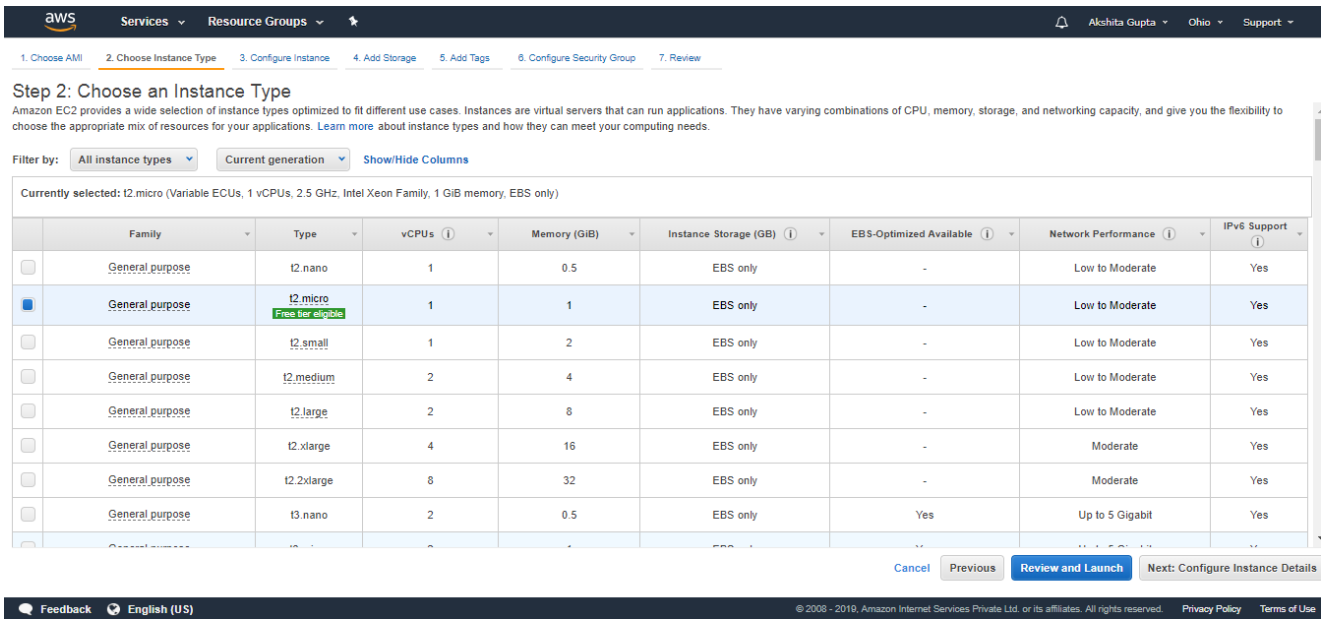
- A security group is a virtual firewall which is controlling the traffic to your EC2 instances.
- When you first launch an EC2 instance, you can associate it with one or more security groups.
- A Security group is the first defence against hackers.

Let's understand the concept of security group through an example.

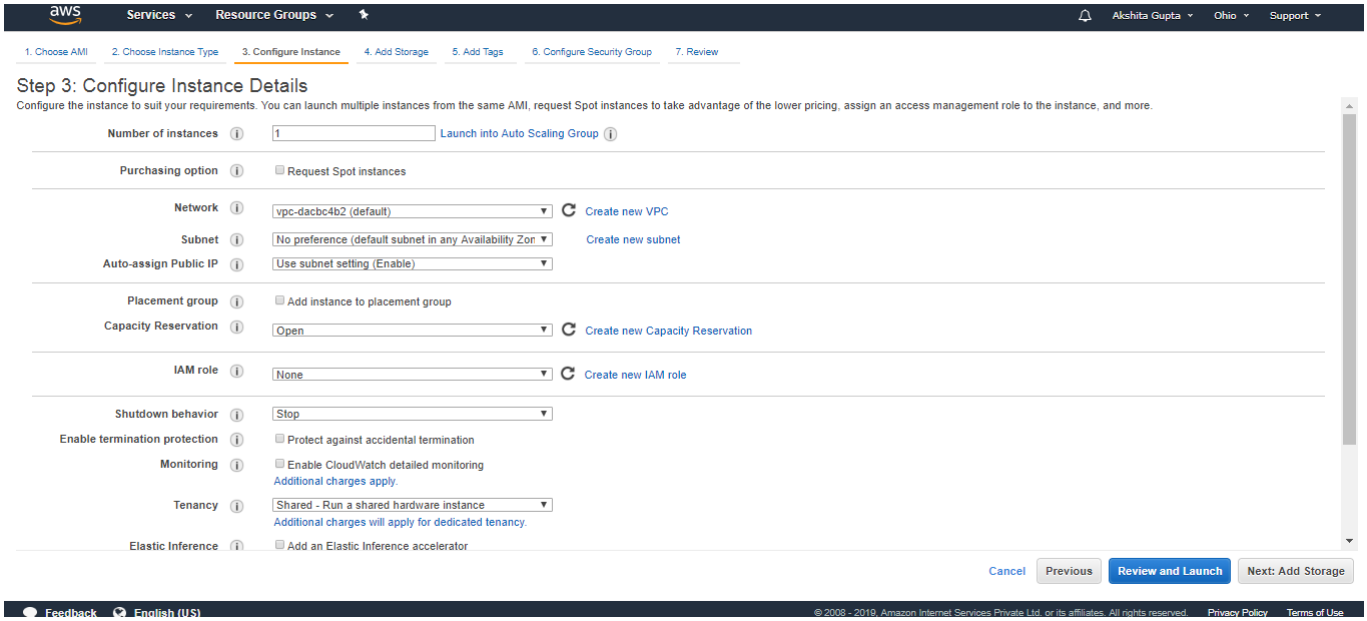
- Sign in to the AWS Management console.
- Launch a new EC2 instance.
- Choose an Amazon Machine Image.



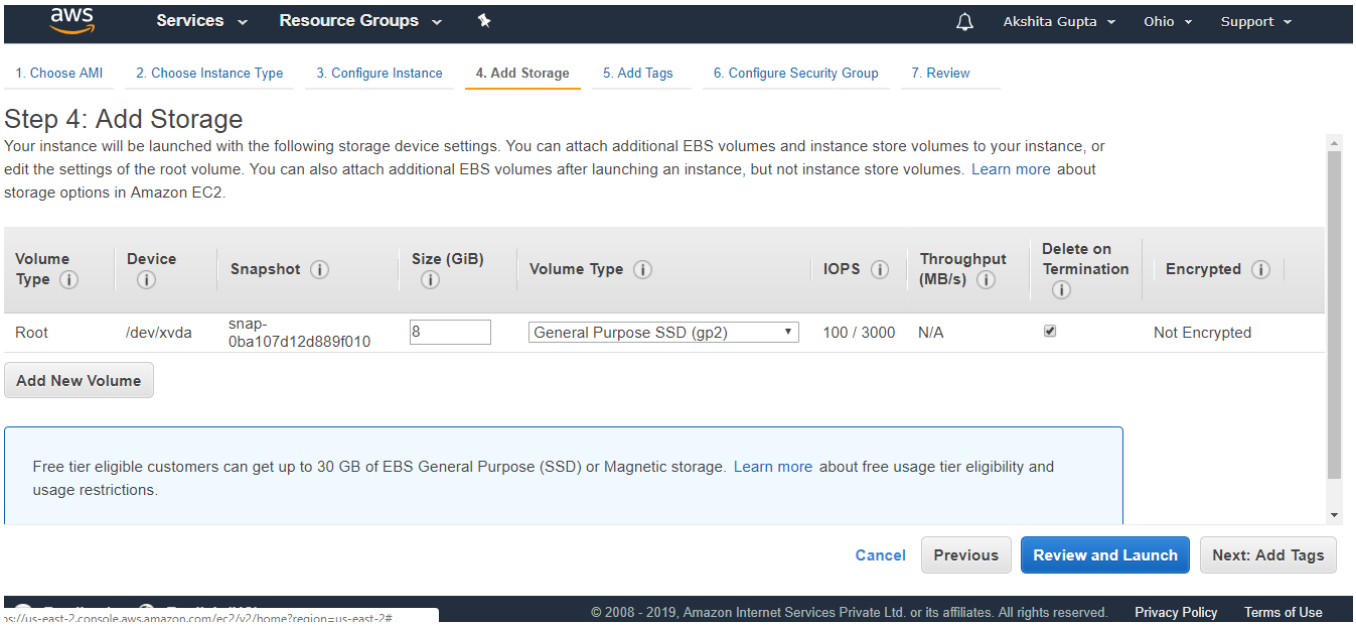
- Choose the instance type. Suppose I choose the instance, i.e., t2.micro, and then click on the **Next.**



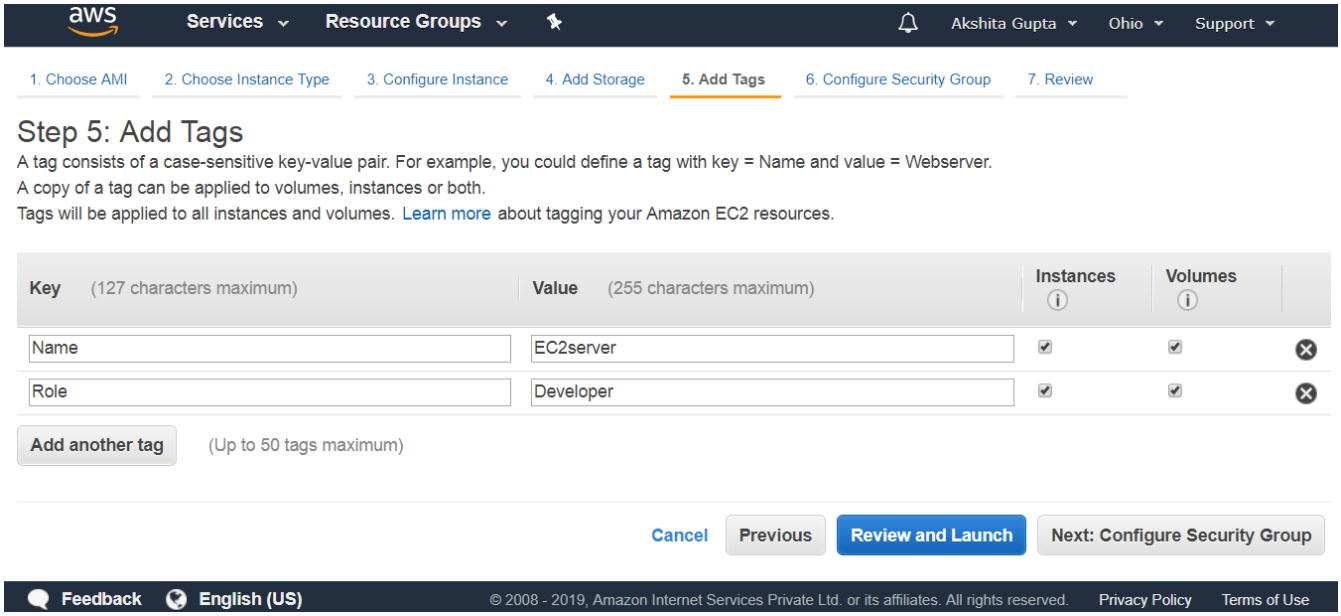
- Now, configure the Instance details. Keep all the details as default, and then click on the **Next.**



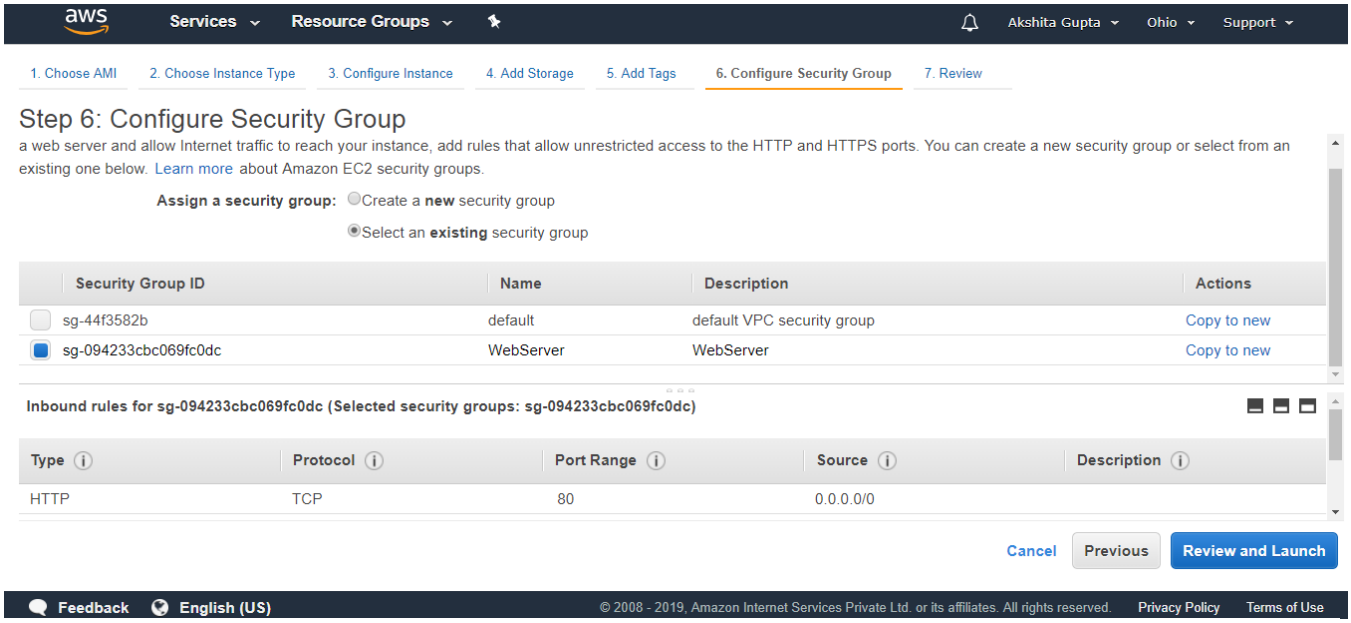
- Attach the EBS Volume to your EC2 instance. By default, Root is the default EBS volume which is attached to your EC2 instance. Click on the **Next.**

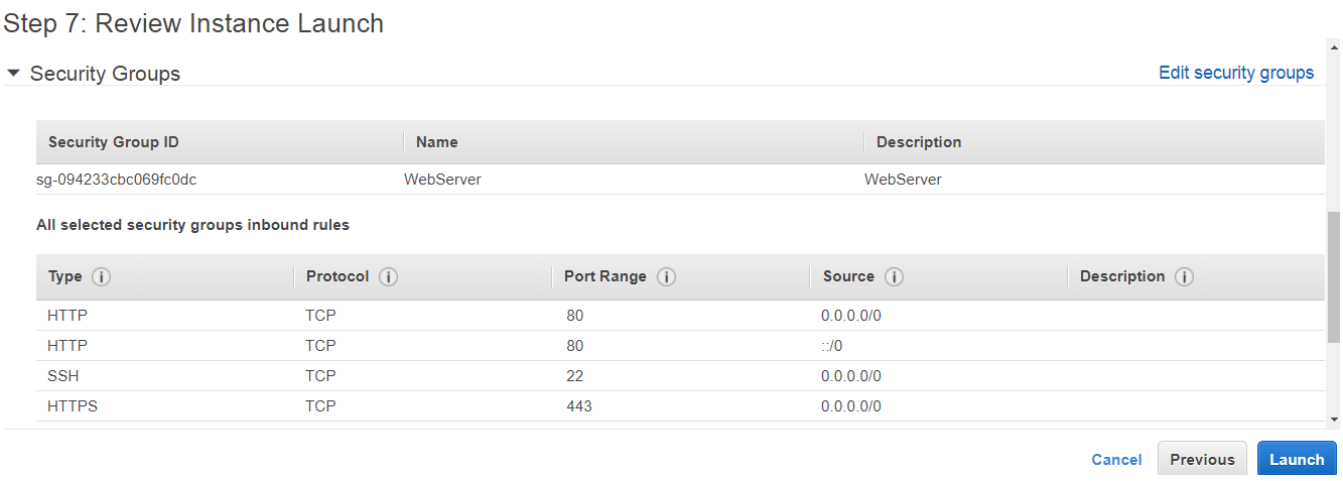


- Add tags.



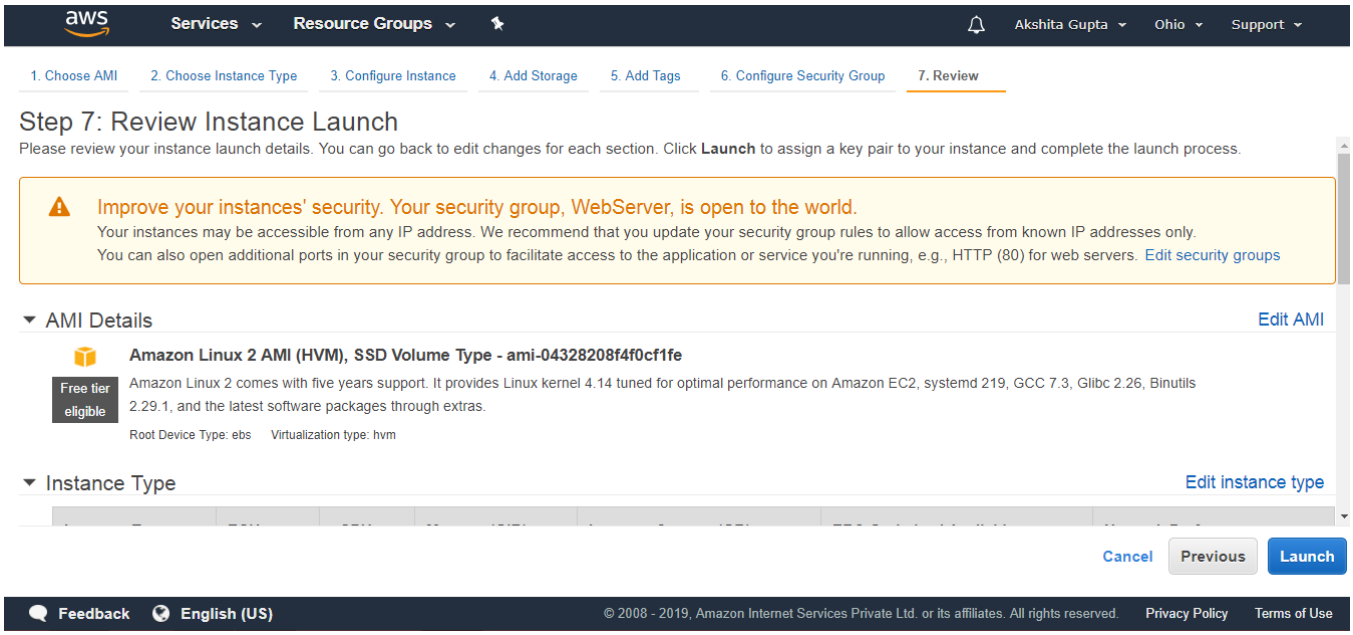
- Configure Security Group. Select an existing security group that you created previously, i.e., **WebServer.**





The above screen shows that a WebServer is a security group that consists of inbound rules such as protocol, port range, and source address.

- Click on the **Review and Launch** button.



From the above screen, we observe that the security group, WebServer is open to the world means that SSH port is open to the world.

AMI

- An AMI stands for **Amazon Machine Images**.
- An AMI is a virtual image used to create a virtual machine within an EC2 instance.
- You can also create multiple instances using single AMI when you need instances with the same configuration.
- You can also create multiple instances using different AMI when you need instances with a different configuration.
- It also provides a template for the root volume of an instance.

AMI Lifecycle

- First, you need to create and register an AMI.

- You can use an AMI to launch EC2 instances.
- You can also copy an AMI to some different region.
- When AMI is no longer required, then you can also deregister it.