Assignment No 5

Problem Definition:

Case study on Amazon EC2 to learn about Amazon EC2, Amazon EC2 (Elastic Compute Cloud) is a central part of Amazon.com's cloud computing platform Amazon Web Services. How EC2 allows users to rent virtual computers on which to run their own computer applications.

Objectives:

1. To learn about Amazon EC2.
2. To create an instance using Amazon EC2.

Software requirements:

Operating system (Linux/Windows/Mac), browser.

Hardware requirements:

Pentium IV system with latest configurations.

Theory:

1) What is Amazon EC2?

Amazon Elastic Compute Cloud (Amazon EC2) provides scalable computing capacity in the Amazon Web Services (AWS) cloud. Using Amazon EC2 eliminates your need to invest in hardware up front, so you can develop and deploy applications faster. You can use Amazon EC2 to launch as many or as few virtual servers as you need, configure security and networking, and manage storage. Amazon EC2 enables you to scale up or down to handle changes in requirements or spikes in popularity, reducing your need to forecast traffic.

Amazon EC2 is a central part of AWS:

Amazon Elastic Compute Cloud (EC2) forms a central part of Amazon.com's cloud-computing platform, Amazon Web Services (AWS),

by allowing users to **rent virtual computers** on which to run their own computer applications. EC2 encourages scalable deployment of applications by providing a web service through which a user can boot an Amazon Machine Image (AMI) to configure a virtual machine, which Amazon calls an "instance", containing any software desired. A user can create, launch, and terminate server-instances as needed, paying by the second for active servers – hence the term "elastic". EC2 provides users with control over the geographical location of instances that allows for latency optimization and high levels of redundancy.

In November 2010, Amazon switched its own retail website to use EC2 and AWS.

2) Instance types:

Initially, EC2 used Xen virtualization exclusively. However, on November 6, 2017, Amazon announced the new C5 family of instances that were based on a custom architecture around the KVM hypervisor, called Nitro. Each virtual machine, called an "instance", functions as a virtual private server. Amazon sizes instances based on "Elastic Compute Units". The performance of otherwise identical virtual machines may vary. On November 28, 2017, AWS announced a bare-metal instance type offering marking a remarkable departure from exclusively offering virtualized instance types.

As of January 2019, the following instance types were offered:

- General Purpose: A1, T3, T2, M5, M5a, M4, T3a
- Compute Optimized: C5, C5n, C4
- Memory Optimized: R5, R5a, R4, X1e, X1, High Memory, z1d
- Accelerated Computing: P3, P2, G3, F1
- Storage Optimized: H1, I3, D2

As of April 2018, the following paying method for instance were offered:

- On-demand: pay by the hour without commitment.
- Reserved: rent instances with one-time payment receiving discounts on the hourly charge.
- Spot: bid-based service: runs the jobs only if the spot price is below the bid specified by bidder. The spot price is claimed to be supply-demand based, however a 2011 study concluded that the price was generally not set to clear the market, but was dominated by an undisclosed reserve price.

3) Cost:

As of April 2018, Amazon charged about $0.0058/hour ($4.176/month) for the smallest "Nano Instance" (t2.nano) virtual machine running Linux or Windows. Storage-optimized instances cost as much as $4.992/hour (i3.16xlarge). "Reserved" instances can go as low as $2.50/month for a three-year prepaid plan. The data transfer charge ranges from free to $0.12 per gigabyte, depending on the direction and monthly volume (inbound data transfer is free on all AWS services).

4) Free tier:

As of December 2010, Amazon offered a bundle of free resource credits to new account holders. The credits are designed to run a "micro" sized server, storage (EBS), and bandwidth for one year. Unused credits cannot be carried over from one month to the next.

5) Reserved instances:

Reserved instances enable EC2 or RDS service users to reserve an instance for one or three years. The corresponding hourly rate charged by Amazon to operate the instance is 35-75% lower than the rate charged for on-demand instances. Reserved Instances can be purchased in three different ways: All Upfront, Partial Upfront and No Upfront. The different purchase options allow for different structuring of payment models. In September 2016, AWS announced several enhancements to Reserved Instances, introducing a new feature called scope and a new reservation type called a Convertible. In October 2017, AWS announced the allowance to subdivide the instances purchased for more flexibility.

6) Spot instances:

Cloud providers maintain large amounts of excess capacity they have to sell or risk incurring losses. Amazon EC2 Spot instances are spare compute capacity in the AWS cloud available at up to 90% discount compared to On-Demand prices. As a trade-off, AWS offers no SLA on these instances and customers take the risk that it can be interrupted with only two minutes of

notification when Amazon needs the capacity back. Researchers from the Israeli Institute of Technology found that "they (Spot instances) are typically generated at random from within a tight price interval via a dynamic hidden reserve price". Some companies, like Spotinst, are using big data combined with machine learning to predict spot interruptions up to 15 minutes in advance.

7) Saving plans:

In November 2019, Amazon announced Savings Plans. Savings Plans are an alternative to Reserved Instances that come in 2 different plan types: Compute Savings Plans and EC2 Instances Savings Plans. Compute Savings Plans allow an organisation to commit to EC2 and Fargate usage with the freedom to change region, family, size, availability zone, OS and tenancy inside the lifespan of the commitment. EC2 Instance Savings plans provide the lowest prices but are less flexible meaning a user must commit to individual instance families within a region to take advantage, but with the freedom to change instances within the family in that region.

8) Features of EC2:

Amazon EC2 provides the following features:

- Virtual computing environments, known as *instances*
- Preconfigured templates for your instances, known as *Amazon Machine Images (AMIs)*, that package the bits you need for your server (including the operating system and additional software)
- Various configurations of CPU, memory, storage, and networking capacity for your instances, known as *instance types*
- Secure login information for your instances using *key pairs* (AWS stores the public key, and you store the private key in a secure place)
- Storage volumes for temporary data that's deleted when you stop or terminate your instance, known as *instance store volumes*
- Persistent storage volumes for your data using Amazon Elastic Block Store (Amazon EBS), known as *Amazon EBS volumes*
- Multiple physical locations for your resources, such as instances and Amazon EBS volumes, known as *Regions* and *Availability Zones*

- A firewall that enables you to specify the protocols, ports, and source IP ranges that can reach your instances using *security groups*
- Static IPv4 addresses for dynamic cloud computing, known as *Elastic IP addresses*
- Metadata, known as *tags*, that you can create and assign to your Amazon EC2 resources
- Virtual networks you can create that are logically isolated from the rest of the AWS cloud, and that you can optionally connect to your own network, known as *virtual private clouds* (VPCs)

9) Limits of EC2:

AWS defines certain limits by default, to prevent users from accidentally creating too many resources. Your AWS account may reach one or more of these limits when using a large number of servers, backups or static IP addresses.

- EC2 Instances

By default, AWS has a limit of 20 instances per region. This includes all instances set up on your AWS account.

To increase EC2 limits, request a higher limit by providing information about the new limit and regions where it should be applied.

- Static IP Addresses

By default, AWS sets a limit of 5 static IP addresses per region. This includes IP addresses unassigned and currently assigned to a server.

To increase IP addresses limit, request a higher limit by providing information about the new limit and regions where it should be applied.

- Snapshots

The AWS default limit for all snapshots is 10000 snapshots per region.

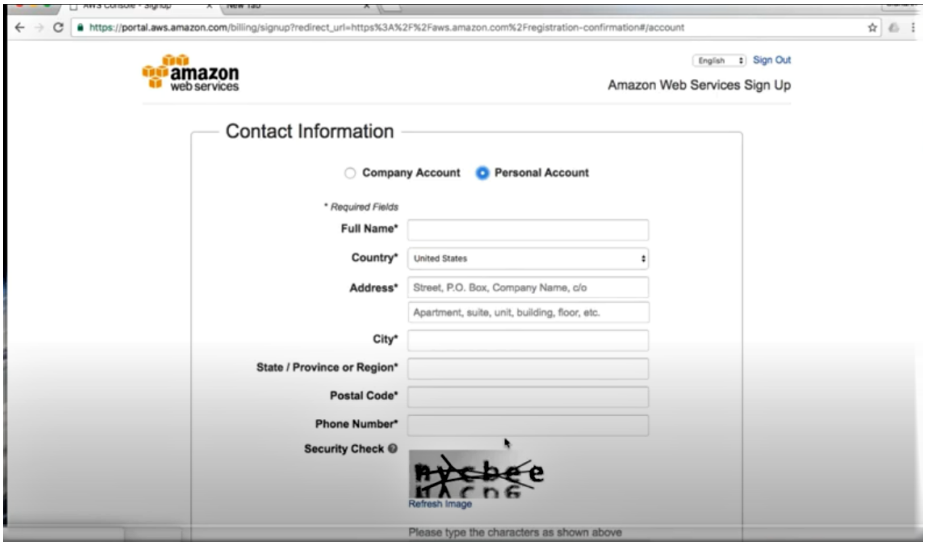
To increase the number of snapshots allowed, contact AWS Support and request a higher limit.

- Other Limits

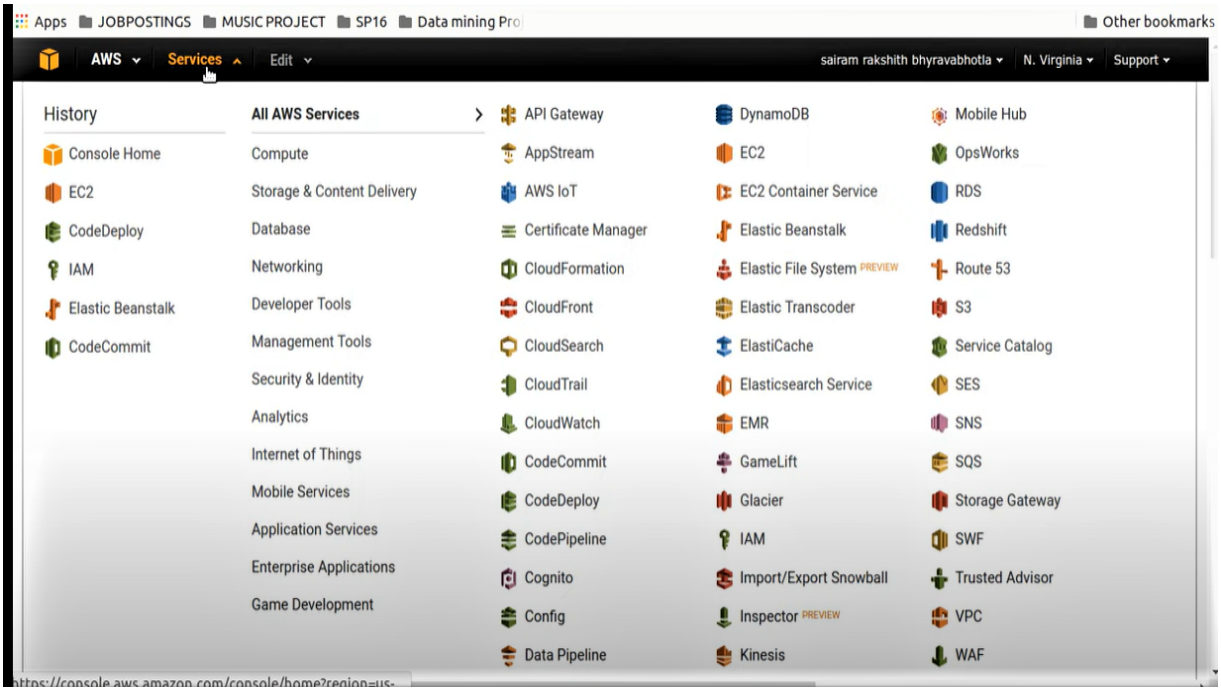
If your AWS account reaches any of AWS' other limits, contact AWS Support and request a higher limit.

10) Steps to create instance of EC2:

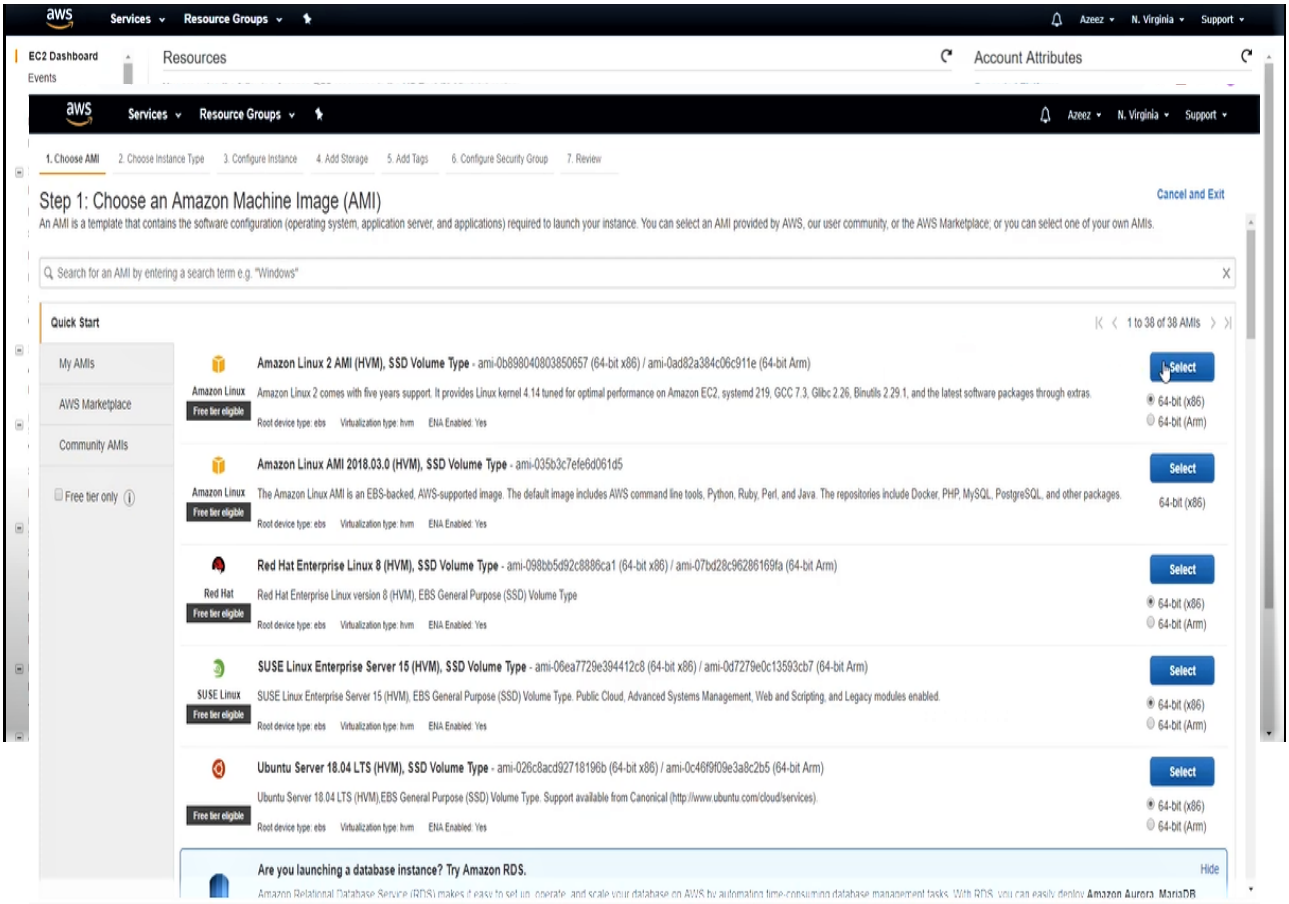
I) Go to aws.amazon.com, sign in if existing user or sign up if new user.



II) **On the home page after signing in: Go to services -> select EC2**

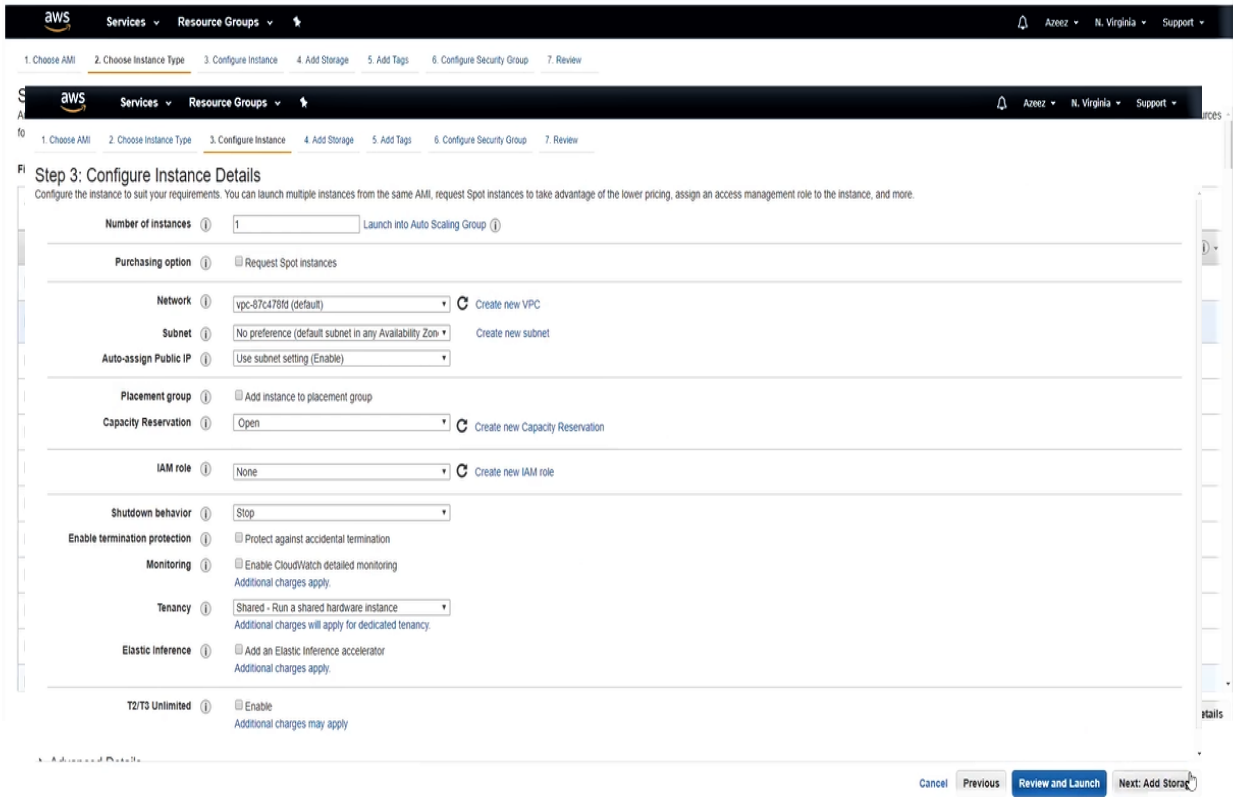


III) **You can see EC2 dashboard screen now. Now choose: Launch Instance**



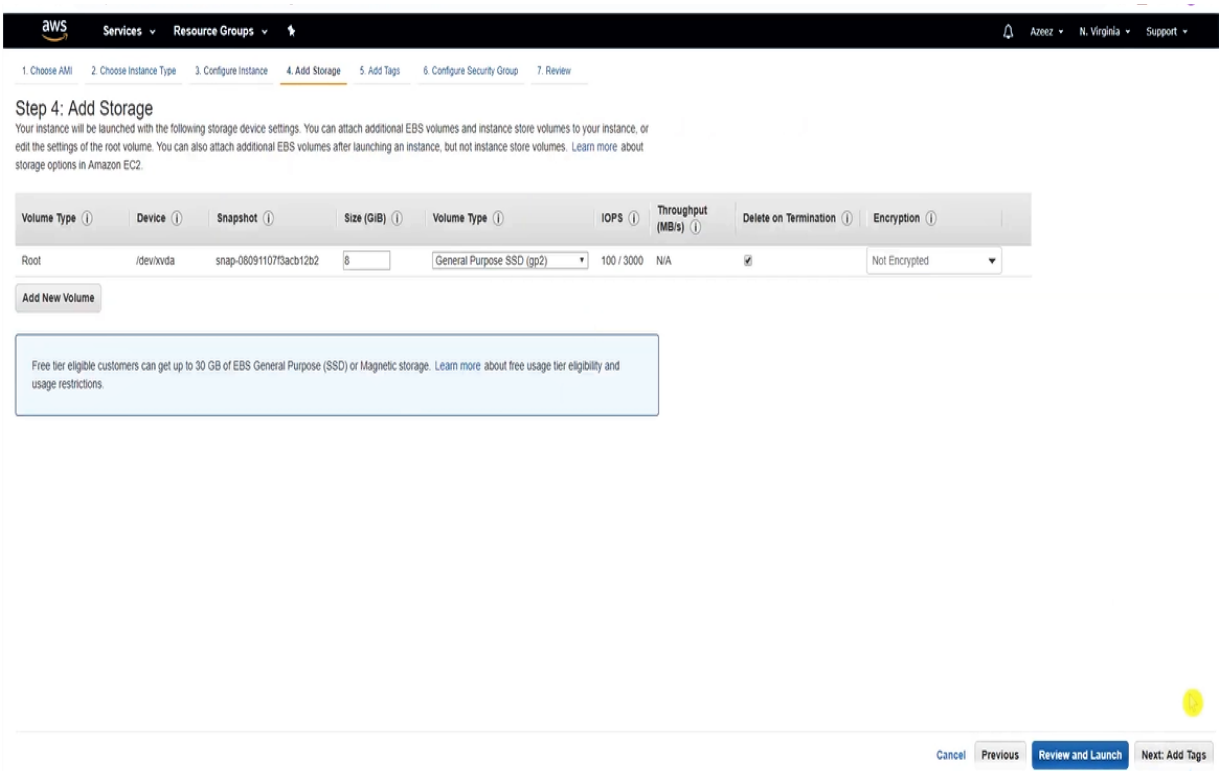
IV) Choose an Amazon Machine Image (AMI) –

V) Choose an instance type

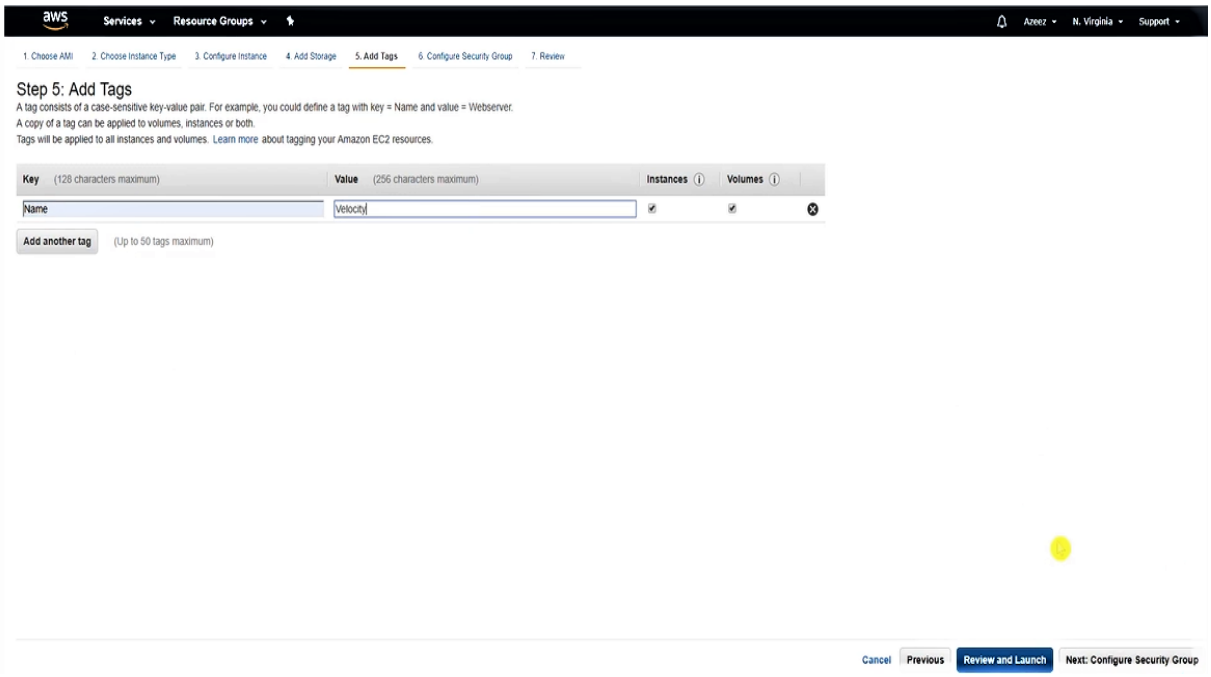


VI) Configure Instance Details (in our case we are using default configurations)

VII) Add Storage

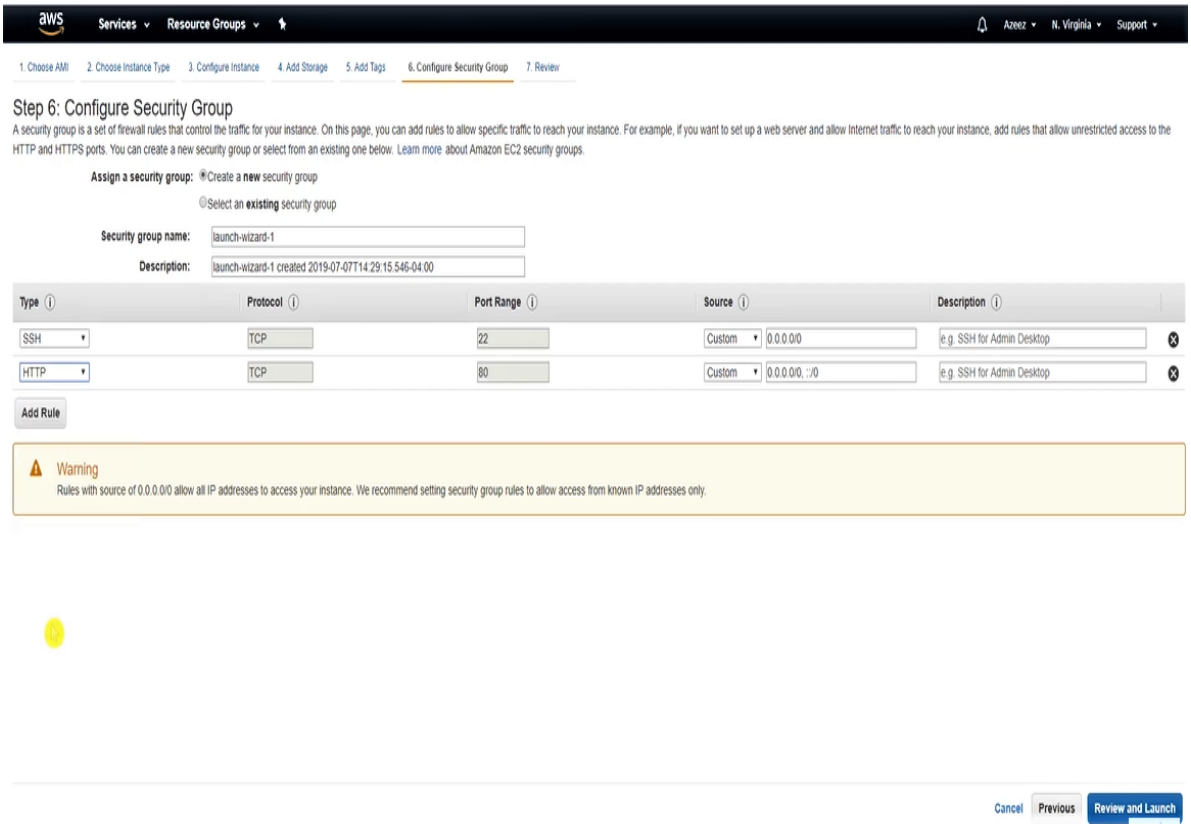


VIII) Add Tags

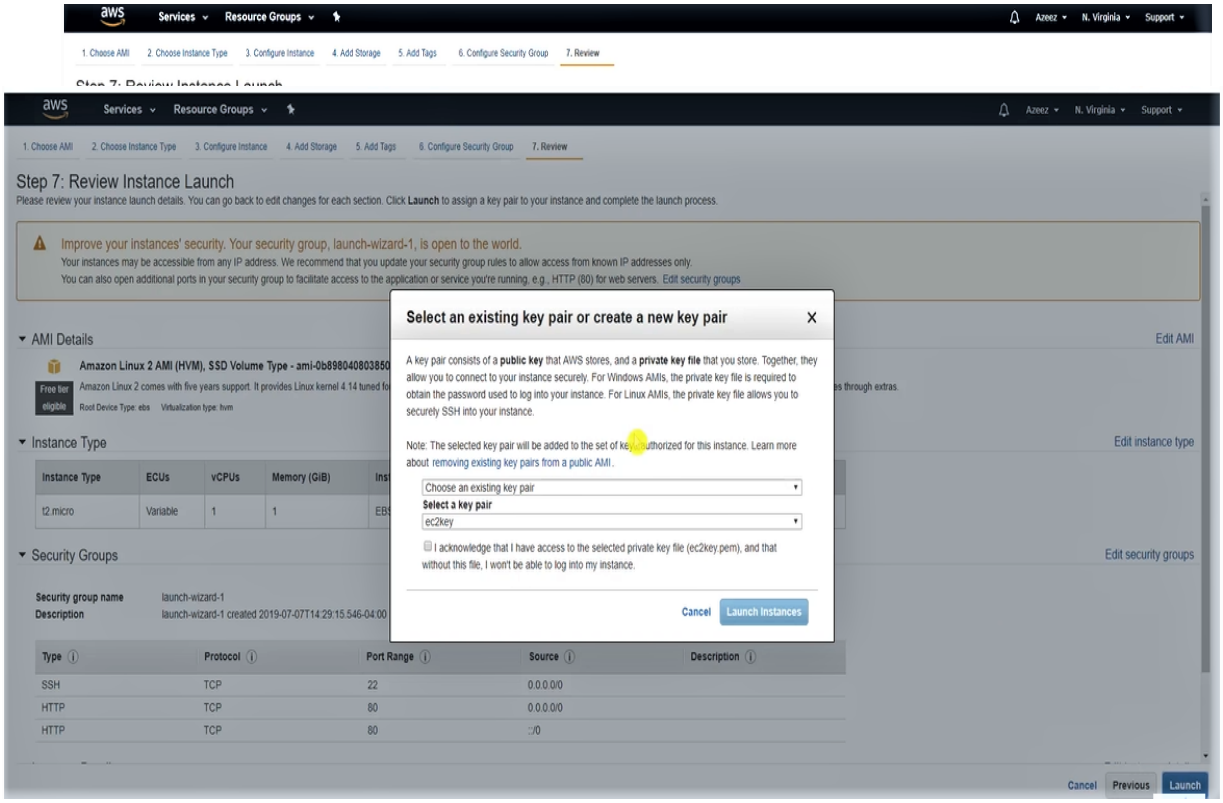


IX) Configure Security Group (As per requirements)

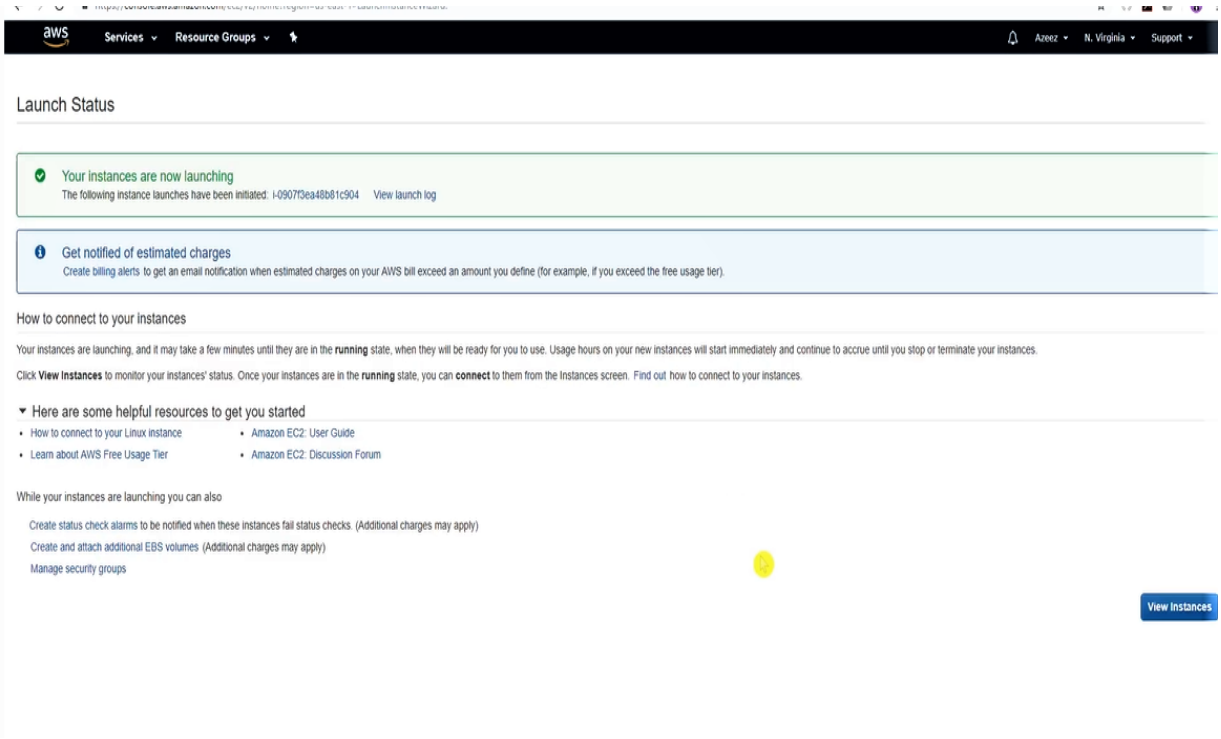
Example: If website is to be hosted on the instance add http, https security group by clicking on *Add Rule*, etc.

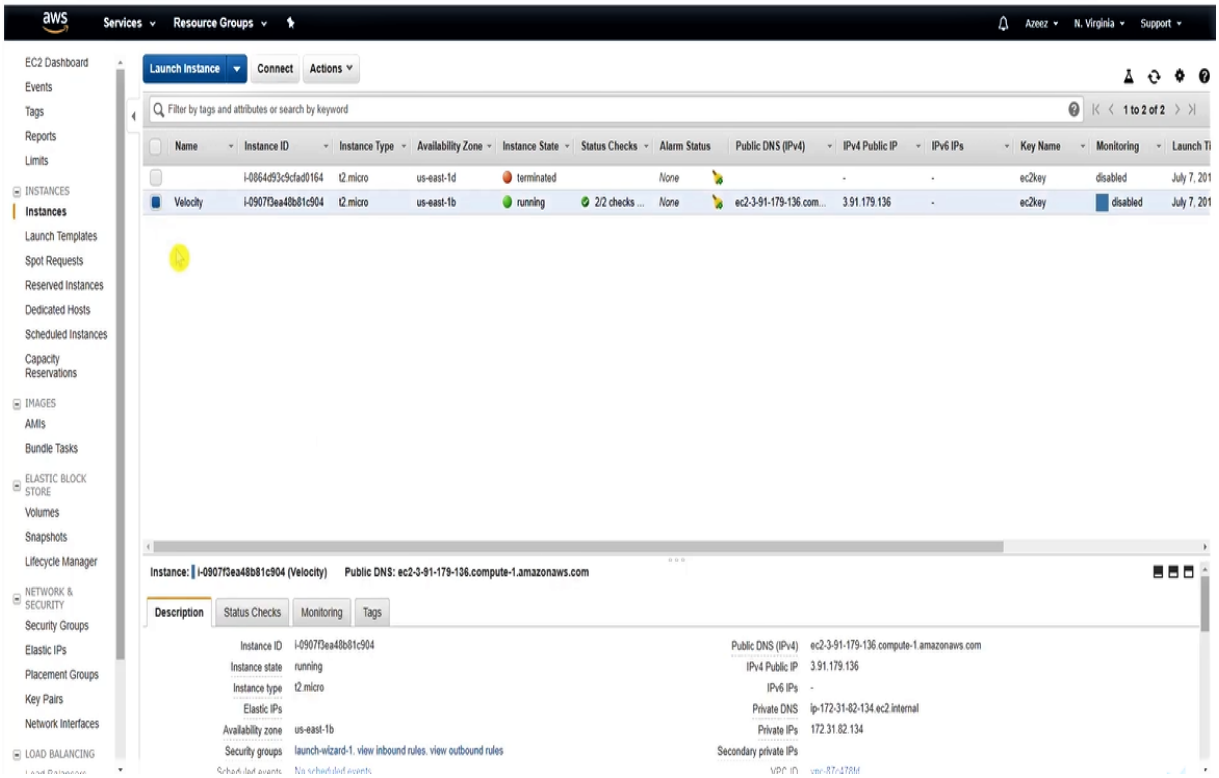


X) Review the details for instance, if no changes are required, click on launch -> select existing key pair or create a new key pair -> download key pair -> click on Launch Instance.



XI) Instance is created. Use this instance to execute computer applications.


aws
Services
Resource Groups
Azeez
N. Virginia
Support
Launch Status
Your instances are now launching
The following instance launches have been initiated: i-0907f3ea48b81c904 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
While your instances are launching you can also
Create status check alarms to be notified when these instances fail status checks. (Additional charges may apply)
Create and attach additional EBS volumes (Additional charges may apply)
Manage security groups
View Instances


aws
Services
Resource Groups
Azeez
N. Virginia
Support
EC2 Dashboard
Events
Tags
Reports
Limits
INSTANCES
Instances
Launch Templates
Spot Requests
Reserved Instances
Dedicated Hosts
Scheduled Instances
Capacity Reservations
IMAGES
AMIs
Bundle Tasks
ELASTIC BLOCK STORE
Volumes
Snapshots
Lifecycle Manager
NETWORK & SECURITY
Security Groups
Elastic IPs
Placement Groups
Key Pairs
Network Interfaces
LOAD BALANCING
Launch Instance
Connect
Actions
Filter by tags and attributes or search by keyword
1 to 2 of 2
Name
Instance ID
Instance Type
Availability Zone
Instance State
Status Checks
Alarm Status
Public DNS (IPv4)
IPv4 Public IP
IPv6 IPs
Key Name
Monitoring
Launch Ti
i-0864d93c9cfad0164 t2.micro us-east-1d terminated None - - ec2key disabled July 7, 201
Velocity i-0907f3ea48b81c904 t2.micro us-east-1b running 2/2 checks ... None ec2-3-91-179-136.com... 3.91.179.136 - ec2key disabled July 7, 201
Instance: i-0907f3ea48b81c904 (Velocity) Public DNS: ec2-3-91-179-136.compute-1.amazonaws.com
Description
Status Checks
Monitoring
Tags
Instance ID i-0907f3ea48b81c904
Instance state running
Instance type t2.micro
Elastic IPs
Availability zone us-east-1b
Security groups launch-wizard-1. view inbound rules. view outbound rules
Public DNS (IPv4) ec2-3-91-179-136.compute-1.amazonaws.com
IPv4 Public IP 3.91.179.136
IPv6 IPs -
Private DNS ip-172-31-82-134.ec2.internal
Private IPs 172.31.82.134
Secondary private IPs

Conclusion:

Hence, we have studied about the Amazon EC2 and have implemented an instance of Amazon EC2 services.