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C14-2103058

EXPERIMENT NO . 4

Aim: To study and implement Infrastructure as a Service using AWS EC2

Theory:

Amazon EC2(Elastic Compute Cloud)

Amazon EC2 (Elastic Compute Cloud) is a web service offered by Amazon Web Services (AWS) that provides resizable compute capacity in the cloud. EC2 allows users to rent virtual machines (VMs), known as instances, and run applications on them. It offers a wide selection of instance types optimized for different use cases, such as compute-optimized, memory-optimized, storage-optimized, and GPU instances.

Key features of Amazon EC2 include:

1. Scalability: EC2 allows users to easily scale their compute resources up or down based on demand. Instances can be launched or terminated as needed.

2. Variety of Instance Types: Users can choose from a wide range of instance types to suit their specific workload requirements. These instance types vary in terms of CPU, memory, storage, and networking capabilities.

3. Pay-as-you-go Pricing: EC2 follows a pay-as-you-go pricing model, where users only pay for the compute capacity they consume. There are various pricing options available, including On-Demand Instances, Reserved Instances, and Spot Instances.

4. Flexibility: EC2 offers flexibility in terms of operating systems, programming languages, libraries, and databases. Users can choose from a variety of pre-configured Amazon Machine Images (AMIs) or create their own custom AMIs.

5. Integration with Other AWS Services: EC2 integrates seamlessly with other AWS services such as Amazon S3 (Simple Storage Service), Amazon RDS (Relational Database Service), and AWS Lambda, enabling users to build complex, scalable applications.

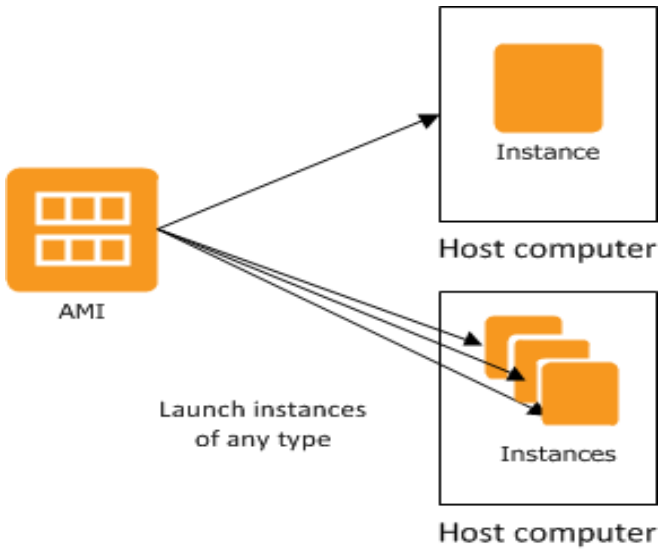
6. Security: EC2 provides various security features such as security groups, network access control lists (ACLs), and Identity and Access Management (IAM) roles to help users secure their instances and data.

7. Reliability: EC2 instances run on AWS's highly reliable infrastructure, which is designed to provide high availability and fault tolerance.

Overall, Amazon EC2 is a versatile and widely-used cloud computing service that enables users to quickly deploy and scale applications without the need to invest in physical hardware infrastructure.

Amazon Machine Image (AMI)

An *Amazon Machine Image (AMI)* is a template that contains a software configuration (for example, an operating system, an application server, and applications). From an AMI, you launch an *instance*, which is a copy of the AMI running as a virtual server in the cloud. You can launch multiple instances of an AMI, as shown in the following figure.



Your instances keep running until you stop, hibernate, or terminate them, or until they fail. If an instance fails, you can launch a new one from the AMI.

An Amazon Machine Image (AMI) is a pre-configured template that contains the software configuration (operating system, application server, applications, and related configuration settings) required to launch an instance (virtual server) in the Amazon Elastic Compute Cloud (EC2). Essentially, an AMI provides the necessary blueprint for launching virtual servers within the EC2 environment.

Key components of an AMI include:

1. Operating System: The base operating system for the instance, such as Amazon Linux, Ubuntu, CentOS, Windows Server, etc.

2. Application Server: If required, the AMI may include pre-installed application servers like Apache HTTP Server, Nginx, Tomcat, etc.

3. Applications: Specific applications or software packages that are pre-installed and configured in the image. For example, a web application stack might include WordPress, Drupal, or a custom application.

4. Configuration Settings: Any necessary configurations and settings required for the operating system, applications, and network settings.

AMIs are available in different types:

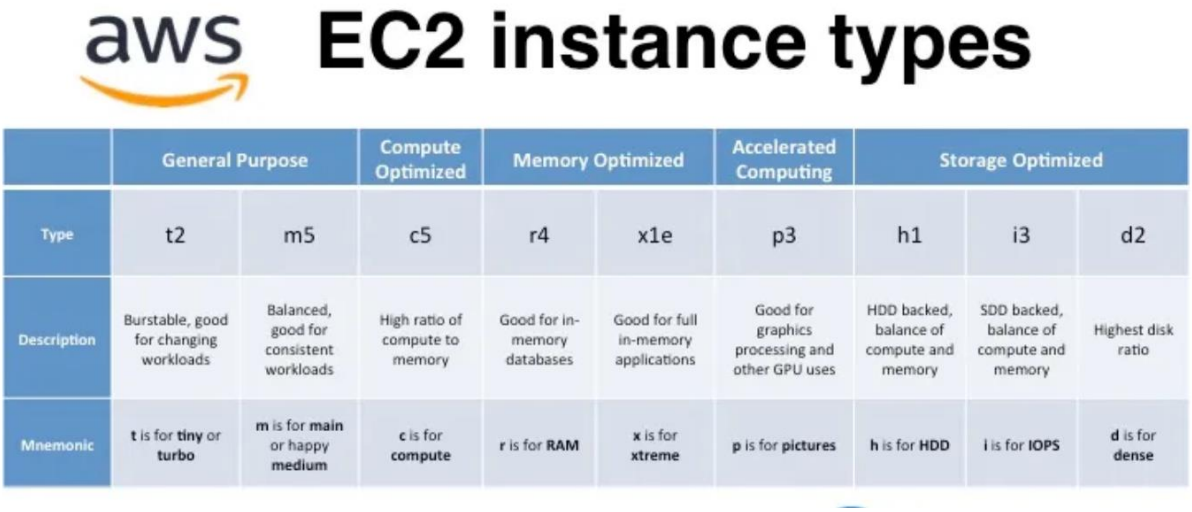
1. Public AMIs: These are AMIs provided by AWS or other third-party vendors and are available to all AWS users. Public AMIs cover a wide range of operating systems and applications.

2. Private AMIs: Users can create their own custom AMIs with their specific configurations and applications and keep them private within their AWS account. Private AMIs are useful for maintaining consistency across instances and for ensuring that specific configurations and applications are readily available for deployment.

3. Shared AMIs: AWS users can share their custom AMIs with specific AWS accounts or make them public for wider access. This allows for collaboration and sharing of standardized environments.

AMIs are fundamental to the process of launching instances in the AWS EC2 environment. Users can select an appropriate AMI based on their requirements, launch instances from it, and then customize the instances further as needed for their specific workloads. AMIs streamline the process of deploying and managing virtual servers in the cloud, enabling users to quickly spin up instances with predefined configurations and software stacks.

Types of EC2 computing instances



Amazon EC2 offers various types of computing instances optimized for different workloads and use cases.

t2 instance type

The t2 family is a burstable instance type. If you have an application that needs to run with some basic CPU and memory usage, you can choose t2. It also works well if you have an application that gets used sometimes but not others. When the resource is idle, you'll generate CPU credit, which you'll utilize when the resource is used. It's a cheaper option that's useful for things that come and go a lot, such as websites or development environments.

Mnemonic: *t* is for *tiny* or *turbo*.

m5 instance type

The m5 instance type is similar, but for more consistent workloads. It has a nice balance of CPU, memory, and disk. It's not hard to see why almost half of EC2 workloads are on "m" instances.There's also an m5d option, which uses solid state drives (SSD) for the instance storage.

Mnemonic: *m* is for *main* choice or happy *medium*.

Compute Optimized

c5 instance type

The c5 instance type has a high ratio of compute/CPU versus memory. If you have a compute-intensive application — maybe scientific modelling, intensive machine learning, or multiplayer gaming — these instances are a good choice. There is also the c5d option, which is SSD-backed.

Mnemonic: *c* is for *compute* (at least that one's easy!)

Memory Optimized

r4 instance family

The r4 instance family is memory-optimized, which you might use for in-memory databases, real-time processing of unstructured big data, or Hadoop/Spark clusters. You can think of it as a kind of midpoint between the m5 and the x1e.

Mnemonic: *r* is for *RAM*.

x1e instance family

The x1e family has a much higher ratio of memory, so this is a good choice if you have a full in-memory application or a big data processing engine like Apache Spark or Presto.

Mnemonic: *x* is for *xtreme*, as in "xtreme RAM" seems to be generally accepted, but we think this is a bit weak. If you have any suggestions, comment below.

Accelerated Computing

p3 instance type

If you need GPUs on your instances, p3 instances are a good choice. They are useful for video editing, and AWS also lists use cases of "computational fluid dynamics, computational finance, seismic analysis, speech recognition, autonomous vehicles" — so it's fairly specialized.

Mnemonic: *p* is for *pictures* (graphics).

Storage Optimized

h1 instance type

The h1 type is HDD backed, with a balance of compute and memory. You might use it for distributed file systems, network file systems, or data processing applications.

Mnemonic: *h* is for *HDD*.

i3 instance type

The i3 instance type is similar to h1, but it is SSD backed, so if you need an NVMe drive, choose this type. Use it for NoSQL databases, in-memory databases, Elasticsearch, and more.

Mnemonic: *i* is for *IOPS*.

d2 instance type

d2 instances have an even higher ratio of disk to CPU and memory, which makes them a good fit for Massively Parallel Processing (MPP), MapReduce and Hadoop distributed computing, and similar applications.

Mnemonic: *d* is for *dense*.

Elastic IP address :

An Elastic IP address (EIP) is a static IPv4 address designed for dynamic cloud computing. It's associated with your AWS account, not with a specific instance, and you can assign it to any instance in your account. The "elastic" aspect refers to the ability to quickly and easily reassign the IP address from one instance to another within your AWS infrastructure.

Here are some key features and benefits of Elastic IP addresses:

1. Static IP Address: Unlike the dynamic IP addresses typically assigned to instances in AWS, an Elastic IP address remains constant until you choose to release it.

2. Internet-Facing: Elastic IP addresses are publicly routable on the internet, allowing instances associated with them to communicate with the outside world.

3. Easy Reassignment: You can quickly and seamlessly reassign an Elastic IP address from one instance to another within the same AWS region. This is useful for scenarios such as replacing a failed instance or deploying a new instance with a different IP address.

4. Avoiding IP Address Change: Since Elastic IP addresses are static, they prevent the need to update DNS records or configurations that rely on a specific IP address when instances are replaced or restarted.

5. Cost Implications: While Elastic IP addresses are free to use as long as they are assigned to an instance, AWS charges a small fee for unattached Elastic IP addresses. Therefore, it's advisable to release unused Elastic IP addresses to avoid unnecessary charges.

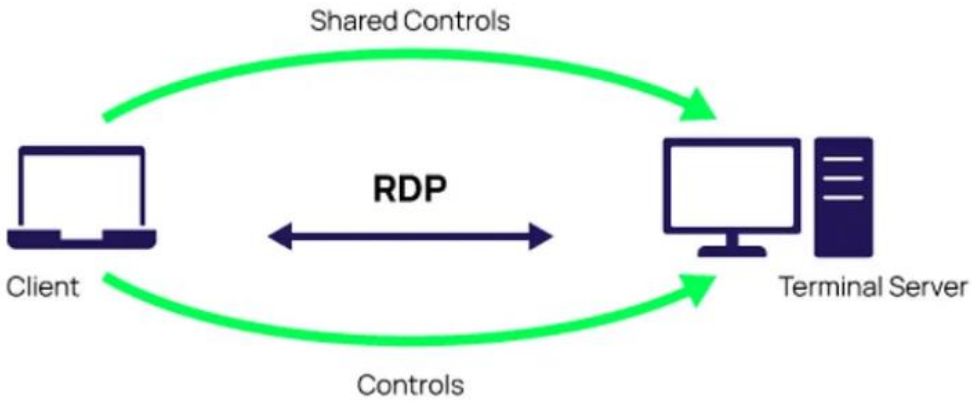
6. Network Failover: Elastic IP addresses can be part of a failover architecture, allowing you to quickly switch traffic from one instance to another in the event of instance or availability zone failure.

7. Limitations: Each AWS account is limited to a certain number of Elastic IP addresses per region, and there may be additional charges for excessive use or if you exhaust your quota.

Elastic IP addresses provide flexibility and reliability for internet-facing applications and infrastructure in AWS, enabling seamless communication with the outside world while avoiding the complexities associated with IP address changes in dynamic cloud environments.

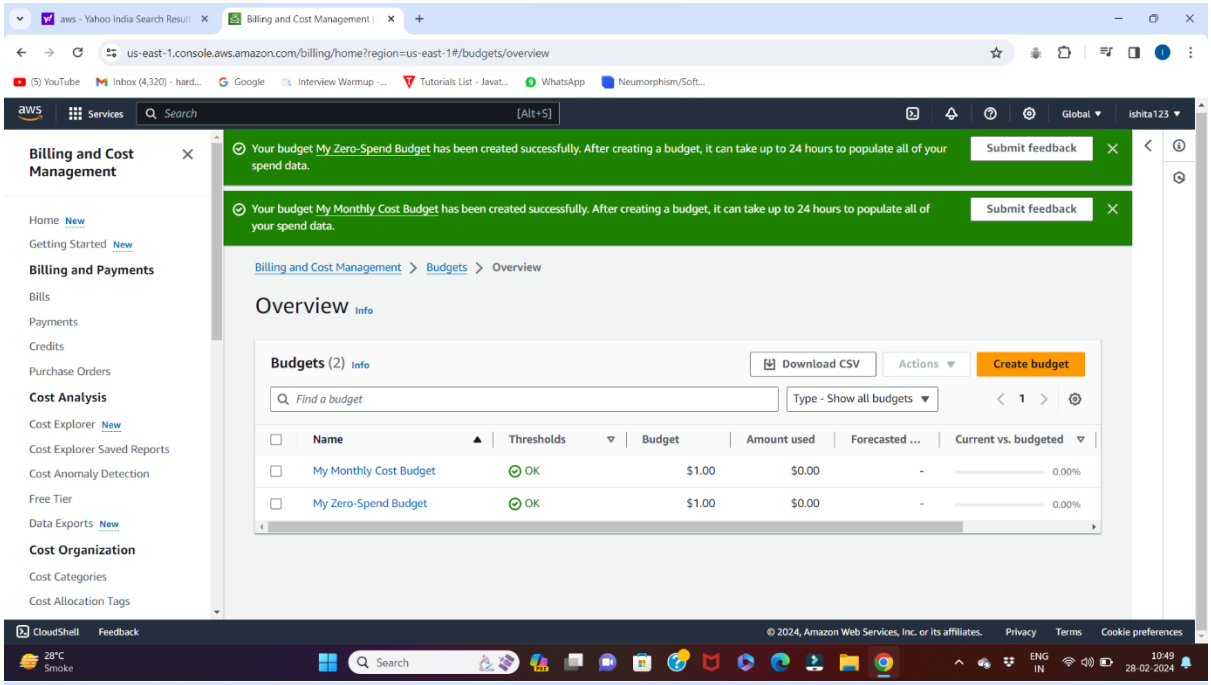
Remote Desktop Protocol (RDP):

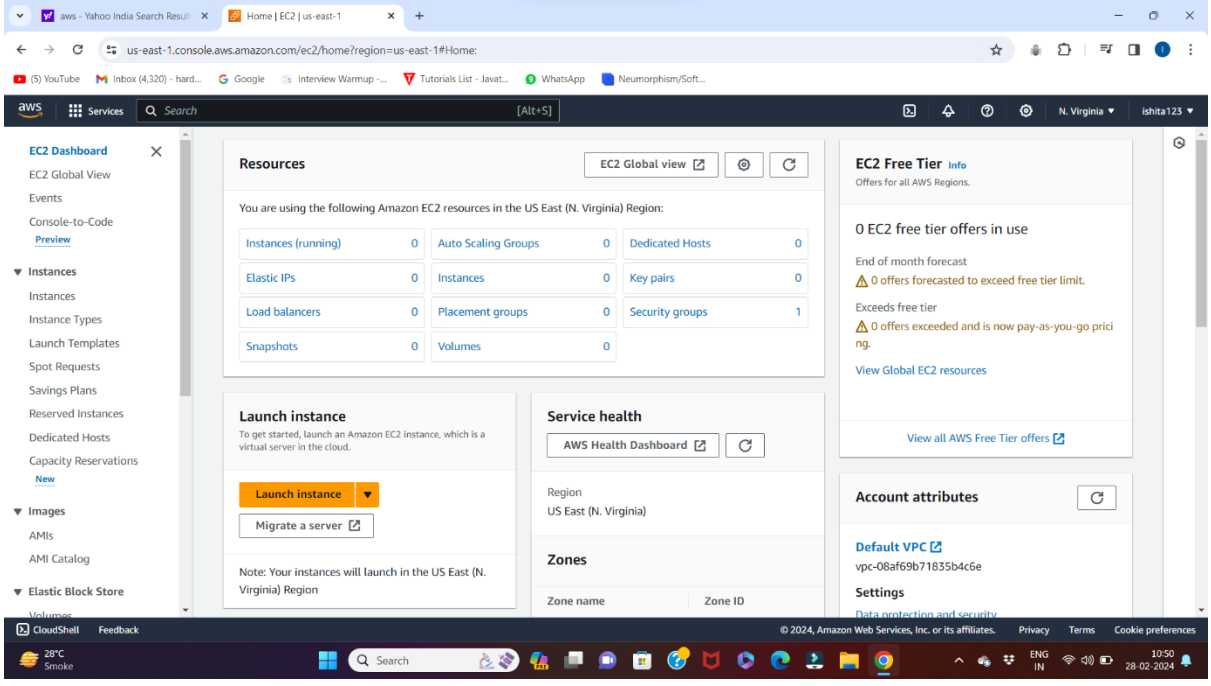
Remote Desktop Protocol (RDP) is a proprietary protocol developed by Microsoft that enables remote access to graphical desktops and applications on a remote computer over a network connection. It allows users to connect to a remote Windows-based computer or virtual machine and interact with it as if they were physically present at the remote location.

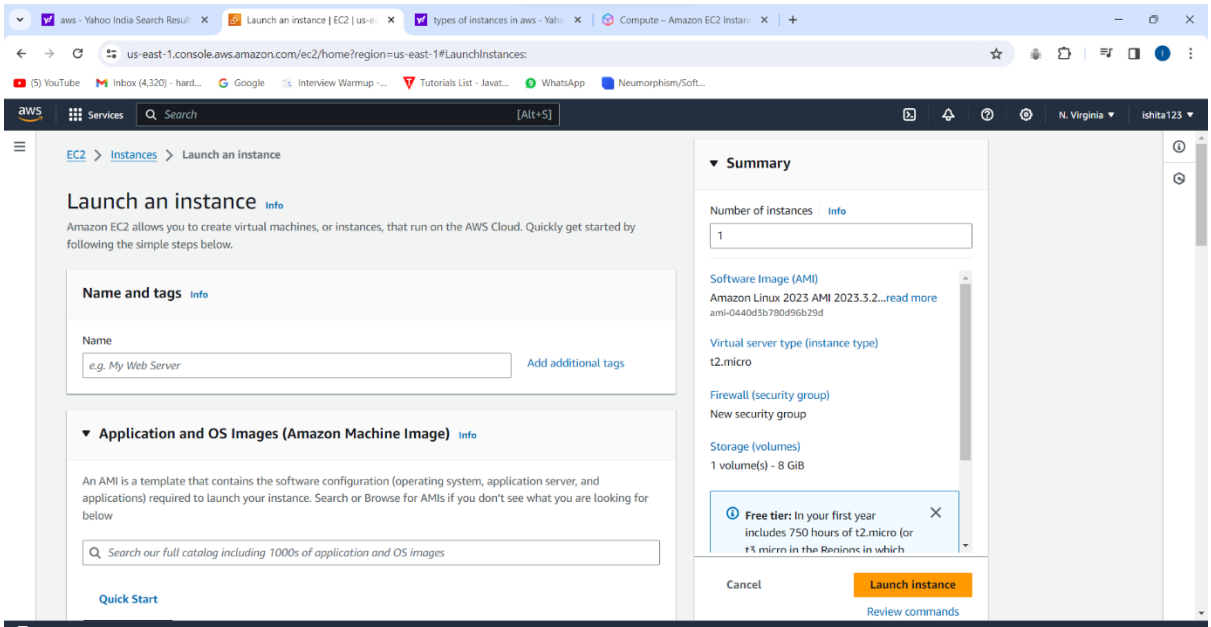


Implementation:

1. Create an EC2 Instance






us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#LaunchInstances:
Services
Search
[Alt+S]
N. Virginia
ishita123
EC2 > Instances > Launch an instance
Launch an instance Info
Amazon EC2 allows you to create virtual machines, or instances, that run on the AWS Cloud. Quickly get started by following the simple steps below.
Name and tags Info
Name
e.g. My Web Server
Add additional tags
Application and OS Images (Amazon Machine Image) Info
An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. Search or Browse for AMIs if you don't see what you are looking for below
Search our full catalog including 1000s of application and OS images
Quick Start
Summary
Number of instances Info
1
Software Image (AMI)
Amazon Linux 2023 AMI 2023.3.2...read more
ami-0440d3b780d96b29d
Virtual server type (instance type)
t2.micro
Firewall (security group)
New security group
Storage (volumes)
1 volume(s) - 8 GiB
Free tier: In your first year includes 750 hours of t2.micro (or
Cancel
Launch instance
Review commands
CloudShell
Feedback
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Privacy
Terms
Cookie preferences
29°C
Air: Moderate
Search
ENG
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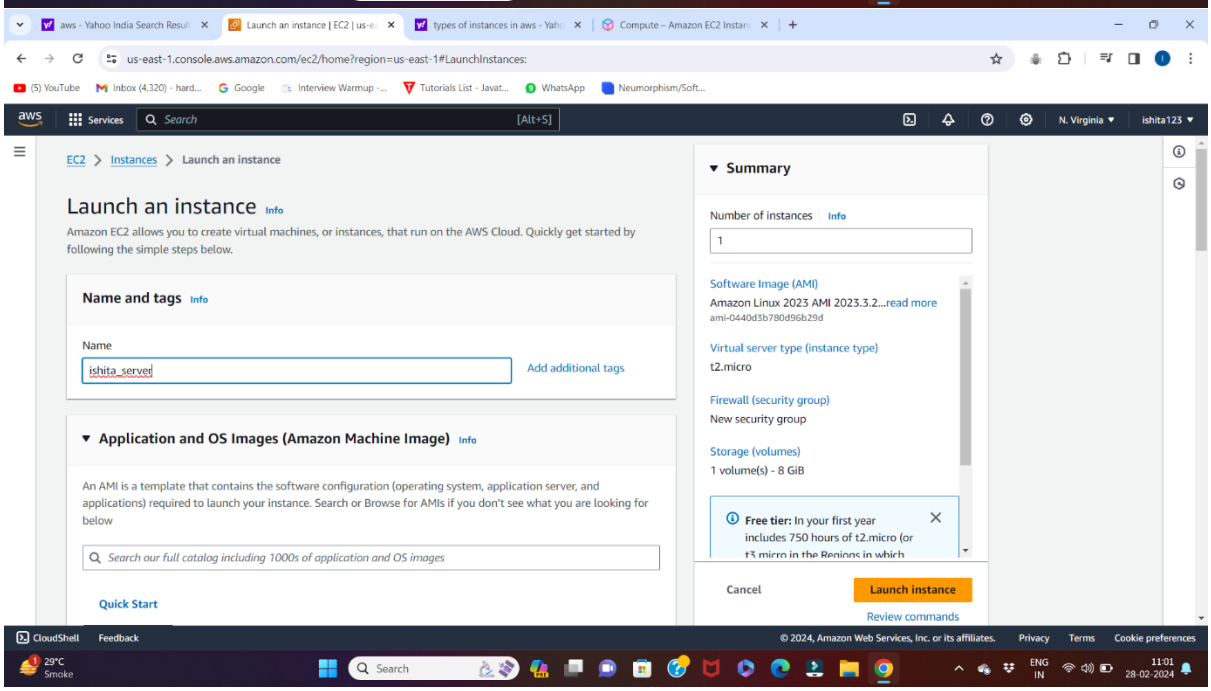
28-02-2024


us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#LaunchInstances:
Services
Search
[Alt+S]
N. Virginia
ishita123
EC2 > Instances > Launch an instance
Launch an instance Info
Amazon EC2 allows you to create virtual machines, or instances, that run on the AWS Cloud. Quickly get started by following the simple steps below.
Name and tags Info
Name
ishita_server
Add additional tags
Application and OS Images (Amazon Machine Image) Info
An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. Search or Browse for AMIs if you don't see what you are looking for below
Search our full catalog including 1000s of application and OS images
Quick Start
Summary
Number of instances Info
1
Software Image (AMI)
Amazon Linux 2023 AMI 2023.3.2...read more
ami-0440d3b780d96b29d
Virtual server type (instance type)
t2.micro
Firewall (security group)
New security group
Storage (volumes)
1 volume(s) - 8 GiB
Free tier: In your first year includes 750 hours of t2.micro (or
Cancel
Launch instance
Review commands
CloudShell
Feedback
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Privacy
Terms
Cookie preferences
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Smoke
Search
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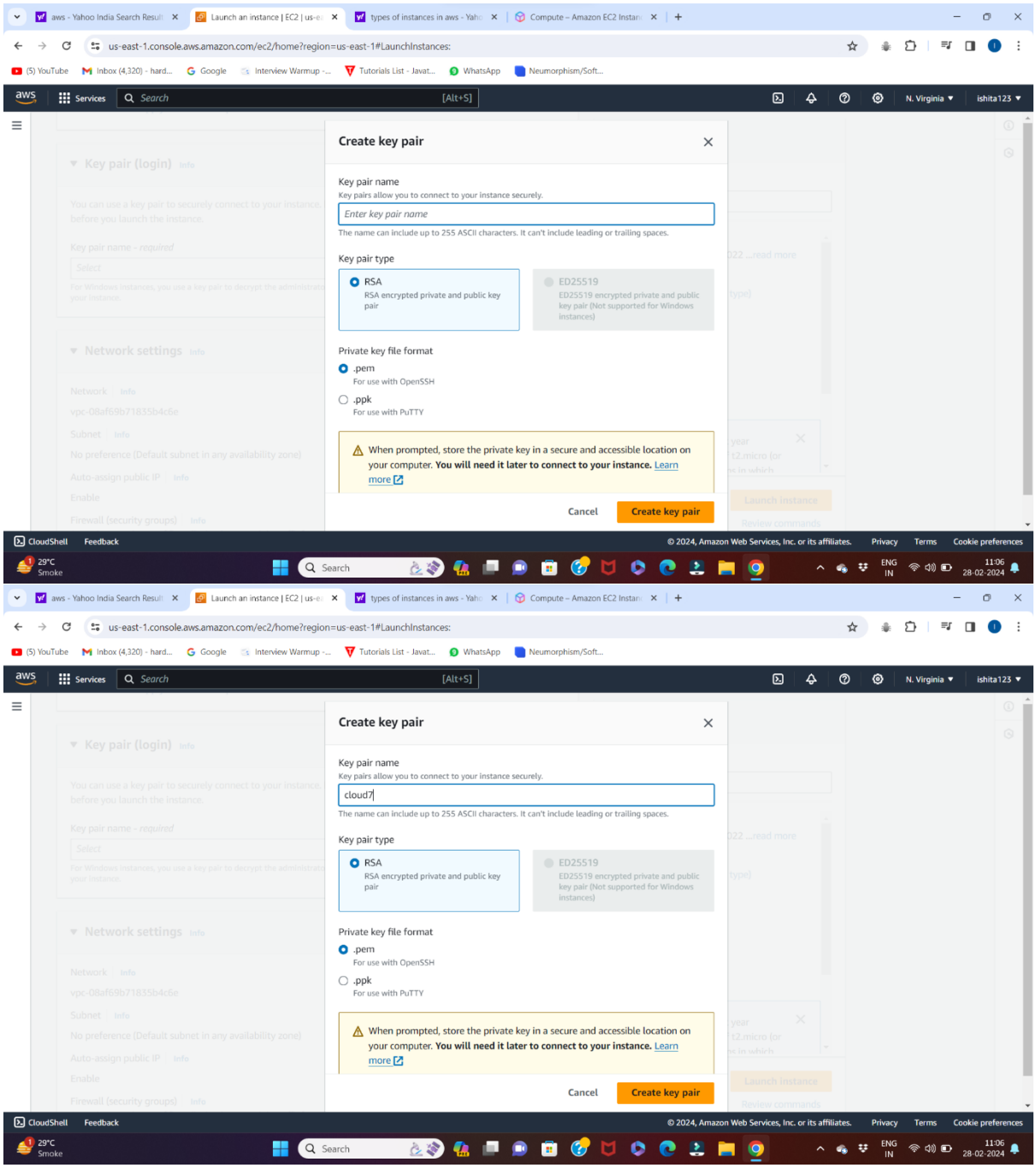
28-02-2024


Create key pair
Key pair name
Key pairs allow you to connect to your instance securely.
Enter key pair name
The name can include up to 255 ASCII characters. It can't include leading or trailing spaces.
Key pair type
RSA
RSA encrypted private and public key pair
ED25519
ED25519 encrypted private and public key pair (Not supported for Windows instances)
Private key file format
.pem
For use with OpenSSH
.ppk
For use with PuTTY
When prompted, store the private key in a secure and accessible location on your computer. You will need it later to connect to your instance. Learn more
Cancel
Create key pair

Create key pair
Key pair name
Key pairs allow you to connect to your instance securely.
cloud7
The name can include up to 255 ASCII characters. It can't include leading or trailing spaces.
Key pair type
RSA
RSA encrypted private and public key pair
ED25519
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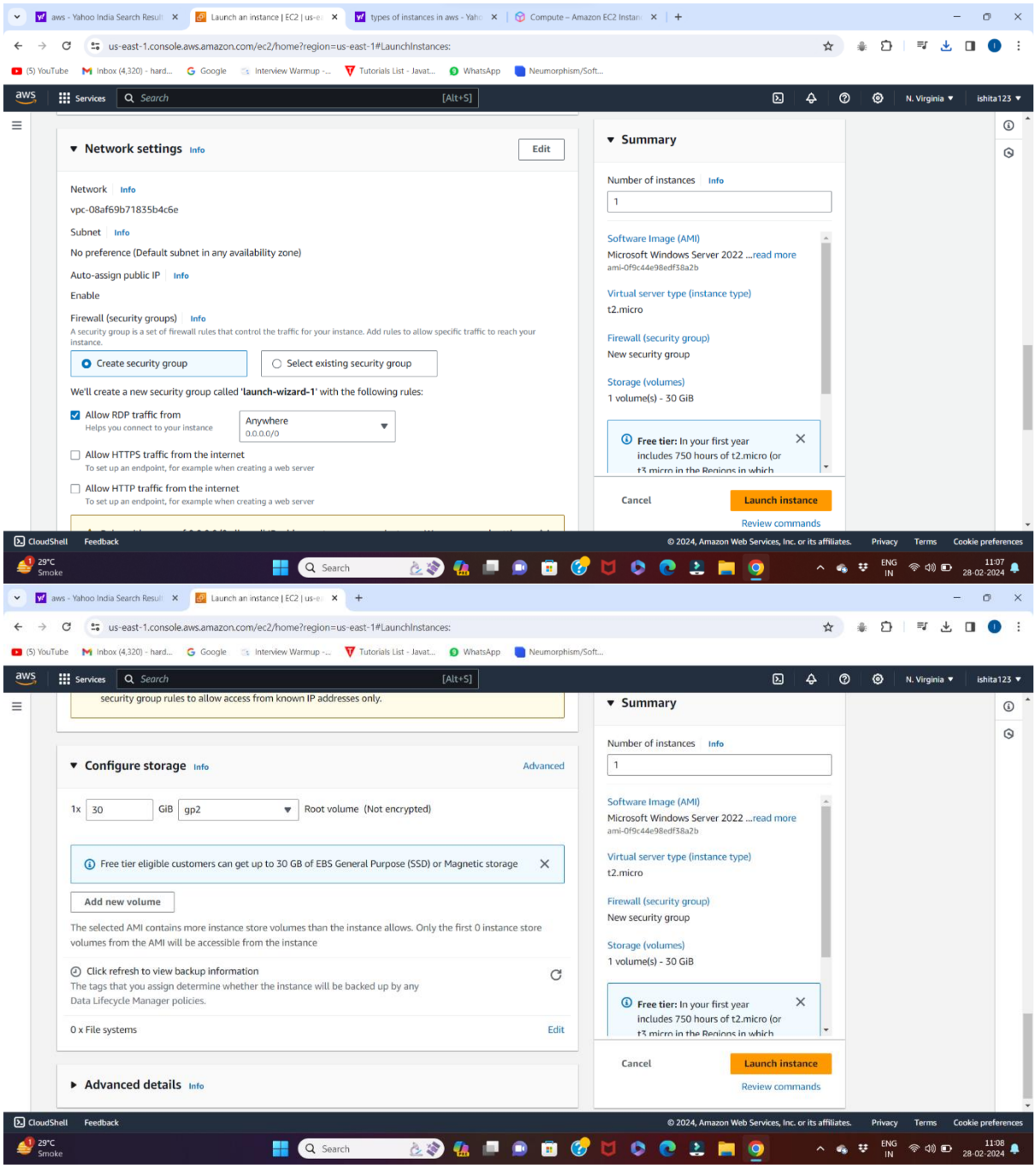
Cancel
Create key pair


us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#LaunchInstances:
Services
Search
[Alt+S]
N. Virginia
ishita123
Network settings Info
Edit
Network Info
vpc-08af69b71835b4c6e
Subnet Info
No preference (Default subnet in any availability zone)
Auto-assign public IP Info
Enable
Firewall (security groups) Info
A security group is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your instance.
Create security group
Select existing security group
We'll create a new security group called 'launch-wizard-1' with the following rules:
Allow RDP traffic from
Helps you connect to your instance
Anywhere
0.0.0.0/0
Allow HTTPS traffic from the internet
To set up an endpoint, for example when creating a web server
Allow HTTP traffic from the internet
To set up an endpoint, for example when creating a web server
Summary
Number of instances Info
1
Software Image (AMI)
Microsoft Windows Server 2022 ...read more
ami-0f9c44e98edf38a2b
Virtual server type (instance type)
t2.micro
Firewall (security group)
New security group
Storage (volumes)
1 volume(s) - 30 GiB
Free tier: In your first year includes 750 hours of t2.micro (or
Cancel
Launch instance
Review commands
CloudShell
Feedback
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Cookie preferences
29°C
Smoke
Search
ENG
IN
11:07
28-02-2024

us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#LaunchInstances:
Services
Search
[Alt+S]
N. Virginia
ishita123
security group rules to allow access from known IP addresses only.
Configure storage Info
Advanced
1x
30
GiB
gp2
Root volume (Not encrypted)
Free tier eligible customers can get up to 30 GB of EBS General Purpose (SSD) or Magnetic storage
Add new volume
The selected AMI contains more instance store volumes than the instance allows. Only the first 0 instance store volumes from the AMI will be accessible from the instance
Click refresh to view backup information
The tags that you assign determine whether the instance will be backed up by any Data Lifecycle Manager policies.
0 x File systems
Edit
Advanced details Info
Summary
Number of instances Info
1
Software Image (AMI)
Microsoft Windows Server 2022 ...read more
ami-0f9c44e98edf38a2b
Virtual server type (instance type)
t2.micro
Firewall (security group)
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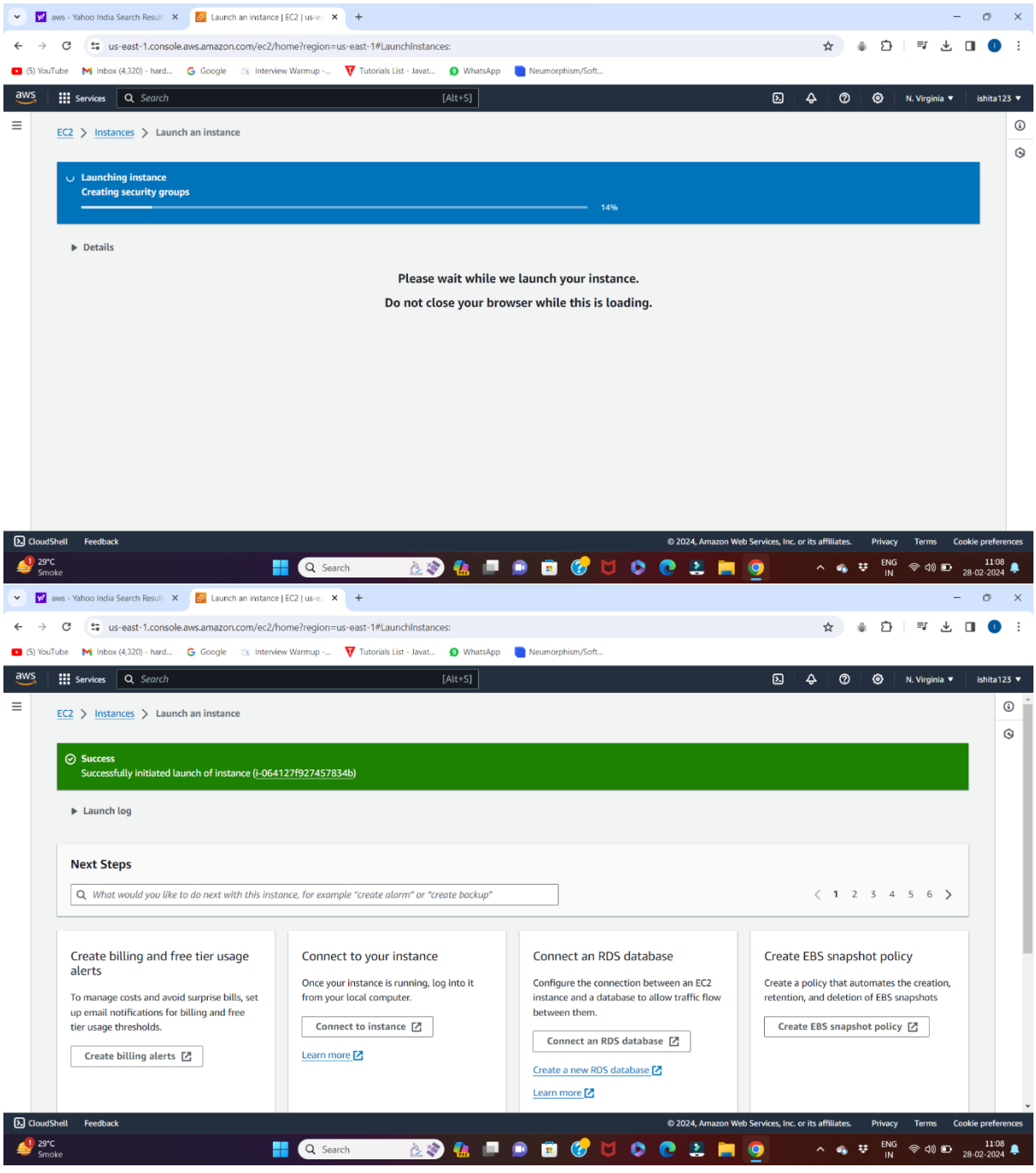
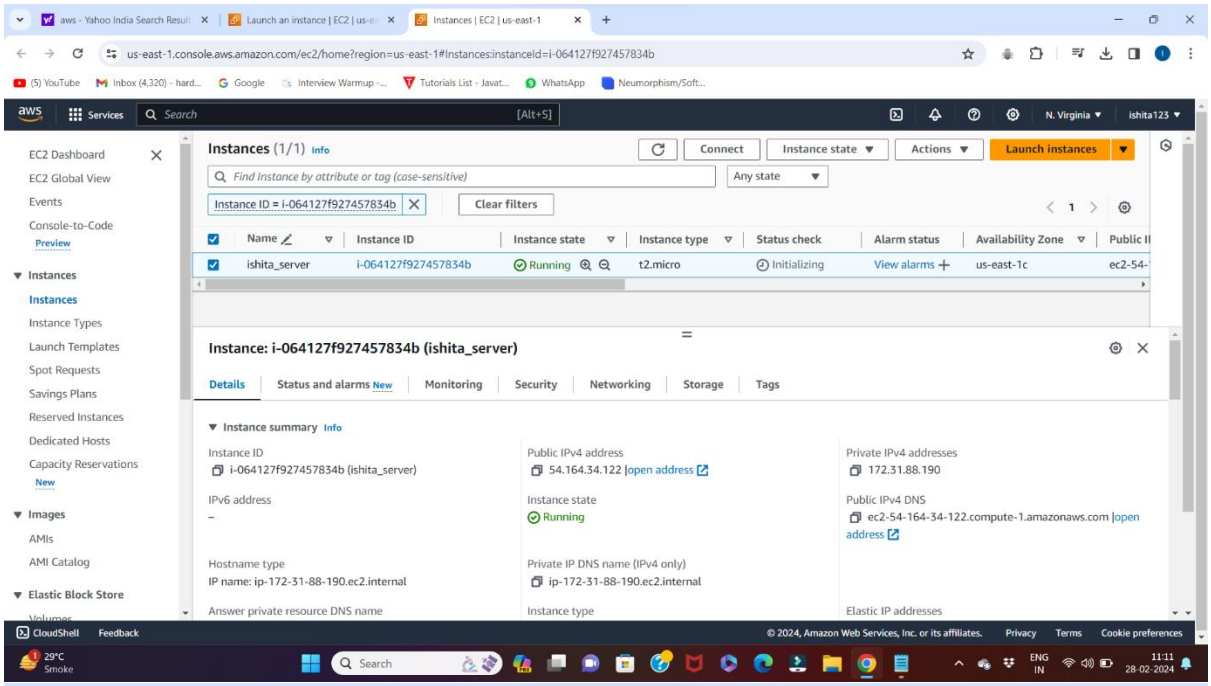
2.Launching and establishing connection




us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#Instances:instanceId=i-064127f927457834b
Instances (1/1) Info
Connect
Instance state
Actions
Launch instances
Find instance by attribute or tag (case-sensitive)
Any state
Instance ID = i-064127f927457834b
Clear filters
Name
Instance ID
Instance state
Instance type
Status check
Alarm status
Availability Zone
ishita_server
i-064127f927457834b
Running
t2.micro
Initializing
View alarms
us-east-1c
Instance: i-064127f927457834b (ishita_server)
Details
Status and alarms New
Monitoring
Security
Networking
Storage
Tags
Instance summary Info
Instance ID
i-064127f927457834b (ishita_server)
Public IPv4 address
54.164.34.122 |open address
Private IPv4 addresses
172.31.88.190
IPv6 address
–
Instance state
Running
Public IPv4 DNS
ec2-54-164-34-122.compute-1.amazonaws.com |open address
Hostname type
IP name: ip-172-31-88-190.ec2.internal
Private IP DNS name (IPv4 only)
ip-172-31-88-190.ec2.internal
Answer private resource DNS name
Instance type
Elastic IP addresses
EC2 Dashboard
EC2 Global View
Events
Console-to-Code
Preview
Instances
Instance Types
Launch Templates
Spot Requests
Savings Plans
Reserved Instances
Dedicated Hosts
Capacity Reservations
New
Images
AMIs
AMI Catalog
Elastic Block Store
CloudShell
Feedback
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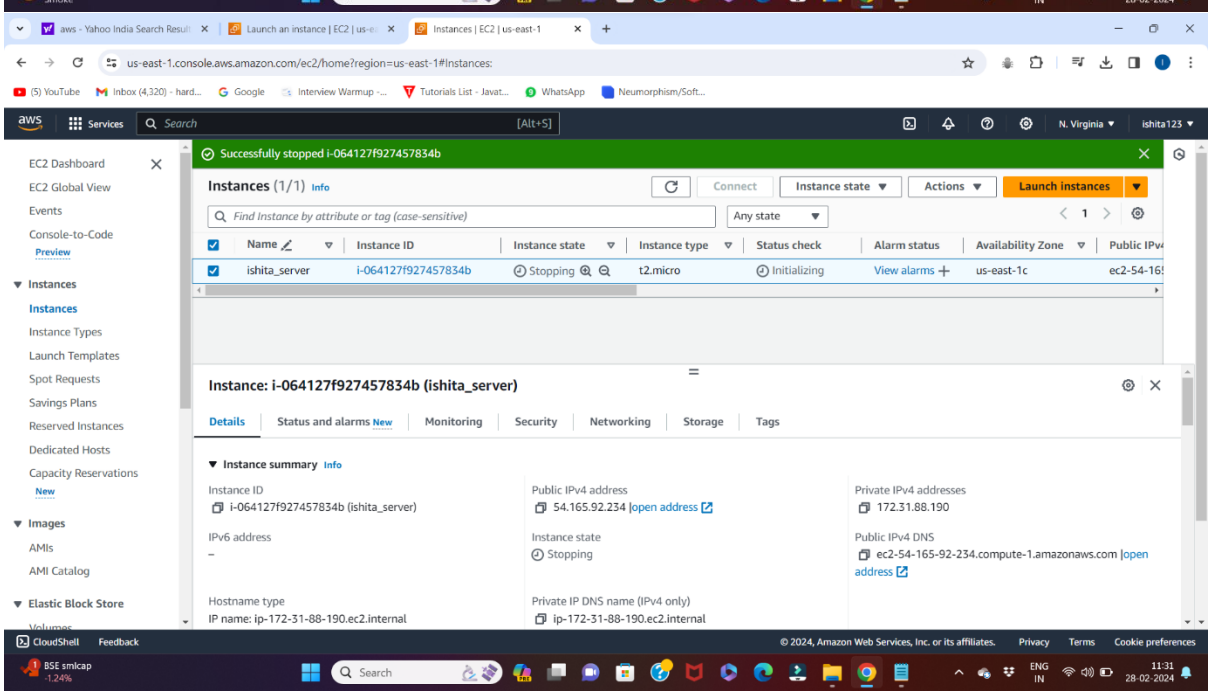
us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#Instances:
Successfully stopped i-064127f927457834b
Instances (1/1) Info
Connect
Instance state
Actions
Launch instances
Find instance by attribute or tag (case-sensitive)
Any state
Name
Instance ID
Instance state
Instance type
Status check
Alarm status
Availability Zone
ishita_server
i-064127f927457834b
Stopping
t2.micro
Initializing
View alarms
us-east-1c
Instance: i-064127f927457834b (ishita_server)
Details
Status and alarms New
Monitoring
Security
Networking
Storage
Tags
Instance summary Info
Instance ID
i-064127f927457834b (ishita_server)
Public IPv4 address
54.165.92.234 |open address
Private IPv4 addresses
172.31.88.190
IPv6 address
–
Instance state
Stopping
Public IPv4 DNS
ec2-54-165-92-234.compute-1.amazonaws.com |open address
Hostname type
IP name: ip-172-31-88-190.ec2.internal
Private IP DNS name (IPv4 only)
ip-172-31-88-190.ec2.internal
EC2 Dashboard
EC2 Global View
Events
Console-to-Code
Preview
Instances
Instance Types
Launch Templates
Spot Requests
Savings Plans
Reserved Instances
Dedicated Hosts
Capacity Reservations
New
Images
AMIs
AMI Catalog
Elastic Block Store
CloudShell
Feedback
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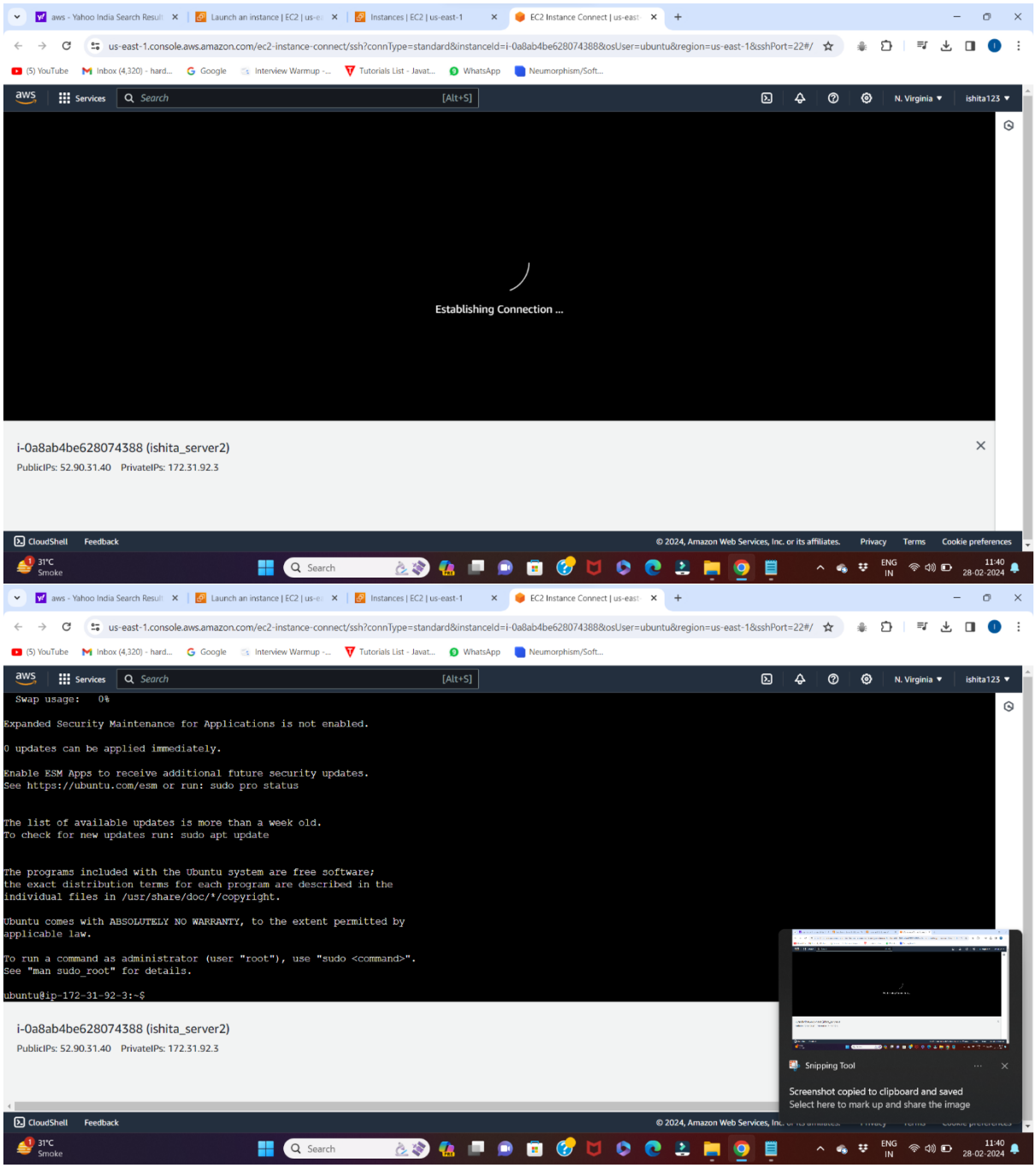
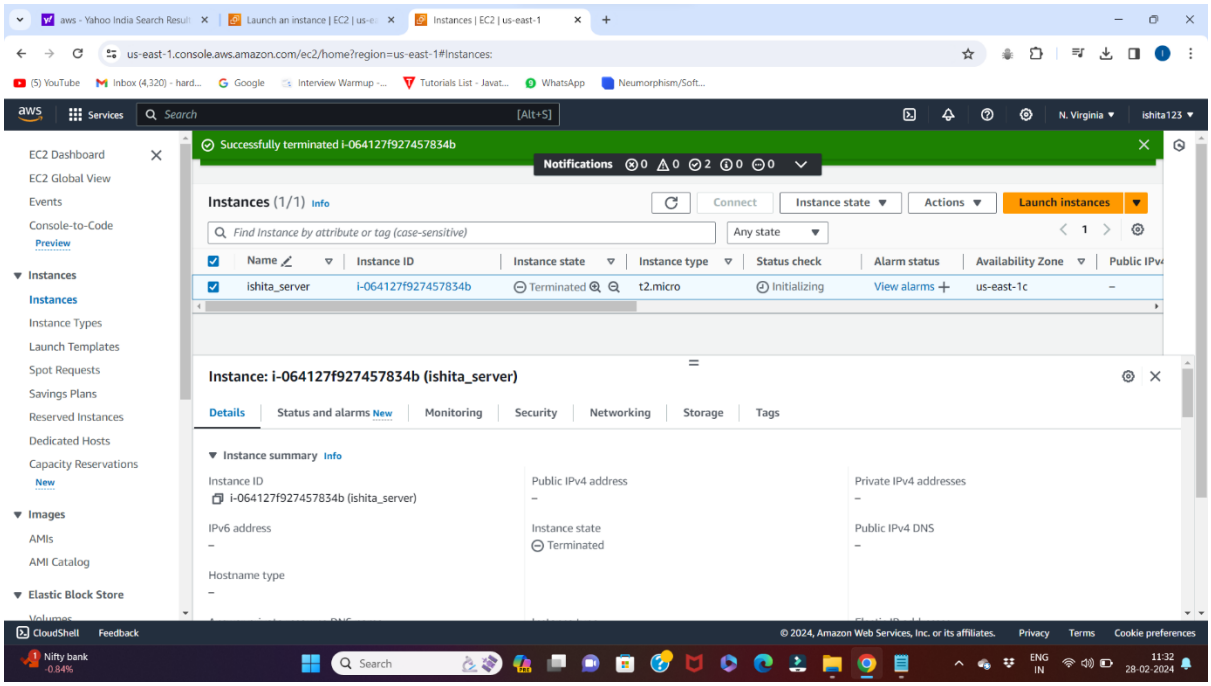

Establishing Connection ...
i-0a8ab4be628074388 (ishita_server2)
PublicIPs: 52.90.31.40 PrivateIPs: 172.31.92.3

Swap usage: 0%
Expanded Security Maintenance for Applications is not enabled.
0 updates can be applied immediately.
Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status
The list of available updates is more than a week old.
To check for new updates run: sudo apt update
The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.
Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.
ubuntu@ip-172-31-92-3:~$
i-0a8ab4be628074388 (ishita_server2)
PublicIPs: 52.90.31.40 PrivateIPs: 172.31.92.3
Snipping Tool
Screenshot copied to clipboard and saved
Select here to mark up and share the image


us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#Instances:
Services
Search
[Alt+S]
N. Virginia
ishita123
EC2 Dashboard
EC2 Global View
Events
Console-to-Code
Preview
Instances
Instances
Instance Types
Launch Templates
Spot Requests
Savings Plans
Reserved Instances
Dedicated Hosts
Capacity Reservations
New
Images
AMIs
AMI Catalog
Elastic Block Store
Successfully terminated i-064127f927457834b
Notifications
Instances (1/1) Info
Connect
Instance state
Actions
Launch instances
Find instance by attribute or tag (case-sensitive)
Any state
Name
Instance ID
Instance state
Instance type
Status check
Alarm status
Availability Zone
ishita_server
i-064127f927457834b
Terminated
t2.micro
Initializing
View alarms
us-east-1c
Instance: i-064127f927457834b (ishita_server)
Details
Status and alarms New
Monitoring
Security
Networking
Storage
Tags
Instance summary Info
Instance ID
i-064127f927457834b (ishita_server)
Public IPv4 address
Private IPv4 addresses
IPv6 address
Instance state
Terminated
Public IPv4 DNS
Hostname type
CloudShell
Feedback
© 2024, Amazon Web Services, Inc. or its affiliates.
Privacy
Terms
Cookie preferences
Nifty bank
-0.84%
Search
ENG
IN
11:32
28-02-2024