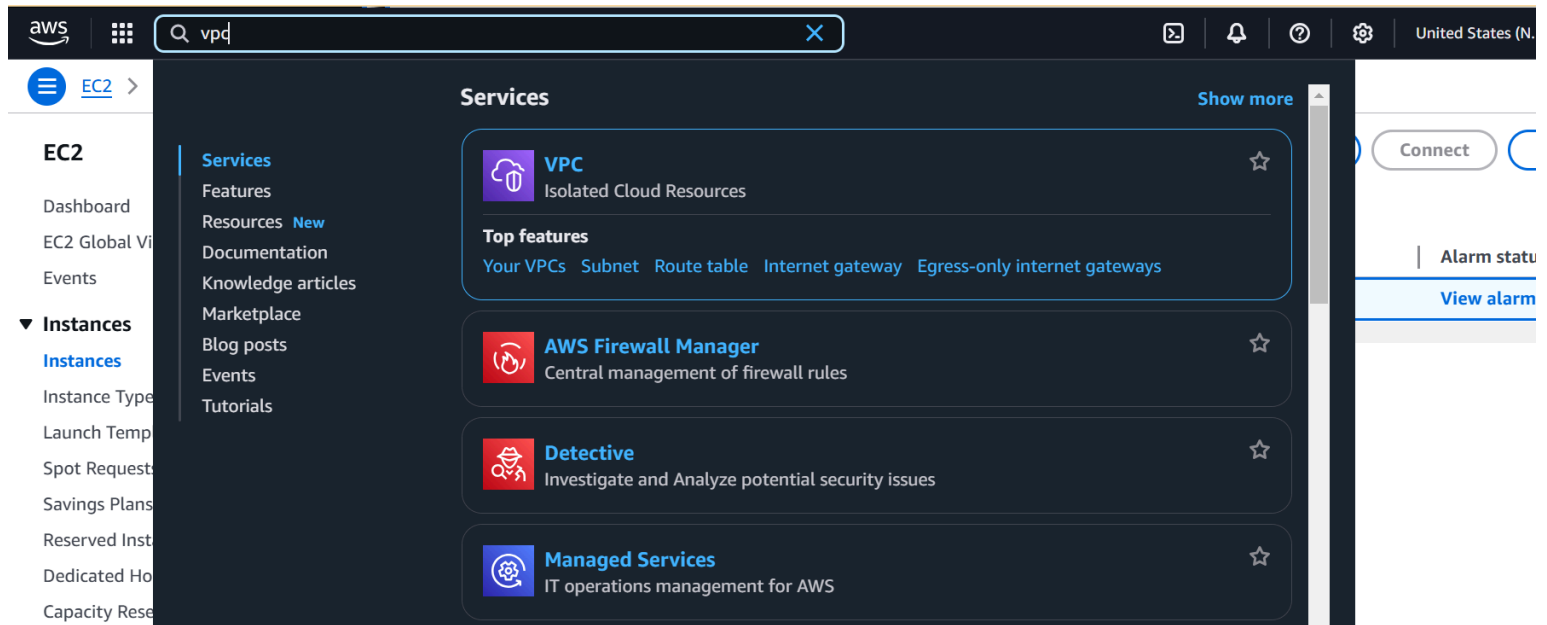


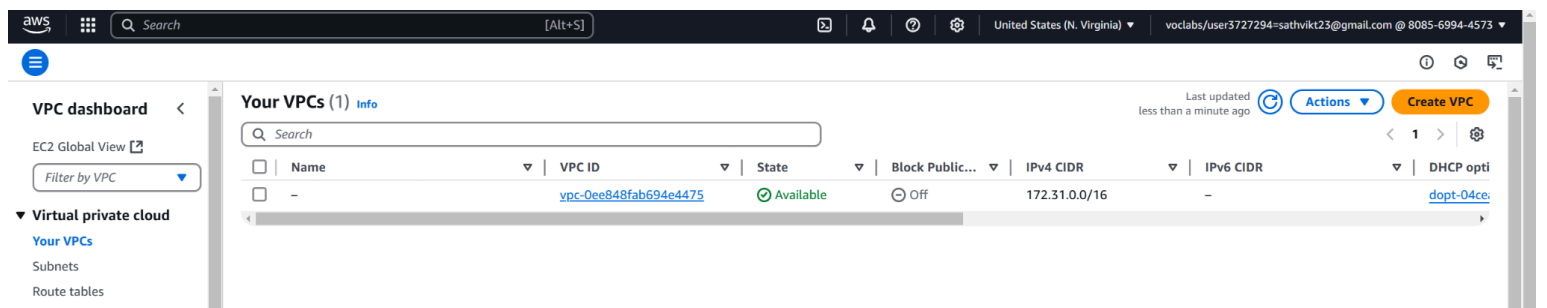
Experiment 5

Creating an **Amazon Virtual Private Cloud (VPC)** that includes a **Bastion Host** for secure access.

Step 1 : Go to the VPC Section in AWS



Step 2 : Click on Create VPC



Step 3 : VPC Setting:

Resources to create: select Resources to create

Name tag - *optional* : Write ur Rollno-VPC

IPv4 CIDR block : IPv4 CIDR manual input

IPv4 CIDR: 12.0.0.0/16

IPv6 CIDR block: No IPv6 CIDR block

Tenancy: Default

Tags: Key : Your Name Value- Rollno-VPC

Finally Click Create VPC

VPC > Your VPCs > Create VPC

Create VPC Info

A VPC is an isolated portion of the AWS Cloud populated by AWS objects, such as Amazon EC2 instances.

VPC settings

Resources to create Info
Create only the VPC resource or the VPC and other networking resources.

☒ VPC only ☐ VPC and more

Name tag - optional Info
Creates a tag with a key of 'Name' and a value that you specify.

22BD1A05DR-VPC-east-1a

IPv4 CIDR block Info
☒ IPv4 CIDR manual input
☐ IPAM-allocated IPv4 CIDR block

IPv4 CIDR
12.0.0.0/16
CIDR block size must be between /16 and /28.

IPv6 CIDR block Info
☒ No IPv6 CIDR block
☐ IPAM-allocated IPv6 CIDR block
☐ Amazon-provided IPv6 CIDR block
☐ IPv6 CIDR owned by me

Tenancy Info
Default

Tags

A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and filter your resources or track your AWS costs.

Key **Value - optional**

You can add 49 more tags

Step 4 : Click on Create Internet Gateways

VPC dashboard < EC2 Global View Filter by VPC

▼ Virtual private cloud
Your VPCs
Subnets
Route tables

Internet gateways (1) Info

<input type="checkbox"/>	Name	Internet gateway ID	State	VPC ID	Owner
<input type="checkbox"/>	-	igw-0dec78101a1fd726a	Attached	vpc-0ee848fab694e4475	808569944573

Step 5 : Enter the Name tag details by starting with roll no

VPC > Internet gateways > Create internet gateway

Create internet gateway [Info](#)

An internet gateway is a virtual router that connects a VPC to the internet. To create a new internet gateway specify the name for the gateway below.

Internet gateway settings**Name tag**

Creates a tag with a key of 'Name' and a value that you specify.

22BD1A05DR-IG1

Tags - optional

A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and filter your resources or track your AWS costs.

Key

Q Name

Value - optional

Q 22BD1A05DR-IG1

Remove

Add new tag

You can add 49 more tags.

Cancel

Create internet gateway

✓ The following internet gateway was created: igw-04c0b10bf17d331d2 - 22BD1A05DR-IG1. You can now attach to a VPC to enable the VPC to communicate with the internet.

Attach to a VPC

igw-04c0b10bf17d331d2 / 22BD1A05DR-IG1

Actions

Details [Info](#)**Internet gateway ID**

igw-04c0b10bf17d331d2

State

Detached

VPC ID

-

Owner

808569944573

Tags

Manage tags

Q Search tags

Key | Value

Name 22BD1A05DR-IG1

Step 6 : Attach the Internet gateway to the VPC

aws [Search] [Alt+S] United States (N. Virginia) voclabs/user3727294=sathvik23@gmail.com @ 8085-6994-4573

VPC > Internet gateways > Attach to VPC (igw-04c0b10bf17d331d2)

✓ The following internet gateway was created: igw-04c0b10bf17d331d2 - 22BD1A05DR-IG1. You can now attach to a VPC to enable the VPC to communicate with the internet. [Attach to a VPC](#)

Attach to VPC (igw-04c0b10bf17d331d2) [Info](#)

VPC
Attach an internet gateway to a VPC to enable the VPC to communicate with the internet. Specify the VPC to attach below.

Available VPCs
Attach the internet gateway to this VPC.

Q vpc-0b457c693387d10d2

► AWS Command Line Interface command

Cancel [Attach internet gateway](#)

Step 7 : Go to the subnet section and click on create subnets

Step 8 : Select the VPC created earlier

Step 9 : Configure subnet 1 IPV4 CIDR block being 12.0.1.0/24

Step 10 Configure Subnet 2 IPV4 CIDR block being 12.0.3.0/24

Subnet 2 of 2

Subnet name
Create a tag with a key of 'Name' and a value that you specify.
22BD1A05DR-private-s2
The name can be up to 256 characters long.

Availability Zone [Info](#)
Choose the zone in which your subnet will reside, or let Amazon choose one for you.
United States (N. Virginia) / us-east-1a

IPv4 VPC CIDR block [Info](#)
Choose the VPC's IPv4 CIDR block for the subnet. The subnet's IPv4 CIDR must lie within this block.
12.0.0.0/16

IPv4 subnet CIDR block
12.0.3.0/24 256 IPs

▼ **Tags - optional**

Key	Value - optional	
Q Name	Q 22BD1A05DR-private-s2	Remove

[Add new tag](#)
You can add 49 more tags.

[Remove](#)

[Add new subnet](#)

[Cancel](#) [Create subnet](#)

Step 11 : Go to the Route tables section and click on Create route table

Give name to the route table and select the VPC created earlier

***Note : This represents the public routing table**

VPC dashboard < EC2 Global View [Filter by VPC](#)

▼ Virtual private cloud

Route tables (1) [Info](#)

Find resources by attribute or tag

Last updated 13 minutes ago [Actions](#) [Create route table](#)

	Name	Route table ID	Explicit subnet associ...	Edge associations	Main	VPC	Owne...
<input type="checkbox"/>	-	rtb-07b7641bd360e98fd	-	-	Yes	vpc-0ee848fab694e4475	808569...

Create route table [Info](#)

A route table specifies how packets are forwarded between the subnets within your VPC, the internet, and your VPN connection.

Route table settings**Name - optional**

Create a tag with a key of 'Name' and a value that you specify.

22BD1A05DR-RT

VPC

The VPC to use for this route table.

vpc-0b457c693387d10d2 (22BD1A05DR-VPC-east-1a)

Tags

A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and filter your resources or track your AWS costs.

Key

Q Name

Value - optional

Q 22BD1A05DR-RT

Remove

Add new tag

You can add 49 more tags.

Cancel

Create route table

Step 12 : In the Route table settings click on Edit routes where add route 0.0.0.0/0 and keeping the target Internet Gateway of the VPC created earlier .

Edit routes**Destination**

12.0.0.0/16

Target

local

Status

Active

Propagated

No

Q 0.0.0.0/0

Q local

Internet Gateway

Q igw-04c0b10bf17d331d2

-

No

Remove

Add route

Cancel

Preview

Save changes

Step 13 :In the Route table settings click on Edit subnet associations and select public subnet

VPC > Route tables > rtb-06833803192c42bb2 > Edit subnet associations

Edit subnet associations

Change which subnets are associated with this route table.

Available subnets (1/2)

Filter subnet associations

<input type="checkbox"/>	Name	Subnet ID	IPv4 CIDR	IPv6 CIDR	Route table ID
<input type="checkbox"/>	22BD1A05DR-private-s2	subnet-0c74b9c1a15666d22	12.0.3.0/24	-	Main (rtb-024393a05ccbbae1f)
<input checked="" type="checkbox"/>	22BD1A05DR-public-s1	subnet-05bab48ee46a25b16	12.0.1.0/24	-	Main (rtb-024393a05ccbbae1f)

Selected subnets

subnet-05bab48ee46a25b16 / 22BD1A05DR-public-s1

Cancel

Save associations

Step 14 : Go to the Route tables section and click on Create route table
 Give name to the route table and select the VPC created earlier
***Note : This represents the private routing table**

aws [Search] [Alt+S] United States (N. Virginia) vocabs/user3727294=sathvikt23@gmail.com @ 8085-6994-4573

VPC > Route tables > Create route table

Create route table [info](#)

A route table specifies how packets are forwarded between the subnets within your VPC, the internet, and your VPN connection.

Route table settings

Name - optional
 Create a tag with a key of 'Name' and a value that you specify.

22BD1A05DR-RT-Private

VPC
 The VPC to use for this route table.

vpc-0b457c693387d10d2 (22BD1A05DR-VPC-east-1a)

Tags

A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and filter your resources or track your AWS costs.

Key **Value - optional**

Q Name X Q 22BD1A05DR-RT-Private X Remove

Add new tag

You can add 49 more tags.

Cancel Create route table

Step 15 : In the Route table settings click on Edit subnet associations and select private subnet

VPC > Route tables > rtb-0471e3a465a71ea2c > Edit subnet associations

Edit subnet associations

Change which subnets are associated with this route table.

Available subnets (1/2)

Filter subnet associations

	Name	Subnet ID	IPv4 CIDR	IPv6 CIDR	Route table ID
<input checked="" type="checkbox"/>	22BD1A05DR-private-s2	subnet-0c74b9c1a15666d22	12.0.3.0/24	-	Main (rtb-024393a05ccbae1f)
<input type="checkbox"/>	22BD1A05DR-public-s1	subnet-05bab48ee46a25b16	12.0.1.0/24	-	rtb-06833803192c42bb2 / 22BD1A05...

Selected subnets

subnet-0c74b9c1a15666d22 / 22BD1A05DR-private-s2

Cancel

Save associations

Step 16 : Launch instance for the Bastion Host (Public)EC2 access

Network configurations :

Select the VPC which had been created earlier

Select the public subnet which had been created earlier

Keeping the source type anywhere

Launch an instance

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

Name

22BD1A05DR-VPC-public

Add additional tags

Application and OS Images (Amazon Machine Image)

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

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Recents

Quick Start

Amazon Linux

macOS

Ubuntu

Windows

Red Hat

SUSE Linux

Debian

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Including AMIs from AWS, Marketplace and the Community

Amazon Machine Image (AMI)

Ubuntu Server 24.04 LTS (HVM), SSD Volume Type

ami-084568db4383264d4 (64-bit (x86)) / ami-0c4e709339fa8521a (64-bit (Arm))

Virtualization: hvm ENA enabled: true Root device type: ebs

Description

Ubuntu Server 24.04 LTS (HVM),EBS General Purpose (SSD) Volume Type. Support available from Canonical (http://www.ubuntu.com/cloud/services).

Canonical Ubuntu 24.04 amd64 noble image

Amazon Machine Image (AMI)

Amazon Linux 2023 AMI

ami-08b5b3a93ed654d19 (64-bit (x86), uefi-preferred) / ami-0eae2a0fc13b15fce (64-bit (Arm), uefi)

Virtualization: hvm ENA enabled: true Root device type: ebs

Description

Amazon Linux 2023 is a modern, general purpose Linux-based OS that comes with 5 years of long term support. It is optimized for AWS and designed to provide a secure, stable and high-performance execution environment to develop and run your cloud applications.

Amazon Linux 2023 AMI 2023.6.20250303.0 x86_64 HVM kernel-6.1

Architecture

64-bit (x86)

Boot mode

uefi-preferred

AMI ID

ami-08b5b3a93ed654d19

Publish Date

2025-03-04

Username

ec2-user

Verified provider

Instance type

t2.micro

Family: t2 1 vCPU 1 GiB Memory Current generation: true

On-Demand Windows base pricing: 0.0162 USD per Hour On-Demand Ubuntu Pro base pricing: 0.0134 USD per Hour

On-Demand SUSE base pricing: 0.0116 USD per Hour On-Demand RHEL base pricing: 0.026 USD per Hour

On-Demand Linux base pricing: 0.0116 USD per Hour

Additional costs apply for AMIs with pre-installed software

Key pair (login)

You can use a key pair to securely connect to your instance. Ensure that you have access to the selected key pair before you launch the instance.

Key pair name - required

22bd1a05drebs

Create new key pair

CC_LAB_CSE_D

▼ Network settings

VPC - required

vpc-0b457c693387d10d2 (22BD1A05DR-VPC-east-1a)
12.0.0.0/16

Subnet

subnet-05bab48ee46a25b16 22BD1A05DR-public-s1
VPC: vpc-0b457c693387d10d2 Owner: 808569944573 Availability Zone: us-east-1a
Zone type: Availability Zone IP addresses available: 251 CIDR: 12.0.1.0/24

Auto-assign public IP

Enable

Additional charges apply when outside of free tier allowance

Firewall (security groups)

Create security group

Security group name - required

launch-wizard-2

Description - required

launch-wizard-2 created 2025-03-21T22:26:03.302Z

Inbound Security Group Rules

▼ Security group rule 1 (TCP, 22, 0.0.0.0/0)

Type

ssh

Protocol

TCP

Port range

22

Source type

Anywhere

Source

0.0.0.0/0

Description - optional

e.g. SSH for admin desktop

Rules with source of 0.0.0.0/0 allow all IP addresses to access your instance. We recommend setting security group rules to allow access from known IP addresses only.

Add security group rule

Advanced network configuration

Step 17 : Connect to the instance and verify the allocated IP to the public ec2

EC2 > Instances > i-09ea3b66db408b4c5 > Connect to instance

Connect to instance

Connect to your instance i-09ea3b66db408b4c5 (22bd1a05dr-VPC-Public) using any of these options

EC2 Instance Connect

Session Manager

SSH client

EC2 serial console

Instance ID

i-09ea3b66db408b4c5 (22bd1a05dr-VPC-Public)

1. Open an SSH client.

2. Locate your private key file. The key used to launch this instance is 22bd1a05drebs.pem

3. Run this command, if necessary, to ensure your key is not publicly viewable.
chmod 400 "22bd1a05drebs.pem"

4. Connect to your instance using its Public IP:
44.197.118.22

Example:
ssh -i "22bd1a05drebs.pem" ec2-user@44.197.118.22

Note: In most cases, the guessed username is correct. However, read your AMI usage instructions to check if the AMI owner has changed the default AMI username.

Cancel

System information as of Fri Mar 21 22:47:59 UTC 2025

System load:	0.31	Processes:	108
Usage of /:	25.0% of 6.71GB	Users logged in:	0
Memory usage:	21%	IPv4 address for enX0:	12.0.1.55
Swap usage:	0%		

Step 18 : Launch instance for the private EC2 access

Network configurations :

Select the VPC which had been created earlier

Select the public subnet which had been created earlier

Keeping the source type anywhere

Launch an instance

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

Name

22BD1A05DR-EC2-private

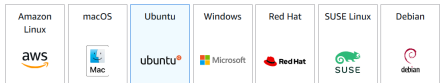
Add additional tags

Application and OS Images (Amazon Machine Image)

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

Recents Quick Start



Browse more AMIs
Including AMIs from AWS, Marketplace and the Community

Amazon Machine Image (AMI)

Ubuntu Server 24.04 LTS (HVM), SSD Volume Type
ami-09a556db4353254de (64-bit (x86)) / ami-0c4e709339fa6521a (64-bit (Arm))
Virtualization: hvm ENA enabled: true Root device type: ebs

Free tier eligible

Description

Ubuntu Server 24.04 LTS (HVM),EBS General Purpose (SSD) Volume Type. Support available from Canonical (http://www.ubuntu.com/cloud/services).

Canonical Ubuntu 24.04 amd64 noble image

Amazon Machine Image (AMI)

Ubuntu Server 24.04 LTS (HVM), SSD Volume Type

Free tier eligible

ami-084568db4383264d4 (64-bit (x86)) / ami-0c4e709339fa8521a (64-bit (Arm))

Virtualization: hvm ENA enabled: true Root device type: ebs

Description

Ubuntu Server 24.04 LTS (HVM),EBS General Purpose (SSD) Volume Type. Support available from Canonical (<http://www.ubuntu.com/cloud/services>).

Canonical, Ubuntu, 24.04, amd64 noble image

Architecture

AMI ID

Publish Date

Username

Verified provider

64-bit (x86)

ami-084568db4383264d4

2025-03-05

ubuntu

Verified provider

▼ Instance type

Info | Get advice

Instance type

t2.micro

Free tier eligible

Family: t2 1 vCPU 1 GiB Memory Current generation: true

On-Demand Windows base pricing: 0.0162 USD per Hour On-Demand Ubuntu Pro base pricing: 0.0134 USD per Hour

On-Demand SUSE base pricing: 0.0116 USD per Hour On-Demand RHEL base pricing: 0.026 USD per Hour

On-Demand Linux base pricing: 0.0116 USD per Hour

All generations

Compare instance types

Additional costs apply for AMIs with pre-installed software

▼ Network settings

Info

VPC - required

Info

vpc-0b457c693387d10d2 (22BD1A05DR-VPC-east-1a)

12.0.0.0/16

Create new VPC

Subnet

Info

subnet-0c74b9c1a15666d22

22BD1A05DR-private-s2

VPC: vpc-0b457c693387d10d2 Owner: 808569944573 Availability Zone: us-east-1a Create new subnet

Zone type: Availability Zone IP addresses available: 251 CIDR: 12.0.3.0/24

Auto-assign public IP

Info

Disable

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

Security group name - required

launch-wizard-5

This security group will be added to all network interfaces. The name can't be edited after the security group is created. Max length is 255 characters. Valid characters: a-z, A-Z, 0-9, spaces, and _-:/!@#%^&*~+=<>[]{}|`~`

Description - required

Info

launch-wizard-5 created 2025-03-21T22:59:57.003Z

Inbound Security Group Rules

▼ Security group rule 1 (TCP, 22, 12.0.1.0/24)

Remove

Type

Info

ssh

Protocol

Info

TCP

Port range

Info

22

Source type

Info

Custom

Source

Info

Q Add CIDR, prefix list or security group

12.0.1.0/24

Description - optional

Info

e.g. SSH for admin desktop

Add security group rule

► Advanced network configuration

Step 19 : Connect to the Bastion Host EC2 instance through SSH

```
PS C:\languages\aws> ssh -i "22bd1a05drebs.pem" ubuntu@44.203.234.248
Welcome to Ubuntu 24.04.2 LTS (GNU/Linux 6.8.0-1024-aws x86_64)
```

```
* Documentation:  https://help.ubuntu.com
* Management:    https://landscape.canonical.com
* Support:       https://ubuntu.com/pro
```

```
System information as of Fri Mar 21 23:09:03 UTC 2025
```

```
System load:  0.0                Processes:            105
Usage of /:   25.2% of 6.71GB    Users logged in:     0
Memory usage: 20%               IPv4 address for enX0: 12.0.1.55
Swap usage:   0%
```

Step 20 : Make a new directory by running the command `$mkdir dir_name` and copy the .pem contents using `$nano .pem` and paste it

```
ubuntu@ip-12-0-1-55:~$ mkdir aws
ubuntu@ip-12-0-1-55:~$ cd aws
ubuntu@ip-12-0-1-55:~/aws$ nano 22bd1a05drebs.pem
```

OUTPUT

DEBUG CONSOLE

TERMINAL

PORTS

```
GNU nano 7.2
```

```
-----BEGIN RSA PRIVATE KEY-----
```

```
MIIEpQIBAAKCAQEAYtBABQ54bkA+s0+KSHlq6qR88K1pq2ZIE9LV4hvKA4QYmAZ
6srK5nbROMiB4lRHE9aH6klf0t79m0UpearkOduvfKWAhFlWjQDpDM+bC/yYwciO
8d8o+7yCFM7QpBrU95rcFM+5DOR0tToGjXoSf7WdyJBPT1pAKdcmp/SS6NnuIgst
0F6abCIgAdBHpw9XD5Ig2HxAo046XIkWisheixvdeAS39K9mCb0eANh11HvteeiX
grchcY0iiN1bGV82P50EUAeNSmE/CXRIWbWY/mc5Mm8cgiTU1JSrp6cndGab4WTT
```

Step 21 : Copy the instance of the private EC2 and run the commands

```
$chmod 400 pem_name.pem
```

```
$ssh -i "pem_name.pem" ubuntu@private_ip
```



Connect to instance [Info](#)

Connect to your instance i-051f50ff51182e787 (22BD1A05DR-EC2-private) using any of these options


EC2 Instance Connect Session Manager **SSH client** EC2 serial console


Instance ID

 i-051f50ff51182e787 (22BD1A05DR-EC2-private)

1. Open an SSH client.
2. Locate your private key file. The key used to launch this instance is 22bd1a05drebs.pem
3. Run this command, if necessary, to ensure your key is not publicly viewable.
 chmod 400 "22bd1a05drebs.pem"
4. Connect to your instance using its Private IP:
 12.0.3.246

 Command copied

 ssh -i "22bd1a05drebs.pem" ubuntu@12.0.3.246

 **Note:** In most cases, the guessed username is correct. However, read your AMI usage instructions to check if the AMI owner has changed the default AMI username.

[Cancel](#)

```
ubuntu@ip-12-0-1-55:~/aws$ chmod 400 22bd1a05drebs.pem
ubuntu@ip-12-0-1-55:~/aws$ ssh -i "22bd1a05drebs.pem" ubuntu@12.0.3.246
Welcome to Ubuntu 24.04.2 LTS (GNU/Linux 6.8.0-1024-aws x86_64)
```

```
* Documentation:  https://help.ubuntu.com
* Management:    https://landscape.canonical.com
* Support:        https://ubuntu.com/pro
```

```
System information as of Fri Mar 21 23:27:04 UTC 2025
```

```
System load:  0.08                Processes:            103
Usage of /:   24.9% of 6.71GB      Users logged in:     0
Memory usage: 20%                 IPv4 address for enX0: 12.0.3.246
Swap usage:   0%
```