

AWS EC2:

EC2 VM:

Amazon Machine Image (AMI)

Instance type

Keypair

Virtual Private Cloud (VPC)

Security Groups

Elastic Block Storage (EBS)

EBS (Volumes & Snapshots) -> Load-balancer, Types of Load-balancer, Auto-scaling

IPs

Static Website Hosting

Practicals on EC2 VM:

1. Create Key pair (.pem file)

- a) Public key (AWS will keep it)
- b) Private key (We will get)

The screenshot shows the AWS Management Console interface. At the top, there's a header with 'Key pairs (2)' and an 'Info' link. Below this is a search bar and a table of existing key pairs. The table has columns for Name, Type, Created, Fingerprint, and ID. Two key pairs are listed: 'devopsLinuxFeb22' and 'devops_linux', both of type 'rsa'. Below the table is a 'Create key pair' wizard. The wizard has a 'Name' field with 'DevOpsMar8' entered. The 'Key pair type' is set to 'RSA'. The 'Private key file format' is set to '.pem'. There are 'Add new tag' and 'Cancel' buttons at the bottom.

Name	Type	Created	Fingerprint	ID
devopsLinuxFeb22	rsa	2025/02/22 12:01 GMT-5	06:02:13:bf:3b:5b:b9:ab:87:ce:e1:99:73:96:d6:17:b...	key-0aab44f0553c61133
devops_linux	rsa	2025/02/08 15:45 GMT-5	de:8a:eb:03:80:ff:2e:19:24:c1:e0:c8:ed:39:ac:6a:07:...	key-018001dca3194710a

Create key pair

Key pair
A key pair, consisting of a private key and a public key, is a set of security credentials that you use to prove your identity when connecting to an instance.

Name
DevOpsMar8
The name can include up to 255 ASCII characters. It can't include leading or trailing spaces.

Key pair type
☒ RSA ☐ ED25519

Private key file format
☒ .pem For use with OpenSSH
☐ .ppk For use with PuTTY

Tags - optional
No tags associated with the resource.
[Add new tag](#)
You can add up to 50 more tags.

[Cancel](#) [Create key pair](#)

2. Create Security groups & update Inbound rules to allow traffic

Lifecycle Manager

▼ Network & Security

Security Groups

Elastic IPs

Placement Groups

Key Pairs

Network Interfaces

Create security group [Info](#)

A security group acts as a virtual firewall for your instance to control inbound and outbound traffic. To create a new security group, complete the fields below.

Basic details

Security group name [Info](#)

DevOps-sg

Name cannot be edited after creation.

Description [Info](#)

Allows SSH access to developers

VPC [Info](#)

vpc-0a752647f0a021f2e

Inbound rules [Info](#)

Type Info	Protocol Info	Port range Info	Source Info
RDP	TCP	3389	Anywh... <div>0.0.0.0/0</div>
SSH	TCP	22	Anywh... <div>0.0.0.0/0</div>
HTTP	TCP	80	Anywh... <div>0.0.0.0/0</div>

Inbound rules [Info](#)

Type Info	Protocol Info	Port range Info	Source Info
RDP	TCP	3389	Anywh... <div>0.0.0.0/0</div>
SSH	TCP	22	Anywh... <div>0.0.0.0/0</div>
HTTP	TCP	80	Anywh... <div>0.0.0.0/0</div>
HTTPS	TCP	443	Anywh... <div>0.0.0.0/0</div>

Add rule

sg-031a081efd38c0e3a - DevOps-sg

✔ Security group (sg-031a081efd38c0e3a | DevOps-sg) was created successfully

▶ Details

sg-031a081efd38c0e3a - DevOps-sg

3. Create Windows EC2:

Name and tags [Info](#)

Name

WindowsVM

[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

Recents

Quick Start



[Browse more AMIs](#)

Including AMIs from AWS, Marketplace and the Community

Amazon Machine Image (AMI)

Microsoft Windows Server 2025 Base
ami-02bce8b27768e3fdf (64-bit (x86))
Virtualization: hvm ENA enabled: true Root device type: ebs

Free tier eligible

Description

Microsoft Windows 2025 Datacenter edition. [English]

Microsoft Windows Server 2025 Full Locale English AMI provided by Amazon

▼ Instance type [Info](#) | [Get advice](#)

Instance type

t3.micro
Family: t3 2 vCPU 1 GiB Memory Current generation: true On-Demand RHEL base pricing: 0.0404 USD per Hour
On-Demand Linux base pricing: 0.0116 USD per Hour On-Demand SUSE base pricing: 0.0116 USD per Hour
On-Demand Ubuntu Pro base pricing: 0.0151 USD per Hour On-Demand Windows base pricing: 0.0208 USD per Hour

☐ All generations

[Compare instance types](#)

Additional costs apply for AMIs with pre-installed software

▼ Key pair (login) [Info](#)

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*

DevOpsMar8



[Create new key pair](#)

For Windows instances, you use a key pair to decrypt the administrator password. You then use the decrypted password to connect to your instance.

▼ Network settings [Info](#)

[Edit](#)

Network [Info](#)

vpc-0a752647f0a021f2e

Subnet [Info](#)

No preference (Default subnet in any availability zone)

Auto-assign public IP [Info](#)

Enable

Additional charges apply when outside of free tier allowance

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

Common security groups [Info](#)

Select security groups

DevOps-sg sg-031a081efd38c0e3a

VPC: vpc-0a752647f0a021f2e



[Compare security group rules](#)

Security groups that you add or remove here will be added to or removed from all your network interfaces.

▼ Configure storage [Info](#)

[Advanced](#)

1x 30 GiB gp3 Root volume, 3000 IOPS, Not encrypted

[i](#) Free tier eligible customers can get up to 30 GB of EBS General Purpose (SSD) or Magnetic storage

Connect to instance

Info

Connect to your instance i-009704642e203be1a (WindowsVM) using any of these options

Session Manager

RDP client

EC2 serial console

Instance ID

i-009704642e203be1a (WindowsVM)

Connection Type

Connect using RDP client

Download a file to use with your RDP client and retrieve your password.

Connect using Fleet Manager

To connect to the instance using Fleet Manager Remote Desktop, the SSM Agent must be installed and running on the instance. For more information, see [Working with SSM Agent](#)

You can connect to your Windows instance using a remote desktop client of your choice, and by downloading and running the RDP shortcut file below:

Download remote desktop file

When prompted, connect to your instance using the following username and password:

Public DNS

ec2-35-182-39-59.ca-central-1.compute.amazonaws.com

Username

Info

Administrator

Password

Get password

If you've joined your instance to a directory, you can use your directory credentials to connect to your instance.

Cancel

Click on Get Password

Get Windows password

Info

Use your private key to retrieve and decrypt the initial Windows administrator password for this instance.

Instance ID

i-009704642e203be1a (WindowsVM)

Key pair associated with this instance

DevOpsMar8

Private key

Either upload your private key file or copy and paste its contents into the field below.

Upload private key file

Private key contents - optional

Private key contents

Click on Upload Private Key File

Private key contents - optional

-----BEGIN RSA PRIVATE KEY-----
MIIEowIBAAKCAQEAxdL0cZLApZuu1AbxbAIK+NlUqQNQIMk2sBjXwOSeAZ5/DKJ
fPm6GtNst9dPqalsuLSND9FLGNVlwpw8Lbq8hAG5tCYEJhK8TE+EaxX9qd68Af
K5rhZINJHhdY6f51Sko3CIW0DCQaa4WJcP7dNjT7ZhdZ5JQq0ZPZs1h4eWxqPxN
4g7SLmVoefzdZf7KiB2mfHmM8KO+MQ/ce3H+1yRGRKuZ6MHDLHnn6Nk6YpCoazM
pyRtZwpA96qrKqdzpft0zPHyGps2yv8RQ9hGhw0D2lXyLHoRmCrBp8ARKxqf
cVW+OIBvHmXeeQYfPvW94rjZzHhMf523XvWdAQABa0BAEXEEFca098vxbS
WtN26Vq4YPcq+7XoZXvXGt4TuGfc40Sp4nY6BJ6S8KH+nQt+sPBMUUVC4tZ18Nm

Cancel

Decrypt password

When you click Decrypt password, we can get the password

That's the password for Windows

Open Remote Desktop Connection



Connect to instance [Info](#)

Connect to your instance i-009704642e203be1a (WindowsVM) using any of these options

Session Manager **RDP client** EC2 serial console

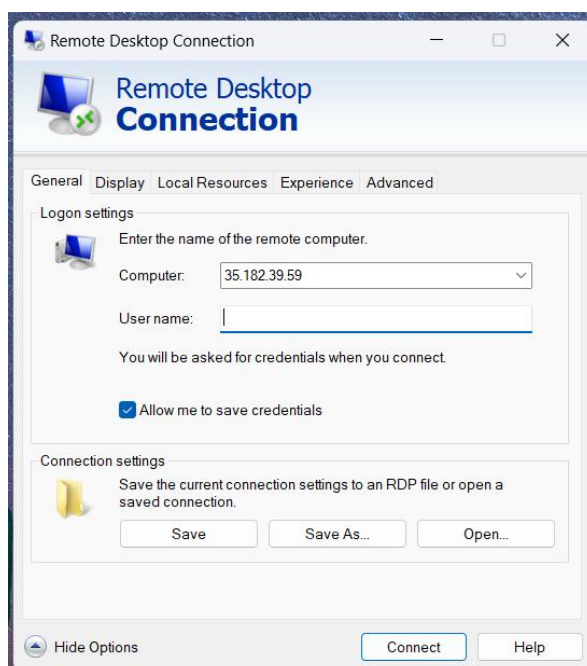
Instance ID
i-009704642e203be1a (WindowsVM)

Connection Type
☒ **Connect using RDP client**
Download a file to use with your RDP client and retrieve your password.

You can connect to your Windows instance using a remote desktop client of your choice, and

[Download remote desktop file](#)

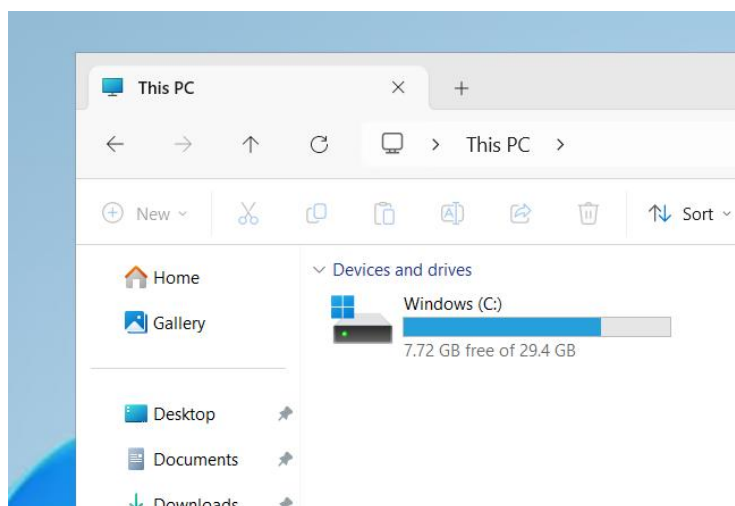
Computer is Public IP from EC2



Click Connect



Totally 30GB memory is available for free - Default EBS storage



Windows RDP: 3389 port#

Linux SSH: 22

HTTP: 80

HTTPS: 443

MySQL: 3306

Types of IPs:

Private IP -> it is a fixed IP . this IP will not change. Used for internal communication (within VPC)

Public IP -> Dynamic IP in AWS -> used to connect with EC2 VM from outside world -> whenever we restart our VM then Public IP gets changed. We could have fixed public IPs, we should use Elastic IP

address -> Allocate Elastic IP address -> it is paid service



Action -> Associate Elastic IP address -> Instance (where you want to associate) -> select an instance -> Paste Private IP address -> click Associate
Go back to Instances -> we should see Elastic IP option as well now
Now if you stop instance and restart instance, the Elastic IP won't change

[Paid service: first Disassociate Elastic IP -> Actions -> Release Elastic IP address -> Release. No Elastic IP found in the region](#)

Elastic IP -> If we want fixed IP -> Elastic IPs are commercial (bills will be generated)

Lab Practicals on Elastic IP:

1. Allocate Elastic IP from AWS
2. Associate Elastic IP with EC2 VM
3. Restart and check EC2 public IP and it will remain the same and won't change
4. Deassociate Elastic IP
5. Release Elastic IP to AWS -> to avoid billing

EBS -> Elastic Block Storage

It is a block level storage device (HDD/SSD)

Whenever we create an EC2 by default, EBS will be attached to EC2 instance

In EBS, we have two types of volumes (storage) -> root volume and additional volume

EBS provides both Primary and Secondary storages for EC2 instances

Whenever we launch EC2 instances, by default we will be getting a Root volume

For Windows virtual machines, 30GB

For Linux virtual machines, we get 8GB of default value

Note: EBS volume can be up to 16TB

Root volume is mandatory to launch EC2 instance and if we try to remove root volume from EC2 then we cannot start or use that instance

We can have additional EBS volumes and they are optional (we can add or remove based on need)

One EC2 VM can have multiple EBS volumes. However, one EBS volume can be attached to one EC2 VM at a time.

Can we create additional EBS volumes and attach to EC2? answer is Yes

Note: EC2 VM availability zone and EBS volume zone must be the same. Availability zone must be the same to attach EBS volume to EC2

EBS volumes are Availability zone specific that's if an EC2 VM is created in AP-South-1A zone then our EBS volume must also be there in AP-South-1a only then we can attach it

Default volumes for EC2

Volumes (3) [Info](#)

Saved filter sets		Search					
Choose filter set ▼							
<input type="checkbox"/>	Name ▼	Volume ID ▼	Type ▼	Size ▼	IOPS ▼	Throughput ▼	Snapshot
<input type="checkbox"/>	-	vol-0b70844ae63d238b7	gp3	8 GiB	3000	125	snapshot
<input type="checkbox"/>	-	vol-0f88c72762e5219a3	gp3	30 GiB	3000	125	snapshot
<input type="checkbox"/>	-	vol-062944bcbdbe6989d	gp3	8 GiB	3000	125	snapshot

EBS volume types:

1. General purpose -> minimum 1 GiB and maximum 16384 GiB
2. Provisioned IOPS -> min 4 GiB to 16384 GiB
3. Cold HDD -> Min 125 GiB to 16384 GiB
4. Throughput optimized -> Min 125 GiB to 16384 GiB
5. Magnetic -> Min 1 GiB to Max 1024 GiB

EBS & Snapshot -> VM1 and VM2. Lets attach an additional volume to VM1 take that and attach to VM2.

"lsblk" command to check volumes in EC2

```
[ec2-user@ip-172-31-13-80 ~]$ lsblk
NAME        MAJ:MIN RM SIZE RO TYPE MOUNTPOINTS
xvda        202:0    0  8G  0 disk
├─xvda1     202:1    0  8G  0 part /
├─xvda127   259:0    0  1M  0 part
└─xvda128   259:1    0 10M  0 part /boot/efi
```


Lets add additional 1GiB volume

Saved filter sets		Search					
Choose filter set ▼							
<input type="checkbox"/>	Name ▼	Volume ID ▼	Type ▼	Size ▼	IOPS		
<input type="checkbox"/>	-	vol-0b70844ae63d238b7	gp3	8 GiB	3000		
<input checked="" type="checkbox"/>	Additional ... ✎	vol-02f62db1a481349ea	gp3	1 GiB	3000		
<input type="checkbox"/>	-	vol-062944bcbdbe6989d	gp3	8 GiB	3000		

Attach volume [Info](#)


Attach a volume to an instance to use it as you would a regular physical hard disk drive.

Basic details

Volume ID
 vol-0a6b4ebb4b53c97f0

Availability Zone
ca-central-1b

Instance [Info](#)


i-0f87d8181852ad376
(DevOpsCoursePractice) (running) ▼ 

Only instances in the same Availability Zone as the selected volume are displayed.

Device name [Info](#)

/dev/sdb ▼

Recommended device names for Linux: /dev/xvda for root volume, /dev/sd[f-p] for data volumes.

 Newer Linux kernels may rename your devices to **/dev/xvdf** through **/dev/xvdp** internally, even when the device name entered here (and shown in the details) is **/dev/sdf** through **/dev/sdp**.

We could create an EBS volume of 10GB attach to a VM1 then download data, detach this additional volume from VM1 then attach to another VM2. copy the data into VM2. it is like attaching and transferring data via pen drive
Mounting: attaching additional volume with VM1

```
[ec2-user@ip-172-31-13-80 ~]$ lsblk
NAME        MAJ:MIN RM SIZE RO TYPE MOUNTPOINTS
xvda        202:0   0  8G  0 disk
├─xvda1     202:1   0  8G  0 part /
├─xvda127   259:0   0  1M  0 part
└─xvda128   259:1   0 10M  0 part /boot/efi
[ec2-user@ip-172-31-13-80 ~]$ lsblk
NAME        MAJ:MIN RM SIZE RO TYPE MOUNTPOINTS
xvda        202:0   0  8G  0 disk
├─xvda1     202:1   0  8G  0 part /
├─xvda127   259:0   0  1M  0 part
└─xvda128   259:1   0 10M  0 part /boot/efi
xvdb        202:16   0  1G  0 disk
```

“sudo mkfs -t ext4 /dev/xvdb”

```
[ec2-user@ip-172-31-13-80 ~]$ sudo mkfs -t ext4 /dev/xvdb
mke2fs 1.46.5 (30-Dec-2021)
Creating filesystem with 262144 4k blocks and 65536 inodes
Filesystem UUID: 524d9f3d-018f-4e72-8c32-73ada2009eda
Superblock backups stored on blocks:
    32768, 98304, 163840, 229376
```

```
Allocating group tables: done
Writing inode tables: done
Creating journal (8192 blocks): done
Writing superblocks and filesystem accounting information: done
```

Create directory after mounting
mkdir dir1

```

sudo mount /dev/xvdb dir1
Mounting
[ec2-user@ip-172-31-13-80 ~]$ sudo mount /dev/xvdb dir1
[ec2-user@ip-172-31-13-80 ~]$

ls -l
[ec2-user@ip-172-31-13-80 ~]$ ls -l
total 128
-r-----. 1 ec2-user ec2-user 1674 Feb 22 21:59 devops_linux.pem
drwxr-xr-x. 3 root    root    4096 Mar  8 21:40 dir1

[ec2-user@ip-172-31-13-80 ~]$ cd dir1
[ec2-user@ip-172-31-13-80 dir1]$
[ec2-user@ip-172-31-13-80 dir1]$
[ec2-user@ip-172-31-13-80 dir1]$ sudo touch f1.txt f2.txt

```

I detach the Additional Volume from VM1

Now I log into VM2

Attach the same Additional Volume to VM2

Attach volume Info

Attach a volume to an instance to use it as you would a regular physical hard disk drive.

Basic details

Volume ID

 vol-0a6b4ebb4b53c97f0 (Additional Volume)

Availability Zone

ca-central-1b

Instance Info

i-010749e72842b303b
(DevOpsCourse) (running)

Only instances in the same Availability Zone as the selected volume are displayed.

Device name Info

/dev/sdb

Recommended device names for Linux: /dev/xvda for root volume. /dev/sd[f-p] for data volumes.

 Newer Linux kernels may rename your devices to /dev/xvdf through /dev/xvdp internally, even when the device name entered here (and shown in the details) is /dev/sdf through /dev/sdp.

We can see xvdb in VM2

```

[ec2-user@ip-172-31-6-153 ~]$ lsblk
NAME        MAJ:MIN RM SIZE 0 TYPE MOUNTPOINTS
xvda       202:0   0   8G  0 disk
├─xvda1    202:1   0   8G  0 part /
├─xvda127  259:0   0   1M  0 part
└─xvda128  259:1   0  10M  0 part /boot/efi
xvdb       202:16   0   1G  0 disk

[ec2-user@ip-172-31-6-153 ~]$ sudo mkfs -t ext4 /dev/xvdb
mke2fs 1.46.5 (30-Dec-2021)
/dev/xvdb contains a ext4 file system
    last mounted on /home/ec2-user/dir1 on Sat Mar  8 21:40:54 2025
Proceed anyway? (y,N) y

```

Creating filesystem with 262144 4k blocks and 65536 inodes
Filesystem UUID: d9d2e351-d492-4761-97d7-dea4833745cb
Superblock backups stored on blocks:
32768, 98304, 163840, 229376

Allocating group tables: done
Writing inode tables: done
Creating journal (8192 blocks): done
Writing superblocks and filesystem accounting information: done

```
[ec2-user@ip-172-31-6-153 ~]$ ls -l
total 8
-rw-r--r--. 1 ec2-user ec2-user 52 Feb 22 22:13 alien.txt
-rw-r--r--. 1 ec2-user ec2-user 25 Feb 23 02:54 first-script.sh
```

```
[ec2-user@ip-172-31-6-153 ~]$ mkdir dir1
[ec2-user@ip-172-31-6-153 ~]$ cd dir1
```

Mounting

```
sudo mount /dev/xvdb dir1
```

We see f1.txt and f2.txt in VM2. those files were originally created in VM1

How to copy files from VM zone 'a' to VM in zone 'b'?

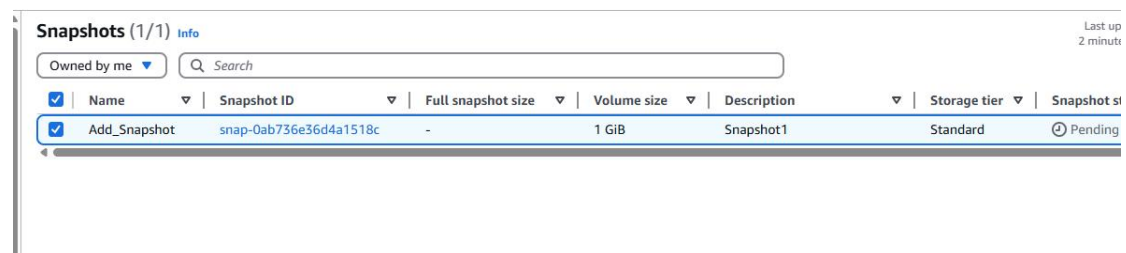
Concept of Snapshots come into picture. Snapshots are backups for volumes and they are regional specific (Volumes are zone specific).

From a Volume, we can create a Snapshot (backup of volume), and from Snapshot again we can create a Volume

Volume -> Snapshot -> Volume

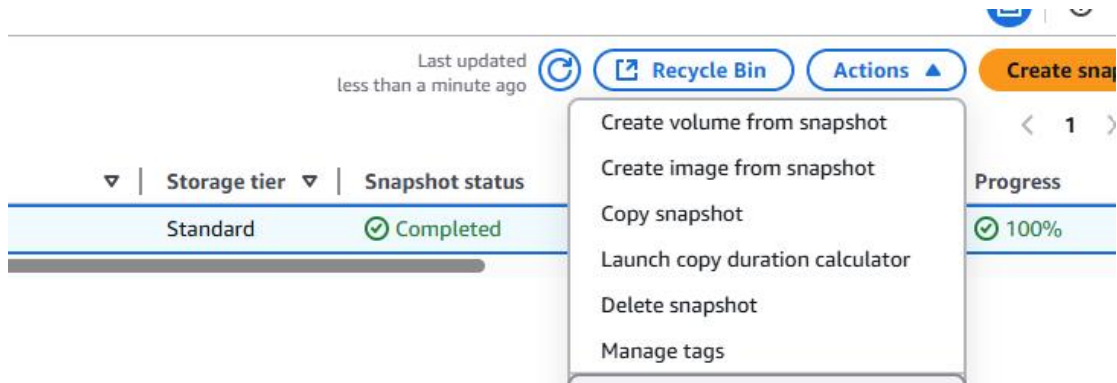
1a Volume -> Snapshot -> 1b Volume -> Attach to VM in zone b

Snapshots cannot be attached to EC2 Instance directly (as seen before Volumes can be attached but not Snapshots)



The screenshot shows the AWS Management Console 'Snapshots' page. At the top, it says 'Snapshots (1/1)' with an 'Info' link. Below this is a filter bar with 'Owned by me' and a search box. A table lists the snapshots. The table has columns: Name, Snapshot ID, Full snapshot size, Volume size, Description, Storage tier, and Snapshot status. There is one snapshot listed: 'Add_Snapshot' with ID 'snap-0ab736e36d4a1518c', size '-', volume size '1 GiB', description 'Snapshot1', storage tier 'Standard', and status 'Pending'.

<input checked="" type="checkbox"/>	Name	Snapshot ID	Full snapshot size	Volume size	Description	Storage tier	Snapshot status
<input checked="" type="checkbox"/>	Add_Snapshot	snap-0ab736e36d4a1518c	-	1 GiB	Snapshot1	Standard	Pending



How to know how many Volumes are there?

Created EC2 VM -> EBS root volume 8GB

Created an Additional Volume with 10GB (Check AZ)

VM in 1a AZ then Volume also in 1a AZ

Attach additional volumes to existing VM as shown in live class

Connect to VM from MobaXTerm:

lsblk -> Check volumes attached

Store files into EBS additional volume and follow commands

```
sudo mkfs -t ext4/dev/xvdb
```

```
mkdir dir1
```

Mounting is establishing relation between additional volume and directory

```
sudo mount /dev/xvdb dir1 -> dev/xvdb is the name we have selected at the time of volume creation
```

```
cd dir1 -> change dir to our created directory dir1
```

```
sudo touch f1.txt f2.txt and add into dir1
```

Detached the additional volume from EC2 VM1

Create new EC2 VM and attach EBS additional volume to EC2 new VM

Check files by running commands

```
lsblk
```

```
mkdir dir1
```

```
sudo mount /dev/xvdb dir1
```

```
ls -l dir1
```

NOTE: make sure after practice detach additional volumes and delete to avoid billing