

# Cloud Computing - Lab Assignment 1

- by Group 1

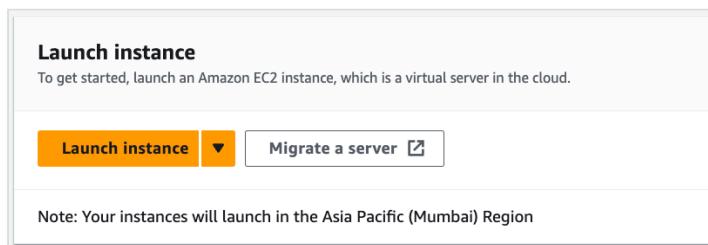
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## [LA 1. 1] Instance Stores Are Lost When an Instance Is Stopped

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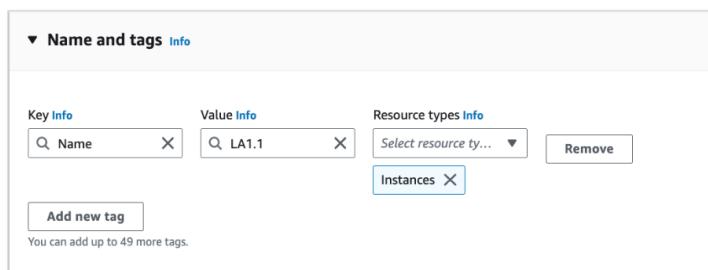
### 1. Launch an instance in the Amazon Management Console.

Navigate to EC2 Dashboard and click on Launch instance. This directs you to Launch an Instance Page



### 2. Add Names and Tags

Add key as Name and value as LA1.1, and resource type as Instances



### 3. Choose an AMI

Choose the Microsoft Windows Server 2022 Base AMI.

**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.

**Quick Start**

Amazon Linux	macOS	Ubuntu	Windows	Red Hat	SUSE Li
					

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

**Amazon Machine Image (AMI)**

Microsoft Windows Server 2022 Base ami-08abb3eeacc61972d (64-bit (x86)) Virtualization: hvm ENA enabled: true Root device type: ebs	Free tier eligible
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**Description**  
Microsoft Windows Server 2022 Full Locale English AMI provided by Amazon

**Architecture** 64-bit (x86)    **AMI ID** ami-08abb3eeacc61972d    **Verified provider**

#### 4. Choose an Instance type that allows instance stores.

Choose the m5ad.large instance type which supports 1 instance type. The selected AMI contains more instance store volumes than the instance allows. Only the first 1 instance store volumes from the AMI will be accessible from the instance.

**Instance type [Info](#)**

**Instance type**

m5ad.large	All generations
Family: m5ad 2 vCPU 8 GiB Memory Current generation: true	<a href="#">Compare instance types</a>
On-Demand Linux base pricing: 0.067 USD per Hour	
On-Demand SUSE base pricing: 0.123 USD per Hour	
On-Demand RHEL base pricing: 0.127 USD per Hour	
On-Demand Windows base pricing: 0.159 USD per Hour	

**Additional costs apply for AMIs with pre-installed software**

#### 5. Generate a key-pair

Use a key pair to securely connect to your instance

**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**

keyPairLA1.1	<a href="#">Create new key pair</a>
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For Windows instances, you use a key pair to decrypt the administrator password. You then use the decrypted password to connect to your instance.

### Create key pair

**Key pair name**  
Key pairs allow you to connect to your instance securely.

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

## 6. Configure the Network settings

Assign a VPC, Subnet and a security group

▼ Network settings Info

**VPC - required** Info

vpc-0e059f1ba10cfa4c9  
172.31.0.0/16

(default) ▾
 [Copy](#)

**Subnet Info**

subnet-074447ac02aa654b6  
VPC: vpc-0e059f1ba10cfa4c9 Owner: 464962521672 Availability Zone: ap-south-1a IP addresses available: 4091 CIDR: 172.31.32.0/20

▼
 [Copy](#)
 [Create new subnet](#)

**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

**Common security groups** Info

Select security groups

default sg-0441ec8e5dd07d973 X

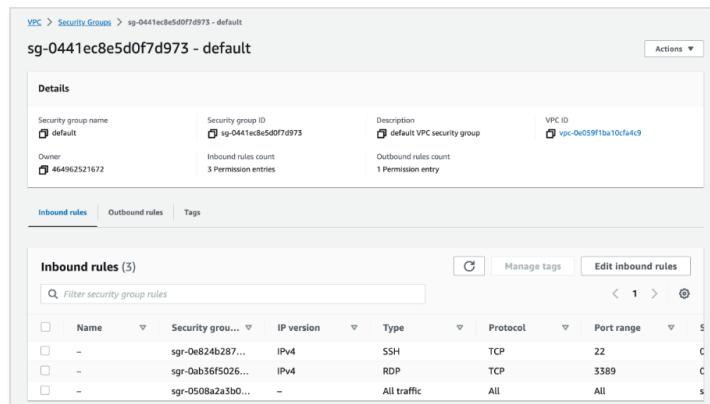
 [Compare security group rules](#)

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

**► Advanced network configuration**

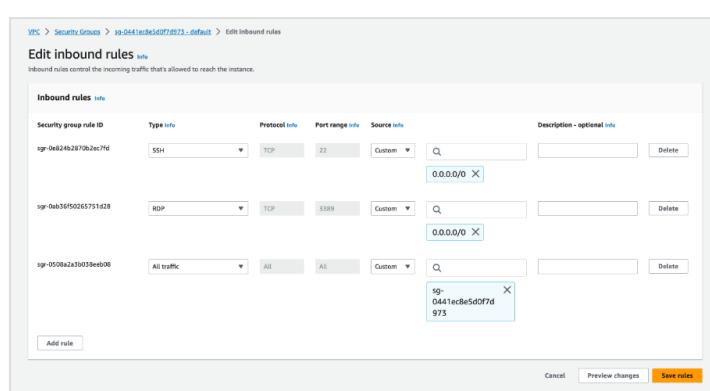
## 7. Confirm that the Security Group chosen allows RDP and SSH traffic.

This can be done by going to Security Groups under VPC Dashboard. Select the security group and click on EDIT INBOUND RULES.



The screenshot shows the AWS VPC Security Groups dashboard. A security group named 'sg-0441ec8e5d0f7d973 - default' is selected. The 'Inbound rules' tab is active, displaying three entries:

Name	Security group rule ID	IP version	Type	Protocol	Port range
-	sgr-0e824b287...	IPv4	SSH	TCP	22
-	sgr-0ab36f5026...	IPv4	RDP	TCP	3389
-	sgr-0508a2a5b0...	-	All traffic	All	All

The screenshot shows the 'Edit inbound rules' dialog box for the selected security group. It lists the three rules with their details:

Security group rule ID	Type	Protocol	Port range	Description
sgr-0e824b28702ec7fd	SSH	TCP	22	Custom 0.0.0.0/0
sgr-0ab36f50265751d8	RDP	TCP	3389	Custom 0.0.0.0/0
sgr-0508a2a3b03be0b0	All traffic	All	All	Custom sg-0441ec8e5d0f7d973

## 8. Configure Storage

Here we can see there is an EBS backed root volume (mentioned in the AMI) and also Instance stores (only 1 as that is all this instance type supports).

Network File Storage / Shared File Storage such as EFS and FSx can also be added here.

**Configure storage** [Info](#)

Advanced

1x	30	GiB	gp2	Root volume
----	----	-----	-----	-------------

(Not encrypted)

[Add new volume](#)

**Instance store volumes** [Hide details](#)

Instance store volumes are not included in the template unless modified

**Volume 2 (Instance Type)**

Storage type <a href="#">Info</a> ephemeral0	Device name <a href="#">Info</a> <code>/dev/nvme0n1</code>	Snapshot <a href="#">Info</a> Not Applicable
Size (GB) <a href="#">Info</a> 75	Volume type <a href="#">Info</a> SSD (NVMe AMI required)	IOPS <a href="#">Info</a> Not Applicable
Delete on termination <a href="#">Info</a> Not Applicable	Encrypted <a href="#">Info</a> Not Applicable	KMS key <a href="#">Info</a> <a href="#">Select</a> Not Applicable

The selected AMI contains more instance store volumes than the instance allows. Only the first 1 instance store volumes from the AMI will be accessible from the instance

0 x File systems [Edit](#)

## 9. Review the Summary and Launch instance

**Summary**

Number of instances [Info](#)  
1

**Software Image (AMI)**  
Microsoft Windows Server 2022 ...[read more](#)  
ami-08abb3eeacc61972d

**Virtual server type (instance type)**  
m5ad.large

**Firewall (security group)**  
default

**Storage (volumes)**  
2 volume(s) - 105 GiB

[Cancel](#) [Launch instance](#) [Review commands](#)

## 10. Go to the EC2 Instances page.

As we can see, the instance state is now running.

The screenshot shows the AWS EC2 Instances page with the instance summary for i-00a81fc7e353591e0 (LA1.1). The instance is currently running. Key details include:

- Public IPv4 address:** 3.110.178.1 ([Open address](#))
- Private IPv4 addresses:** 172.31.45.248
- Public IPv6 DNS:** ec2-3-110-178-1.ap-south-1.compute.amazonaws.com ([Open address](#))
- Instance state:** Running
- Instance type:** m5adlarge
- VPC ID:** vpc-0e059f1ba10cfa4c9 ([View](#))
- AWS Compute Optimizer finding:** Opt-in to AWS Compute Optimizer for recommendations. Learn more ([View](#))
- Subnet ID:** subnet-074447ac02aa654b6 ([View](#))
- Auto Scaling Group name:** -

Other tabs visible include Details, Security, Networking, Storage, Status checks, Monitoring, and Tags.

## 11. Connect to EC2 instance.

- a. Click on connect. This opens up the Connect to Instance page.
- b. Select RDP Client.
- c. Click on get password. Upload the private key file (.pem) generated while creating the EC2 instance and decrypt the password.
- d. Download the remote desktop file
- e. Import the RDP file to Microsoft Remote Desktop.
- f. Double click on the instance in Microsoft Remote Desktop
- g. Use the password we decrypted in step c to login

**Connect to instance** Info

Connect to your instance i-00a81fc7e353591e0 (LA1.1) using any of these options

Session Manager | **RDP client** | EC2 serial console

Instance ID  
i-00a81fc7e353591e0 (LA1.1)

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 details:

Public DNS <a href="#">ec2-3-110-178-1.ap-south-1.compute.amazonaws.com</a>	User name <a href="#">Administrator</a>
Password <a href="#">Get password</a>	

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

**Get Windows password** Info

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

Instance ID  
i-00a81fc7e353591e0 (LA1.1)

Key pair associated with this instance  
keyPairLA1.1

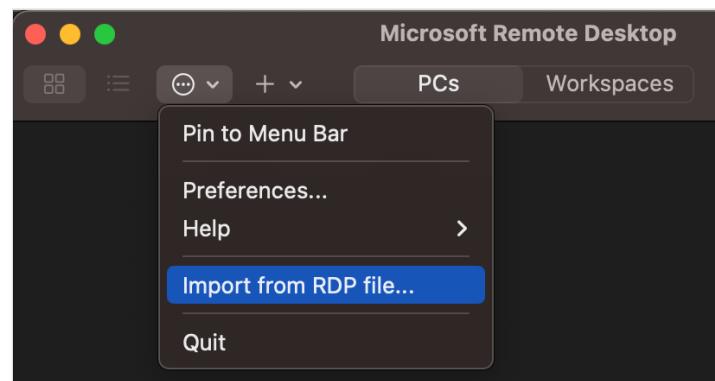
Private key  
Either upload your private key file or copy and paste its contents into the field below.

[Upload private key file](#)

Private key contents - optional

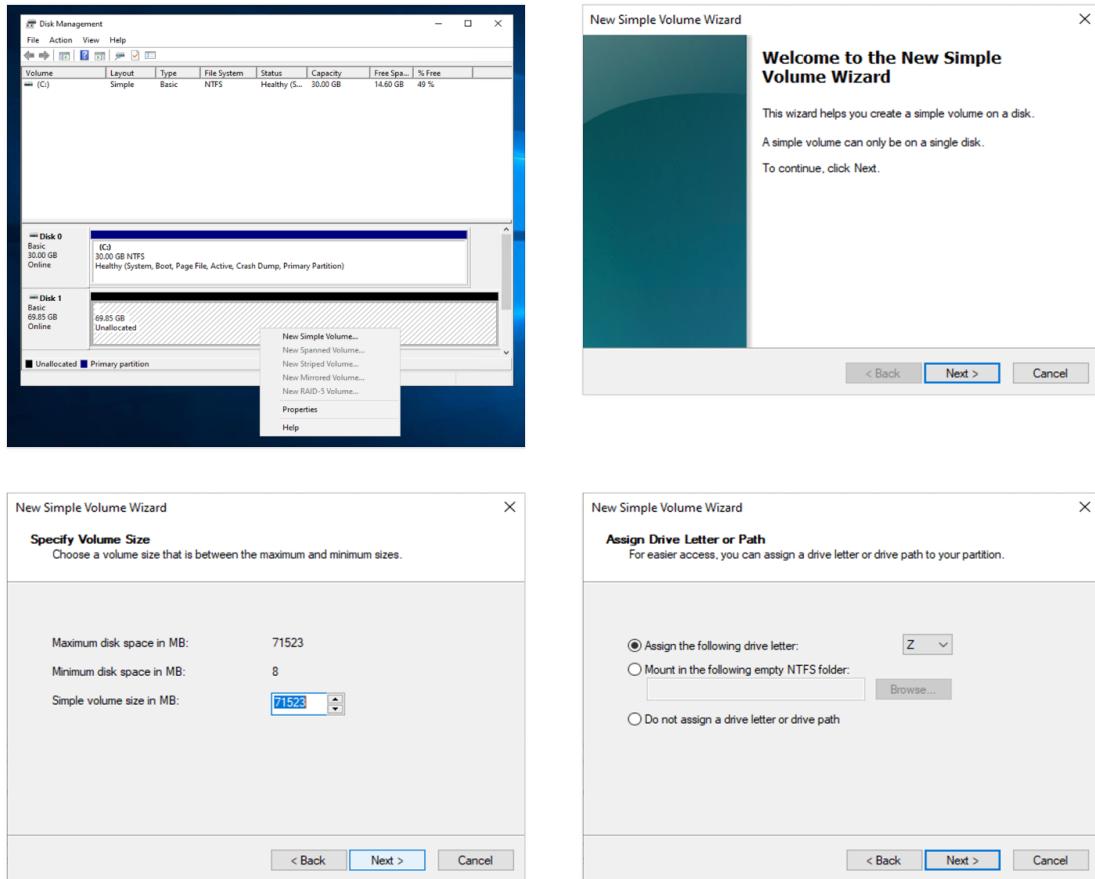
Private key contents

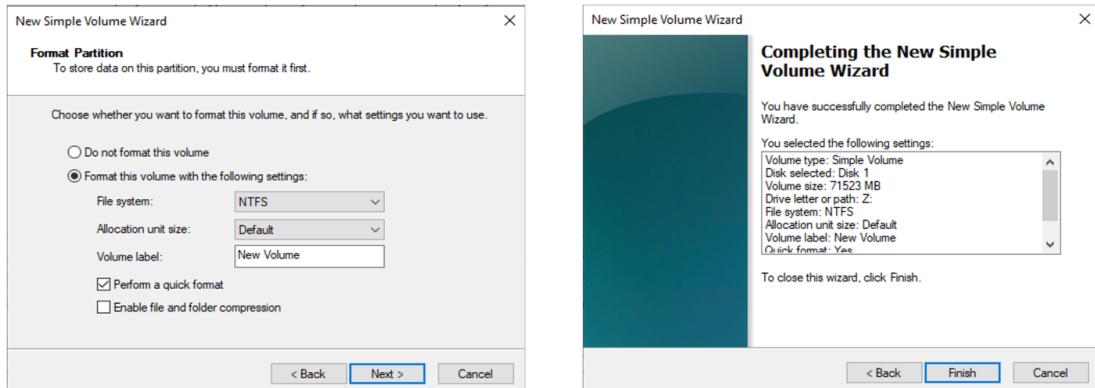
[Cancel](#) [Decrypt password](#)



12. Mount the instance store volume [<https://docs.aws.amazon.com/AWSEC2/latest/WindowsGuide/add-instance-store-volumes.html>]

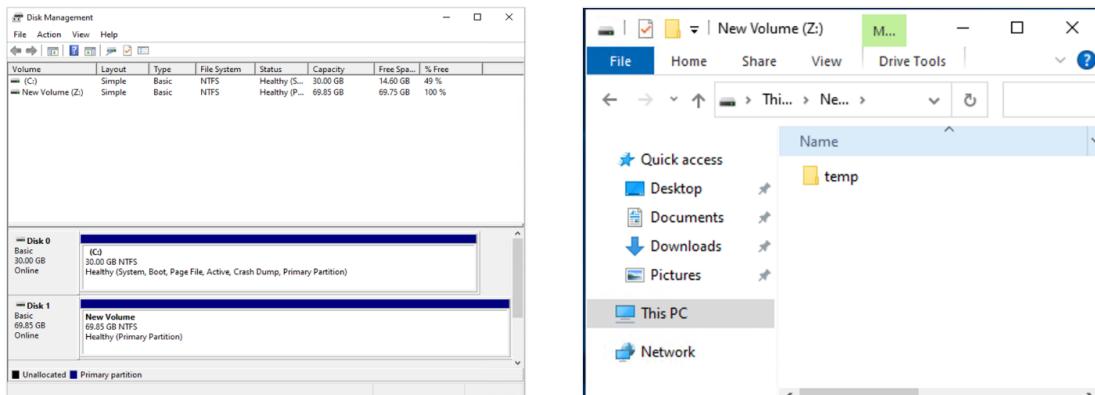
- a. open Disk Management
- b. right click on the disk to be mounted (in our case the instance store represented by Disk 1. Disk 0 represents the Root volume and is an EBS).
- c. click on New Simple Volume.
- d. Follow the steps on the wizard to mount the volume and assign a drive letter path (in our case Z:\)





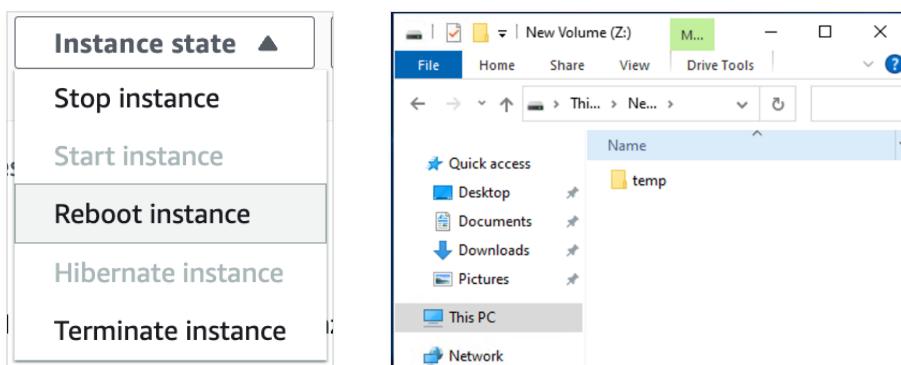
### 13. Add folder in Instance Store.

Once the Instance store is mounted. Open File Explorer and add a *temp* folder in the Z:\ drive. also add a test.txt folder inside the C:\ drive



### 14. Reboot Instance

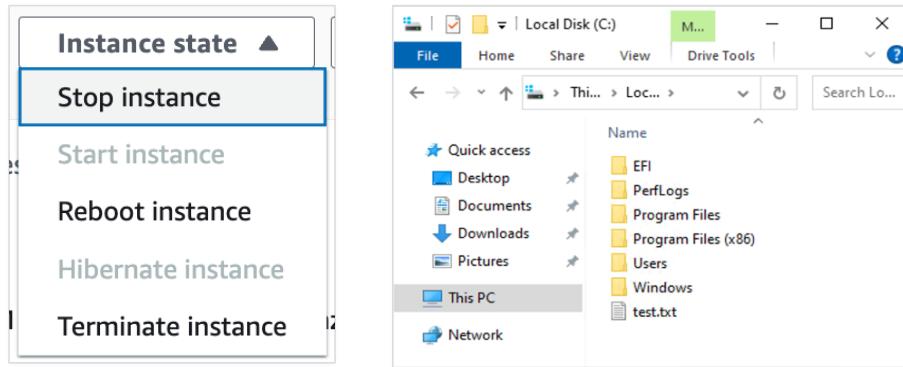
- Go to the instance page and Reboot the instance by clicking on the Instance state drop-down menu
- Note that the Instance store and its files still persist after rebooting



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## 15. Stop Instance

- a. Go to the instance page and Stop the instance by clicking on the Instance state drop-down menu.
- b. Restart the instance and login through RDP client.
- c. You will have to download the RDP file again as the IP address of the instance may have changed.
- d. Note that the Instance store and its files disappear but the created .txt file on EBS backed root storage persists.



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## 16. Terminate the instance

This cleans up the resources- deletes the EC2 instance and the attached EBS backed root volume.

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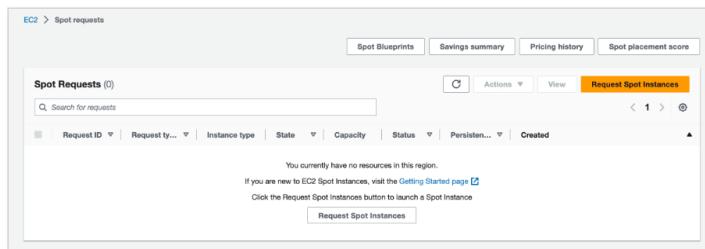
## [LA 1. 2] Launch a Spot Instance

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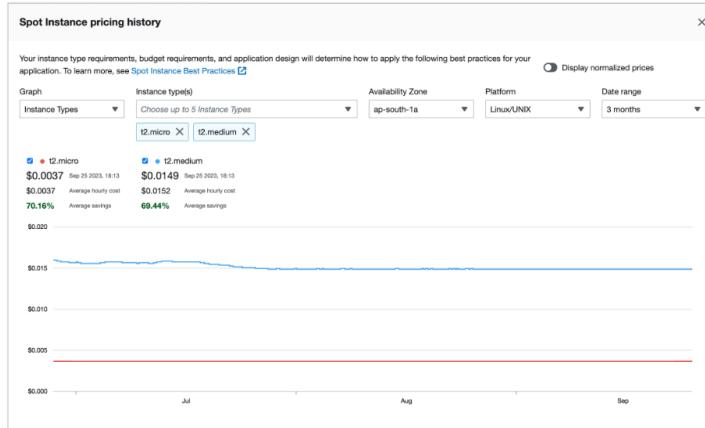
### 1. Visit Spot Requests Page

Click on Pricing history.

Filter based on instance type and view the latest pricing of spot instances



Here we can see the prices of t2.micro has been consistently \$0.0037 and indicates around 70% savings compared to dedicated hosts.



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### 2. Request Spot Instances

Go to EC2 Creation page just like in LA1.1. Choose an Amazon Linux AMI

Expand Advance details and check the Request Spot Instances checkbox.

Set a maximum price, Request type, and expiry date for request.

**▼ Advanced details Info**

Purchasing option Info  
 Request Spot Instances Discard

Maximum price Info  
 No maximum price  
 Request Spot Instances at the Spot price, capped at the On-Demand price  
 Set your maximum price (per instance/hour)  
 \$

Request type Info  
 Persistent

Valid to Info  
 No request expiry date  
 The default value is no expiry date  
 Set your request expiry date  
 2023/09/25  21:00  +05:30

Interruption behavior Info  
 Stop

### 3. If Bid Price is less than Spot Price

EC2 > Instances > Launch an instance

**Instance launch failed**  
 Your Spot request price of 0.003 is lower than the minimum required Spot request fulfillment price of 0.0037.

▼ Launch log  
 Initializing requests Succeeded  
 Launch initiation Failed

Cancel

### 4. If Bid Price is more than Spot Price.

We can see that the status of the request is fulfilled

EC2 > Spot requests

Spot Requests (1)

Request ID	Request type	Instance type	State	Capacity	Status	Persistent...	Created
sr-yb6mmz	instance	t2.micro	active	1	fulfilled	persistent	a minute ago

Here we can see the Instance is running and Lifecycle is mentioned as Spot

Details	Security	Networking	Storage	Status checks	Monitoring	Tags
<b>▼ Instance details <a href="#">Info</a></b>						
Platform				AMI ID		
Amazon Linux (Inferred)				ami-067c21fb1979f0b27		
Platform details				AMI name		
Linux/UNIX				al2023-ami-2023.2.20230920.1-kernel-6.1-x86_64		
Stop protection				Launch time		
Disabled				Mon Sep 25 2023 18:23:13 GMT+0530 (India Standard Time) (4 minutes)		
Instance auto-recovery				Lifecycle		
Default				spot		
AMI Launch index				Key pair assigned at launch		
0				keyPairLA1.2		
Credit specification				Kernel ID		
standard				-		
Usage operation				RAM disk ID		
RunInstances				-		

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## [LA 1. 3] Create an Amazon EBS Volume and Show That It Remains After the Instance Is Terminated

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### 1. Name and tags

Add a name to the EC2 instance such as LA1.3

▼ Name and tags <a href="#">Info</a>		
Key <a href="#">Info</a>	Value <a href="#">Info</a>	Resource types <a href="#">Info</a>
<input type="text" value="Name"/> <a href="#">X</a>	<input type="text" value="LA1.3"/> <a href="#">X</a>	<input type="button" value="Select resource ty..."/> <a href="#">Remove</a>
<a href="#">Instances</a> <a href="#">X</a>		
<a href="#">Add new tag</a>		
You can add up to 49 more tags.		

---

### 2. Select AMI

Choose the Amazon Linux 2023 AMI.

**Note:** the Root device type is EBS

ie: this is an EBS backed AMI and not instance store backed.

Therefore it comes with a default EBS Volume which will be mounted at root directory '/'

▼ 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**

[Amazon Linux](#) [macOS](#) [Ubuntu](#) [Windows](#) [Red Hat](#) [SUSE Linux Enterprise Server](#) [Browse more AMIs](#)

Including AMIs from AWS, Marketplace and the Community

**Amazon Machine Image (AMI)**

**Amazon Linux 2023 AMI**  
ami-0703b5d7f7da98d1e (64-bit (x86)) / ami-039bd1903a607d247 (64-bit (Arm))  
Virtualization: hvm ENA enabled: true Root device type: ebs Free tier eligible

**Description**  
Amazon Linux 2023 AMI 2023.2.20230920.1 x86\_64 HVM kernel-6.1

**Architecture** 64-bit (x86) **AMI ID** ami-0703b5d7f7da98d1e Verified provider

### 3. Select Instance Type

Choose the t3.micro instance type

▼ Instance type [Info](#)

**Instance type**

**t3.micro** Free tier eligible All generations [Compare instance types](#)

Family: t3 2 vCPU 1 GiB Memory Current generation: true  
On-Demand RHEL base pricing: 0.0708 USD per Hour  
On-Demand SUSE base pricing: 0.0108 USD per Hour  
On-Demand Linux base pricing: 0.0108 USD per Hour  
On-Demand Windows base pricing: 0.02 USD per Hour

Additional costs apply for AMIs with pre-installed software

### 4. Create key pair

This allows us to connect to our instance securely.

**Create key pair**

**Key pair name**  
Key pairs allow you to connect to your instance securely.

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

**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**

## 5. Configure network settings

Ensure that the selected security group allows all inbound SSH traffic. Else, we cannot access the EC2 instance via the internet.

**▼ Network settings** [Info](#) [Edit](#)

Network [Info](#)  
vpc-0e059f1ba10cfa4c9

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

Common security groups [Info](#)  
[Select security groups](#) ▾

default sg-0441ec8e5d0f7d973 X  
VPC: vpc-0e059f1ba10cfa4c9

Compare security group rules

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

## 6. Configure Storage

In addition to the root volume, click on the “Add new volume” to add an additional EBS volume.

**Configure storage**

Root volume  
(Not encrypted)

EBS volume (Not encrypted)  
Remove

Add new volume

File systems  
Edit

## 7. Advanced Storage settings

We can also add additional configurations by clicking on the “Advanced” button

Volume 2 (Custom)

Storage type: EBS | Device name - required: /dev/sdb | Snapshot: Select

Size (GiB): 8 | Volume type: gp3 | IOPS: 3000

Delete on termination: No | Encrypted: Not encrypted | KMS key: Select

Throughput: 125

Add new volume

## 7. Launch Instance

Navigate to Volumes under Elastic Block Store. Note that there are now two volumes.

Name	Volume ID	Type	Size	IOPS	Throughput	Snapshot	Created	Availability Zone	Volume state	Alarm status	Attached Instances	Volume status
LA1.3_ROOT	vol-01d5261611019e398	gp2	8 GiB	100	-	snap-0b268d5...	2023/09/25...	eu-north-1a	in-use	No alarms	+ i-06230f1380fb3cd5 (LA1...)	Okay
LA1.3_USER	vol-0c1799e99b246756a	gp2	50 GiB	150	-	-	2023/09/25...	eu-north-1a	in-use	No alarms	+ i-06230f1380fb3cd5 (LA1...)	Okay

Volume ID: vol-01d5261611019e398 (LA1.3_ROOT)							
Volume ID: vol-0e2799e96b246756a (LA1.3_USER)							
Details		Status checks		Monitoring		Tags	
Volume ID	vol-01d5261611019e398 (LA1.3_ROOT)	Size	8 GiB	Type	gp2	Size	50 GiB
AWS Compute Optimizer finding		Volume state	In-use	IOPS	100	Volume state	In-use
<input type="checkbox"/> Opt-in to AWS Compute Optimizer for recommendations.	<a href="#">Learn more</a>			<input type="checkbox"/> In-use		<input type="checkbox"/> In-use	
Encryption	Not encrypted	KMS key ID	-	KMS key alias	-	KMS key ID	-
Fast snapshot restored	No	Snapshot	<a href="#">snap-0b268d53037e3e63d</a>	Availability Zone	eu-north-1a	Snapshot	Availability Zone
Multi-Attach enabled	No	Attached Instances	<a href="#">i-04230f1380fb3cd5 (LA1.3) /dev/vda (attached)</a>	Outposts ARN	-	Attached Instances	<a href="#">i-04230f1380fb3cd5 (LA1.3) /dev/sdb (attached)</a>

One of them is the root volume (LA1.3\_ROOT) and the other is the additional volume (LA1.3\_USER).

**Note:** currently both are in the “in-use” state

## 8. Connect to EC2 via Amazon Instance Connect

run the `lsblk` command to view information of all block storages and partitions attached to the linux system

```
[ec2-user@ip-172-31-26-140 ~]$ lsblk
NAME      MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
nvme1n1   259:0    0   50G  0 disk
nvme0n1   259:1    0   8G  0 disk
└─nvme0n1p1 259:2    0   8G  0 part /
└─nvme0n1p128 259:3    0   1M  0 part
[ec2-user@ip-172-31-26-140 ~]$ █
```

As we can see, `nvme0n1p1` partition is mounted at the root (`/`).

This is our root EBS volume.

But our additional volume disk - `nvme1n1`- is yet to be mounted.

## 7. Mount the Additional volume

run the `sudo mkfs.ext4 /dev/nvme1n1` to create a file system on the volume

```
[ec2-user@ip-172-31-26-140 ~]$ sudo mkfs.ext4 /dev/nvme1n1
mke2fs 1.42.9 (28-Dec-2013)
Filesystem label=
OS type: Linux
Block size=4096 (log=2)
Fragment size=4096 (log=2)
Stride=0 blocks, Stripe width=0 blocks
3276800 inodes, 13107200 blocks
655360 blocks (5.00%) reserved for the super user
First data block=0
Maximum filesystem blocks=2162163712
400 block groups
32768 blocks per group, 32768 fragments per group
8192 inodes per group
Superblock backups stored on blocks:
            32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208,
            4096000, 7962624, 11239424

Allocating group tables: done
Writing inode tables: done
Creating journal (32768 blocks): done
Writing superblocks and filesystem accounting information: done
```

run `sudo mount /dev/nvme1n1 /mnt/data` to mount the volume to the mount point `/mnt/data`. Check by running `lsblk` again

```
[ec2-user@ip-172-31-26-140 ~]$ sudo mount /dev/nvme1n1 /mnt/data
[ec2-user@ip-172-31-26-140 ~]$ lsblk
NAME      MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
nvme1n1    259:0   0   50G  0 disk /
nvme0n1    259:1   0   8G  0 disk
└─nvme0n1p1 259:2   0   8G  0 part /
nvme0n1p28 259:3   0   1M  0 part
[ec2-user@ip-172-31-26-140 ~]$
```

## 1. Make a directory in the EBS storage

Create a directory in EBS storage named `tempNewDisk` for future reference to check persistence.

## 9. Terminate the instance

Notice that the Root Volume is no longer present.

The additional EBS storage, however, persists. Its Volume state changes from *In-use* to *Available*.

Name	Volume ID	Type	Size	IOPS	Throughput	Snapshot	Created	Availability	Volume state	Alarm status
LA1_3_ROOT	vol-0165261611019e398	gp2	8 GiB	100	-	snap-0b268d5...	2023/09/25...	eu-north-1a	<span>● In-use</span>	No alarms +
LA1.3_USER	vol-0e2799e96b246756a	gp2	50 GiB	150	-	-	2023/09/25...	eu-north-1a	<span>● In-use</span>	No alarms +

**Terminate instance?**

⚠ On an EBS-backed instance, the default action is for the root EBS volume to be deleted when the instance is terminated. Storage on any local drives will be lost.

Are you sure you want to terminate these instances?

Instance ID	Termination protection
i-06230f13808fb3cd5 (LA1.3)	<span>○ Disabled</span>

**Clean up associated resources**

Associated resources may incur costs after these instances are terminated.

▼ Delete EBS volumes

EBS volumes which do not have "Delete on Termination" set to true will persist after this instance is terminated. These volumes may incur an EBS cost per [Amazon EC2 pricing](#)

To delete volumes associated with this instance, go to the [Volumes screen](#).

The following volumes are not set to delete on termination: vol-0e2799e96b246756a

To confirm that you want to terminate the instances, choose the terminate button below. Instances with termination protection enabled will not be terminated. Terminating the instance cannot be undone.

Cancel Terminate

## [LA 1. 4] Take a Snapshot and Restore

---

### 1. Create a Snapshot

Locate the Additional EBS volume created in LA1.3.  
Click on *Actions>Create Snapshot*.

Add a description and a name, such as LA1.4

The screenshot shows the 'Create snapshot' dialog box. At the top, it says 'EC2 > Volumes > vol-0e2799e96b246756a > Create snapshot'. The main section is titled 'Create snapshot' with a 'Info' link. It asks 'Create a point-in-time snapshot to back up the data on an Amazon EBS volume to Amazon S3.' Below this is a 'Details' section with fields for 'Volume ID' (set to 'vol-0e2799e96b246756a (LA1.3.\_USER)'), 'Description' (containing 'This is a snapshot of additional EBS volume created and attached'), and 'Encryption' (set to 'Not encrypted'). A 'Tags' section follows, showing a single tag 'Name: LA1.4'. At the bottom right are 'Cancel' and 'Create snapshot' buttons, with 'Create snapshot' being highlighted.

### 2. Locate the Snapshot

Find the created snapshot under Snapshot section under Elastic Block Store. Wait for the progress to become *100%* and snapshot status to display '*Complete*'.

Snapshots (1) <small>Info</small>									
Owned by me		Search				Actions		< 1 >	
Name	Snapshot ID	Volume size	Description	Storage tier	Snapshot status	Started	Progress		
LA1.4	arn:aws:s3:::vol-0e2799e96b246756a/LA1.4	50 GB	This is a snapshot of addit...	Standard	Completed	2023/09/25 11:18 GMT+5...	Available (100%)		

### 3. Create a volume of same size from the snapshot

Select the Snapshot, go to *Actions > Create volume*.

Select volume type, availability zone and set size same as the initial volume- 50GiB.

Name it LA1.4-50GB-COPY.

Click on Create Volume.

**Create volume** [Info](#)

Create an Amazon EBS volume to attach to any EC2 instance in the same Availability Zone.

**Volume settings**

**Snapshot ID**  
 snap-033be4be514fc4ac0 (LA1.4)

**Volume type** [Info](#)  
General Purpose SSD (gp2)

**Size (GiB)**  
50  
Min: 1 GiB, Max: 16384 GiB. The value must be an integer.

**IOPS**  
150 / 3000  
Baseline of 3 IOPS per GiB with a minimum of 100 IOPS, burstable to 3000 IOPS.

**Throughput (MiB/s)** [Info](#)  
Not applicable

**Availability Zone** [Info](#)  
eu-north-1a

**Fast snapshot restore** [Info](#)  
 Not enabled for selected snapshot

**Encryption** [Info](#)  
Use Amazon EBS encryption as an encryption solution for your EBS resources associated with your EC2 instances.  
 Encrypt this volume

**Tags - optional** [Info](#)  
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
<input type="text"/> Name	<input type="text"/> LA1.4-50GB-COPY

Add tag  
You can add 49 more tags.

[Cancel](#) [Create volume](#)

#### 4. Check Available Volumes.

Navigate to EBS Volumes. We can now see the new volume created from the snapshot of the earlier volume.

<input type="checkbox"/>	Name	Volume ID	Type	Size	IOPS	Throughput	Snapshot	Created	Availability Zone	Volume state	Alarm status
<input type="checkbox"/>	LA1.3_USER	vol-0e2799e60246756a	gp2	50 GiB	150	-	-	2023/09/25...	eu-north-1a	<span style="color: blue;">Available</span>	No alarms +
<input type="checkbox"/>	LA1.4-50GB-C...	vol-079cd8337e4be815	gp2	50 GiB	150	-	snap-033be4b...	2023/09/25...	eu-north-1a	<span style="color: blue;">Available</span>	No alarms +

#### 5. Create a volume of same size from the snapshot.

Follow the same steps to create another volume from the snapshot. This time, mention 40GiB as the size.

This gives an error saying the size of the volume can only be increased not decreased.

The screenshot shows a form field labeled "Size (GiB)" with the value "40" entered. A red box highlights the input field. Below the field, a red warning message reads: "⚠ The size of a volume can only be increased, not decreased." and "Min: 1 GiB, Max: 16384 GiB. The value must be an integer."

Change the Size to 100GiB and create volume. Navigate back to EBS Volumes dashboard and notice the new Volume with a 100GiB size created from the Snapshot of 50GiB volume

Name	Volume ID	Type	Size	IOPS	Throughput	Snapshot	Created	Availability Zone	Volume state	Alarm status	Attached Instances	Volume status	Encryption	
LA1_3_USER	vol-0e2799e6b246756a	gp2	50 GiB	150	-	-	2023/09/25...	eu-north-1a	Available	No alarms	+	-	Okay	Not encrypted
LA1A-50GB-C...	vol-074cd84375e1be616	gp2	50 GiB	150	-	snap-033be4b...	2023/09/25...	eu-north-1a	Available	No alarms	+	-	Okay	Not encrypted
LA1A-100GB-...	vol-0095b6455d3780279	gp2	100 GiB	300	-	snap-033be4b...	2023/09/25...	eu-north-1a	Available	No alarms	+	-	Okay	Not encrypted

## 6. Copy Snapshot to another Region

Click on *Actions > Copy snapshot*.

Select a description, name and the destination region.

Notice that the original snapshot is in *eu-north-1* region. Our destination is set as *ap-south-1*

EC2 > Snapshots > snap-033be4be514fc4ac0 > Copy snapshot

### Copy snapshot Info

Copy a snapshot from one AWS Region to another, or within the same Region.

#### Settings

**Snapshot ID**  
The ID of the original snapshot that is to be copied.  
 snap-033be4be514fc4ac0 (LA1.4)

**New snapshot settings**

**Description**  
A description for the snapshot copy.  

255 characters maximum.

**Destination Region**  
The Region in which to create the snapshot copy.

**Encryption Info**  
Use Amazon EBS encryption as an encryption solution for your EBS resources.  
 Encrypt this snapshot

**Tags - optional Info**  
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
<input type="text" value="Name"/>	<input type="text" value="LA1.4-MUMBAI"/>

You can add 49 more tags.

## 7. Check the Snapshot

Change the Region to *Mumbai (ap-south-1)* [top right corner of console].

Navigate to Snapshots section under EBS.

Snapshots (1) <small>Info</small>						
Owned by me		Actions				
		Snapshot ID	Volume size	Description	Storage tier	Snapshot status
<input type="checkbox"/>	LA1.4-MUMBAI	snap-0d073e7e9b3578b33	50 GiB	[Copied snap-033be4be51...	Standard	<span style="color: green;">Completed</span> 2023/09

## 8. Create a volume and an EC2 instance

Create a volume from this snapshot and an EC2 instance following same steps as earlier.

Be mindful of the Availability Zone along with region while creating the Volume and EC2 instance. Both have to be in the same availability zone for the volume to be attached to the EC2 instance.

This can be achieved by selecting the correct Subnet in the network settings while creating the EC2 instance, and selecting the

same Availability Zone (that the subnet is present in) while creating the volume.

**Create volume** [Info](#)

Create an Amazon EBS volume to attach to any EC2 instance in the same Availability Zone.

**Volume settings**

Snapshot ID  
[snap-0d073e7e9b3578b33 \(LA1.4-MUMBAI\)](#)

Volume type [Info](#)  
General Purpose SSD (gp2)

Size (GiB)  
50  
Min: 1 GiB, Max: 16384 GiB. The value must be an integer.

IOPS  
150 / 3000  
Baseline of 3 IOPS per GiB with a minimum of 100 IOPS, burstable to 3000 IOPS.

Throughput (MiB/s) [Info](#)  
Not applicable

Availability Zone [Info](#)  
ap-south-1b

Fast snapshot restore [Info](#)  
Not enabled for selected snapshot

Encryption [Info](#)  
Use Amazon EBS encryption as an encryption solution for your EBS resources associated with your EC2 instances.  
 Encrypt this volume

## 9. Attach Volume with EC2 instance

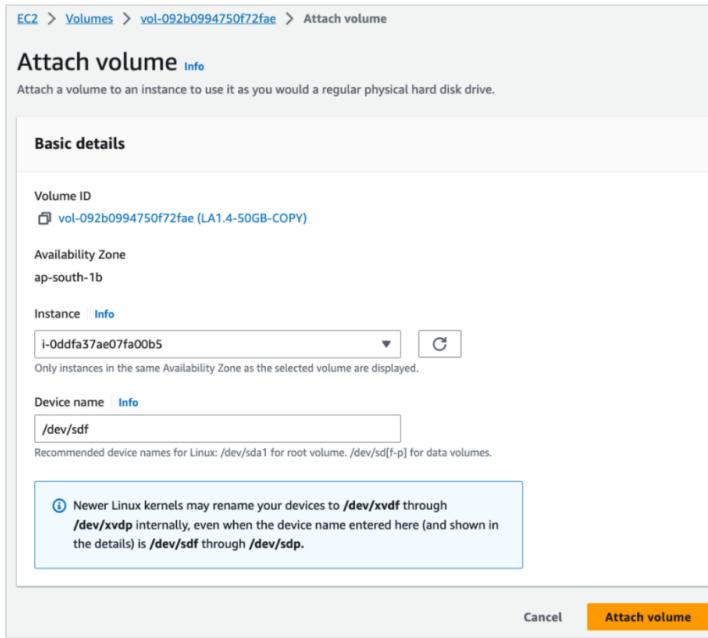
Locate the Volume and select *Actions > Attach volume*.

Pick an EC2 instance in the same Availability zone. (created in the previous step).

Select a device name.

**Note:** volume status changes from ‘Available’ to ‘In-use’

Traditionally, one EBS Volume can only be attached with one EC2 Instance.



## 10. View Contents of Volume

Mount the volume to desired mount-point and view the contents.

As we can see the directory we had created in the previous section

- *tempNewDisk* - has persisted.

```
ec2-user@ip-172-31-1-202 ~]$ 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
xvdf     202:80   0 50G 0 disk
ec2-user@ip-172-31-1-202 ~]$ mkdir /mnt/data
mkdir: cannot create directory '/mnt/data': Permission denied
ec2-user@ip-172-31-1-202 ~]$ sudo mkdir /mnt/data
ec2-user@ip-172-31-1-202 ~]$ sudo mount /dev/xvdf /mnt/data
ec2-user@ip-172-31-1-202 ~]$ cd /mnt/data
ec2-user@ip-172-31-1-202 data]$ ls
ost+found tempNewDisk
ec2-user@ip-172-31-1-202 data]$
```

## 11. Detach the volume

To detach the volume, first use the command -

`sudo umount /mnt/data`

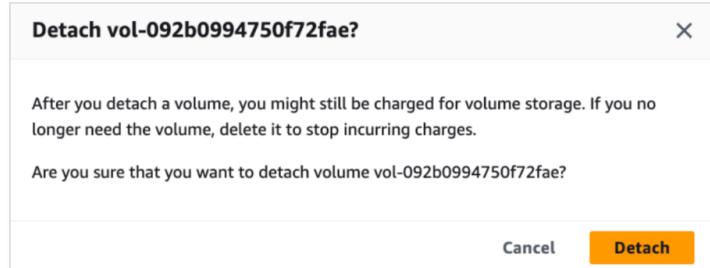
to unmount the volume.

Navigate to the EBS Volume,

Click on *Actions > Detach Volume* to detach the volume from the

## EC2 instance

```
[ec2-user@ip-172-31-1-202 ~]$ sudo umount /mnt/data
[ec2-user@ip-172-31-1-202 ~]$ 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
xvdf      202:80   0  50G  0 disk 
[ec2-user@ip-172-31-1-202 ~]$ █
```



## 12. Delete the volumes

Merely detaching doesn't prevent the EBS storage from getting billed. We have to delete the EBS by navigating to the EBS Volumes and clicking *Actions > Delete Volume*.

