

CSE 3035

PRINCIPLES OF CLOUD COMPUTING



Lab Assessment – 2

L15+L16 | SJT501
Dr. Sivaprakash S

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by

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Assessment 2 .

Experiment:

Title: VM Migration

Aim:

- To configure a VM instance in one region of AWS EC2 and migrate the same to another region of the same account.
- To configure a VM instance in one AWS account and migrate it to another account. Both accounts should be in the same region.

Background Theory:

VM Migration:

- Virtual machine migration is the task of moving a virtual machine from one physical hardware environment to another. Virtual machine migration is also known as teleportation.
- Migrating a virtual machine involves capturing and copying the entire state of the machine at a snapshot in time including processor and memory state as well as virtual hardware resources such as BIOS, devices networks and MAC addresses.
- It also includes the entire disk space, including system and user directories as well as swap space used for virtual memory operating system scheduling.

Necessity:

- VM migration techniques serve as a base for managing computing resources, minimizing VM performance overhead, and achieving energy efficiency and load balancing in cloud computing.

Types:

- There are two types of VM migration: cold and live. Cold migration occurs when the VM is shut down. Live migration occurs while the VM is actually running.

Requirements for conducting the experiment:

- AWS Licence

Procedure & Screenshots:

(1) VM Migration from one region to another region (in the same AWS account):

Step 1: Create an Instance with the following configuration: (a) ubuntu 64-bit architecture, (b) type: t2.micro, (c) 8 gib, gpu2 root volume

How to migrate EC2 instance from... | vm migration - Google Search | Inbox (780) - sharadinduadhikari | Launch an instance | EC2 Manager | +

ap-south-1.console.aws.amazon.com/ec2/home?region=ap-south-1#LaunchInstances

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Name and tags

Name: Cloud-DA-2 [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

Amazon Machine Image (AMI)

Amazon Linux 2 AMI (HVM) - Kernel 5.10, SSD Volume Type
ami-06489866022e12a14 (64-bit (x86)) / ami-0e18b1d379af4e263 (64-bit (Arm))
Virtualization: hvm ENA enabled: true Root device type: ebs

Free tier eligible

Summary

Number of instances: 1

Software Image (AMI)
Amazon Linux 2 Kernel 5.10 AMI...
ami-06489866022e12a14

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

Cancel [Launch instance](#)

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25°C Raining now

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ap-south-1.console.aws.amazon.com/ec2/home?region=ap-south-1#LaunchInstances

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Create key pair

Key pairs allow you to connect to your instance securely.

Enter the name of the key pair below. 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](#)

Key pair name: Cloud-2

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

Cancel [Create key pair](#)

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ap-south-1.console.aws.amazon.com/ec2/home?region=ap-south-1#LaunchInstances

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You've been opted into the new launch experience. [Find out more](#) about this experience or [send us feedback](#). You can still return to the previous version by opting out. [Opt out to the old experience](#)

EC2 > Instances > Launch an instance

Success
Successfully initiated launch of instance (i-0bdddafba49e2135f)

Launch log

Initializing requests	Succeeded
Creating security groups	Succeeded
Creating security group rules	Succeeded
Launch initiation	Succeeded

Step 2: Launch cloud Instance

The screenshot shows the AWS Management Console for the 'ap-south-1' region. The 'Instances' page displays a single instance, 'Cloud-DA-2', with ID 'i-0bdddafba49e2135f'. The instance is in a 'Running' state, using the 't2.micro' instance type. The 'Instance summary' section provides details: Instance ID, Public IPv4 address (43.205.124.107), Private IPv4 addresses (172.31.38.123), Instance state (Running), Hostname type (IP name: ip-172-31-38-123.ap-south-1.compute.internal), Private IP DNS name (ip-172-31-38-123.ap-south-1.compute.internal), Instance type (t2.micro), and Elastic IP addresses (none).

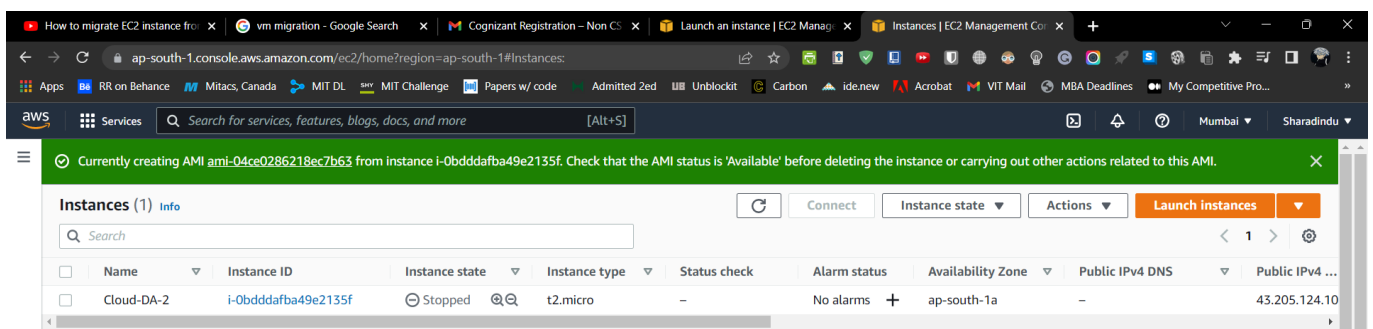
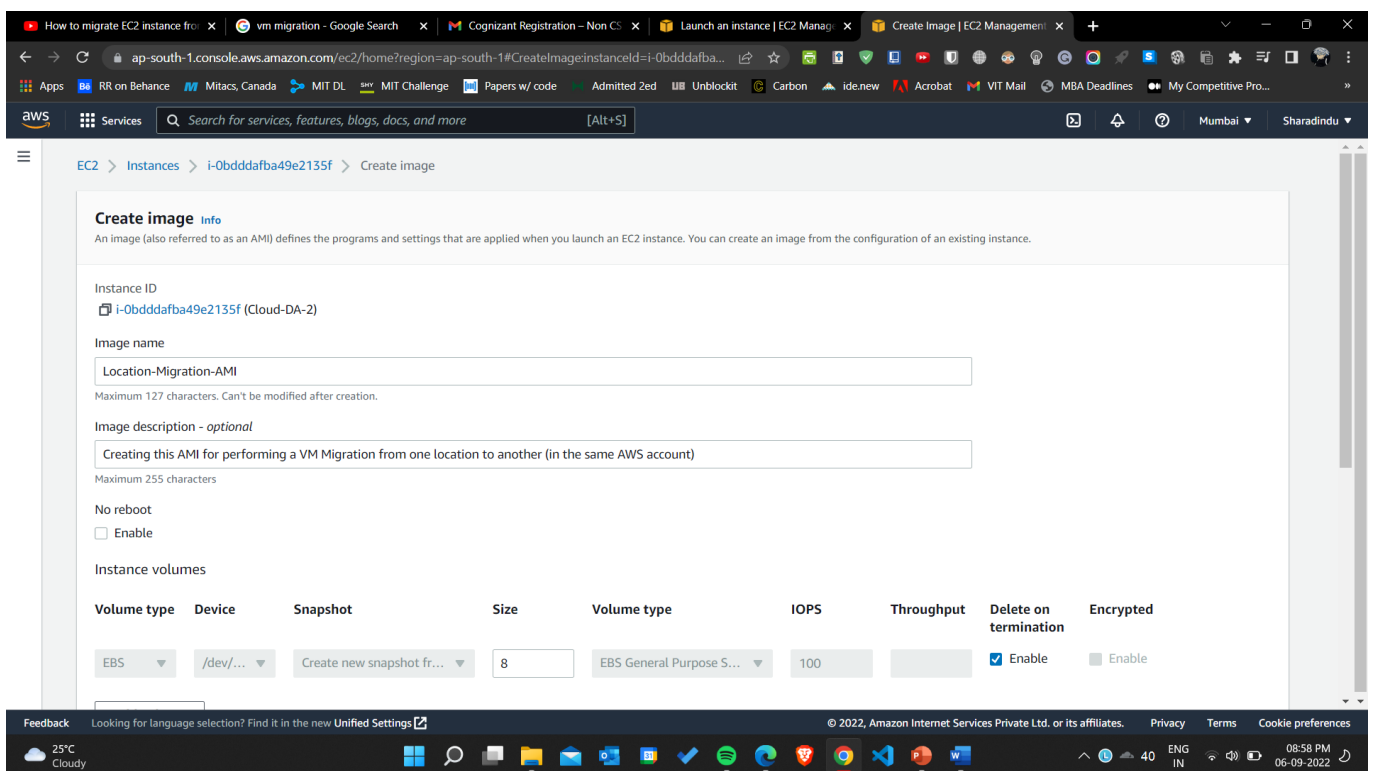
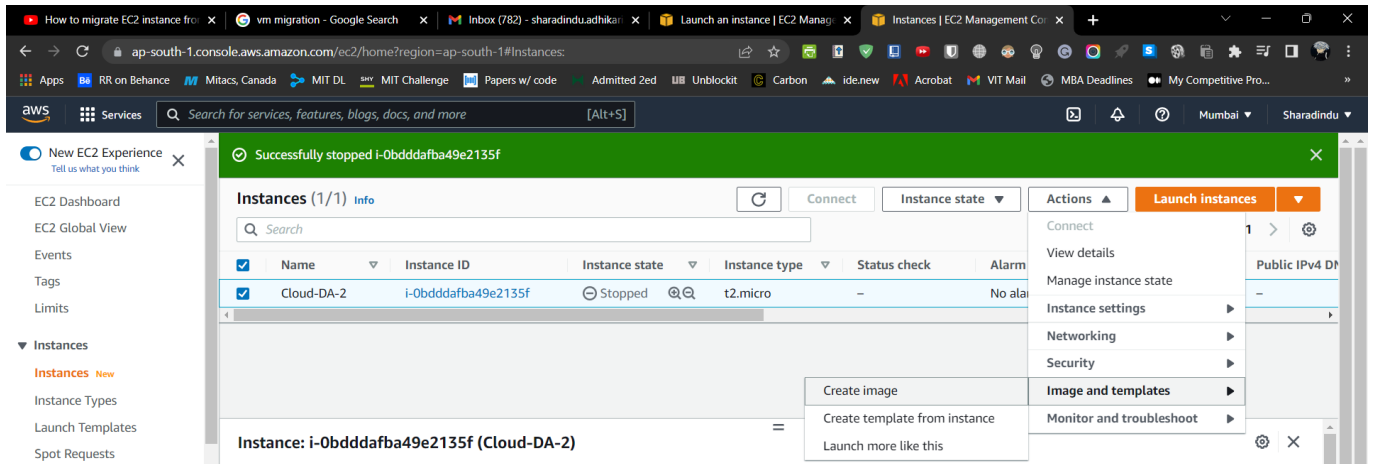
Step 3: Stop the newly created Instance

The screenshot shows the 'Manage instance state' page for the instance 'i-0bdddafba49e2135f (Cloud-DA-2)'. A dialog box titled 'Stop instance?' is displayed, asking for confirmation to stop the instance. The dialog includes the instance ID and a 'Stop' button.

The screenshot shows the AWS Management Console for the 'ap-south-1' region. The 'Instances' page displays the instance 'Cloud-DA-2' with ID 'i-0bdddafba49e2135f'. The instance is now in a 'Stopped' state, using the 't2.micro' instance type. A green notification banner at the top indicates 'Successfully stopped i-0bdddafba49e2135f'.

I could have created the AMI while the Instance was running. But stopping it first guarantees the file system's data integrity.

Step 4: Create a new image. It is in the Mumbai region (Asia Pacific South).



The screenshot shows the AWS Management Console for Amazon Machine Images (AMIs) in the ap-south-1 region. The AMI ID is ami-04ce0286218ec7b63, named Location-Migration-AMI, owned by account 917110574018. The AMI is in an 'Available' state. The details section shows it is a Linux/UNIX machine image, x86_64 architecture, with EBS root device and hvm virtualization type. The creation date is Tue Sep 06 2022 20:58:39 GMT+0530 (India Standard Time).

Name	AMI ID	AMI name	Source	Owner	Visibility	Status
-	ami-04ce0286218ec7b63	Location-Migration-AMI	917110574018/Location-Migration-AMI	917110574018	Private	Available

AMI ID: ami-04ce0286218ec7b63

Details	Permissions	Storage	Tags
<p>AMI ID: ami-04ce0286218ec7b63</p> <p>AMI name: Location-Migration-AMI</p> <p>Root device name: /dev/xvda</p> <p>Boot mode: -</p>	<p>Image type: machine</p> <p>Owner account ID: 917110574018</p> <p>Status: Available</p> <p>State reason: -</p>	<p>Platform details: Linux/UNIX</p> <p>Architecture: x86_64</p> <p>Source: 917110574018/Location-Migration-AMI</p> <p>Creation date: Tue Sep 06 2022 20:58:39 GMT+0530 (India Standard Time)</p>	<p>Root device type: EBS</p> <p>Usage operation: RunInstances</p> <p>Virtualization type: hvm</p> <p>Kernel ID: -</p>

Step 5: Copy the newly created AMI.

The screenshot shows the 'Copy AMI' process in the AWS Management Console. The original AMI ID is ami-04ce0286218ec7b63. The copy name is Location-Migration-AMI. The copy description is [Copied ami-04ce0286218ec7b63 from ap-south-1] Location-Migration-AMI. The destination region is Europe (Paris). The 'Encrypt EBS snapshots of AMI copy' checkbox is unchecked.

Copy Amazon Machine Image (AMI)

Original AMI ID: ami-04ce0286218ec7b63

AMI copy name: Location-Migration-AMI

AMI copy description: [Copied ami-04ce0286218ec7b63 from ap-south-1] Location-Migration-AMI

Destination Region: Europe (Paris)

☐ Encrypt EBS snapshots of AMI copy

Cancel Copy AMI

The screenshot shows the AWS Management Console in the ap-south-1 region. A notification banner at the top states: "AMI copy operation for ami-04ce0286218ec7b63 initiated. It can take a few minutes for the AMI to be copied. You can check the progress of the operation in the AMI table in eu-west-3. The AMI ID of the new AMI is ami-077ef969ff55f6449." Below the banner, the "Amazon Machine Images (AMIs)" page is displayed. A table lists the source AMI: ami-04ce0286218ec7b63, named "Location-Migration-AMI", with source "917110574018/Location-Migration-AMI" and owner "917110574018". The status is "Available". Below the table, a "Select an AMI" section is visible.

Name	AMI ID	AMI name	Source	Owner	Visibility	Status
-	ami-04ce0286218ec7b63	Location-Migration-AMI	917110574018/Location-Migration-AMI	917110574018	Private	Available

Step 6: Viewing the copied image in the new region: EU West (Paris)

The screenshot shows the AWS Management Console in the eu-west-3 region. The "Amazon Machine Images (AMIs)" page displays the copied AMI: ami-077ef969ff55f6449, named "Location-Migration-AMI", with source "917110574018/Location-Migration-AMI" and owner "917110574018". The status is "Available". Below the table, the "Details" tab for the AMI is expanded, showing various attributes.

AMI ID	AMI name	Source	Owner	Visibility	Status	Creation date
ami-077ef969ff55f6449	Location-Migration-AMI	917110574018/Location-Migration-AMI	917110574018	Private	Available	2022/09/06 21:11 GM

Details	
AMI ID	ami-077ef969ff55f6449
Image type	machine
Platform details	Linux/UNIX
Root device type	EBS
AMI name	Location-Migration-AMI
Owner account ID	917110574018
Architecture	x86_64
Usage operation	RunInstances
Root device name	/dev/xvda
Status	Available
Source	917110574018/Location-Migration-AMI
Virtualization type	hvm
Boot mode	-
State reason	-
Creation date	Tue Sep 06 2022 21:11:54 GMT+0530 (India Standard Time)
Kernel ID	-
Block devices	-
Description	-
Product codes	-
RAM disk ID	-

Step 7: Create a new Instance from this newly migrated [copied] AMI.

The screenshot shows the 'Launch an instance' page in the AWS Management Console. The page is for the eu-west-3 region. The 'Name' field is set to 'Paris-Cloud-DA-2'. The 'Application and OS Images (Amazon Machine Image)' section shows a search bar and a list of AMIs. The 'Summary' panel on the right shows the following details:

- Number of instances: 1
- Software Image (AMI): [Copied ami-04ce0286218ec7b63 ...read more ami-077ef969f55f6449]
- 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

The 'Launch instance' button is visible at the bottom right of the summary panel.

The screenshot shows the 'Instances' page in the AWS Management Console. The page displays a list of instances, with one instance, 'Paris-Cloud-DA-2', in the 'Running' state. The instance details are shown below the list:

Instance: i-01ef9aefed57d525f (Paris-Cloud-DA-2)

The instance details are organized into tabs: Details, Security, Networking, Storage, Status checks, Monitoring, and Tags. The 'Details' tab is selected, showing the following information:

- Instance ID: i-01ef9aefed57d525f (Paris-Cloud-DA-2)
- Instance state: Running
- Hostname type: IP name: ip-172-31-38-69.eu-west-3.compute.internal
- Public IPv4 address: 35.180.109.249 | [open address](#)
- Private IPv4 addresses: 172.31.38.69
- Public IPv4 DNS: ec2-35-180-109-249.eu-west-3.compute.amazonaws.com | [open address](#)
- Private IP DNS name (IPv4 only): ip-172-31-38-69.eu-west-3.compute.internal

(2) VM Migration from one AWS account to another (in the same region).

Step 1: Create a new Instance in the same region (the destination AWS account currently is).

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sa-east-1.console.aws.amazon.com/ec2/v2/home?region=sa-east-1#LaunchInstances:

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EC2 > Instances > Launch an instance

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: SaoPaulo-Cloud-DA-2-II

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

Summary

Number of instances: 1

Software Image (AMI): Amazon Linux 2 Kernel 5.10 AMI...read more
ami-0aca10934d525a6f0

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

Cancel Launch instance

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SaoPaulo-Key.pem Paris-Cloud-DA-2.pem

26°C Cloudy

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sa-east-1.console.aws.amazon.com/ec2/v2/home?region=sa-east-1#Instances:instanceId=i-0b916c878837f8967

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Instances (1/1)

Search

Instance ID: i-0b916c878837f8967

Clear filters

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4 address
SaoPaulo-Cloud-DA-2-II	i-0b916c878837f8967	Running	t2.micro	2/2 checks passed	No alarms	sa-east-1a	ec2-18-228-153-79.sa-east-1.compute.amazonaws.com	18.228.153.79

Instance: i-0b916c878837f8967 (SaoPaulo-Cloud-DA-2-II)

Details Security Networking Storage Status checks Monitoring Tags

Instance summary

Instance ID: i-0b916c878837f8967 (SaoPaulo-Cloud-DA-2-II)

Public IPv4 address: 18.228.153.79 | open address

Private IPv4 addresses: 172.31.7.254

Instance state: Running

Public IPv4 DNS: ec2-18-228-153-79.sa-east-1.compute.amazonaws.com | open address

Hostname type: IP name: ip-172-31-7-254.sa-east-1.compute.internal

Private IP DNS name (IPv4 only): ip-172-31-7-254.sa-east-1.compute.internal

Answer private resource DNS name: IPv4 (A): t2.micro

Elastic IP addresses: -

Waiting for sa-east-1.console.aws.amazon.com...

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Step 2: Create a new AMI (in the São Paulo region)

Create image Info

An image (also referred to as an AMI) defines the programs and settings that are applied when you launch an EC2 instance. You can create an image from the configuration of an existing instance.

Instance ID
i-0b916c878837f8967 (SaoPaulo-Cloud-DA-2-II)

Image name
SaoPaulo-DA2(ii)-AMI
Maximum 127 characters. Can't be modified after creation.

Image description - optional
AMI for VM Migration from one AWS account to another (within the same region).
Maximum 255 characters

Amazon Machine Images (AMIs) (1/1) Info

Owned by me Search

AMI ID = ami-05ca07808ee12945e Clear filters

AMI ID	AMI name	Source	Owner	Visibility	Status	Creation date
ami-05ca07808ee12945e	SaoPaulo-DA2(ii)-AMI	917110574018/SaoPaulo-DA2(ii)-AMI	917110574018	Private	Available	2022/09/06 22:12:35

AMI ID: ami-05ca07808ee12945e

Details Permissions Storage Tags

AMI ID ami-05ca07808ee12945e	Image type machine	Platform details Linux/UNIX	Root device type EBS
AMI name SaoPaulo-DA2(ii)-AMI	Owner account ID 917110574018	Architecture x86_64	Usage operation RunInstances
Root device name /dev/xvda	Status Available	Source 917110574018/SaoPaulo-DA2(ii)-AMI	Virtualization type hvm
Boot mode -	State reason -	Creation date Tue Sep 06 2022 22:12:35 GMT+0530 (India Standard Time)	Kernel ID -

Step 3: Get the account ID of the destination AWS and share my AMI with it. I'm sharing with Ayushmaan.

Edit AMI permissions Info

By editing the permissions of an AMI, you can share it with the AWS accounts, organizations, or OUs that you specify.

AMI share settings

AMI ID
ami-05ca07808ee12945e

Associated snapshot IDs
snap-017de9ffbcfcac

☐ Add 'Create volume' permission to associated snapshots
This setting only applies when you share an AMI with specific AWS accounts.

AMI availability
☐ Public
Share the AMI publicly with all AWS users.

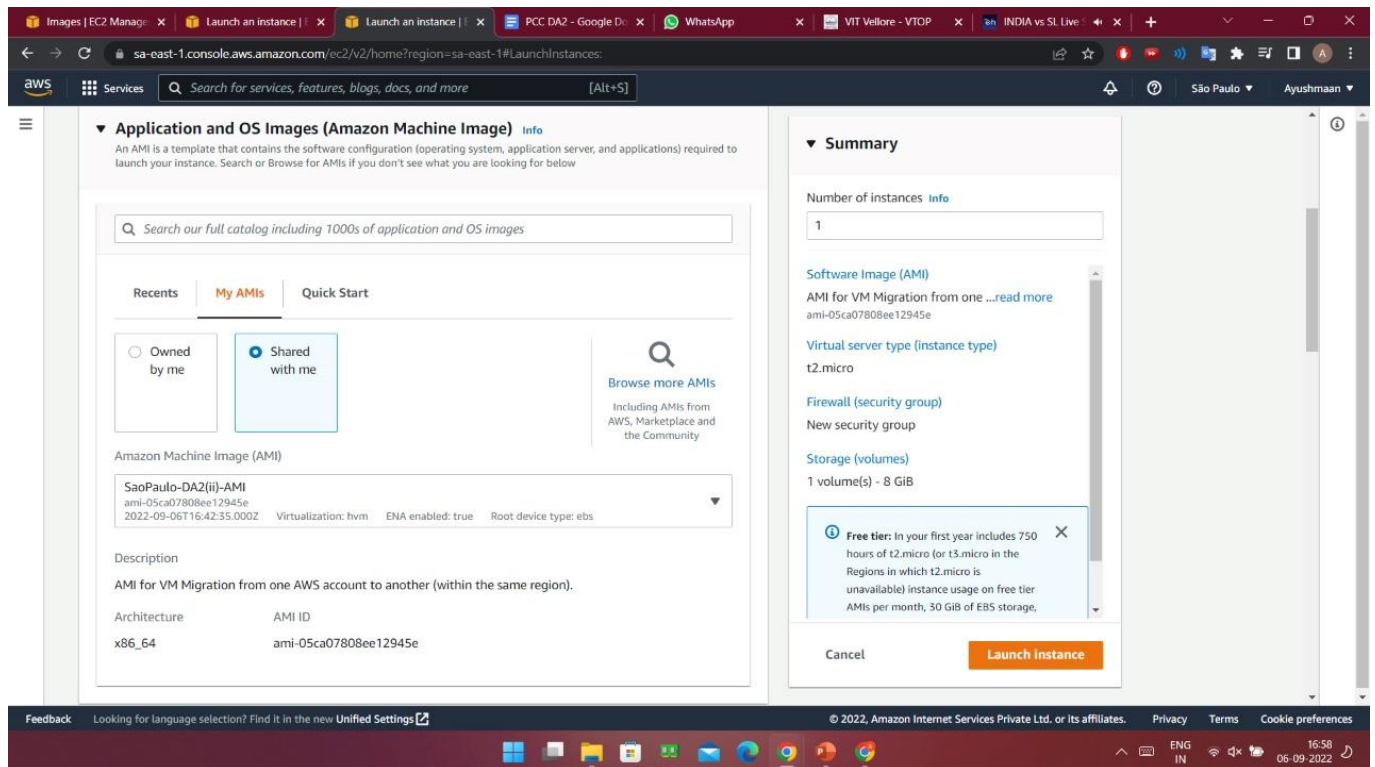
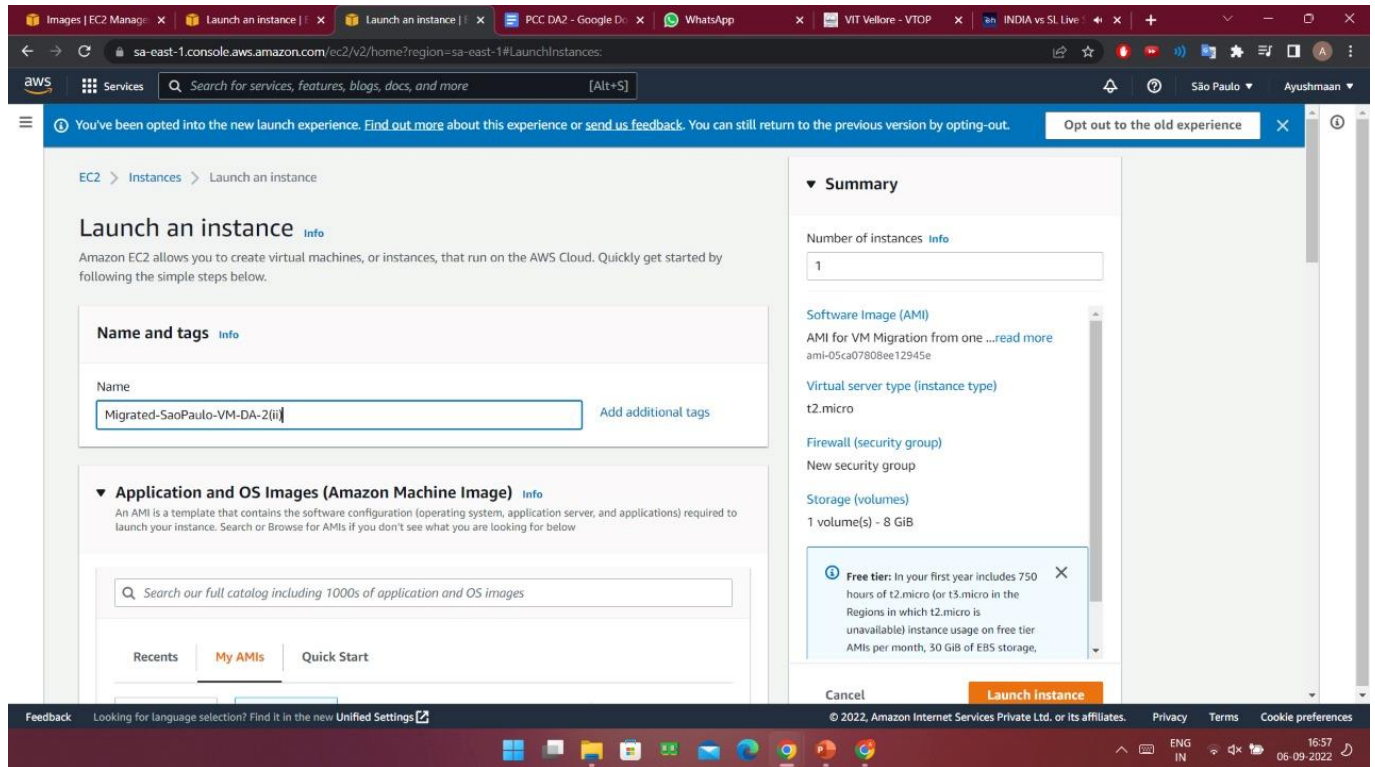
Share AMI with AWS account

AWS account ID
Enter the AWS account ID with which to share the AMI.
165955712588

Enter account ID without hyphens.

Cancel Share AMI

Step 4: On the destination AWS account, launch a new Instance using the newly shared AMI.



The screenshot shows the AWS Management Console for the 'sa-east-1' region. The 'Instances' page displays a single instance named 'Migrated-SaoPaulo-VM-DA-2(ii)' with ID 'i-0809bdc6edaf90a04'. The instance is in a 'Running' state, using a 't2.micro' instance type. The 'Details' tab is selected, showing the following information:

- Instance summary:** Instance ID: i-0809bdc6edaf90a04 (Migrated-SaoPaulo-VM-DA-2(ii)), IP6 address: -, Hostname type: IP name: ip-172-31-6-125.sa-east-1.compute.internal, Answer private resource DNS name: IPv4 (A), Auto-assigned IP address.
- Public IPv4 address:** 18.228.152.18 | [open address](#)
- Private IPv4 addresses:** 172.31.6.125
- Public IPv4 DNS:** ec2-18-228-152-18.sa-east-1.compute.amazonaws.com | [open address](#)
- Instance state:** Running
- Private IP DNS name (IPv4 only):** ip-172-31-6-125.sa-east-1.compute.internal
- Instance type:** t2.micro
- VPC ID:**
- AWS Compute Optimizer finding:**

Step 5: Showing details of the Security Group in the newly migrated Instance (from my AWS account to Ayushmaan's).

The screenshot shows the AWS Management Console for the 'sa-east-1' region. The 'Instances' page displays the same instance. The 'Security' tab is selected, showing the security group 'sg-0c78aa087b65a2f75 (launch-wizard-2)' associated with the instance. The 'Inbound rules' and 'Outbound rules' are listed below:

Security group rule ID	Port range	Protocol	Source	Security groups
sg-088285c2495590fca	22	TCP	0.0.0.0/0	launch-wizard-2

Security group rule ID	Port range	Protocol	Destination	Security groups
sg-03810893dc1a59d11	All	All	0.0.0.0/0	launch-wizard-2

Conclusion:

I've done VM Migration in two different cases successfully: (1) First, migrated from one region (Mumbai) to another (Paris) within the same AWS account. (2) In the second part, I migrated my VM from my AWS account to Ayushmaan's AWS account (in the same region: São Paulo).