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## **Placement Empowerment Program**

### ***Cloud Computing and DevOps Centre***

**Back Up and Restore a Cloud Instance: Take a snapshot of your cloud VM. Terminate the VM and restore it from the snapshot.**

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## Introduction

In today's cloud-driven world, ensuring data availability and reliability is paramount. This Proof of Concept (POC) focuses on the Backup and Restore process for a cloud instance, showcasing how critical data can be safeguarded and restored efficiently in AWS. By taking a snapshot, terminating the instance, and restoring it from the snapshot, this POC demonstrates the ease and reliability of AWS Elastic Block Store (EBS).

## Overview

This POC involves working with Amazon Web Services (AWS) to perform the following tasks:

1. **Launching an EC2 Instance:** Creating a cloud-based virtual machine.
2. **Creating an EBS Snapshot:** Backing up the instance's volume.
3. **Terminating the Instance:** Simulating failure or cost-saving scenarios.
4. **Restoring from Snapshot:** Creating a new volume and attaching it to a fresh EC2 instance.

The step-by-step approach ensures no unnecessary charges while maintaining data integrity and availability.

## Objectives

The objective of this POC is to:

1. Demonstrate the process of creating and managing backups in AWS.
2. Explore the capabilities of EBS snapshots for disaster recovery.
3. Understand how to restore a terminated instance and verify data integrity.
4. Highlight cost-saving techniques using AWS Free Tier while ensuring operational readiness.

## Importance

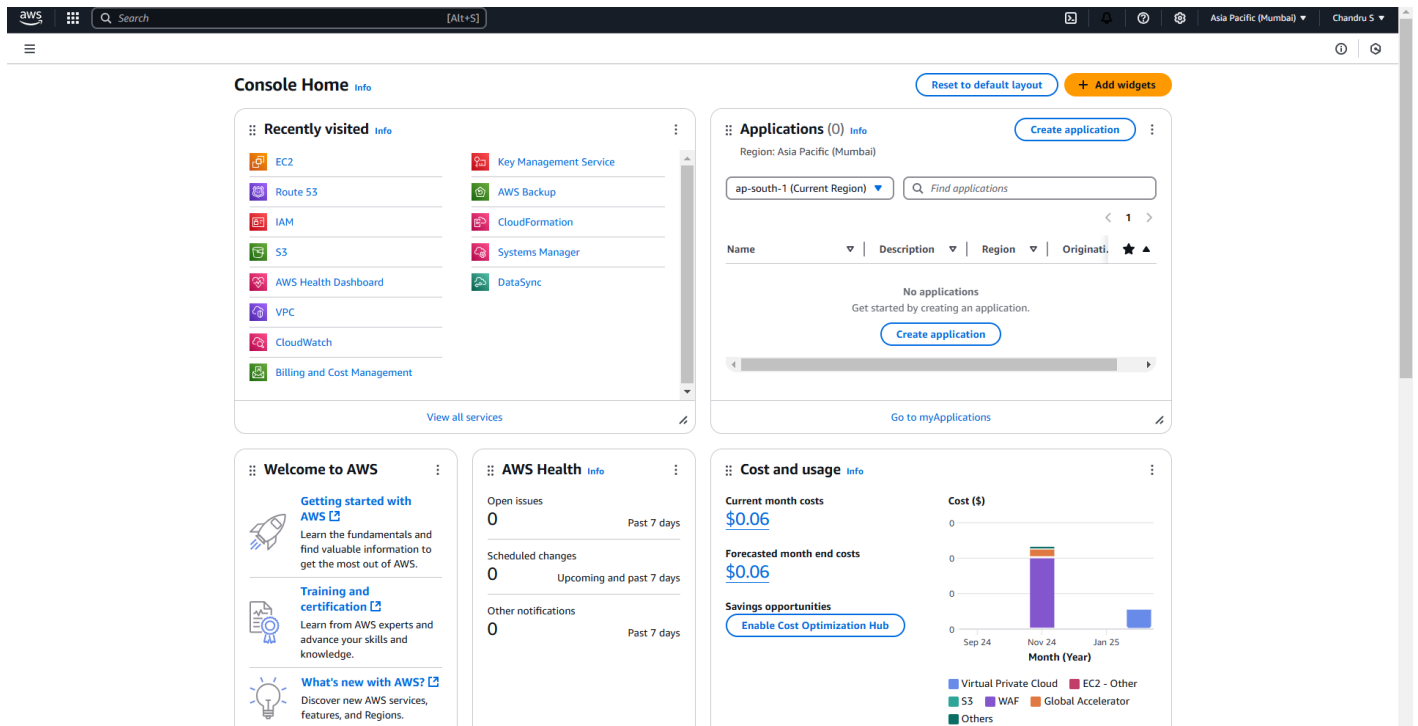
1. **Disaster Recovery:** Ensures that critical data can be restored quickly in case of unexpected failure.
  2. **Cost Optimization:** Demonstrates terminating unused instances and restoring them only when required.
  3. **Scalability and Flexibility:** Showcases AWS's ability to manage snapshots and volumes across regions and availability zones.
  4. **Practical Knowledge:** Provides hands-on experience with EC2, EBS, and snapshot-based recovery processes.
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# Step-by-Step Overview

## Step 1:

### Access AWS Management Console

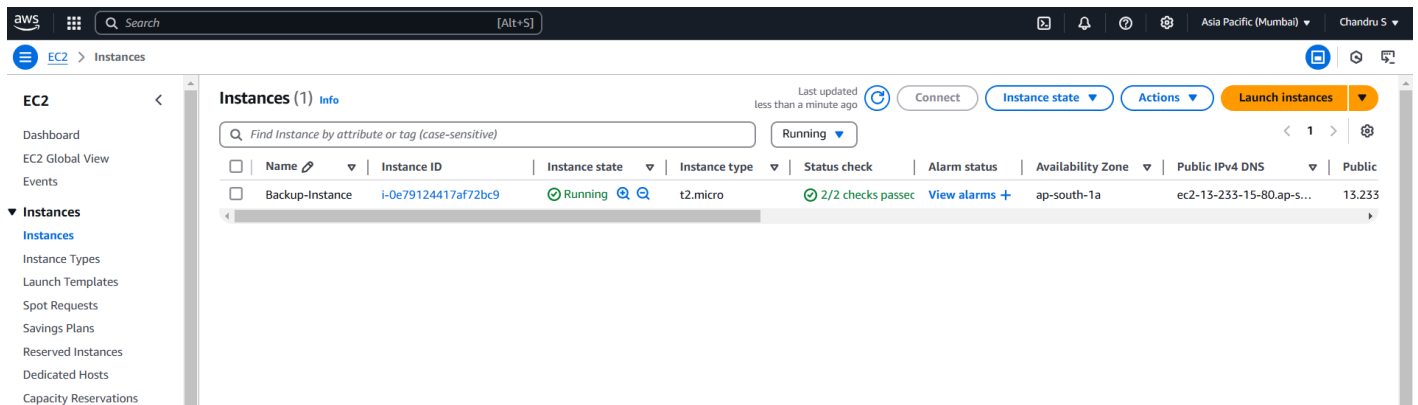
- Log in to the [AWS Management Console](#) with your credentials.



## Step 2:

### Launch an EC2 Instance (Backup Instance)

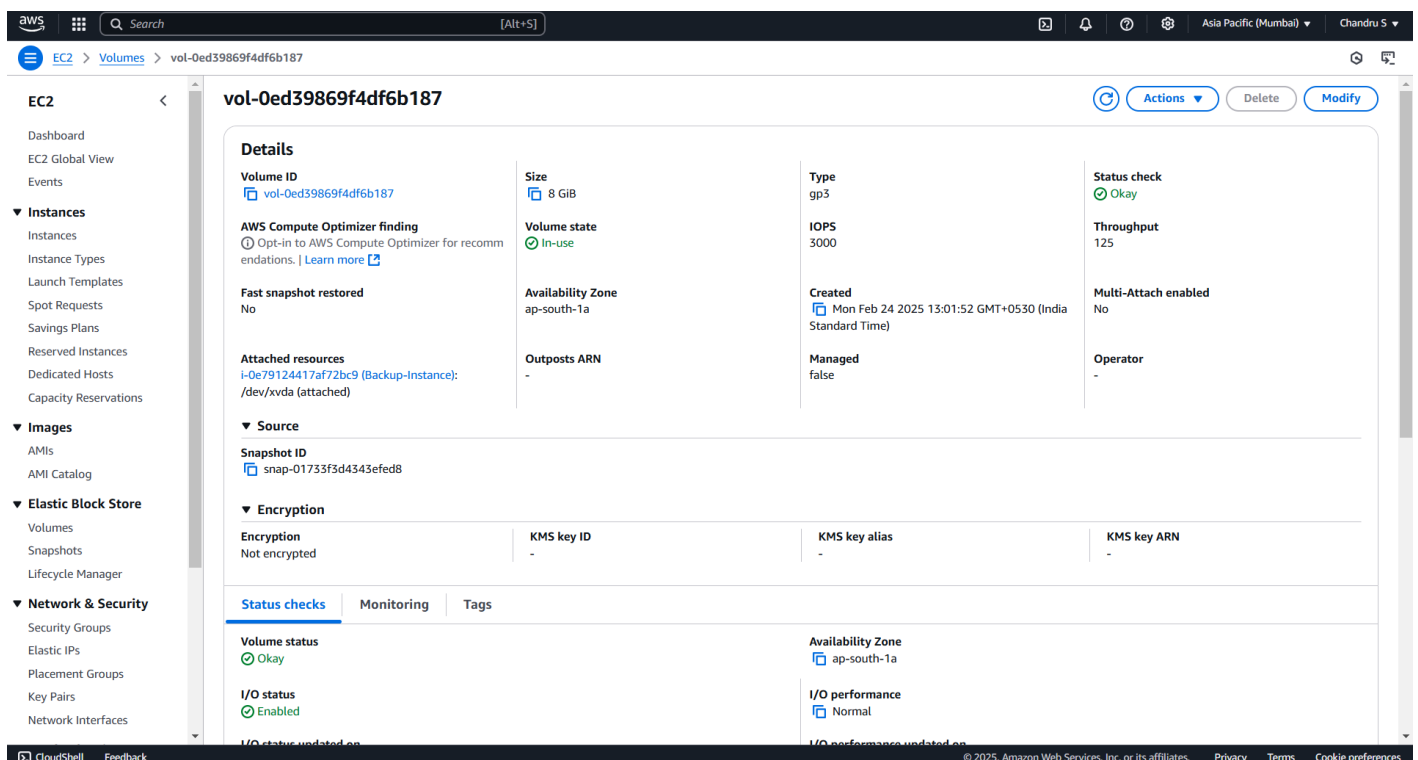
- From the EC2 Dashboard, click **Launch Instance**.
- Set the instance name (e.g., "Backup-Instance").
- Select **Amazon Linux 2 AMI (Free Tier eligible)**.
- Choose **t2.micro** instance type.
- Configure the instance and ensure **Allow HTTP traffic** is enabled under Network settings.
- Review and launch the instance.



## Step 3:

### Create an EBS Volume

1. In the EC2 Dashboard, under **Elastic Block Store**, select **Volumes**.
2. Click Create Volume.
3. Set the volume type to **General Purpose SSD (gp3)** and size to 8 GiB (within Free Tier limits).
4. Ensure the availability zone matches your EC2 instance (e.g., us-east-1b).
5. Click Create Volume and note the **Volume ID** for future reference.



## Step 4:

### Create an EBS Snapshot

1. In the EC2 Dashboard, navigate to **Elastic Block Store > Volumes**.
2. Locate the volume attached to your instance, select it, and click **Actions > Create Snapshot**.

3. Add a description (e.g., "Snapshot of Backup Instance on Feb 7").
4. Click Create Snapshot.
5. Monitor the status under Snapshots until it changes to Completed.

The screenshot shows the AWS Management Console interface for the 'Snapshots' section. The left-hand navigation pane is expanded, showing categories like EC2, Instances, Images, Elastic Block Store, and Network & Security. The 'Snapshots' link under 'Elastic Block Store' is highlighted. The main content area displays a table of snapshots. A single snapshot is listed with the ID 'snap-0b8dae954e9c5dc59', a volume size of 8 GiB, and a description 'Snapshot of Backup Instan...'. The status is 'Pending' and it was started on '2025/02/24 13:39 GMT+5'. At the top right of the console, there are buttons for 'Recycle Bin', 'Actions', and 'Create snapshot'. A search bar and a filter dropdown 'Owned by me' are also visible.

<input type="checkbox"/>	Name	Snapshot ID	Full snapshot size	Volume size	Description	Storage tier	Snapshot status	Started
<input type="checkbox"/>	-	snap-0b8dae954e9c5dc59	-	8 GiB	Snapshot of Backup Instan...	Standard	Pending	2025/02/24 13:39 GMT+5

## Step 5:

### Terminate the EC2 Instance

1. In the EC2 Dashboard, navigate to **Instances**.
2. Select the instance you wish to terminate.
3. Click **Actions > Instance State > Terminate Instance**.
4. Confirm the termination and wait for the state to change to Terminated.

The screenshot shows the 'Manage instance state' page in the AWS Management Console. The breadcrumb navigation at the top indicates the path: EC2 > Instances > i-0e79124417af72bc9 > Manage instance state. The page title is 'Manage instance state'. Under 'Instance details', the instance ID 'i-0e79124417af72bc9' is shown with the label '(Backup-Instance)' and a green 'running' status tag. The 'Instance state settings' section shows four radio button options: 'Start', 'Stop', 'Hibernate', and 'Terminate'. The 'Terminate' option is selected. A yellow warning box contains the text: 'Note that when your instances are terminated: 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.' At the bottom right, there are 'Cancel' and 'Change state' buttons.

## Step 6:

### Create a New Volume from Snapshot

1. In the EC2 Dashboard, go to **Snapshots** under **Elastic Block Store**.
2. Select the snapshot created earlier.
3. Click **Actions > Create Volume**.
4. Keep the size as-is and select the matching availability zone (e.g., **us-east-1a**).
5. Click **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-0b8dae954e9c5dc59](#)

**Volume type** [Info](#)  
General Purpose SSD (gp3)

**Size (GiB)** [Info](#)  
8  
Min: 1 GiB, Max: 16384 GiB.

**IOPS** [Info](#)  
3000  
Min: 3000 IOPS, Max: 16000 IOPS.

**Throughput (MiB/s)** [Info](#)  
125  
Min: 125 MiB, Max: 1000 MiB, Baseline: 125 MiB/s.

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

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

**Encryption**  
Use Amazon EBS encryption as an encryption solution for your EBS resources associated with your EC2 instances.  
☐ Encrypt this volume

## Step 7:

### Launch a New EC2 Instance

1. In the EC2 Dashboard, click **Launch Instance**.
2. Name the instance (e.g., "Restored-POC-VM").
3. Select **Amazon Linux 2023 Free Tier eligible** as the AMI.
4. Choose **t2.micro** instance type (Free Tier eligible).
5. Skip the storage section for now and launch the instance.

**Instances (1)** [Info](#)

Find Instance by attribute or tag (case-sensitive) [Running](#)

Connect [Instance state](#) [Actions](#) [Launch instances](#)

<input type="checkbox"/>	Name <a href="#">↗</a>	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public
<input type="checkbox"/>	Restored-POC...	i-0aad3c3e1322a2b68	Running	t2.micro	Initializing	<a href="#">View alarms</a>	ap-south-1a	-	-

## Step 8:

### Attach the Volume to the Instance

1. After launching the instance, stop it by selecting **Actions > Instance State > Stop Instance**.

The screenshot shows the AWS Management Console interface. On the left, the navigation menu is visible with categories like EC2, Images, Elastic Block Store, and Network & Security. The main content area displays the 'Instances (1/1)' page. A modal dialog titled 'Stop instance' is open in the center. The dialog contains the following information:

- Instance ID:** i-0aad3c3e1322a2b68 (Restored-POC-VM)
- Stop protection:** Off (Can stop instance)
- Warning:** You will be billed for associated resources. After you stop the instance, you are no longer charged usage or data transfer fees for it. However, you will still be billed for associated Elastic IP addresses and EBS volumes.
- Associated resources:** You will continue to incur charges for these resources while the instance is stopped.
- Buttons:** Cancel and Stop.

The background shows the instance details for 'i-0aad3c3e1322a2b68 (Restored-POC-VM)' with fields for Instance ID, IPv6 address, Hostname type, Answer private resource DNS name, Instance state (Running), Private IP DNS name (IPv4 only), Instance type (t2.micro), and Elastic IP addresses.

2. In the **Volumes** section, select the new volume created from the snapshot.
3. Click **Actions > Attach Volume**.

The screenshot shows the AWS Management Console interface for the 'Volumes' section. The main content area displays the details for volume 'vol-03421649742643056'. The 'Details' section includes:

- Volume ID:** vol-03421649742643056
- Size:** 8 GiB
- Volume state:** Available
- Type:** gp3
- IOPS:** 3000
- Availability Zone:** ap-south-1a
- Created:** Mon Feb 24 2025 13:42:52 GMT+0530 (India Standard Time)
- Managed:** false
- Multi-Attach enabled:** No
- Operator:** -

The 'Source' section shows the Snapshot ID: snap-0b8dae954e9c5dc59. The 'Encryption' section shows 'Not encrypted'. The 'Status checks' section shows 'Volume status' as 'Okay' and 'I/O status' as 'Enabled'. The 'I/O performance' section shows 'Not applicable'.

On the right, the 'Actions' menu is open, showing options: Create snapshot, Attach volume, Detach volume, Force detach volume, and Manage auto-enabled I/O. The 'Attach volume' option is highlighted.

#### 4. In the pop-up window, choose the new instance to attach the volume.

**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-03421649742643056](#)

Availability Zone  
ap-south-1a

Instance [Info](#)  
[i-0aad5c3e1322a2b68](#)  
(Restored-POC-VM) (stopped)

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.

[i](#) 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`.

[Cancel](#) [Attach volume](#)

### Verify the Restoration

1. Connect to the instance using SSH.
2. Check if the files, data, and configurations match the original setup.

### POC Completion Steps:

1. Created a snapshot of the instance.
2. Terminated the instance to avoid extra charges.
3. Restored the instance using the snapshot by creating a volume and attaching it to a new VM.

## Outcome

By completing this POC for backing up and restoring a cloud instance in AWS, you will:

1. Create and manage snapshots of EC2 instances, enabling easy backup without manual intervention.
2. Terminate instances while ensuring important data remains intact through the backup snapshot.
3. Restore an instance from a snapshot by creating a new EBS volume and attaching it to a fresh EC2 instance.
4. Verify the restoration process, ensuring data integrity and proper functionality after recovery.
5. Gain practical knowledge of AWS services like EC2 and EBS snapshots, vital for disaster recovery and business continuity in the cloud.