

AWS-Cloud-Cost-Optimization

The "Why" of Cloud Migration and the Need for Cost

- **Primary Reasons for Cloud Adoption:** Organizations primarily move to the cloud for two reasons:
 1. "to reduce the overhead of the infrastructure" (e.g., setting up and maintaining data centers, purchasing servers, managing IT teams).
 2. "to optimize their Cloud cost."
- **On-Premises Challenges:** For startups and mid-scale organizations, establishing and maintaining an on-premises data center involves significant upfront costs (servers, infrastructure) and ongoing operational expenses (team salaries, monitoring). This makes cloud platforms like AWS an "easy gold go to solution."
- **Cloud Efficiency is Key to Cost Reduction:** Simply migrating to the cloud does not automatically guarantee cost savings. "the cloud cost will go down only if you are doing this efficiently." Inefficient use can lead to higher-than-expected cloud costs.

Take a general instance with t2.micro, a volume which comes by default with it.

us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#Instances:v=3;\$case=tags:true%5C,client:false;\$regex=tags:false%5C,client:false

aws Search [Alt+S] United States (N. Virginia) Deepak

EC2 > Instances

EC2

- Dashboard
- EC2 Global View
- Events
- Instances**
 - Instances
 - Instance Types
 - Launch Templates
 - Spot Requests
 - Savings Plans
 - Reserved Instances
 - Dedicated Hosts
 - Capacity Reservations
- Images**
 - AMIs
 - AMI Catalog
- Elastic Block Store**
 - CloudShell
 - Feedback

Instances (1) Info Last updated less than a minute ago

Connect Instance state Actions Launch instances

Find Instance by attribute or tag (case-sensitive) All states

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone
cost-optimizat...	i-00209c44ea700b142	Running	t2.micro	2/2 checks passed	View alarms +	us-east-1a

Select an instance

Activate Windows
Go to Settings to activate Windows.

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us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#Volumes:

aws Search [Alt+S] United States (N. Virginia) Deepak

Spot requests Savings Plans Reserved Instances Dedicated Hosts Capacity Reservations

Images

- AMIs
- AMI Catalog

Elastic Block Store

- Volumes
- Snapshots
- Lifecycle Manager

Network & Security

- Security Groups
- Elastic IPs
- Placement Groups
- Key Pairs
- Network Interfaces

Volumes (1) Info Last updated 1 minute ago

Actions Create volume

Saved filter sets Choose filter set Search

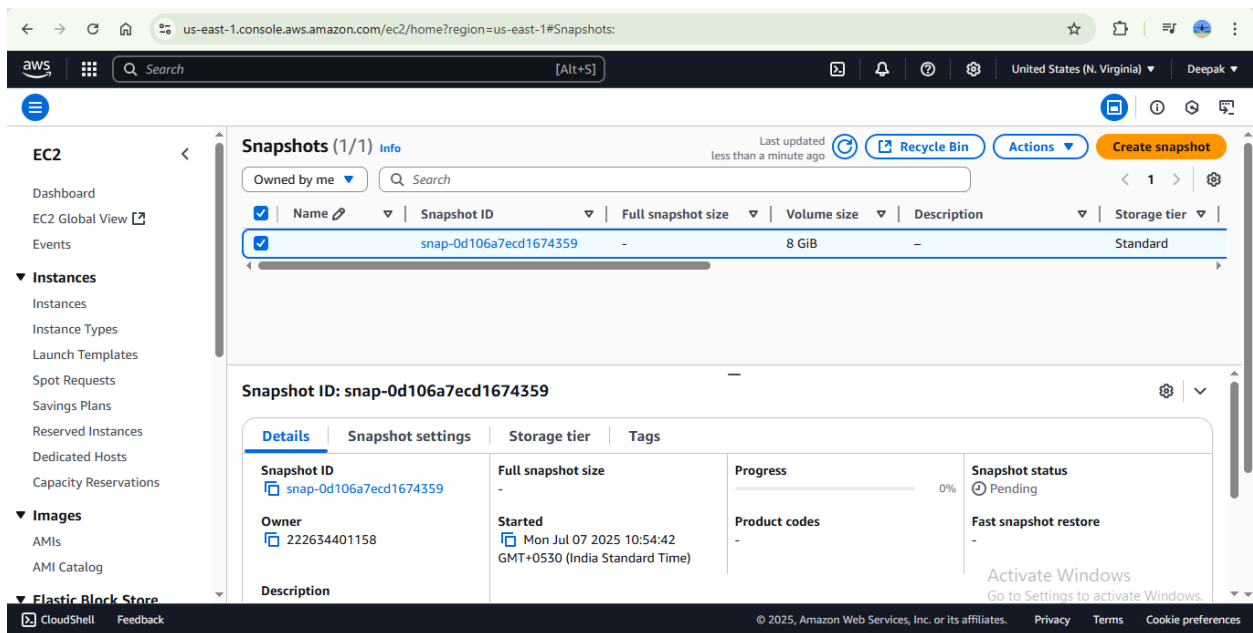
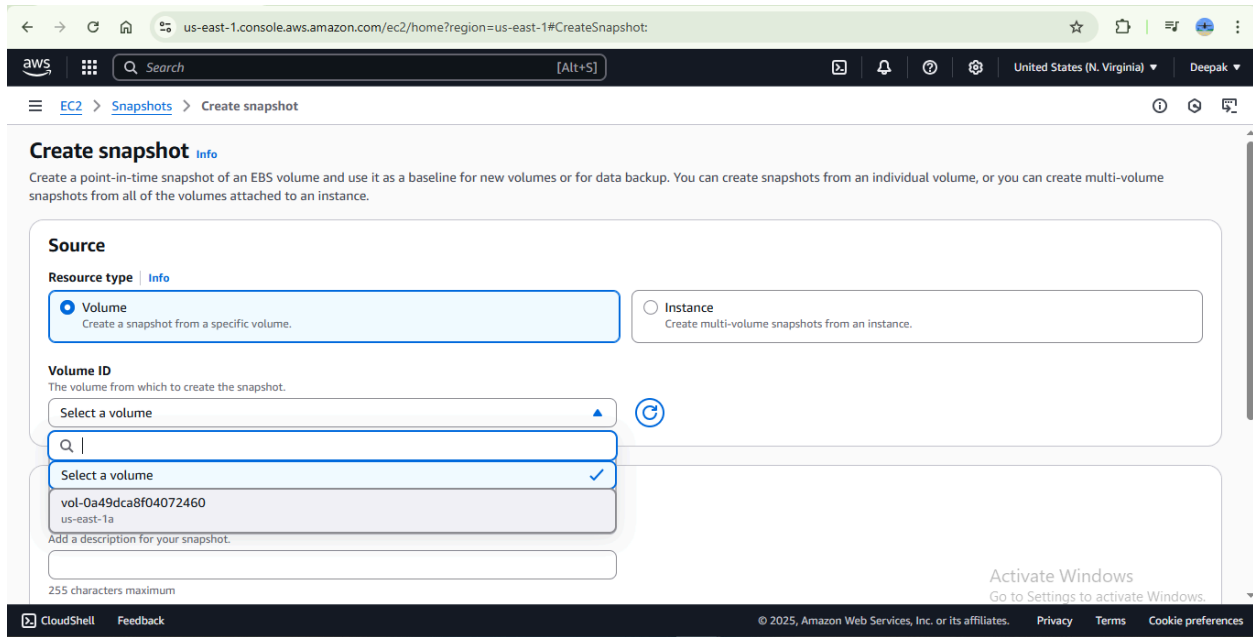
Name	Volume ID	Type	Size	IOPS	Throughput	Snapshot ID	C
	vol-0a49dca8f04072460	gp3	8 GiB	3000	125	snap-0bc1d350c2ac74766	2

Fault tolerance for all volumes in this Region

Activate Windows
Go to Settings to activate Windows.

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Creating a snapshot



Now let's suppose as a DevOps Engineer, there is a need to delete the instance, volume, and snapshots, but we deleted the instance, automatically the volume got deleted, but the snapshot

stayed back!! For such cases we will use lambda function, We are going to write a lambda function that will help us to do this activity.

We are taking Python as a runtime and creating it with default permissions, to understand certain things.

us-east-1.console.aws.amazon.com/lambda/home?region=us-east-1#/create/function?firstrun=true&intent=authorFromScratch

Create function [info](#)

Choose one of the following options to create your function.

- ☒ **Author from scratch**
Start with a simple Hello World example.
- ☐ **Use a blueprint**
Build a Lambda application from sample code and configuration presets for common use cases.
- ☐ **Container image**
Select a container image to deploy for your function.

Basic information

Function name
Enter a name that describes the purpose of your function.

Function name must be 1 to 64 characters, must be unique to the Region, and can't include spaces. Valid characters are a-z, A-Z, 0-9, hyphens (-), and underscores (_).

Runtime [info](#)
Choose the language to use to write your function. Note that the console code editor supports only Node.js, Python, and Ruby.

Architecture [info](#)
Choose the instruction set architecture you want for your function code.
☐ arm64
☒ x86_64

Permissions [info](#)
By default, Lambda will create an execution role with permissions to upload logs to Amazon CloudWatch Logs. You can customize this default role later when adding triggers.

► **Change default execution role**

► **Additional configurations**
Use additional configurations to set up code signing, function URL, tags, and Amazon VPC access for your function.

[Cancel](#) [Create function](#)

Info **Tutorials**

Learn how to implement common use cases in AWS Lambda.

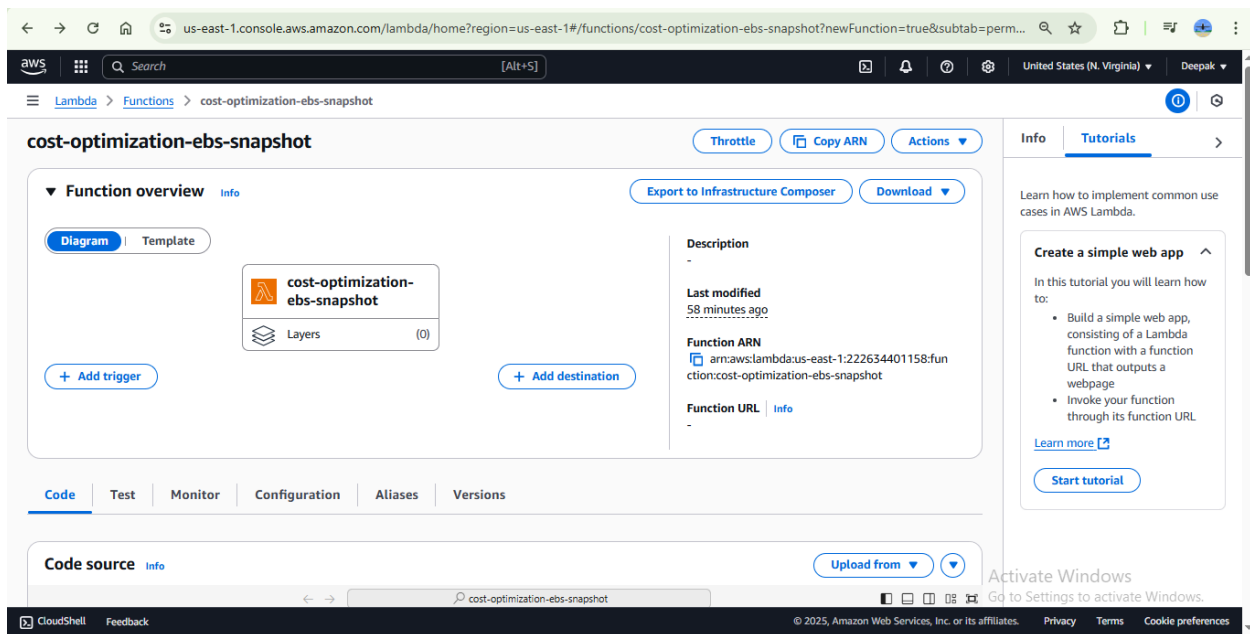
Create a simple web app [^](#)

In this tutorial you will learn how to:

- Build a simple web app, consisting of a Lambda function with a function URL that outputs a webpage
- Invoke your function through its function URL

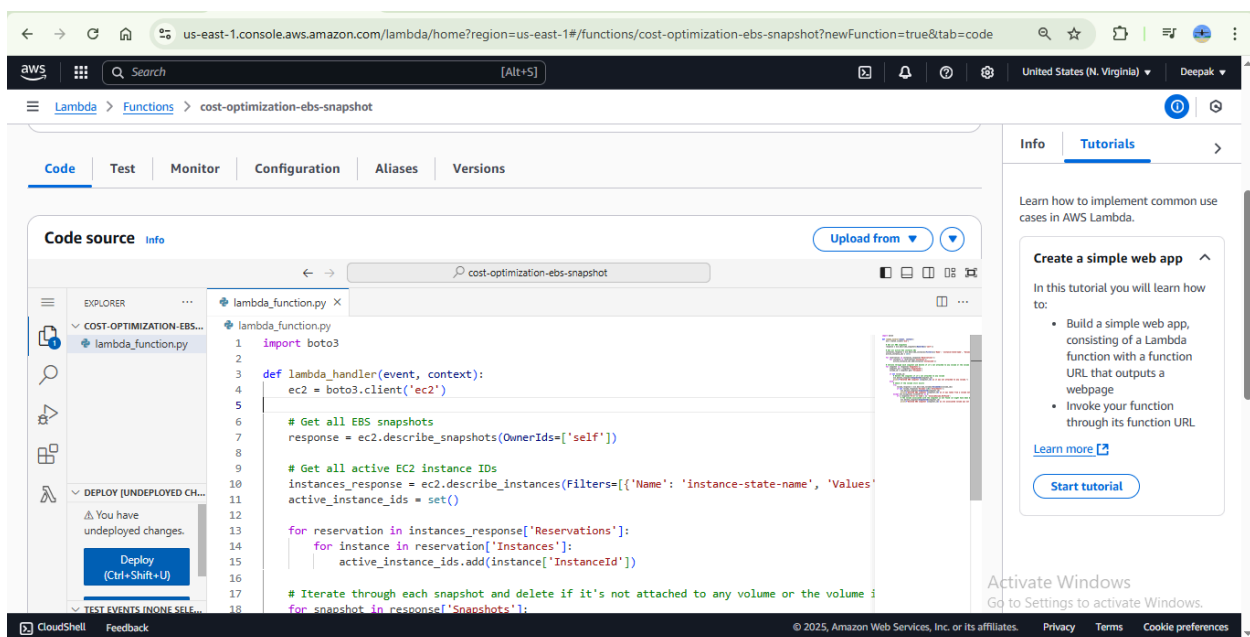
[Learn more](#) [Start tutorial](#)

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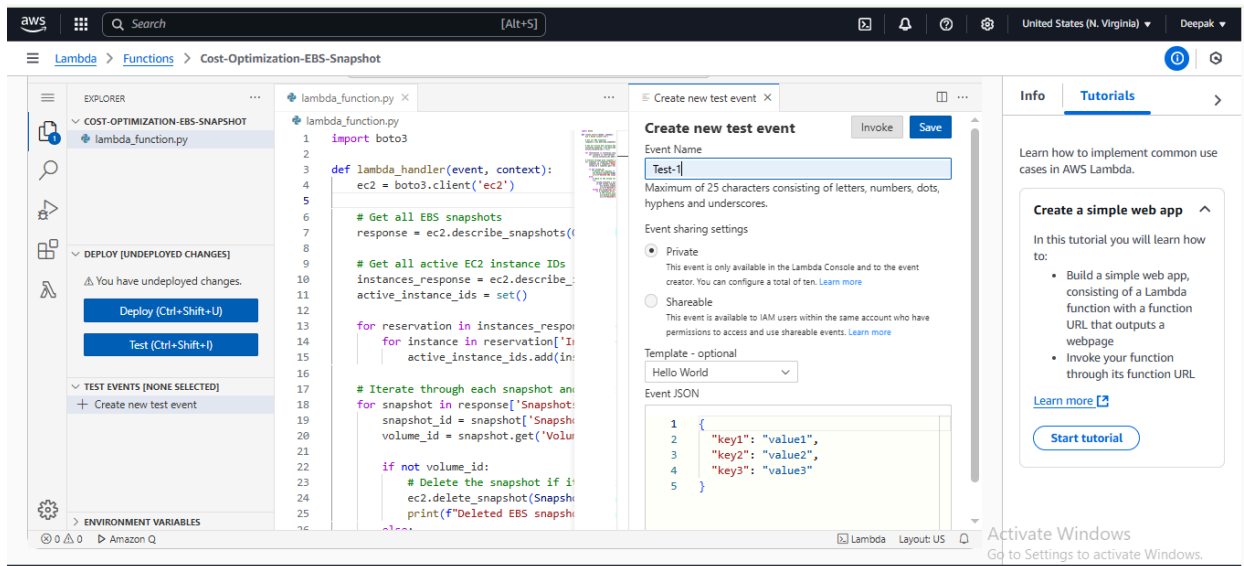


Taking the code from the Abhishek Anna github → https://github.com/iam-veeramalla/aws-devops-zero-to-hero/blob/main/day-18/ebs_stale_snapshots.py

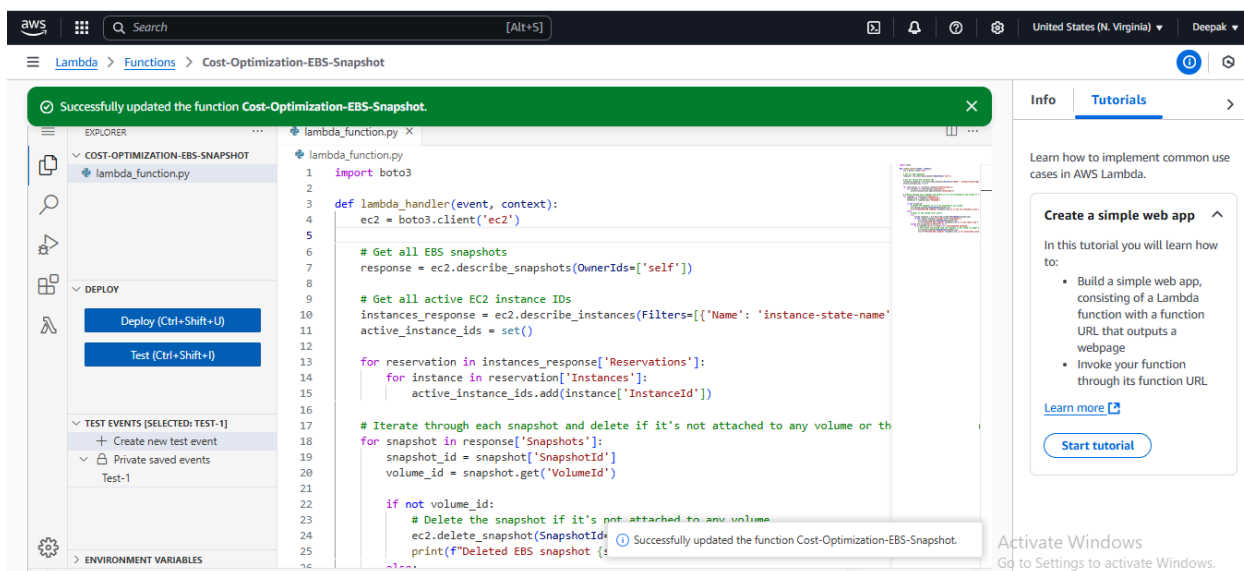
Paste it into the code source



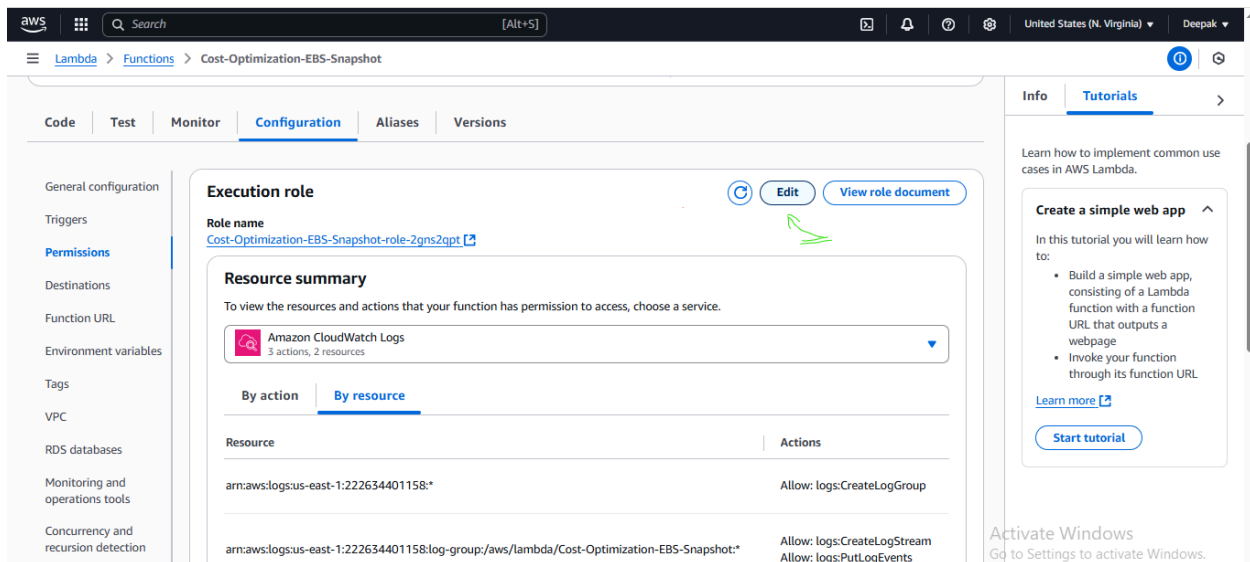
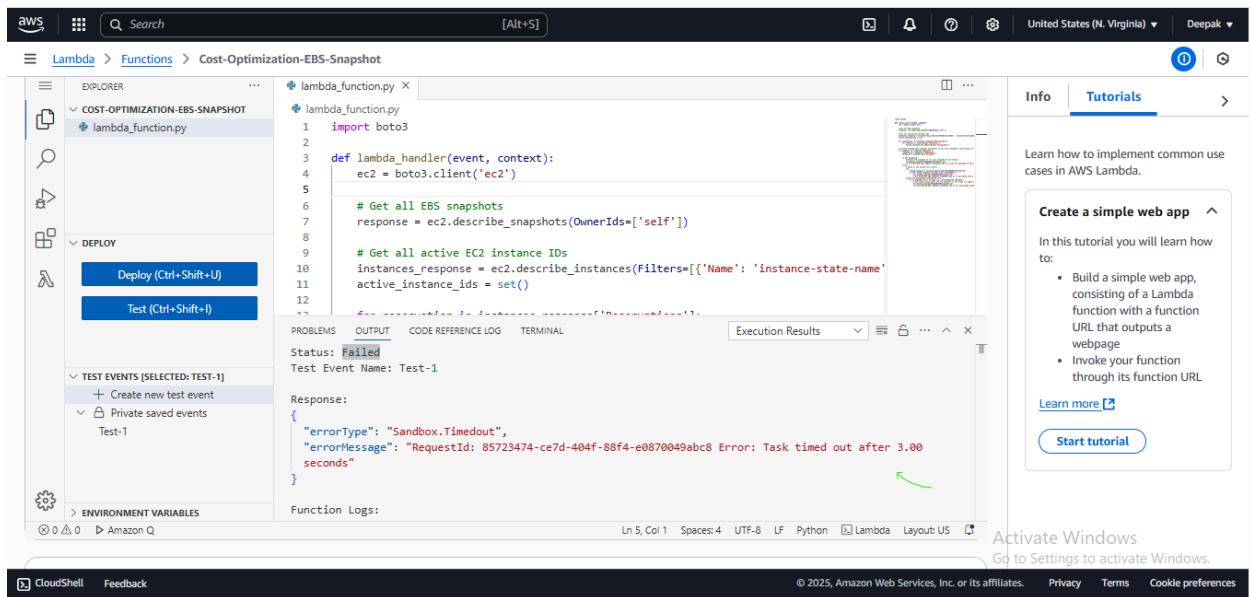
Then create a test event, in the test Template-Optional, you can choose the default one.

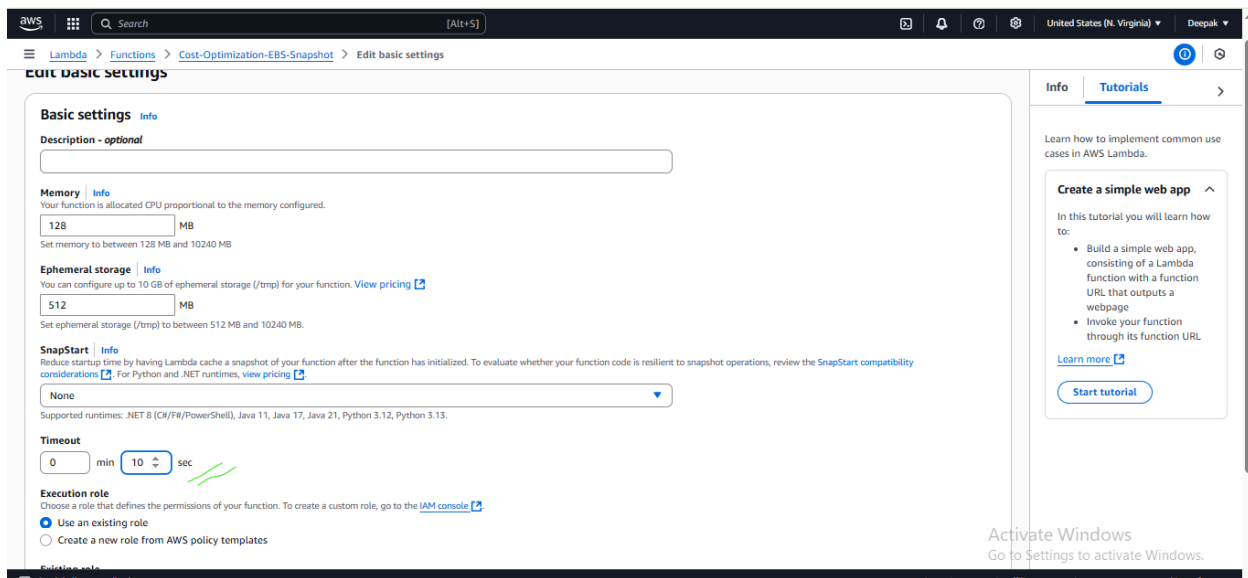


Click on Deploy and then test,

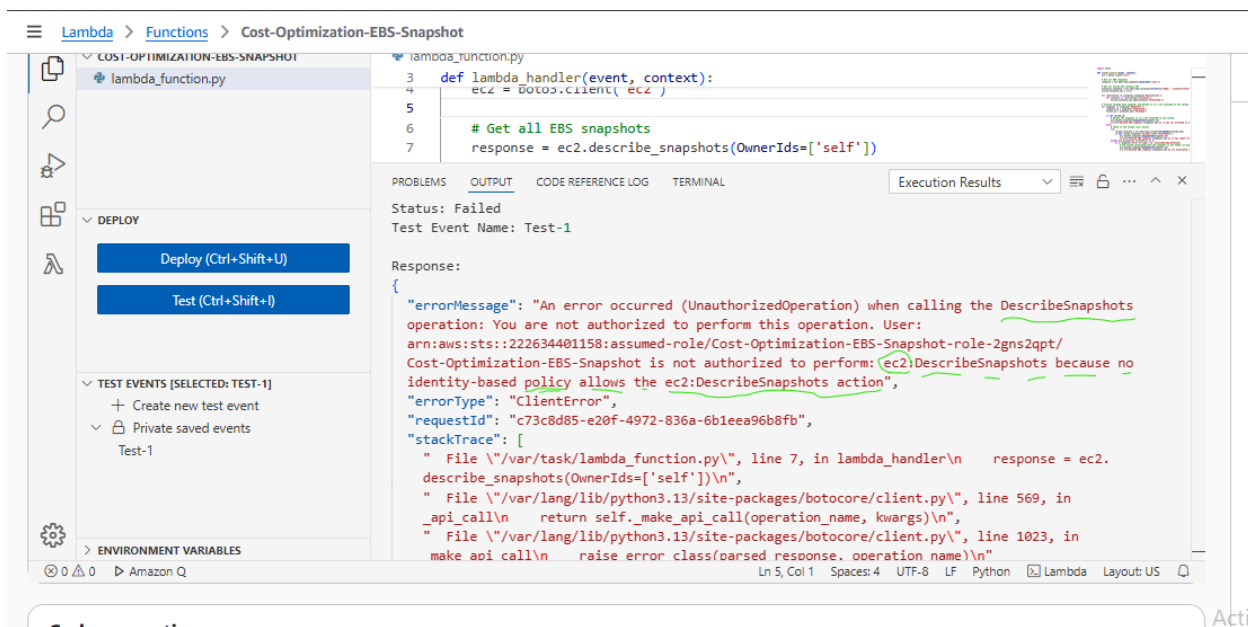


And when clicked test, it given us an error; It gave us an error because of timeout

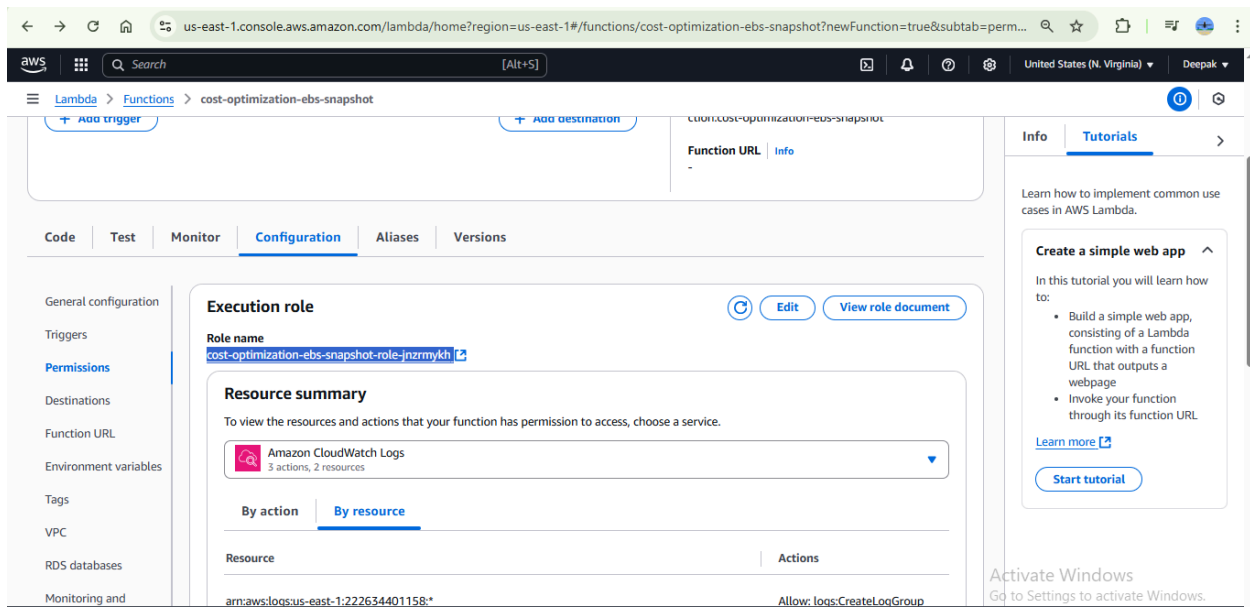




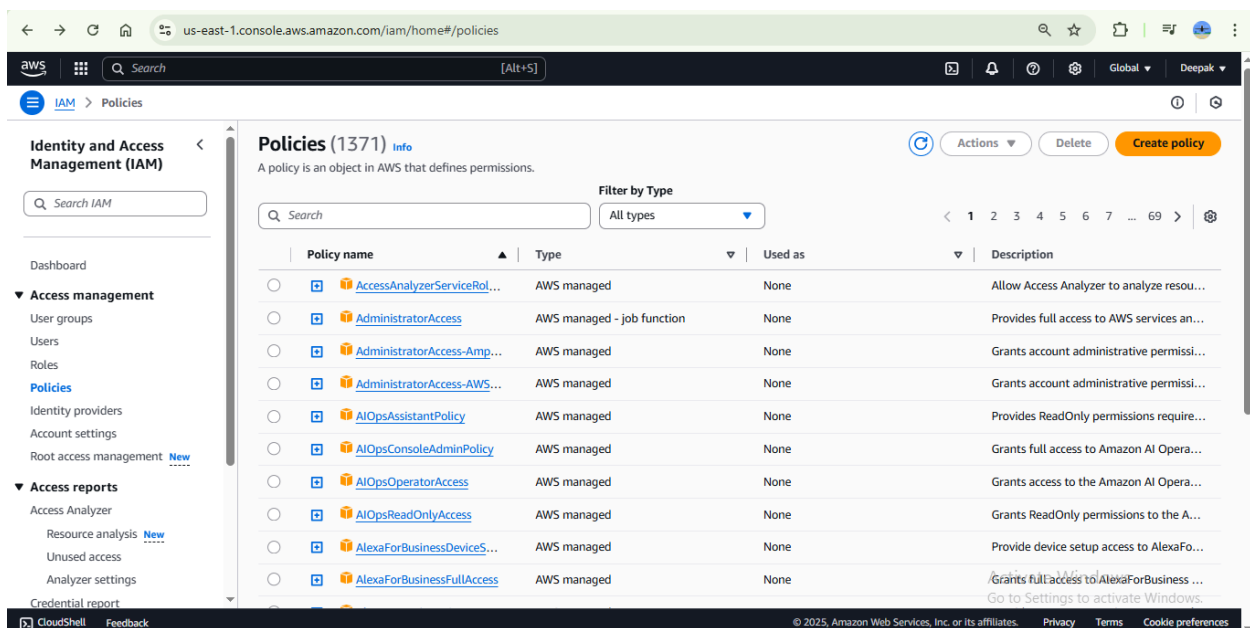
We got again an error because we didn't set permissions



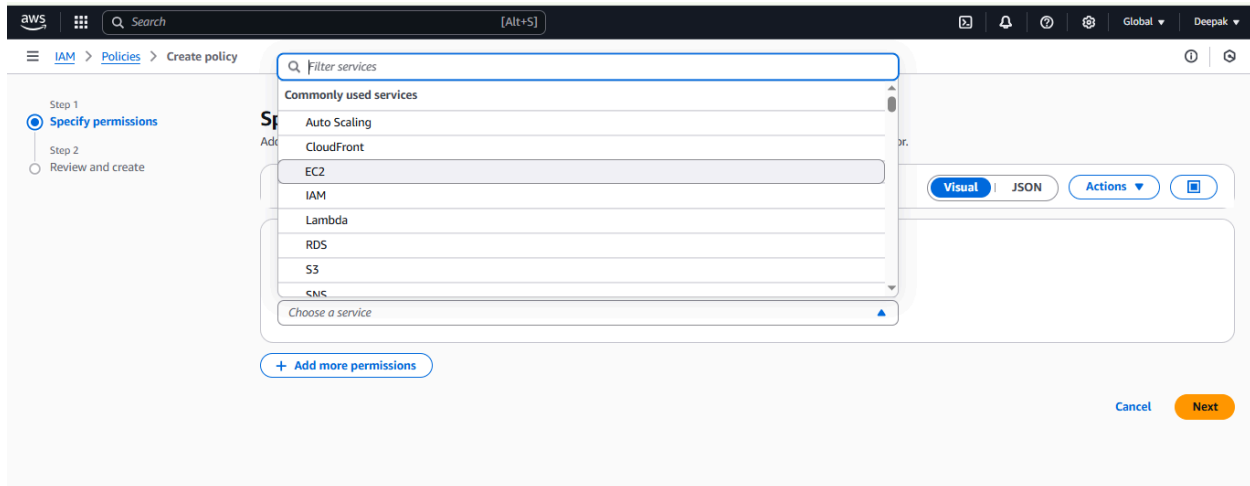
We need to grant permissions, to grant the permissions, we need to know what role is executing these lambda functions.
Go to the configuration → permissions → open the Role link



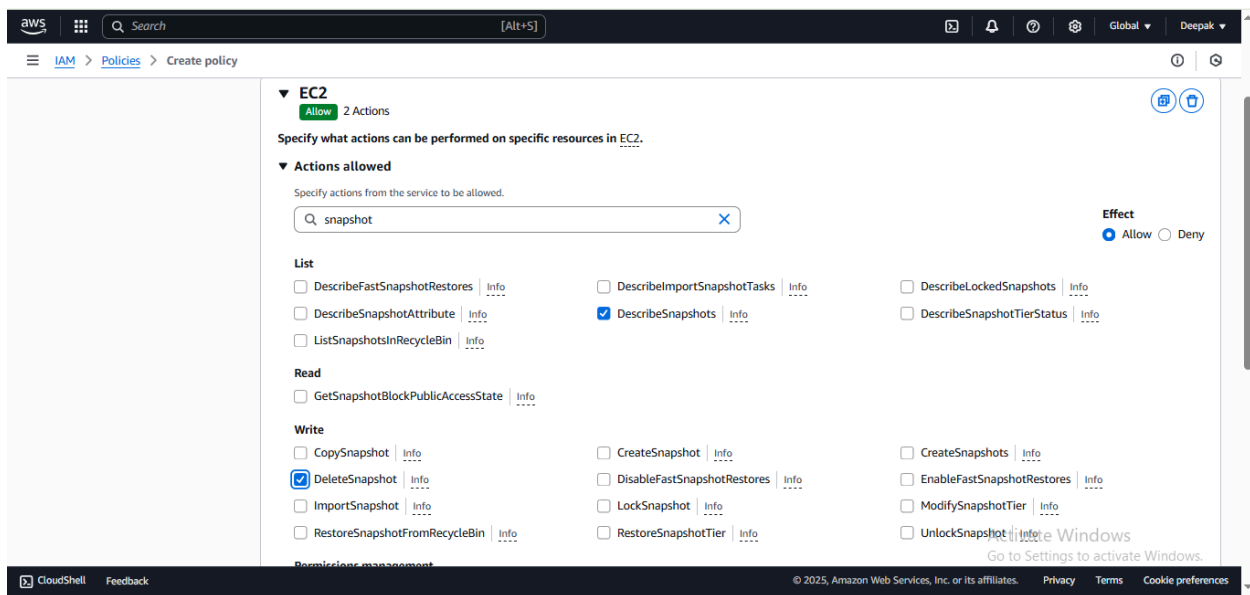
creating a policy

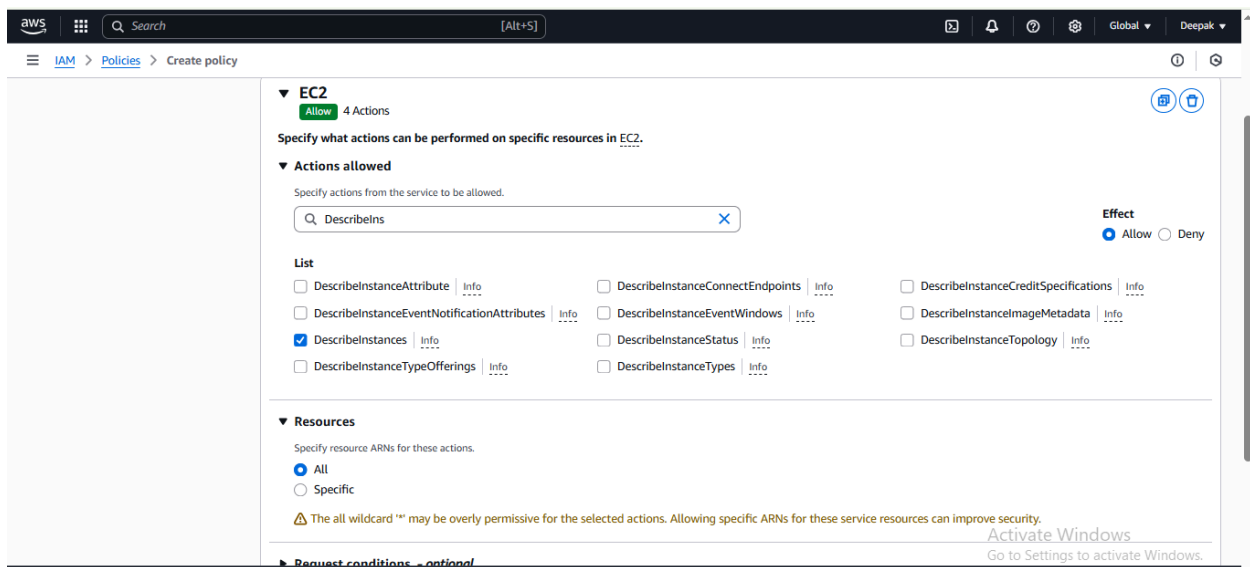
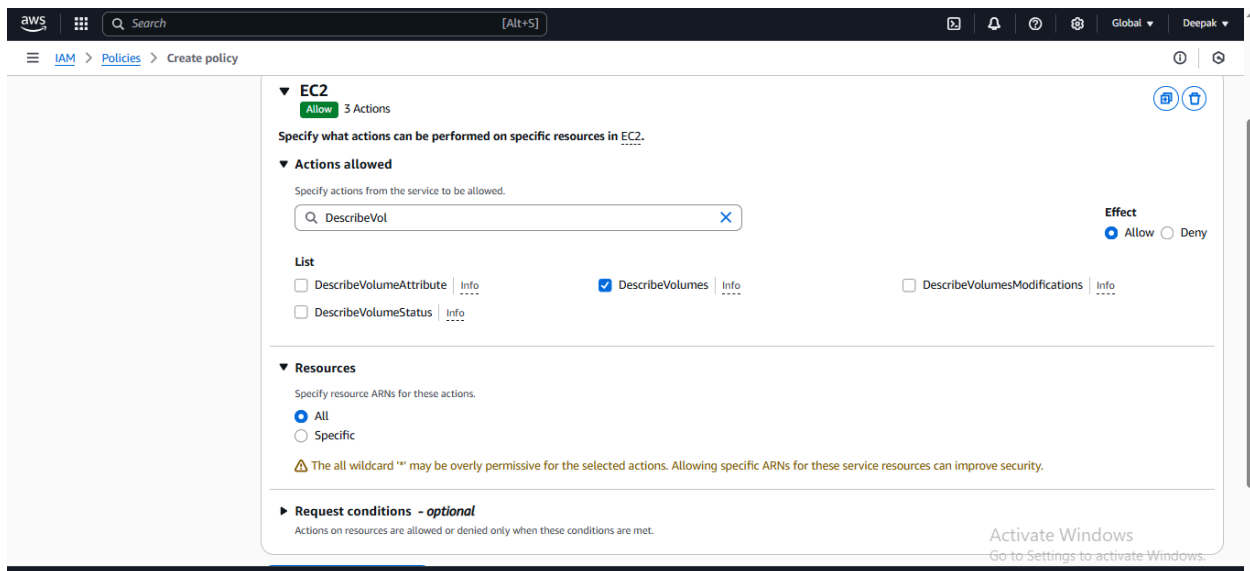


Choose Ec2 then

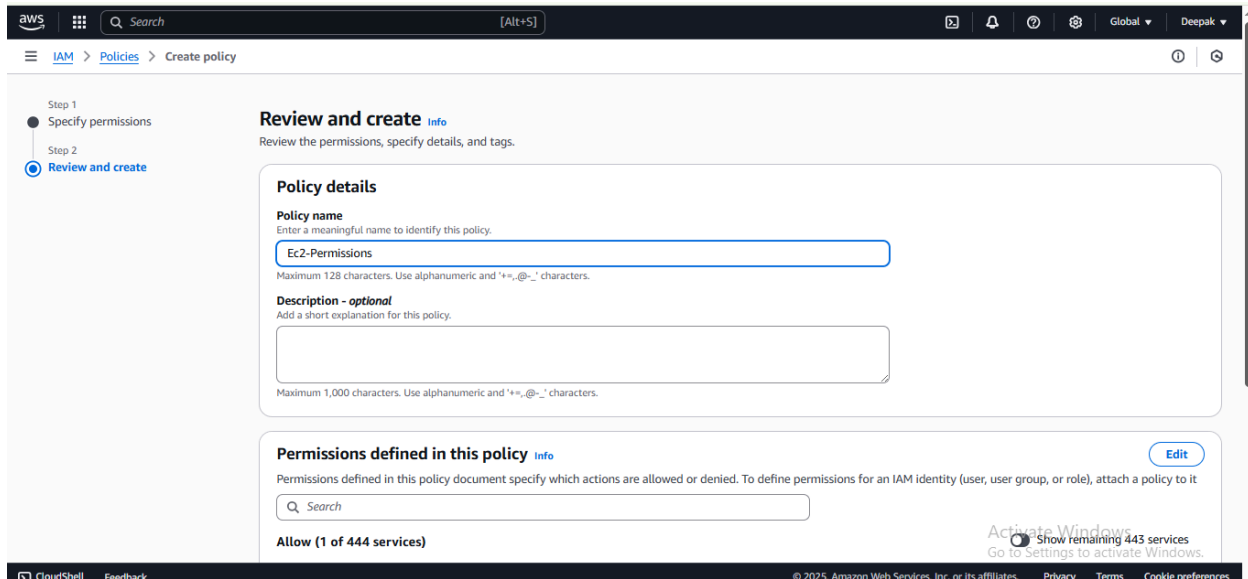


Give permission for snapshot, volumes, instance

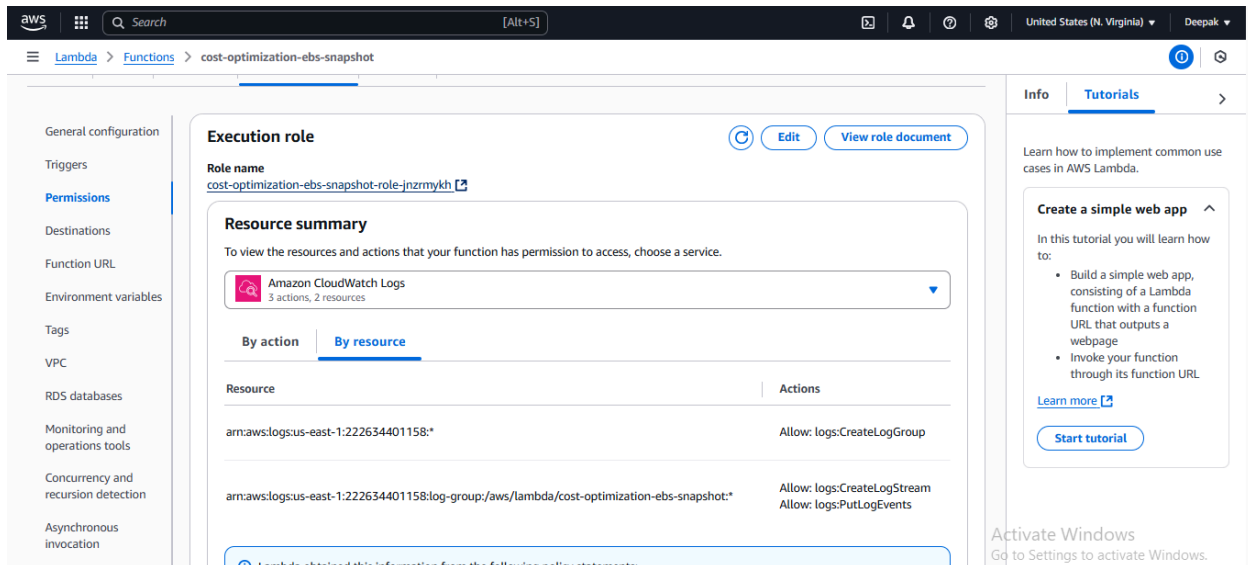


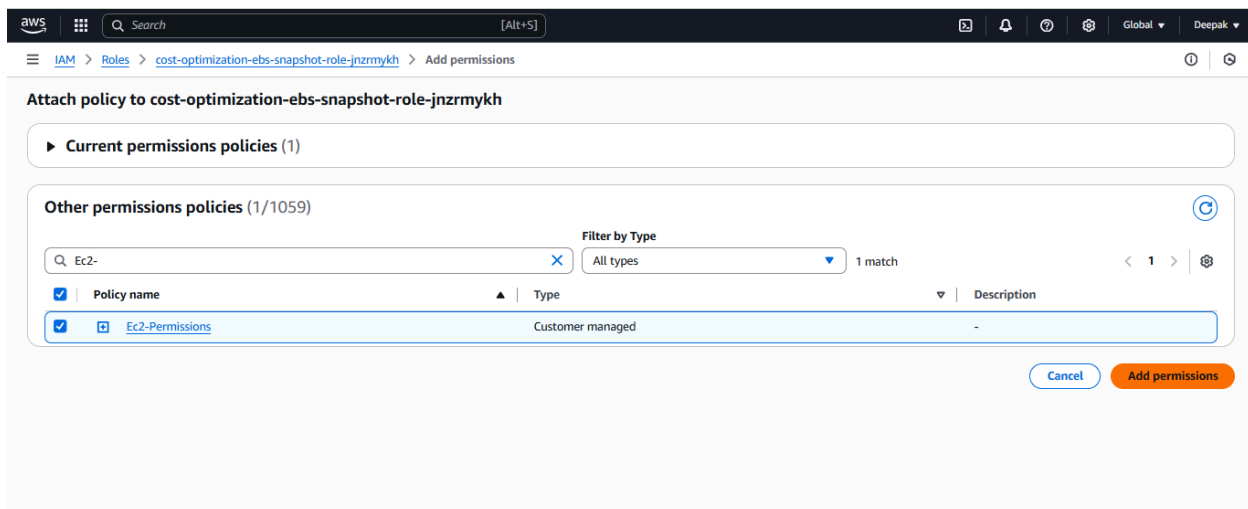
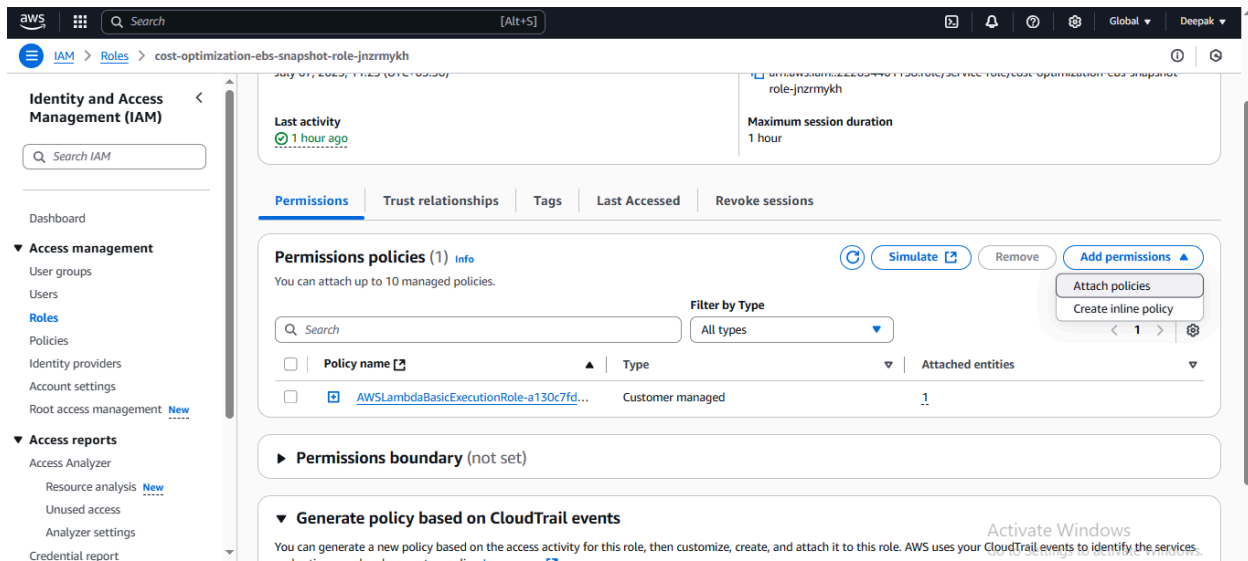


create permission

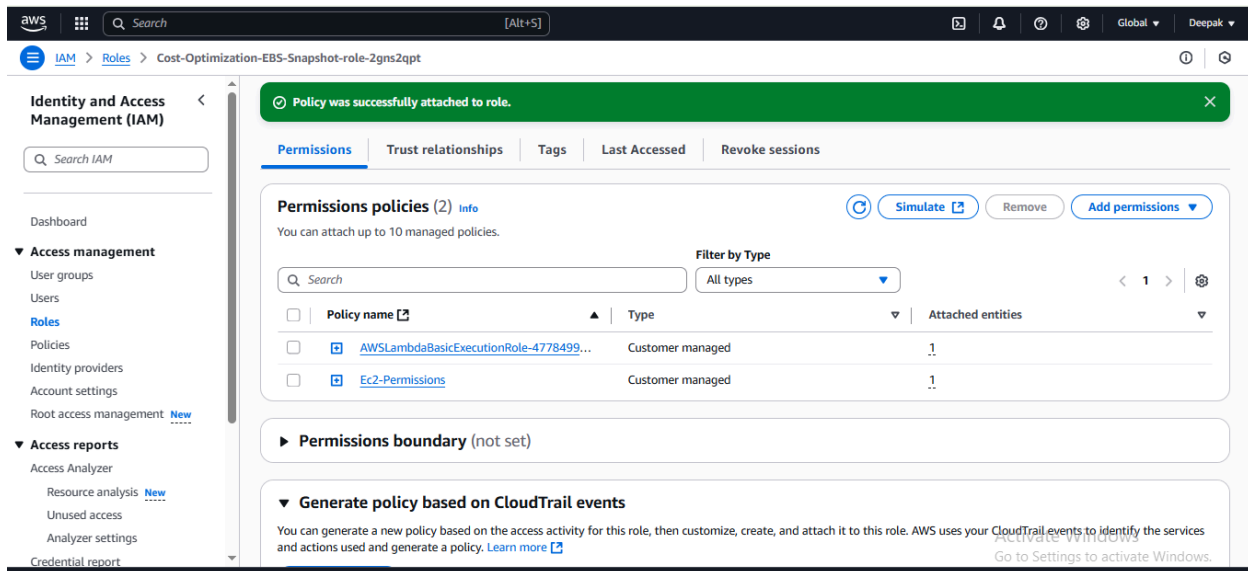


Now, again, going to the Role name link and attaching the policy that we created

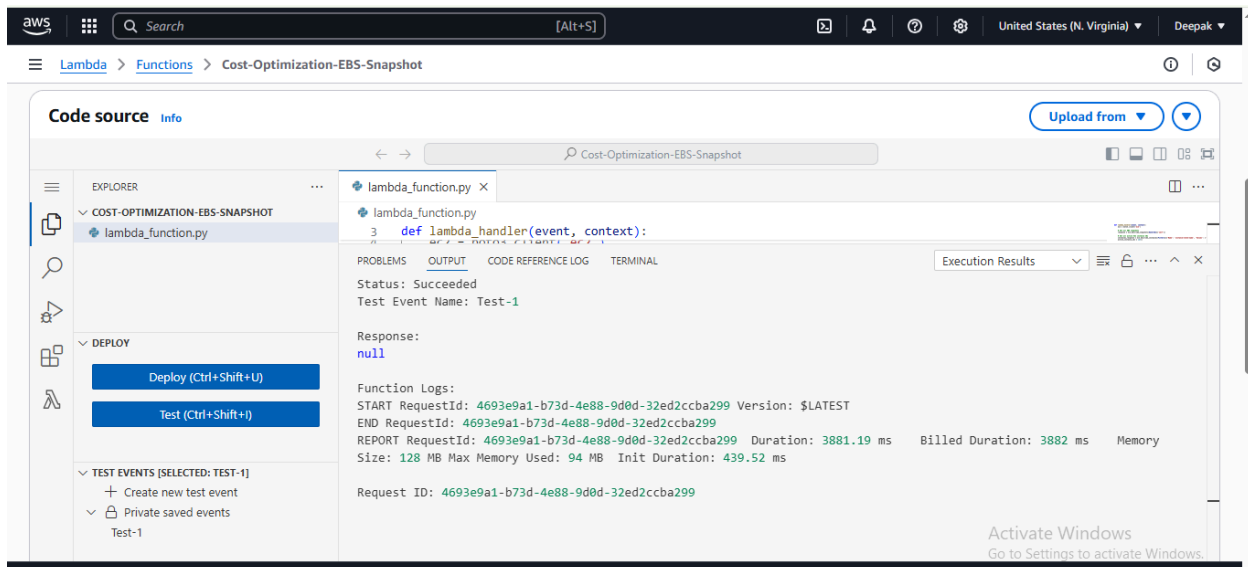




Policies Attached!!



After executing it, you will see that it has succeeded, but the snapshot is not deleted because we wrote the Python function to delete it if it's not attached to any volume or the volume is not attached to a running instance



Snapshots (1) Info

Last updated less than a minute ago

Owned by me Search

Recycle Bin Actions Create snapshot

<input type="checkbox"/>	Name	Snapshot ID	Full snapshot size	Volume size	Description	Storage tier
<input type="checkbox"/>		snap-0d106a7ecd1674359	8 GiB	8 GiB	-	Standard

Now, after deleting the instance, the volume will eventually be deleted, and then we will execute the lambda function, which will delete the snapshot when executed, cause there is no instance and volume attached.

Deleted the instances, volume!!

EC2 > Instances

Instances (1/1) Info

Last updated 1 minute ago

Connect Instance state Actions Launch instances

Find Instance by attribute or tag (case-sensitive) All states

<input checked="" type="checkbox"/>	Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone
<input checked="" type="checkbox"/>	cost-optimizat...	i-05a1bb0055677ca15	Terminated	t2.micro	-	View alarms +	us-east-1a

i-05a1bb0055677ca15 (cost-optimization)




Details Status and alarms Monitoring Security Networking Storage Tags

Instance summary Info

Instance ID i-05a1bb0055677ca15	Public IPv4 address -	Private IPv4 addresses -
IPv6 address -	Instance state Terminated	Public DNS -
Hostname type	Activate Windows Go to Settings to activate Windows.	

We can see only Snapshots as 1 here;

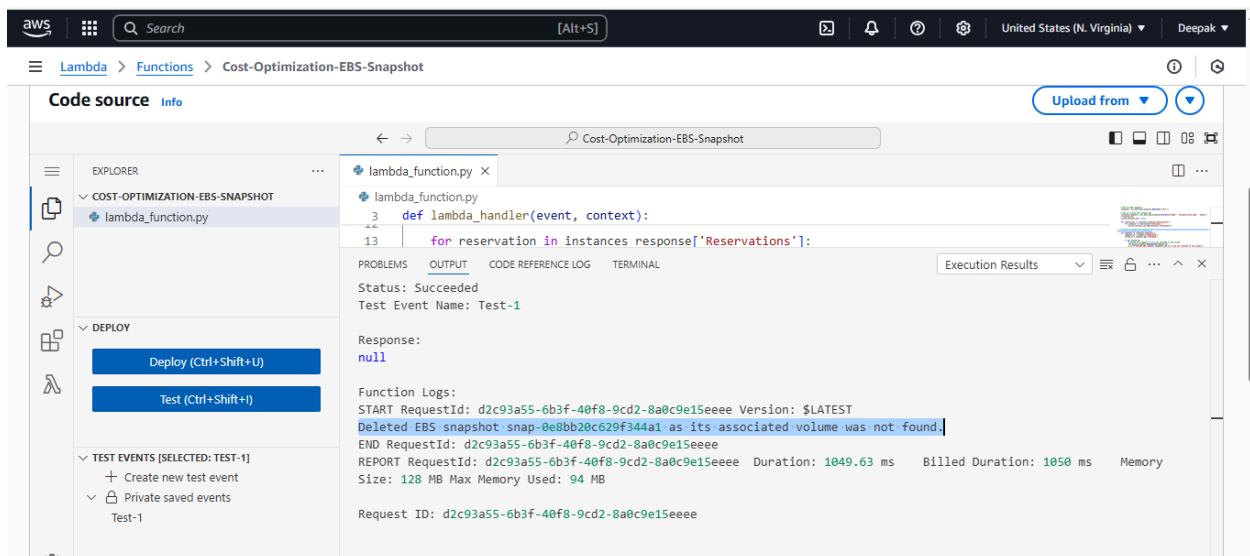
Resources

[EC2 Global View](#)

You are using the following Amazon EC2 resources in the United States (N. Virginia) Region:

Instances (running)	0	Auto Scaling Groups	0
Capacity Reservations	0	Dedicated Hosts	0
Elastic IPs	0	Instances	1
Key pairs	23	Load balancers	0
Placement groups	0	Security groups	2
Snapshots	1	Volumes	0

After executing the lambda function, we can see in the output that snapshot is deleted as no volume is associated.

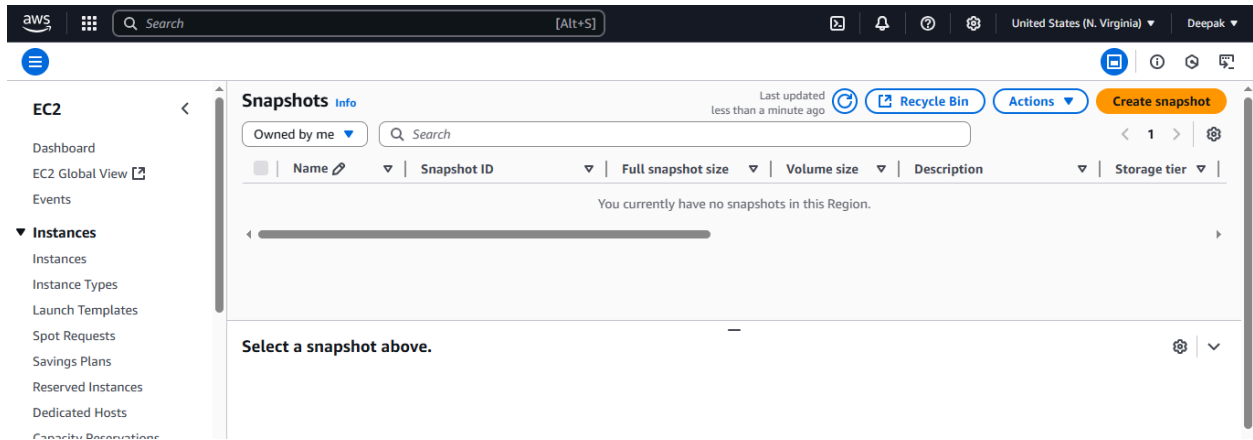


The screenshot shows the AWS Lambda console interface. The top navigation bar includes the AWS logo, a search bar, and the region 'United States (N. Virginia)'. The breadcrumb trail indicates the path: Lambda > Functions > Cost-Optimization-EBS-Snapshot. The main content area is divided into two sections: 'Code source' and 'Info'. The 'Code source' section shows the file 'lambda_function.py' with the following code:

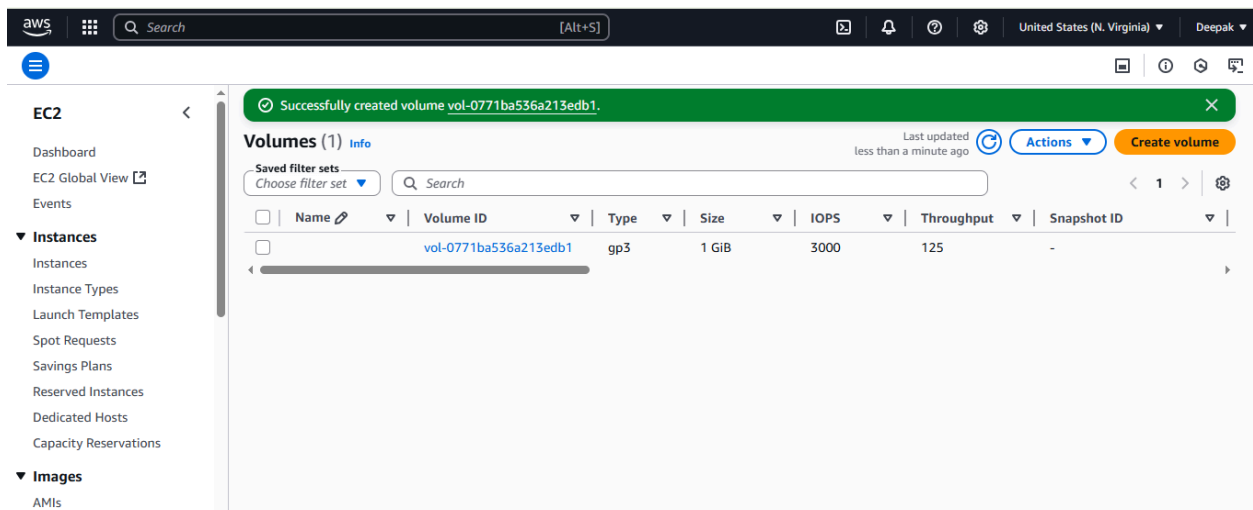
```
def lambda_handler(event, context):
    for reservation in instances response['Reservations']:
```

The 'Info' section displays the execution results for the function. The status is 'Succeeded' and the test event name is 'Test-1'. The response is 'null'. The function logs show the following output:

```
START RequestId: d2c93a55-6b3f-40f8-9cd2-8a0c9e15eeee Version: $LATEST
Deleted EBS snapshot snap-0e8bb20c629f344a1 as its associated volume was not found.
END RequestId: d2c93a55-6b3f-40f8-9cd2-8a0c9e15eeee
REPORT RequestId: d2c93a55-6b3f-40f8-9cd2-8a0c9e15eeee Duration: 1049.63 ms Billed Duration: 1050 ms Memory
Size: 128 MB Max Memory Used: 94 MB
Request ID: d2c93a55-6b3f-40f8-9cd2-8a0c9e15eeee
```

Example- creating a volume and snapshot to see how the lambda functions will behave;



aws

Search

[Alt+S]

United States (N. Virginia)

Deepak

EC2 > Snapshots > Create snapshot

Create snapshot [Info](#)

Create a point-in-time snapshot of an EBS volume and use it as a baseline for new volumes or for data backup. You can create snapshots from an individual volume, or you can create multi-volume snapshots from all of the volumes attached to an instance.

Source

Resource type [Info](#)

☒ Volume
Create a snapshot from a specific volume.

☐ Instance
Create multi-volume snapshots from an instance.

Volume ID
The volume from which to create the snapshot.

vol-0771ba536a213edb1
us-east-1a

Snapshot details

Description
Add a description for your snapshot.

255 characters maximum

Encryption [Info](#)
Not encrypted

Activate Windows
Go to Settings to activate Windows.

aws

Search

[Alt+S]

United States (N. Virginia)

Deepak

Capacity Reservations

▼ Images
AMIs
AMI Catalog

▼ Elastic Block Store
Volumes
Snapshots
Lifecycle Manager

▼ Network & Security
Security Groups
Elastic IPs
Placement Groups
Key Pairs
Network Interfaces

Successfully created snapshot snap-05a80ef22bc6816d1.

Snapshots (1) [Info](#)


Last updated less than a minute ago [Refresh](#) [Recycle Bin](#) [Actions](#) [Create snapshot](#)

Owned by me

Search

<input type="checkbox"/>	Name	Snapshot ID	Full snapshot size	Volume size	Description	Storage tier
<input type="checkbox"/>		snap-05a80ef22bc6816d1	-	1 GiB	-	Standard

Resources

[EC2 Global View](#)



You are using the following Amazon EC2 resources in the United States (N. Virginia) Region:

Instances (running)	0	Auto Scaling Groups	0
Capacity Reservations	0	Dedicated Hosts	0
Elastic IPs	0	Instances	2
Key pairs	23	Load balancers	0
Placement groups	0	Security groups	1
Snapshots	1	Volumes	1

The screenshot displays the AWS Lambda console interface. The top navigation bar shows the AWS logo, a search bar, and the current region 'United States (N. Virginia)'. The breadcrumb trail indicates the path: **Lambda** > **Functions** > **Cost-Optimization-EBS-Snapshot**.


The left-hand sidebar contains the **EXPLORER** panel, which shows the project structure for 'COST-OPTIMIZATION-EBS-SNAPSHOT', including the file **lambda_function.py**. Below this is the **DEPLOY** section with buttons for 'Deploy (Ctrl+Shift+U)' and 'Test (Ctrl+Shift+I)'. The **TEST EVENTS** section shows a list of events, with 'TEST-1' selected.



The main area of the console displays the execution results for the selected test event. The status is 'Succeeded'. The response is 'null'. The function logs show the following details:

- START** RequestId: 71c82430-9b1c-4715-9320-d845fca2264f Version: \$LATEST
- Deleted EBS snapshot snap-05a80ef22bc6816d1 as it was taken from a volume not attached to any running instance.
- END** RequestId: 71c82430-9b1c-4715-9320-d845fca2264f
- REPORT** RequestId: 71c82430-9b1c-4715-9320-d845fca2264f Duration: 3737.54 ms Billed Duration: 3738 ms Memory Size: 128 MB Max Memory Used: 94 MB Init Duration: 294.74 ms

The bottom of the main area displays the Request ID: 71c82430-9b1c-4715-9320-d845fca2264f.

Resources

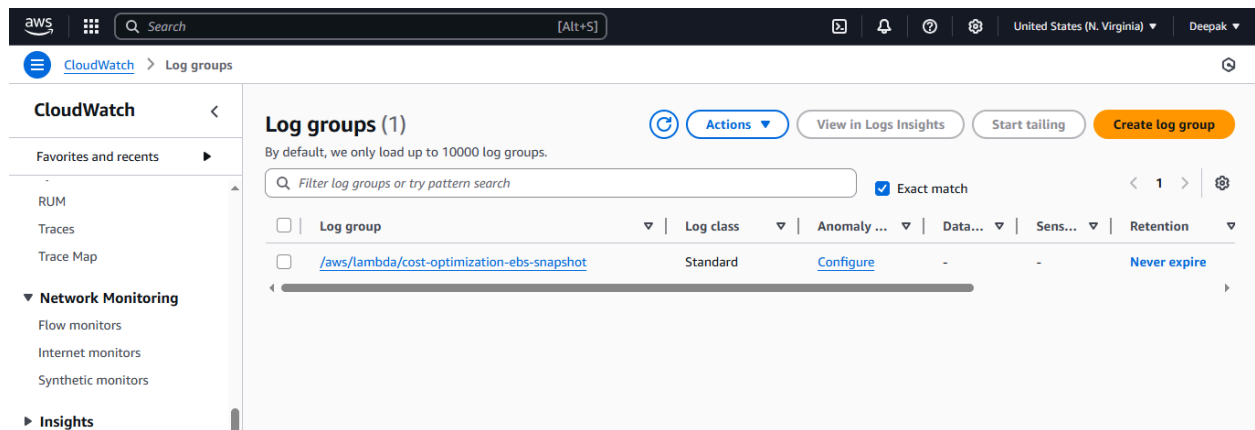
[EC2 Global View](#) 



You are using the following Amazon EC2 resources in the United States (N. Virginia) Region:

Instances (running)	0	Auto Scaling Groups	0
Capacity Reservations	0	Dedicated Hosts	0
Elastic IPs	0	Instances	2
Key pairs	23	Load balancers	0
Placement groups	0	Security groups	1
Snapshots	0	Volumes	1

Deleting the logs from Cloud Watch



The screenshot shows the AWS CloudWatch console interface. The top navigation bar includes the AWS logo, a search bar, and the current region (United States (N. Virginia)). The left sidebar shows the CloudWatch menu with options like Favorites and recents, RUM, Traces, Trace Map, Network Monitoring, and Insights. The main content area is titled 'Log groups (1)' and displays a table of log groups. The table has columns for Log group, Log class, Anomaly, Data, Sens, and Retention. A single log group is listed: '/aws/lambda/cost-optimization-ebs-snapshot' with a retention policy of 'Never expire'. The interface also includes a search bar for log groups, a filter for 'Exact match', and buttons for 'Actions', 'View in Logs Insights', 'Start tailing', and 'Create log group'.

Log group	Log class	Anomaly	Data	Sens	Retention
/aws/lambda/cost-optimization-ebs-snapshot	Standard	Configure	-	-	Never expire

