



# Vivekanand Education Society's

## Institute of Technology

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Hashu Advani Memorial Complex, Collector Colony, Chembur East, Mumbai - 400074.

### Department of Information Technology

A.Y. 2024-25

## Advance DevOps Lab

### Experiment 12

Aim: To Build Your Application using AWS CodeBuild and Deploy on S3 / SEBS using AWS CodePipeline, deploy Sample Application on EC2 instance using AWS CodeDeploy.

Roll No.	22
Name	Sarthak Harade
Class	D15B
Subject	Advance DevOps Lab
LO Mapped	LO1: To understand the fundamentals of Cloud Computing and be fully proficient with Cloud based DevOps solution deployment options to meet your business requirements.  LO6: To engineer a composition of nano services using AWS Lambda and Step Functions with the Serverless Framework
Grade:	

**AIM :** To create a Lambda function which will log “An Image has been added” once you add an object to a specific bucket in S3.

## **THEORY :**

### AWS Lambda and S3 Integration

Delving into the powerful integration between AWS Lambda and Amazon S3, a popular use case in serverless architecture. AWS Lambda enables automatic execution of code in response to events generated by other AWS services, such as the addition of an object to an S3 bucket.

### Event-Driven Architecture

AWS Lambda operates on an event-driven model, where specific events trigger the execution of predefined functions. In this case, when an object like an image is uploaded to a specific S3 bucket, S3 generates an event notification. This event is sent to AWS Lambda, which then triggers the function you have created. The function can be designed to perform various tasks, such as processing the object, extracting metadata, or, as in this experiment, simply logging a message—“An Image has been added.”

### Automation and Real-Time Processing

The integration of AWS Lambda with S3 is a prime example of automation in the cloud. It allows you to set up a real-time response system where actions are automatically triggered without manual intervention. This is particularly useful in scenarios where immediate processing or reaction is required, such as in applications that handle large volumes of incoming data or media files.

### Scalability and Efficiency

One of the key advantages of using AWS Lambda with S3 is its scalability. Lambda functions can automatically scale to handle multiple events concurrently, ensuring that no matter how many objects are added to the S3 bucket, each will trigger the necessary function without delay. This setup is highly efficient, reducing operational overhead and ensuring that processes remain consistent and reliable, even under heavy workloads.

### Use Cases and Practical Applications

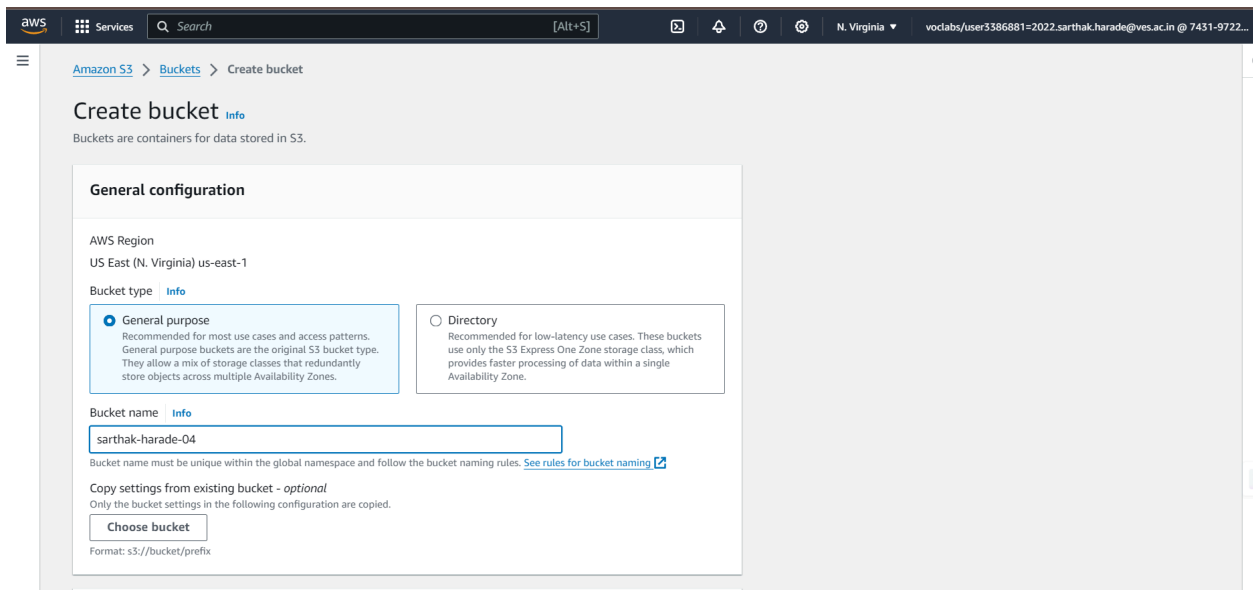
This type of setup is widely used in various domains, including media processing, where images or videos uploaded to S3 can trigger Lambda functions to generate thumbnails or transcode files. It is also commonly used in data analytics, where data uploaded to S3 triggers processing

functions that prepare the data for further analysis or storage. Another application is in backup systems, where new files added to S3 are immediately backed up or replicated in other locations.

## Security Considerations

When working with AWS Lambda and S3, security is paramount. Each Lambda function interacts with S3 via permissions defined by AWS IAM roles and policies. These permissions must be carefully configured to ensure that the function has the necessary access rights—such as read and write permissions for the specific S3 bucket—without exposing unnecessary access to other resources. This ensures that the system remains secure while performing the required tasks efficiently.

Create an S3 Bucket. Enter a unique bucket name.



The screenshot shows the AWS Management Console interface for creating a new S3 bucket. The breadcrumb navigation at the top indicates the path: Amazon S3 > Buckets > Create bucket. The main heading is 'Create bucket' with an 'Info' link. Below this, a sub-header 'General configuration' is displayed. The 'AWS Region' is set to 'US East (N. Virginia) us-east-1'. Under 'Bucket type', there are two options: 'General purpose' (selected with a radio button) and 'Directory'. The 'General purpose' option includes a description: 'Recommended for most use cases and access patterns. General purpose buckets are the original S3 bucket type. They allow a mix of storage classes that redundantly store objects across multiple Availability Zones.' The 'Directory' option is described as 'Recommended for low-latency use cases. These buckets use only the S3 Express One Zone storage class, which provides faster processing of data within a single Availability Zone.' The 'Bucket name' field is populated with 'sarthak-harade-04'. A note below the field states: 'Bucket name must be unique within the global namespace and follow the bucket naming rules. See rules for bucket naming'. There is a 'Choose bucket' button and a note about copying settings from an existing bucket. The format 's3://bucket/prefix' is shown at the bottom.

aws Services Search [Alt+S] N. Virginia voclabs/user3386881=2022.sarthak.harade@ves.ac.in @ 7431-9722...

Amazon S3 > Buckets > Create bucket

### Create bucket [Info](#)

Buckets are containers for data stored in S3.

#### General configuration

AWS Region  
US East (N. Virginia) us-east-1

Bucket type [Info](#)

☒ **General purpose**  
Recommended for most use cases and access patterns. General purpose buckets are the original S3 bucket type. They allow a mix of storage classes that redundantly store objects across multiple Availability Zones.

☐ **Directory**  
Recommended for low-latency use cases. These buckets use only the S3 Express One Zone storage class, which provides faster processing of data within a single Availability Zone.

Bucket name [Info](#)  
sarthak-harade-04

Bucket name must be unique within the global namespace and follow the bucket naming rules. [See rules for bucket naming](#)

Copy settings from existing bucket - *optional*  
Only the bucket settings in the following configuration are copied.

[Choose bucket](#)

Format: s3://bucket/prefix

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Object Ownership info

Control ownership of objects written to this bucket from other AWS accounts and the use of access control lists (ACLs). Object ownership determines who can specify access to objects.

ACLs disabled (recommended)

All objects in this bucket are owned by this account. Access to this bucket and its objects is specified using only policies.

ACLs enabled

Objects in this bucket can be owned by other AWS accounts. Access to this bucket and its objects can be specified using ACLs.

Object Ownership

Bucket owner enforced

Block Public Access settings for this bucket

Public access is granted to buckets and objects through access control lists (ACLs), bucket policies, access point policies, or all. In order to ensure that public access to this bucket and its objects is blocked, turn on Block all public access. These settings apply only to this bucket and its access points. AWS recommends that you turn on Block all public access, but before applying any of these settings, ensure that your applications will work correctly without public access. If you require some level of public access to this bucket or objects within, you can customize the individual settings below to suit your specific storage use cases. [Learn more](#)

☒ Block all public access

Turning this setting on is the same as turning on all four settings below. Each of the following settings are independent of one another.

☒ Block public access to buckets and objects granted through new access control lists (ACLs)

S3 will block public access permissions applied to newly added buckets or objects, and prevent the creation of new public access ACLs for existing buckets and objects. This setting doesn't change any existing permissions that allow public access to S3 resources using ACLs.

☒ Block public access to buckets and objects granted through any access control lists (ACLs)

S3 will ignore all ACLs that grant public access to buckets and objects.

☒ Block public access to buckets and objects granted through new public bucket or access point policies

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Successfully created bucket "sarthak-harade-04"

To upload files and folders, or to configure additional bucket settings, choose [View details](#).

Amazon S3 > Buckets

Account snapshot - updated every 24 hours

Storage lens provides visibility into storage usage and activity trends. [Learn more](#)

View Storage Lens dashboard

General purpose buckets

Directory buckets

General purpose buckets (2)

Buckets are containers for data stored in S3.

Refresh

Copy ARN

Empty

Delete

Create bucket

< 1 >

Name	AWS Region	IAM Access Analyzer	Creation date
<input type="radio"/> <a href="#">elasticbeanstalk-us-east-1-743197227673</a>	US East (N. Virginia) us-east-1	<a href="#">View analyzer for us-east-1</a>	July 30, 2024, 09:15:09 (UTC+05:30)
<input type="radio"/> <a href="#">sarthak-harade-04</a>	US East (N. Virginia) us-east-1	<a href="#">View analyzer for us-east-1</a>	September 30, 2024, 21:24:02 (UTC+05:30)

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Lambda > Functions

Functions (5)

Last fetched 11 seconds ago

Actions

Create function

< 1 >

Function name	Description	Package type	Runtime	Last modified
<input type="checkbox"/> <a href="#">RoleCreationFunction</a>	Create SLR if absent	Zip	Python 3.8	2 months ago
<input type="checkbox"/> <a href="#">ModLabRole</a>	updates LabRole to allow it to assume itself	Zip	Python 3.8	2 months ago
<input type="checkbox"/> <a href="#">MainMonitoringFunction</a>	-	Zip	Python 3.8	2 months ago
<input type="checkbox"/> <a href="#">RedshiftEventSubscription</a>	Create Redshift event subscription to SNS Topic.	Zip	Python 3.8	2 months ago
<input type="checkbox"/> <a href="#">RedshiftOverwatch</a>	Deletes Redshift Cluster if the count is more than 2.	Zip	Python 3.8	2 months ago

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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.

sarthak-harade-04-lambda

Use only letters, numbers, hyphens, or underscores with no spaces.

Runtime

info

Choose the language to use to write your function. Note that the console code editor supports only Node.js, Python, and Ruby.

Python 3.12

Architecture

info

Choose the instruction set architecture you want for your function code.

x86\_64

arm64

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

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x86\_64

arm64

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

Execution role

Choose a role that defines the permissions of your function. To create a custom role, go to the [IAM console](#).

Create a new role with basic Lambda permissions

Use an existing role

Create a new role from AWS policy templates

Existing role

Choose an existing role that you've created to be used with this Lambda function. The role must have permission to upload logs to Amazon CloudWatch Logs.

LabRole

View the LabRole role on the IAM console.

Advanced settings

Cancel

Create function

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Successfully created the function sarthak-harade-04-lambda. You can now change its code and configuration. To invoke your function with a test event, choose "Test".

Lambda > Functions > sarthak-harade-04-lambda

### sarthak-harade-04-lambda

Throttle Copy ARN Actions

Function overview Info

Export to Application Composer Download

Diagram Template

sarthak-harade-04-lambda

Layers (0)

+ Add trigger + Add destination

Description

Last modified 2 seconds ago

Function ARN arn:aws:lambda:us-east-1:743197227673:function:sarthak-harade-04-lambda

Function URL Info

Code Test Monitor Configuration Aliases Versions

aws Services Search [Alt+S] N. Virginia voclabs/user3386881=2022.sarthak.harade@ves.ac.in @ 7431-9722...

Successfully updated the function sarthak-harade-04-lambda.

Code Test Monitor Configuration Aliases Versions

### Code source Info

Upload from

File Edit Find View Go Tools Window Test Deploy

Go to Anything (Ctrl-P)

Environment

sarthak-harade-04-lambda

lambda\_function.py

```
1 import json
2
3 def lambda_handler(event, context):
4     # Extract bucket name and object key from the event
5     bucket_name = event['Records'][0]['s3']['bucket']['name']
6     object_key = event['Records'][0]['s3']['object']['key']
7
8     # Log a message
9     print(f"An Image has been added to the bucket {bucket_name}: {object_key}")
10
11     return {
12         'statusCode': 200,
13         'body': json.dumps('Log entry created successfully')
14     }
15
16
```

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Lambda

Add triggers

## Add trigger

Trigger configuration

Info

S3

aws asynchronous storage

Bucket

Choose or enter the ARN of an S3 bucket that serves as the event source. The bucket must be in the same region as the function.

s3/sarthak-harade-04

X

↺

Bucket region: us-east-1

Event types

Select the events that you want to have trigger the Lambda function. You can optionally set up a prefix or suffix for an event. However, for each bucket, individual events cannot have multiple configurations with overlapping prefixes or suffixes that could match the same object key.

All object create events X

Prefix - optional

Enter a single optional prefix to limit the notifications to objects with keys that start with matching characters. Any special characters must be URL encoded.

e.g. images/

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Lambda

Functions

sarthak-harade-04-lambda

## sarthak-harade-04-lambda

Throttle

Copy ARN

Actions

The trigger sarthak-harade-04 was successfully added to function sarthak-harade-04-lambda. The function is now receiving events from the trigger.

Function overview

Info

Export to Application Composer

Download

Diagram

Template

sarthak-harade-04-lambda

Layers (0)

S3

+ Add trigger

+ Add destination

Description

-

Last modified

5 minutes ago

Function ARN

arn:aws:lambda:us-east-1:743197227673:function:sarthak-harade-04-lambda

Function URL

Info

Code

Test

Monitor

Configuration

Aliases

Versions

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Code

Test

Monitor

Configuration

Aliases

Versions

General configuration

Triggers

Permissions

Destinations

Function URL

Environment variables

Tags

VPC

RDS databases

Monitoring and operations tools

Concurrency and recursion detection

Asynchronous invocation

Triggers (1) Info

Fix errors

Edit

Delete

Add trigger

Find triggers

< 1 >

Trigger

S3: sarthak-harade-04

arn:aws:s3::sarthak-harade-04

Details

aws

Services

Search

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N. Virginia

voclabs/user3386881=2022.sarthak.harade@ves.ac.in @ 7431-9722...

General configuration

Triggers

Permissions

Destinations

Function URL

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Asynchronous invocation

Code signing

File systems

Execution role

View role document

Role name

LabRole

Resource summary

User: arn:aws:sts::743197227673:assumed-role/voclabs/user3386881=2022.sarthak.harade@ves.ac.in is not authorized to perform: iam:GetPolicy on resource: policy arn:aws:iam::743197227673:policy/c127008a3184649f7159654t1w743197227673-VocLabPolicy2-FfYDkYyhHhVt with an explicit deny in an identity-based policy

Resource-based policy statements (1) Info

View policy

Edit

Delete

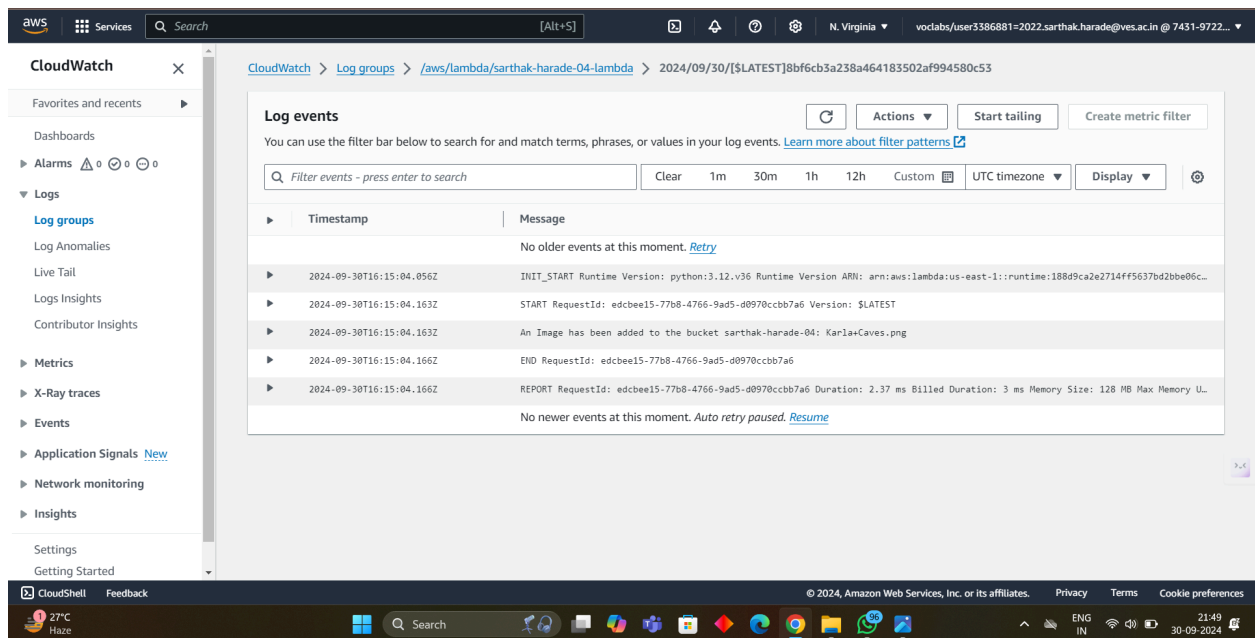
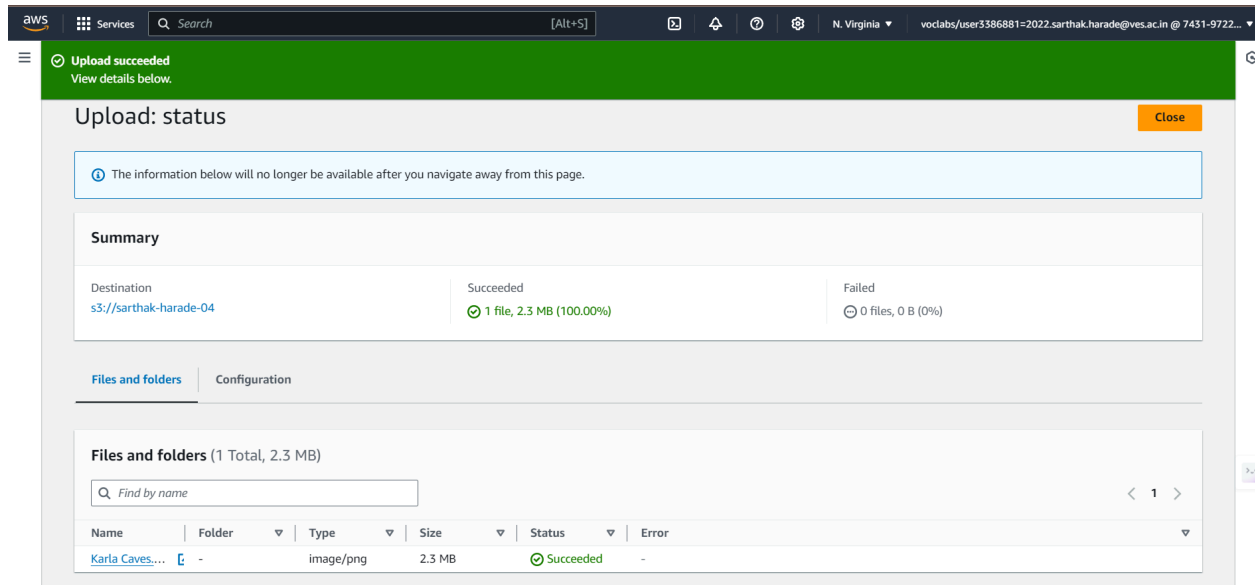
Add permissions

Find policy statements

< 1 >

Statement ID	Principal	PrincipalOrgID	Conditions	Action
lambda-25370e5a-456f...	s3.amazonaws.com	-	StringEquals, ArnLike	lambda:InvokeFunction





**CONCLUSION :** By integrating AWS Lambda with S3, you can create a seamless, automated process that responds instantly to changes in your S3 bucket. This not only improves efficiency but also allows for greater flexibility in handling data and media in real-time, making it a powerful tool in modern cloud-based applications.