Name:Krushikesh Shelar 2024-2025 D15C Roll No:51

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:
AWS Lambda allows you to execute code in response to
various events, including those triggered by Amazon S3. When an object is added to an S3 bucket, it can trigger a Lambda function to execute, allowing for event-driven processing without managing servers.

Workflow:
1. Create an S3 Bucket:
○ First, create an S3 bucket that will store the objects. This bucket will act as the trigger source for the Lambda function.

2. Create the Lambda Function:
○ Set up a new Lambda function using AWS Lambda’s console. You can choose a runtime environment like Python, Node.js, or Java.
○ Write code that logs a message like “An Image has been added” when triggered.

3. Set Up Permissions:
○ Ensure that the Lambda function has the necessary permissions to access S3. You can do this by attaching an IAM role with policies that allow reading from the bucket and writing logs to CloudWatch.

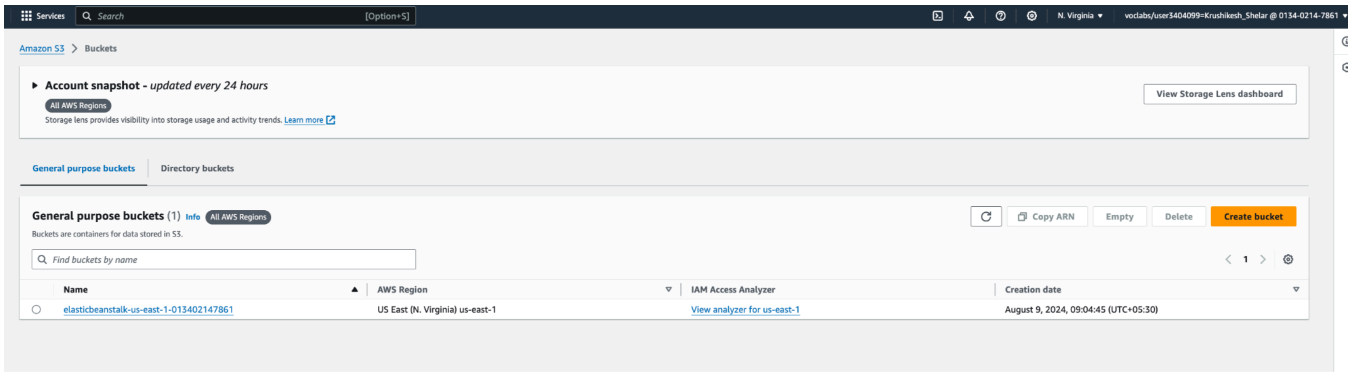
4. Configure S3 Trigger:
○ Link the S3 bucket to the Lambda function by setting up a trigger. Specify that the function should be triggered when an object is created in the bucket (e.g., when an image is uploaded).

5. Test the Setup:
○ Upload an object (e.g., an image) to the S3 bucket to test the trigger. The Lambda function should execute and log the message “An Image has been added” in AWS CloudWatch Logs.

Steps To create the lambda function:

Name:Krushikesh Shelar **2024-2025** **D15C** **Roll No:51**

Step 1: Login to your AWS Academy account. Now open S3 from services and click on create S3 bucket.



Account snapshot - *updated every 24 hours*

All AWS Regions

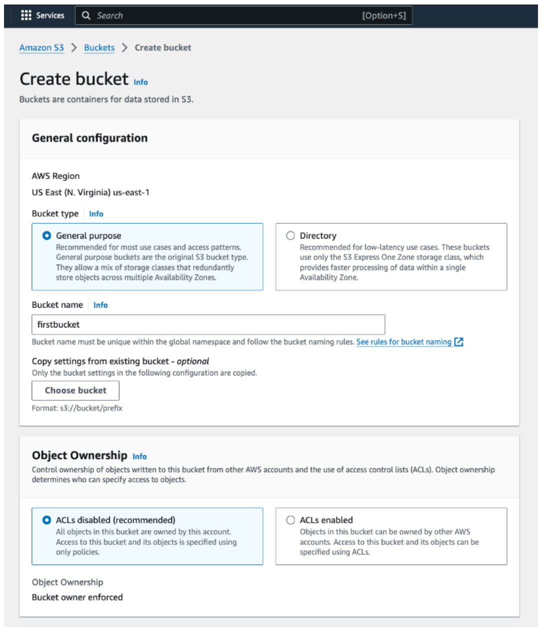
Storage lens provides visibility into storage usage and activity trends. Learn more

General purpose buckets (1) Info All AWS Regions

Buckets are containers for data stored in S3.

Name	AWS Region	IAM Access Analyzer	Creation date
elasticbeanstalk-us-east-1-013402147861	US East (N. Virginia) us-east-1	View analyzer for us-east-1	August 9, 2024, 09:04:45 (UTC+05:30)

Step 2: Now Give a name to the Bucket, select general purpose project and deselect the Block public access and keep other this to default.



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

firstbucket

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.

Format: s3://bucket/prefix

Object Ownership Info

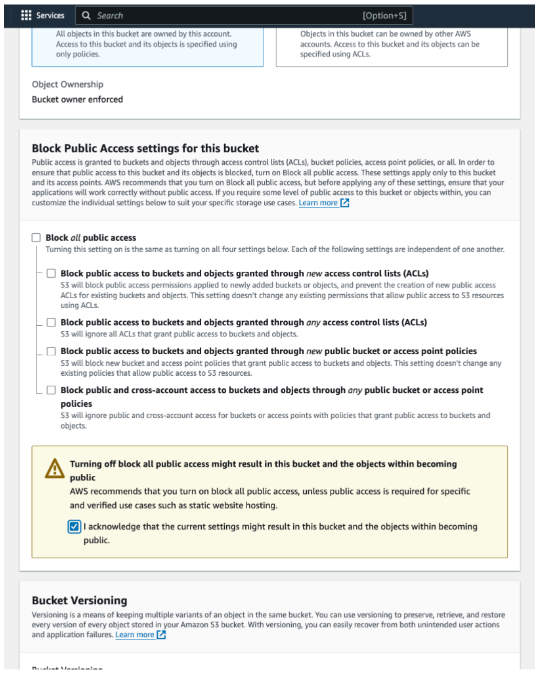
Control ownership of objects written to this bucket from other AWS accounts and the use of access control lists (ACLs). Object ownership determines who can specify access to objects.

[✓ 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



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

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.

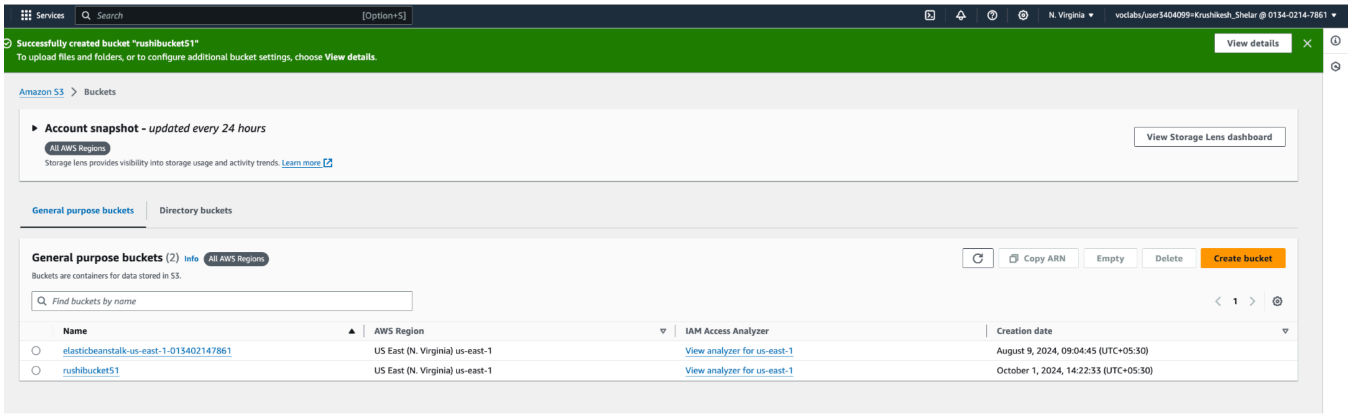
- ☐ **Block public access to buckets and objects granted through *new* access control lists (ACLs)**
  S3 will block public access permissions applied to newly added buckets or objects, and prevent the creation of new public access ACLs for existing buckets and objects. This setting doesn't change any 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**
  S3 will block new bucket and access point policies that grant public access to buckets and objects. This setting doesn't change any existing policies that allow public access to S3 resources.
- ☐ **Block public and cross-account access to buckets and objects through *any* public bucket or access point policies**
  S3 will ignore public and cross-account access for buckets or access points with policies that grant public access to buckets and objects.

Turning off block all public access might result in this bucket and the objects within becoming public
AWS recommends that you turn on block all public access, unless public access is required for specific and verified use cases such as static website hosting.

☑ I acknowledge that the current settings might result in this bucket and the objects within becoming public.

Bucket Versioning

Versioning is a means of keeping multiple variants of an object in the same bucket. You can use versioning to preserve, retrieve, and restore every version of every object stored in your Amazon S3 bucket. With versioning, you can easily recover from both unintended user actions and application failures. Learn more



Successfully created bucket "rushibucket51"
To upload files and folders, or to configure additional bucket settings, choose **View details**.

Account snapshot - *updated every 24 hours*

All AWS Regions

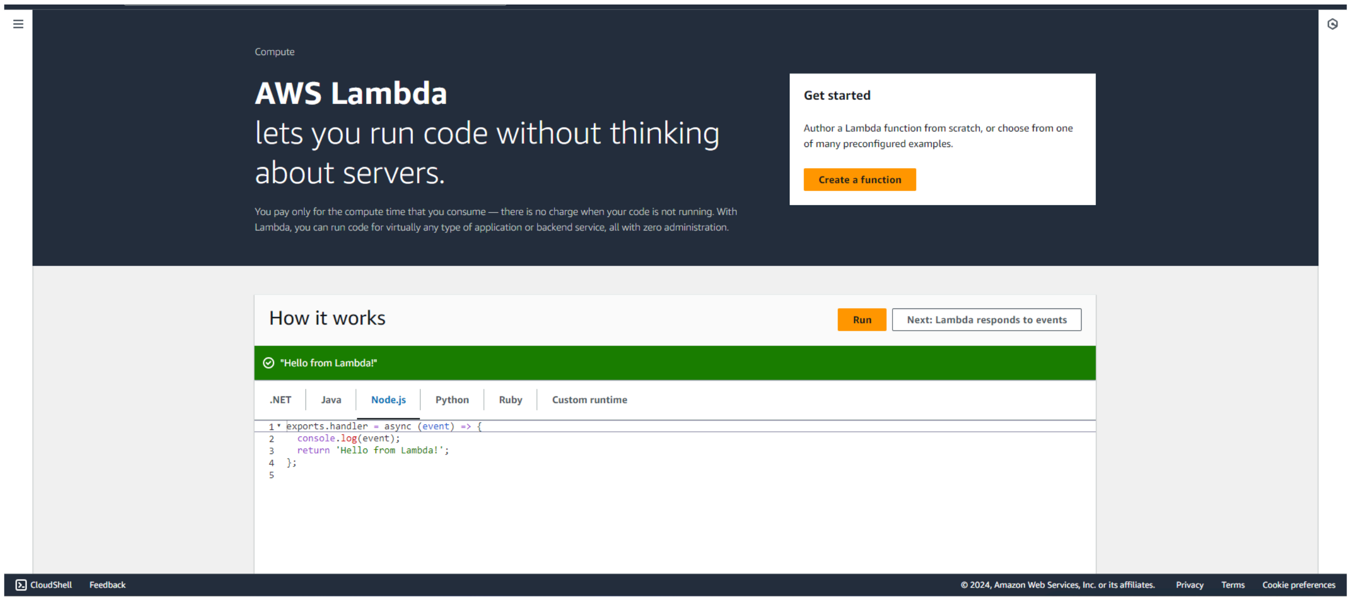
Storage lens provides visibility into storage usage and activity trends. Learn more

General purpose buckets (2) Info All AWS Regions

Buckets are containers for data stored in S3.

Name	AWS Region	IAM Access Analyzer	Creation date
elasticbeanstalk-us-east-1-013402147861	US East (N. Virginia) us-east-1	View analyzer for us-east-1	August 9, 2024, 09:04:45 (UTC+05:30)
rushibucket51	US East (N. Virginia) us-east-1	View analyzer for us-east-1	October 1, 2024, 14:22:33 (UTC+05:30)

Step 3: Open lambda console and click on create function button.



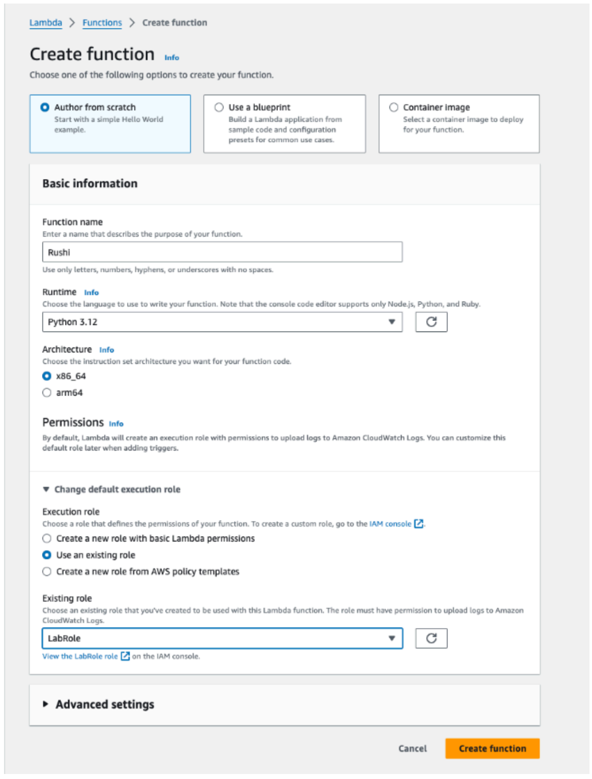
You pay only for the compute time that you consume — there is no charge when your code is not running. With Lambda, you can run code for virtually any type of application or backend service, all with zero administration.

Author a Lambda function from scratch, or choose from one of many preconfigured examples.

"Hello from Lambda!"

```
exports.handler = async (event) => {
  console.log(event);
  return 'Hello from Lambda!';
};
```

Step 4: Now Give a name to your Lambda function, Select the language to use to write your function. Note that the console code editor supports only Node.js, Python, and Ruby. So will select Python 3.12 , Architecture as x86, and Exceution role to Create a new role with basic Lambda permissions.



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.

Function name: Rushi
Enter a name that describes the purpose of your function.
Use only letters, numbers, hyphens, or underscores with no spaces.

Runtime: Python 3.12
Choose the language to use to write your function. Note that the console code editor supports only Node.js, Python, and Ruby.

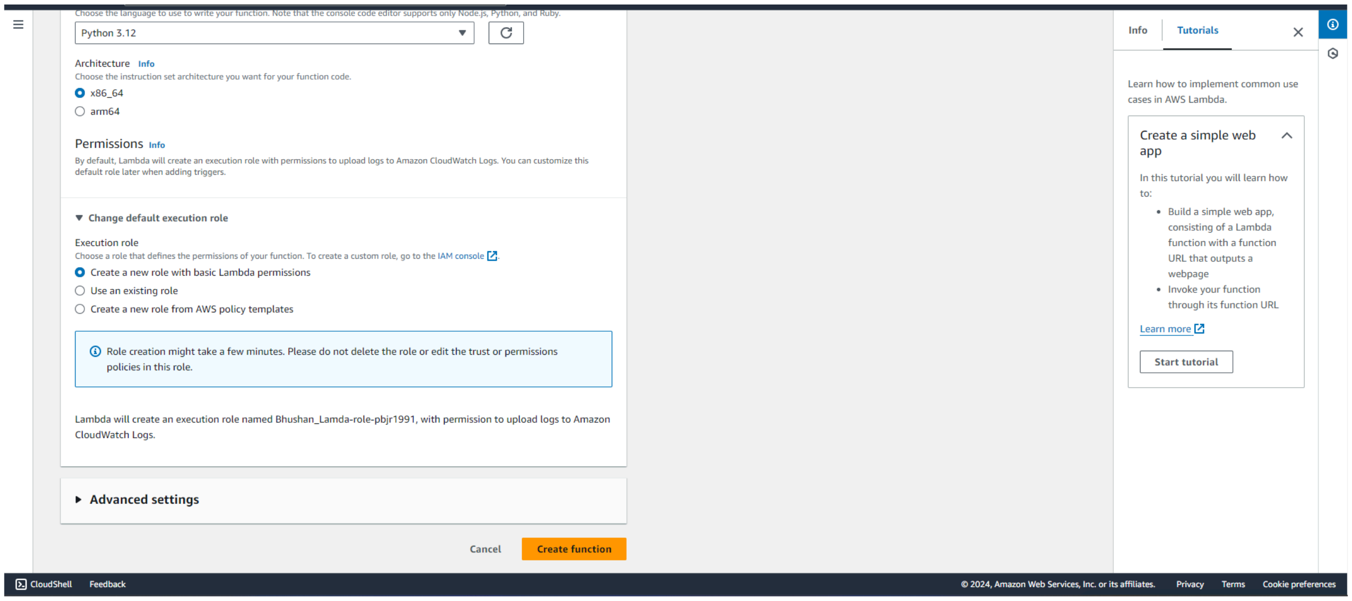
Architecture
Choose the instruction set architecture you want for your function code.
[✓ x86_64] arm64

Permissions
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.

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: LabRole
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.
View the LabRole role on the IAM console.

Name:Krushikesh Shelar 2024-2025 D15C Roll No:51



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

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

Role creation might take a few minutes. Please do not delete the role or edit the trust or permissions policies in this role.

Lambda will create an execution role named Bhushan_Lamda-role-pbjr1991, with permission to upload logs to Amazon CloudWatch Logs.

▶ Advanced settings

Cancel Create function

Info Tutorials

Learn how to implement common use cases in AWS Lambda.

Create a simple web app

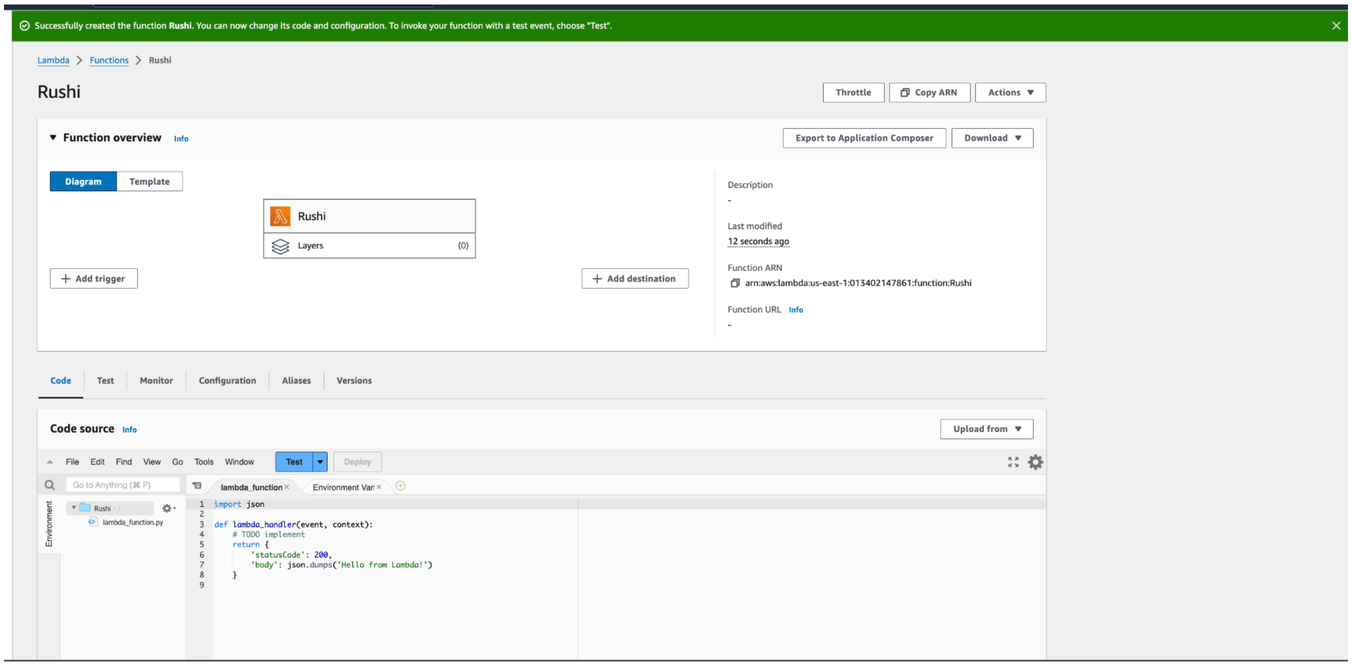
In this tutorial you will learn how to:

- 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

CloudShell Feedback © 2024, Amazon Web Services, Inc. or its affiliates. Privacy Terms Cookie preferences



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

Lambda > Functions > Rushi

Rushi

Throttle Copy ARN Actions

▼ Function overview Info

Export to Application Composer Download

Diagram Template

Description
-

Last modified
12 seconds ago

Function ARN
arn:aws:lambda:us-east-1:013402147861:function:Rushi

Function URL Info
-

Code Test Monitor Configuration Aliases Versions

Code source Info

Upload from

File Edit Find View Go Tools Window Test Deploy

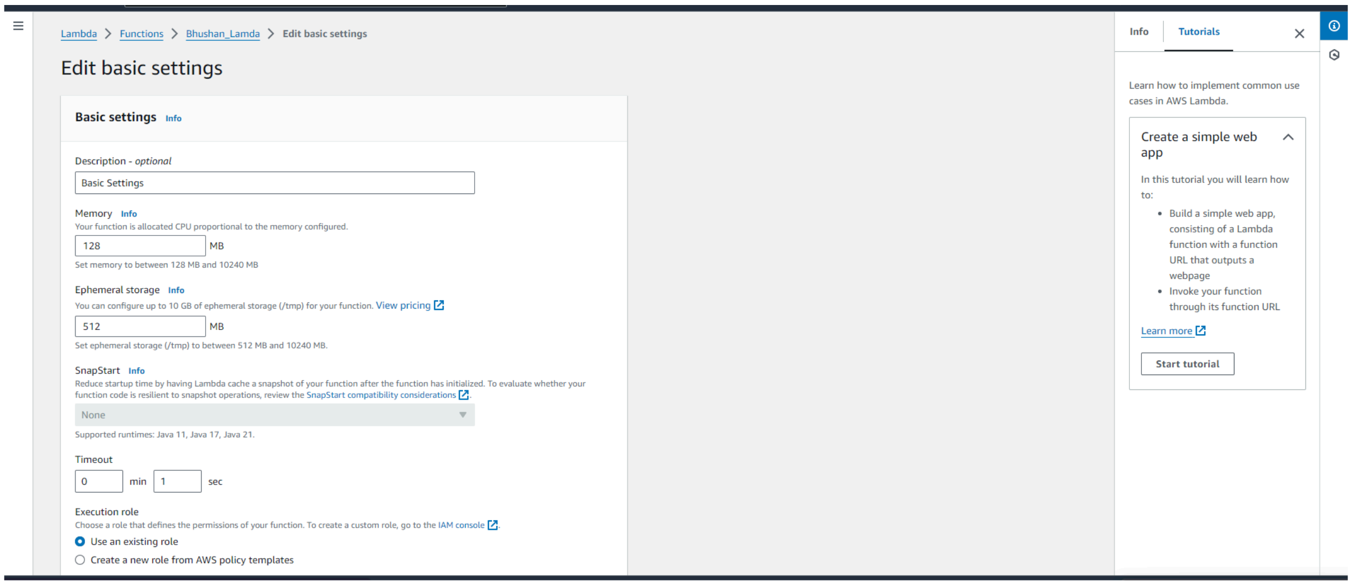
lambda_function.py

```python
import json

def lambda_handler(event, context):
    # TODO implement
    return {
        'statusCode': 200,
        'body': json.dumps('Hello from Lambda!')
    }
```

So See or Edit the basic settings go to configuration then click on edit general setting. Here, you can enter a description and change Memory and Timeout. I've changed the Timeout period to 1 sec since that is sufficient for now.

Step 5: Now Click on the Test tab then select Create a new event, give a name to the event and select Event Sharing to private, and select s3 put template.

Name:Krushikesh Shelar 2024-2025 D15C Roll No:51



Lambda > Functions > Bhushan_Lamda > Edit basic settings

Edit basic settings

Basic settings Info

Description - *optional*
Basic Settings

Memory Info
Your function is allocated CPU proportional to the memory configured.
128 MB
Set memory to between 128 MB and 10240 MB

Ephemeral storage Info
You can configure up to 10 GB of ephemeral storage (/tmp) for your function. View pricing
512 MB
Set ephemeral storage (/tmp) to between 512 MB and 10240 MB.

SnapStart Info
Reduce startup time by having Lambda cache a snapshot of your function after the function has initialized. To evaluate whether your function code is resilient to snapshot operations, review the SnapStart compatibility considerations.
None
Supported runtimes: Java 11, Java 17, Java 21.

Timeout
0 min 1 sec

Execution role
Choose a role that defines the permissions of your function. To create a custom role, go to the IAM console.
[✓ Use an existing role]
Create a new role from AWS policy templates

Info | Tutorials

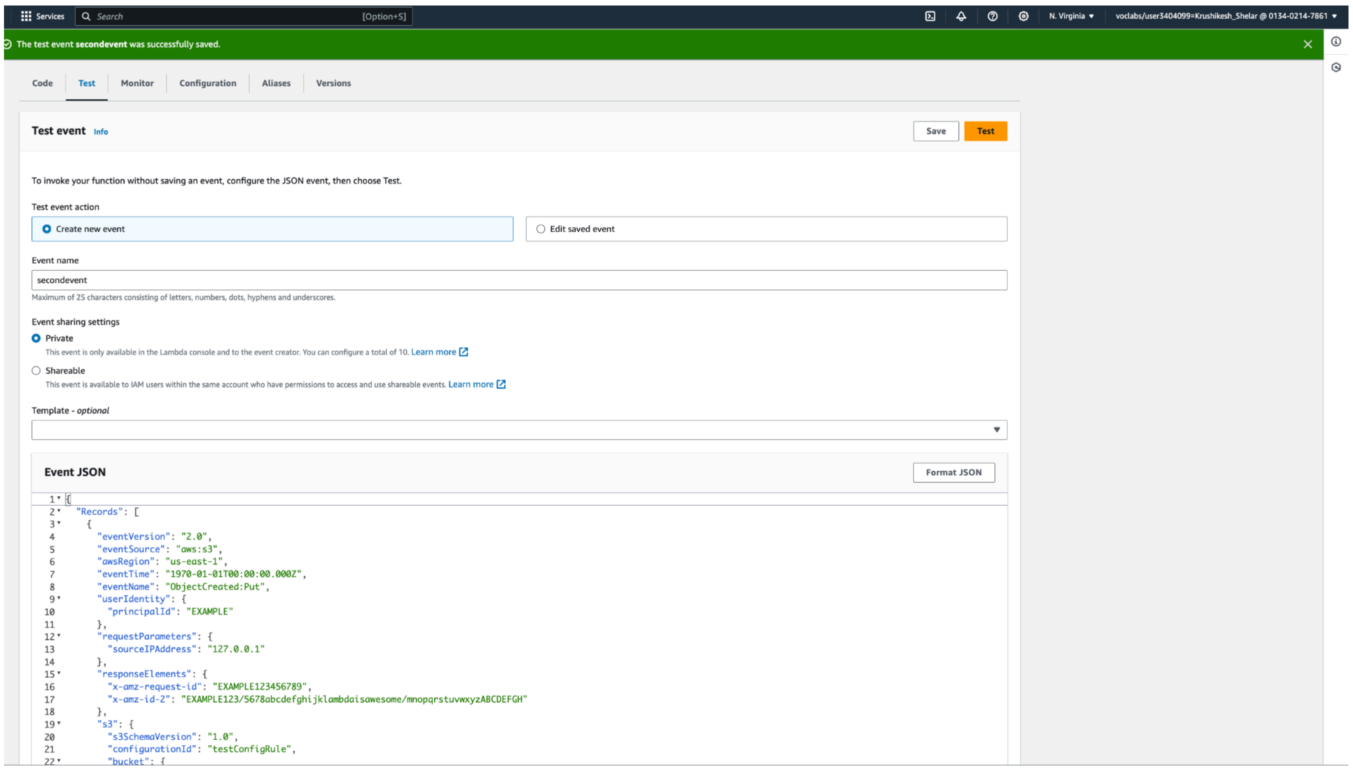
Learn how to implement common use cases in AWS Lambda.

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



Services | Search [Option+S] | N. Virginia | voclabs/user3404099=Krushikesh_Shelar @ 0134-0214-7861

The test event **secondevent** was successfully saved.

Code | Test | Monitor | Configuration | Aliases | Versions

Test event Info — Save | Test

To invoke your function without saving an event, configure the JSON event, then choose Test.

Test event action
[✓ Create new event] Edit saved event

Event name
secondevent
Maximum of 25 characters consisting of letters, numbers, dots, hyphens and underscores.

Event sharing settings
[✓ Private]
This event is only available in the Lambda console and to the event creator. You can configure a total of 10. Learn more
Shareable
This event is available to IAM users within the same account who have permissions to access and use shareable events. Learn more

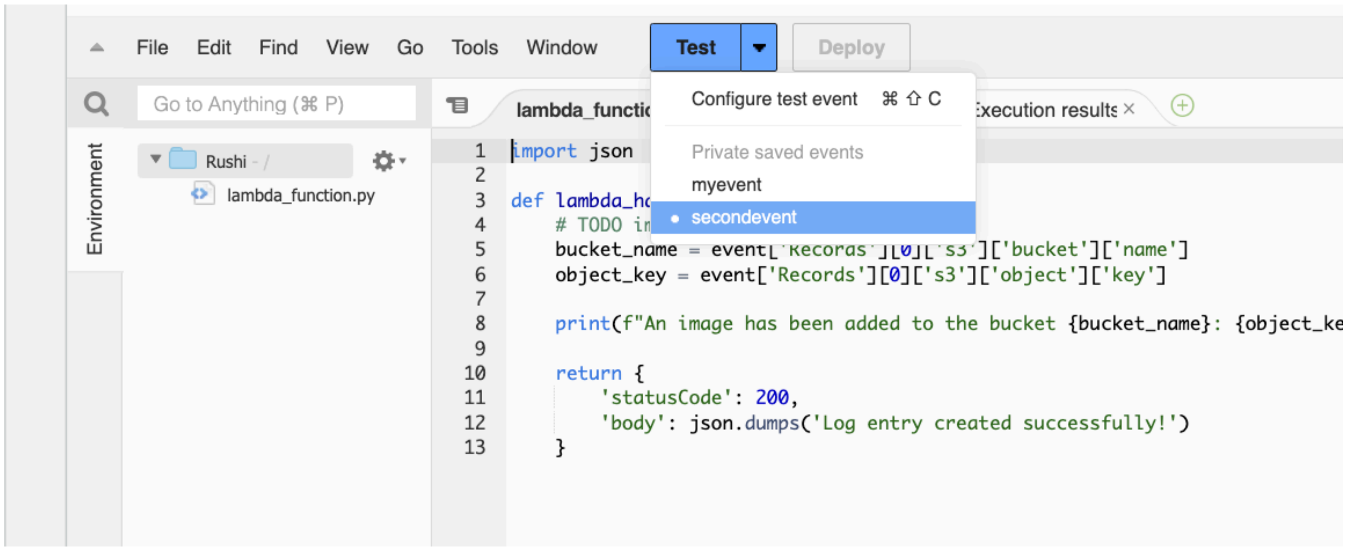
Template - *optional*

Event JSON — Format JSON

```
{
  "Records": [
    {
      "eventVersion": "2.0",
      "eventSource": "aws:s3",
      "awsRegion": "us-east-1",
      "eventTime": "1970-01-01T00:00:00.000Z",
      "eventName": "ObjectCreated:Put",
      "userIdentity": {
        "principalId": "EXAMPLE"
      },
      "requestParameters": {
        "sourceIPAddress": "127.0.0.1"
      },
      "responseElements": {
        "x-amz-request-id": "EXAMPLE123456789",
        "x-amz-id-2": "EXAMPLE123/5678abcdefghijklambdaisawesome/mnopqrstuvwxyzABCDEFGH"
      },
      "s3": {
        "s3SchemaVersion": "1.0",
        "configurationId": "testConfigRule",
        "bucket": {
```

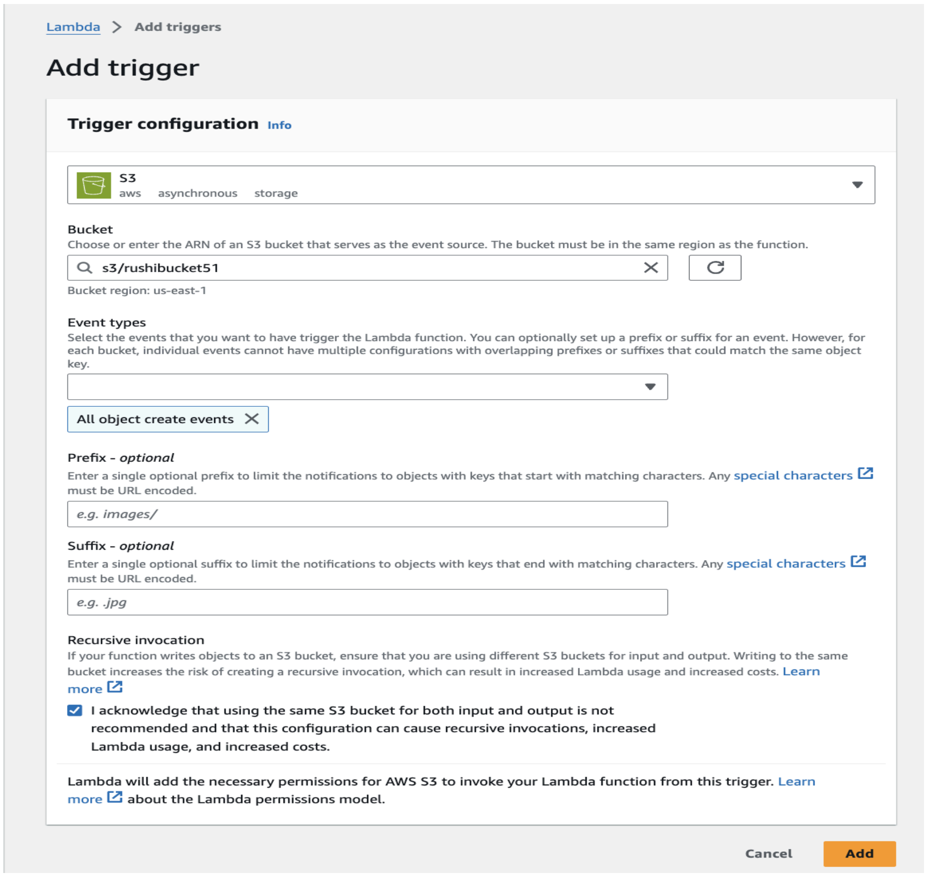
Step 6: Now In Code section select the created event from the dropdown .

Name:Krushikesh Shelar 2024-2025 D15C Roll No:51



```
import json

def lambda_ha
    # TODO in
    bucket_name = event['Records'][0]['s3']['bucket']['name']
    object_key = event['Records'][0]['s3']['object']['key']

    print(f"An image has been added to the bucket {bucket_name}: {object_ke

    return {
        'statusCode': 200,
        'body': json.dumps('Log entry created successfully!')
    }
```

Step 7: Now In the Lambda function click on add tigger.
Now select the source as S3 then select the bucket name from the dropdown, keep other things to default and also you can add prefix to image.



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/rushibucket51
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

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/

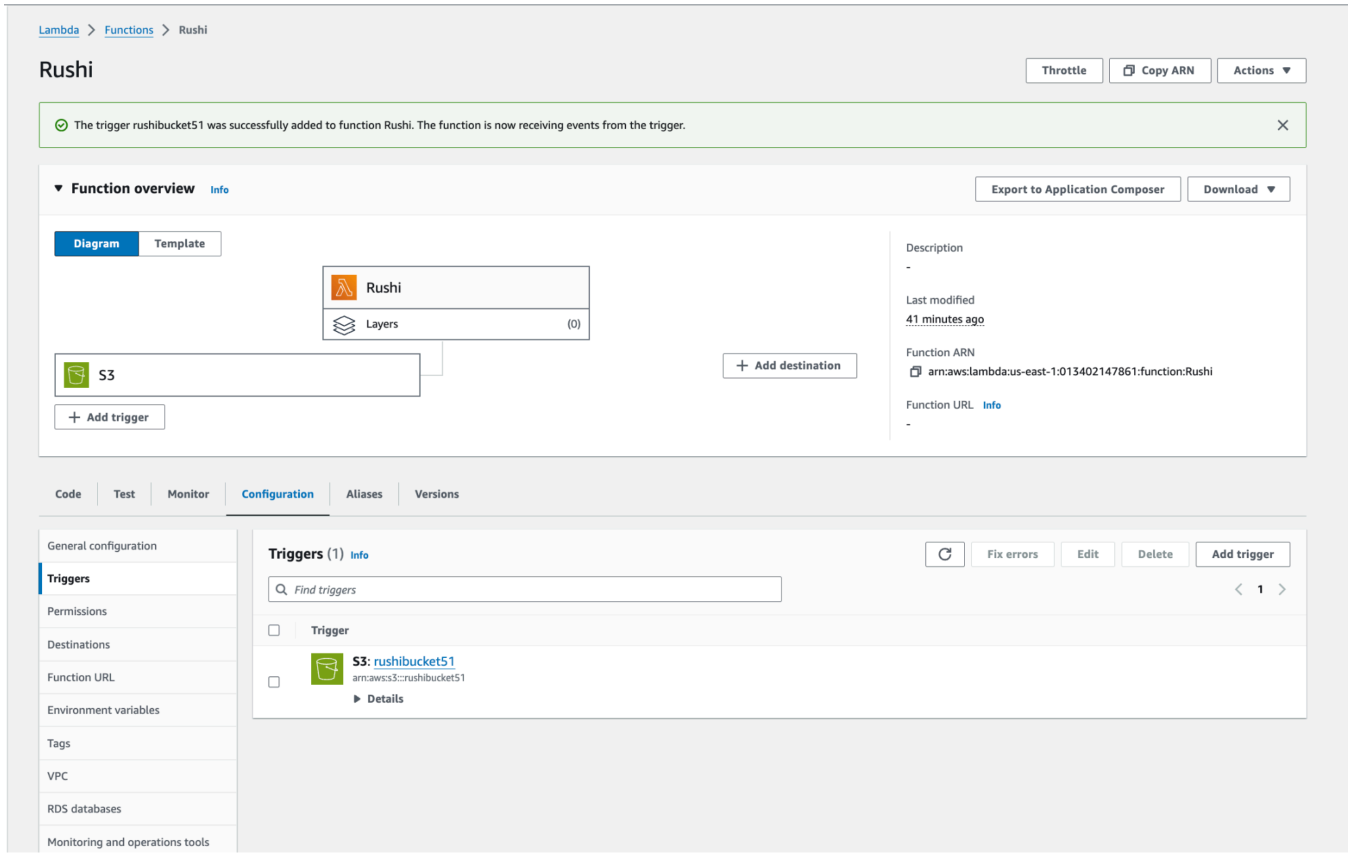
Suffix - *optional*
Enter a single optional suffix to limit the notifications to objects with keys that end with matching characters. Any special characters must be URL encoded.
e.g. .jpg

Recursive invocation
If your function writes objects to an S3 bucket, ensure that you are using different S3 buckets for input and output. Writing to the same bucket increases the risk of creating a recursive invocation, which can result in increased Lambda usage and increased costs. Learn more

✓ I acknowledge that using the same S3 bucket for both input and output is not recommended and that this configuration can cause recursive invocations, increased Lambda usage, and increased costs.

Lambda will add the necessary permissions for AWS S3 to invoke your Lambda function from this trigger. Learn more about the Lambda permissions model.

Name:Krushikesh Shelar **2024-2025** **D15C** **Roll No:51**



Lambda > Functions > Rushi

Rushi

The trigger rushibucket51 was successfully added to function Rushi. The function is now receiving events from the trigger.

Function overview

Description: -

Last modified: 41 minutes ago

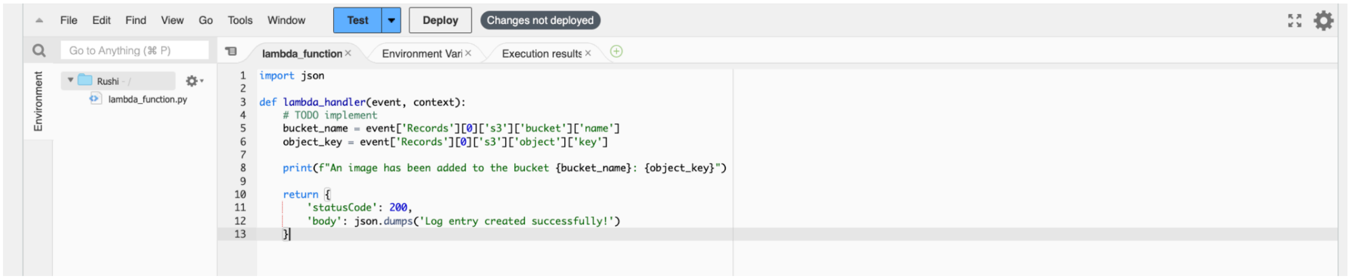
Function ARN: arn:aws:lambda:us-east-1:013402147861:function:Rushi

Function URL: -

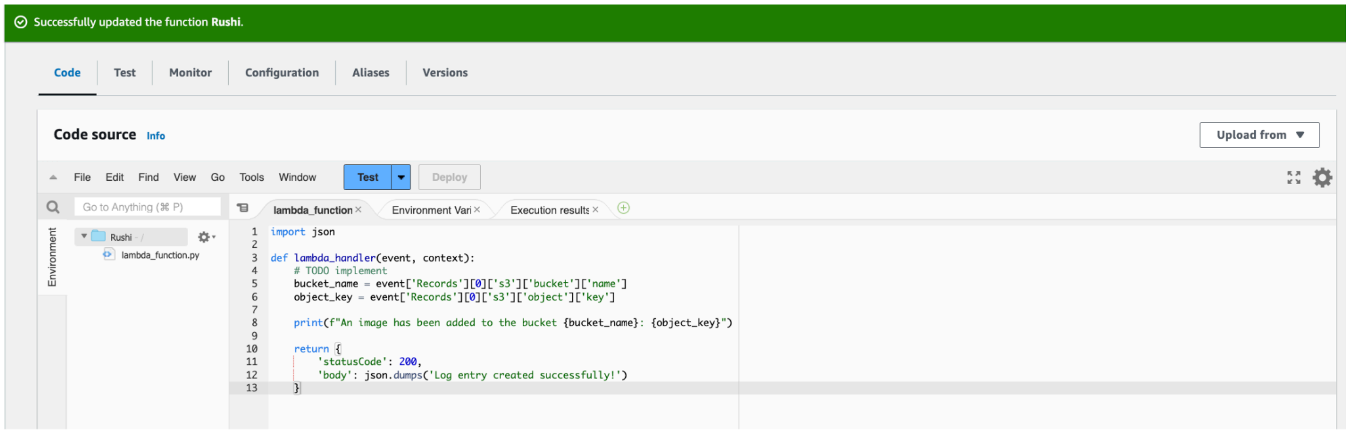
Triggers (1)

	Trigger
	S3: rushibucket51 arn:aws:s3:::rushibucket51

Step 8: Now Write code that logs a message like “An Image has been added” when triggered. Save the file and click on deploy.



```python
import json

def lambda_handler(event, context):
    # TODO implement
    bucket_name = event['Records'][0]['s3']['bucket']['name']
    object_key = event['Records'][0]['s3']['object']['key']

    print(f"An image has been added to the bucket {bucket_name}: {object_key}")

    return {
        'statusCode': 200,
        'body': json.dumps('Log entry created successfully!')
    }
```



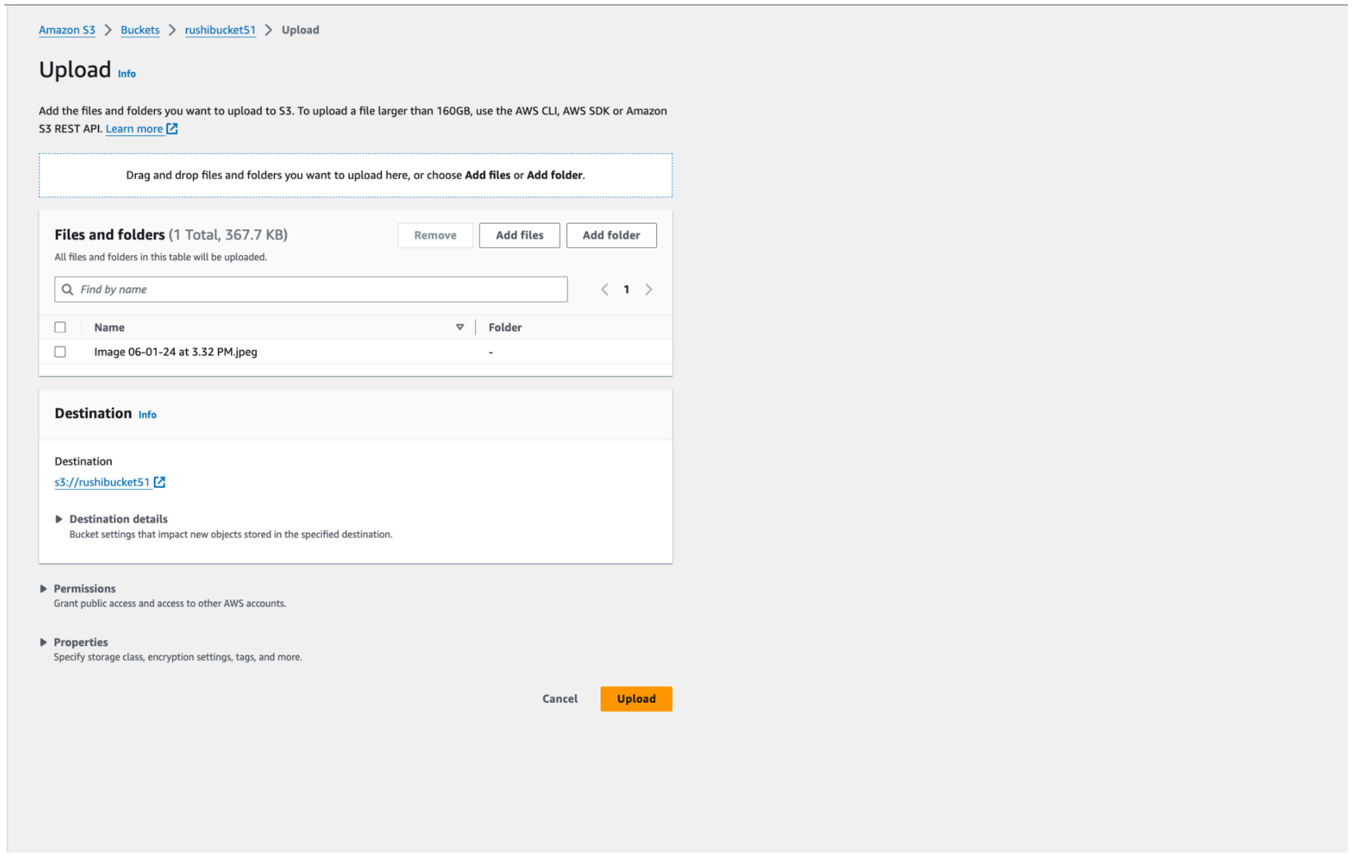
Successfully updated the function Rushi.

Code source

```python
import json

def lambda_handler(event, context):
    # TODO implement
    bucket_name = event['Records'][0]['s3']['bucket']['name']
    object_key = event['Records'][0]['s3']['object']['key']

    print(f"An image has been added to the bucket {bucket_name}: {object_key}")

    return {
        'statusCode': 200,
        'body': json.dumps('Log entry created successfully!')
    }
```

Step 9: Now upload any image to the bucket.

Name:Krushikesh Shelar **2024-2025** **D15C** **Roll No:51**



Amazon S3 > Buckets > rushibucket51 > Upload

Upload Info

Add the files and folders you want to upload to S3. To upload a file larger than 160GB, use the AWS CLI, AWS SDK or Amazon S3 REST API. Learn more

Drag and drop files and folders you want to upload here, or choose **Add files** or **Add folder**.

Files and folders (1 Total, 367.7 KB)

All files and folders in this table will be uploaded.

Name	Folder
Image 06-01-24 at 3.32 PM.jpeg	-

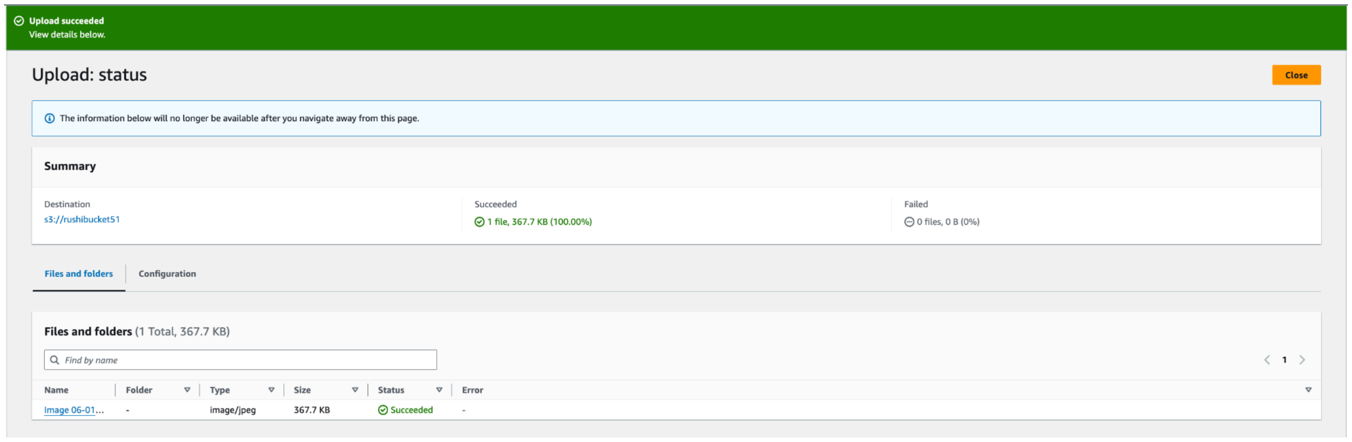
Destination Info

Destination
s3://rushibucket51

Destination details
Bucket settings that impact new objects stored in the specified destination.

Permissions
Grant public access and access to other AWS accounts.

Properties
Specify storage class, encryption settings, tags, and more.



Upload succeeded
View details below.

Upload: status

The information below will no longer be available after you navigate away from this page.

Summary

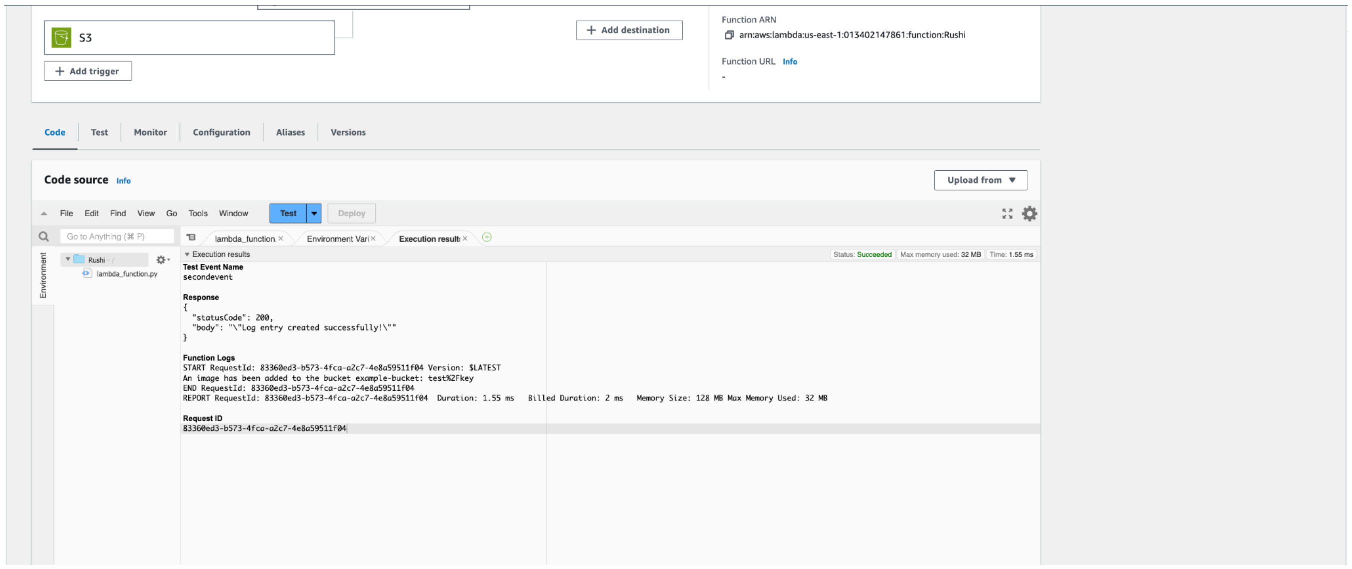
Destination	Succeeded	Failed
s3://rushibucket51	1 file, 367.7 KB (100.00%)	0 files, 0 B (0%)

Files and folders (1 Total, 367.7 KB)

Name	Folder	Type	Size	Status	Error
Image 06-01...	-	image/jpeg	367.7 KB	Succeeded	-

Step 10: Now to click on test in lambda to check whether it is giving log when image is added to S3.

Name:Krushikesh Shelar 2024-2025 D15C Roll No:51

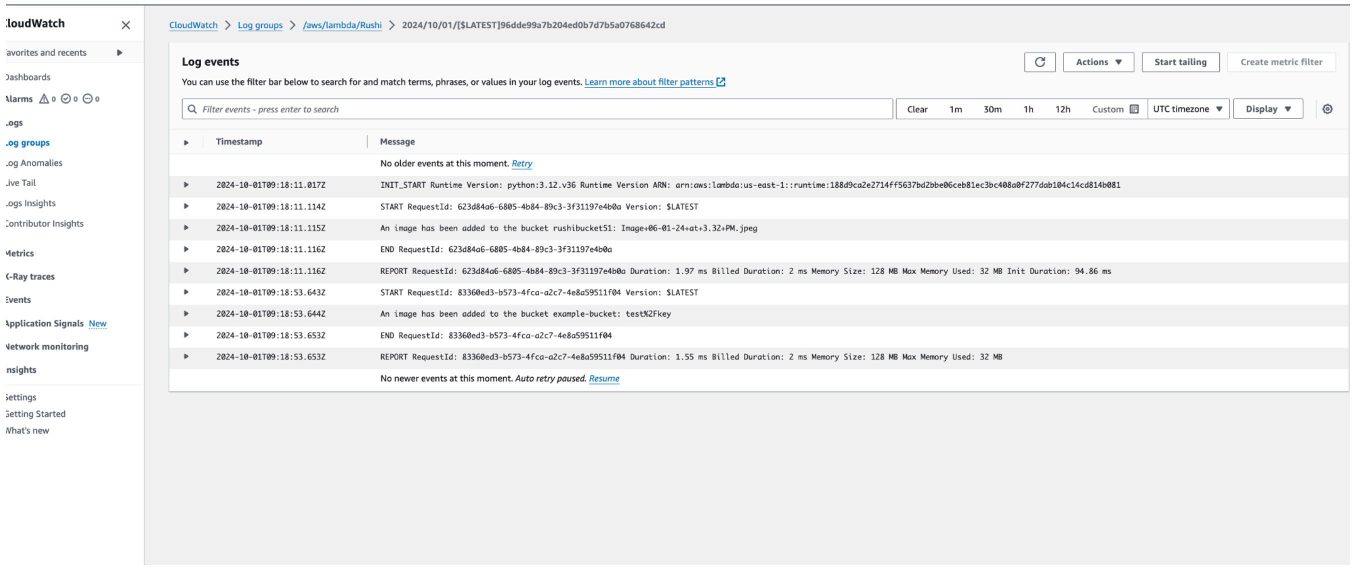


Function ARN
arn:aws:lambda:us-east-1:013402147861:function:Rushi

```
Test Event Name
secondevent

Response
{
  "statusCode": 200,
  "body": "\"Log entry created successfully!\""
}

Function Logs
START RequestId: 83360ed3-b573-4fca-a2c7-4e8a59511f04 Version: $LATEST
An image has been added to the bucket example-bucket: test%2Fkey
END RequestId: 83360ed3-b573-4fca-a2c7-4e8a59511f04
REPORT RequestId: 83360ed3-b573-4fca-a2c7-4e8a59511f04  Duration: 1.55 ms   Billed Duration: 2 ms   Memory Size: 128 MB Max Memory Used: 32 MB

Request ID
83360ed3-b573-4fca-a2c7-4e8a59511f04
```

Status: Succeeded Max memory used: 32 MB Time: 1.55 ms

Step 11: Now Lets see the log on Cloud watch.To see it go to monitor section and then click on view cloudwatch logs.



CloudWatch > Log groups > /aws/lambda/Rushi > 2024/10/01/[$LATEST]96dde99a7b204ed0b7d7b5a0768642cd

Log events

You can use the filter bar below to search for and match terms, phrases, or values in your log events. Learn more about filter patterns

```
Timestamp                  Message
                           No older events at this moment. Retry
2024-10-01T09:18:11.017Z   INIT_START Runtime Version: python:3.12.v36 Runtime Version ARN: arn:aws:lambda:us-east-1::runtime:188d9ca2e2714ff5637bd2bbe06ceb81ec3bc408a0f277dab104c14cd814b081
2024-10-01T09:18:11.114Z   START RequestId: 623d84a6-6805-4b84-89c3-3f31197e4b0a Version: $LATEST
2024-10-01T09:18:11.115Z   An image has been added to the bucket rushibucket51: Image+06-01-24+at+3.32+PM.jpeg
2024-10-01T09:18:11.116Z   END RequestId: 623d84a6-6805-4b84-89c3-3f31197e4b0a
2024-10-01T09:18:11.116Z   REPORT RequestId: 623d84a6-6805-4b84-89c3-3f31197e4b0a Duration: 1.97 ms Billed Duration: 2 ms Memory Size: 128 MB Max Memory Used: 32 MB Init Duration: 94.86 ms
2024-10-01T09:18:53.643Z   START RequestId: 83360ed3-b573-4fca-a2c7-4e8a59511f04 Version: $LATEST
2024-10-01T09:18:53.644Z   An image has been added to the bucket example-bucket: test%2Fkey
2024-10-01T09:18:53.653Z   END RequestId: 83360ed3-b573-4fca-a2c7-4e8a59511f04
2024-10-01T09:18:53.653Z   REPORT RequestId: 83360ed3-b573-4fca-a2c7-4e8a59511f04 Duration: 1.55 ms Billed Duration: 2 ms Memory Size: 128 MB Max Memory Used: 32 MB
                           No newer events at this moment. Auto retry paused. Resume
```

Conclusion: In this experiment, we successfully created an AWS Lambda function that logs a message when an image is uploaded to an S3 bucket. It is important to note that we have to select S3-put template in event other wise code will give an error.The function was successfully triggered by S3 object uploads, validating the functionality of Lambda's event-driven architecture. This experiment demonstrated how Lambda can efficiently respond to S3 events and how to troubleshoot common issues with event structure.