



Academic Year: 2022-23

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Class / Branch: TE IT

Subject: Advanced Devops Lab (ADL)

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EXPERIMENT NO. 12

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:

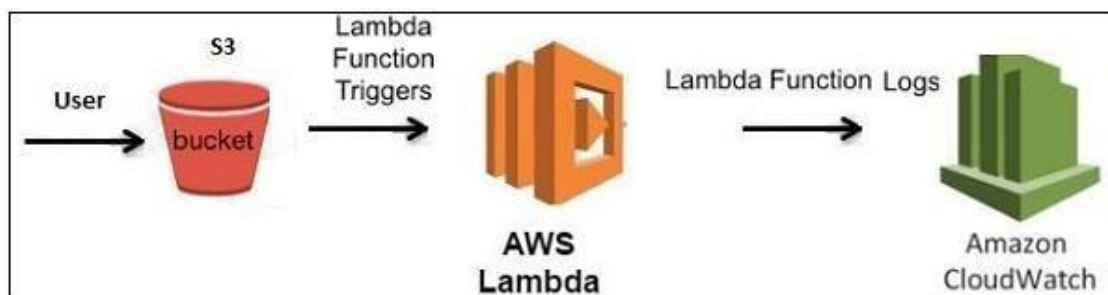
Using Lambda Function with Amazon S3

Amazon S3 service is used for file storage, where you can upload or remove files. We can trigger AWS Lambda on S3 when there are any file uploads in S3 buckets. AWS Lambda has a handler function which acts as a start point for AWS Lambda function. The handler has the details of the events. In this chapter, let us see how to use AWS S3 to trigger AWS Lambda function when we upload files in S3 bucket.

Steps for Using AWS Lambda Function with Amazon S3

To start using AWS Lambda with Amazon S3, we need the following –

- Create S3 Bucket
- Create role which has permission to work with s3 and lambda
- Create lambda function and add s3 as the trigger.





Let us see these steps with the help of an example which shows the basic interaction between Amazon S3 and AWS Lambda

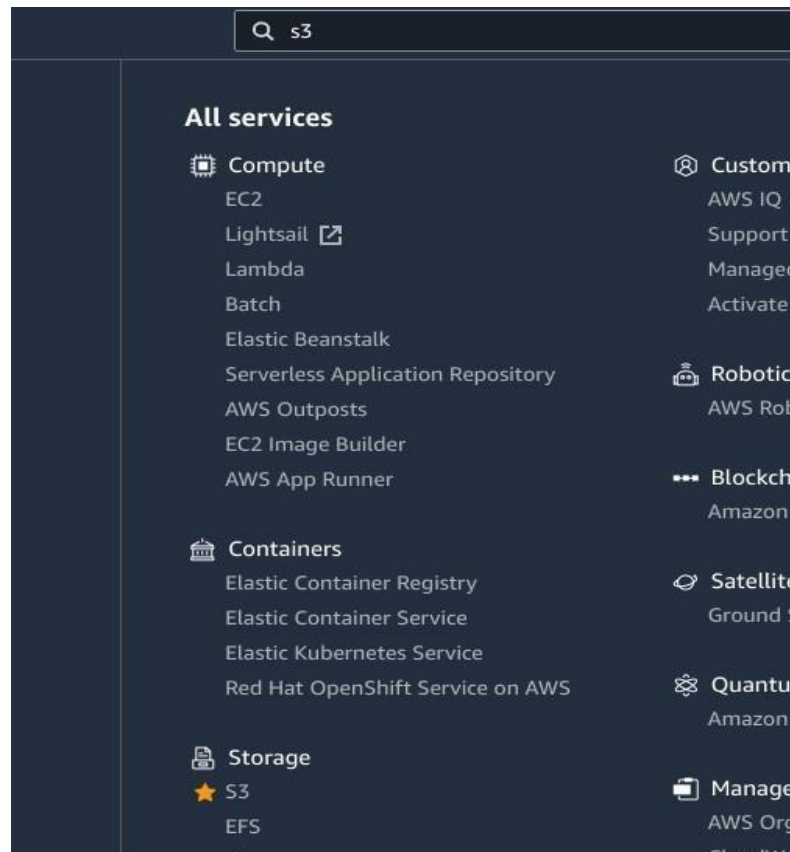
- User will upload a file in Amazon S3 bucket
- Once the file is uploaded, it will trigger AWS Lambda function in the background which will display an output in the form of a console message that the file is uploaded.
- The user will be able to see the message in Cloudwatch logs once the file is uploaded.

Creating S3 Bucket

Let us start first by creating a s3 bucket in AWS console using the steps given below –

Step 1

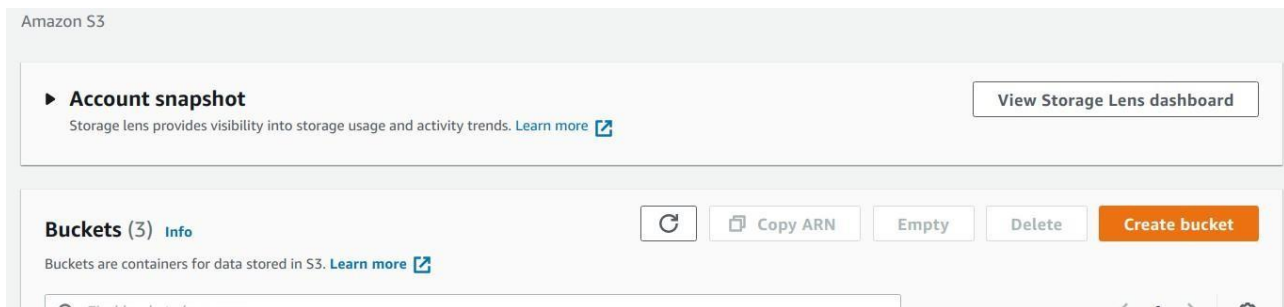
Go to Amazon services and click **S3** in storage section as highlighted in the image given below –





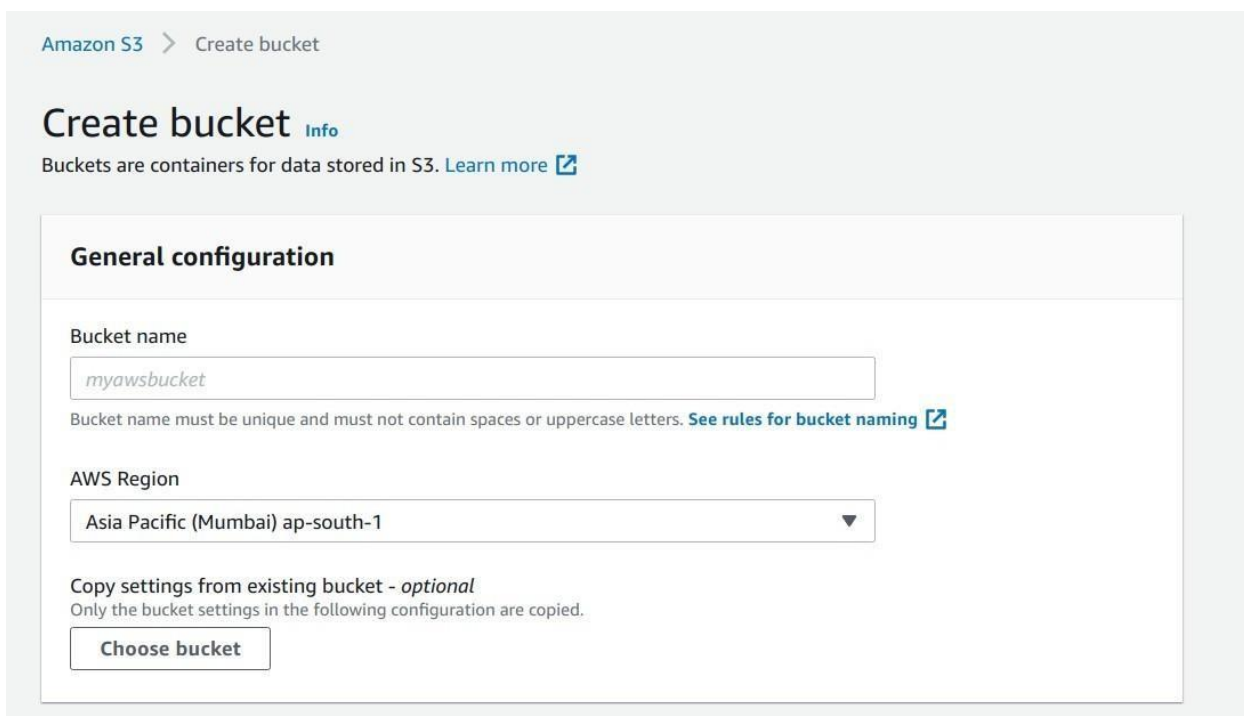
Step 2

Click **S3** storage and **Create bucket** which will store the files uploaded.



Step 3

Once you click Create bucket button, you can see a screen as follows –





Enter the details Bucket name, Select the Region and click Create button at the bottom left side. Thus, we have created bucket with name :

| | | | | |
|-----------------------|--------------|----------------------------------|-------------------------------|--------------------------------------|
| <input type="radio"/> | lambdawiths3 | Asia Pacific (Mumbai) ap-south-1 | Bucket and objects not public | August 3, 2021, 11:22:23 (UTC+05:30) |
|-----------------------|--------------|----------------------------------|-------------------------------|--------------------------------------|

Step 5

Now, click the bucket name and it will ask you to upload files as shown below –

lambdawiths3 [Info](#)

Objects | Properties | Permissions | Metrics | Management | Access Points

Objects (0)

Objects are the fundamental entities stored in Amazon S3. You can use [Amazon S3 inventory](#) to get a list of all objects in your bucket. For others to access your objects, you'll need to explicitly grant them permissions. [Learn more](#)

< 1 >

| <input type="checkbox"/> | Name | Type | Last modified | Size | Storage class |
|--------------------------|------|------|---------------|------|---------------|
| No objects | | | | | |

Thus, we are done with bucket creation in S3.

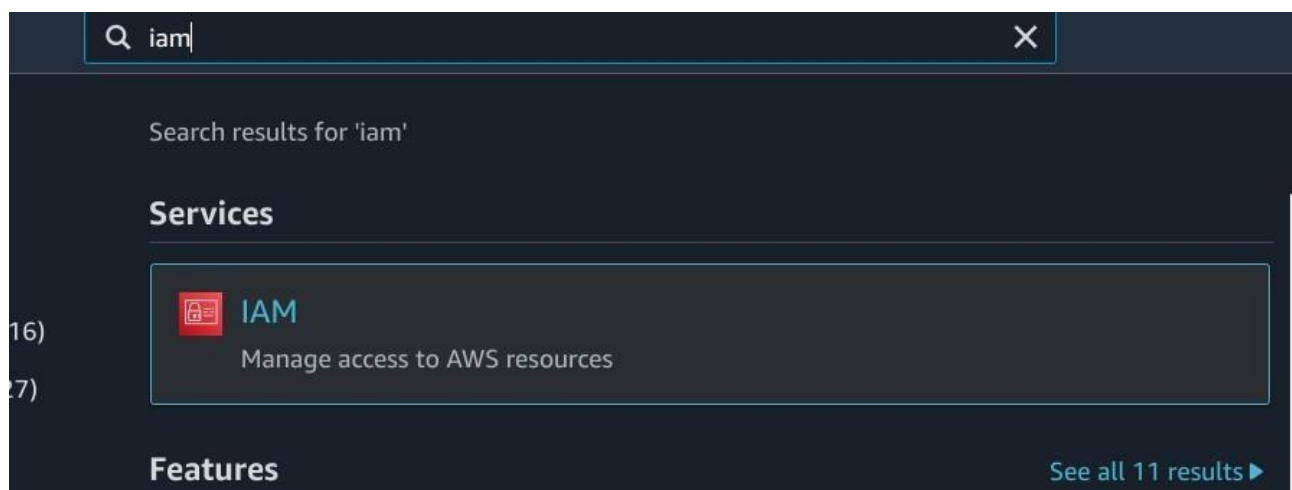


Create Role that Works with S3 and Lambda

To create role that works with S3 and Lambda, please follow the Steps given below –

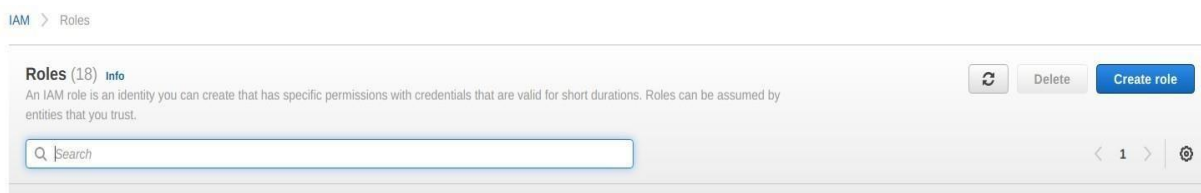
Step 1

Go to AWS services and select IAM as shown below –



Step 2

Now, click **IAM** -> **Roles** as shown below –





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Now, click **Create role** and choose the services that will use this role. Select Lambda and click **Permission** button.


Create role

1 2 3 4

Select type of trusted entity

**AWS service**
EC2, Lambda and others

**Another AWS account**
Belonging to you or 3rd party

**Web identity**
Cognito or any OpenID provider

**SAML 2.0 federation**
Your corporate directory

Allows AWS services to perform actions on your behalf. [Learn more](#)

Choose a use case

Common use cases

EC2

Allows EC2 instances to call AWS services on your behalf.

Lambda

Allows Lambda functions to call AWS services on your behalf.

Or select a service to view its use cases

| | | | | |
|--------------------------|------------------------|----------------------------|------------------|--------------|
| API Gateway | CodeBuild | EMR Containers | IoT SiteWise | RDS |
| AWS Backup | CodeDeploy | ElastiCache | IoT Things Graph | Redshift |
| AWS Chatbot | CodeGuru | Elastic Beanstalk | KMS | Rekognition |
| AWS Marketplace | CodeStar Notifications | Elastic Container Registry | Kinesis | RoboMaker |
| AWS Support | Comprehend | Elastic Container Service | Lake Formation | S3 |
| Amplify | Config | Elastic Transcoder | Lambda | SMS |
| AppStream 2.0 | Connect | ElasticLoadBalancing | Lex | SNS |
| AppSync | DMS | EventBridge | License Manager | SWF |
| Application Auto Scaling | Data Lifecycle Manager | Forecast | MQ | SageMaker |
| Application Discovery | Data Pipeline | GameLift | Machine Learning | Security Hub |

* Required

Cancel

Next: Permissions



Add the permission from below and click Review.

AmazonS3FullAccess, AWSLambdaFullAccess and CloudWatchFullAccess.

Step 5

Observe that we have chosen the following permissions –

Create role

1

2

3

Review

Provide the required information below and review this role before you create it.

Role name*

Use alphanumeric and '+=,.,@-_' characters. Maximum 64 characters.

Role description

Allows Lambda functions to call AWS services on your behalf.

Maximum 1000 characters. Use alphanumeric and '+=,.,@-_' characters.

Trusted entities

AWS service: lambda.amazonaws.com

Policies



AmazonS3FullAccess



AWSLambda_FullAccess



CloudWatchFullAccess



Permissions boundary

Permissions boundary is not set

No tags were added.

Observe that the Policies that we have selected are **AmazonS3FullAccess, AWSLambdaFullAccess and CloudWatchFullAccess.**



Now, enter the Role name, Role description and click Create Role button at the bottom.

☐ `lambdawiths3service` AWS Service: `lambda`

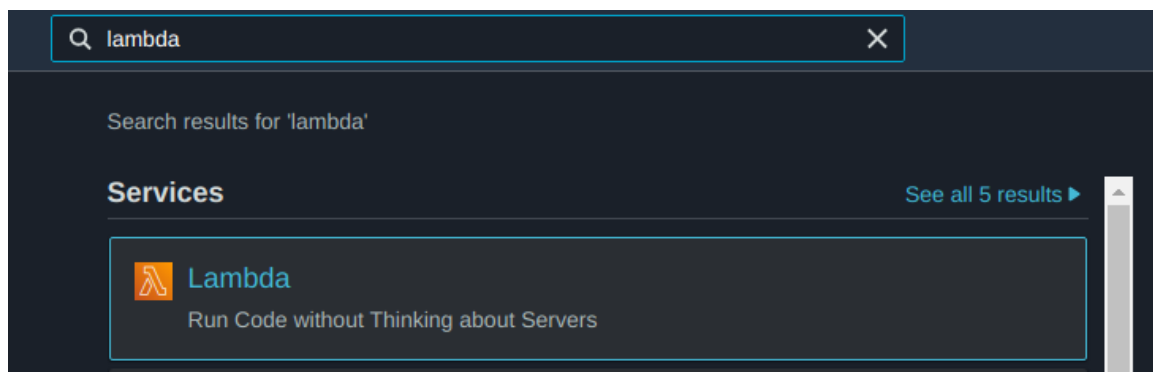
Thus, our role named `lambdawiths3service` is created.

Create Lambda function and Add S3 Trigger

In this section, let us see how to create a Lambda function and add a S3 trigger to it. For this purpose, you will have to follow the Steps given below –

Step 1

Go to AWS Services and select Lambda as shown below –





Click **Lambda** and follow the process for adding **Name**. Choose the **Runtime**, **Role** etc. and create the function. The Lambda function that we have created is shown in the screenshot below –

Lambda > Functions > Create function

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.

Basic information

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

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.

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

▼ **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.

[View the lambdawiths3service role](#) on the IAM console.

Step 3

Now let us add the S3 trigger.



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Lambda > Functions > lambdawiths3bucket

lambdawiths3bucket Throttle Copy ARN Actions

► **Function overview** info

Code | Test | Monitor | **Configuration** | Aliases | Versions

General configuration
Triggers
Permissions
Destinations
Environment variables
Tags
VPC

Triggers (0) Refresh Enable Disable Fix errors Delete Add trigger

Find triggers

Trigger


No triggers
No triggers are configured.
Add trigger

Step 4

Choose the trigger from above and add the details as shown below –

Add trigger

Trigger configuration

 **S3**
aws storage

Bucket
Please select the S3 bucket that serves as the event source. The bucket must be in the same region as the function.
lambdawiths3 Refresh

Event type
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.
e.g. images/

Suffix - optional
Enter a single optional suffix to limit the notifications to objects with keys that end with matching characters.
.jpg

Lambda will add the necessary permissions for Amazon S3 to invoke your Lambda function from this trigger. [Learn more](#) about the Lambda permissions model.

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.

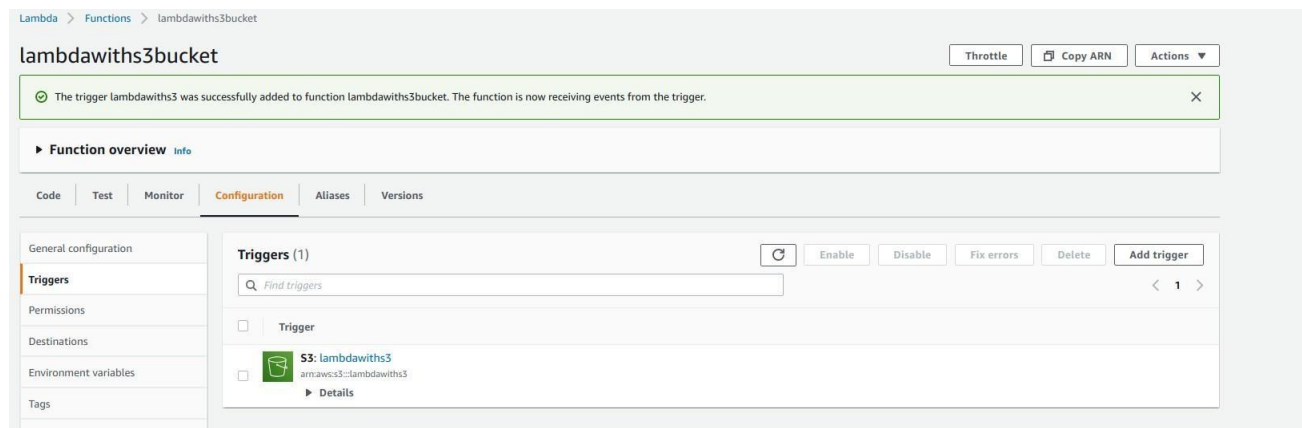
Cancel Add



You can add Prefix and File pattern which are used to filter the files added. For Example, to trigger lambda only for .jpg images. as we need to trigger Lambda for all jpg image files uploaded. Click Add button to add the trigger.

Step 5

You can find the the trigger display for the Lambda function as shown below –



Step 6

Let's add the details for the aws lambda function. Here, we will use the online editor to add our code and use nodejs as the runtime environment.

To trigger S3 with AWS Lambda, we will have to use S3 event in the code as shown below –



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Lambda > Functions > lambdawiths3bucket

lambdawiths3bucket Throttle Copy ARN Actions

✓ The trigger lambdawiths3 was successfully added to function lambdawiths3bucket. The function is now receiving events from the trigger.

► **Function overview** [Info](#)

[Code](#) | [Test](#) | [Monitor](#) | [Configuration](#) | [Aliases](#) | [Versions](#)

Code source [Info](#) Upload from

File Edit Find View Go Tools Window Test Deploy Changes not deployed

Go to Anything (Ctrl-P)

Environment

lambdawiths3bucket

index.js

```
1 exports.handler = function(event, context, callback) {
2   console.log("Incoming Event: ", event);
3   const bucket = event.Records[0].s3.bucket.name;
4   const filename = decodeURIComponent(event.Records[0].s3.object.key.replace(/\+/g, ' '));
5   const message = 'An Image has been added - ${bucket} -> ${filename}';
6   console.log(message);
7   callback(null, message);
8 };
```

8:3 JavaScript Spaces: 4

Code properties

| | | |
|----------------------------|---|--|
| Package size 304.0 byte | SHA256 hash uTJfXt0sQYd8f6CxoZoBcLT6Hd0A48LnMm4gpxgDw= | Last modified August 3, 2021, 11:36 AM GMT+5:30 |
|----------------------------|---|--|

Runtime settings [Info](#) Edit

| | |
|-------------------------|---|
| Runtime Node.js 14.x | Handler Info index.handler |
|-------------------------|---|

Step 7:

let us save the changes and test the lambda function with S3upload.



Step 8:

Now, save the Lambda function. Open S3 from Amazon services and open the bucket we created earlier namely lambdawiths3.

Upload the image in it as shown below –

Click **Add files** to add files. You can also drag and drop the files. Now, click **Upload** button.

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 folders**.

Files and folders (1 Total, 44.0 KB)
All files and folders in this table will be uploaded.

Remove

Add files

Add folder

< 1 >

| <input type="checkbox"/> | Name | Folder | Type | Size |
|--------------------------|----------------|--------|------------|---------|
| <input type="checkbox"/> | apsit_logo.jpg | - | image/jpeg | 44.0 KB |

Thus, we have uploaded one image in our S3 bucket.

Step 9

To see the trigger details, go to AWS service and select CloudWatch. Open the logs for the Lambda AWS Lambda function gets triggered when file is uploaded in S3 bucket and the details are logged in Cloudwatch as shown below –



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CloudWatch > Log groups > /aws/lambda/lambdawith3bucket > 2021/08/03/[\${LATEST}]0f36a60d46ca40078172fc11de9d735f

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](#)

Clear 1m

| Timestamp | Message |
|---|--|
| | No older events at this moment. Retry |
| 2021-08-03T12:01:00.069+05:30 | START RequestId: ae43508a-8eb7-4b08-8fa1-841814d597c1 Version: \$LATEST |
| 2021-08-03T06:31:00.097Z ae43508a-8eb7-4b08-8fa1-841814d597c1 | INFO Incoming Event: { Records: [{ eventVersion: '2.1', eventSource: 'aws:s3', awsRegion: 'ap-south-1', |
| 2021-08-03T12:01:00.098+05:30 | 2021-08-03T06:31:00.098Z ae43508a-8eb7-4b08-8fa1-841814d597c1 INFO An Image has been added - lambdawith3 -> apsit_logo.jpg |
| 2021-08-03T06:31:00.098Z ae43508a-8eb7-4b08-8fa1-841814d597c1 | INFO An Image has been added - lambdawith3 -> apsit_logo.jpg |
| 2021-08-03T12:01:00.119+05:30 | END RequestId: ae43508a-8eb7-4b08-8fa1-841814d597c1 |
| 2021-08-03T12:01:00.119+05:30 | REPORT RequestId: ae43508a-8eb7-4b08-8fa1-841814d597c1 Duration: 49.40 ms Billed Duration: 50 ms Memory Size: 128 MB Max Memory Used: 65 MB Init Duration: 155.37 ms |
| | No newer events at this moment. Auto retry paused . Resume |

An image has been Added -> apsit_logo.jpg you can see in cloudwatch logs.

Conclusion: Write your own findings.