

Cloud Plus Plus Services



Create AWS Lambda using AWS CLI and implement event-driven architecture.

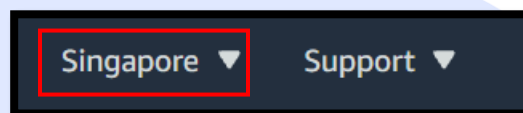
Tutorial Objectives:

1. Learn to create Lambda using AWS CLI
2. Learn to implement event-driven architecture using S3 as event source to invoke Lambda function

Step 1: Create the execution role.

1. In AWS Console, top blue bar, from region drop down, select any region.

Here, **Asia Pacific (Singapore) ap-southeast-1** is selected.



2. Open AWS Management Console and search for IAM.

Go to Roles and click on the Create Role.

Create role

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
Your IdP

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.

- Select type of trusted entity: **AWS Service**
- Choose a use case: **Lambda**

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- Click **Next: Permission**

Then search for **AmazonS3FullAccess** and **AWSLambdaBasicExecutionRole**, proceed to Next Step and Review.



Policy name ▾	Policy type ▾
▶  AmazonS3FullAccess	AWS managed policy
▶  AWSLambdaBasicExecutionRole	AWS managed policy

- **Role Name: Lambda-S3**

Create role. Copy the **Role ARN** and paste it in notepad we will use it in Step 4.

[Roles](#) > [Lambda-S3](#)


Summary

Role ARN	arn:aws:iam:::role/Lambda-S3 
Role description	Allows Lambda functions to call AWS services on your behalf. Edit
Instance Profile ARNs	
Path	/

Step 2: Create S3 Buckets.

1. Open AWS Console in new tab and search for S3 and create two buckets in the **same region** which is selected in Step 1.

Buckets (0) [Info](#)

 [Copy ARN](#) [Empty](#) [Delete](#) [Create bucket](#)

Buckets are containers for data stored in S3. [Learn more](#)

Name ▲ AWS Region ▼ Access ▼ Creation date ▼

No buckets

You don't have any buckets.

[Create bucket](#)

- **Bucket Name: rm-thumbnail-test**
Keep other settings default and **create the bucket**.

Follow the same procedure to create second bucket give it a name as

- **Bucket Name: rm-thumbnail-test-resized**

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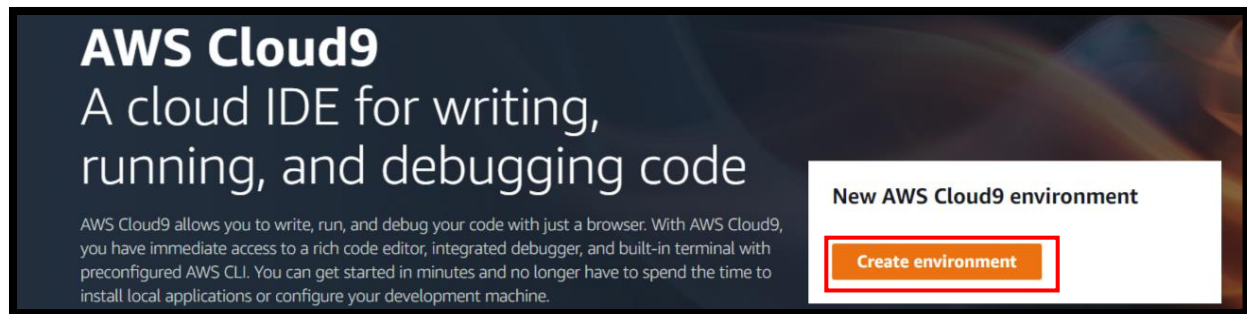
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Step 3: Create Cloud9 environment.

1. Select the same region as Step 1 and Step 2.

Go to **Cloud9** Service. Click on **Create Environment**.



Provide the following configuration:

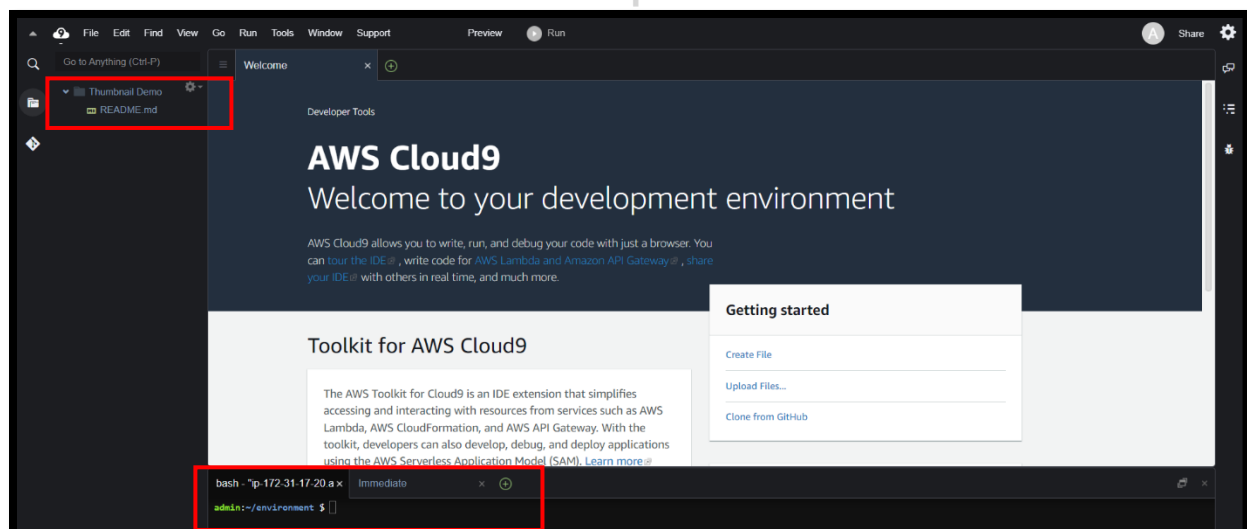
- **Environment Name:** Thumbnail Demo
- **Description:** Cloud9 IDE for CloudPlusPlus Tutorial

Go to **Next Step**. Confirm the following list of default selected choices:

- **Environment type:** Create a new EC2 instance for environment (direct access)
- **Instance type:** t2.micro (1 GiB RAM + 1 vCPU)
- **Platform:** Amazon Linux 2 (recommended)

Proceed to **Next Step**. Review and click on **Create environment**.

2. You will have the Cloud9 IDE ready in some time. A window as below will be visible.

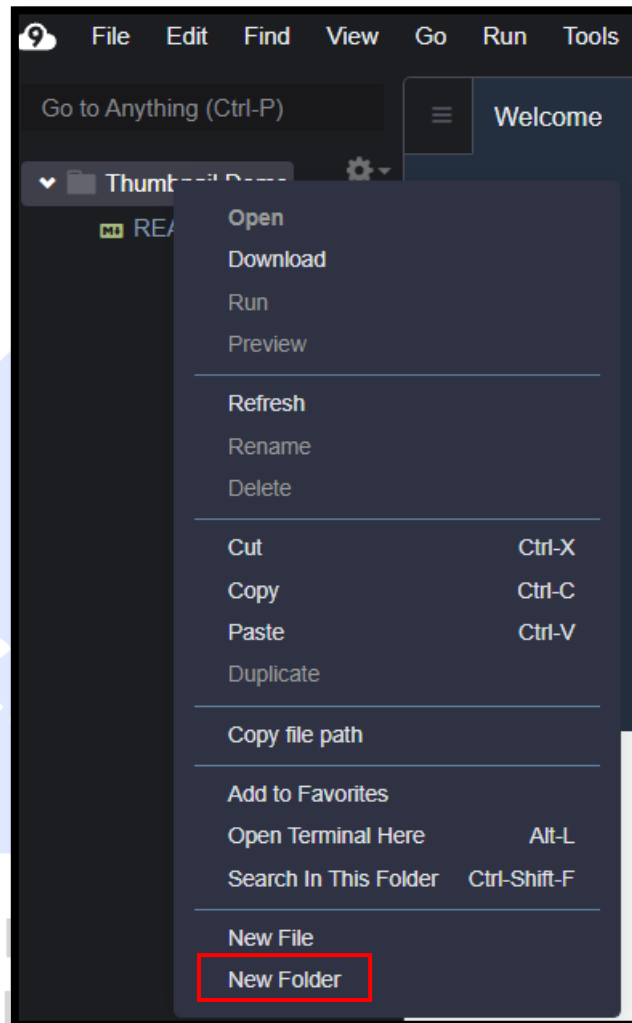


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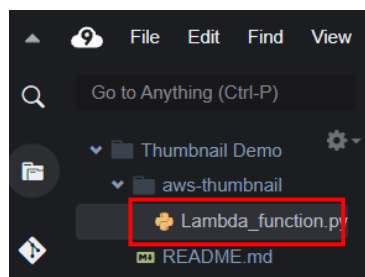


In the bottom part of the screen, a Terminal Window is visible. If not go to the **Window** option in Menu Bar of Cloud9 IDE and click on **New Terminal**.

3. Right Click on the Thumbnail Demo and create a new folder, name it as **aws-thumbnail**.



4. Similarly create **new file** in the aws-thumbnail folder and name it as **lambda_function.py**.



Double click on the **lambda_function.py**, open the file and paste the below code.

```
import boto3
import os
import sys
import uuid
from urllib.parse import unquote_plus
from PIL import Image
import PIL.Image

s3_client = boto3.client('s3')

def resize_image(image_path, resized_path):
    with Image.open(image_path) as image:
        image.thumbnail(tuple(x / 2 for x in image.size))
        image.save(resized_path)

def lambda_handler(event, context):
    for record in event['Records']:
        bucket = record['s3']['bucket']['name']
        key = unquote_plus(record['s3']['object']['key'])
        tmpkey = key.replace('/', '')
        download_path = '/tmp/{}'.format(uuid.uuid4(), tmpkey)
        upload_path = '/tmp/resized-{}'.format(tmpkey)
        s3_client.download_file(bucket, key, download_path)
        resize_image(download_path, upload_path)
        s3_client.upload_file(upload_path, '{}-resized'.format(bucket), key)
```

Save the file by **Ctrl+S**.

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```
1 import boto3
2 import os
3 import sys
4 import uuid
5 from urllib.parse import unquote_plus
6 from PIL import Image
7 import PIL.Image
8
9 s3_client = boto3.client('s3')
10
11 def resize_image(image_path, resized_path):
12     with Image.open(image_path) as image:
13         image.thumbnail(tuple(x / 2 for x in image.size))
14         image.save(resized_path)
15
16 def lambda_handler(event, context):
17     for record in event['Records']:
18         bucket = record['s3']['bucket']['name']
19         key = unquote_plus(record['s3']['object']['key'])
20         tmpkey = key.replace('/', '')
21         download_path = '/tmp/{}'.format(uuid.uuid4(), tmpkey)
22         upload_path = '/tmp/resized-{}'.format(tmpkey)
23         s3_client.download_file(bucket, key, download_path)
24         resize_image(download_path, upload_path)
25         s3_client.upload_file(upload_path, '{}-resized'.format(bucket), key)
26
```

Type the following command in the terminal to change the directory.

cd aws-thumbnail

```
bash - "ip-172-31-17-20.a x Immediate x +
admin:~/environment $ cd aws-thumbnail
admin:~/environment/aws-thumbnail $
```

Install pillow package using following command.

pip install pillow

```
admin:~/environment/aws-thumbnail $ pip install pillow
Defaulting to user installation because normal site-packages is not writeable
Collecting pillow
  Downloading Pillow-8.3.2-cp37-cp37m-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (3.0 MB)
    | 3.0 MB 5.8 MB/s
Installing collected packages: pillow
Successfully installed pillow-8.3.2
admin:~/environment/aws-thumbnail $
```

Use below command to get the location of pillow package.

pip show pillow

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```
python3 - "ip-172-31-17-2 x Immediate x +  
Summary: Python Imaging Library (Fork)  
Home-page: https://python-pillow.org  
Author: Alex Clark (PIL Fork Author)  
Author-email: aclark@python-pillow.org  
License: HPND  
Location: /home/ec2-user/.local/lib/python3.7/site-packages  
Requires:  
Required-by:  
admin:~/environment/aws-thumbnail $
```

Copy the location and run the following command

```
cd /home/ec2-user/.local/lib/python3.7/site-packages
```

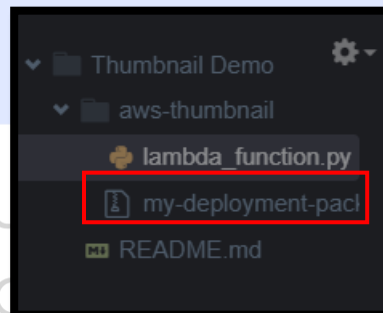
Create a zip file of pillow package and give it name as my-deployment-package, use following command.

```
zip -r my-deployment-package.zip .
```

Run **ls** command to check if the package is ready.

Move my-deployment-package to aws-thumbnail folder.

```
mv my-deployment-package.zip ~/environment/aws-thumbnail/
```



Use **cd** command to move to the root directory. Run the following command.

```
cd environment/aws-thumbnail/
```

```
admin:~/environment/aws-thumbnail $ mv my-deployment-package.zip ~/environment/aws-thumbnail/  
admin:~/environment/aws-thumbnail $ cd  
admin:~/environment/aws-thumbnail $  
admin:~/environment/aws-thumbnail $
```

create a zip file of my-deployment-package and lambda_function.py

```
zip -g my-deployment-package.zip lambda_function.py
```

```
zip error: Nothing to do: (my-deployment-package.zip)
admin:~/environment/aws-thumbnail $ zip -g my-deployment-package.zip Lambda_function.py
adding: Lambda_function.py (deflated 54%)
admin:~/environment/aws-thumbnail $
```

Step 4: Create the Lambda Function.

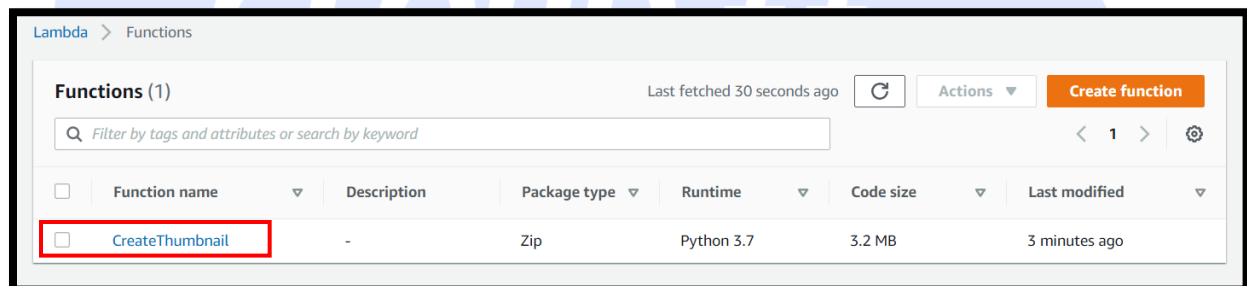
Create a Lambda function with the create-function command.

```
aws lambda create-function --function-name CreateThumbnail \
--zip-file fileb://my-deployment-package.zip --handler
lambda_function.lambda_handler --runtime python3.7 \
--timeout 30 --memory-size 1024 \
--role arn:aws:iam::xxxxxxxxxxxx:role/Lambda-S3
```

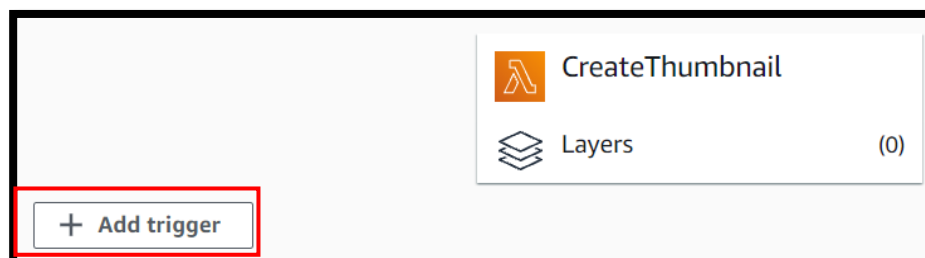
For the role parameter, replace `<arn:aws:iam::xxxxxxxx:role/Lambda-S3>` with your Role ARN which we copied in [Step 1](#) and run the command.

Step 5: Add S3 trigger.

1. Go to the Lambda Service tab, Click on the **CreateThumbnail** Function.



2. Click Add trigger option.



3. Search for **S3** and select it from the dropdown.

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Add trigger

Trigger configuration

Select a trigger

Q s3

S3
aws storage

4. Select Source Bucket i.e **rm-thumbnaill-test**.

Bucket

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

Q |

rm-thumbnaill-test

rm-thumbnaill-test-resized

5. Scroll down **Acknowledge and Add trigger.**

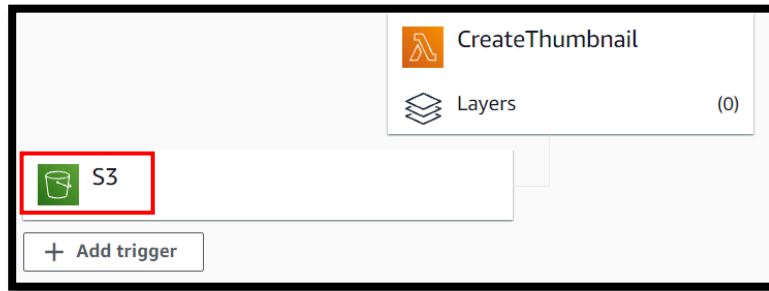
Recursive invocation

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

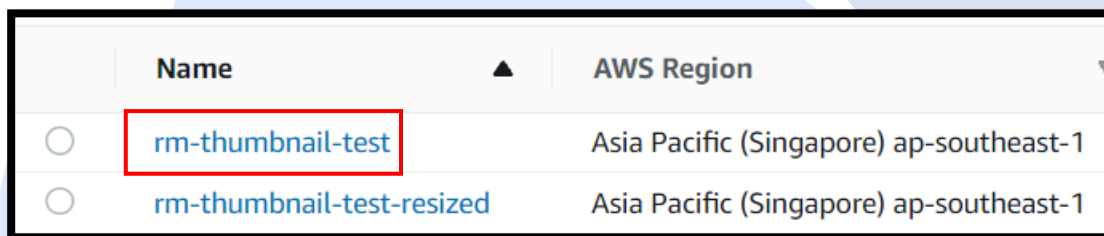
6. The S3 trigger will be added to lambda function.



Step 6: Upload an object to bucket.

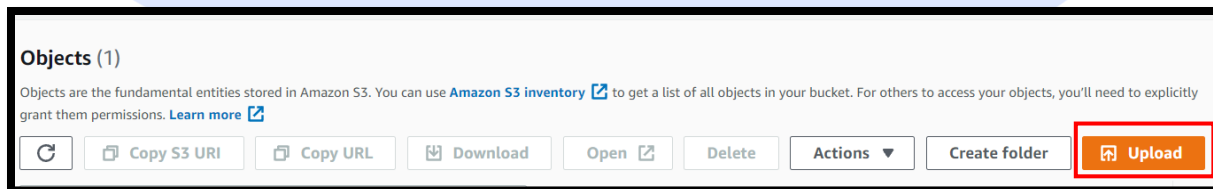
1. Now go to **S3 Management Console**.

2. Click on **rm-thumbnail-test** bucket.

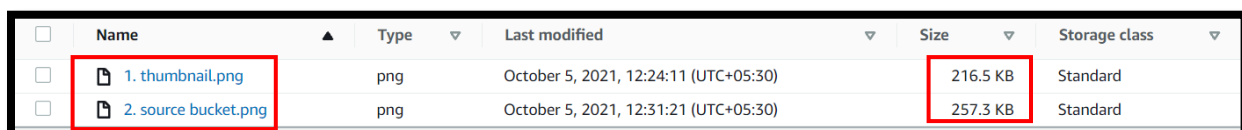
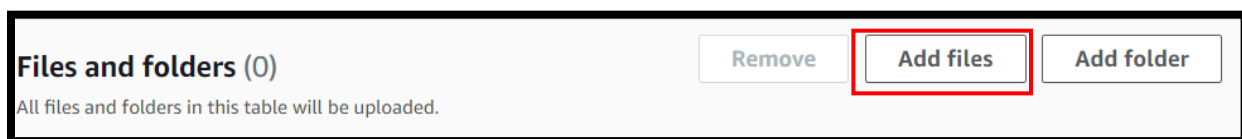


	Name	AWS Region
<input type="radio"/>	rm-thumbnail-test	Asia Pacific (Singapore) ap-southeast-1
<input type="radio"/>	rm-thumbnail-test-resized	Asia Pacific (Singapore) ap-southeast-1

3. Click on **Upload**.



4. Click on **Add files and upload any image**



<input type="checkbox"/>	Name	Type	Last modified	Size	Storage class
<input type="checkbox"/>	1. thumbnail.png	png	October 5, 2021, 12:24:11 (UTC+05:30)	216.5 KB	Standard
<input type="checkbox"/>	2. source bucket.png	png	October 5, 2021, 12:31:21 (UTC+05:30)	257.3 KB	Standard

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5. After Uploading check the **rm-thumbnail-test-resized** bucket.

<input type="checkbox"/>	Name	Type	Last modified	Size	Storage class
<input type="checkbox"/>	1. thumbnail.png	png	October 5, 2021, 12:24:13 (UTC+05:30)	157.5 KB	Standard
<input type="checkbox"/>	2. source bucket.png	png	October 5, 2021, 12:31:23 (UTC+05:30)	155.7 KB	Standard

Thus, we have successfully created a thumbnail image using lambda function and S3.

Note: If you no longer need the resources, you may delete the Lambda Function, S3 Buckets and Cloud9 environment.



Document Created by	Version
Shruti Dhongade	09-Oct-2021
Bavyaa R	14-Oct-2021