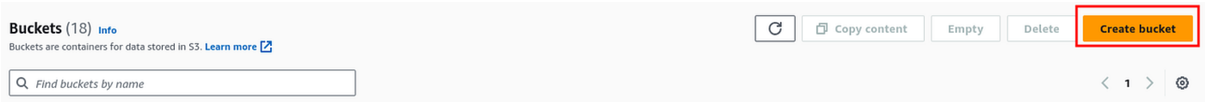
In this project, we will be creating two buckets. The first bucket will be used to store the original images that we want to resize. The second bucket will be dedicated to storing the resized images. The resizing process will be automated through an AWS Lambda function, which will automatically upload the resized images to the second bucket.

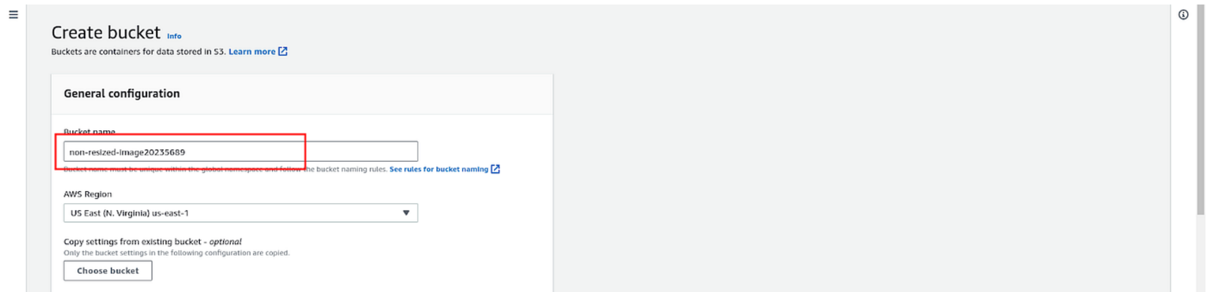
Creating the first S3 bucket by clicking on **Create bucket**.



Buckets (18) Info

Buckets are containers for data stored in S3. Learn more

2. Enter the name of Bucket 1 and click on **Create bucket**.



Create bucket Info

Buckets are containers for data stored in S3. Learn more

General configuration

Bucket name: non-resized-image20235689

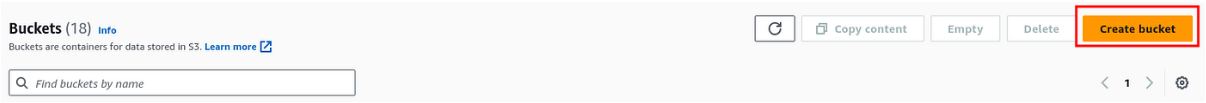
Bucket name must be unique within the global namespace and follow the bucket naming rules. See rules for bucket naming

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

Copy settings from existing bucket - *optional*

Only the bucket settings in the following configuration are copied.

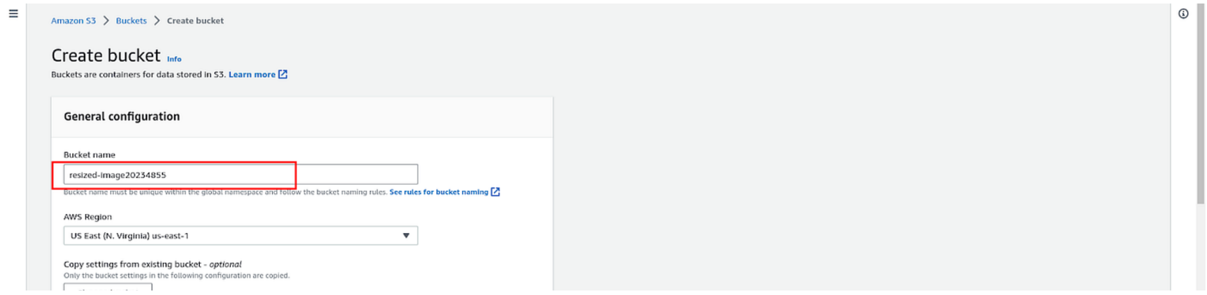
3. Create the second S3 bucket by clicking on **Create bucket.**



Buckets (18) Info

Buckets are containers for data stored in S3. Learn more

4. Enter the name of **Bucket2** and click on **Create bucket.**



Create bucket Info

Buckets are containers for data stored in S3. Learn more

General configuration

Bucket name: resized-image20234855

Bucket name must be unique within the global namespace and follow the bucket naming rules. See rules for bucket naming

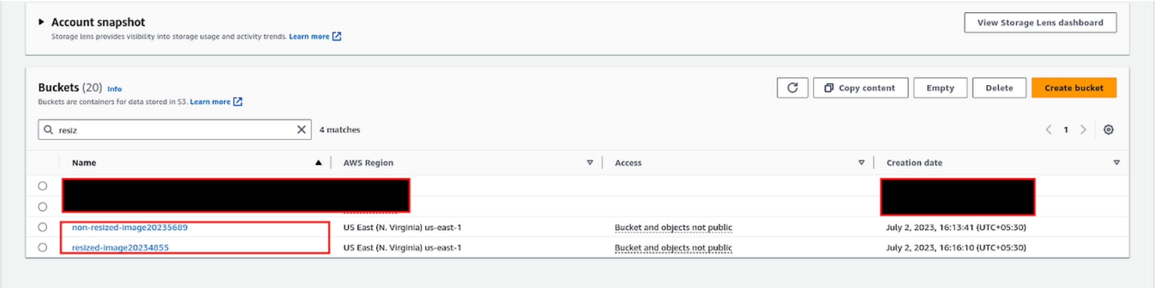
AWS Region: US East (N. Virginia) us-east-1

Copy settings from existing bucket - *optional*

Only the bucket settings in the following configuration are copied.

5. So, Here we have created two Buckets.

You can check the below screenshot.



▸ Account snapshot

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

View Storage Lens dashboard

Buckets (20) Info

Buckets are containers for data stored in S3. Learn more

Copy content | Empty | Delete | Create bucket

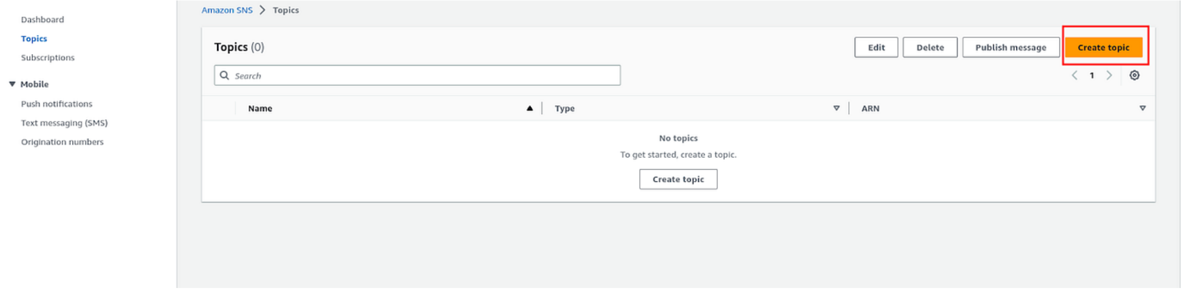
resiz

4 matches

	Name	AWS Region	Access	Creation date
○	[redacted]			[redacted]
○	[redacted]			[redacted]
○	non-resized-image20235689	US East (N. Virginia) us-east-1	Bucket and objects not public	July 2, 2023, 16:13:41 (UTC+05:30)
○	resized-image20234855	US East (N. Virginia) us-east-1	Bucket and objects not public	July 2, 2023, 16:16:10 (UTC+05:30)

6. Now, let's create an SNS **topic** and an SNS **subscription** before creating a lambda **function.**

Click on **Create topic.**



Topics (0)

Edit | Delete | Publish message | Create topic

Search

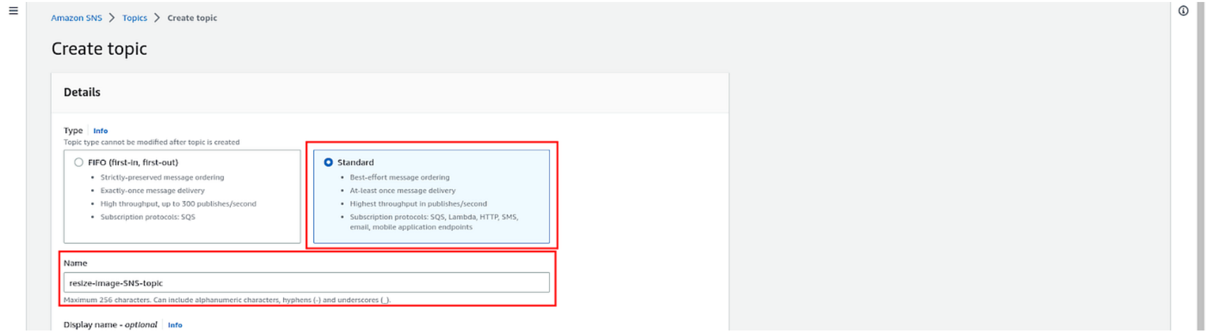
Name	Type	ARN

No topics

To get started, create a topic.

Create topic

7. Select **Standard** type SNS topic and enter the suitable name for your SNS topic and click on **Create topic**.



Create topic

Details

Type Info

Topic type cannot be modified after topic is created

○ FIFO (first-in, first-out)
- Strictly-preserved message ordering
- Exactly-once message delivery
- High throughput, up to 300 publishes/second
- Subscription protocols: SQS

● Standard
- Best-effort message ordering
- At-least once message delivery
- Highest throughput in publishes/second
- Subscription protocols: SQS, Lambda, HTTP, SMS, email, mobile application endpoints

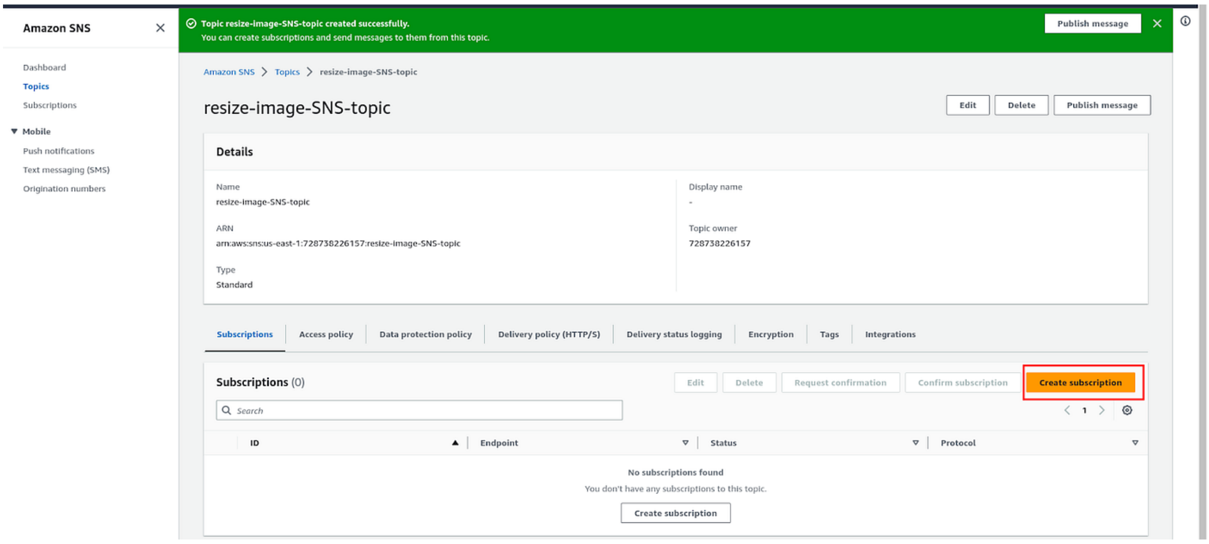
Name

resize-image-SNS-topic

Maximum 256 characters. Can include alphanumeric characters, hyphens (-) and underscores (_).

Display name - *optional* Info

8. As you can see in the below screenshot, we have configured the **SNS topic.** Now, click on **Create subscription** to add your email address.



Topic resize-image-SNS-topic created successfully.
You can create subscriptions and send messages to them from this topic.

Amazon SNS > Topics > resize-image-SNS-topic

resize-image-SNS-topic

Details

Name
resize-image-SNS-topic

ARN
arn:aws:sns:us-east-1:728738226157:resize-image-SNS-topic

Type
Standard

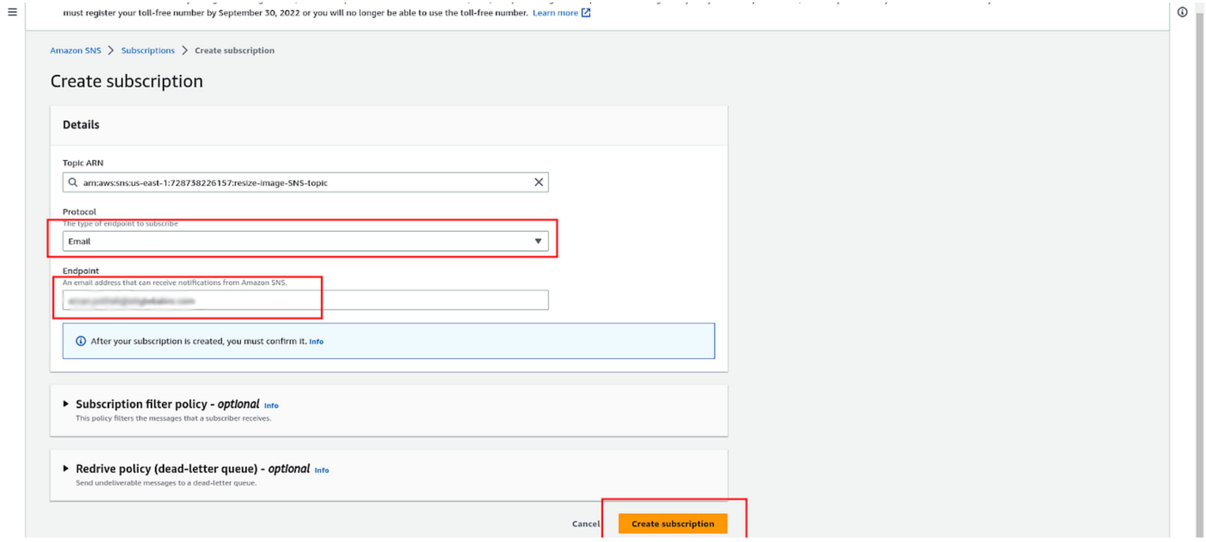
Display name
-

Topic owner
728738226157

Subscriptions (0)

No subscriptions found
You don't have any subscriptions to this topic.

9. Select the **Protocol type** as **email** and add your mail address in **Endpoint** and click on **Create Subscription.**



must register your toll-free number by September 30, 2022 or you will no longer be able to use the toll-free number. Learn more

Amazon SNS > Subscriptions > Create subscription

Create subscription

Details

Topic ARN
arn:aws:sns:us-east-1:728738226157:resize-image-SNS-topic

Protocol
The type of endpoint to subscribe
Email

Endpoint
An email address that can receive notifications from Amazon SNS.
[redacted]

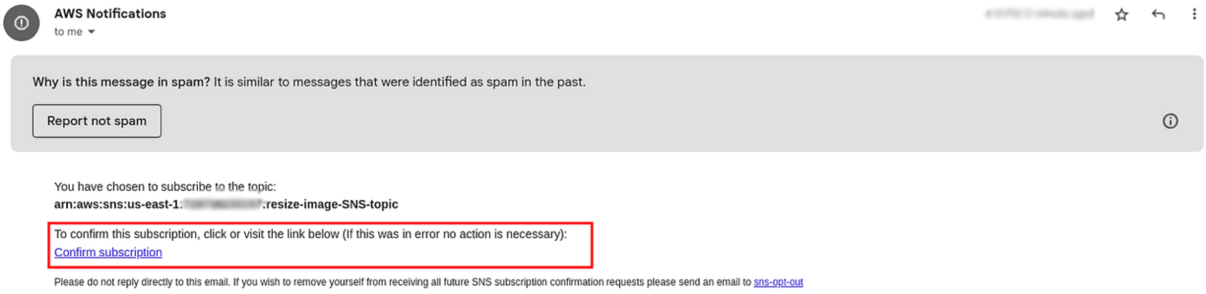
After your subscription is created, you must confirm it. Info

Subscription filter policy - *optional* Info
This policy filters the messages that a subscriber receives.

Redrive policy (dead-letter queue) - *optional* Info
Send undeliverable messages to a dead-letter queue.

10. After creating **Subscription,** you will get a notification on your given mail address if not, please check your **spam box**. The mail will look like the below screenshot.

Click on **Confirm subscription** to get the notification for the resized image.



AWS Notifications
to me

[redacted]

Why is this message in spam? It is similar to messages that were identified as spam in the past.

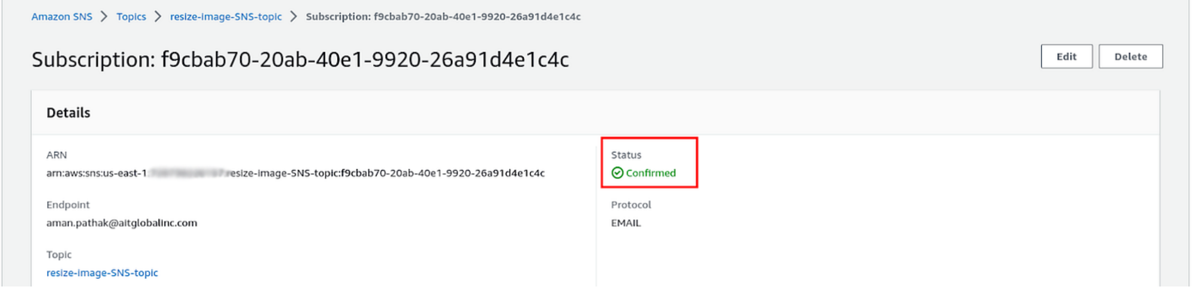
You have chosen to subscribe to the topic:
arn:aws:sns:us-east-1:[redacted]:resize-image-SNS-topic

To confirm this subscription, click or visit the link below (If this was in error no action is necessary):
Confirm subscription

Please do not reply directly to this email. If you wish to remove yourself from receiving all future SNS subscription confirmation requests please send an email to sns-opt-out

11. Once you confirm your **subscription**. The **status** should be **Confirmed** from **Pending status.**

Here, we configured the **SNS topic** and **subscription.**



Amazon SNS > Topics > resize-image-SNS-topic > Subscription: f9cbab70-20ab-40e1-9920-26a91d4e1c4c

Subscription: f9cbab70-20ab-40e1-9920-26a91d4e1c4c

Details

ARN
arn:aws:sns:us-east-1[redacted]resize-image-SNS-topic:f9cbab70-20ab-40e1-9920-26a91d4e1c4c

Endpoint
aman.pathak@aitglobalinc.com

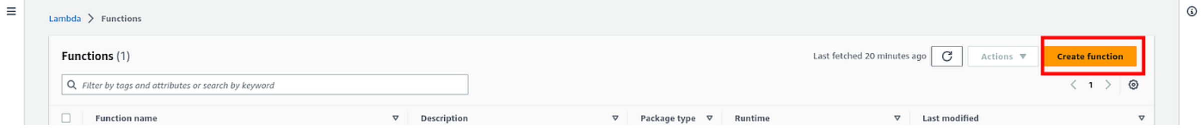
Topic
resize-image-SNS-topic

Status
Confirmed

Protocol
EMAIL

12. Now, Let’s create **a Lambda function** that will help us to resize the images and store the images.

Click on **Create function.**

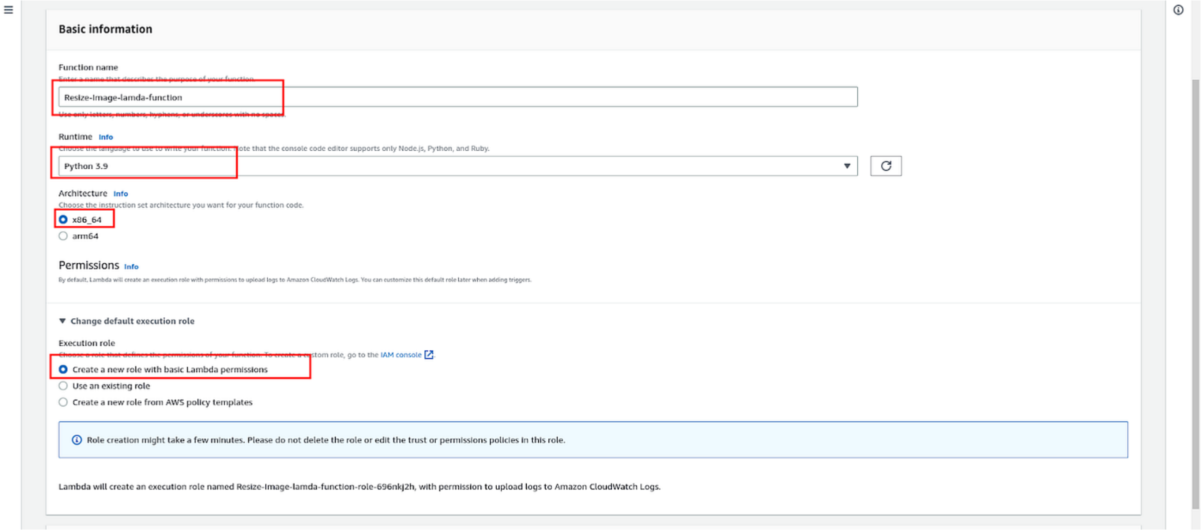


Functions (1)

Last fetched 20 minutes ago
Actions
Create function
Filter by tags and attributes or search by keyword
1

□	Function name	Description	Package type	Runtime	Last modified

13. Enter the **function name, runtime(**I am using Python 3.9), and **architecture,** and for **role** select the first option, So we can configure from our own all the access for the services and click on **Create function**.



Basic information

Function name
Enter a name that describes the purpose of your function.
Resize-Image-lamda-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.
Python 3.9

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

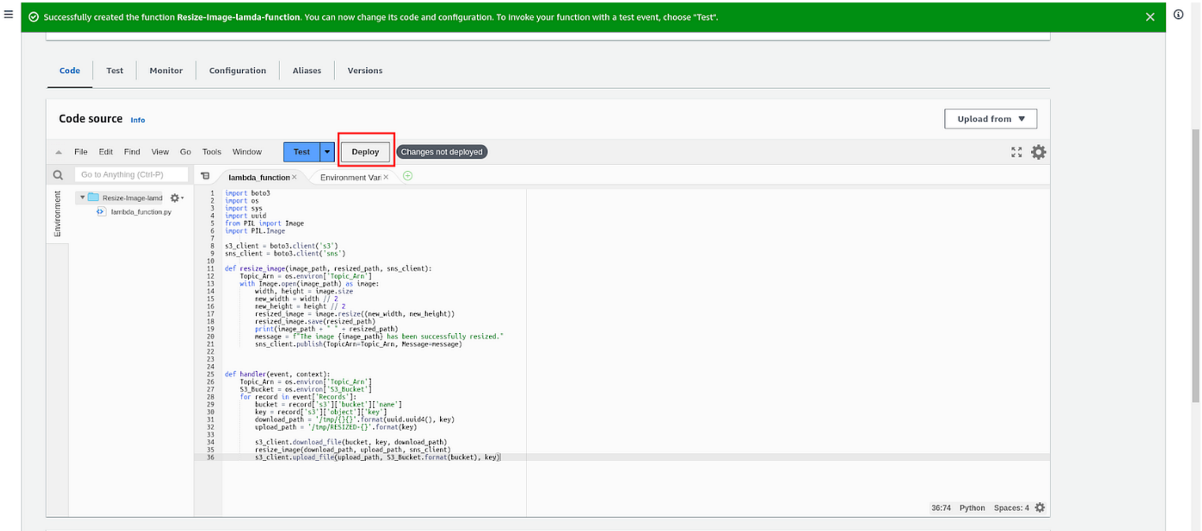
Execution role
Choose a role that defines the permissions of your function. To create a custom role, go to the IAM console.
● Create a new role with basic Lambda permissions
○ Use an existing role
○ Create a new role from AWS policy templates

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 Resize-Image-lamda-function-role-696nkj2h, with permission to upload logs to Amazon CloudWatch Logs.

14. First of all, replace the code with our code that will resize the image

Code link- [Lambda-Code](), After replacing the code, **deploy** it by clicking on **Deploy.**

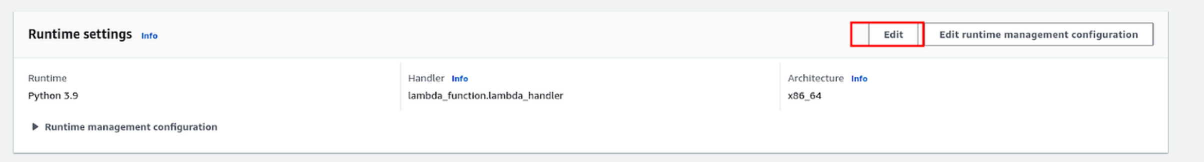


Successfully created the function **Resize-Image-lamda-function**. You can now change its code and configuration. To invoke your function with a test event, choose "Test".

```python
import boto3
import os
import sys
import uuid
from PIL import Image
import PIL.Image

s3_client = boto3.client('s3')
sns_client = boto3.client('sns')

def resize_image(image_path, resized_path, sns_client):
    Topic_Arn = os.environ['Topic_Arn']
    with Image.open(image_path) as image:
        width, height = image.size
        new_width = width // 2
        new_height = height // 2
        resized_image = image.resize((new_width, new_height))
        resized_image.save(resized_path)
        print(image_path + " " + resized_path)
        message = f"The image {image_path} has been successfully resized."
        sns_client.publish(TopicArn=Topic_Arn, Message=message)



def handler(event, context):
    Topic_Arn = os.environ['Topic_Arn']
    S3_Bucket = os.environ['S3_Bucket']
    for record in event['Records']:
        bucket = record['s3']['bucket']['name']
        key = record['s3']['object']['key']
        download_path = '/tmp/{}{}'.format(uuid.uuid4(), key)
        upload_path = '/tmp/RESIZED-{}'.format(key)

        s3_client.download_file(bucket, key, download_path)
        resize_image(download_path, upload_path, sns_client)
        s3_client.upload_file(upload_path, S3_Bucket.format(bucket), key)
```

15. Now, we need to configure lots of things in the **lambda function.** Let's start with **runtime settings,** that is, exactly under the code itself.

Click on Edit

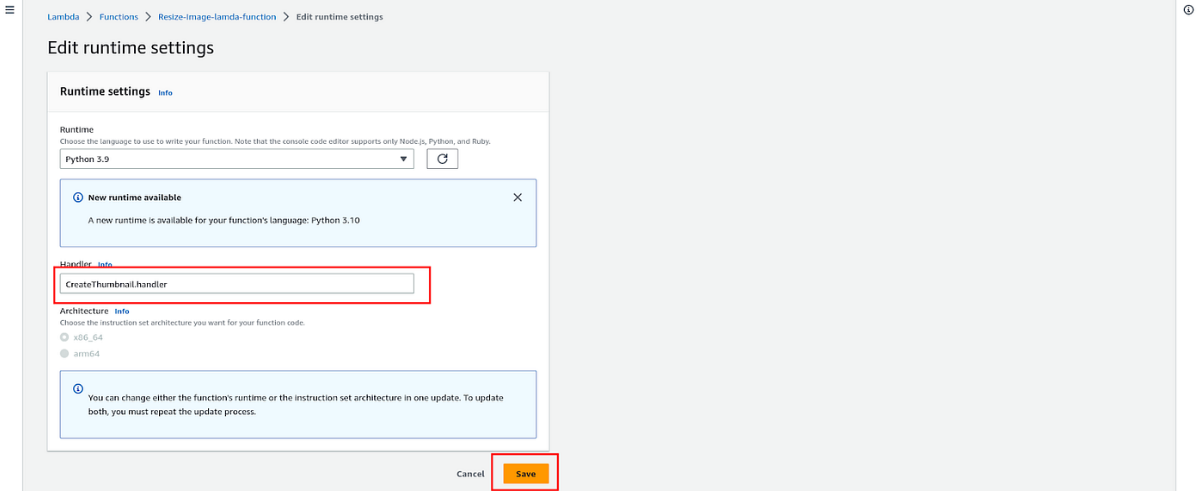

Runtime settings Info
Edit
Edit runtime management configuration

Runtime: Python 3.9
Handler Info: lambda_function.lambda_handler
Architecture Info: x86_64

▶ Runtime management configuration

16. Now, add the **handler** name according to your **Python code name** and click on **Save.**

My **lambda function code** name is **CreateThumbnail** and **handler** name is **handler**. So, I have written **CreateThumbnail.handler**.


Lambda > Functions > Resize-Image-lamda-function > Edit runtime settings
Edit runtime settings
Runtime settings Info

Runtime
Choose the language to use to write your function. Note that the console code editor supports only Node.js, Python, and Ruby.
Python 3.9

New runtime available
A new runtime is available for your function's language: Python 3.10

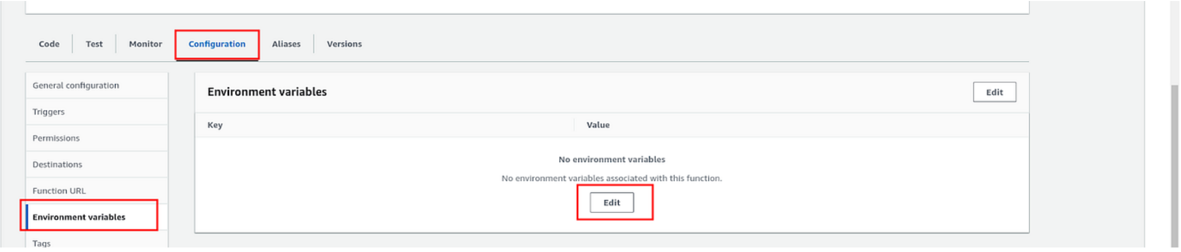
Handler Info
CreateThumbnail.handler

Architecture Info
Choose the instruction set architecture you want for your function code.
○ x86_64
○ arm64

You can change either the function's runtime or the instruction set architecture in one update. To update both, you must repeat the update process.

17. In our **Python code,** we have to provide *Bucket2*- **resized-bucket name** and **SNS topic Arn**. But instead of hardcoding it, we will use **Lambda environment variables and we will** pass our information.

To do that, Go to the **configuration** section, under click on **Environment variables,** and click on **edit.**



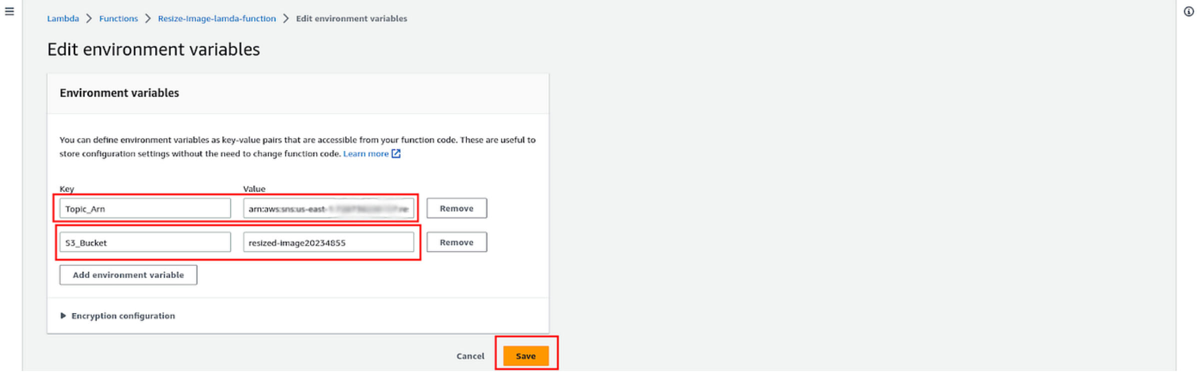
Environment variables

Key	Value

No environment variables

No environment variables associated with this function.

18. Add the **SNS topic arn** and **S3 bucket name** of **Bucket2 according to your service name and on and click** on **Save.**


Lambda > Functions > Resize-image-lamda-function > Edit environment variables
Remove
Remove
Add environment variable
▸ Encryption configuration
Cancel
Save

Edit environment variables

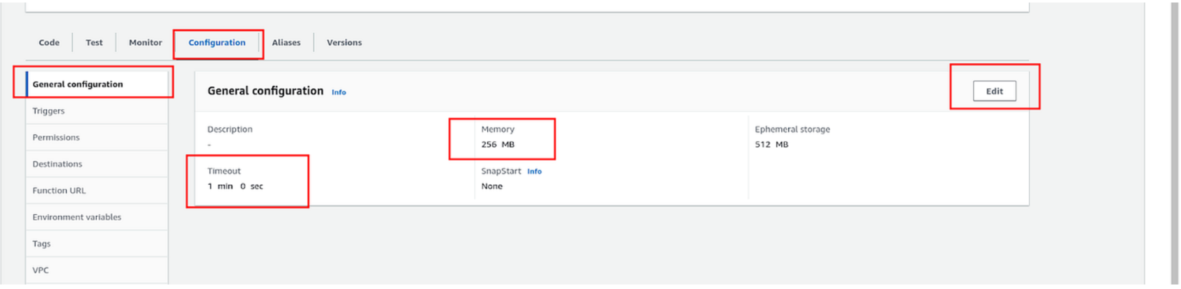
Environment variables

You can define environment variables as key-value pairs that are accessible from your function code. These are useful to store configuration settings without the need to change function code. Learn more

Key	Value
Topic_Arn	arn:aws:sns:us-east-[redacted]
S3_Bucket	resized-image20234855

19. In the lambda function, we have to increase the **timeout** and **Memory size** because the lambda function needs more time and memory to perform the resizing task.

To do that, Go to the **Configuration tab-> General configuration section -> click on edit.** Add the timeout 1 min and give memory 256MB. It would be enough to perform our task.



General configuration

Description: -

Memory: 256 MB

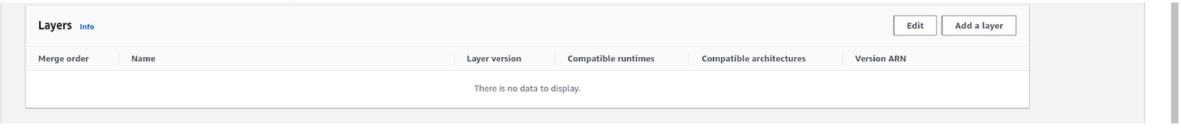
Ephemeral storage: 512 MB

Timeout: 1 min 0 sec

SnapStart: None

20. Now, we need to add one **PIL** layer for our Python code.

Click on **Add a layer.**



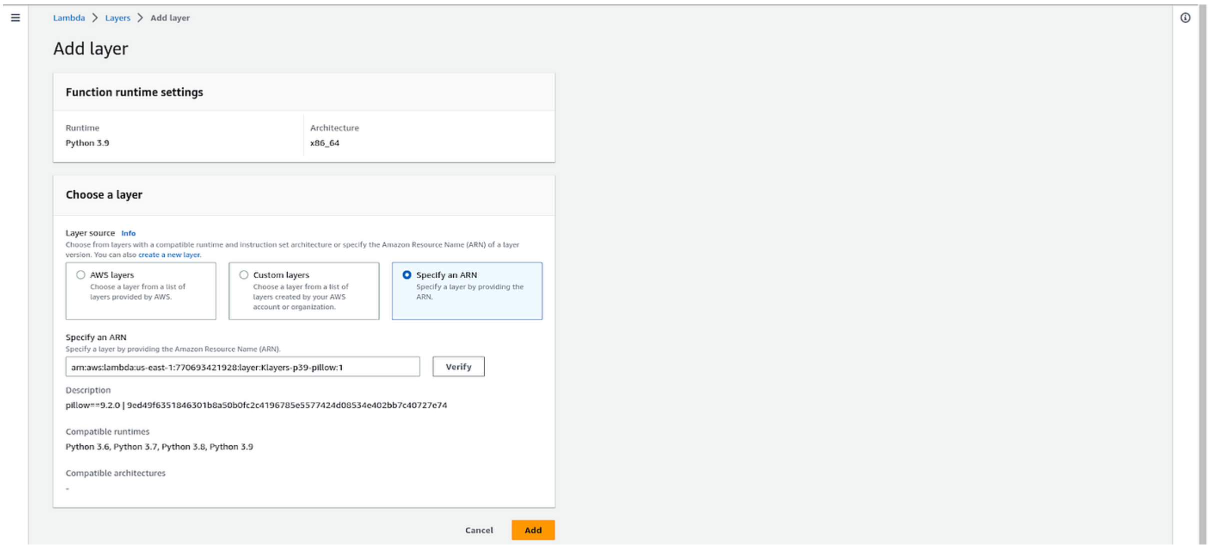
Layers Info

Edit | Add a layer

Merge order	Name	Layer version	Compatible runtimes	Compatible architectures	Version ARN

There is no data to display.

21. Add the ARN of the layer **arn:aws:lambda:us-east-1:770693421928:layer:Klayers-p39-pillow:1** and click on **Save.**



Lambda > Layers > Add layer

Add layer

Function runtime settings

Runtime
Python 3.9

Architecture
x86_64

Choose a layer

Layer source Info
Choose from layers with a compatible runtime and instruction set architecture or specify the Amazon Resource Name (ARN) of a layer version. You can also create a new layer.

○ AWS layers
Choose a layer from a list of layers provided by AWS.

○ Custom layers
Choose a layer from a list of layers created by your AWS account or organization.

● Specify an ARN
Specify a layer by providing the ARN.

Specify an ARN
Specify a layer by providing the Amazon Resource Name (ARN).
arn:aws:lambda:us-east-1:770693421928:layer:Klayers-p39-pillow:1
Verify

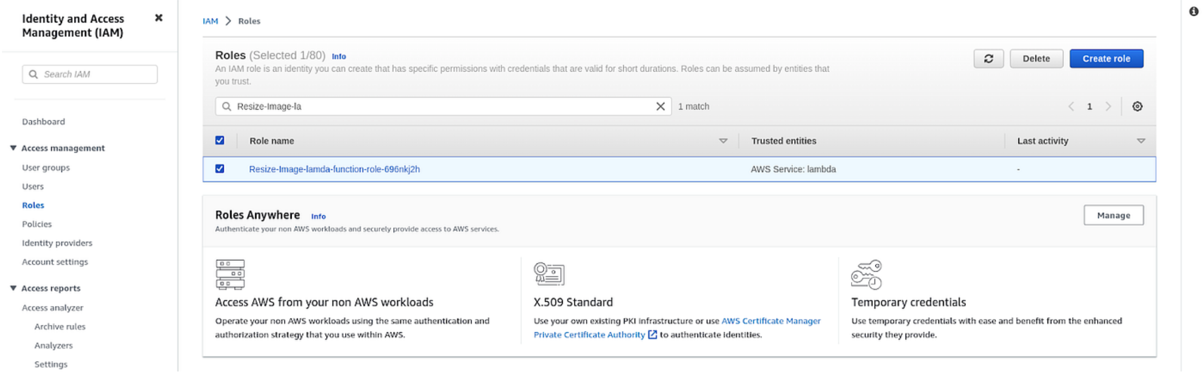
Description
pillow==9.2.0 | 9ed49f6351846301b8a50b0fc2c4196785e5577424d08534e402bb7c40727e74

Compatible runtimes
Python 3.6, Python 3.7, Python 3.8, Python 3.9

Compatible architectures
-

Cancel | Add

22. Let’s do the IAM role configuration for our **Lambda function.** Go to **IAM -> roles -> ‘search for your lambda name role’** and click on the **role.**



Identity and Access Management (IAM)

Search IAM

Dashboard

▼ Access management
User groups
Users
Roles
Policies
Identity providers
Account settings

▼ Access reports
Access analyzer
Archive rules
Analyzers
Settings

IAM > Roles

Roles (Selected 1/80) Info
An IAM role is an identity you can create that has specific permissions with credentials that are valid for short durations. Roles can be assumed by entities that you trust.

Delete | Create role

Resize-Image-la — 1 match

☑	Role name	Trusted entities	Last activity
☑	Resize-Image-lamda-function-role-696nkj2h	AWS Service: lambda	-

Roles Anywhere Info
Authenticate your non AWS workloads and securely provide access to AWS services.

Manage

Access AWS from your non AWS workloads
Operate your non AWS workloads using the same authentication and authorization strategy that you use within AWS.

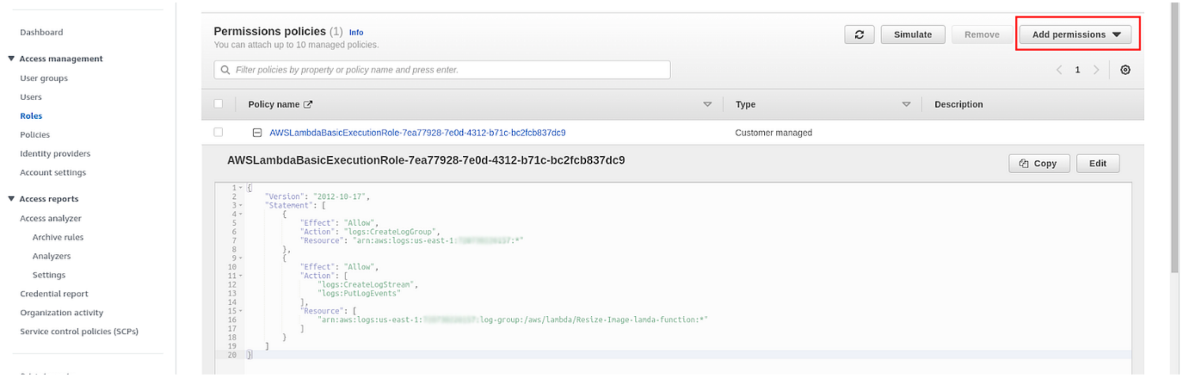
X.509 Standard
Use your own existing PKI infrastructure or use AWS Certificate Manager Private Certificate Authority to authenticate identities.

Temporary credentials
Use temporary credentials with ease and benefit from the enhanced security they provide.

23. Here we have only one **permission** that is related to see the **logs** of our **lambda function** in loggroup. But we need two

more permissions which is **SNSFullAccess** to send the mail to the person and **S3FullAccess** to get the images and store the images in the respective buckets.

To do that, Click on **Add permissions** and select **Attach policy.**



You can attach up to 10 managed policies.

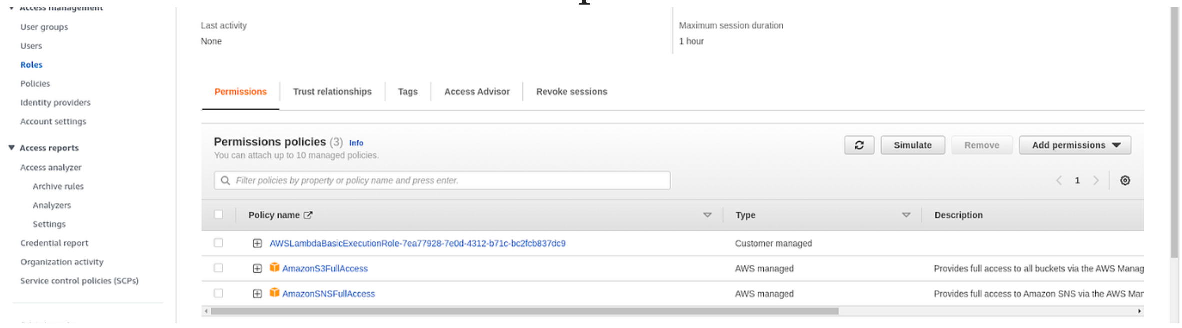
□	Policy name	Type	Description
□	AWSLambdaBasicExecutionRole-7ea77928-7e0d-4312-b71c-bc2fcb837dc9	Customer managed	

AWSLambdaBasicExecutionRole-7ea77928-7e0d-4312-b71c-bc2fcb837dc9

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": "logs:CreateLogGroup",
            "Resource": "arn:aws:logs:us-east-1:[redacted]:*"
        },
        {
            "Effect": "Allow",
            "Action": [
                "logs:CreateLogStream",
                "logs:PutLogEvents"
            ],
            "Resource": [
                "arn:aws:logs:us-east-1:[redacted]:log-group:/aws/lambda/Resize-Image-lamda-function:*"
            ]
        }
    ]
}
```

24. Now, find the two permissions one by one **SNSFullAccess** and **S3FullAccess,** and check the box on the left of the permissions. After doing both, click on **Add permissions.**

The final IAM role has the below permissions list.



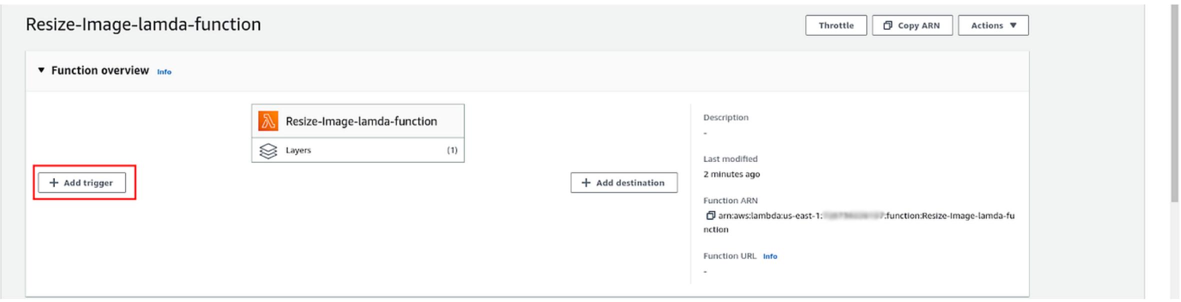
Last activity
None

Maximum session duration
1 hour

You can attach up to 10 managed policies.

□	Policy name	Type	Description
□	AWSLambdaBasicExecutionRole-7ea77928-7e0d-4312-b71c-bc2fcb837dc9	Customer managed	
□	AmazonS3FullAccess	AWS managed	Provides full access to all buckets via the AWS Manag
□	AmazonSNSFullAccess	AWS managed	Provides full access to Amazon SNS via the AWS Mar

25. Finally, We have to add a trigger for the Lambda function. So whenever someone uploads an image to Bucket1. The lambda function will trigger and start the process of resizing the image and doing the other respective things.



Resize-Image-lamda-function

▼ Function overview Info

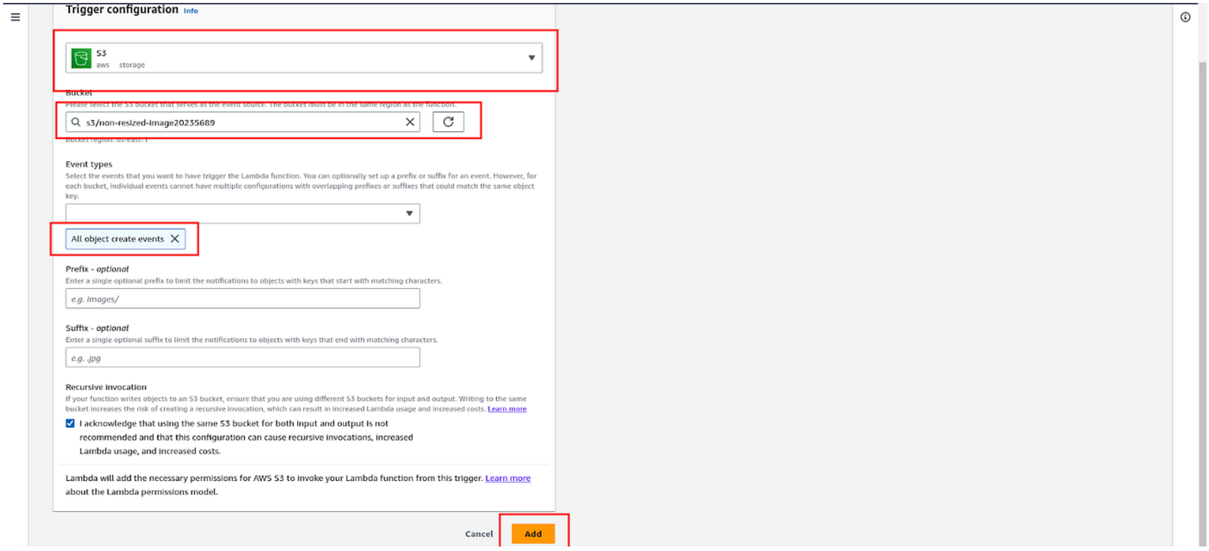
Description
-

Last modified
2 minutes ago

Function ARN
arn:aws:lambda:us-east-1:[redacted]:function:Resize-Image-lamda-function

Function URL Info
-

26. Add the **S3** as **source, Bucket1** which will trigger the **Lambda function,** and click on **Add.**



Trigger configuration Info

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.
s3/non-resized-image20235689
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.
e.g. images/

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

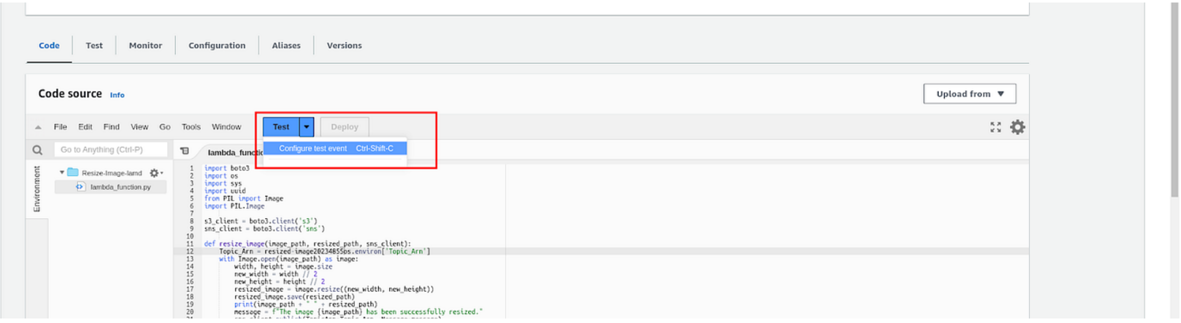
Recursive invocation
If your function writes objects to an S3 bucket, ensure that you are using different S3 buckets for input and output. Writing to the same bucket increases the risk of creating a recursive invocation, which can result in increased Lambda usage and increased costs. Learn more

☑ 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.

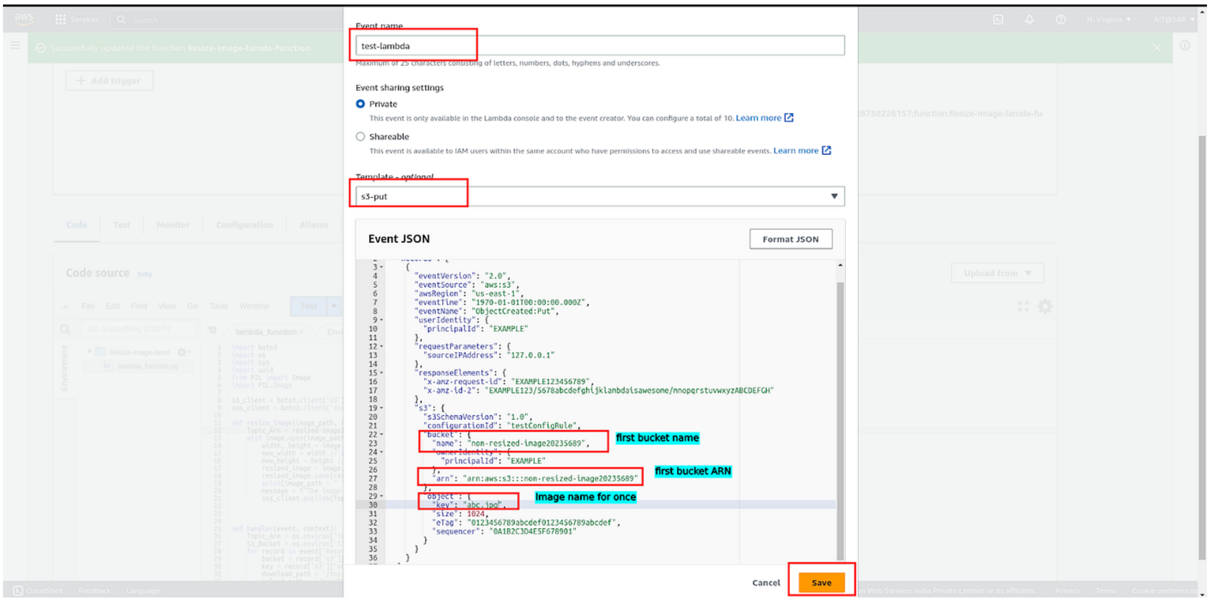
27. Now, we have configured all the things related to the **Lambda function.** It's time to test it.

To do that click on **Test -> Configure test event.**



```
import boto3
import os
import sys
import uuid
from PIL import Image
import PIL.Image

s3_client = boto3.client('s3')
sns_client = boto3.client('sns')

def resize_image(image_path, resized_path, sns_client):
    Topic_Arn = resized-image20234855os.environ['Topic_Arn']
    with Image.open(image_path) as image:
        width, height = image.size
        new_width = width // 2
        new_height = height // 2
        resized_image = image.resize((new_width, new_height))
        resized_image.save(resized_path)
        print(image_path + " " + resized_path)
        message = f"The image {image_path} has been successfully resized."
```

28. Add the **Event-name, the** template should be **s3 put** replace the few things that are given in the below screenshot, and click on **Save**.



Event name
test-lambda
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*
s3-put

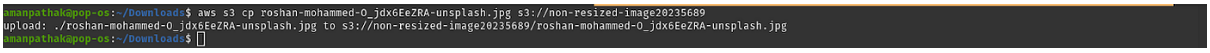
Event JSON

```
  "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": {
          "name": "non-resized-image20235689",
          "ownerIdentity": {
            "principalId": "EXAMPLE"
          },
          "arn": "arn:aws:s3:::non-resized-image20235689"
        },
        "object": {
          "key": "abc.jpg",
          "size": 1024,
          "eTag": "0123456789abcdef0123456789abcdef",
          "sequencer": "0A1B2C3D4E5F678901"
        }
      }
    }
```

29. Now, don't run the lambda manually. Just upload an image to **Bucket1** and see the magic below.

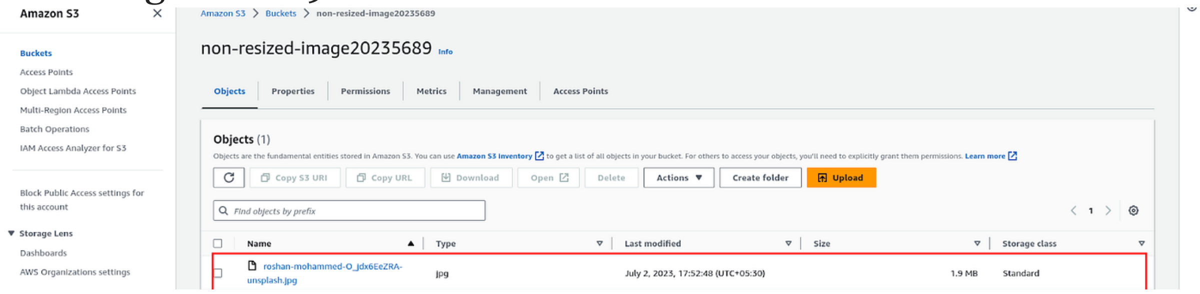
Outputs:

Uploading an Image to the Bucket1.



```
amanpathak@pop-os:~/Downloads$ aws s3 cp roshan-mohammed-O_jdx6EeZRA-unsplash.jpg s3://non-resized-image20235689
upload: ./roshan-mohammed-O_jdx6EeZRA-unsplash.jpg to s3://non-resized-image20235689/roshan-mohammed-O_jdx6EeZRA-unsplash.jpg
amanpathak@pop-os:~/Downloads$ 
```

The Image is of 1.9MB in the Bucket 1.



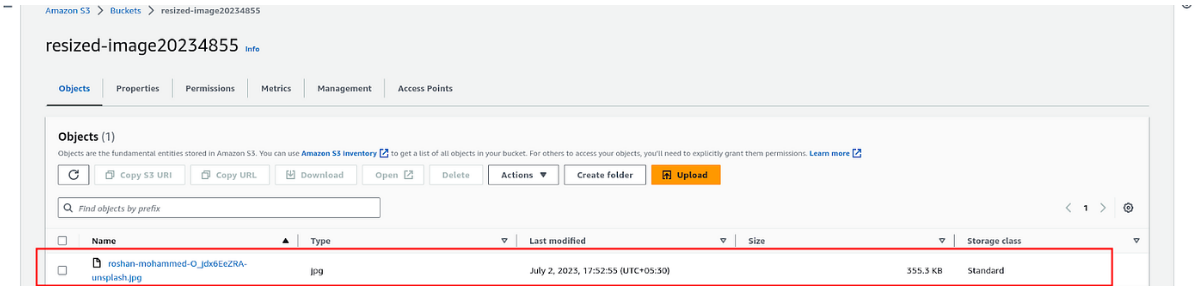
Amazon S3 > Buckets > non-resized-image20235689

non-resized-image20235689 Info

Objects (1)
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

Name	Type	Last modified	Size	Storage class
roshan-mohammed-O_jdx6EeZRA-unsplash.jpg	jpg	July 2, 2023, 17:52:48 (UTC+05:30)	1.9 MB	Standard

The Image has been resized automatically from 1.9MB to 355.3KB.



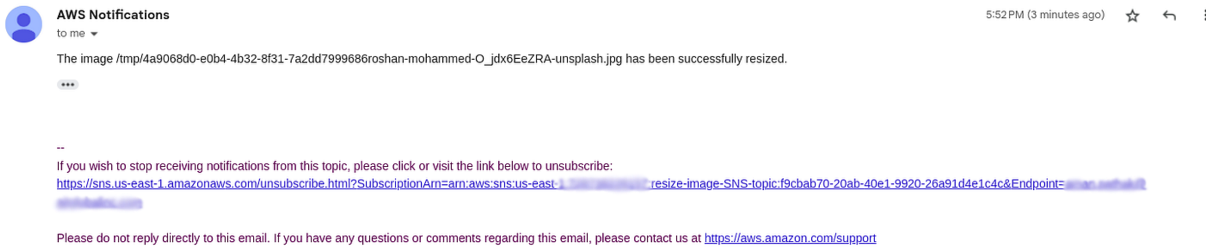
resized-image20234855 Info

Objects (1)

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

□	Name	Type	Last modified	Size	Storage class
□	roshan-mohammed-O_jdx6EeZRA-unsplash.jpg	jpg	July 2, 2023, 17:52:55 (UTC+05:30)	355.3 KB	Standard

Hurray, We have received the mail as well.



AWS Notifications
to me

5:52 PM (3 minutes ago)

The image /tmp/4a9068d0-e0b4-4b32-8f31-7a2dd7999686roshan-mohammed-O_jdx6EeZRA-unsplash.jpg has been successfully resized.

--
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