Name: Harsh Dalvi
Roll No: 13

Experiment No. 12

Aim: To construct a Lambda function which will log "An Image has been added" once you add an object to a specific bucket in S3. **(LO1, LO6)**

Theory:

What is Amazon S3?

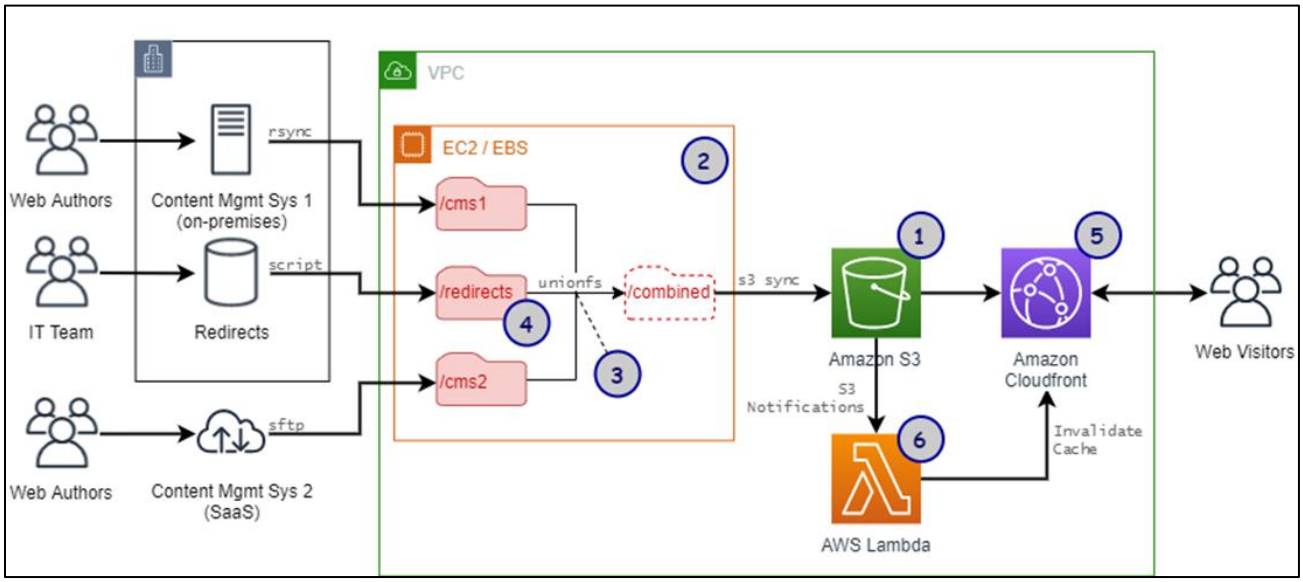
- Amazon Simple Storage Service (Amazon S3) is an object storage service that offers industry-leading scalability, data availability, security, and performance.
- Customers of all sizes and industries can use Amazon S3 to store and protect any amount of data for a range of use cases, such as data lakes, websites, mobile applications, backup and restore, archive, enterprise applications, IoT devices, and big data analytics.
- Amazon S3 provides management features so that you can optimize, organize, and configure access to your data to meet your specific business, organizational, and compliance requirements.
- To work with Amazon S3, you can configure Amazon S3 buckets to store, organize, and manage various data files using an easy-to-use online web interface because it duplicates or replicates data objects across multiple devices or servers in different S3 clusters on a regular basis,

Features of Amazon S3:

- **Storage management:** Amazon S3 has storage management features that you can use to manage costs, meet regulatory requirements, reduce latency, and save multiple distinct copies of your data for compliance requirements.
  1. **S3 Replication** – Replicate objects and their respective metadata and object tags to one or more destination buckets in the same or different AWS Regions for reduced latency, compliance, security, and other use cases.
  2. **S3 Batch Operations** – Manage billions of objects at scale with a single S3 API request or a few clicks in the Amazon S3 console. You can use Batch Operations to perform operations such as Copy, Invoke AWS Lambda function, and Restore on millions or billions of objects.

- **Access management:** Amazon S3 provides features for auditing and managing access to your buckets and objects. By default, S3 buckets and the objects in them are private. You have access only to the S3 resources that you create.
  1. **AWS Identity and Access Management (IAM)** – Create IAM users for your AWS account to manage access to your Amazon S3 resources. For example, you can use IAM with Amazon S3 to control the type of access a user or group of users has to an S3 bucket that your AWS account owns.

2. **Bucket policies** – Use IAM-based policy language to configure resource-based permissions for your S3 buckets and the objects in them.
3. **Amazon S3 access points** – Configure named network endpoints with dedicated access policies to manage data access at scale for shared datasets in Amazon S3.



AWS S3 Benefits:
Some of the benefits of AWS S3 are:

- **Durability:** S3 provides 99.999999999 percent durability.
- **Low cost:** S3 lets you store data in a range of "storage classes." These classes are based on the frequency and immediacy you require in accessing files.
- **Scalability:** S3 charges you only for what resources you actually use, and there are no hidden fees or overage charges. You can scale your storage resources to easily meet your organization's ever-changing demands.
- **Availability:** S3 offers 99.99 percent availability of objects
- **Security:** S3 offers an impressive range of access management tools and encryption features that provide top-notch security.
- **Flexibility:** S3 is ideal for a wide range of uses like data storage, data backup, software delivery, data archiving, disaster recovery, website hosting, mobile applications, IoT devices, and much more.
- **Simple data transfer:** You don't have to be an IT genius to execute data transfers on S3. The service revolves around simplicity and ease of use.

AWS Lambda:

- AWS Lambda is a serverless compute service that runs your code in response to events and automatically manages the underlying compute resources for you. These events may include changes in state or an update, such as a user placing an item in a shopping cart on an ecommerce website.
- You can use AWS Lambda to extend other AWS services with custom logic, or create your own backend services that operate at AWS scale, performance, and security. AWS Lambda automatically runs code in response to multiple events, such as HTTP requests via Amazon API Gateway, modifications to objects in Amazon Simple Storage Service (Amazon S3) buckets, table updates in Amazon DynamoDB, and state transitions in AWS Step Functions.
- You can use AWS Lambda to extend other AWS services with custom logic, or create your own back end services that operate at AWS scale, performance, and security.
- AWS Lambda is a fully managed compute service that runs your code in response to events generated by custom code or from various AWS services such as Amazon S3, DynamoDB, Amazon Kinesis, Amazon SNS, and Amazon Cognito.
- Lambda runs your code on high availability compute infrastructure and performs all the administration of your compute resources. This includes server and operating system maintenance, capacity provisioning and automatic scaling, code and security patch deployment, and code monitoring and logging. All you need to do is supply the code.

AWS Lambda Features:

1. AWS lambda easily scales the infrastructure without any additional configuration. It reduces the operational work involved,

2. It offers multiple options like AWS S3, CloudWatch, DynamoDB, API Gateways, Kinesis, Code Commit, and many more to trigger an event.

3. You don’t need to invest upfront. You can pay only for the memory used by the lambda function and minimal cost on the number of requests hence cost-efficient.

4. AWS Lambda is secure. It uses AWS IAM to define all the roles and security policies.

5. It offers fault tolerance for both services running the code and the function. You don not have to worry about the application being down.

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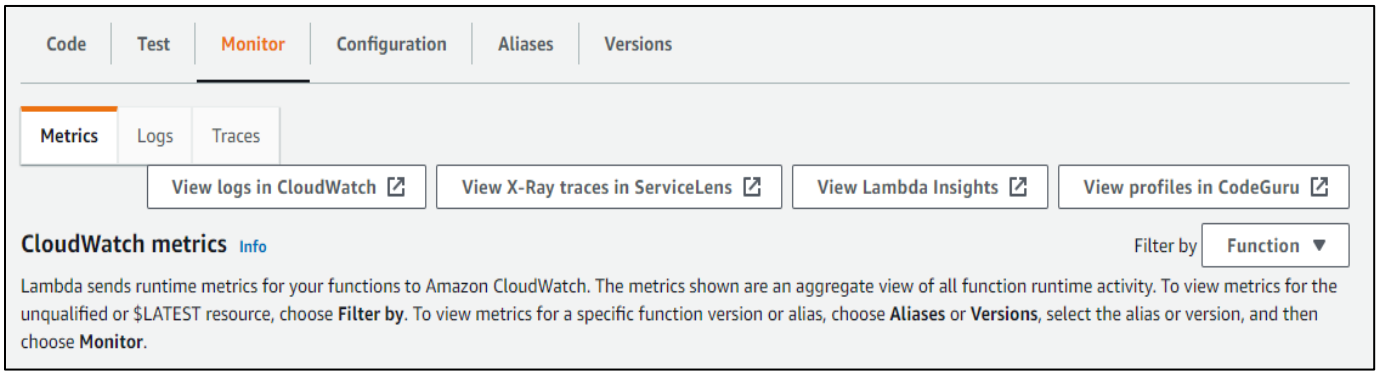
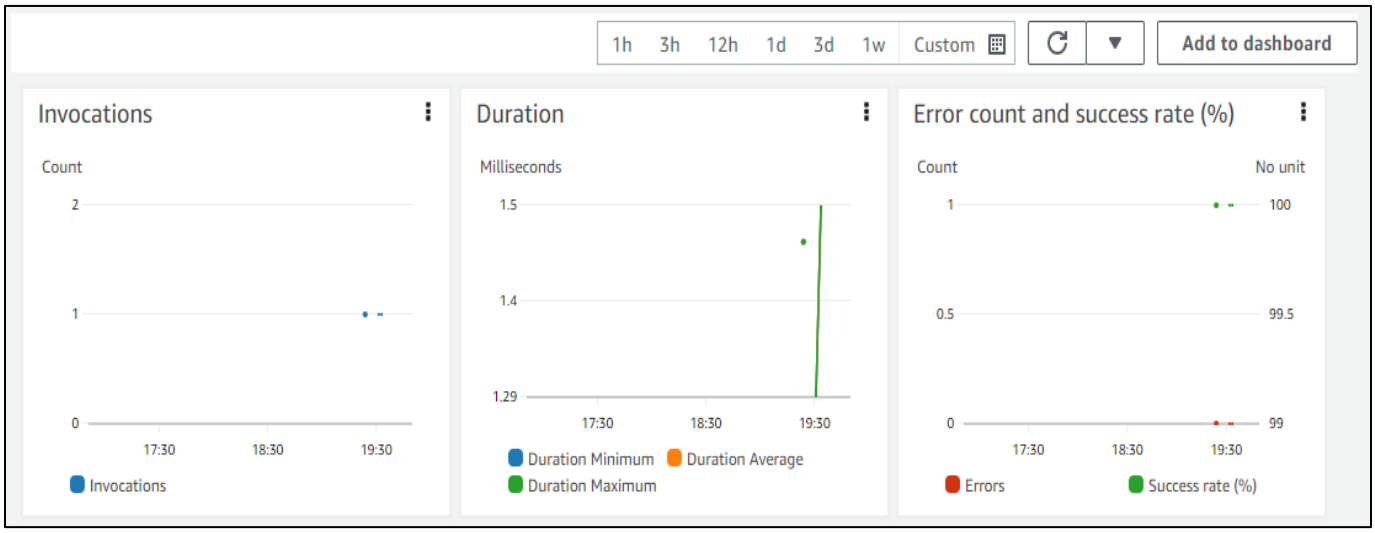
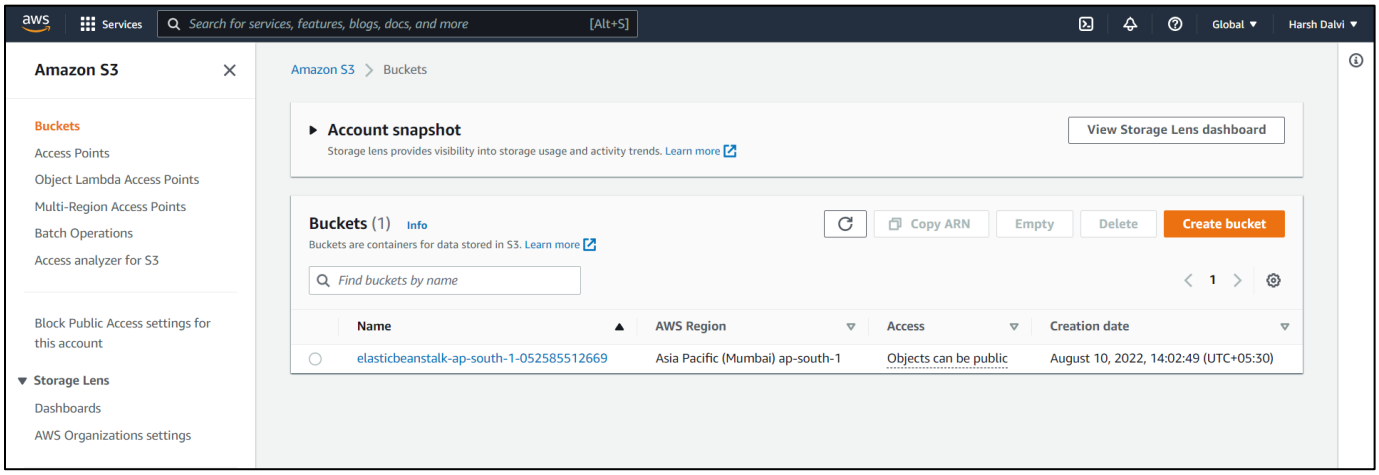
Steps to perform the experiment:

Step1: Go to your Lambda function and Click on the Monitor section.





Step 2: Go to S3 Bucket and create a new bucket.



Create bucket Info

Buckets are containers for data stored in S3. Learn more

General configuration

Bucket name

advexp12

Bucket name must be globally unique and must not contain spaces or uppercase letters. See rules for bucket naming

AWS Region

Asia Pacific (Mumbai) ap-south-1

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

Choose bucket

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**
    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.

- [x] I acknowledge that the current settings might result in this bucket and the objects within becoming public.

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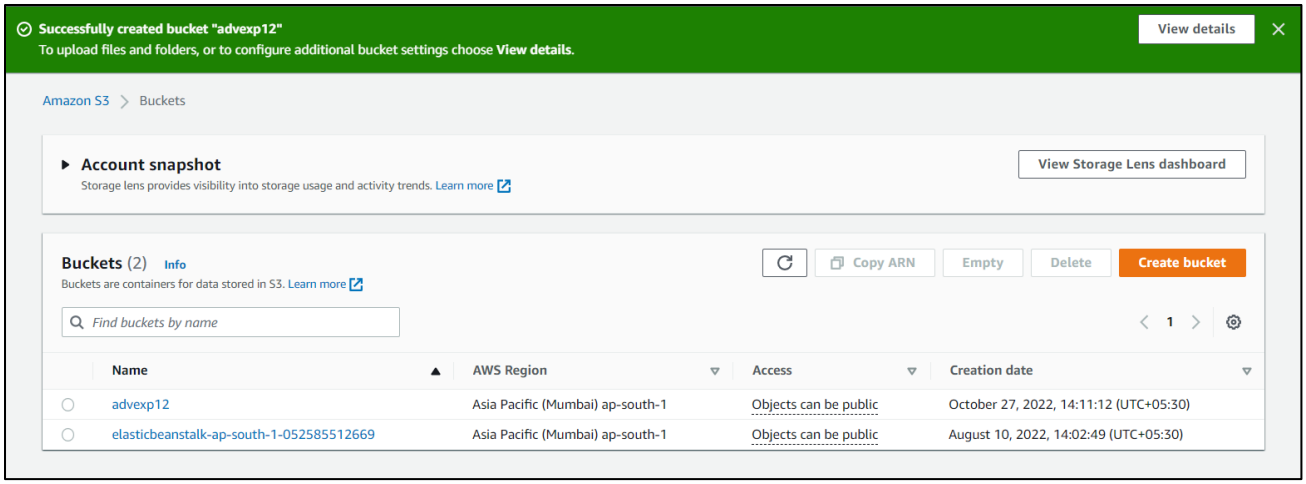
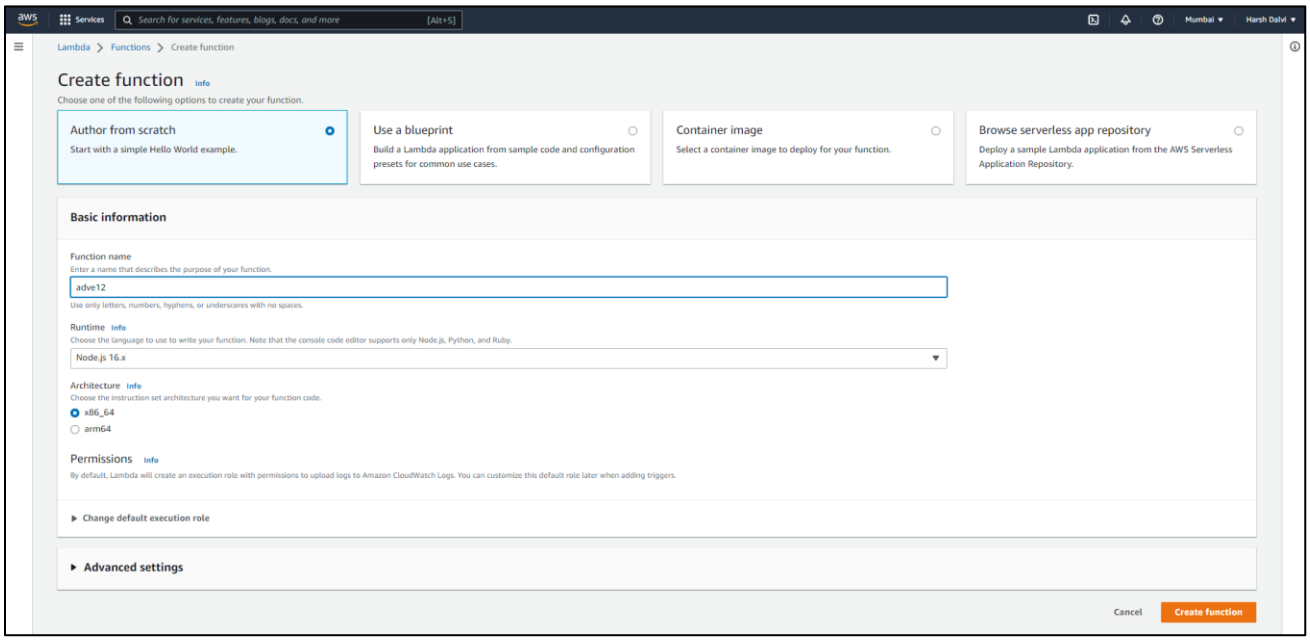
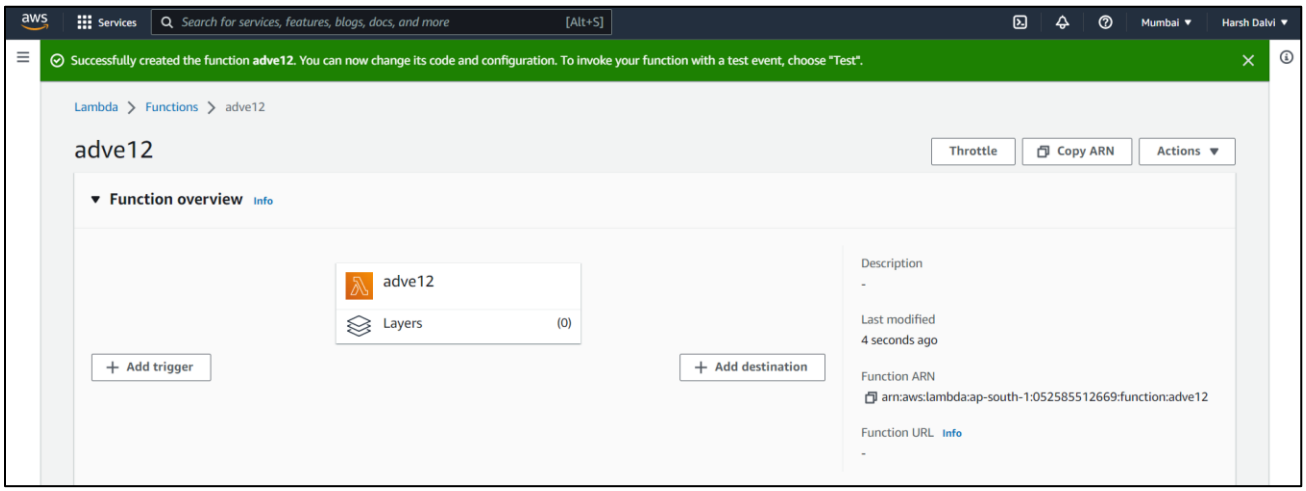
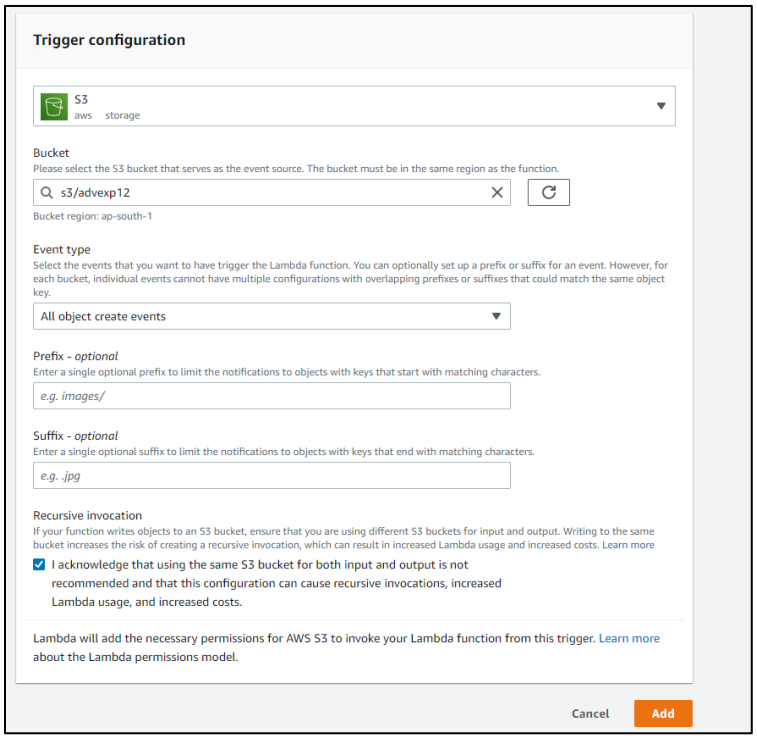


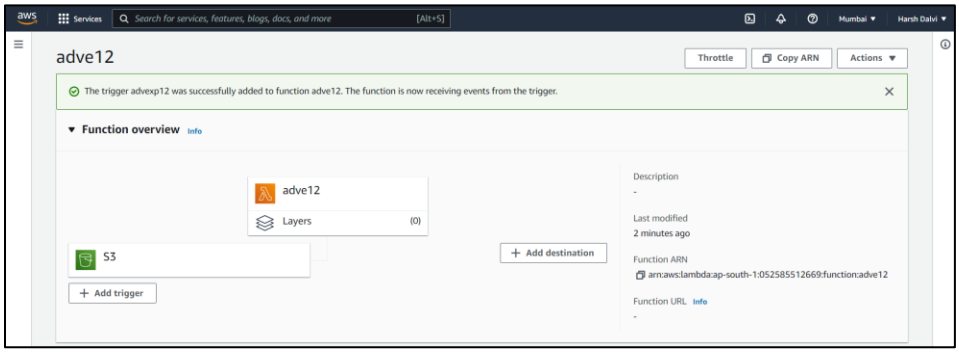
Step 3: Now, Under Lambda function, go to add trigger > trigger configuration.



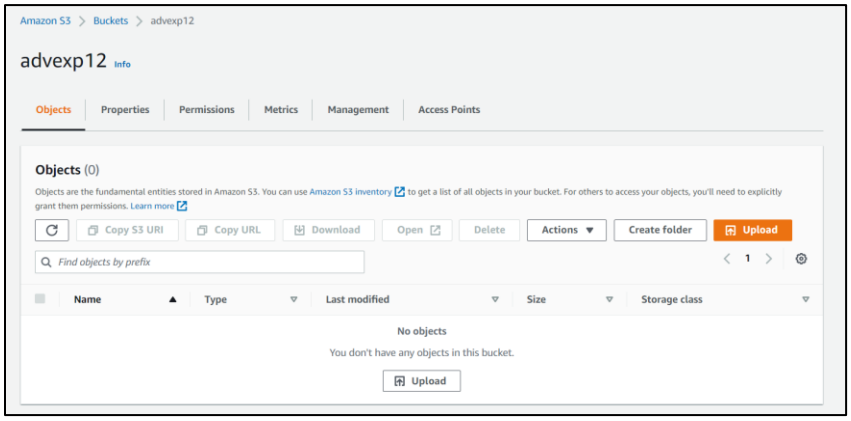


Select and add the newly created bucket here. This is your trigger bucket which can be seen in function overview.

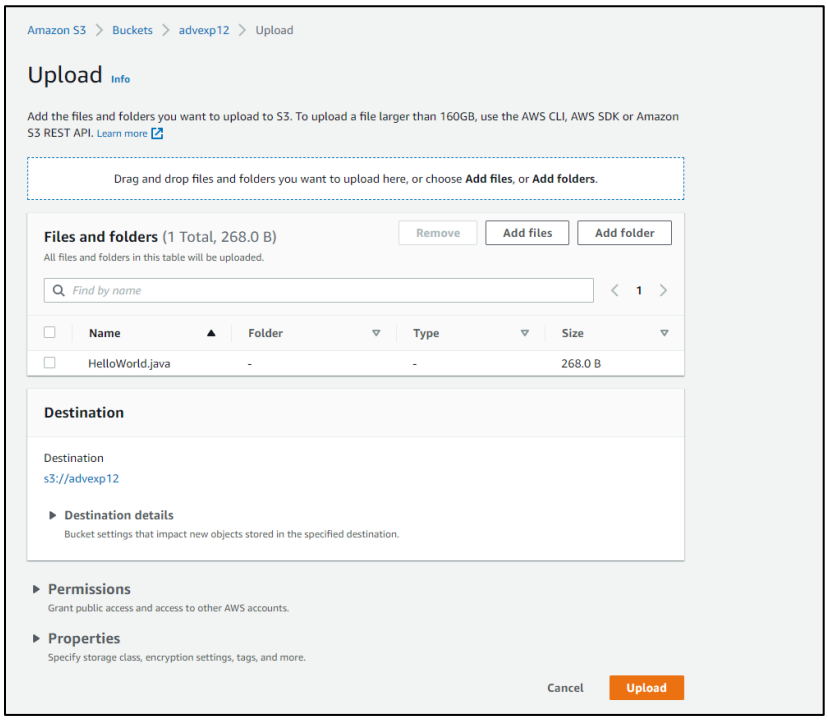


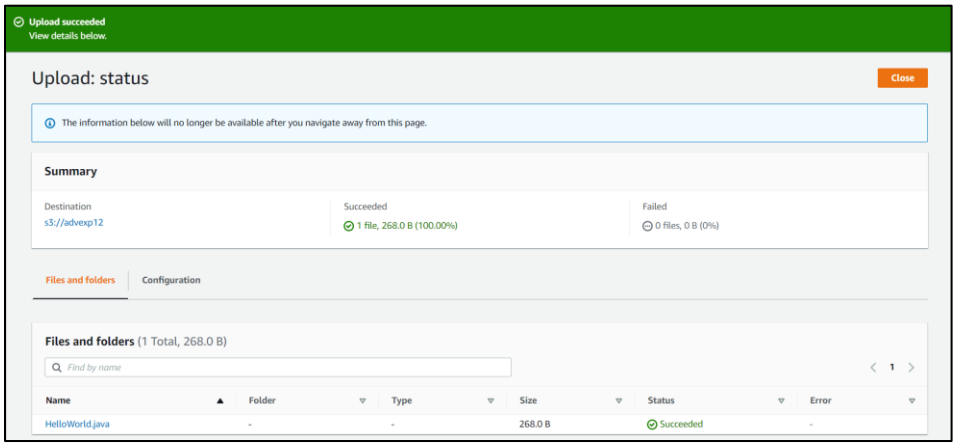


Step 4: Now go to amazonS3, under the newly created bucket, go to upload > add files ,



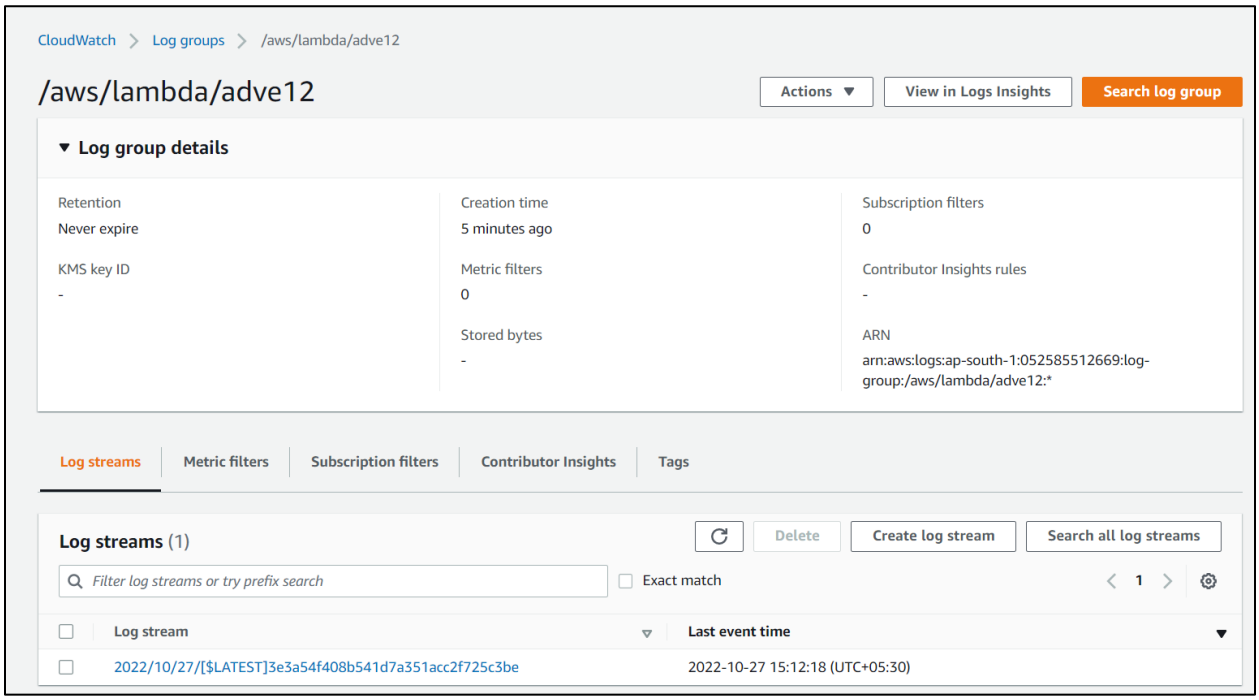
Select a file and upload it.

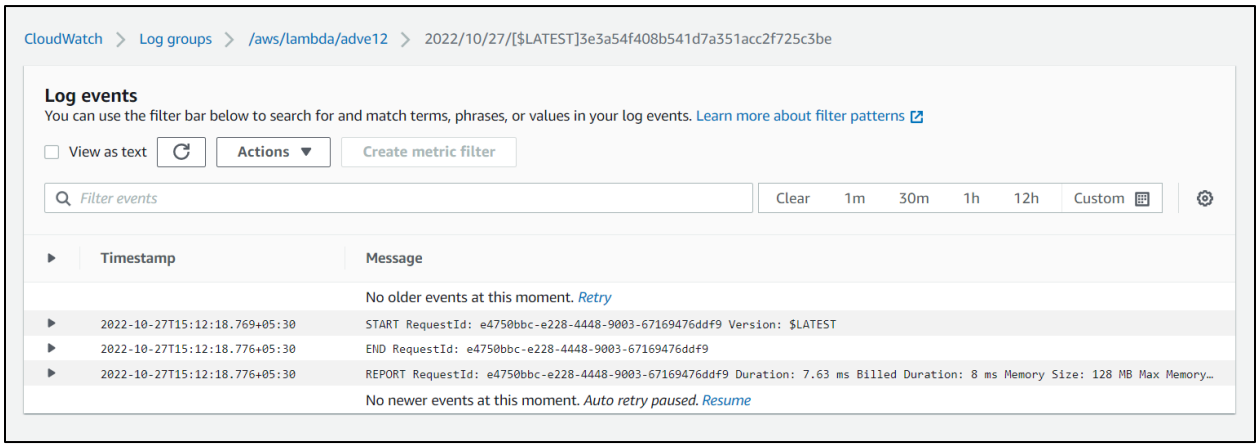




Step 5: Come to the lambda function and in configuration check the triggers, select newly created bucket and check logs. Go to recent invocations and check if the log is present.

Step 6: Go to cloudwatch>log groups> /aws/lambda/adve12 and check Log events.





Conclusion: From this experiment, it is concluded that we have understood the concepts of AWS S3 Buckets and AWS Lambda. In this experiment, we constructed a Lambda function which will log a message once an object is added to a specific bucket in S3. Hence, we have successfully achieved the Lab Outcome One and Lab Outcome Six (LO1 and LO6). Also, we have achieved PO1, PO2, PO3, PO4, PO5, PO9, PO10 and PO12 from this experiment.