AWS Data Redundancy Removal System Project Document

Project Overview

The AWS Data Redundancy Removal System was developed to optimize data storage in AWS by identifying and removing redundant data from S3 buckets. This project was designed to reduce storage costs, improve data management, and enhance system efficiency.

Technologies Used

- **Amazon S3:** For data storage and lifecycle management.
- **S3 Lifecycle Policies:** For automated management of data retention.
- **AWS Lambda:** For automated execution of data analysis and redundancy removal.
- **Amazon CloudWatch:** For monitoring, logging, and triggering alarms.
- **AWS IAM:** For secure access management and permissions control.

Roles and Responsibilities

- **Cloud Engineer (Your Role):**
    - Configured S3 buckets and implemented lifecycle policies.
    - Developed a Lambda function for automatic data redundancy detection and removal.
    - Set up CloudWatch for monitoring and logging.
    - Defined IAM roles and policies for secure access management.
    - Documented the solution and provided training to team members.

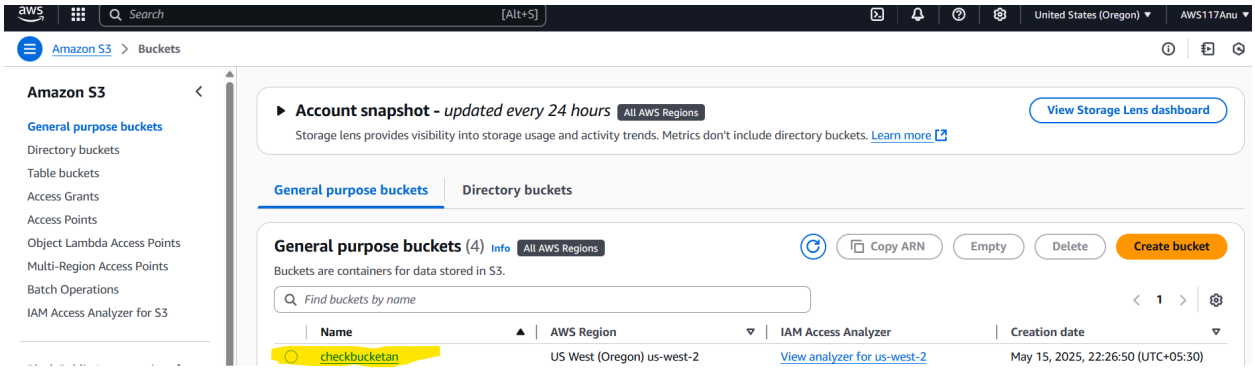
Project Scope

- Implement a data redundancy detection system for S3 bucket data.
- Automate data lifecycle management using S3 Lifecycle Policies.
- Set up real-time monitoring with CloudWatch.
- Ensure secure access management with IAM policies.
- Optimize the cost of data storage in AWS.

Implementation Steps

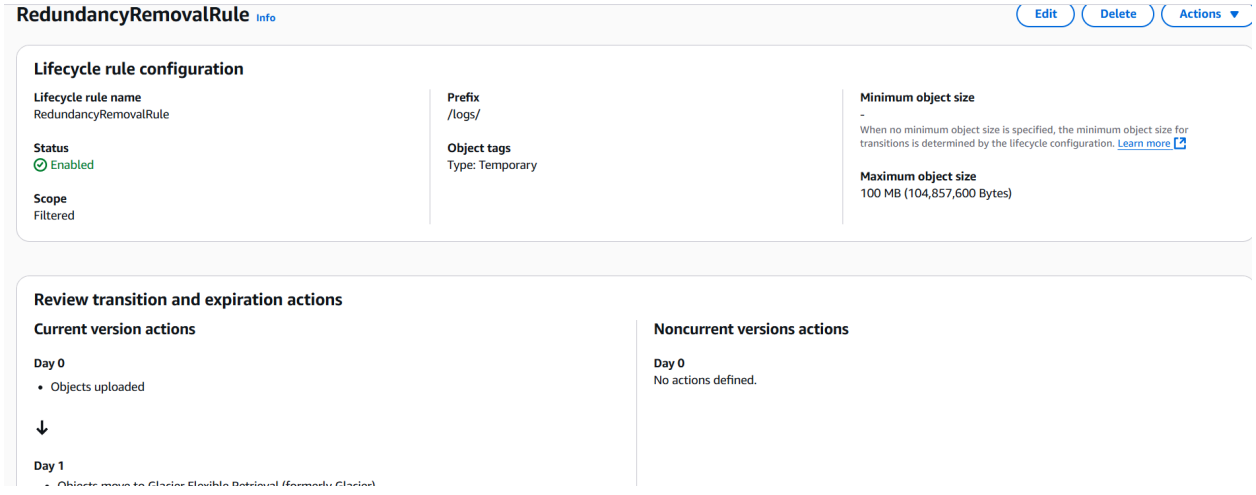
Step 1: Setting Up S3 Buckets

- Created an S3 bucket with appropriate naming conventions.
- Configured versioning to maintain multiple versions of data.



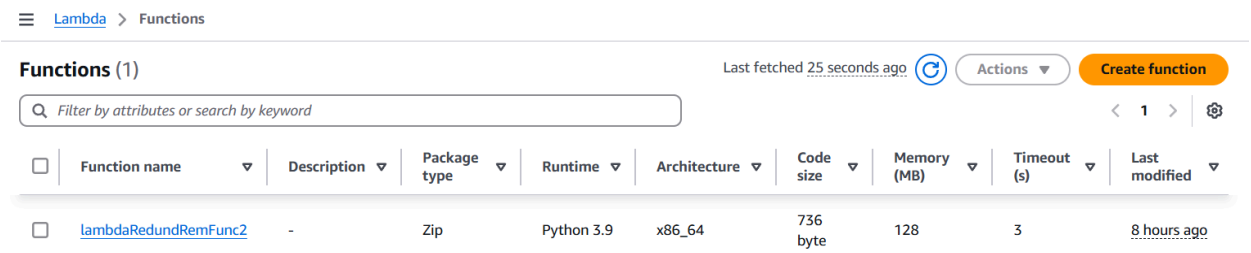
Step 2: Defining Lifecycle Policies

- Set up S3 Lifecycle Policies to automatically transition or delete redundant data.



Step 3: Creating the Lambda Function

- Developed a Lambda function using Python to detect redundant data.
- Integrated Lambda with S3 for automatic triggering.
- Configured IAM roles to grant Lambda the necessary permissions.



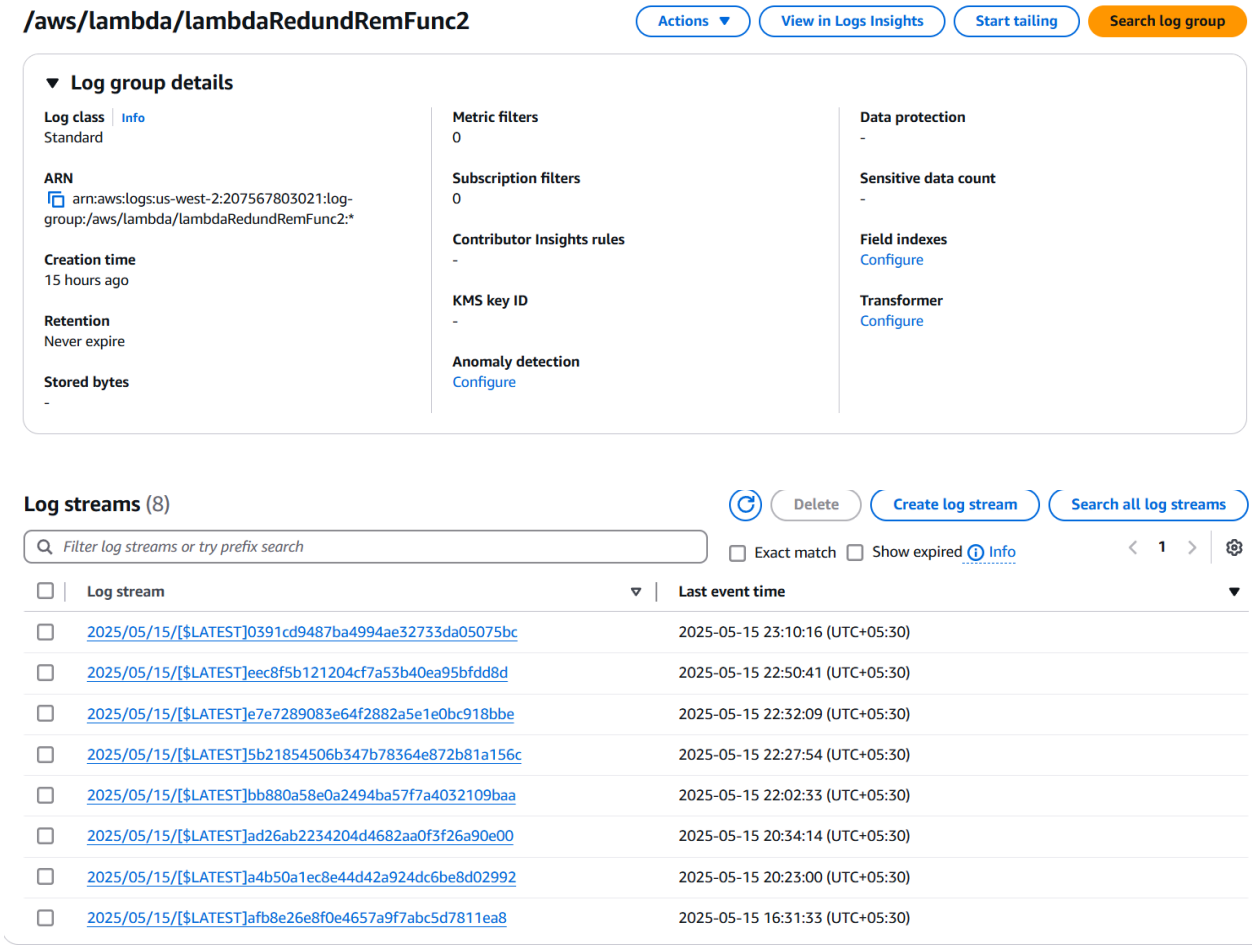
Lambda Function

```
import boto3

import hashlib

from datetime import datetime


s3_client = boto3.client('s3')


def lambda_handler(event, context):

    bucket_name = 'checkbucketan'  # Replace with your bucket name

    # List all objects in the bucket

    response = s3_client.list_objects_v2(Bucket=bucket_name)

    if 'Contents' not in response:

        return {'status': 'No files found'}


    # Dictionary to store hash and file metadata

    file_hashes = {}

    for obj in response['Contents']:

        key = obj['Key']

        # Get object content to compute MD5 hash
```

```
        obj_content = s3_client.get_object(Bucket=bucket_name,
Key=key)['Body'].read()

        md5_hash = hashlib.md5(obj_content).hexdigest()



        if md5_hash in file_hashes:

            # Compare last modified time to keep the oldest file

            existing_file = file_hashes[md5_hash]

            new_file_time = obj['LastModified']

            if new_file_time > existing_file['LastModified']:

                # Delete newer duplicate

                s3_client.delete_object(Bucket=bucket_name, Key=key)

                print(f"Deleted duplicate: {key}")

            else:

                # Delete older file and update hash entry

                s3_client.delete_object(Bucket=bucket_name,
Key=existing_file['Key'])

                file_hashes[md5_hash] = {'Key': key, 'LastModified':
new_file_time}

                print(f"Deleted duplicate: {existing_file['Key']}")

        else:

            file_hashes[md5_hash] = {'Key': key, 'LastModified':
obj['LastModified']}



    return {'status': 'Deduplication complete'}
```

Step 4: Configuring CloudWatch

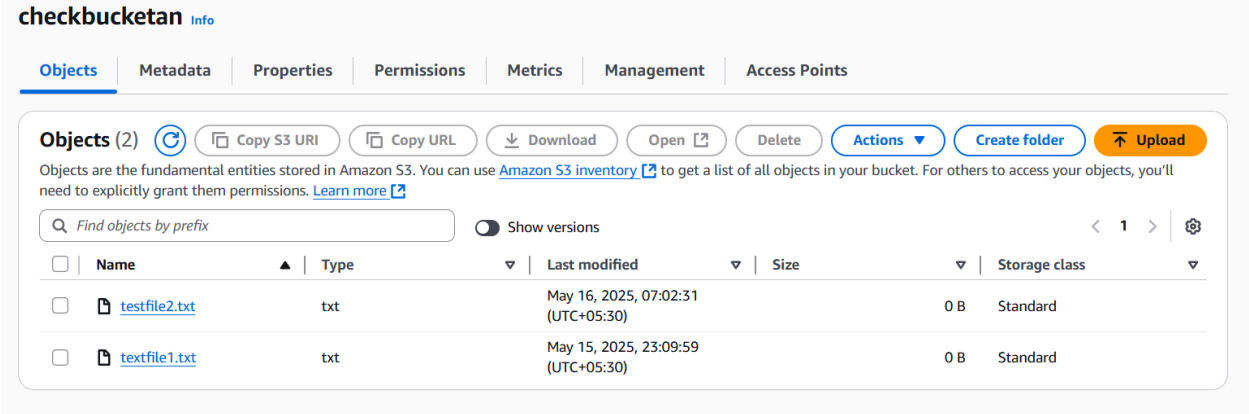
- Set up CloudWatch for monitoring Lambda function executions.
- Enabled CloudWatch Logs for debugging and tracking Lambda performance.



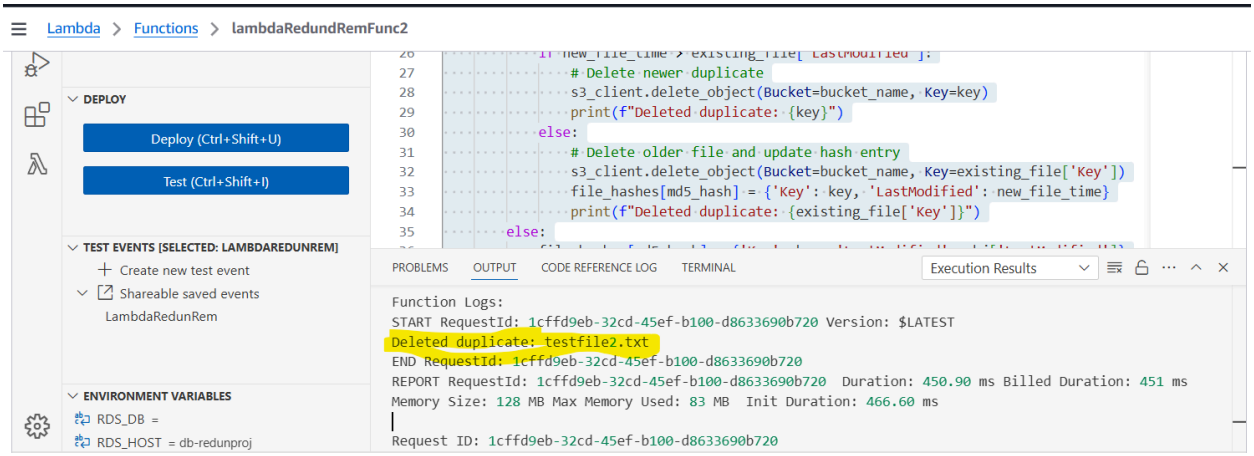
Step 5: Testing and Validation

- Uploaded test data to S3 to validate redundancy detection.
- Verified that redundant data was automatically identified and removed.

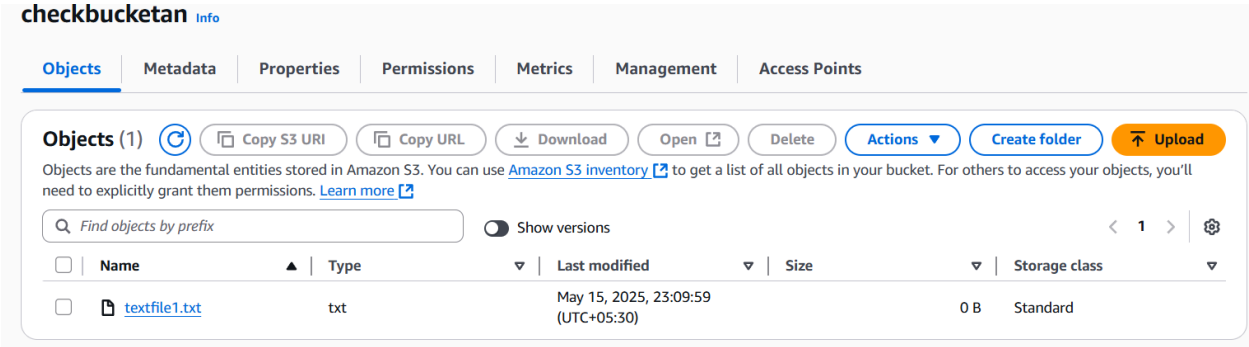
I uploaded two differently named files, but the content is the same.



I have tested the lamda function as shown in the picture.

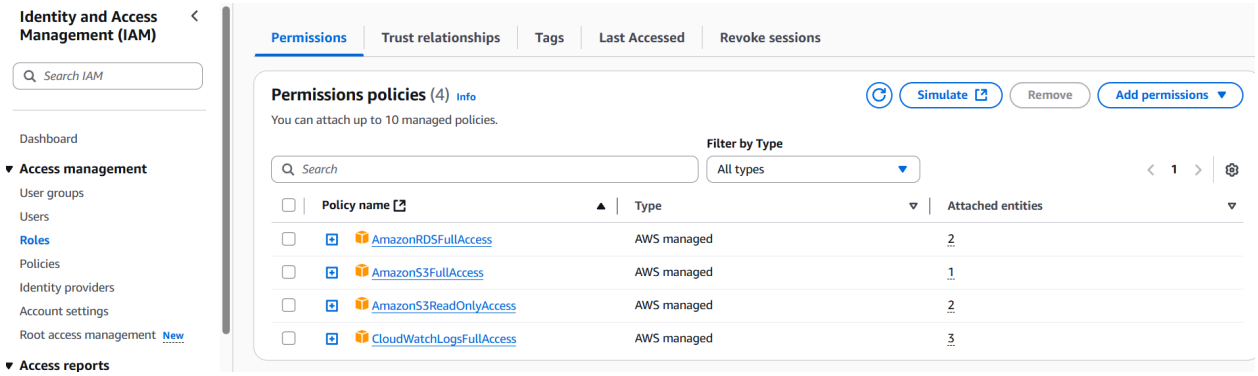


Here we can see that textfile2.txt is removed.



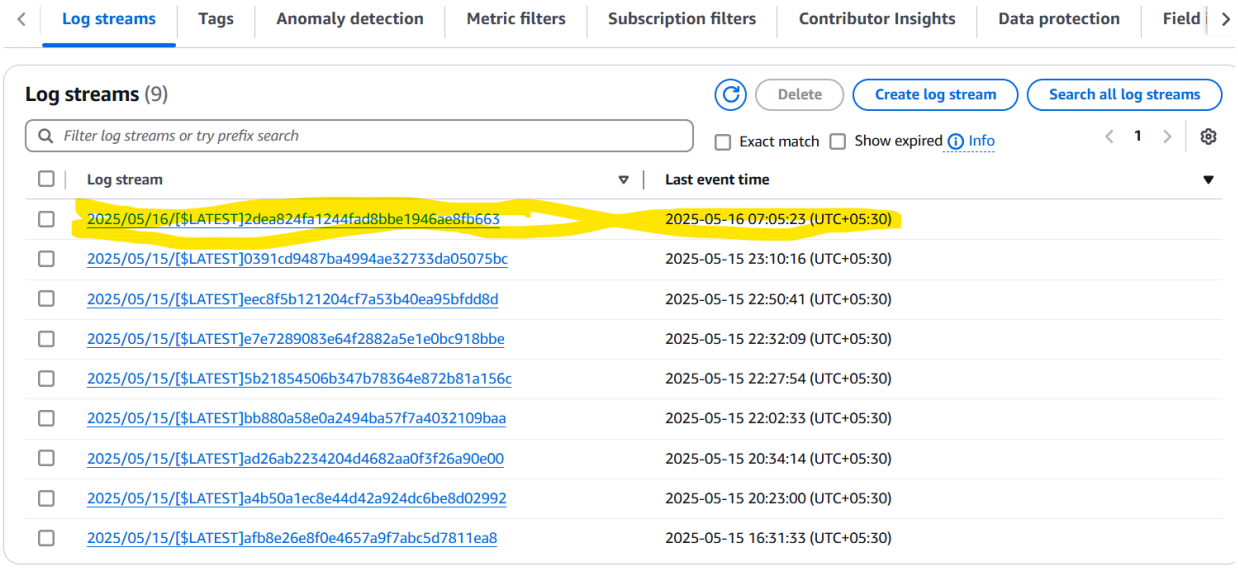
Step 6: Security Management with IAM

- Created IAM roles and policies with the least privilege principle.
- Ensured secure access for Lambda and S3.



Step 7: Monitoring and Optimization

- Set up CloudWatch Alarms for error notifications.
- Monitored storage costs to verify cost savings.



Problem Solved

The project addressed the issue of excessive storage costs due to redundant data in S3. By implementing an automated redundancy detection and removal process, the project reduced unnecessary data storage and improved cost efficiency.

Benefits to the Organization

- **Reduction in Storage Costs:** Minimized expenses by eliminating redundant data.
- **Increased Profitability:** Optimized storage usage without affecting data integrity.

- **Improved Efficiency:** Automated the process of identifying and deleting redundant data.

Team Size

- The project was completed by Anulata Priyadarshini.

Conclusion

The AWS Data Redundancy Removal System effectively optimized data storage in AWS S3, leading to reduced costs and enhanced data management capabilities for the organization.