Software Engineer for Cloud Project 2

Instructions
Every screenshot requested in this workbook is compulsory and carries 5 marks. Each of (EC2, Dynamodb, Kinesis, and SNS) setup in Task 1 will carry 20 marks each. In Task 2, S3 setup via Cloudformation will carry 20 marks. Also, complete codedeploy setup will also carry 20 marks. In Task 3, complete Lambda setup via Cloudformation will carry 20 marks.
Your AWS account ID must be clearly visible in every screenshot using the AWS console; missing id or using someone else's id is not permitted. Such cases will be considered as plagiarism and severe penalty will be imposed.
All screenshots must be in the order mentioned under "Expected Screenshots" for every step
DO NOT WAIT UNTIL THE LAST MINUTE. The program office will not extend the project submission deadline under any circumstances.
The file should be renamed in the format BATCH_FIRSTNAME_LASTNAME_PROJECT1. For example: ACSEOCT20_VIJAY_DWIVEDI_PROJECT2.docx

Resource Clean Up
Cloud is always pay per use model and all resources/services that we consume are chargeable. Cleaning up when you've completed your lab or project is always necessary. This is true whether you're doing a lab or implementing a project at your workplace.
After completing the lab, make sure to delete each resource created in reverse chronological order.

Anomaly Detection using CloudFormation and CodeDeploy

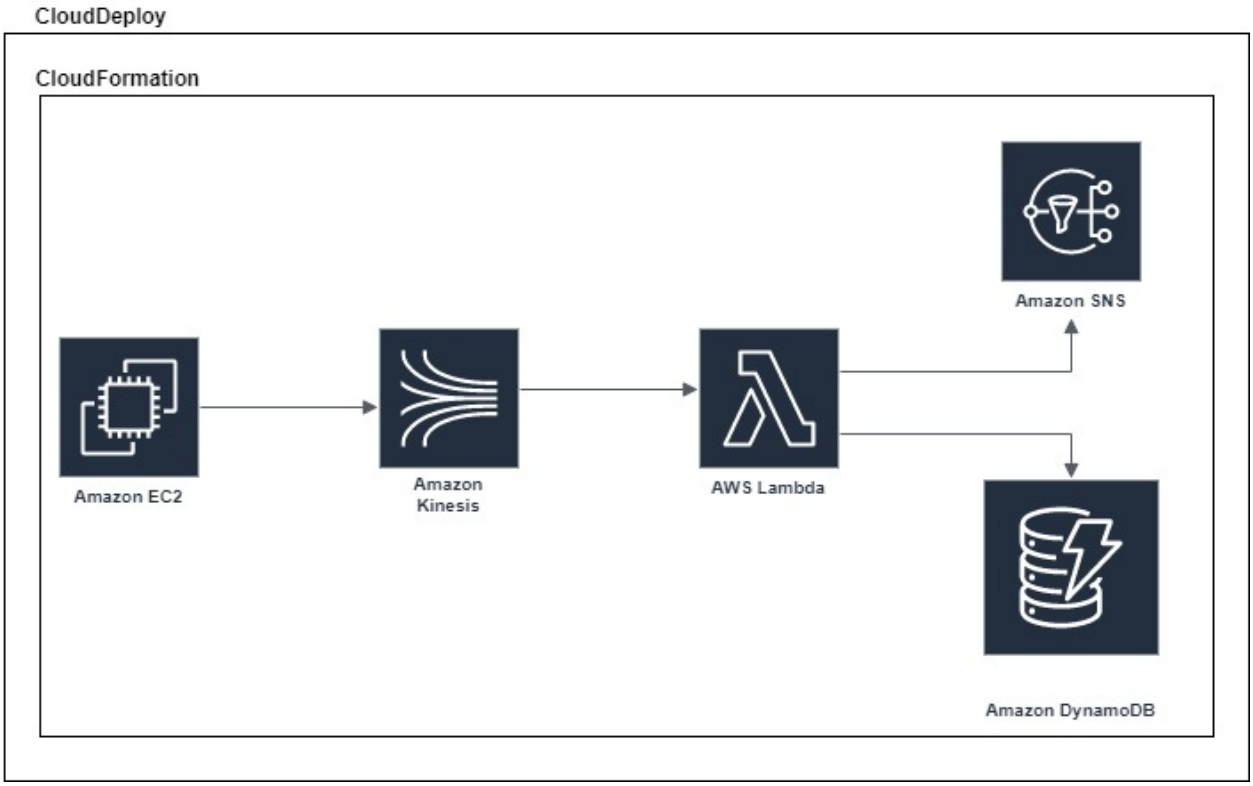
Introduction

The anomaly detection M03P01 where AWS services used were all provisioned manually by using the AWS console. In the mentioned Project, we have configured services such as Kinesis, SNS, EC2 instance creation, setting up lambda handler, setting up the kinesis trigger, pushing data in DynamoDB etc. Once the services are up and running and data is pushed, the deployed lambda handler will perform anomaly detection, and it will trigger the SNS notification and detected data will be pushed on DynamoDB.

As we are moving more and more towards task automation. It makes sense if we can automate the service setup used in Anomaly detection Project using CloudFormation and CloudDeploy. The idea here is to slowly and gradually automate all the tasks involved in the M03P01. That is why the basic dummy python script which pushes data over cloud will be provided. The lambda handler code that performs anomaly detection will also be provided as a file. The focus is on automated setup, no changes are expected to be made in the actual python code which is a simple functioning dummy example, except for SNS topic ARN.

Expected Kinesis data stream name - m03p02_raw_data_stream
Expected Dynamodb anomaly table name - m03p02_anomaly_data
Expected SNS topic name - m03p02_anomaly_alerts

1. **Raw data (Python script):**
    a. This file is named as dummy_temp_data.py will generate the random environment temperature data using the random library.
    b. This python file will publish the data over Kinesis stream, from there data will be pulled by lambda service.
2. **Anomaly detection (Lambda Handler):**
    a. This anomaly_detection.py python file is configured to perform the anomaly detection on the raw data.
    b. After anomaly detection, data (detected) will be pushed in DB and a notification will be generated using SNS arn.



Problem Statement

In this project we will be doing the step by step automation of Anomaly detection given in the M03P01. This project will essentially be using Kinesis, SNS, EC2, S3, DynamoDB and lambda handler. In each step some of the services will be provisioned through Cloud formation, which in turn will automate the mentioned tasks. In the next step, a few more services such as CodeDeploy will be provisioned to increase the automation part. In the last Task, the lambda handler part will be provisioned by using cloud formation, this will in turn make the whole process automated starting from trivial service enabling to CodeDeploy and then doing anomaly detection.

Task Organization

This project is divided into three tasks: **Easy, Moderate and Hard**. Please note that if you plan to complete all three tasks, then everything will be automated. If you finish only till Task 1 or Task 2 in your final solution, then you should implement the remaining items manually so that you have a running system. Please find more details related to each task below:

Task - 1 (Easy)

a. Provision the services (EC2, kinesis, dynamodb, SNS) using cloud formation.
b. Setup the ingestion python script in the EC2 instance manually.

c. Create the lambda handler function from lambda handler service manually through AWS console. Copy the lambda handler code and make changes in SNS arn and Table name.
d. The entire setup for anomaly detection should work i.e notification should be generated and detected data should be pushed in DynamoDB

Task - 2 (Moderate)

a. Provision S3 service using Cloud formation, store the original application of Task-1 and the ***appspec.yml*** here.
b. Deploy the contents of S3 using CodeDeploy into the EC2 instance at the same location where it was running earlier.
c. Lambda handler will still be there and deployed manually from AWS console
d. The entire setup for anomaly detection should work i.e notification should be generated and detected data should be pushed in DynamoDB

Task - 3 (Hard)

a. Provision the lambda handler service using cloud formation
b. Remove the older lambda handler function from Task-2, edit the python code in newly created lambda handler service.
c. The entire setup for anomaly detection should work i.e notification should be generated and detected data should be pushed in DynamoDB

Submission Files

Task - 1

1. Cloud template file that has JSON script for
    a. Created Linux EC2 machine configuration
    b. Created Kinesis stream configuration
    c. Created SNS configuration along with Topic & subscription name
    d. Created DynamoDB table configuration

Task - 2

1. Cloud template file that has JSON script:
    a. Created S3 service configuration
2. CodeDeploy file:
    a. After successfully uploading appec.yml file

Task - 3

1. Cloud template file that has JSON script:
    a. Lambda handler configuration that enables lambda services for the existing application
2. CodeDeploy file:
    a. After successfully uploading appspec.yml file

Reference Links

1. AWS EC2 CloudFormation developer guide: EC2 Instance creation CF user guide
2. AWS Kinesis CloudFormation developer guide: Kinesis Stream CF user guide
3. AWS Lambda CloudFormation developer guide: Lambda Handler CF user guide
4. AWS SNS CloudFormation developer guide:
    a. Topic creation: Topic CF user guide
    b. Subscription: Subscription CF user guide
5. AWS DynamoDB CloudFormation developer guide: DynamoDB table CF user guide

Evaluation Rubric

1. All images at the image place-holders: 85 Marks
2. Creation of EC2, Kinesis, DynamoDB, SNS: 80 Marks
3. Creation of S3 and CodeDeploy: 40 Marks
4. Creation of Lambda handler and Python script: 20 Marks

Total: **225 Marks**

Task List

Architecture Implementation (Task 1)	
1	Cloud formation engine page, Take screenshot of the summary page after successful operation
2	Enabled EC2 instance
3	Enabled Kinesis stream
4	Enabled SNS arn
5	Enabled DynamoDB table

Architecture Implementation (Task 2)	
1	Cloud formation engine page, screenshot of the summary page after successful operation
2	Enabled S3 service
3	Uploaded files over S3 directory
4	Successful CodeDeploy operation summary age

Architecture Implementation (Task 3)	
1	Cloud formation engine page, screenshot of the summary page after successful operation
2	Enabled lambda handler service
3	CodeDeploy summary page after successful operation

Tasks with image place-holders

Task 1:

Step number	a
Step name	Cloud formation summary page
Instructions	1) Template file (JSON script) to enable mentioned services in the Task -1
Expected screenshots	1. Cloud formation summary page

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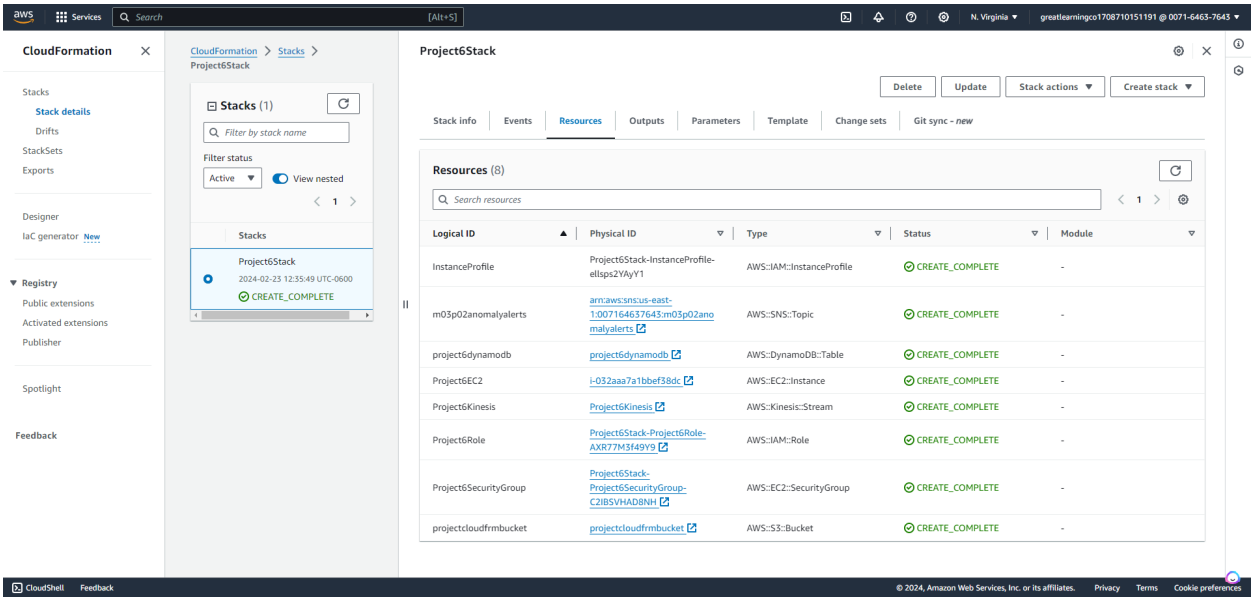

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Step number	b
Step name	Enabled EC2 instance
Instructions	1) Make sure that cloud formation operation is successful 2) Check if the EC2 services are successful, if yes, check for the created instance on EC2 console
Expected screenshots	1) Created EC2 instance

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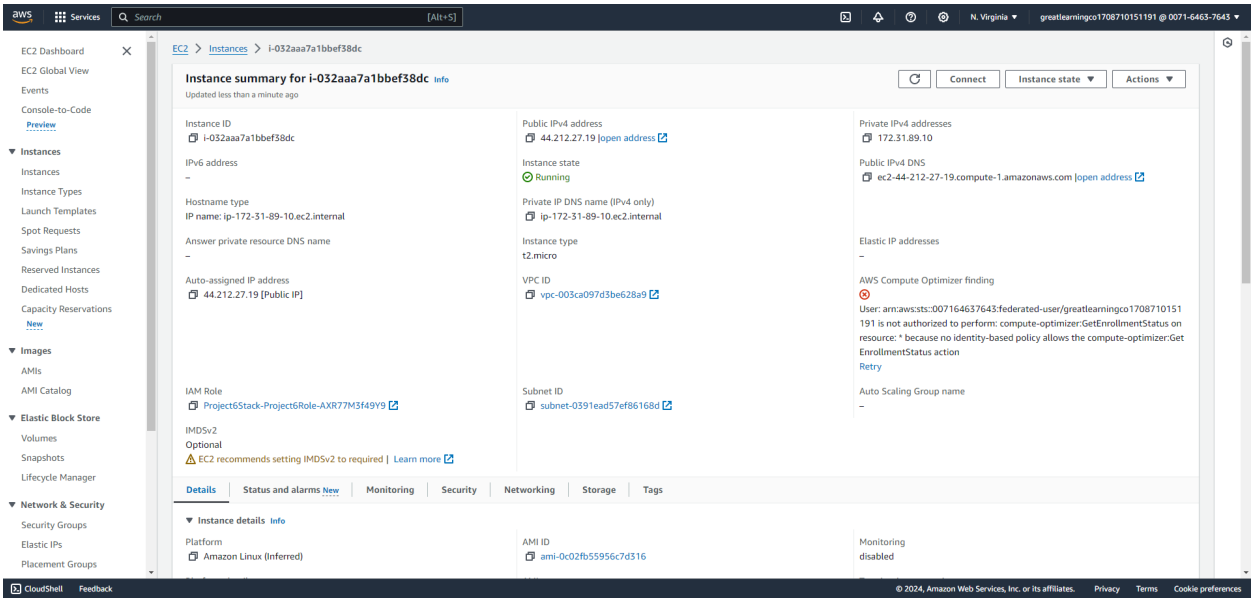

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Step number	c
Step name	Enabled Kinesis stream
Instructions	1) Make sure that cloud formation operation is successful 2) Check if the kinesis services are successful, if yes, check for the created data stream on kinesis console
Expected screenshots	1) Create kinesis data stream

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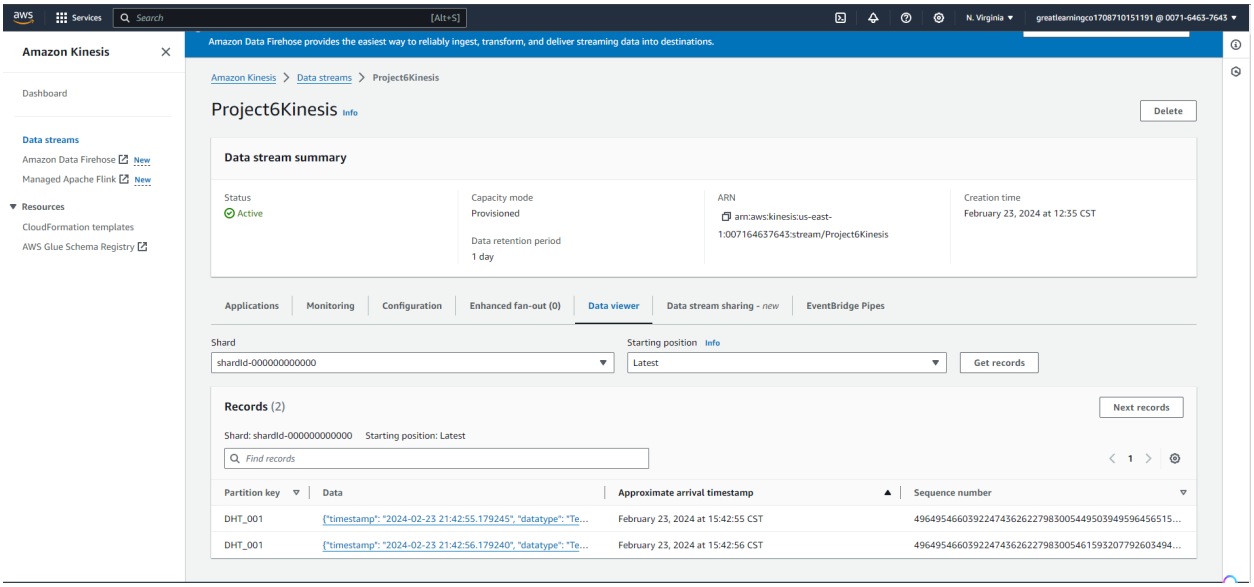

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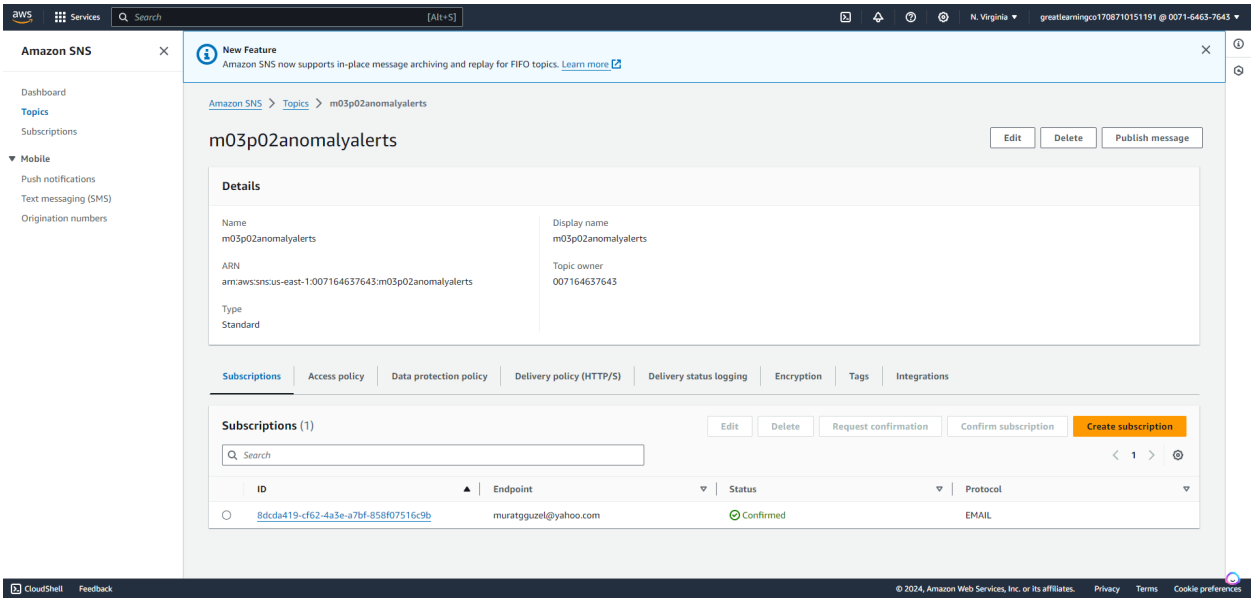
Step number	d
Step name	Enabled SNS arn
Instructions	1) Make sure that cloud formation operation is successful 2) Check if the SNS service are successful, if yes, goto SNS console and create a subscription for the created topic/arn
Expected screenshots	1. Created SNS arn 2. Created subscription and accepted subscription through mail

<


Amazon SNS
Dashboard
Topics
Subscriptions
Mobile
Push notifications
Text messaging (SMS)
Origination numbers
New Feature
Amazon SNS now supports in-place message archiving and replay for FIFO topics. Learn more
Amazon SNS > Topics > m03p02anomalyalerts
m03p02anomalyalerts
Edit
Delete
Publish message
Details
Name
m03p02anomalyalerts
Display name
m03p02anomalyalerts
ARN
arn:aws:sns:us-east-1:007164637643:m03p02anomalyalerts
Topic owner
007164637643
Type
Standard
Subscriptions
Access policy
Data protection policy
Delivery policy (HTTP/S)
Delivery status logging
Encryption
Tags
Integrations
Subscriptions (1)
Edit
Delete
Request confirmation
Confirm subscription
Create subscription
Search
ID
Endpoint
Status
Protocol
8dcda419-cf62-4a3e-a7bf-858f07516c9b
muratgguzel@yahoo.com
Confirmed
EMAIL
CloudShell
Feedback
© 2024, Amazon Web Services, Inc. or its affiliates.
Privacy
Terms
Cookie preferences

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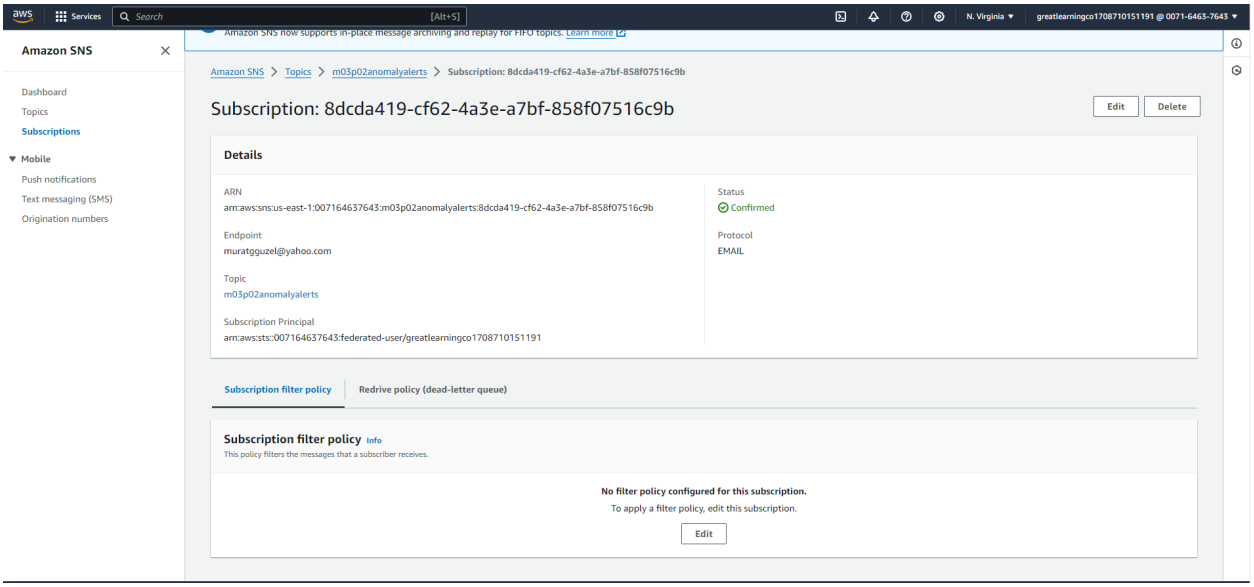
Amazon SNS
Dashboard
Topics
Subscriptions
Mobile
Push notifications
Text messaging (SMS)
Origination numbers
Amazon SNS > Topics > m03p02anomalyalerts > Subscription: 8dcda419-cf62-4a3e-a7bf-858f07516c9b
Subscription: 8dcda419-cf62-4a3e-a7bf-858f07516c9b
Edit
Delete
Details
ARN
arn:aws:sns:us-east-1:007164637643:m03p02anomalyalerts:8dcda419-cf62-4a3e-a7bf-858f07516c9b
Status
Confirmed
Endpoint
muratgguzel@yahoo.com
Protocol
EMAIL
Topic
m03p02anomalyalerts
Subscription Principal
arn:aws:sts::007164637643:federated-user/greatlearningco1708710151191
Subscription filter policy
Redrive policy (dead-letter queue)
Subscription filter policy Info
This policy filters the messages that a subscriber receives.
No filter policy configured for this subscription.
To apply a filter policy, edit this subscription.
Edit

>

Task - 2:

Step number	a
Step name	Cloud formation summary page
Instructions	1) Template file (JSON script) to enable mentioned services in Task -1 and Task-2
Expected screenshots	1) Cloud formation summary page

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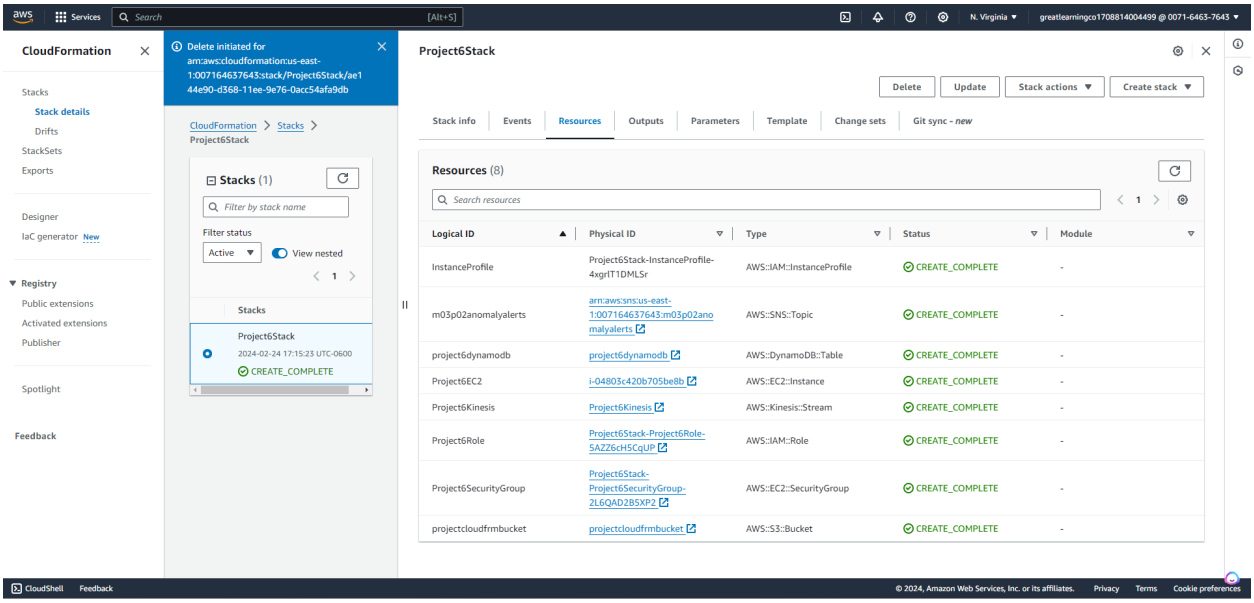

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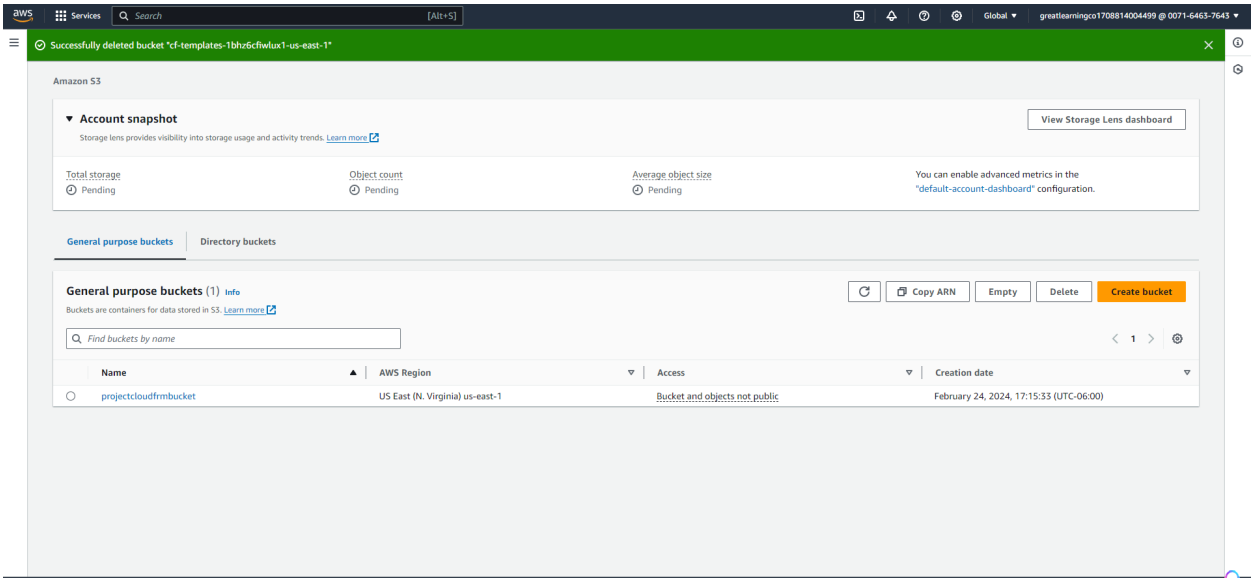
Step number	b
Step name	Enabled S3 service

Instructions	1) Make sure that cloud formation operation is successful 2) Check if the S3 service are successful, if yes, goto S3 console and assure the created directory is available 3) Upload the relevant scripts and appsec.yml
Expected screenshots	1) Enabled empty S3 service 2) S3 directory after uploading the application 3) S3 directory after uploading appsec.yml

< Bucket Created after Cloud formation template



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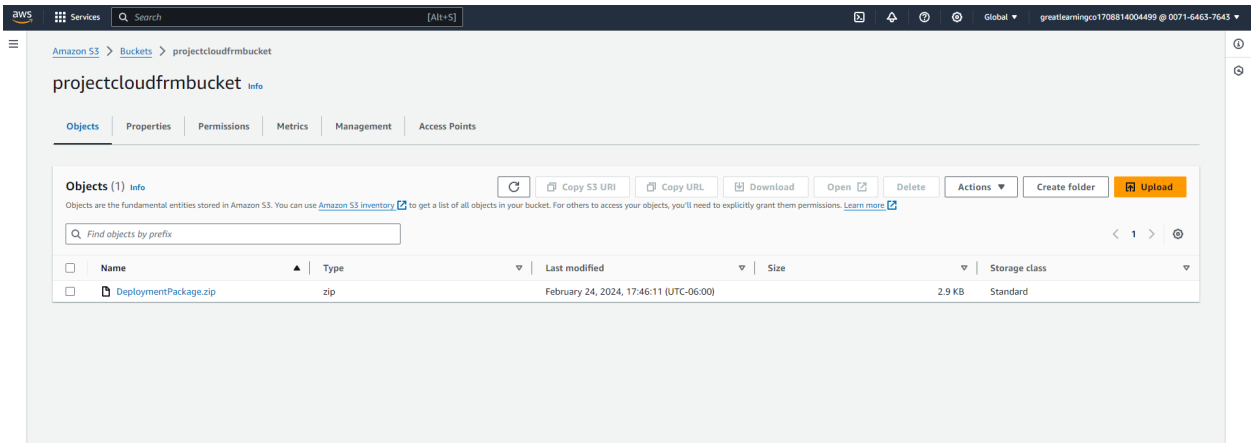

Screen 1: Showing DeploymentPackage.zip

NOTE: DeploymentPackage.zip consists Scripts Folder, Appspec.yml and RawDataService.zip. I made single zip file

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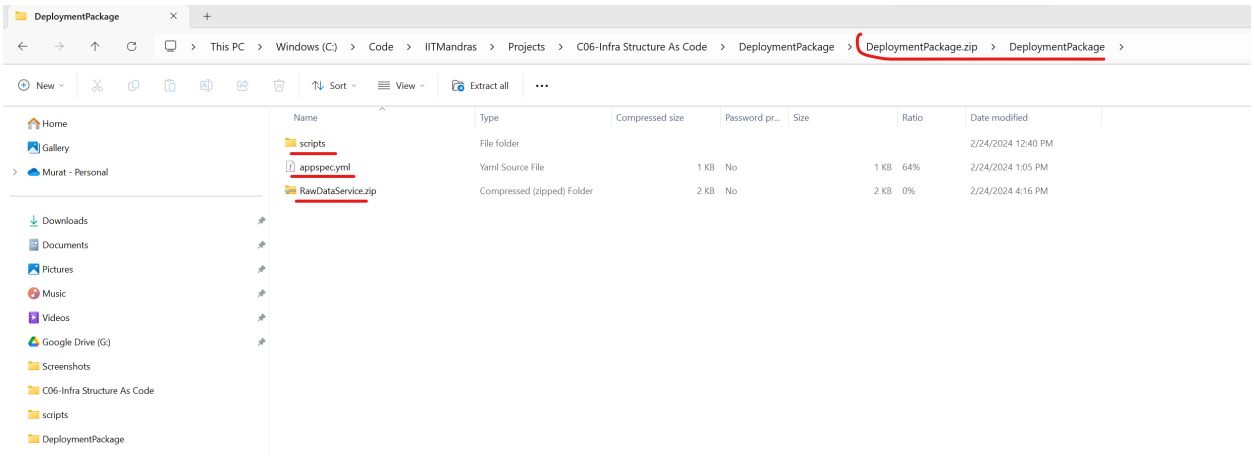
<



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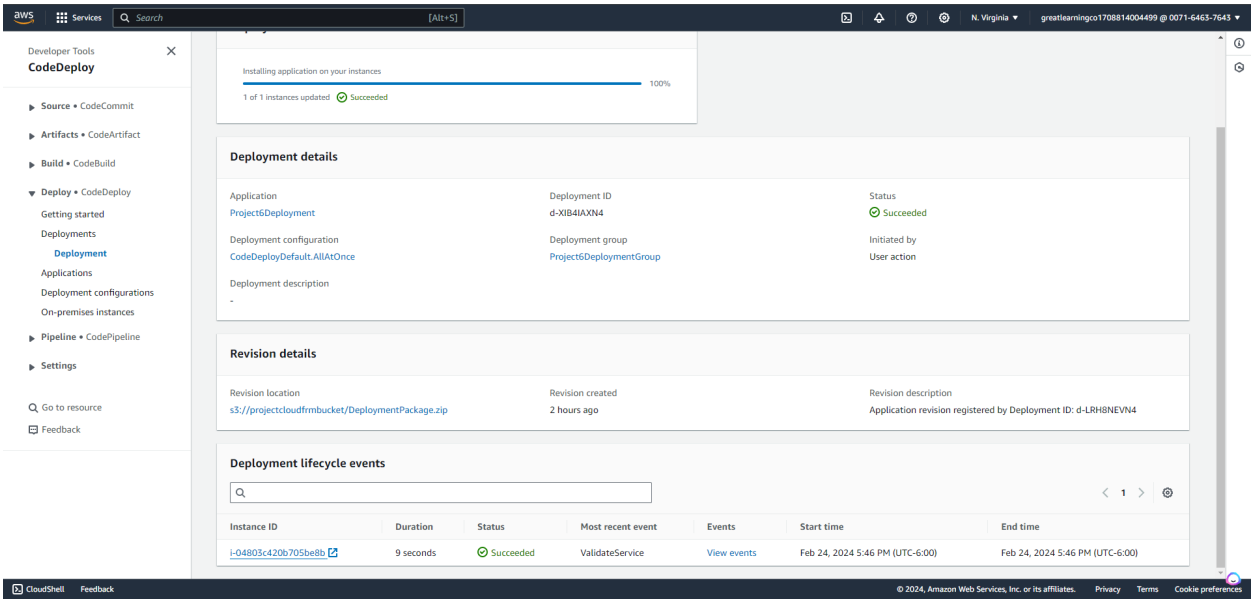
Screen 2: Showing DeploymentPackage.zip contents

Step number	c
Step name	CodeDeploy

Instructions	1) Perform the CodeDeploy operation through AWS console 2) If CodeDeploy is successful look if the Anomaly detection related data is going into the relevant DB and SNS services
Expected screenshots	1) Successful CodeDeploy operation summary page 2) Anomaly data pushed in the DynamoDB 3) SNS notification

<



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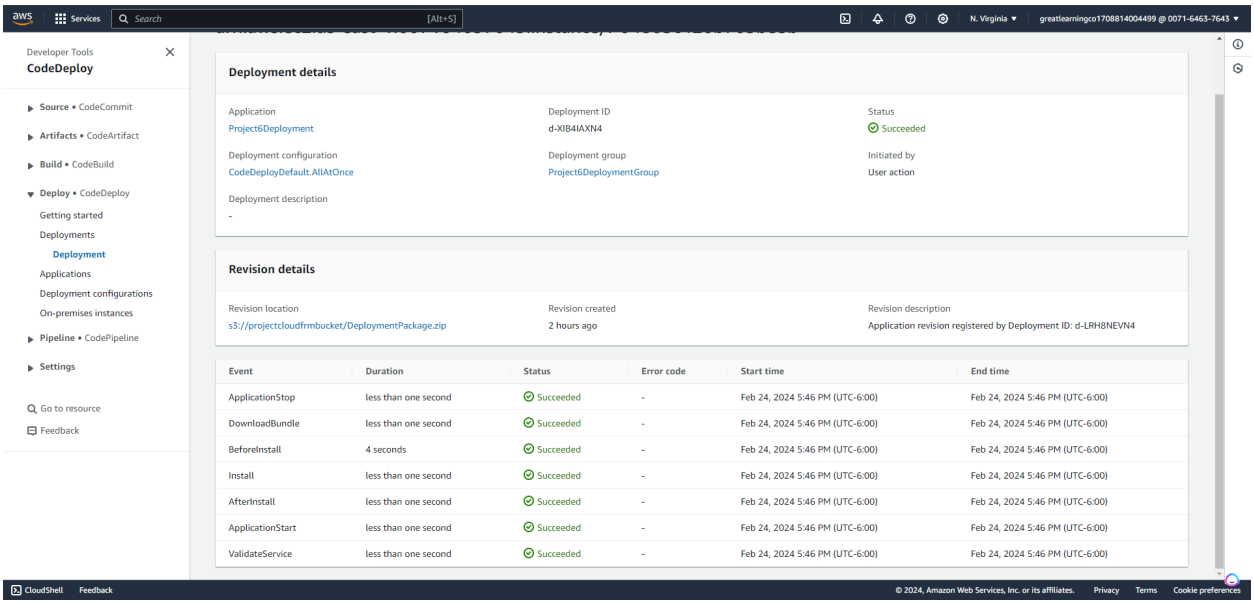

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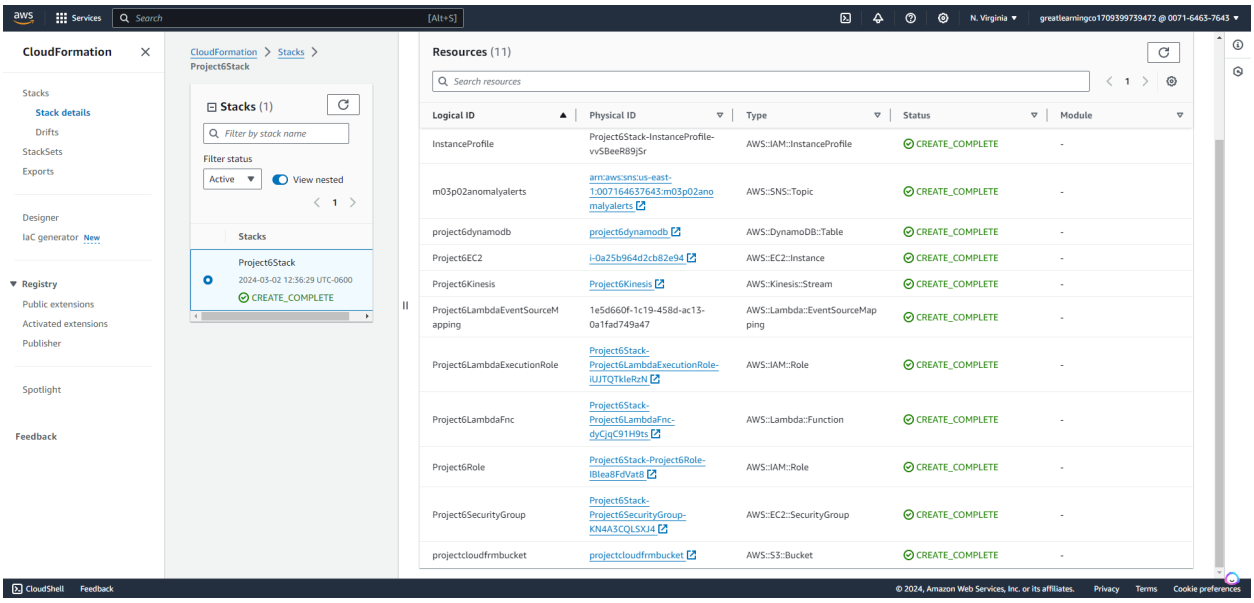
<Insert Screenshot c(3) here>

Task - 3:

Step number	a
Step name	Cloud formation summary page
Instructions	1) Template file (JSON script) to enable mentioned services in all three tasks
Expected screenshots	1) Cloud formation summary page

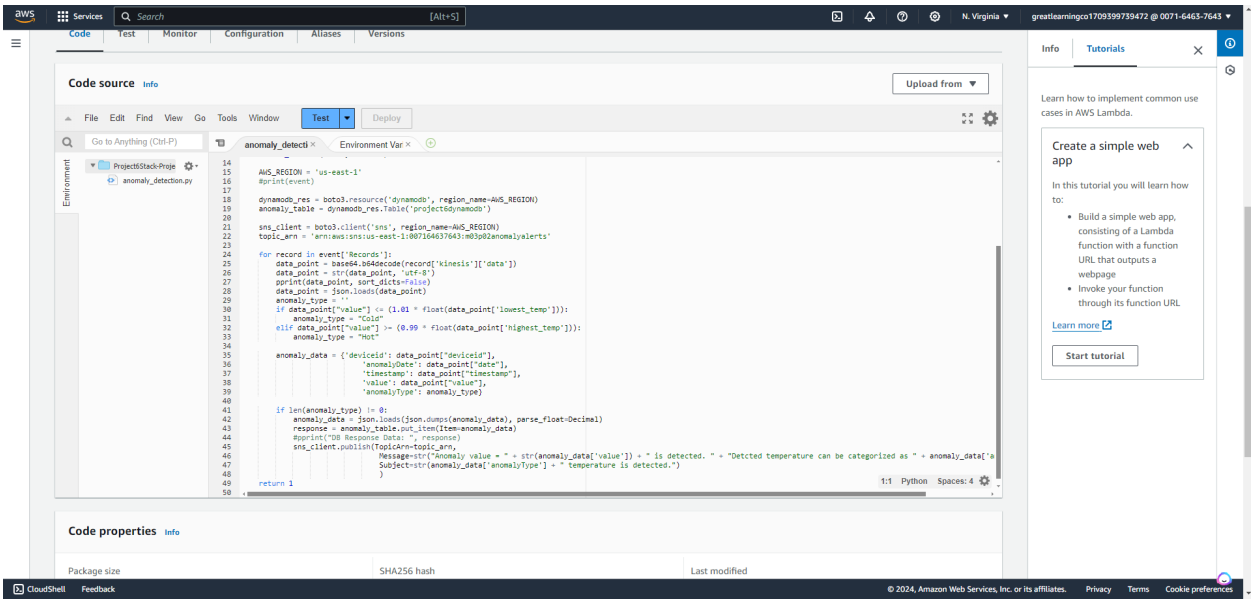
<



>

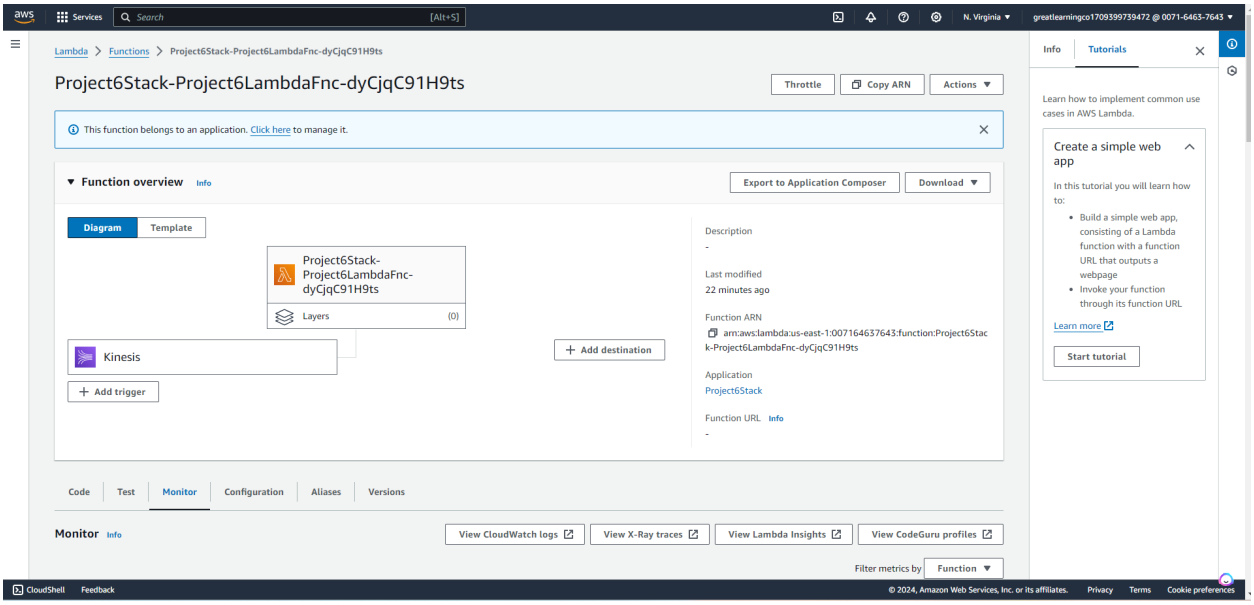
Step number	b
Step name	Enabled lambda handler service
Instructions	1) Make sure that cloud formation operation is successful 2) Check if the lambda handler service is successfully enabled
Expected screenshots	1) Lambda handler

<

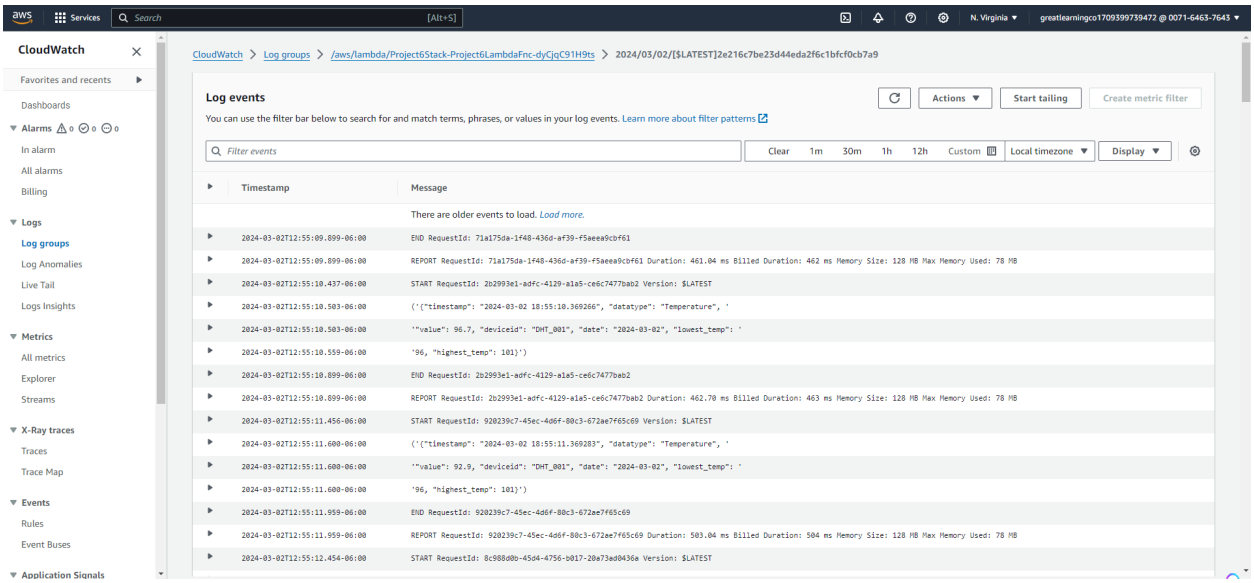


>

Lambda Handler Screen 1 after it automatically captured from S3[new] , I removed manual operation



Lambda Handler Screen 2



Lambda Handler Screen 3 ‘CloudWatch Logs‘ showing all operations successful

Step number	c
Step name	CodeDeploy
Instructions	3) Perform the CodeDeploy operation through AWS console 4) If CodeDeploy is successful look if the Anomaly detection related data is going into the relevant DB and SNS services
Expected screenshots	4) Successful CodeDeploy operation summary page 5) Anomaly data pushed in the DynamoDB 6) SNS notification

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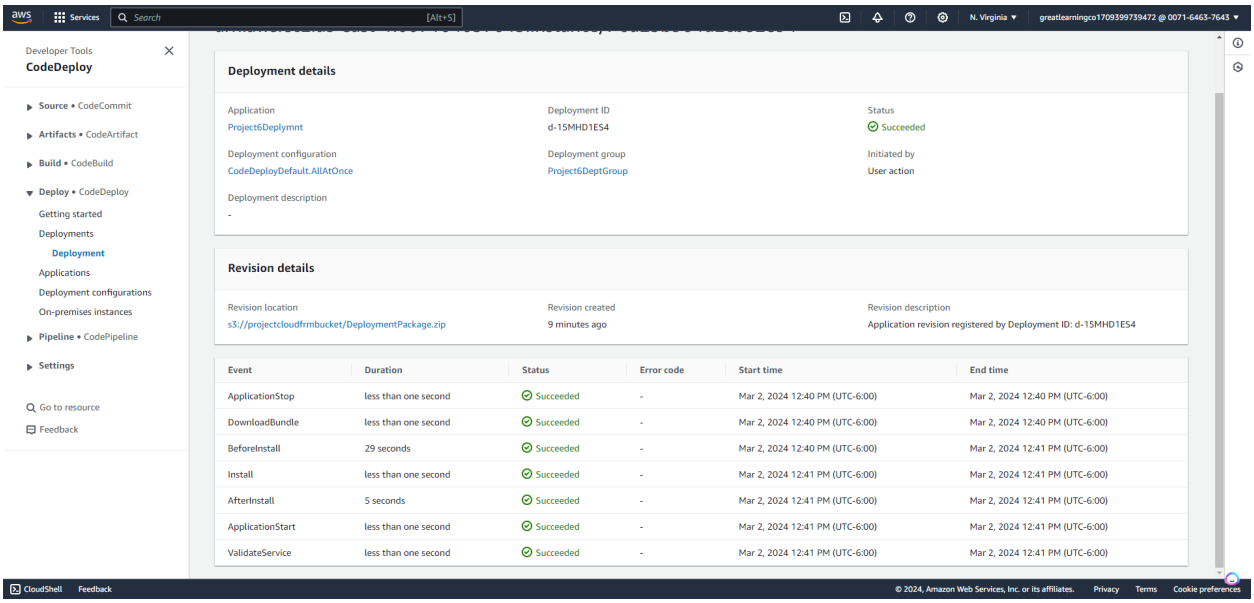

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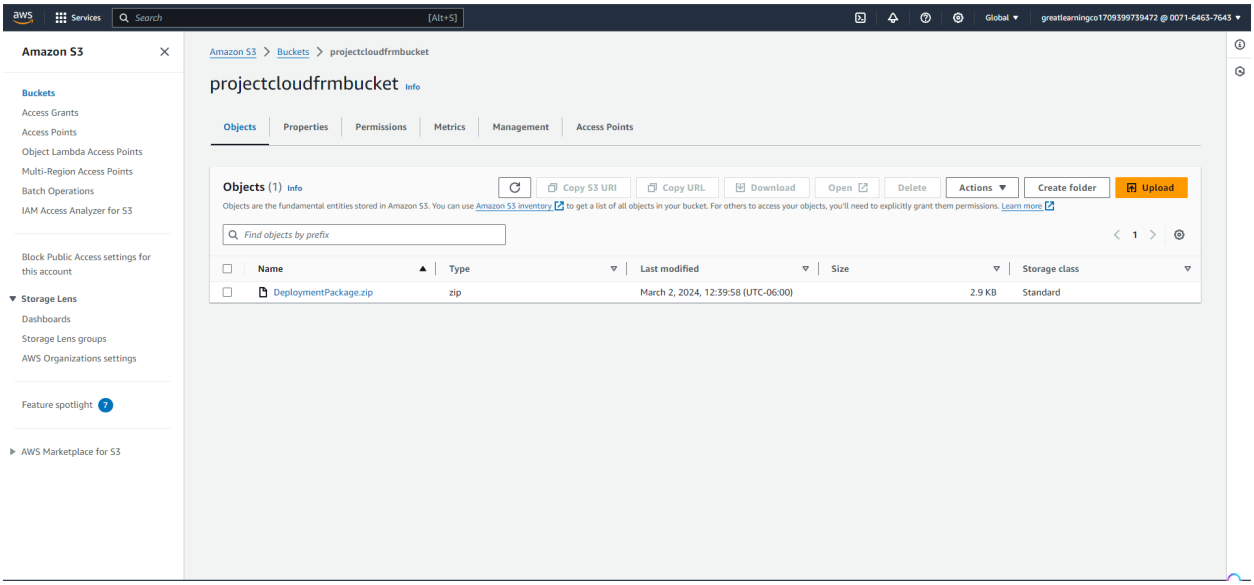
CodeDeploy Secreen 1 – Summary Page



CodeDeploy Secreen 2 – DeploymentPackage.zip

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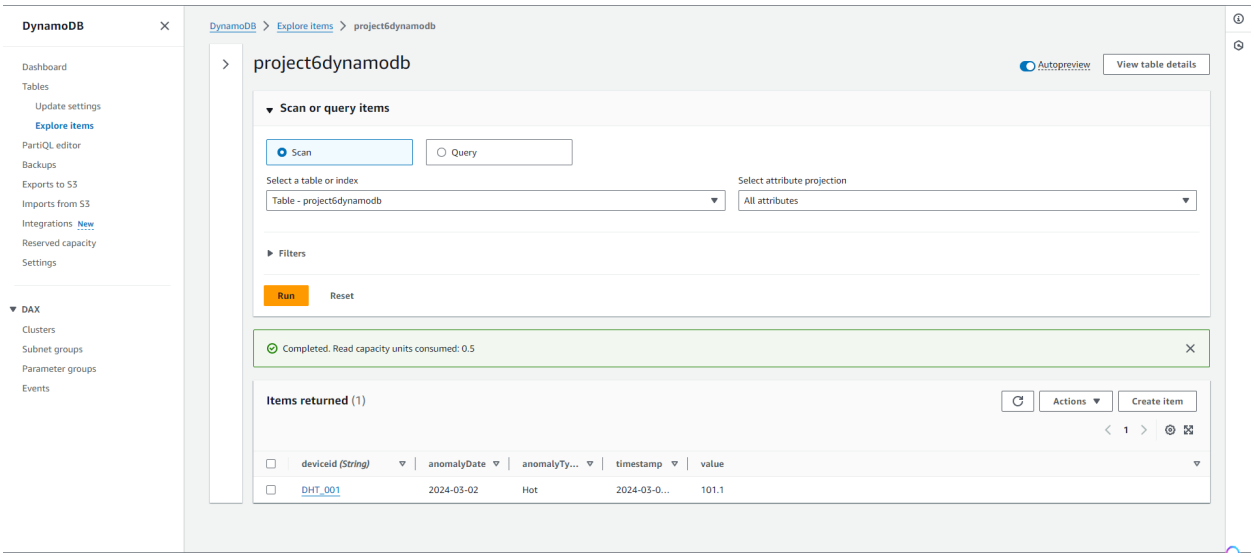
DynamoDB
Dashboard
Tables
Update settings
Explore items
PartiQL editor
Backups
Exports to S3
Imports from S3
Integrations New
Reserved capacity
Settings
DAX
Clusters
Subnet groups
Parameter groups
Events
DynamoDB > Explore items > project6dynamodb
project6dynamodb
Autopreview
View table details
Scan or query items
Scan
Query
Select a table or index
Table - project6dynamodb
Select attribute projection
All attributes
Filters
Run
Reset
Completed. Read capacity units consumed: 0.5
Items returned (1)
Actions
Create item
deviceid (String)
anomalyDate
anomalyTy...
timestamp
value
DHT_001
2024-03-02
Hot
2024-03-0...
101.1

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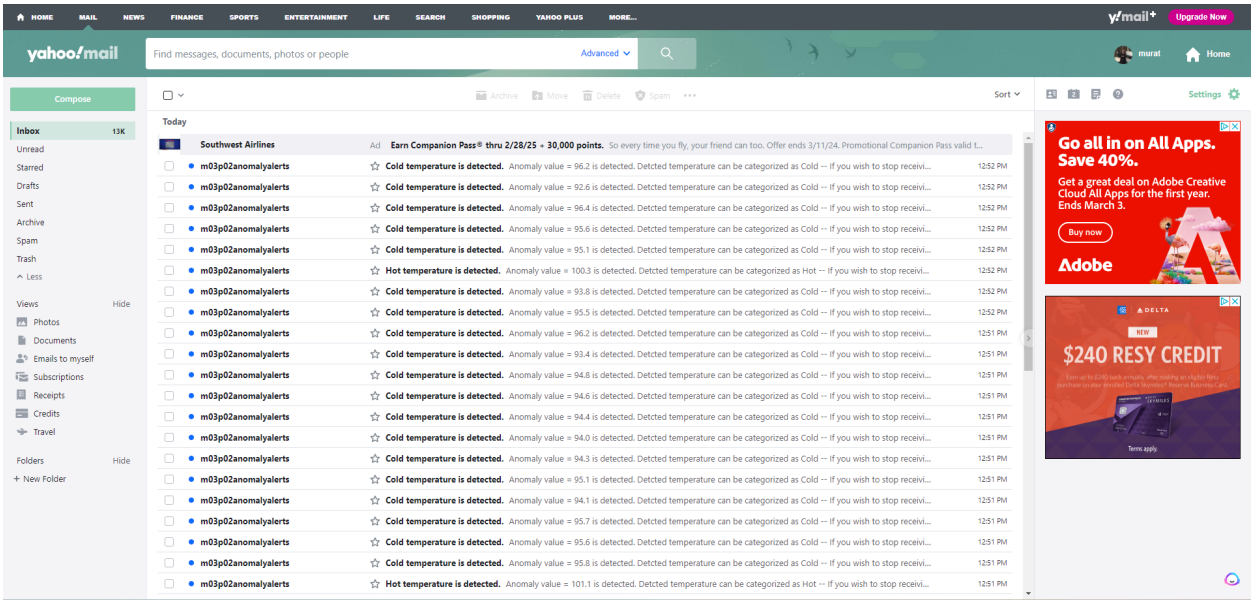
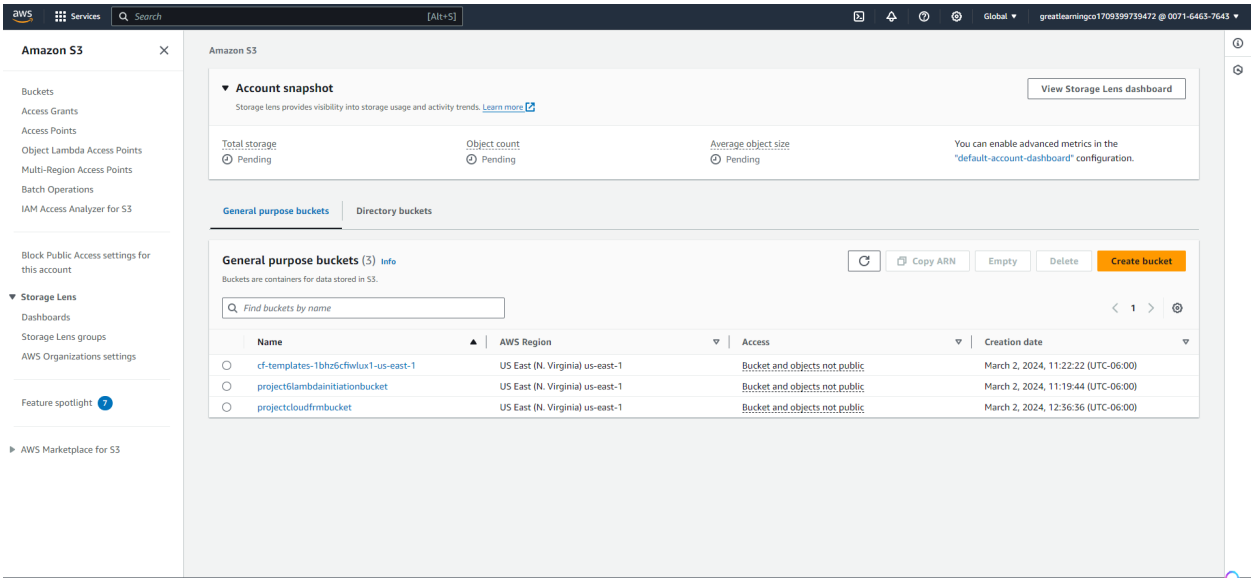

yahoo!mail
Find messages, documents, photos or people
Compose
Inbox 13K
Unread
Starred
Drafts
Sent
Archive
Spam
Trash
Today
Southwest Airlines
Earn Companion Pass® thru 2/28/25 + 30,000 points.
m03p02anomalyalerts
Cold temperature is detected.
Hot temperature is detected.
Go all in on All Apps. Save 40%.
Get a great deal on Adobe Creative Cloud All Apps for the first year. Ends March 3.
Buy now
Adobe
$240 RESY CREDIT

>

Additional Screens and notes:

- I also automated at step 3 getting Lambda Code from another S3 bucket at CloudFormation template , no manual operation exits



- I used single Zip file having deployment package.