

Implementing a Serverless Architecture for the Café

10.3HD

Task 1: Downloading the Source Code

- **Objective:** Download and inspect two .zip files:
 - salesAnalysisReportDataExtractor.zip: Extracts sales data from the RDS database.
 - salesAnalysisReport.zip: Formats and sends the daily report via email.
- **Purpose:** Understand what each Lambda function is responsible for before deploying them.

The screenshot shows a web browser window with three stacked challenge lab questions. Each question has a radio button selection and a 'Submit' button.

Question 1: Why does the salesAnalysisReportDataExtractor.zip file have a package folder?

- It's an optional folder to improve caching within the Lambda function
- The folder contains any Python packages that are used by the Lambda function
- The folder contains debugging information for Python
- The folder is a required folder for Lambda functions that are deployed to a VPC

Question 2: Why must the salesAnalysisReportDataExtractor be in a VPC?

- The Lambda function must be able to communicate with the web server instance
- The Lambda function must be able to communicate with the RDS instance
- This Lambda function must be set up differently than the other Lambda function
- This Lambda function must be able to communicate with an email server

Question 3: Could the topicARN be stored as an AWS Systems Manager parameter instead of as an environment variable (assuming that the code could be updated)?

- Yes
- No

Question 2: Why must the salesAnalysisReportDataExtractor be in a VPC?

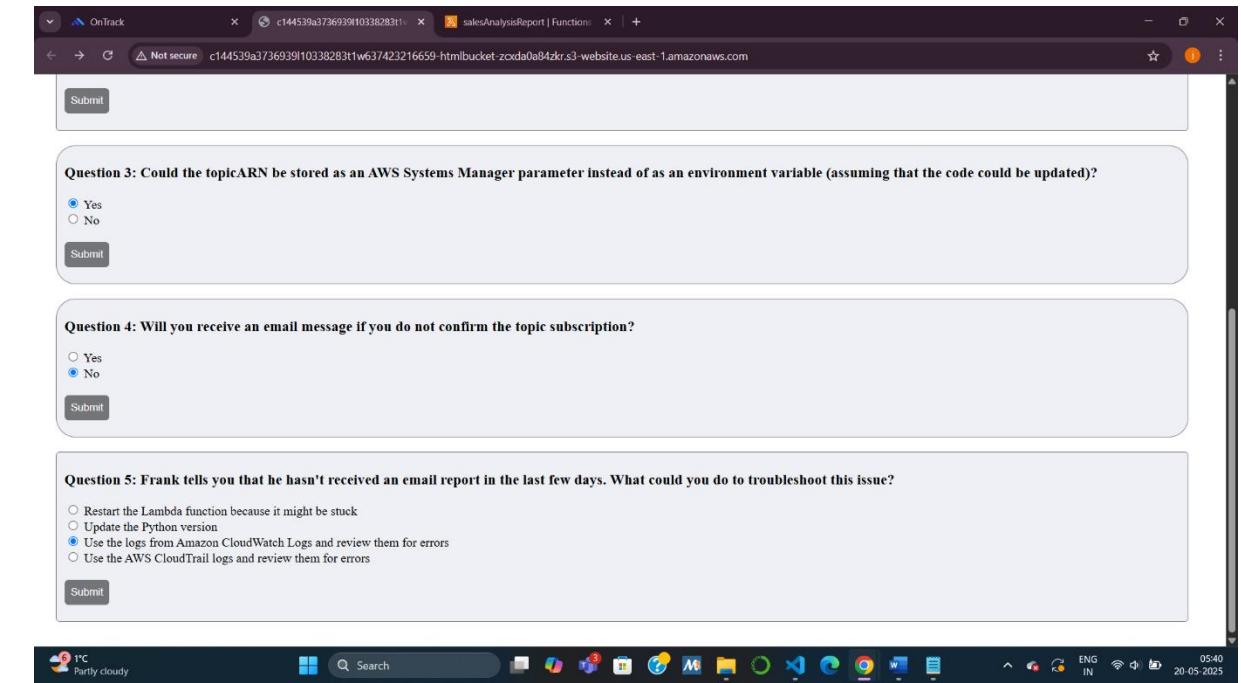
- The Lambda function must be able to communicate with the web server instance
- The Lambda function must be able to communicate with the RDS instance
- This Lambda function must be set up differently than the other Lambda function
- This Lambda function must be able to communicate with an email server

Question 3: Could the topicARN be stored as an AWS Systems Manager parameter instead of as an environment variable (assuming that the code could be updated)?

- Yes
- No

Question 4: Will you receive an email message if you do not confirm the topic subscription?

- Yes
- No



Task 2: Creating the DataExtractor Lambda Function in the VPC

- **Step 1: Create a new security group (LambdaSG)**
 - Outbound rules: Allow all traffic.
 - VPC: Use the provided Lab VPC.
- **Step 2: Update the existing DatabaseSG security group**
 - Add an inbound rule: type MySQL/Aurora and source as the LambdaSG security group.
 - Purpose: Allow Lambda to access the RDS database.
- **Step 3: Create the Lambda function salesAnalysisReportDataExtractor**
 - Runtime: Python 3.11
 - Role: salesAnalysisReportDERole
 - VPC Configuration: Use both Private Subnet 1 and 2 + LambdaSG.
 - Upload code zip, set handler to
`salesAnalysisReportDataExtractor.lambda_handler`
 - Timeout: 30 seconds, Memory: 128 MB
 - **Purpose:** Extract sales data securely inside the VPC from RDS.

Screenshot of the AWS VPC console showing the creation of a new security group named "LambdaSG". The security group allows SSH access to developers and is associated with the Lab VPC.

Basic details

- Security group name**: LambdaSG
- Description**: Allows SSH access to developers
- VPC**: vpc-0f87f1a1ecb63b85d (Lab VPC)

Inbound rules

This security group has no inbound rules.

Add rule

Outbound rules

Type	Protocol	Port range	Destination	Description - optional
CloudShell	TCP	3306	Custom	
-	TCP	3306	Custom	

Edit inbound rules

Inbound rules control the incoming traffic that's allowed to reach the instance.

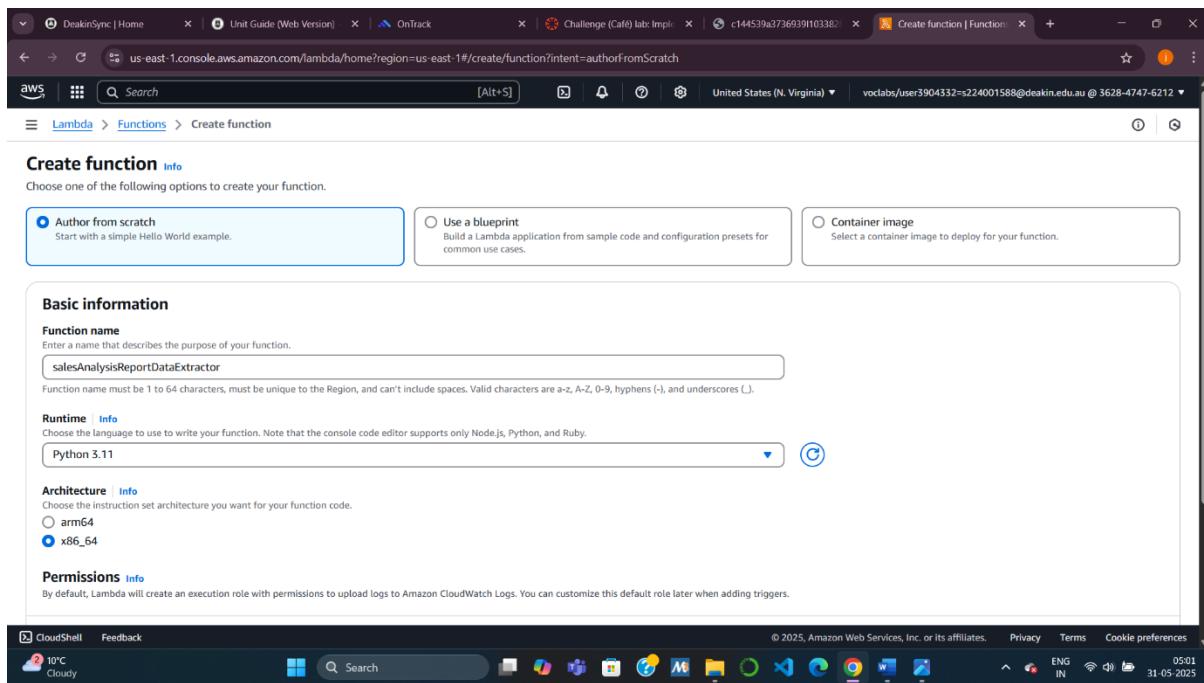
Security group rule ID	Type	Protocol	Port range	Source	Description - optional
sgr-03e9b5f36b2463937	MySQL/Aurora	TCP	3306	Custom	sg-03e75af15295997f8
-	MySQL/Aurora	TCP	3306	Custom	sg-0de5d4bfd32ba8ff2

Add rule

Buttons: Cancel, Preview changes, Save rules

Task 3: Creating the SalesAnalysisReport Lambda Function

- **Create Lambda function salesAnalysisReport**
 - Role: salesAnalysisReportRole
 - Upload the second zip file.
 - Set handler: salesAnalysisReport.lambda_handler
 - Same timeout (30s) and memory (128 MB) settings.
 - **Purpose:** Generate report content and send it via SNS.



Screenshot of the AWS Lambda 'Create function' wizard, step 2: Set runtime and permissions.

Architecture: Choose the instruction set architecture you want for your function code.

- arm64
- x86_64

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

Existing role

Choose an existing role that you've created to be used with this Lambda function. The role must have permission to upload logs to Amazon CloudWatch Logs.

[salesAnalysisReportDERole](#) (View the salesAnalysisReportDERole role on the IAM console.)

Additional Configurations

Use additional configurations to set up code signing, function URL, tags, and Amazon VPC access for your function.

[Cancel](#) [Create function](#)

Screenshot of the AWS Lambda 'Create function' wizard, step 3: Set VPC configuration.

You can allow outbound IPv6 traffic to subnets that have both IPv4 and IPv6 CIDR blocks.

Subnets

Select the VPC subnets for Lambda to use to set up your VPC configuration.

[Choose subnets](#)

us-east-1b

```
subnet-0c1f233690f69a2f6 (10.0.2.0/24)
aws:cloudformation:logical-id: PrivateSubnet2
aws:cloudformation:stack-id: am:aws:cloudformation:us-east-1:362847476212:stack/c144539a373693910338231w362847476212/e3ea20a0-3d82-11f0-bfa3-0e0b0bd86f0f3
aws:cloudformation:stack-name: c144539a373693910338231w362847476212  clouddb: c144539a373693910338231w362847476212
Name: Private Subnet 2
```

us-east-1a

```
subnet-02d108cafde6e12d8 (10.0.1.0/24)
aws:cloudformation:logical-id: PrivateSubnet1
aws:cloudformation:stack-id: am:aws:cloudformation:us-east-1:362847476212:stack/c144539a373693910338231w362847476212/e3ea20a0-3d82-11f0-bfa3-0e0b0bd86f0f3
aws:cloudformation:stack-name: c144539a373693910338231w362847476212  clouddb: c144539a373693910338231w362847476212
Name: Private Subnet 1
```

You must select between 1 and 16 Subnets.

Security groups

Choose the VPC security groups for Lambda to use to set up your VPC configuration. The table below shows the inbound and outbound rules for the security groups that you choose.

[Choose security groups](#)

sg-0de5d4bf032ba8ff2 (LambdaSG) (lambdaSG)

You must select between 1 and 5 Security groups.

Inbound rules **Outbound rules**

[CloudShell](#) [Feedback](#)

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10°C Cloudy ENG IN 05:03 31-05-2025

Screenshot of the AWS Lambda console showing the creation of a new function named "salesAnalysisReportDataExtractor".

The "Code source" tab is selected. A modal dialog titled "Upload a .zip file" is open, showing the uploaded file "salesAnalysisReportDataExtractor.zip" (113.79 KB). The "Save" button is highlighted.

The "Edit basic settings" tab is selected. Configuration options include:

- Memory:** Set to 128 MB.
- Ephemeral storage:** Set to 512 MB.
- Snapshot:** Set to 0 minutes.
- Execution role:** Set to "salesAnalysisReportDERole".

The browser status bar at the bottom shows the URL "us-east-1.console.aws.amazon.com/lambda/home?region=us-east-1#/functions/salesAnalysisReportDataExtractor/edit/basic-settings?tab=configure" and the date "31-05-2025".

The screenshot shows the 'Edit runtime settings' page for the 'salesAnalysisReportDataExtractor' function. The 'Runtime' section is set to Python 3.11. A message box indicates a new runtime is available. The 'Handler' is set to 'salesAnalysisReportDataExtractor.lambda_handler'. The 'Architecture' section shows 'x86_64' selected. A note states that changing both runtime and architecture requires a full update. At the bottom are 'Cancel' and 'Save' buttons.

The screenshot shows the 'Create function' page for the 'salesAnalysisReportDataExtractor' function. It shows a success message for updating the function. Three options are listed: 'Author from scratch' (selected), 'Use a blueprint', and 'Container image'. The 'Basic information' section includes fields for 'Function name' (set to 'salesAnalysisReport'), 'Runtime' (Python 3.11), and 'Architecture' (x86_64). The 'Permissions' section notes that a default execution role is created. At the bottom is a 'Change default execution role' button.

The screenshot shows the 'Create function' wizard in the AWS Lambda console. The top navigation bar includes tabs for 'DeakinSync | Home', 'Unit Guide (Web Version)', 'OnTrack', 'Challenge (Cafe) lab: Impl...', 'c144539a3736939103382...', 'Create function | Function...', and other browser tabs. The main content area is titled 'Create function' under 'Lambda > Functions'. It shows the selected architecture as 'x86_64'. The 'Permissions' section indicates that Lambda will create an execution role with permissions to upload logs to Amazon CloudWatch Logs. The 'Change default execution role' section shows three options: 'Create a new role with basic Lambda permissions' (radio button), 'Use an existing role' (selected), and 'Create a new role from AWS policy templates'. The 'Existing role' dropdown is set to 'salesAnalysisReportRole'. Below this, the 'Additional Configurations' section is collapsed. At the bottom right are 'Cancel' and 'Create function' buttons.



Edit basic settings

Basic settings [Info](#)

Description - optional
Lambda function to generate and send the daily sales report

Memory [Info](#)
Your function is allocated CPU proportional to the memory configured.
 MB
Set memory to between 128 MB and 10240 MB.

Ephemeral storage [Info](#)
You can configure up to 10 GB of ephemeral storage (/tmp) for your function. [View pricing](#)
 MB
Set ephemeral storage (/tmp) to between 512 MB and 10240 MB.

SnapStart [Info](#)
Reduce startup time by having Lambda cache a snapshot of your function after the function has initialized. To evaluate whether your function code is resilient to snapshot operations, review the [SnapStart compatibility considerations](#). For Python and .NET runtimes, [View pricing](#).
 None
Supported runtimes: .NET 8 (C#/F#/PowerShell), Java 11, Java 17, Java 21, Python 3.12, Python 3.13.

Timeout
 min sec

Execution role
<https://aws.amazon.com/lambda/pricing>

Edit runtime settings

Runtime settings [Info](#)

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

New runtime available
A new runtime is available for your function's language: Python 3.13

Handler [Info](#)

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.

Task 4: Creating an SNS Topic

- **Step 1:** Create an SNS topic
 - Name: SalesReportTopic, Display Name: "Sales Report Topic"
- **Step 2:** Add environment variable to Lambda
 - Key: topicARN
 - Value: The ARN of the topic just created
 - Purpose: Let the Lambda function know where to send the report.

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

Display name - optional
To use this topic with SMS subscriptions, enter a display name. Only the first 10 characters are displayed in an SMS message.
Sales Report Topic
Maximum 100 characters.

Encryption - optional
Amazon SNS provides in-transit encryption by default. Enabling server-side encryption adds at-rest encryption to your topic.

Access policy - optional
This policy defines who can access your topic. By default, only the topic owner can publish or subscribe to the topic.

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
topicARN	arn:aws:sns:us-east-1:362847476212:SalesReportTopic

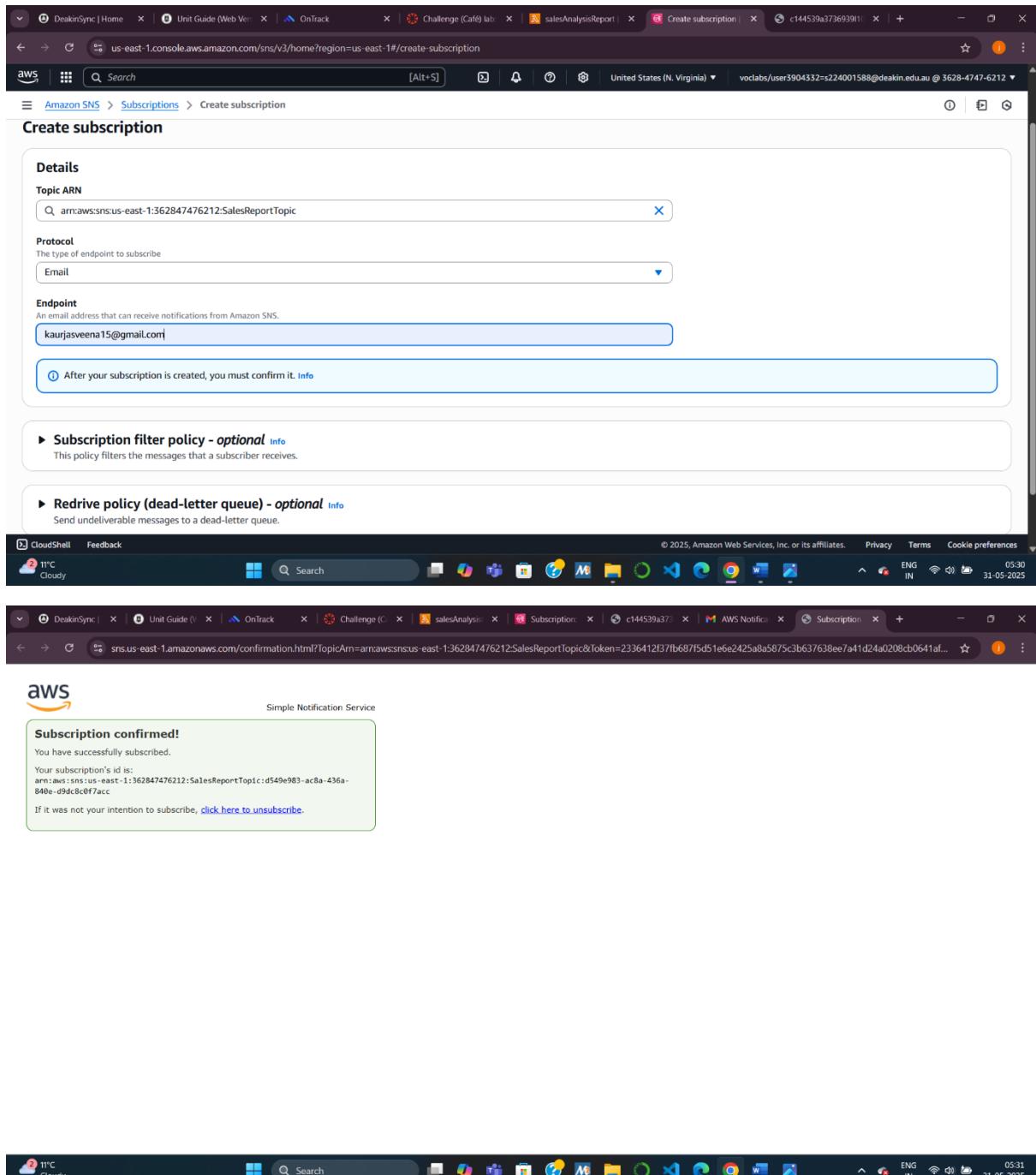
Add environment variable

Encryption configuration

Cancel Save

Task 5: Creating an Email Subscription to the SNS Topic

- **Step 1:** Subscribe your email to the SNS topic.
- **Step 2:** Confirm the subscription from your inbox (check spam folder).
- **Purpose:** Enable email delivery of the sales report.



Task 7: Setting up Amazon EventBridge to Trigger Daily

- **Step 1:** Create a scheduled EventBridge rule (cron or rate expression)
 - Example: cron(0 14 * * ? *) to run at 2:00 PM UTC
- **Step 2:** Attach the salesAnalysisReport Lambda function to the rule.
- **Step 3:** Use the existing IAM role: mySchedulerRole
- **Purpose:** Automate daily execution of the report at a fixed time.

Screenshot of the AWS Lambda console showing the configuration of a function named "salesAnalysisReport".

Test event Info
To invoke your function without saving an event, configure the JSON event, then choose Test.

Test event action
 Create new event Edit saved event

Event name
test_1 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
Hello World

Event JSON

```
1 * [{"key1": "value1", "key2": "value2", "key3": "value3"}]
```

Screenshot of a Gmail inbox showing an email from "Sales Report Topic <no-reply@sns.amazonaws.com>" titled "Daily Sales Analysis Report".

The email body contains the following text and tables:

Sales Analysis Report
Date: 2025-05-30

Product Group: Pastries

Item Name	Quantity
Croissant	29
Donut	23
Chocolate Chip Cookie	18
Muffin	6
Strawberry Blueberry Tart	34
Strawberry Tart	33

Product Group: Drinks

Item Name	Quantity
Coffee	33
Hot Chocolate	17
Latte	24

If you wish to stop receiving notifications from this topic, please click or visit the link below to unsubscribe.

Screenshot of the AWS Lambda trigger configuration page:

Trigger configuration

EventBridge (CloudWatch Events)

Rule
 Create a new rule
 Existing rules

Rule name

Rule description

Rule type
 Event pattern
 Schedule expression

Schedule expression

e.g. rate(1 day), cron(0 17 ? * MON-FRI *)

Lambda will add the necessary permissions for Amazon EventBridge (CloudWatch Events) to invoke your Lambda function from this trigger. Learn more about the Lambda permissions model.

Screenshot of the AWS Lambda function configuration page:

salesAnalysisReport

Function overview

Description
Lambda function to generate and send the daily sales report

Last modified
10 minutes ago

Function ARN
arn:aws:lambda:us-east-1:362847476212:function:salesAnalysisReport

Function URL
-

Configuration

Environment variables (1)

Challenge (Café) lab: Implementing a Serverless Architecture for the Café

Submission
May 19 at 7:53pm
Submission Details
Grade: 46.40000000000006
(56 pts possible)
Graded Anonymously: no
Comments:
No Comments

Tip: Choose existing role **mySchedulerRole**.

25. Check your email to see whether you received the report.

26. Return to the browser tab with the multiple-choice questions for this lab, and answer the following question:

o **Question 5:** Frank tells you that he hasn't received an email report in the last few days. What can you do to troubleshoot this issue?

AWS 01:38 Start Lab End Lab AWS Details Details

EN_US Submit Submission Report Grades

Total score 35/35

[Task 2] Lambda security group exists

[Task 2] Lambda function salesAna

[Task 3] Lambda function salesAna

[Task 4] SNS topic exists

[Task 5] Email subscription exists

[Task 7] Daily report exists

Challenge (Café) lab: Implementing a Serverless Architecture for the Café

Submission
May 19 at 7:53pm
Submission Details
Grade: 46.40000000000006
(56 pts possible)
Graded Anonymously: no
Comments:
No Comments

Submission Report

[Executed at: Fri May 30 12:43:49 PDT 2025]

[Answer 01] Correct. The package folder is used to store any packages used by you

[Answer 02] Correct. The lambda needs to be able to communicate with the RDS instance

[Answer 03] Correct. You could store the topicARN in SSM

[Answer 04] Correct. You need to accept subscriptions before messages are delivered

[Answer 05] Correct. You can use the logs in CloudWatch to look for errors

Testing report - The Lambda security group exists

Testing report - The salesAnalysisReportDataExtractor Lambda function exists!

Testing report - The salesAnalysisReport Lambda function exists!

an email report in the last few days. What can you do to troubleshoot this issue?

AWS 01:38 Start Lab End Lab AWS Details Details

EN_US Submission Report Grades

[Task 1] SNS topic exists

[Task 2] Lambda security group exists

[Task 3] Lambda function salesAna

[Task 4] Email subscription exists

[Task 5] Daily report exists

Screenshot of a web browser showing an AWS Academy challenge submission report.

The URL in the address bar is awsacademy.instructure.com/courses/104153/assignments/1147513.

The main page title is "Challenge (Café) lab: Implementing a Serverless Architecture for the Café".

On the left sidebar, under "Courses", there is a "Challenge (Café)" section with a "Submission" status of "Due" and a "Points" total of 56.

The "Submission" details show a grade of 46.400000000000006 (56 pts possible) and "Graded Anonymously: no". There are no comments.

A modal window titled "Submission Report" displays the following text:

```
Testing report - The SalesAnalysisReportLambda function exists!
Testing report - The salesAnalysisReport Lambda function exists!
Testing report - The SNS topic exists and is configured in the Lambda function.
Testing Report - Email subscription exists.
Testing Report - Daily event exists.

gradeFile = /mnt/vocwork4/grader/eee_G_2990563 asn3736938_20 asn3736939_1 /tmp/tempfile
reportFile = /mnt/vocwork4/grader/eee_G_2990563 asn3736938_20 asn3736939_1 /tmp/tempfile
/mnt/vocwork4/grader/eee_G_2990563 asn3736938_20 asn3736939_1 /tmp/tempfile_05302020
```

Below the report, a message asks: "an email report in the last few days. What can you do to troubleshoot this issue?"

The bottom of the screen shows a Windows taskbar with various icons and system status information: 11°C Cloudy, ENG IN, 05:44, 31-05-2025.