

CSCI 5410 - Serverless Data Processing

Assignment - 5

Name	Banner Id	Mail id
Bommera Geetanjali	B00881511	gt584369@dal.ca

Table of Contents

1. Part A.....	3
1. Introduction	3
2. Use case	3
2. Part B.....	4
3. References	16
4. Git Link	17

1. Part A

1. Introduction

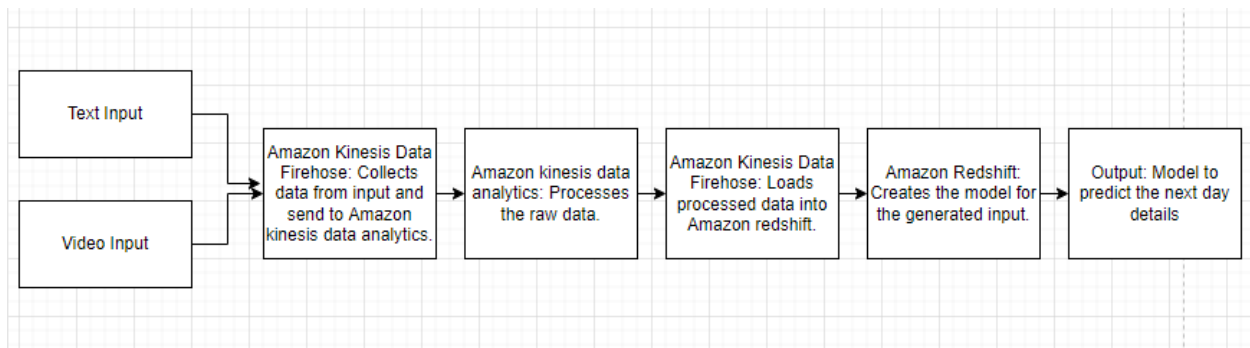
AWS Kinesis is particularly used to collect, process, and analyze real-time data that is continuously streaming. It is mainly used in the case of real-time applications where scalability is a major concern. Data that is collected from different resources is by kinesis video streams or kinesis data streams based on the type of data received. Once data is processed it is stored in a data firehouse or Amazon S3 buckets etc. Kinesis data analytics process the data streams in real-time SQL or Apache Flink to process the data that helps further to extract knowledge. Amazon AI services use this data as the input for different algorithms to bring insights. Output from Kinesis data analytics is used as input for creating models using different technologies such as AWS Lambda, Amazon Redshift.

2. Use case

Considering the pandemic last year, there is a great change in symptoms every now and then. The number of cases was increasing each day, and no one was able to predict the situation. In such a situation, it is difficult to collect whole data, analyze and predict the situation. Also, the insights might not be useful by the time model is built. In such a case, analyzing and processing the data as it comes is very essential.

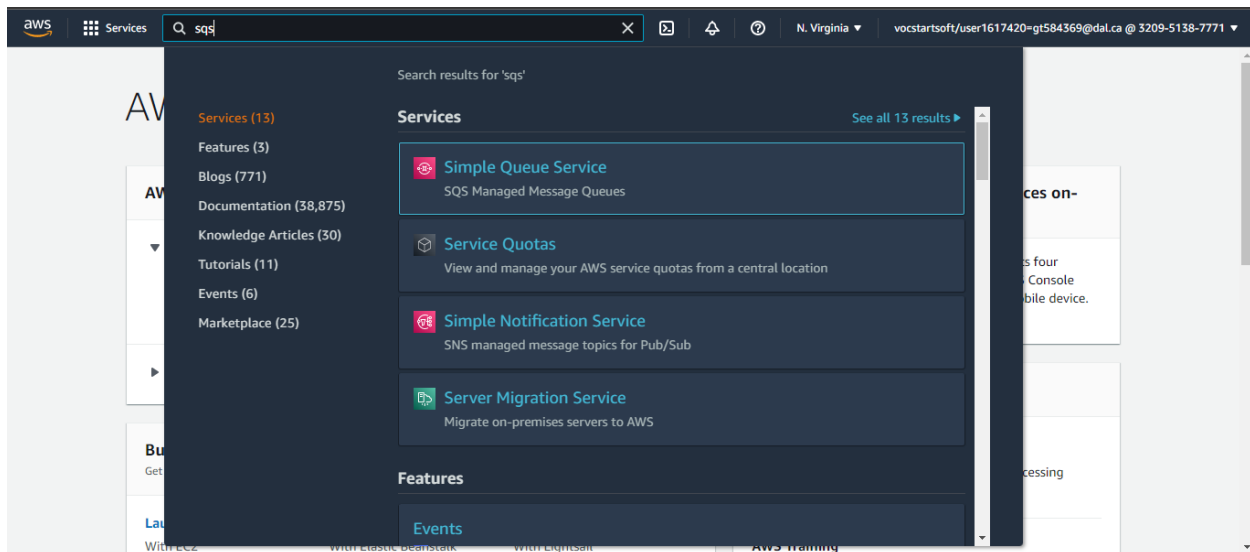
For instance, predicting the number of patients for the next day so that number of beds or rooms can be arranged. Hence data that belongs to the number of patients and type of patients received should be collected. This data can be collected from excel sheets or by scanning cameras while they check-in. Amazon Kinesis data firehouse collects raw data from different inputs and sends it to Amazon kinesis data analytics. Data might consist of patient name, age, health issues, symptoms, medicines currently taken, etc. Once Amazon's kinesis data analytics service receives data it processes data in real-time. Amazon redshift then receives the processed data to build the model from amazon kinesis data analytics through amazon kinesis data firehouse. Once the model is built, users can use this model to predict the number of patients to come to the hospital.

Note: Diagram is drawn using draw.io

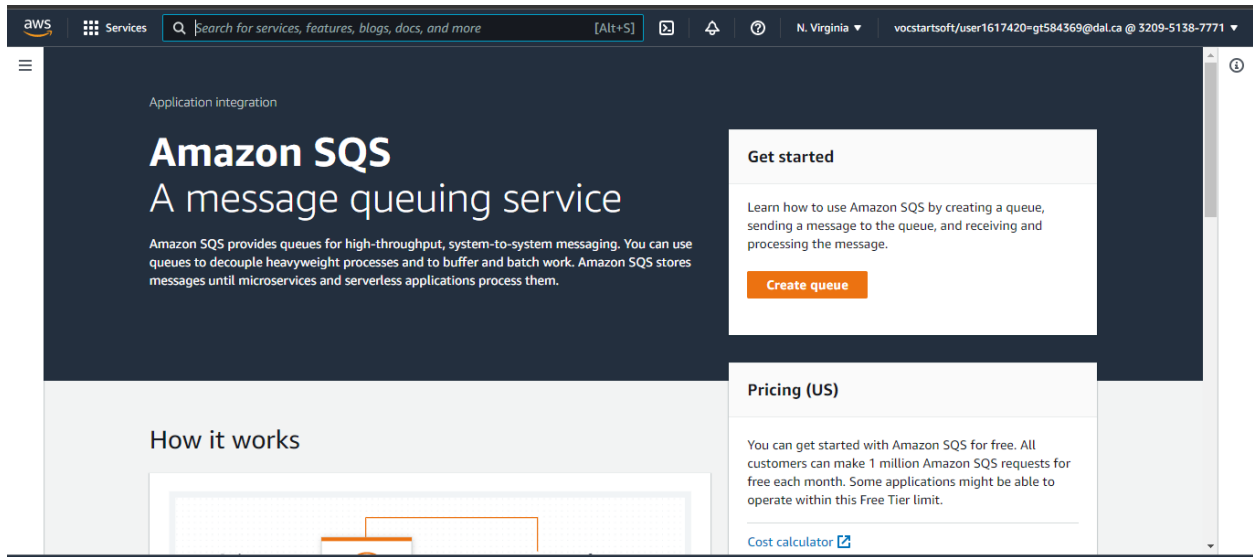


2. Part B

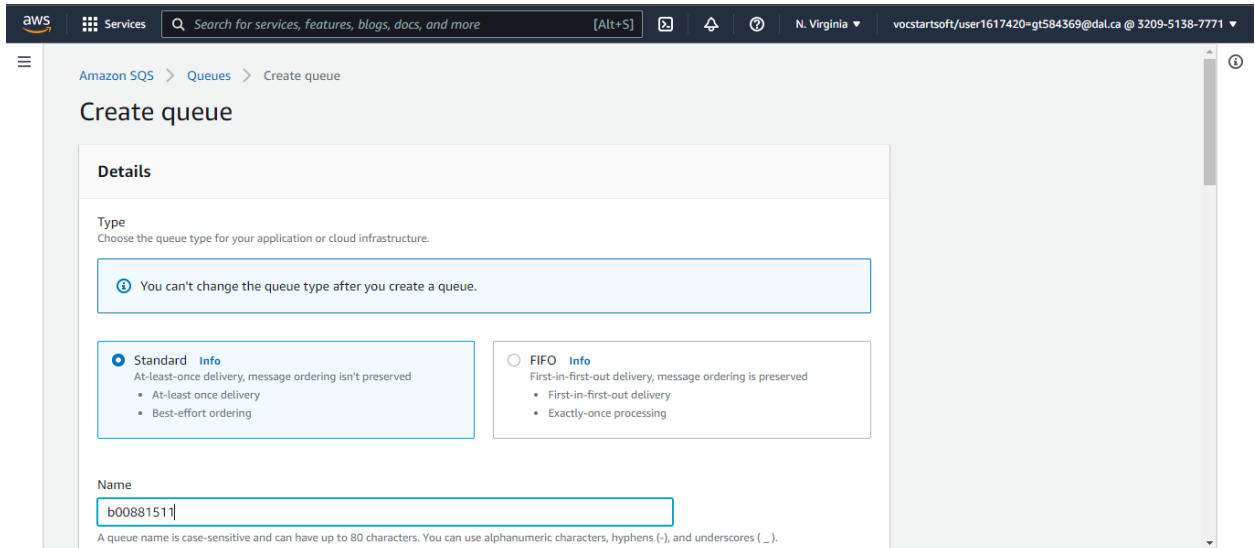
1. Go to AWS console and search for SQS. Click on Simple Queue Service [1].



2. Click on create queue to create the queue from the console.



3. Give the name of the queue.



4. Give the delivery delay as 5 seconds and click on create a queue.

aws Services Search for services, features, blogs, docs, and more [Alt+S] N. Virginia vocstartsoft/user1617420-gt584369@dal.ca @ 3209-5138-7771

b00881511

A queue name is case-sensitive and can have up to 80 characters. You can use alphanumeric characters, hyphens (-), and underscores (_).

Configuration

Set the maximum message size, visibility to other consumers, and message retention. [Info](#)

Visibility timeout Info	Message retention period Info
<input type="text" value="30"/> Seconds	<input type="text" value="4"/> Days
Should be between 0 seconds and 12 hours.	Should be between 1 minute and 14 days.
Delivery delay Info	Maximum message size Info
<input type="text" value="5"/> Seconds	<input type="text" value="256"/> KB
Should be between 0 seconds and 15 minutes.	Should be between 1 KB and 256 KB.
Receive message wait time Info	
<input type="text" value="0"/> Seconds	
Should be between 0 and 20 seconds.	

- Go to the AWS console once again to create a Simple Notification Service. Click on Simple Notification Service [2].

aws Services Search for services, features, blogs, docs, and more [Alt+S] N. Virginia vocstartsoft/user1617420-gt584369@dal.ca @ 3209-5138-7771

Search results for 'sns'

Api

Services (8)

- Features (6)
- Blogs (488)
- Documentation (44,290)
- Knowledge Articles (30)
- Tutorials (9)
- Events (2)
- Marketplace (32)

Simple Notification Service

SNS managed message topics for Pub/Sub

Server Migration Service

Migrate on-premises servers to AWS

Route 53 Resolver

Resolve DNS queries in your Amazon VPC and on-premises network.

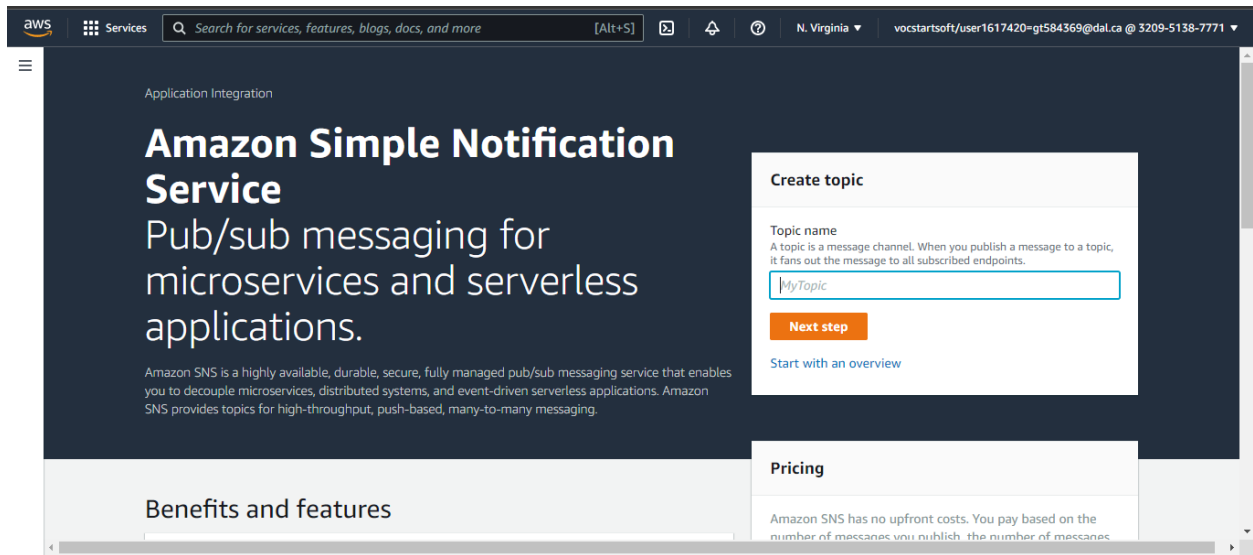
Route 53

Scalable DNS and Domain Name Registration

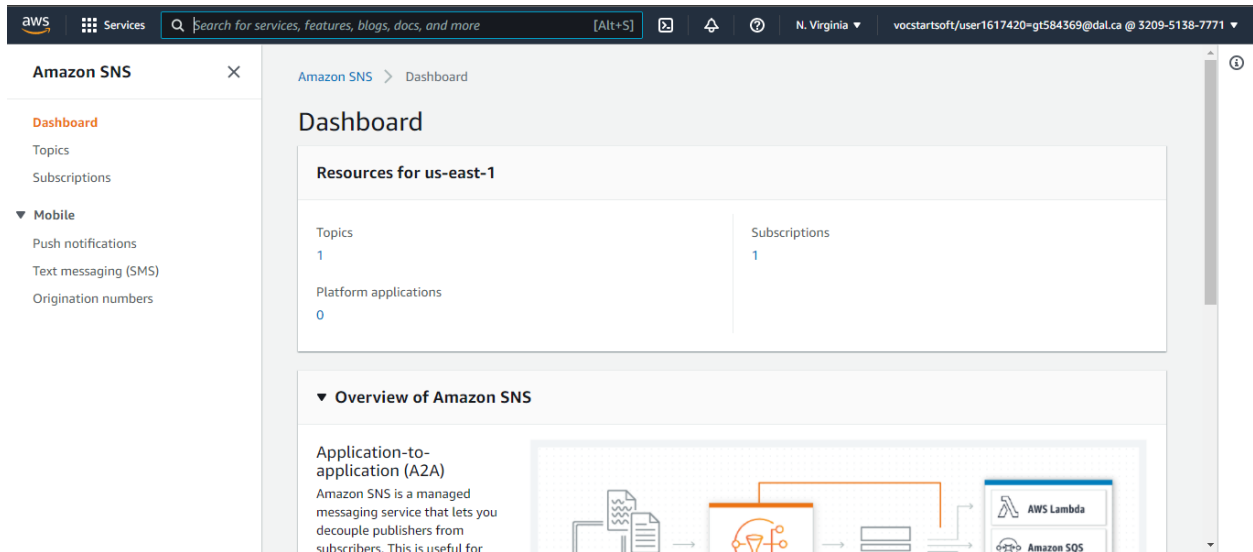
Features

Events

- Click on start with an overview.



7. Click on topics and then create a topic.



8. Give the name for the topic and choose type as standard. Click on create a topic to save this topic.

The screenshot shows the 'Create topic' page in the AWS Management Console. The breadcrumb navigation is 'Amazon SNS > Topics > Create topic'. The page title is 'Create topic'. Under the 'Details' section, the 'Type' is set to 'Standard' (selected with a radio button). The 'Name' field contains 'HalifaxDineAssignment5'. The 'Display name - optional' field is empty. The 'Standard' type description lists: Best-effort message ordering, At-least once message delivery, Highest throughput in publishes/second, and Subscription protocols: SQS, Lambda, HTTP, SMS, email, mobile application endpoints.

9. Click on subscriptions and then on create a subscription.

The screenshot shows the 'Subscriptions' page in the AWS Management Console. The breadcrumb navigation is 'Amazon SNS > Subscriptions'. The page title is 'Subscriptions (0)'. There are buttons for 'Edit', 'Delete', 'Request confirmation', 'Confirm subscription', and 'Create subscription'. A search bar is present. Below the search bar is a table with columns: ID, Endpoint, Status, Protocol, and Topic. The table is empty, and a message 'No subscriptions found' is displayed with a 'Create subscription' button below it.

10. Give the topic as the topic created in the above step. Give protocol as email as mail is the medium of notification. Give endpoint as the mail id to which notification needs to be received.

Amazon SNS > Subscriptions > Create subscription

Create subscription

Details

Topic ARN

Protocol
The type of endpoint to subscribe

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

After your subscription is created, you must confirm it. [Info](#)

- Once create subscription button is hit, an email confirmation is sent to the given mail id. Click on confirm subscription in the mail.

AWS Notification - Subscription Confirmation



CAUTION: The Sender of this email is not from within Dalhousie.

You have chosen to subscribe to the topic:
arn:aws:sns:us-east-1:320951387771:HalifaxDineAssignment5

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](#)

- Pop up the tab in the browser is displayed as shown below.



Simple Notification Service

Subscription confirmed!

You have successfully subscribed.

Your subscription's id is:

arn:aws:sns:us-east-1:320951387771:HalifaxDineAssignment5:be319f67-fe0b-49dc-8cf9-2d4a77381d3c

If it was not your intention to subscribe, [click here to unsubscribe](#).

- Go to IAM from the AWS console [3]. Create the role to have access to the SNS, SQS, and Lambda. Click on create the role.

Identity and Access Management (IAM)

Unable to load search
Dashboard

▼ **Access management**

- User groups
- Users
- Roles**
- Policies
- Identity providers
- Account settings

▼ **Access reports**

- Access analyzer
- Archive rules
- Analizers
- Settings
- Credential report
- Organization activity

Roles (20) 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.

Search

<input type="checkbox"/>	Role name	Trusted entities	Last act...
<input type="checkbox"/>	accessDB-role-hvixdyd	AWS Service: lambda	-
<input type="checkbox"/>	AmazonComprehendServiceRole-Assignment4_Partc	AWS Service: comprehend	10 days ago
<input type="checkbox"/>	Assignment4_Partc	AWS Service: lambda	10 days ago
<input type="checkbox"/>	AWSServiceRoleForAmazonGuardDuty	AWS Service: guardduty (Service-Linked Role)	-
<input type="checkbox"/>	AWSServiceRoleForAWSCloud9	AWS Service: cloud9 (Service-Linked Role)	-
<input type="checkbox"/>	AWSServiceRoleForCloudWatchEvents	AWS Service: events (Service-Linked Role)	-
<input type="checkbox"/>	AWSServiceRoleForElasticCache	AWS Service: elasticache (Service-Linked Role)	-
<input type="checkbox"/>	AWSServiceRoleForElasticMapReduce	AWS Service: lexv2 (Service-Linked Role)	-

- Give the name to the role and attach the policies required.

Create role

1 2 3 4

Review

Provide the required information below and review this role before you create it.


Role name* HalifaxDine

Use alphanumeric and '+', '@', '_' characters. Maximum 64 characters.

Role description HalifaxDine - Serverless Assignment 5

Maximum 1000 characters. Use alphanumeric and '+', '@', '_' characters.

Trusted entities AWS service: lambda.amazonaws.com

Policies  AmazonSQSFullAccess [↗](#)
 AWSLambdaExecute [↗](#)

Permissions boundary Permissions boundary is not set

* Required

Cancel

Previous

Create role

15. Full access policies for all three services are given for the role.

Identity and Access Management (IAM)

Dashboard

Access management

User groups

Users

Roles

Policies

Identity providers

Account settings

Access reports

Access analyzer

Archive rules

Analizers

Settings

Credential report

Role ARN arn:aws:iam::320951387771:role/HalifaxDine

Role description HalifaxDine - Serverless Assignment 5 [Edit](#)

Instance Profile ARNs

Path /

Creation time 2021-11-26 13:53 AST

Last activity 2021-11-27 22:37 AST (Today)

Maximum session duration 1 hour [Edit](#)

Permissions

Trust relationships

Tags




Access Advisor

Revoke sessions

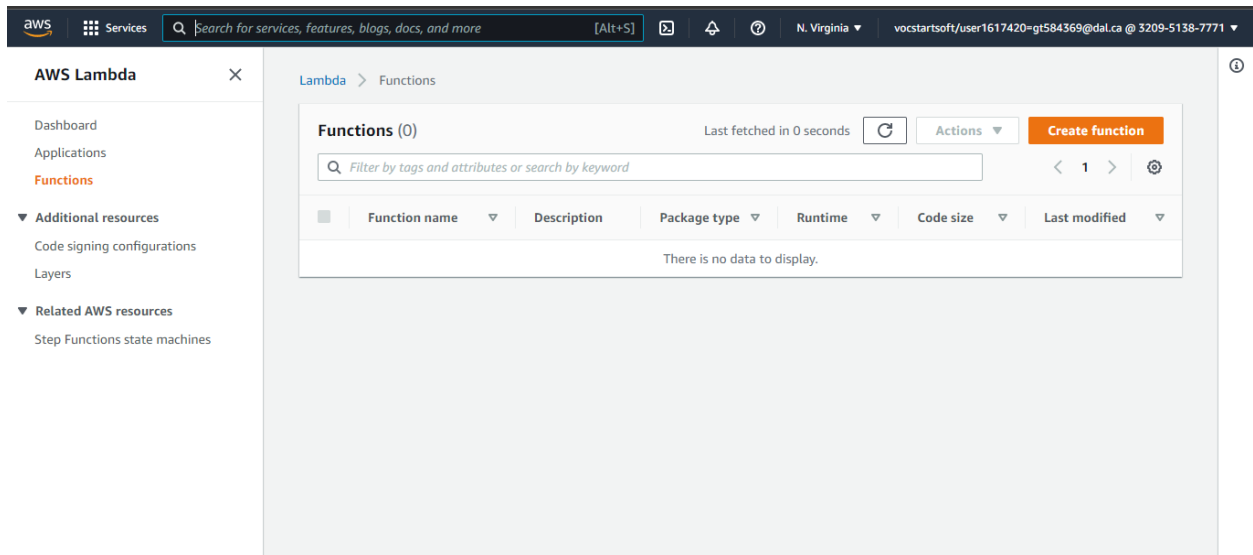
Permissions policies (3 policies applied)

Attach policies

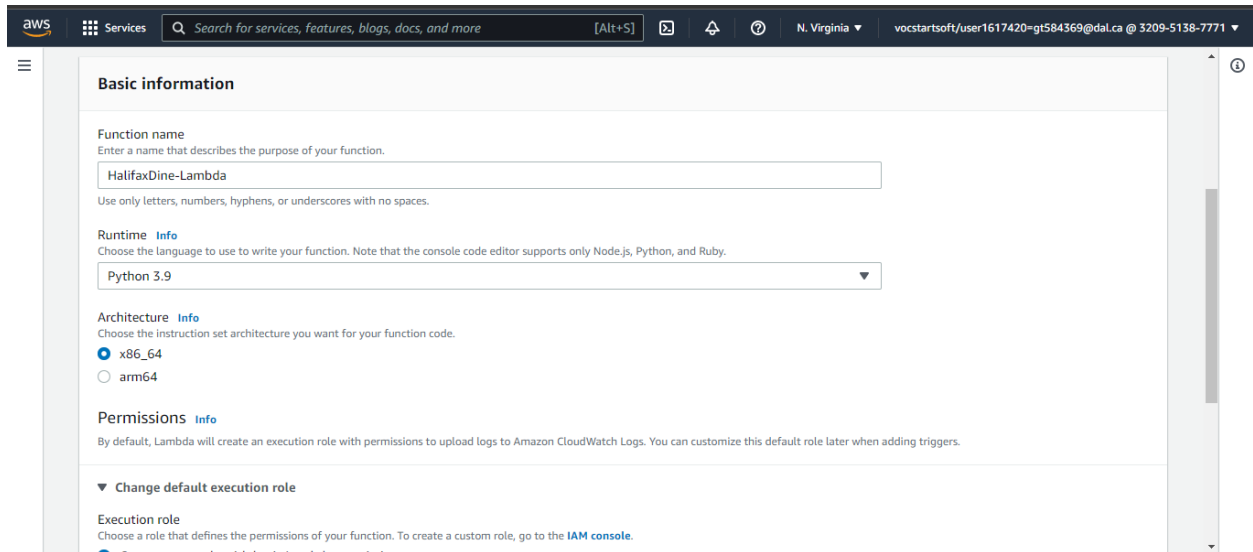
[Add inline policy](#)

Policy name	Policy type	
 AmazonSQSFullAccess	AWS managed policy	✕
 AWSLambdaExecute	AWS managed policy	✕
 AmazonSNSFullAccess	AWS managed policy	✕

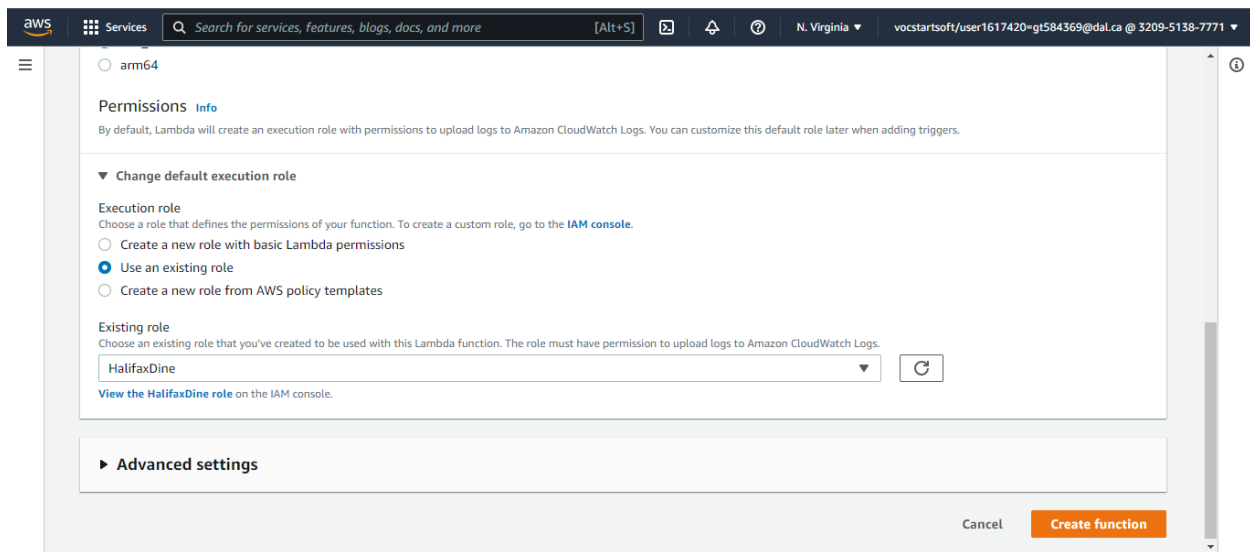
16. Go to AWS console and search for lambda [4]. Click on lambda and create the function.



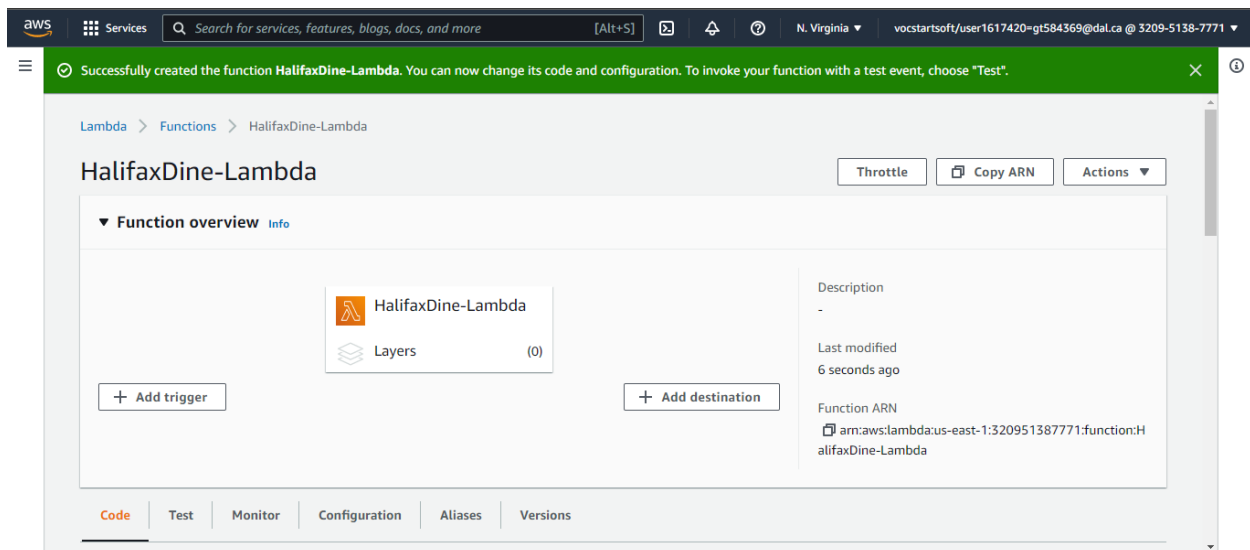
17. Give lambda function name and select the language as python 3.9.



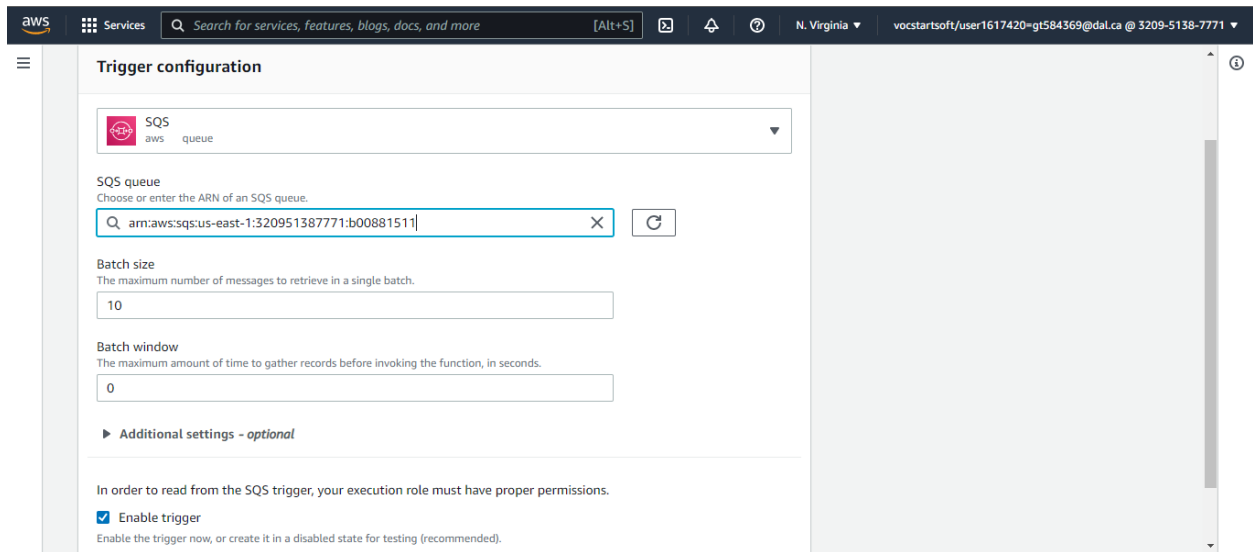
18. Select the existing role option and choose the role created in the above steps. Click on create function.



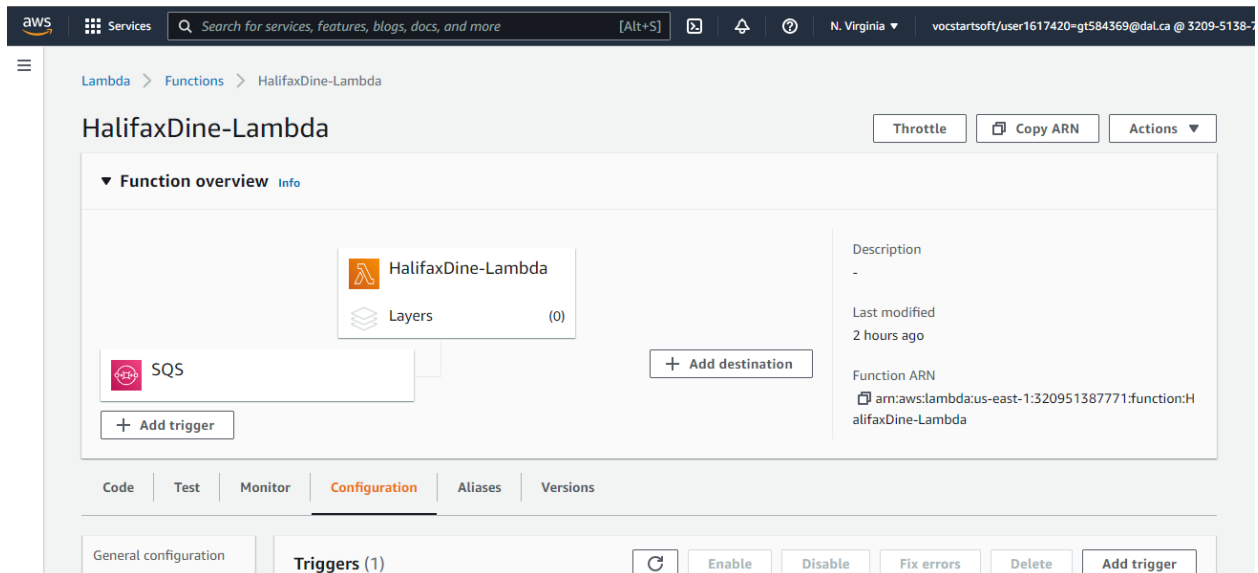
19. Click on add trigger to add SQS as a trigger to this lambda function.



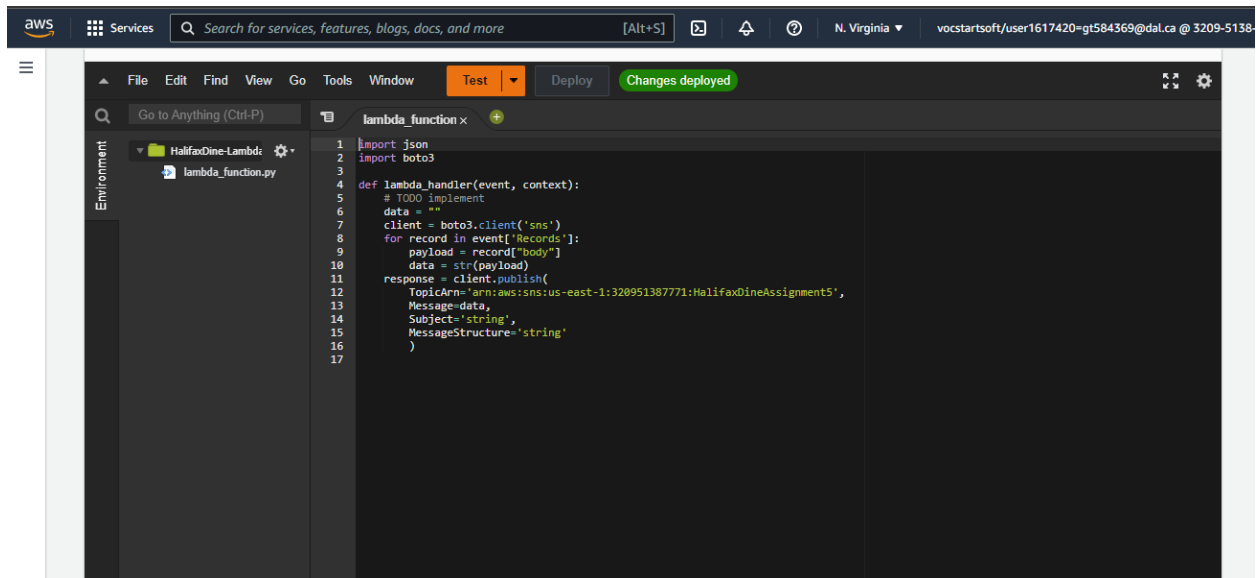
20. Search for SQS and select SQS. Select the SQS queue that is already created and save it.



21. Once the trigger is added, SQS is shown as the trigger for the lambda function.



22. Click on the code to write the code that sends the notification to the mail [5].



23. Once the code is ready. Click on deploy. Run the java program that inserts the data into the queue [6].

```

import com.amazonaws.auth.AWSStaticCredentialsProvider;
import com.amazonaws.auth.BasicSessionCredentials;
import com.amazonaws.regions.Regions;
import com.amazonaws.services.sqs.AmazonSQS;
import com.amazonaws.services.sqs.AmazonSQSClientBuilder;
import com.amazonaws.services.sqs.model.SendMessageRequest;
import java.util.Random;
import java.util.ArrayList;

public class HalifaxDine {
    public static void main(String[] args) {
        String access_key_id = "ASIAUVORRQZ55L3CQJWH";
        String secret_key_id = "kKgmgFI0qJLN8zpBzUWLuoDcQQ/mHThRQETrCFz7a";
        String session_token =
"FWoGZXIvYXdzEPv////////wEaDJZc0Z5EIS2QXWtYMsSK/AQ3g+Zx7wq+vQdSc6f6kBXqkP
CSaSy508ltq/1Sip20lBI/zCb7lZ6hEDdVaYrp6tI8m09yMmNcN7T9jodyYAECdnnQfwNILHGr
QEv3CHNV/f1tFwu/WX6zkwGY1MUH19LMRkpf9L/2XA29+GWNrebaexmziTTQEJepOk7vvhiOY9
GghFF5toJ0nvlbGGPFDUu3NQbYk+ApO8w9PbAIS8w2uASxOELCohtNW6i6KkUhVgcrVe7qHQ6K
BI4zwiV1YKIiti40GMilxhafOf8byM5D9rA8TYjXfpp62zuNH87wZ6zh8cGbNc7sUehXci04tz
izdNIs=";
        BasicSessionCredentials sessionCredentials = new
BasicSessionCredentials(
            access_key_id, secret_key_id, session_token);
        AmazonSQS sqs =
AmazonSQSClientBuilder.standard().withRegion(Regions.US_EAST_1)
            .withCredentials(new
AWSStaticCredentialsProvider(sessionCredentials))
            .build();
        createQueue(sqs);
    }

    private static void createQueue( AmazonSQS sqs) {
//        https://docs.aws.amazon.com/sdk-for-java/v1/developer-
guide/examples-sqs-message-queues.html

```

```
String QUEUE_NAME = "b00881511";
String queueUrl = sqs.getQueueUrl(QUEUE_NAME).getQueueUrl();
ArrayList<String> quantity = new ArrayList<>();
quantity.add("Small");
quantity.add("Medium");
quantity.add("Large");
ArrayList<String> food_items = new ArrayList<>();
food_items.add("Pizza");
food_items.add("Salad");
food_items.add("Rice");
Random rand = new Random();
for(int i =0;i<2;i++) {
    int index = rand.nextInt(3);
    String item = food_items.get(index);
    String size = quantity.get(index);
    String body = item + " : " + size;
    SendMessageRequest send_msg_request = new SendMessageRequest()
        .withQueueUrl(queueUrl)
        .withMessageBody(body)
        .withDelaySeconds(300);
    sqs.sendMessage(send_msg_request);
}
}
```

24. Once the data is inserted the mail notifications are sent with a delay of 5 seconds every time.



Order <no-reply@sns.amazonaws.com>
To Geetanjali Bommera

Reply
 Reply All
 Forward

Sat 11/27/2021 10:19 PM

CAUTION: The Sender of this email is not from within Dalhousie.

Rice : Large

--

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

<https://sns.us-east-1.amazonaws.com/unsubscribe.html?SubscriptionArn=arn:aws:sns:us-east-1:320951387771:HalifaxDineAssignment5:be319f67-fe0b-49dc-8cf9-2d4a77301d3c&Endpoint=gt584369@dal.ca>

Please do not reply directly to this email. If you have any questions or comments regarding this email, please contact us at

<https://aws.amazon.com/support>

3. References

- [1] Amazon, "Amazon Simple Queue Service," [Online]. Available: <https://docs.aws.amazon.com/AWSSimpleQueueService/latest/SQSDeveloperGuide/sqs-configure-create-queue.html>. [Accessed 26 November 2021].

- [2] Amazon, "Amazon Simple Notification Service," [Online]. Available: <https://console.aws.amazon.com/sns/v3/home?region=us-east-1#/homepage>. [Accessed 26 November 2021].
- [3] Amazon, "Identity and Access Management (IAM)," [Online]. Available: <https://console.aws.amazon.com/iam/home#/roles/HalifaxDine?section=permissions>. [Accessed 26 November 2021].
- [4] Amazon, "AWS Lambda," [Online]. Available: <https://console.aws.amazon.com/lambda/home?region=us-east-1#/functions>. [Accessed 26 November 2021].
- [5] Amazon, "Sample Amazon SQS function code," [Online]. Available: <https://docs.aws.amazon.com/lambda/latest/dg/with-sqs-create-package.html#with-sqs-example-deployment-pkg-python>. [Accessed 26 November 2021].
- [6] Amazon, "Creating an Amazon SQS queue," [Online]. Available: <https://docs.aws.amazon.com/AWSSimpleQueueService/latest/SQSDeveloperGuide/sqs-configure-create-queue.html>. [Accessed 26 November 2021].

4. Git Link

<https://git.cs.dal.ca/bommera/csci-5410-f2021-b00881511-geetanjali-bommera>