

## Lab 1 - Using AWS Lambda

In this lab, you will work with the AWS Lambda service (<http://docs.aws.amazon.com/lambda/latest/dg/welcome.html>).

You will create a Lambda function and attach it as a trigger script to a DynamoDB table to listen on for any inserts in the target table. Then, you will use the *aws* unified tool to insert a JSON-encoded document into the DynamoDB table.

The lab will also illustrate how you can tweak service permissions expressed in IAM policies.

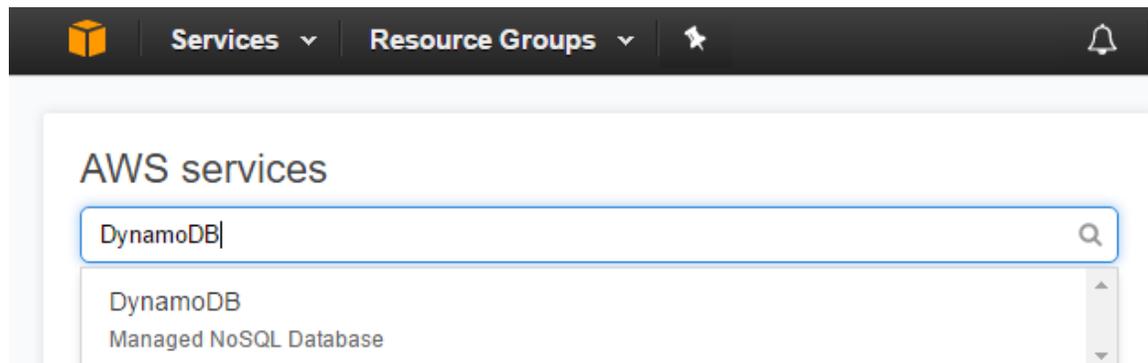
This lab builds on the results of the *Getting Started with AWS Command-line Interface* and *Getting Started with the EC2 Service* labs.

### Part 1 - Log In to AWS Management Console

1. Open your browser and sign in to the AWS Management Console.
2. Make sure you are in the **Oregon** region.

### Part 2 - Create a DynamoDB Table

1. In the AWS Management Console, search for and select **DynamoDB**



You will be placed in the Amazon DynamoDB Welcome page.

**Note:** We will be referring to this browser tab as the *DynamoDB* tab.

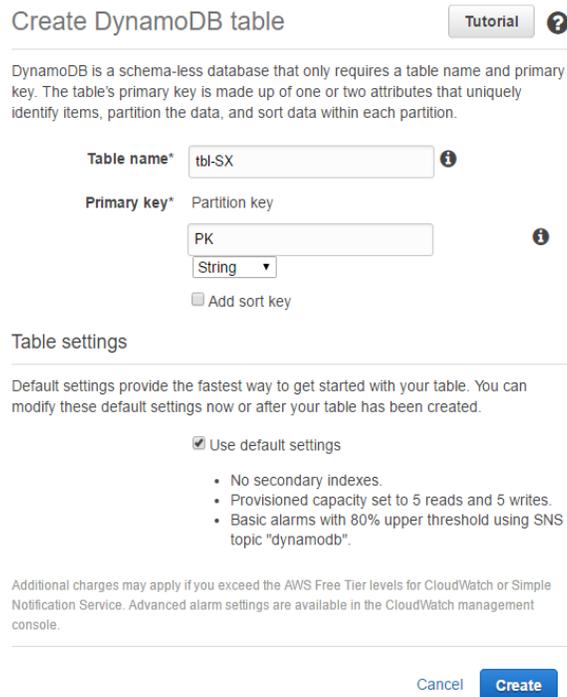
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- \_\_2. Click **Create table**
- \_\_3. For **Table name**, enter *tbl-{Your User Name}*, e.g. **tbl-SX**
- \_\_4. For **Primary key** (Partition key), enter **PK**; keep **String** for its type.
- \_\_5. Keep other defaults and click **Create**



Create DynamoDB table Tutorial ?

DynamoDB is a schema-less database that only requires a table name and primary key. The table's primary key is made up of one or two attributes that uniquely identify items, partition the data, and sort data within each partition.

**Table name\***  ⓘ

**Primary key\*** Partition key

ⓘ

▾

Add sort key

Table settings

Default settings provide the fastest way to get started with your table. You can modify these default settings now or after your table has been created.

Use default settings

- No secondary indexes.
- Provisioned capacity set to 5 reads and 5 writes.
- Basic alarms with 80% upper threshold using SNS topic "dynamodb".

Additional charges may apply if you exceed the AWS Free Tier levels for CloudWatch or Simple Notification Service. Advanced alarm settings are available in the CloudWatch management console.

Cancel Create

It may take a moment for AWS to create the table.

- \_\_6. Click the **Tables** link in the left-hand navigation bar.
- \_\_7. Select the newly created table.
- \_\_8. In the **Overview** tab, check the table's Amazon Resource Name (ARN):

Amazon Resource Name (ARN) `arn:aws:dynamodb:us-west-2:11336:table/tbl-SX`

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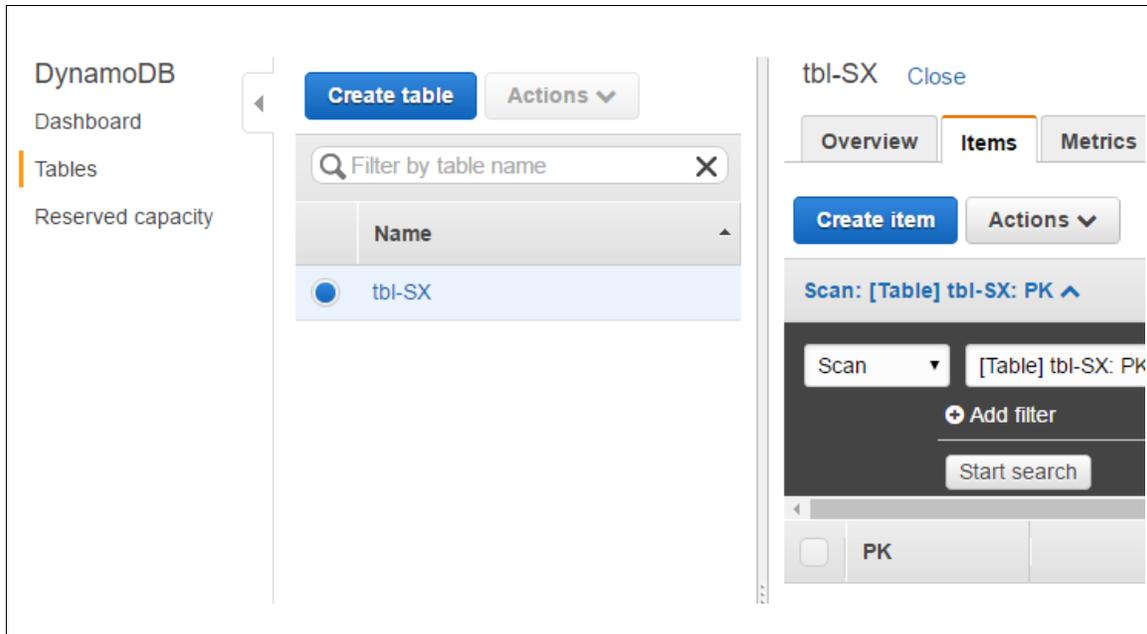
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Which has the region in which the table was created embedded in it (**us-west-2** above).

\_\_9. Click the **Items** tabs.

On creation, the table should be empty.



### Part 3 - Create a Lambda Role and a Policy

Before we create our lambda function, we need to set up a specialized role that our lambda function could use; the role, in turn, depends on a policy that prescribes the allowable actions.

\_\_1. Duplicate the browser tab.

\_\_2. Navigate to the **IAM** service.

**Note:** We will refer to this browser tab as the *IAM* tab.

\_\_3. Click **Policies** in the left-hand side navigation bar.

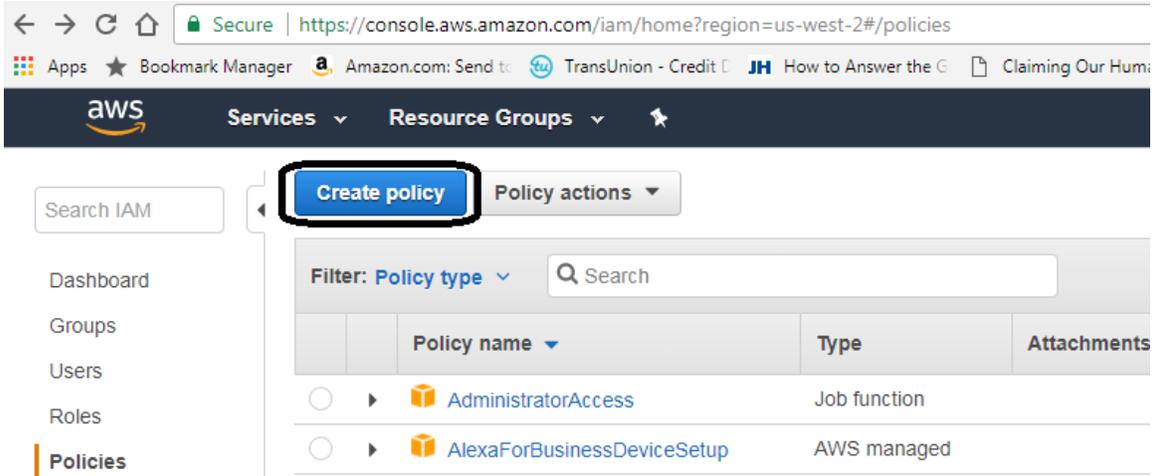
\_\_4. Click **Create policy**

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5. Click the **JSON** tab in the *Create Your Own Policy* section.

## Create policy

A policy defines the AWS permissions that can be assigned to a user, group, or role. You can create a policy in the console, using the **JSON editor**.



6. Open a new browser tab and navigate to <http://bit.ly/2sTwYpZ>

7. Copy the policy text to the clipboard.

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```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "dynamodb:*"
      ],
      "Resource": "arn:aws:dynamodb:us-west-2:113363365482:table/*"
    }
  ]
}
```

8. Go back to the *IAM* tab and paste the contents of the clipboard in the **JSON** window.



The screenshot shows the IAM console interface with two tabs: "Visual editor" and "JSON". The "JSON" tab is active, displaying the following policy content in a code editor:

```
1 {
2   "Version": "2012-10-17",
3   "Statement": [
4     {
5       "Effect": "Allow",
6       "Action": [
7         "dynamodb:*"
8       ],
9       "Resource": "arn:aws:dynamodb:us-west-2:113363365482:table/*"
10    }
11  ]
12 }
```

9. Click **Review Policy**

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Cancel

Review policy

10. Enter the information for name and description as shown below, replacing “GHN” with your student number or initials.

### Review policy

Before you create this policy, provide the required information and review this policy.

Name\* policy-lambda-GHN <sup>1</sup>

Maximum 128 characters. Use alphanumeric and '+', '@', '-' characters.

Description Curious George Joy of Lambda policy <sup>2</sup>

#### Summary

This policy defines some actions, resources, or conditions that do not provide permissions. To grant access, policies must have an applicable resource or condition. For details, choose [Show remaining](#). [Learn more](#)

Q Filter

Service ▾

Access level

Resource

Request condition

Allow (1 of 131 services) [Show remaining](#) 130

DynamoDB

Limited: Read, Write

TableName | string like | All

None

\* Required

Cancel

Previous

Create policy <sup>3</sup>

11. Create **Create Policy**

12. Now, click **Roles** in the left-hand side navigation bar.

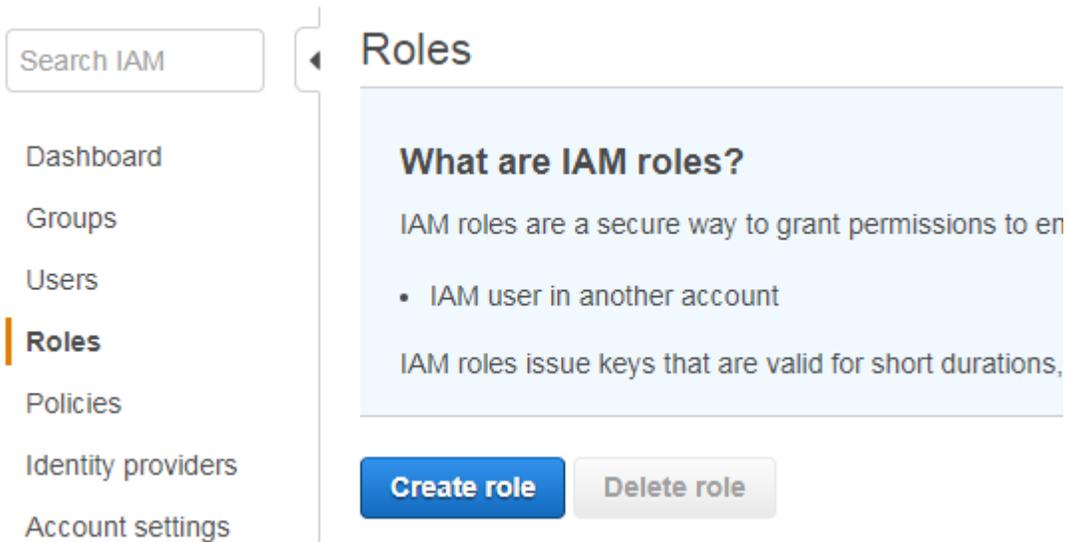
13. Click **Create Role**

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Search IAM

Dashboard

Groups

Users

**Roles**

Policies

Identity providers

Account settings

## Roles

### What are IAM roles?

IAM roles are a secure way to grant permissions to external users.

- IAM user in another account

IAM roles issue keys that are valid for short durations.

[Create role](#) [Delete role](#)

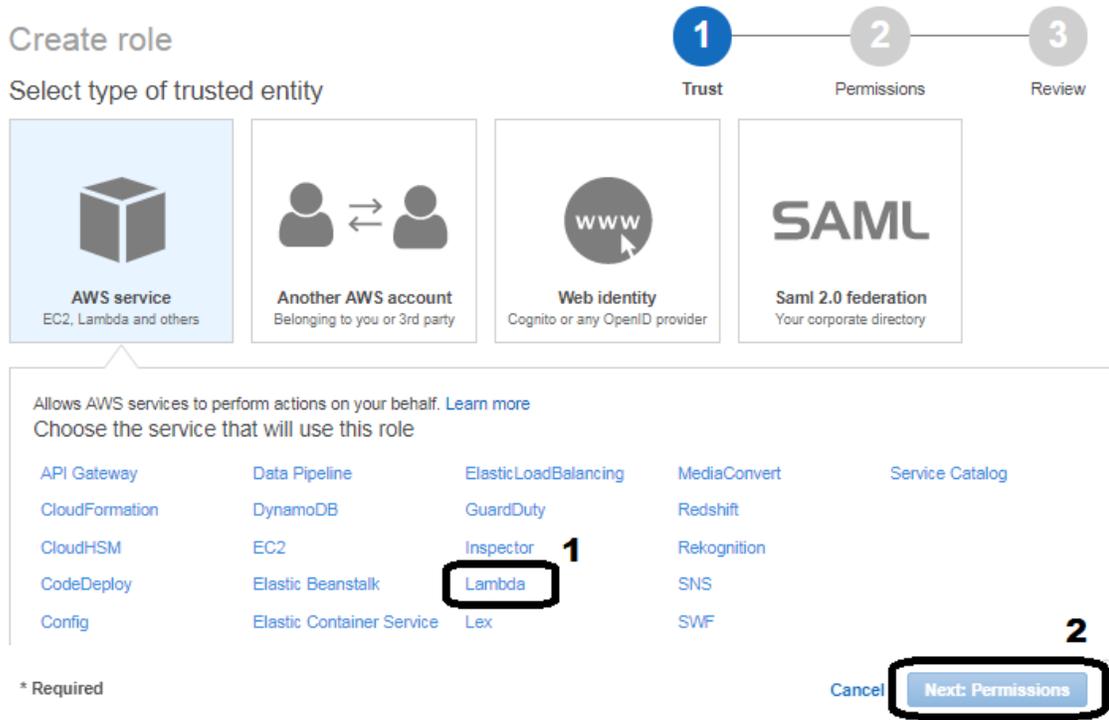
\_\_14. Click to select in the **Lambda**. Click **Next:Permissions**

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15. In the *Attach permissions policy* page, search for your policy, and select it. For **Role name**, enter `role-lambda-{Your User Name}`. Click **Next:Review**

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### Review

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

Role name\*  <sup>1</sup>  
Maximum 64 characters. Use alphanumeric and '+,.,@,-\_' characters.

Role description  <sup>2</sup>  
Maximum 1000 characters. Use alphanumeric and '+,.,@,-\_' characters.

Trusted entities AWS service: lambda.amazonaws.com

Policies [policy-lambda-GHN-2](#) <sup>3</sup>

\* Required Cancel Previous Create role

### 16. Click **Create role**

You role should now be listed in the *Roles* main page (*role-lambda-{Your Student ID or Initials}* is shown below).

Search IAM

Dashboard  
Groups  
Users  
**Roles**  
Policies  
Identity providers  
Account settings  
Credential report  
Encryption keys

Create new role Role actions

Filter

<input type="checkbox"/>	Role name
<input type="checkbox"/>	aws-elasticbeanstalk-ec2-role
<input type="checkbox"/>	aws-elasticbeanstalk-service-role
<input type="checkbox"/>	DataPipelineDefaultResourceRole
<input type="checkbox"/>	DataPipelineDefaultRole
<input type="checkbox"/>	ecsInstanceRole
<input type="checkbox"/>	role-lambda-SX

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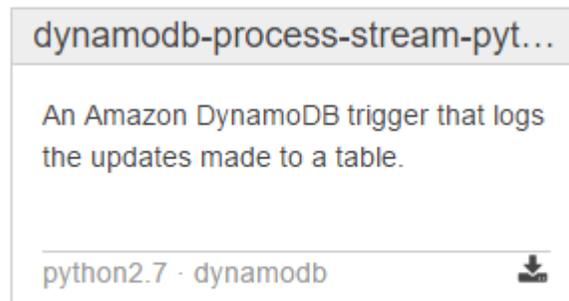
Now that we have set-up the specialized role and attached the required policy to it, we can go ahead and create our lambda function and bind our role to it.

## Part 4 - Create a Lambda Function

- \_\_1. Duplicate the browser tab. We will refer to the new tab as the *Lambda* tab.
- \_\_2. In the *Lambda* browser tab, click **Services** in the upper left corner and locate **Lambda**
- \_\_3. In the *AWS Lambda* welcome page, click **Get Started Now**, or **Create a Lambda function** or **Create a function**, depending on the previous user activities.

We will use one of the useful blueprints to help us navigate through the configuration options.

- \_\_4. Search for **dynamodb-process-stream-python** with **python2.7** runtime support.
- \_\_5. Click **dynamodb-process-stream-python** with **python2.7** runtime support.



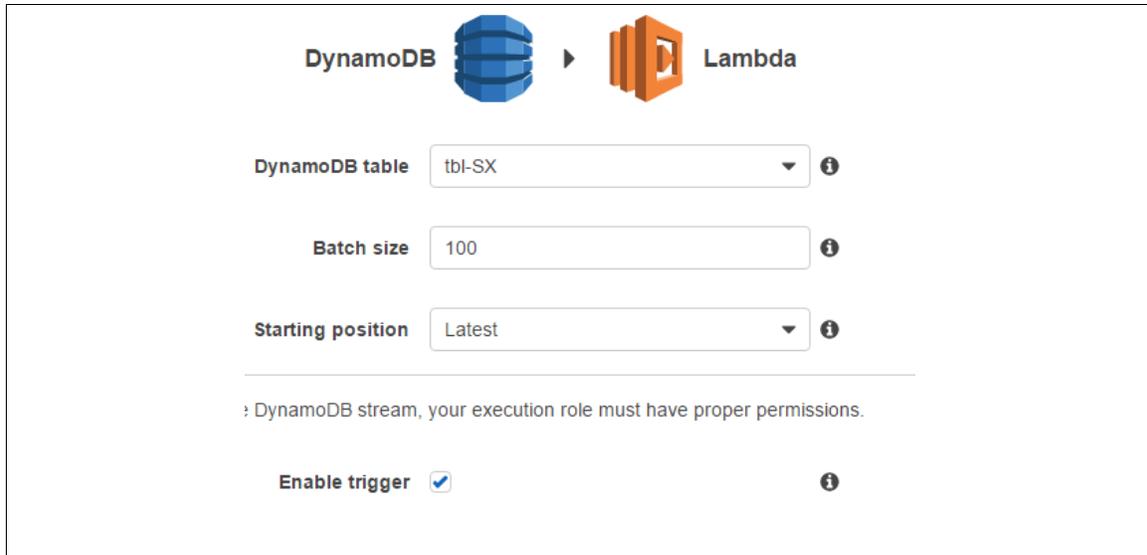
- \_\_6. In the *Configure triggers* page,
  - For **DynamoDB** table, select the table name you created above.
  - For **Starting position**, select **Latest**
  - Check **Enable trigger**
  - Click **Next**

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**DynamoDB**  **Lambda**

DynamoDB table  ⓘ

Batch size  ⓘ

Starting position  ⓘ

---

: DynamoDB stream, your execution role must have proper permissions.

Enable trigger  ⓘ

The *Configure function* page should open.

\_\_7. In the *Configure function* page,

- For **Name**, enter *lambda-{your user name}*, e.g. **lambda-SX**
- Keep the **Description** as is.
- In the **Runtime** drop-down, select **Python 2.7**
- In the **Lambda function code**, do the following updates:
  - ✓ Uncomment the print statement (remove the # character) :

```
# print("Received event: " + json.dumps(event, indent=2))
```

- Under the **Lambda function handler and role** section, for **Role**, select **Choose an existing role**
- In the **Existing role**, select your role you created in the previous Lab part.
- Keep other defaults.
- Click **Next**

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## 8. Review your Lambda function details.

### Review

Please review your Lambda function details. You can go back to edit changes for each section. When you are ready, click **Create function** to complete the setup process.

Triggers [Edit](#)



DynamoDB

DynamoDB table: **tbl-SX**    Batch size: **100**    Starting position: **LATEST**

Enabled

Lambda function [Edit](#)

<b>Name</b>	lambda-SX
<b>Description</b>	An Amazon DynamoDB trigger that logs the updates made to a table.
<b>Runtime</b>	Python 2.7
<b>Environment variables</b>	
<b>Handler</b>	lambda_function.lambda_handler
<b>Existing role*</b>	role-lambda-SX
<b>Tags</b>	
<b>DLQ Resource</b>	
<b>Memory (MB)</b>	128

## 9. Click **Create function**

Function creation will take a moment.

## 10. Click the **Triggers** function.

Your DynamoDB table should be listed there as the source.

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Lambda > Functions > lambda-SX

Qualifiers ▼ **Test** Actions ▼

Congratulations! Your Lambda function "lambda-SX" has been successfully created and configured with tbl-SX as a trigger. your function.

Code Configuration **Triggers** Tags Monitoring

 **DynamoDB: tbl-SX**  
 arn:aws:dynamodb:us-west-2:113363365482:table/tbl-SX/stream/2017-06-26T17:17:12.760  
 Last processing result: **No records processed** Batch size: **100**

[+ Add trigger](#) [↻ Refresh triggers](#)

▶ View function policy

\_\_ 11. Switch to the *DynamoDB* tab.

\_\_ 12. Click the **Triggers** tab.

You should see your Lambda function name listed there.

If you do not see your function there, refresh the page.

**Create table** Actions ▼

Filter by table name X

Name
<input checked="" type="radio"/> tbl-SX

tbl-SX [Close](#)

Overview Items Metrics Alarms Capacity Indexes **Triggers** /

**Create trigger** ▼ Edit/Test trigger Delete trigger

Function name	State	Last result
<input type="radio"/> lambda-SX	Enabled	No records processed

## Part 5 - Connect to Your EC2 Instance with the aws Tool

\_\_ 1. Duplicate the *DynamoDB* tab; we will be referring to the new tab as the *EC2* tab.

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- \_\_2. In the *EC2* browser tab, click **Services**; search for and select **EC2**
- \_\_3. Start the instance named after your user name (e.g. **SX**) – that instance has the **aws** tool updated with your account credentials (the Access key ID and Secret access key) to allow remote connections.
- \_\_4. Write down the Public IP address of your started instance.

## Part 6 - Connect to Your EC2 Instance Using PuTTY

- \_\_1. Launch your PuTTY SSH client and repeat steps **1 through 7** outlined in **Part 3 - Connect to the EC2 Instance Using the PuTTY SSH Client** of the **Getting Started with the EC2 Service** Lab you did previously to connect to your EC2 instance.

Use the public IP address you wrote down above.

You should be placed right into the home directory of the *ec2-user* user on your EC2 instance.

## Part 7 - Use AWS CLI to Insert Data into DynamoDB

You are going to insert data into the DynamoDB table you just created above; when the data is inserted, the trigger in the form of your Lambda function will be invoked and entry is going to be made into a CloudWatch log file.

The file that contains the records to be inserted has already been created and you just need to download it.

- \_\_1. Get the file from the class remote repository using this command:

```
wget --no-check-certificate https://goo.gl/jVveww -O dynamoDbLoad.json
```

The downloaded file named *dynamoDbLoad.json* will be placed in your *ec2-user* home directory.

- \_\_2. Open your text editor (e.g. *nano* or *vi*) and replace the *tbl-SX* token at the beginning of the file with your own, e.g. *tbl-S4*
- \_\_3. Save the changes and close the file.

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\_\_4. At command prompt, enter the following command (in one line) specifying the region your DynamoDB table was created (us-west-2 is shown below):

```
aws dynamodb batch-write-item --request-items file://dynamoDbLoad.json
--region us-west-2
```

You should get the following response:

```
{
  "UnprocessedItems": {}
}
```

\_\_5. Switch to your browser and go to the *DynamoDB* tab.

\_\_6. Click **Items** tab.

\_\_7. Click the **Refresh** button in the upper right corner of the page and click **Start search**

You should see the inserted items.

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**Create table** Actions ▾

Name
<input checked="" type="radio"/> tbl-SX

tbl-SX Close

Overview
Items
Metrics
Alarms
Capacity

**Create item** Actions ▾

Scan: [Table] tbl-SX: PK ▲

Scan ▾

+ Add filter

Start search

<input type="checkbox"/>	PK	COL_A	COL_B
<input type="checkbox"/>	0f097d5988bc7	Value for Col_...	98.92
<input type="checkbox"/>	33cce8f060bb21	Value for Col_...	12.99
<input type="checkbox"/>	3c1a9c4d8cd4f1	Value for Col_...	3453.01

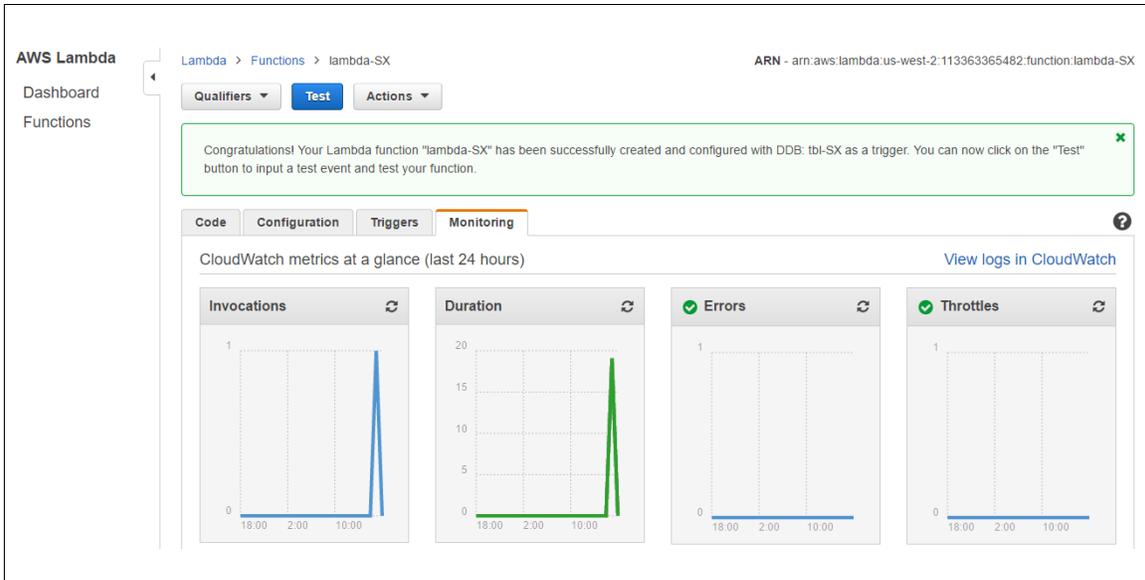
\_\_8. Click the *Lambda* browser tab and click the **Monitoring** tab.

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You should see some metrics captured by the CloudWatch service.

We are almost done in this lab.

While our Lambda function has rather limited functionality, it has all the required settings that can help you make it as complex as you may want it to be, e.g. it can scan the inserted records looking for specific information and then send a notification using Amazon Notification Service or copy selected records to an S3 bucket.

## Part 8 - Workspace Clean-up

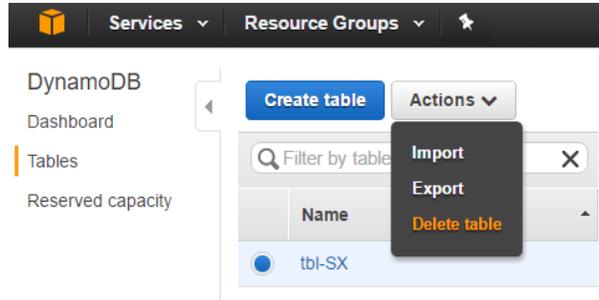
- \_\_\_ 1. Switch to the *EC2* browser tab and stop your EC2 instance.
- \_\_\_ 2. Switch to the *DynamoDB* browser tab and delete the table you created by selecting **Actions > Delete table**.

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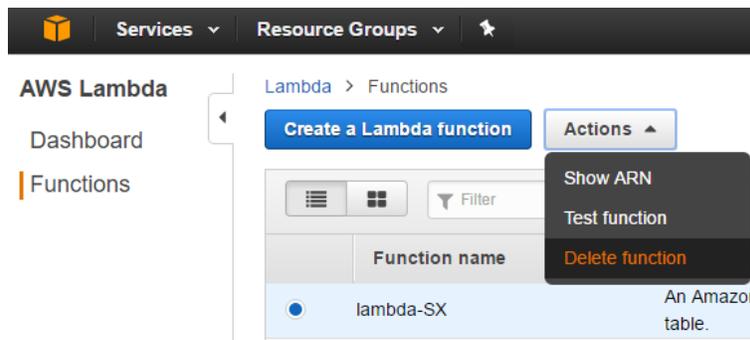
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\_\_\_ 3. In the **Delete table** popup, keep the **Delete all CloudWatch alarms for this table** checked and click **Delete**

\_\_\_ 4. Switch to the *Lambda* browser tab and delete your Lambda function by selecting **Actions > Delete function**.



\_\_\_ 5. Confirm the **Delete** operation.

\_\_\_ 6. Select the *IAM* tab.

\_\_\_ 7. In the left menu, select **Roles**

\_\_\_ 8. Locate and select the role that you created, click **Role Actions** and select **Delete Role**

\_\_\_ 9. Confirm the **Delete** action.

\_\_\_ 10. Click **Policies**; search for and select your policy (e.g. *policy-lambda-SX*); delete the

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policy.

- \_\_ 11. Confirm the **Delete** action.
- \_\_ 12. Sign out from the AWS Management Console.
- \_\_ 13. Close the browser and the PuTTY terminal.

## Part 9 - Review

In this lab, we worked with a Lambda function that we attached as a trigger to a DynamoDB table.

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