FREE eBook

LEARNING aws-lambda

Free unaffiliated eBook created from
Stack Overflow contributors.

#aws-lambda

Table of Contents

About

You can share this PDF with anyone you feel could benefit from it, downloaded the latest version from: aws-lambda

It is an unofficial and free aws-lambda ebook created for educational purposes. All the content is extracted from Stack Overflow Documentation, which is written by many hardworking individuals at Stack Overflow. It is neither affiliated with Stack Overflow nor official aws-lambda.

Use the content presented in this book at your own risk; it is not guaranteed to be correct nor accurate, please send your feedback and corrections to info@zzzprojects.com

Chapter 1: Getting started with aws-lambda

Remarks

AWS Lambda is a serverless setup for executing functions in the cloud. It leverages existing Amazon Web Services technologies to infinitely scale and run only when necessary in it's own isolated environment. Using Lambda, you can upload your code, configure it to run based on a variety of triggers, and then automatically decommission the process when complete. It operates on a pay-per-use model and is extremely cost effective and easy to scale.

AWS Lambda supports code written in Node.js (JavaScript), Python, Java (Java 8 compatible) and C# (.NET Core). Your code can include existing libraries, even native ones.

Triggers can include:

HTTP Endpoints

- Mobile Apps
- Other AWS Services (Including REST implementation with Amazon API Gateway)

Lambda is best designed for real-time serverless data processing such as:

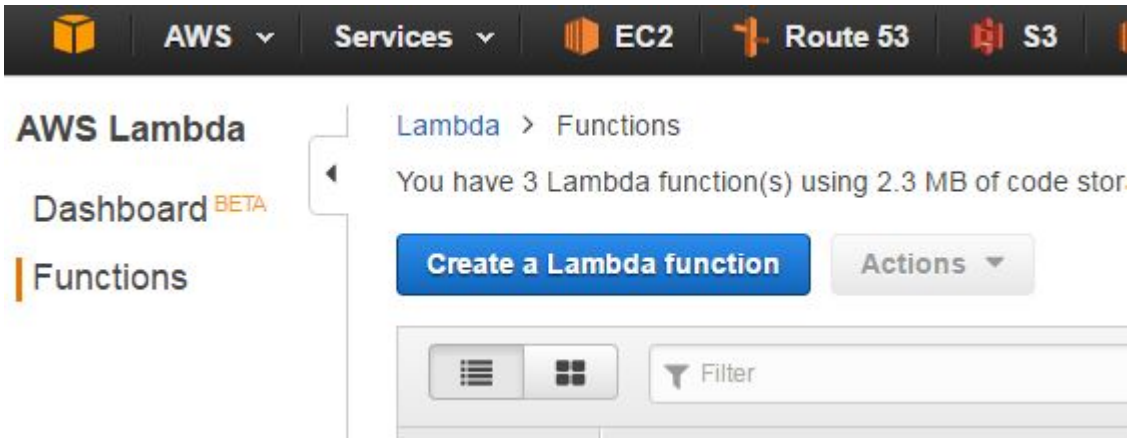
- File processing of uploads
    - Transcoding
    - Indexing
    - Validation
    - Resizing & Filtering
- Streaming data analysis
- Telemetry
- Run as a method-based mobile and web backend
- Extending and linking other AWS products

Examples

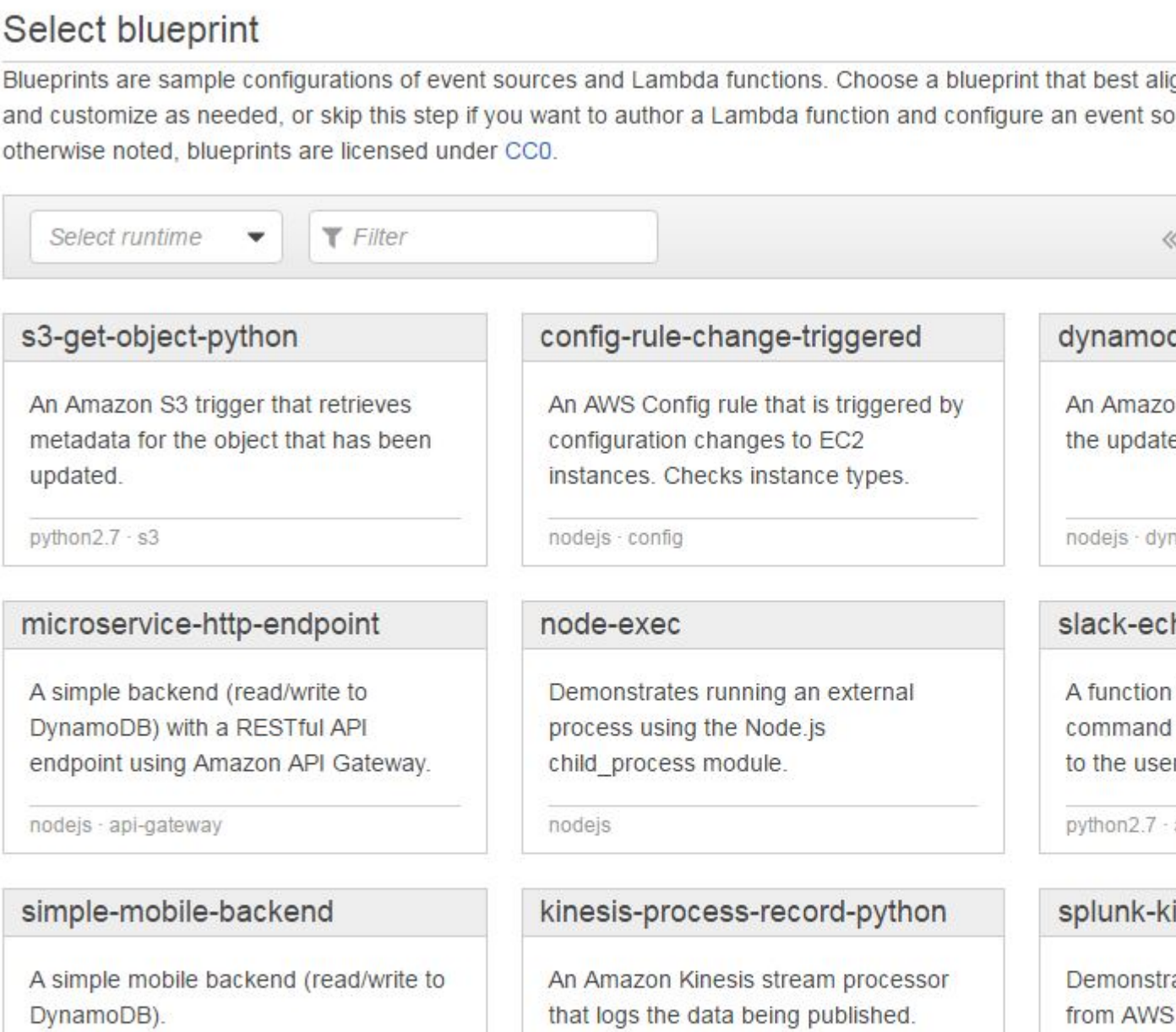
Installation or Setup

1. Log into your AWS Console and click on **Lambda** under the **Services** tab.

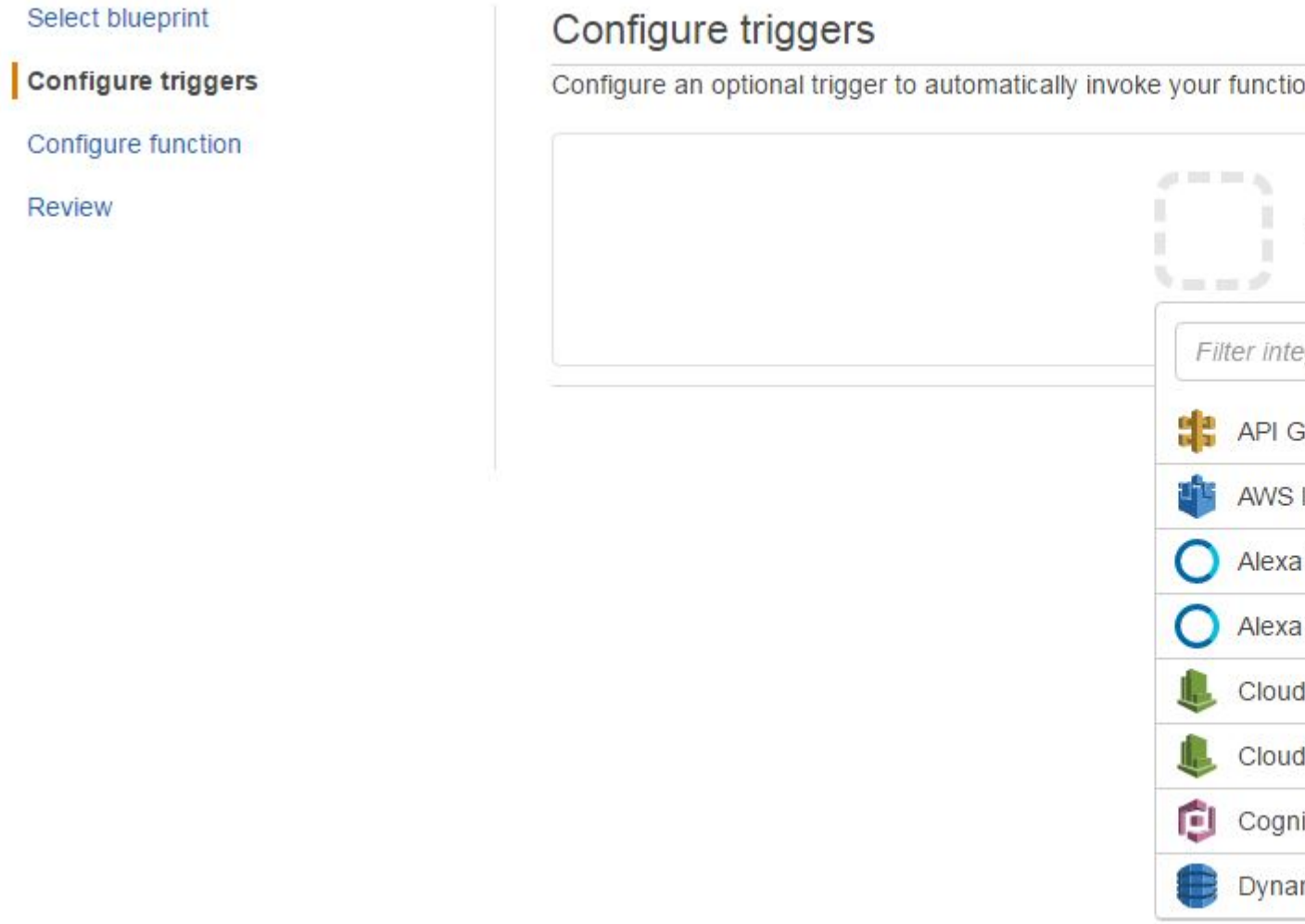
2. Under **Functions** you'll be able to **Create a Lambda function** using the same-labeled button.



3. You'll be shown a screen where you can select a blueprint. These are simply starting points to existing Lambda functions for quickly starting out with Lambda.



4. On the next screen you can configure any triggers you'd like to use to "set" this Lambda function off. You can choose between no triggers (through manual setup later depending on your task), API Gateway (for creating a serverless REST client), Alexa Skills, or a plethora of other others to fire off the function you'll create.



5. You'll finish configuration on the next screen by setting the **Name**, **Description**, choosing a **Runtime**, opting to edit the function inline, upload a .zip file, or upload a file from Amazon S3, choose a **Role** (useful for permissions-based interaction between AWS services), set the memory and limits, and ready your app for live use.

Select blueprint

Configure triggers

Configure function

Review

Configure function

A Lambda function consists of the custom code you want to execu

Name* myFunctionNam

Description A starter AWS La

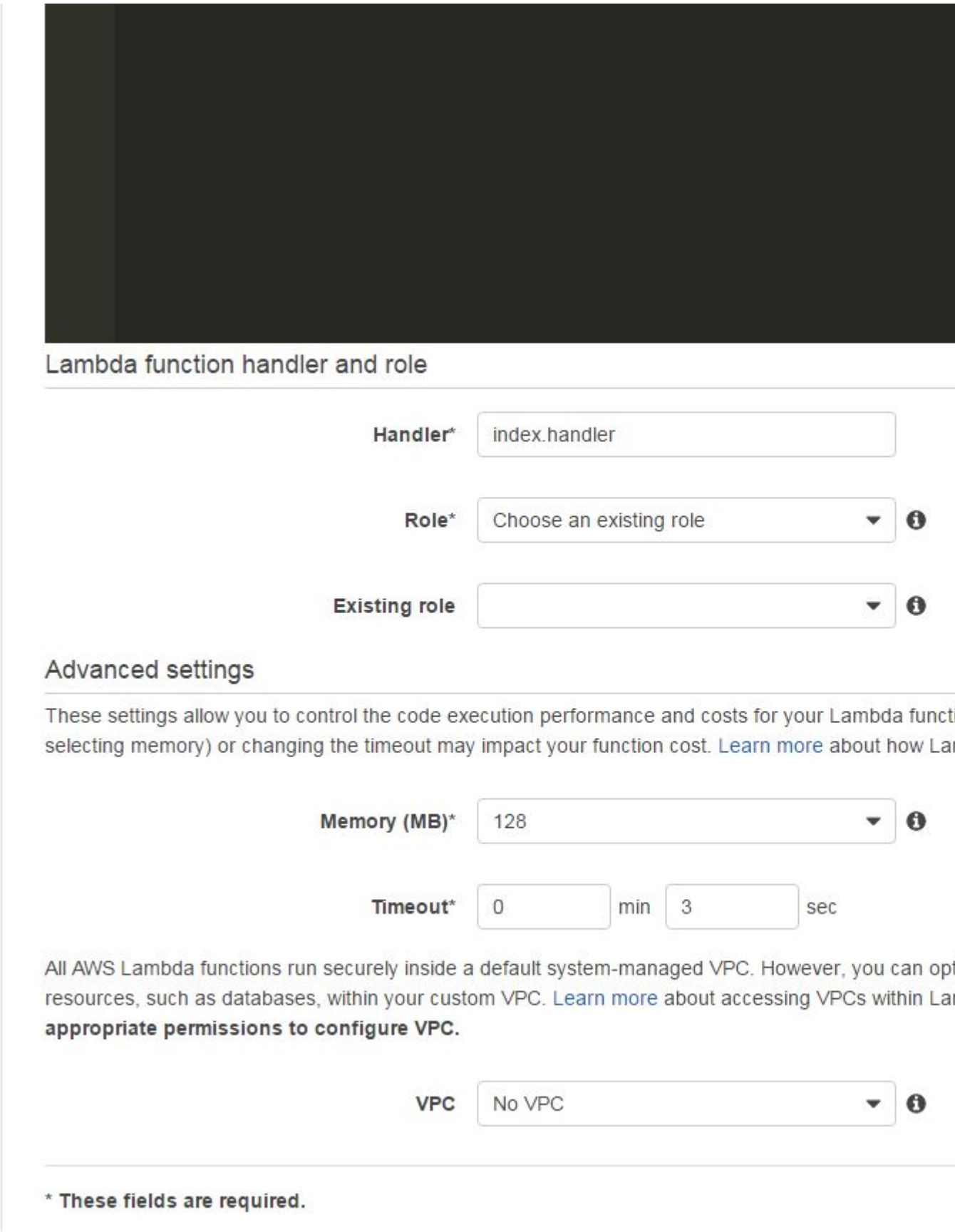
Runtime* Node.js 4.3

Lambda function code

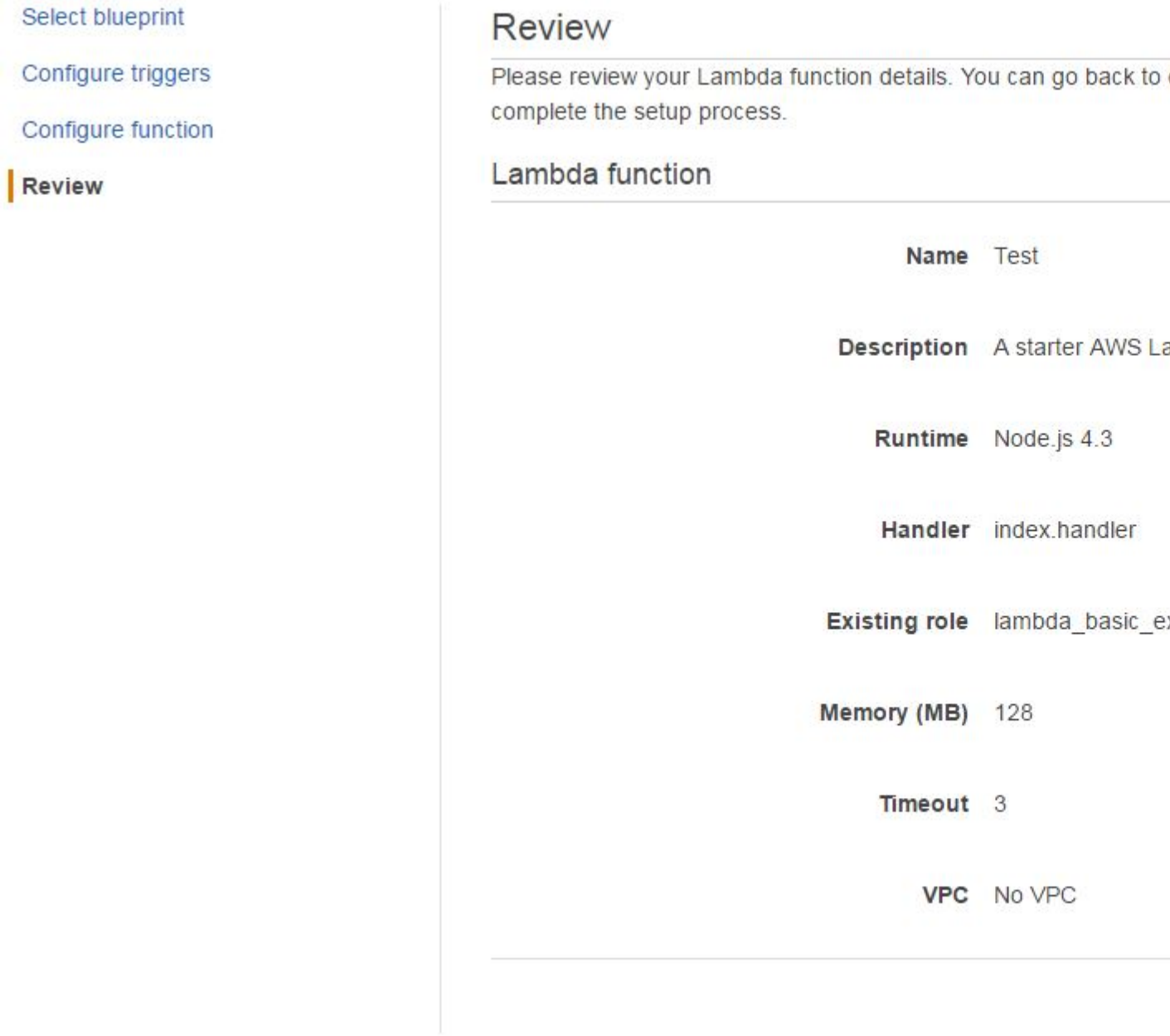
Provide the code for your function. Use the editor if your code does
libraries, you can upload your code and libraries as a .ZIP file. Lea

Code entry type Edit code inline

```
1  'use strict';
2  console.log('Loading function');
3
4  exports.handler = (event, context, callback) =>
5      //console.log('Received event:', JSON.string
6      console.log('value1 =', event.key1);
7      console.log('value2 =', event.key2);
8      console.log('value3 =', event.key3);
9      callback(null, event.key1);  // Echo back th
10     // callback('Something went wrong');
11 };
```



6. Lastly, you'll review your function and create it. Since Lambda utilizes the Pay-Per-Use model, no chargers are incurred until you start using your newly created function.



Java AWS-Lambda S3 Triggered

An AWS-Lambda function can be attached to a certain bucket event. Whenever a file/folder is created or removed, an event can trigger lambda function execution.

A simple Lambda function to print the name of an uploaded File

This is a one class lambda project to print the name of an uploaded file. For maven we need to add those dependencies:

```
    <dependencies>
    <dependency>
        <groupId>com.amazonaws</groupId>
        <artifactId>aws-lambda-java-core</artifactId>
        <version>1.1.0</version>
        <type>jar</type>
```

```
    </dependency>
    <dependency>
        <groupId>com.amazonaws</groupId>
        <artifactId>aws-lambda-java-events</artifactId>
        <version>1.3.0</version>
        <type>jar</type>
    </dependency>
</dependencies>
```

Now let's go to our HelloWorld Class:

```
package com;
import com.amazonaws.services.lambda.runtime.Context;
import com.amazonaws.services.lambda.runtime.RequestHandler;
import com.amazonaws.services.lambda.runtime.events.S3Event;
import com.amazonaws.services.s3.event.S3EventNotification;

public class HelloWorld implements RequestHandler< S3Event, String> {
    @Override
    public String handleRequest(S3Event event, Context ctx) {
     S3EventNotification.S3EventNotificationRecord record=event.getRecords().get(0);
     System.out.println("Bucket Name is "+record.getS3().getBucket().getName());
     System.out.println("File Path is "+record.getS3().getObject().getKey());
     return null;
    }
}
```

Next step is to build the project using mvn.

After building the project, we need to upload it to AWS-Lambda. Go to Lambda, choose "create a lambda function". Skip the part where you choose the blueprint, because Java is usually not there.

Also, skip "Configure triggers" because we will configure it from a different location. The next page, enter a name for your first lambda function, then a small description and choose Java as runtime.

For the "Code entry type", choose "Upload from a .ZIP file" and then select your .zip file in the next location to upload it.

The tricky part on this page is the Handler field. In the handler field, you have to specify the location of the class the implements the RequestHandler. This class is the entry point for the lambda and your Lambda function won't work if this is not specified correctly. For our case handler is "com.HelloWorld"

Attaching a S3 trigger to Lambda:

Here we will attach a trigger to the S3 file upload

- Go to S3, choose the bucket, then "Properties".
- In the "Properties" section, go to "Events".
- Add event details. In the "Events" field, choose how you want to trigger your Lambda. We will choose "ObjectCreated(All)" Note that the lambda function and the bucket need to be on the same amazon Region

- For "Sends to", check Lambda Function, and choose your lambda function from the list.

Monitoring Lambda Output

Now, we will upload a file to the bucket that has the lambda trigger. To see the lambda outputs and logs, go to "CloudWatch", then choose "Logs", then choose your Lambda function. You might see many entries under "Log Streams", choose the latest one and open it. You should be able to see the output of the lambda execution there.

Read Getting started with aws-lambda online: https://riptutorial.com/aws-lambda/topic/2357/getting-started-with-aws-lambda

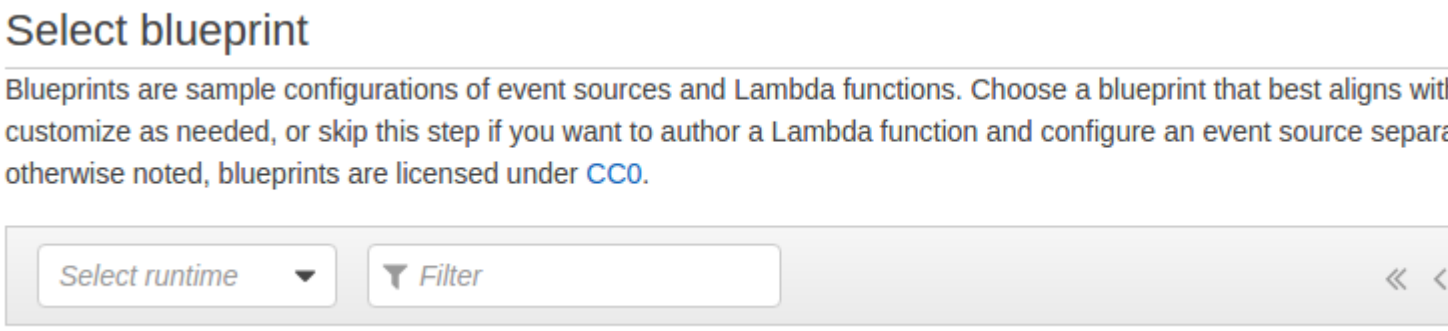
Chapter 2: alexa-skills-kit

Examples

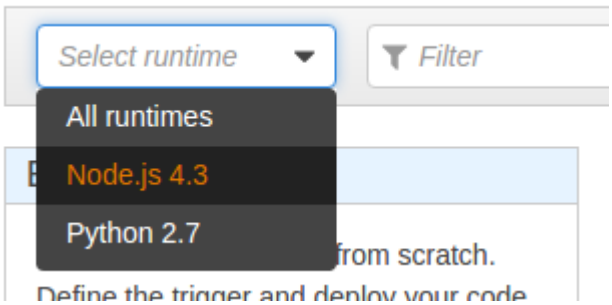
Create Alexa Skills Kit Using Blueprint

Log in to the AWS Management Console and navigate to AWS Lambda.

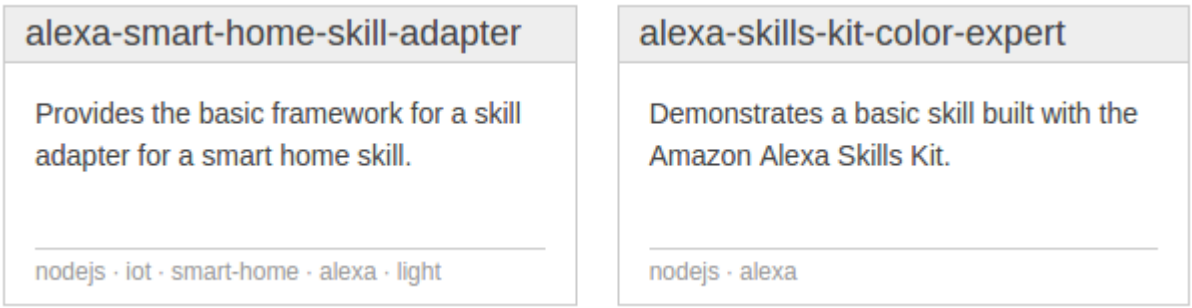
Click create new function then you will see this window.



Select Runtime environment but blueprint (sample code) only for node.js and python

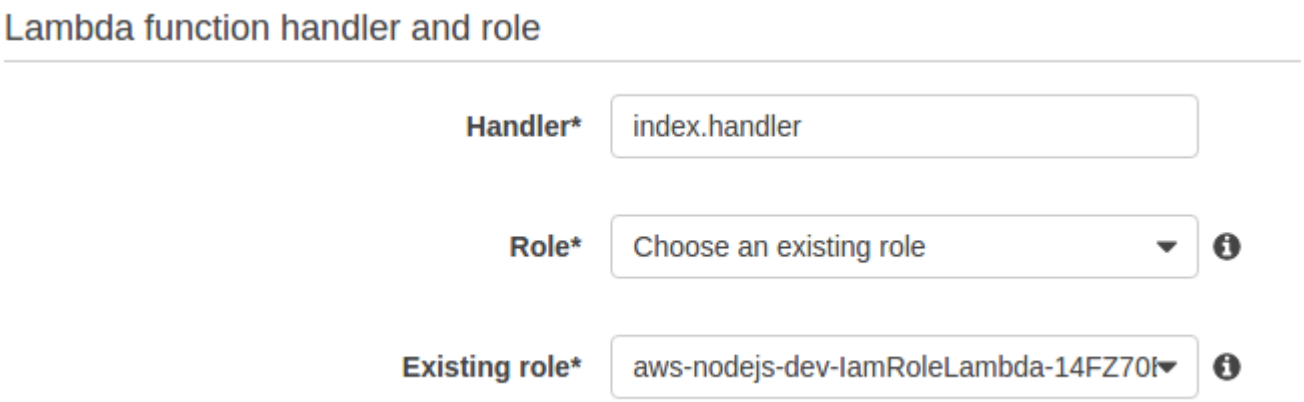


There are two example conation for alexa skills kit. You can filter those thing.



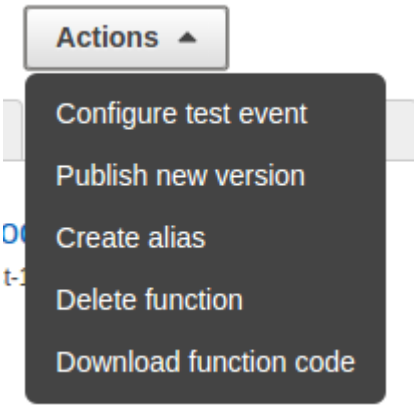
By selection one of these blue print. You can view **Configure triggers** window you can next it by filling required field.

In **Configure function** window you can add name for your lambda function and have to add role for function execution.

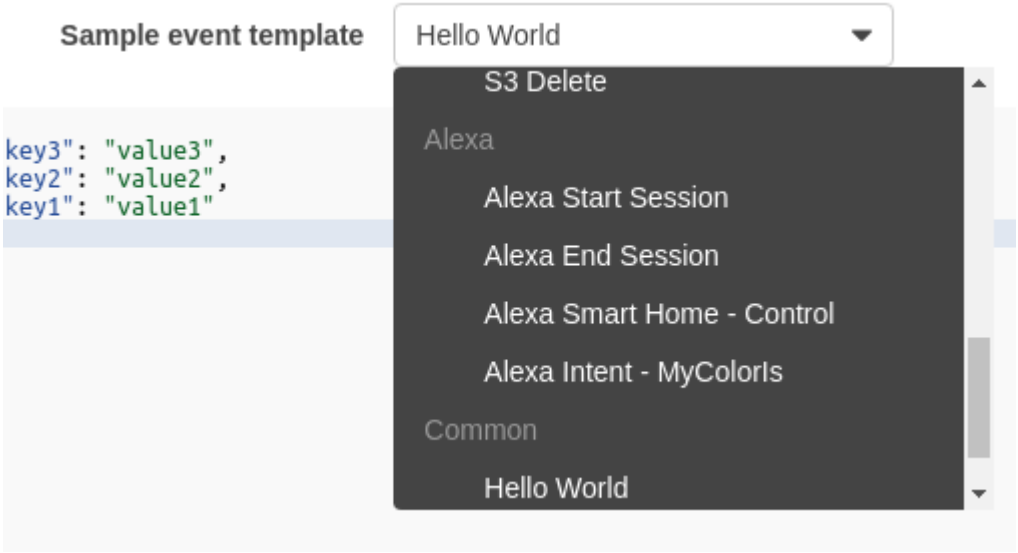


Now you can create function.

After the creation you can test your function. Click **action** button



In here select **Configure test event**



In ths window select alexa event template. Template name is depend on you selected blueprint

After selection this template you can test your code sample.

Read alexa-skills-kit online: https://riptutorial.com/aws-lambda/topic/7698/alexa-skills-kit

Chapter 3: AWS Lambda triggered by S3

Examples

Echo Input Args in Java

You can get easily get this information by barfing out the input in your handler function. For example, in Java:

```
public String handleRequest(String input, Context context) {
    context.getLogger().log("Input: " + input);

    String output = "Input:" + System.getProperty("line.separator") + input;

    return output;
}
```

Read AWS Lambda triggered by S3 online: https://riptutorial.com/aws-lambda/topic/6216/aws-lambda-triggered-by-s3

Chapter 4: AWS Lambda using Python

Examples

Why AWS Lambda ?

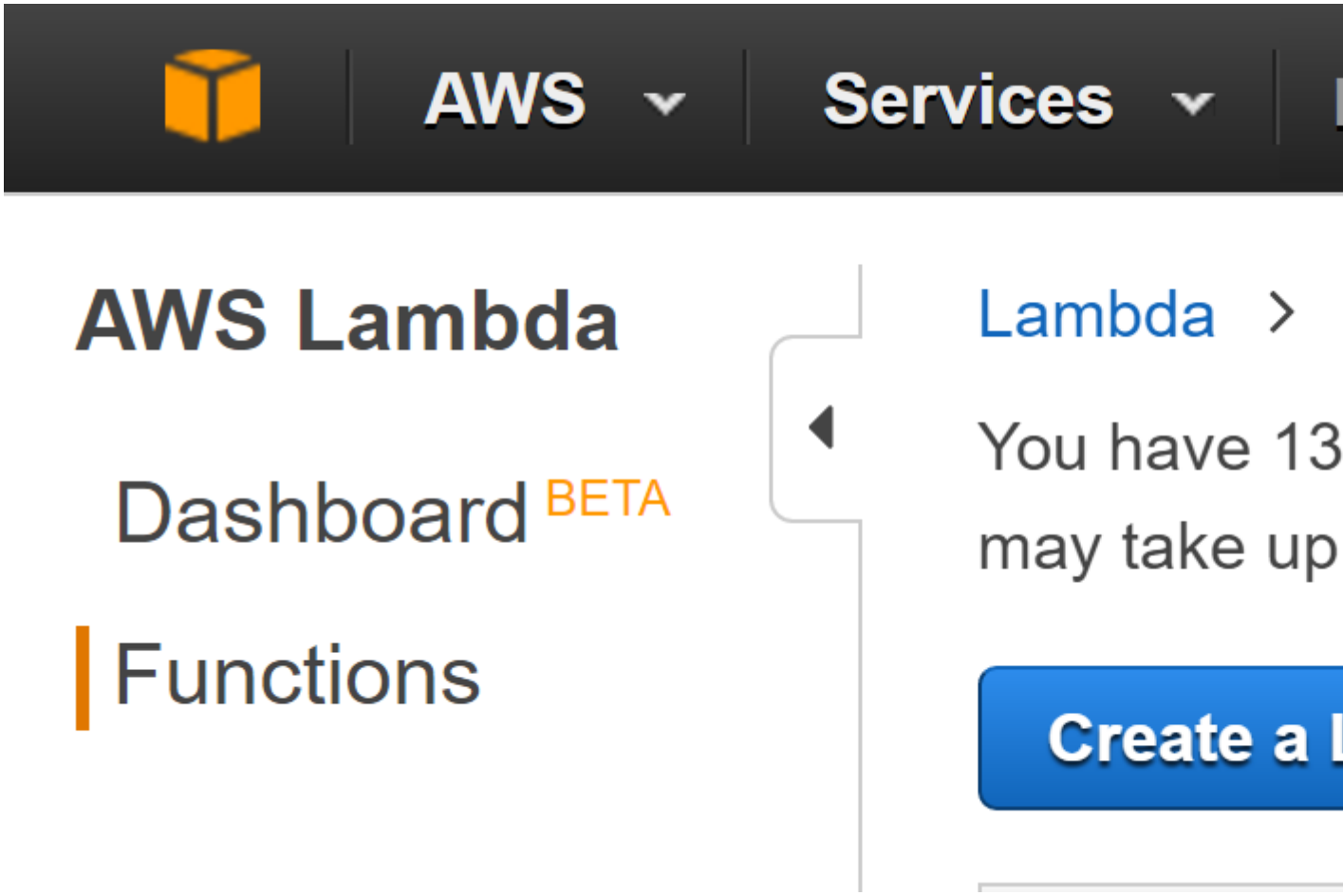
AWS Lambda supports

- Transparent scalability and availability
- Developer friendly operations and no need to manage servers
- Native integration to AWS services
- No need to pay for idle time
- RESTful integration
- Monitoring the RESTful interface using AWS API gateway

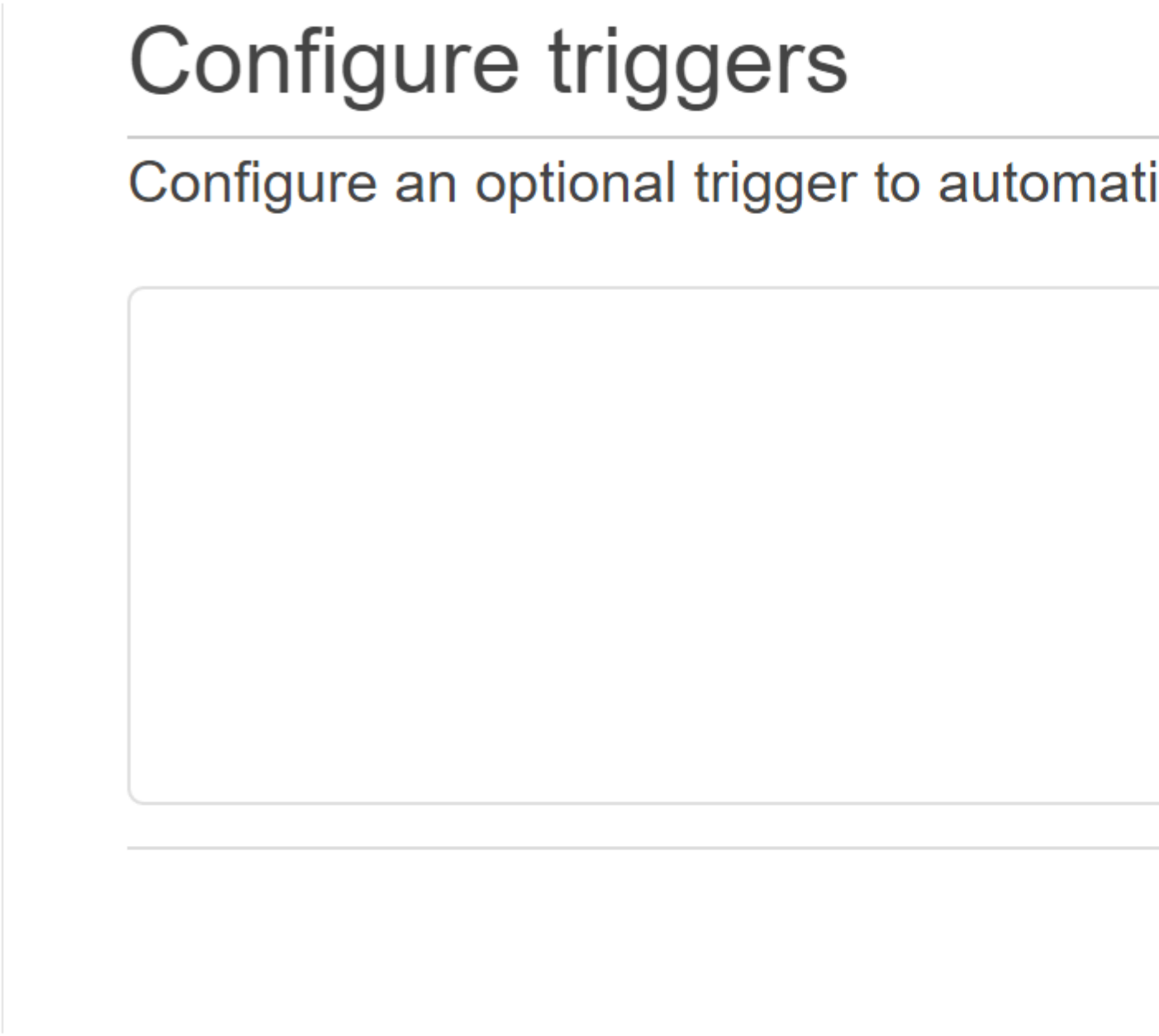
Hello World - Lambda Function

This is one of the simplest lambda function. It is equivalent to Hello World program.
To create your first program follow the below mentioned steps.

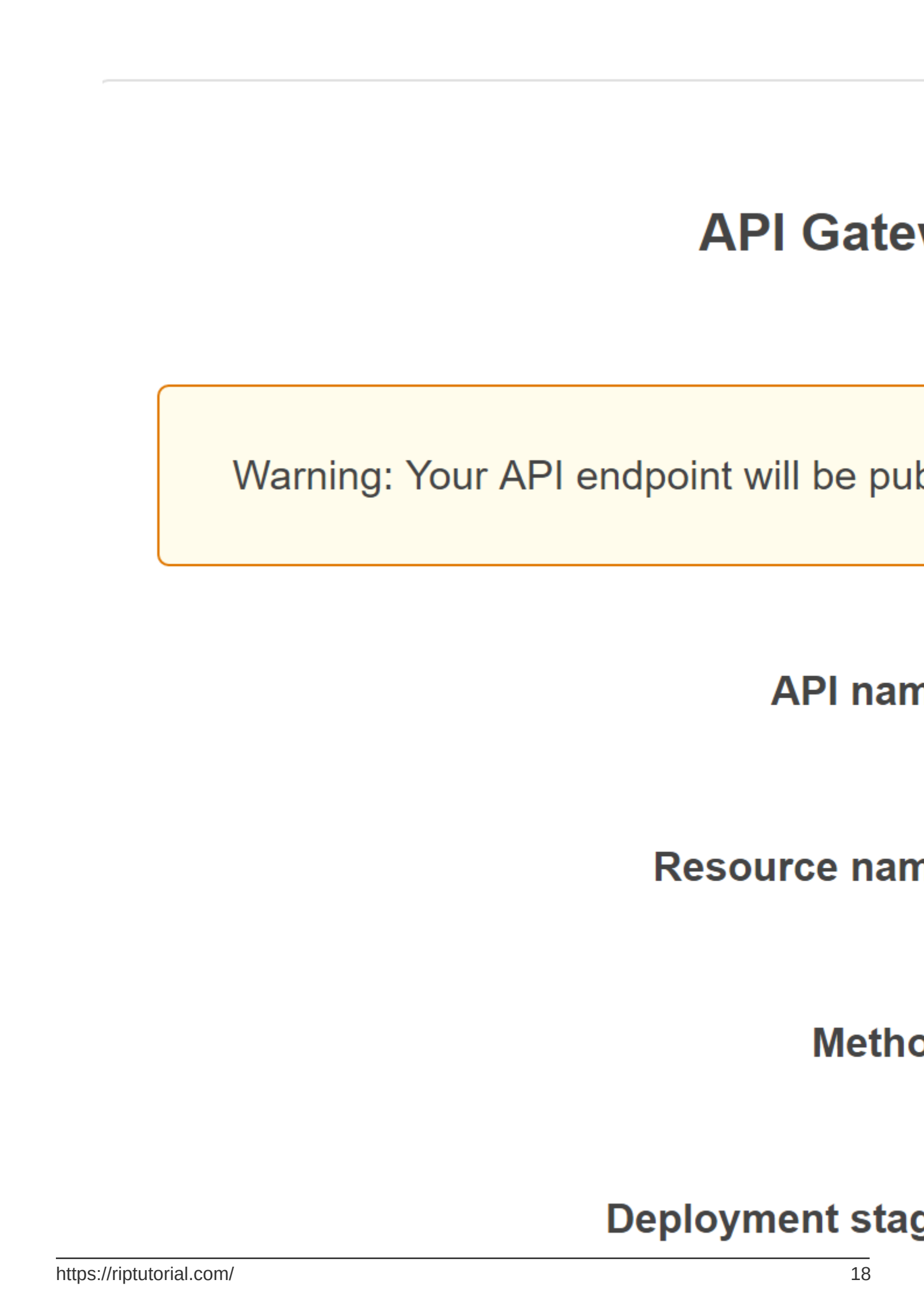
1. Login to AWS Console
2. Click Lambda under compute
3. Click create a Lambda Function



4. Skip select blueprint section
5. In configure trigger click on the dotted rectangle


Configure triggers
Configure an optional trigger to automati

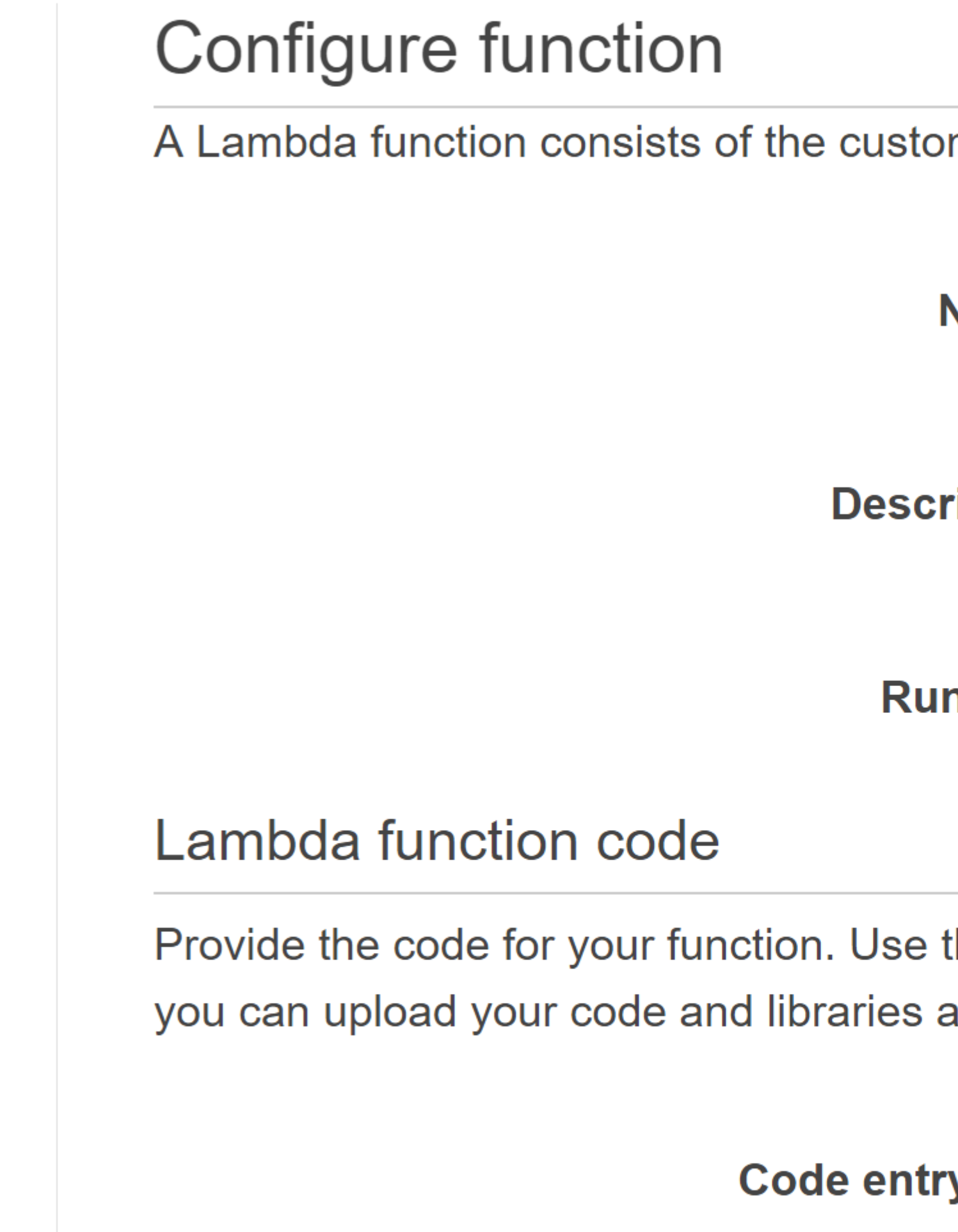
6. Select API Gateway
7. Fill the required details as in the image.


API Gate
Warning: Your API endpoint will be pub
API nam
Resource nam
Metho
Deployment stag

API Name is the name of your API you are going to build. **Resource Pattern** is the URL path which you can invoke your Lambda function. Select the required http method. In our example we choose GET. In AWS staging can be done in different ways like prod,dev ... It will help you to differentiate the functions from prod and dev. For demo purpose lets choose security as Open(Its not recommended in production).Click next

API Name is the name of your API you are going to build. **Resource Pattern** is the URL path which you can invoke your Lambda function. Select the required http method. In our example we choose GET. In AWS staging can be done in different ways like prod,dev ... It will help you to differentiate the functions from prod and dev. For demo purpose lets choose security as Open(Its not recommended in production).Click next

8. Configure the function as below

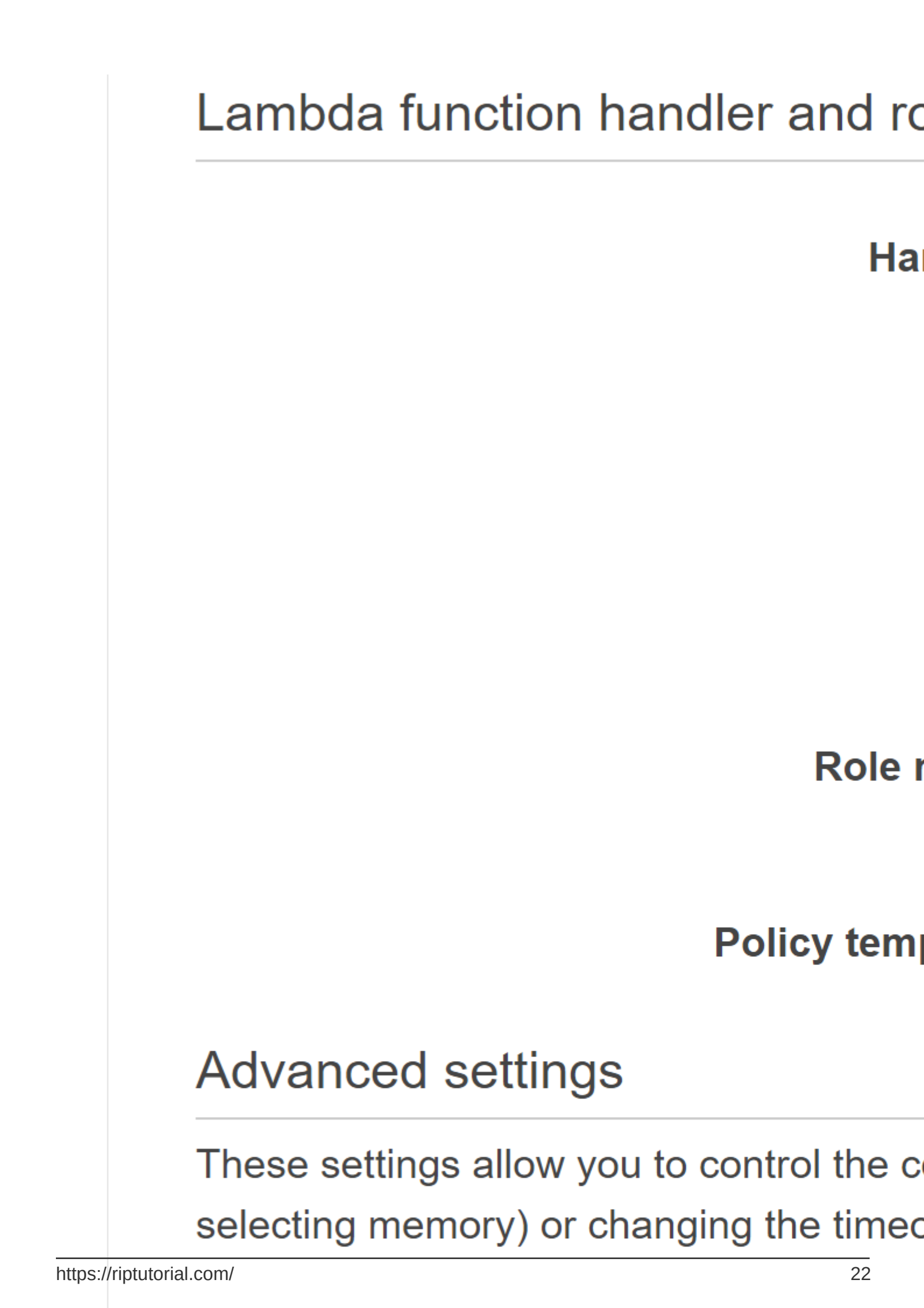

Configure function
A Lambda function consists of the custor
N
Descri
Run
Lambda function code
Provide the code for your function. Use t
you can upload your code and libraries a
Code entry

Provide the function name , description of your function and runtime environment. We are choosing python as runtime environment.

9. Modify the code.

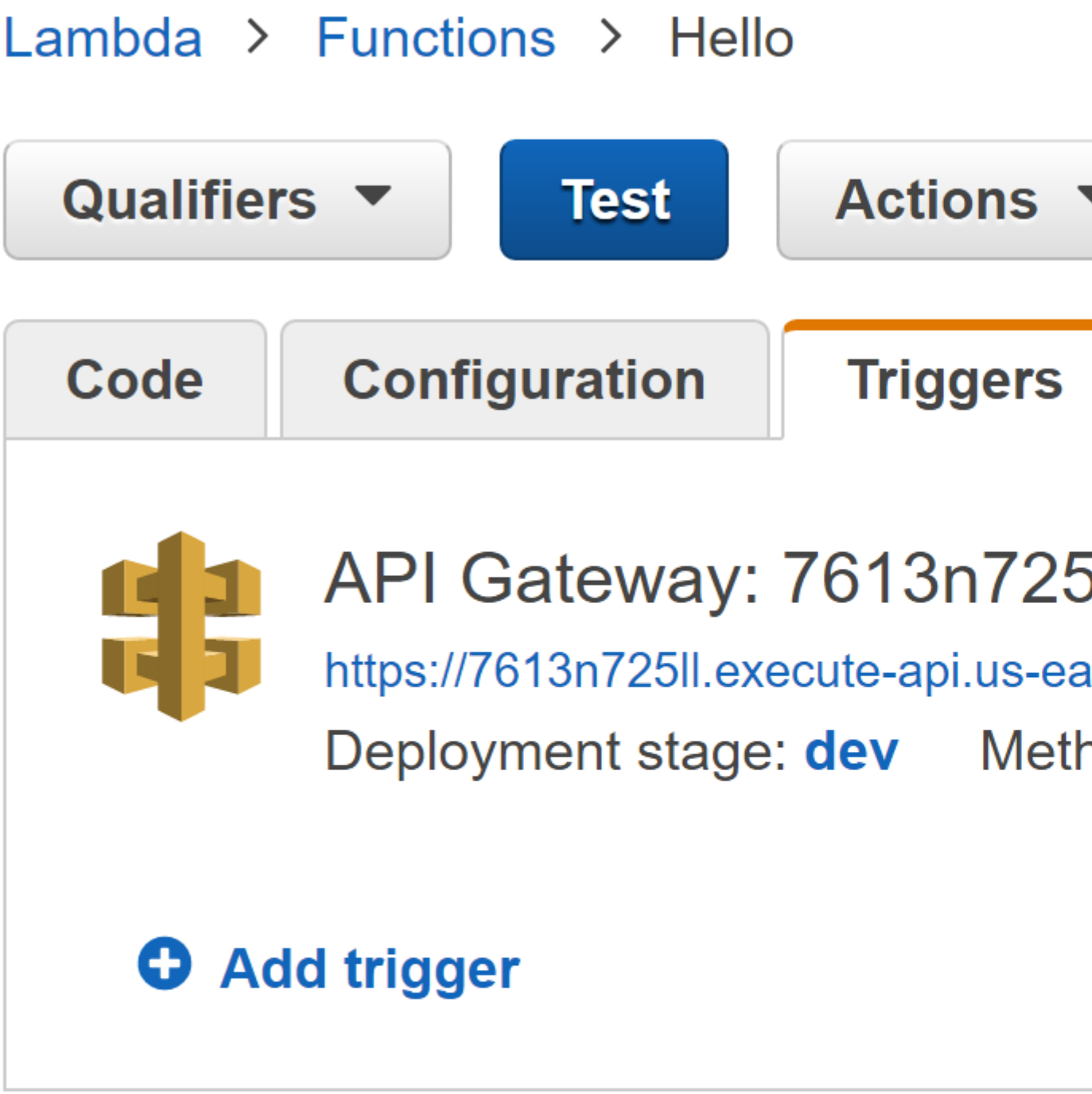
Here we are printing the aws lambda event in cloudtrail which is free. It is also returning a string.

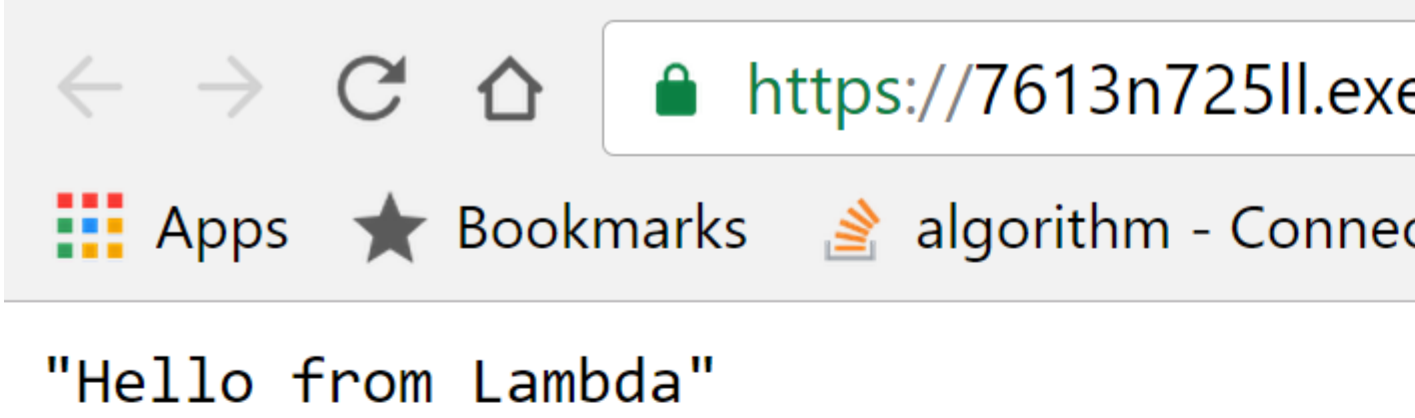
10. Provide Lambda function handler and role


Lambda function handler and ro
Ha
Role
Policy temp
Advanced settings
These settings allow you to control the c
selecting memory) or changing the timec

Make sure that the handler name should start with lambda_function.. Also create a new role for execute the lambda function. Select the amount of main memory required for execute your function. Select the default timeout and click next

11. Click create function
12. Now your function is ready to execute. Click the link provided by the aws


Lambda > Functions > Hello
Qualifiers
Test
Actions
Code
Configuration
Triggers
API Gateway: 7613n725
https://7613n725ll.execute-api.us-ea
Deployment stage: dev
Meth
Add trigger



When you click the link your lambda function will be executed in the background and you will get output in the browser.

Read AWS Lambda using Python online: https://riptutorial.com/aws-lambda/topic/6698/aws-lambda-using-python

Chapter 5: AWS Lambda with S3

Introduction

Lambda developers will handle issues that requires the use of other AWS resources. This topic focuses on S3 (Simple Storage Service) which will commonly be used for storing static files and other configurations. This documentation will consider using AWS-SDK in lambda, accessing files in S3 from Lambda and triggering Lambda functions when an S3 event gets fired

Examples

Cheatsheet

AWS-SDK for javascript

Lambda contains aws-sdk (https://aws.amazon.com/sdk-for-node-js/) in its global so no need to upload this node-module into the zip.

```
const AWS = require('aws-sdk');
```

Sample function

```
module.exports.myFunction = (event, context, callback) => {
    const response = {
        statusCode: 200,
        body: 'Hello Lambda!',
    };
    return callback(null, response);
};
```

Running S3

const s3 = new AWS.S3();

Use with Elasticache Redis

```
//make sure redis node-module is added in zip
const redis = require('redis');
//the redis information should be stored in the environment, not hard coded
const redis_options = {
    host: process.env.REDIS_HOST,
    port: process.env.REDIS_PORT
};

module.exports.myFunction = (event, context, callback) => {
```

```
    try {
        let client = redis.createClient(redis_options);
        context.callbackWaitsForEmptyEventLoop = false;

        client.on('connect', () => {
            console.log('Connected:', client.connected);
        });

        client.on('end', () => {
            console.log('Connection closed.');
        });

        client.on('ready', function () {
            console.log('Connection ready.');
            client.keys('*', (err, keys) => {
            //always quit the redis client when no longer needed
            //else the connection will be used up
            client.quit();

            const response = {
                statusCode: 200,
                body: keys,
            };

            return callback(null, response);
        });
    } catch (err) {
        if (client) { client.quit();}
        console.log('Error!: ' + err.message);
        callback(err);
    }
};
```

Read AWS Lambda with S3 online: https://riptutorial.com/aws-lambda/topic/9286/aws-lambda-with-s3

Chapter 6: aws-lambda triggered by S3

Syntax

- Deserialized JSON based object
- "Records" key has one or more actual events
- Each sub event object contains all information you need to determine what changed

Parameters

Parameter	Details
`Records` -> `[]` -> `s3` -> `bucket` -> `name`	The name of the S3 bucket
`Records` -> `[]` -> `s3` -> `object` -> `key`	The path and name of the file.

Remarks

File names

Unlike most file paths, the S3 key name (JSON Schema: `$.Records[0].s3.object.key`) does not include a leading slash. So, if you have a file in the path `s3://mybucket/path/file.txt`, the key will be `path/file.txt`

In Python at least, the key field value is UTF-8 URL encoded. This is noticeable when the filename contains spaces or non-ascii characters. The field needs to be URL decoded, then UTF-8 decoded - See Get non-ASCII filename from S3 notification event in Lambda

Records key

It is possible to have multiple of the same (or different) actions inside of the `"Records"` key of the event; however, in practice, you will usually see one event per invocation of your Lambda function.

More Examples & Testing

There are actually sample events in the Lambda console, if you choose Actions -> Configure Test Event. However, You can see the PUT operation in the examples above.

You can modify and submit test events from the AWS Lambda console to see how your function responds.

Examples

S3 PUT Operation

```
{
  "Records": [
    {
      "eventVersion": "2.0",
      "eventTime": "1970-01-01T00:00:00.000Z",
      "requestParameters": {
        "sourceIPAddress": "127.0.0.1"
      },
      "s3": {
        "configurationId": "testConfigRule",
        "object": {
          "eTag": "0123456789abcdef0123456789abcdef",
          "sequencer": "0A1B2C3D4E5F678901",
          "key": "HappyFace.jpg",
          "size": 1024
        },
        "bucket": {
          "arn": "arn:aws:s3:::mybucket",
          "name": "sourcebucket",
          "ownerIdentity": {
            "principalId": "EXAMPLE"
          }
        },
        "s3SchemaVersion": "1.0"
      },
      "responseElements": {
        "x-amz-id-2": "EXAMPLE123/5678abcdefghijklambdaisawesome/mnopqrstuvwxyzABCDEFGH",
        "x-amz-request-id": "EXAMPLE123456789"
      },
      "awsRegion": "us-east-1",
      "eventName": "ObjectCreated:Put",
      "userIdentity": {
        "principalId": "EXAMPLE"
      },
      "eventSource": "aws:s3"
    }
  ]
}
```

Read aws-lambda triggered by S3 online: https://riptutorial.com/aws-lambda/topic/6618/aws-lambda-triggered-by-s3

Chapter 7: How to develop aws-lambda(C#) on a local machine

Introduction

As part of the Serverless movement, AWS recently announced C# support for AWS Lambda functions. In this article, I will show you how to develop, install and call a simple C# AWS Lambda Function using Visual Studio 2015.

Before you start this example, first go to the Remarks section of this document and make sure you have all of the required components installed.

Remarks

Install Required Components

At the time of this writing (Jan 2017), the following components will need to be installed on your machine in this order. The machine I used had Windows 10 Home installed.

1. Visual Studio 2015 update 3
2. AWS Toolkit for Visual Studio 2015 - version 1.11.2.0
3. Microsoft .NET Core Tools (Preview 2) - version 14.1.21111.0

Each of these components are actively developed and released, so double check the links and versions and update this document when needed.

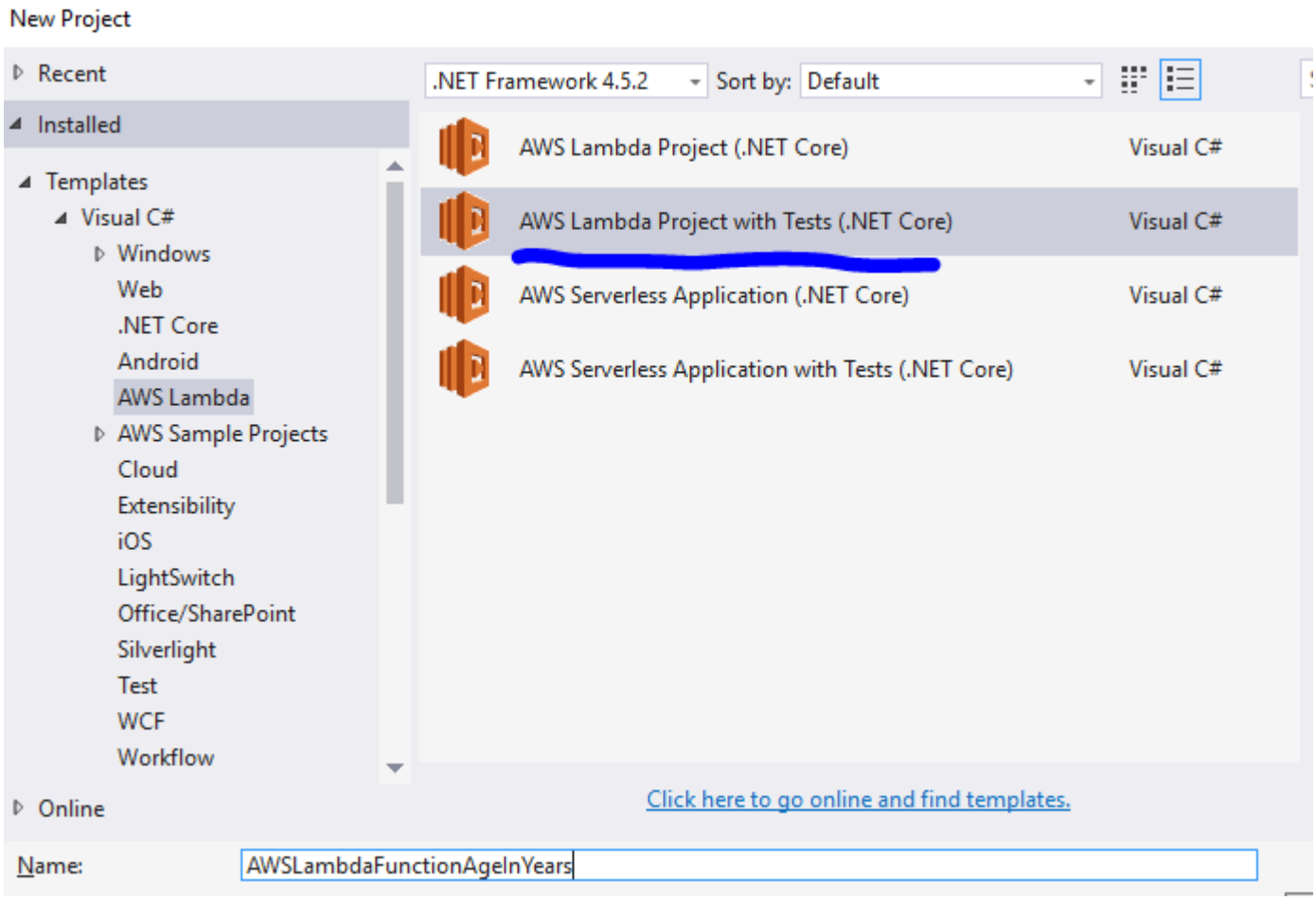
Each of these can take some time to install, so be patient, do one at a time to minimize mistakes.

Lastly, rebooting Windows before starting development is sad, but always a good idea after doing major development tool installations on a Windows box.

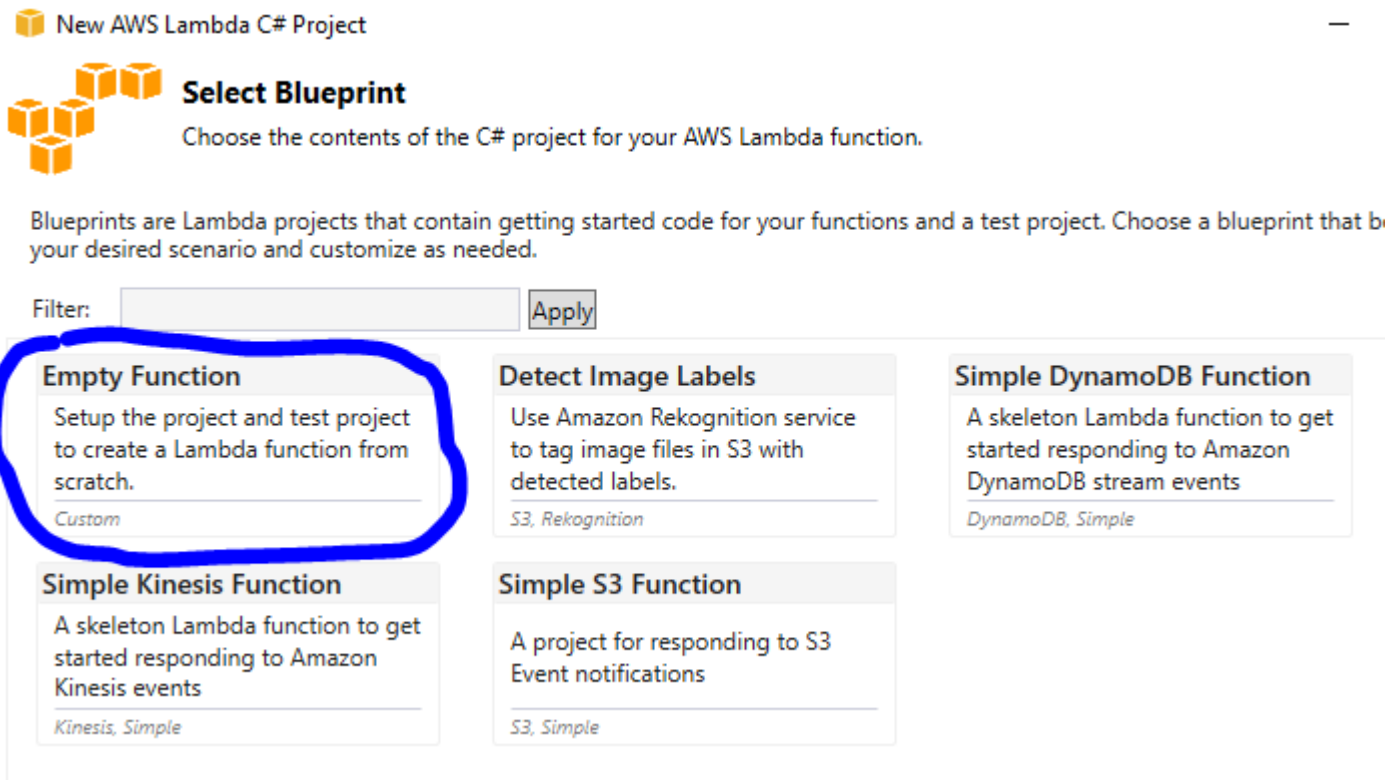
Examples

Step 1. Create a new solution in Visual Studio

1. Open Visual Studio and Select File -> New Project
2. Select AWS Lambda Project with Tests (.NET Core)

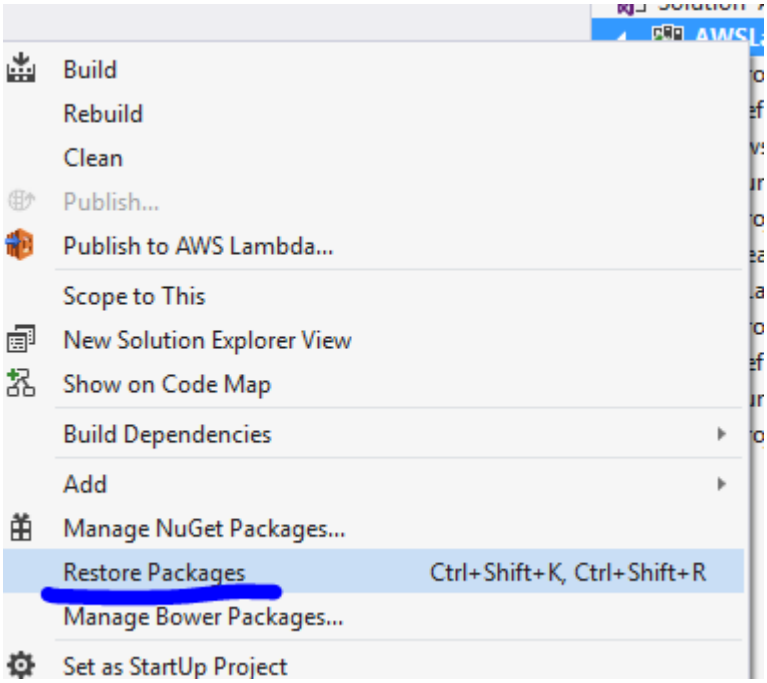


3. Next the **Select Blueprint** screen will display. Select **Empty Function** and Click the Finish button:



4. Go to Tools -> NuGet Package Manager -> Package Manager Console.
5. In the console window, type Install-Package Amazon.Lambda.Core
6. Right-click your project in the solution explorer and select Restore Packages. This is the final

preparation step before you start writing code.



Step 2. Add and change code in your project

1. Open `Function.cs` and replace the class code with the following:

```
public class Function
{

/// <summary>
/// A simple function that takes a birth date and returns Age in years
/// </summary>
/// <param name="input"></param>
/// <returns>Age is years</returns>
///
[LambdaSerializer(typeof(SimpleSerializer))]
public string FunctionHandler(Dictionary<string, int> input)
{
    var defaultMessage = "Age could not be determined.";

    var birthDate = new DateTime(input["year"], input["month"], input["day"]);
    var ageInYears = DateTime.Today.Year - birthDate.Year;
    if (birthDate.DayOfYear > DateTime.Today.DayOfYear)
        ageInYears--;

    defaultMessage = $"Age in years: {ageInYears}";

    return defaultMessage;
}
}
```

You will need to add the following using statements near the top:

```
using System.Collections.Generic;
using Amazon.Lambda.Core;
```

2. Add a file to the project named `SimpleSerializer.cs`
3. Place the following code in that file:

```
using System;

using System.IO;
using Amazon.Lambda.Core;
using Newtonsoft.Json;

namespace AWSLambdaFunctionAgeInYears
{
public class SimpleSerializer : ILambdaSerializer
{
    public T Deserialize<T>(Stream requestStream)
    {
        string text;
        using (var reader = new StreamReader(requestStream))
            text = reader.ReadToEnd();

        try
        {
            return JsonConvert.DeserializeObject<T>(text);
        }
        catch (Exception ex)
        {
            if (typeof(T) == typeof(System.String))
                return (T)Convert.ChangeType(text, typeof(T));

            throw ex;
        }

    }

    public void Serialize<T>(T response, Stream responseStream)
    {
        StreamWriter streamWriter = new StreamWriter(responseStream);
        try
        {
            string text = JsonConvert.SerializeObject(response);
            streamWriter.Write(text);
            streamWriter.Flush();
        }
        catch (Exception ex)
        {
            if (typeof(T) == typeof(System.String))
            {
                streamWriter.Write(response);
                streamWriter.Flush();
                return;
            }

            throw ex;
        }

    }
}
}
```

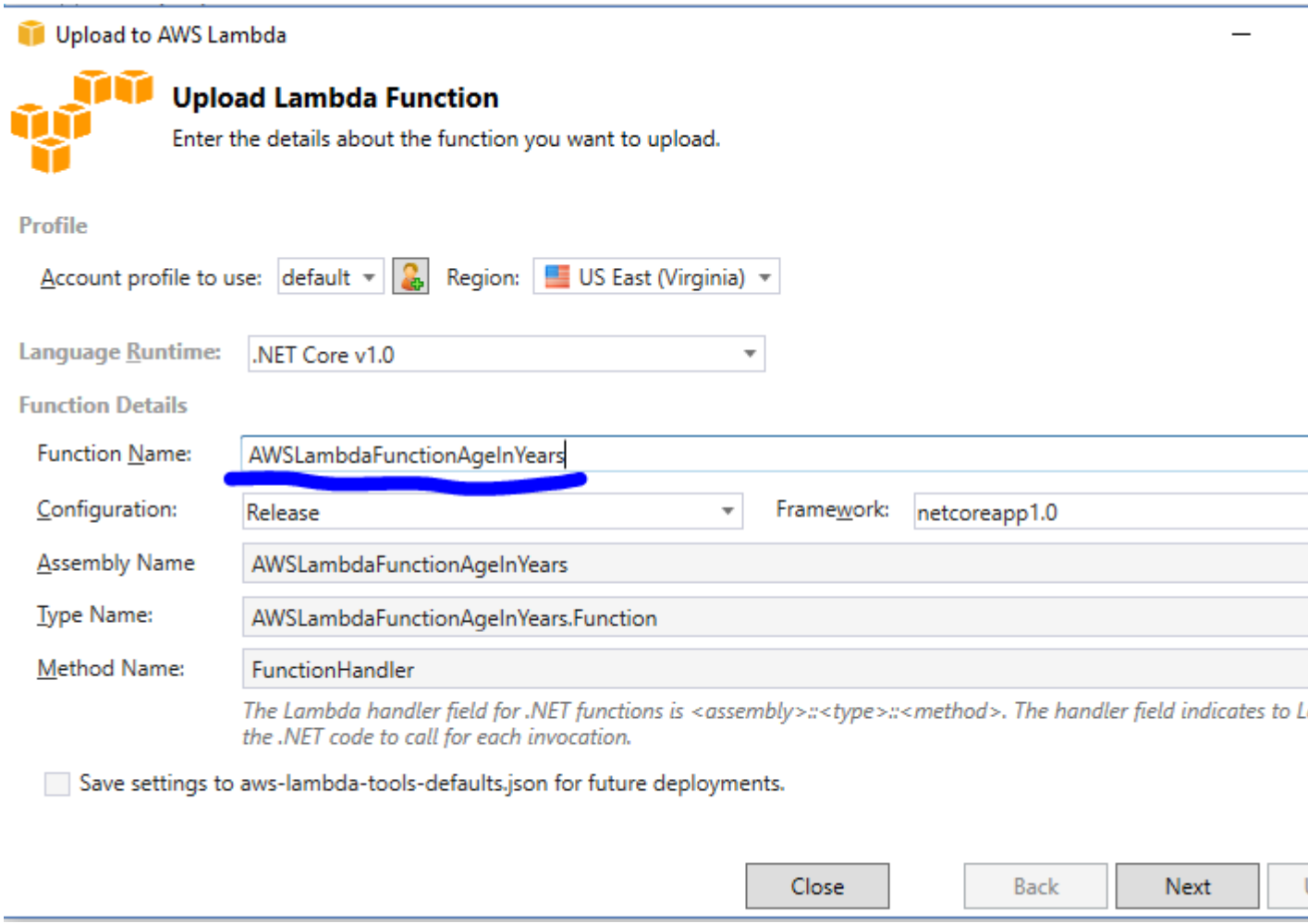
4. In the Test Project, change line 23 of the `FunctionTest.cs` to the following:

```
        var upperCase = function.FunctionHandler(null);
```

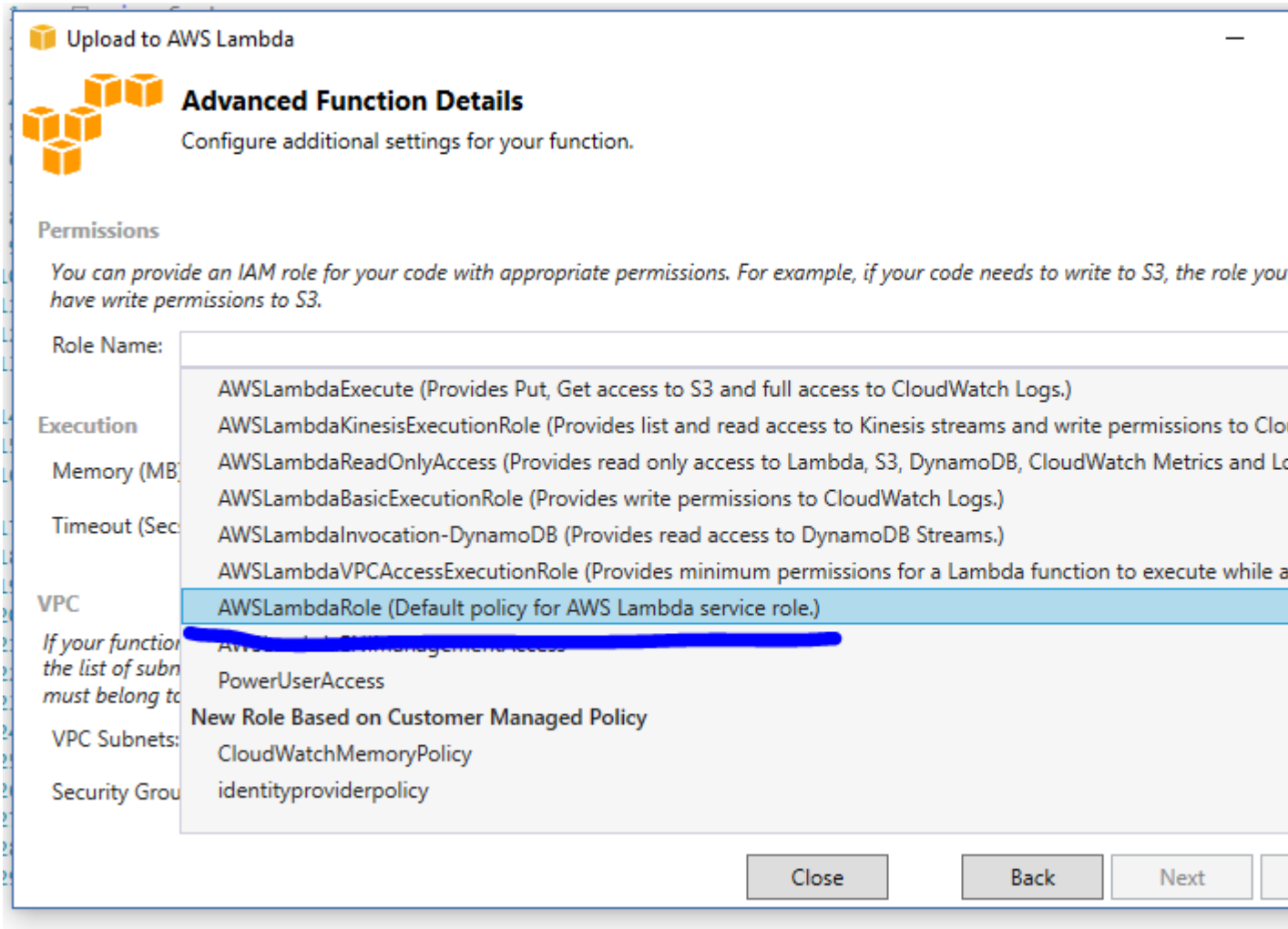
5. Build your solution - you should have no build errors.

Step 3 - Install your Lambda Function into AWS

1. Right Click your project and select **Publish to AWS Lambda...**
2. The Upload to AWS Lambda screen will appear. Make sure the correct region is selected. Keep all of the defaults. Then only enter the Function Name: AWSLambdaFunctionAgeInYears and then click next.



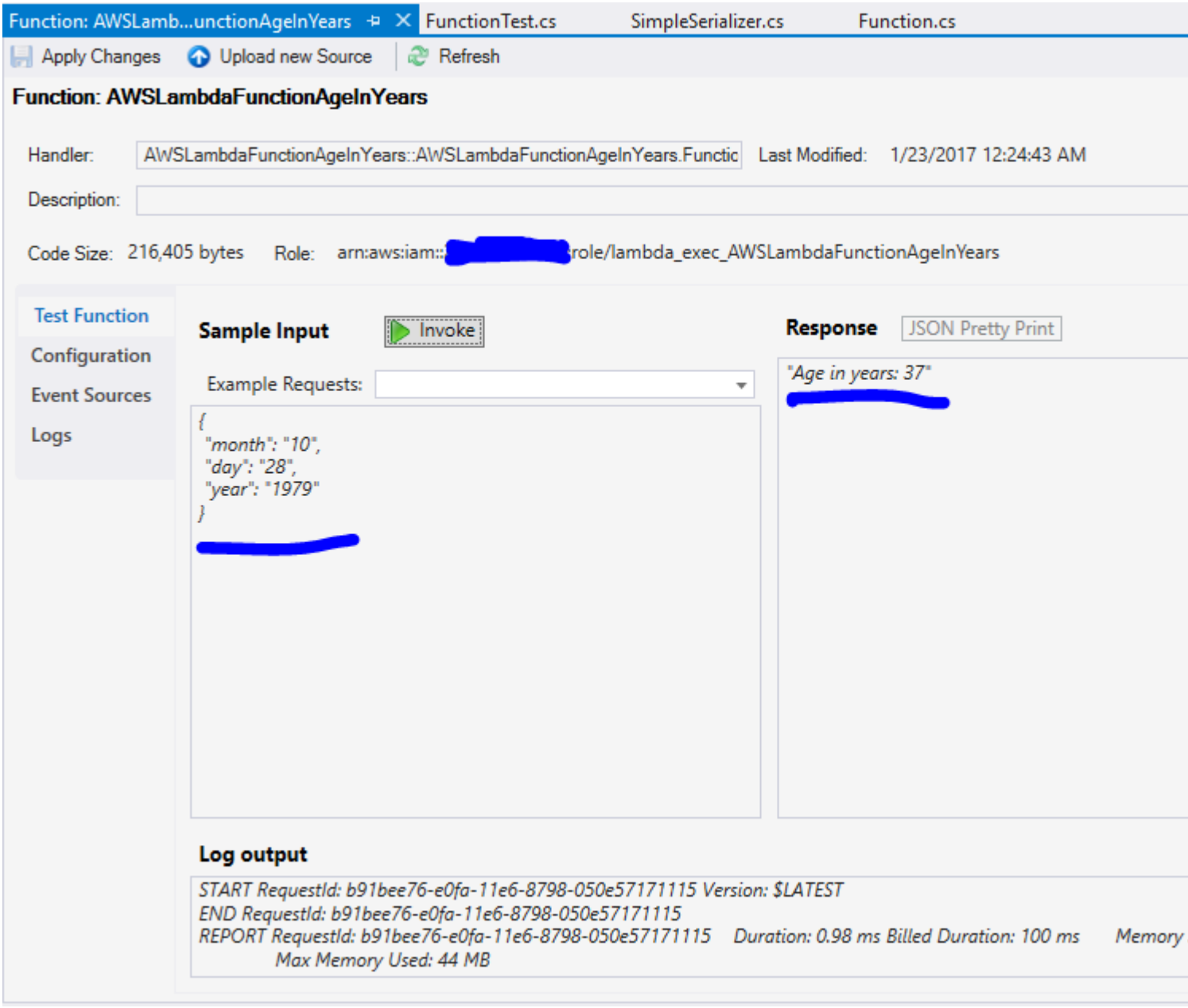
3. On the next page, select AWSLambdaRole for the Role Name field. Click Upload and the function should upload without error.



Step 4. Invoke your AWS Lambda function from within Visual Studio

1. After Step 3 above, Visual Studio will open the `View Function` window with your function loaded.
2. On the bottom left of this screen, enter the following json into the **Sample Input** box:

```
{
"month": "10",
"day": "28",
"year": "1979"
}
```



3. Last step: Click the green **Invoke** button. The function will run on AWS and the response will be displayed in the bottom right hand **Response** window.

Read How to develop aws-lambda(C#) on a local machine online: https://riptutorial.com/aws-lambda/topic/8937/how-to-develop-aws-lambda-csharp--on-a-local-machine

Chapter 8: Serverless Framework

Introduction

The open-source, application framework to easily build serverless architectures on AWS Lambda & more. This section includes, how to setup serverless framework for application development with relevant examples.

Remarks

"Serverless" is a framework: https://serverless.com/

Examples

Serverless

Install serverless globally

```
npm install serverless -g
```

Create an AWS Lamdba function in Node.js

```
serverless create --template aws-nodejs
```

Example of a `handler.js`

```
'use strict';

// Your first function handler
module.exports.hello = (event, context, cb) => cb(null,
  { message: 'Go Serverless v1.0! Your function executed successfully!', event }
);

// You can add more handlers here, and reference them in serverless.yml
```

Deploy to live AWS account

```
serverless deploy
```

Create Simple CRUD Operation

Create simple CRUD Operation Using Serverless Framework

Install Serverless framework globally

```
npm install serverless -g
```

Create simple Lambda Service

```
serverless create --template aws-nodejs --path myService
```

Go to the myService Directory it should contain

1. serverless.yml
2. handler.js
3. event.json

All Serverless service configuration is managed by serverless.yml
Change its contents to define CRUD service.

Example serverless.yml file

```
service: serverless-crud

provider:
  name: aws
  runtime: nodejs4.3
  region: us-east-1
  stage: dev
  iamRoleStatements:
    - Effect: Allow
      Action:
        - dynamodb:DescribeTable
        - dynamodb:Query
        - dynamodb:Scan
        - dynamodb:GetItem
        - dynamodb:PutItem
        - dynamodb:UpdateItem
        - dynamodb:DeleteItem
      Resource: "arn:aws:dynamodb:us-east-1:*:*"

functions:
  create:
    handler: handler.create
    events:
      - http:
          path: todos
          method: post
          cors: true
  readAll:
    handler: handler.readAll
    events:
      - http:
          path: todos
          method: get
          cors: true
  readOne:
    handler: handler.readOne
    events:
```

```
      - http:
          path: todos/{id}
          method: get
          cors: true
  update:
    handler: handler.update
    events:
      - http:
          path: todos/{id}
          method: put
          cors: true
  delete:
    handler: handler.delete
    events:
      - http:
          path: todos/{id}
          method: delete
          cors: true

resources:
  Resources:
    TodosDynamoDbTable:
      Type: 'AWS::DynamoDB::Table'
      DeletionPolicy: Retain
      Properties:
        AttributeDefinitions:
          -
            AttributeName: id
            AttributeType: S
        KeySchema:
          -
            AttributeName: id
            KeyType: HASH
        ProvisionedThroughput:
          ReadCapacityUnits: 1
          WriteCapacityUnits: 1
        TableName: 'todos'
```

This file define

1. Lambda function programming Language
2. Lambda function execution policy
3. Dynamodb table creation and it's policy
4. HTTP end point (API Gateway End Point)

Then you have to define lambda function (ex. node.js) in handler.js file you can define it.

```
'use strict';

const todosCreate = require('./todos-create.js');
const todosReadAll = require('./todos-read-all.js');
const todosReadOne = require('./todos-read-one.js');
const todosUpdate = require('./todos-update.js');
const todosDelete = require('./todos-delete.js');

module.exports.create = (event, context, callback) => {
  todosCreate(event, (error, result) => {
```

```
    const response = {
      statusCode: 200,
      headers: {
        "Access-Control-Allow-Origin" : "*"
      },
      body: JSON.stringify(result),
    };

    context.succeed(response);
  });
};

module.exports.readAll = (event, context, callback) => {
  todosReadAll(event, (error, result) => {
    const response = {
      statusCode: 200,
      headers: {
        "Access-Control-Allow-Origin" : "*"
      },
      body: JSON.stringify(result),
    };

    context.succeed(response);
  });
};

module.exports.readOne = (event, context, callback) => {
  todosReadOne(event, (error, result) => {
    const response = {
      statusCode: 200,
      headers: {
        "Access-Control-Allow-Origin" : "*"
      },
      body: JSON.stringify(result),
    };

    context.succeed(response);
  });
};

module.exports.update = (event, context, callback) => {
  todosUpdate(event, (error, result) => {
    const response = {
      statusCode: 200,
      headers: {
        "Access-Control-Allow-Origin" : "*"
      },
      body: JSON.stringify(result),
    };

    context.succeed(response);
  });
};

module.exports.delete = (event, context, callback) => {
  todosDelete(event, (error, result) => {
    const response = {
      statusCode: 200,
      headers: {
        "Access-Control-Allow-Origin" : "*"
      },
```

```
      body: JSON.stringify(result),
    };



    context.succeed(response);
  });
};
```

Then you have to create new files for define your CRUD functions
Create these files

1. todos-create.js
2. todos-read-all.js
3. todos-read-one.js
4. todos-update.js
5. todos-delete.js

Then define these functions in each file.

for todos-create.js

```
'use strict';

const AWS = require('aws-sdk');
const dynamoDb = new AWS.DynamoDB.DocumentClient();
const uuid = require('uuid');

module.exports = (event, callback) => {
  const data = JSON.parse(event.body);

  data.id = uuid.v1();
  data.updatedAt = new Date().getTime();

  const params = {
    TableName: 'todos',
    Item: data
  };

  return dynamoDb.put(params, (error, data) => {
    if (error) {
      callback(error);
    }
    callback(error, params.Item);
  });
};
```

For todos-read-all.js

```
    'use strict';

    const AWS = require('aws-sdk');
    const dynamoDb = new AWS.DynamoDB.DocumentClient();

    module.exports = (event, callback) => {
      const params = {
```

```
        TableName: 'todos',
      };

      return dynamoDb.scan(params, (error, data) => {
        if (error) {
          callback(error);
        }
        callback(error, data.Items);
      });
    };


For todos-read-one.js <br>

'use strict';

const AWS = require('aws-sdk');
const dynamoDb = new AWS.DynamoDB.DocumentClient();

module.exports = (event, callback) => {
  const params = {
    TableName: 'todos',
    Key: {
      id: event.pathParameters.id
    }
  };

  return dynamoDb.get(params, (error, data) => {
    if (error) {
      callback(error);
    }
    callback(error, data.Item);
  });
};
```

For todos-update.js

```
'use strict';

const AWS = require('aws-sdk');
const dynamoDb = new AWS.DynamoDB.DocumentClient();

module.exports = (event, callback) => {
  const data = JSON.parse(event.body);

  data.id = event.pathParameters.id;
  data.updatedAt = new Date().getTime();

  const params = {
    TableName : 'todos',
    Item: data
  };

  return dynamoDb.put(params, (error, data) => {
    if (error) {
      callback(error);
    }
    callback(error, params.Item);
  });
};
```

For todos-delete.js

```
'use strict';

const AWS = require('aws-sdk');
const dynamoDb = new AWS.DynamoDB.DocumentClient();

module.exports = (event, callback) => {
  const params = {
    TableName : 'todos',
    Key: {
      id: event.pathParameters.id
    }
  };

  return dynamoDb.delete(params, (error, data) => {
    if (error) {
      callback(error);
    }
    callback(error, params.Key);
  });
};
```

For the run these application you need install npm dependencies

1. `npm init` npm initialization
2. `npm install aws-sdk --save` install aws-sdk
3. `npm install uuid --save`

Deployment
Now you can deploy these project
`cd myService` verify you are in project directory then you can deploy your code

```
serverless deploy
```

Use End Point
If you successfully deployed you view api gateway end pont names in your console.

Test **Create** End Point

```
curl -X POST https://XXXX.execute-api.region.amazonaws.com/dev/todos --data '{ "body" : "Learn
Serverless" }'
```

Test for **Read** End Point (Read All)

```
curl https://XXXX.execute-api.region.amazonaws.com/dev/todos
```

Test for **Read** End Point (Read One)

```
curl https://XXXX.execute-api.region.amazonaws.com/dev/todos/<id>
```

Test for **Update** End Point

```
curl -X PUT https://XXXX.execute-api.region.amazonaws.com/dev/todos/<id> --data '{ "body" :
"Understand Serverless" }'
```

Test for **Delete** End Point

```
`curl -X DELETE https://XXXX.execute-api.region.amazonaws.com/dev/todos/<id`>
```

Read Serverless Framework online: https://riptutorial.com/aws-lambda/topic/6719/serverless-framework

Credits

S. No	Chapters	Contributors
1	Getting started with aws-lambda	Ahmed Abouhegaza, alatar, Community
2	alexa-skills-kit	Niroshan Ranapathi
3	AWS Lambda triggered by S3	Doug Schwartz
4	AWS Lambda using Python	Nithin K Anil
5	AWS Lambda with S3	Adonis Lee Villamor
6	aws-lambda triggered by S3	Alastair McCormack, Marshall Anschutz
7	How to develop aws-lambda(C#) on a local machine	Taterhead
8	Serverless Framework	Alastair McCormack, Ashan, Eric Nord, Luc Boissaye, Niroshan Ranapathi