.NET Core Serverless for resize images

Self-Paced Lab

Version 1.0

Duration: 45 minutes

Purpose & Background

In this lab, you will create a simple AWS Lambda project using the Visual Studio to create a lambda function that will resize a jpg file saved in a bucket into a different folder in the same bucket. It shows how to configure and associate an event to a lambda function as well as how to troubleshoot using the CloudWatch logs.

> *Note: This Lab includes a small amount of sample code illustrating a pattern for lazily generate resized images. For deploying a service to resize images to production, consider using the Serverless Image Handler, which is a robust solution to handle image manipulation.*

Lab Exercises

The following exercises should be completed in order for this lab:

1. Create an AWS Lambda Project
2. Create an S3 bucket and a role
3. Deploy to AWS Lambda
4. Create and Associate the S3 Event to your Lambda
5. Upload files and check the lambda execution

Prerequisites

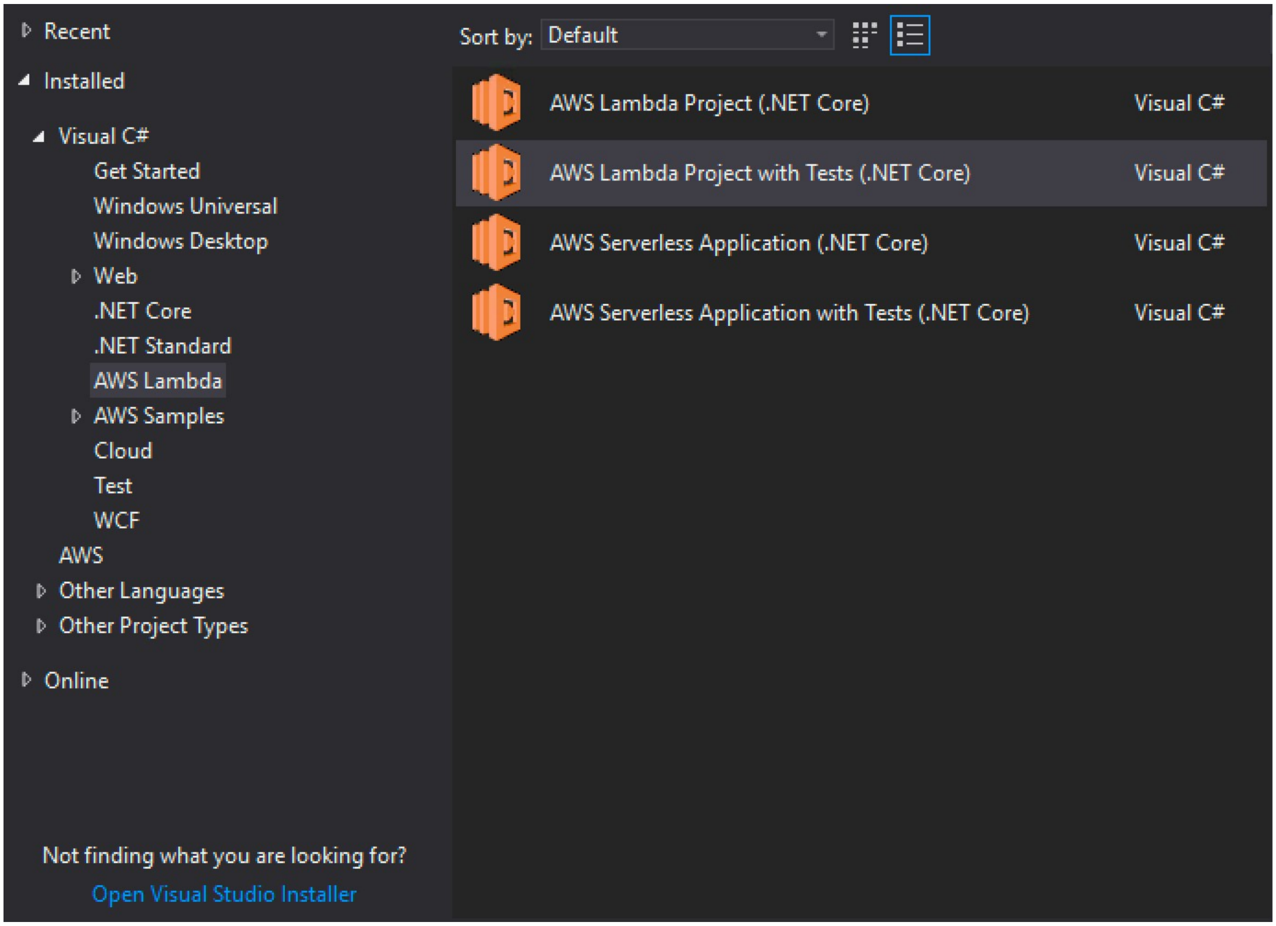
The following are the prerequisites required in order to complete the lab:

- Microsoft Visual Studio 2017 or above installed on your computer
- AWS Toolkit for Visual Studio
- Internet connection
- AWS Account

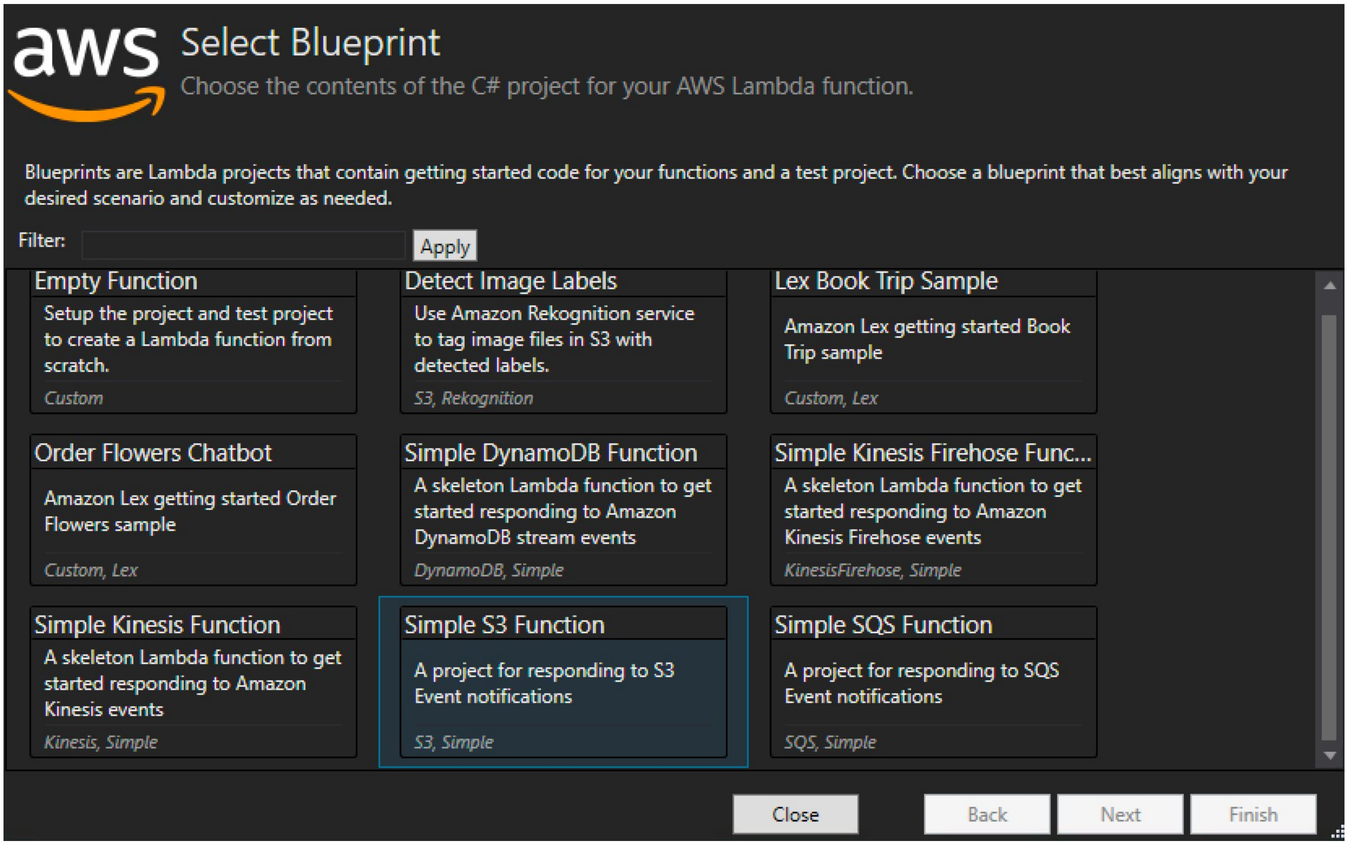
Part 1 – Create an AWS Lambda Project

Follow the steps below to create and customize an ASP.NET Web Project in Visual Studio.

1. In Visual Studio, use `File -> New -> Project` to open the New Project dialog.
2. Under the Web project node, select AWS Lambda and the "AWS Lambda Project with Tests (.Net Core)" template, type **Resize-Lambda-Userid** as the name for your project, then click the OK button.


Recent
Installed
Visual C#
Get Started
Windows Universal
Windows Desktop
Web
.NET Core
.NET Standard
AWS Lambda
AWS Samples
Cloud
Test
WCF
AWS
Other Languages
Other Project Types
Online
Not finding what you are looking for?
Open Visual Studio Installer
Sort by: Default
AWS Lambda Project (.NET Core) Visual C#
AWS Lambda Project with Tests (.NET Core) Visual C#
AWS Serverless Application (.NET Core) Visual C#
AWS Serverless Application with Tests (.NET Core) Visual C#

3. In the next dialog, select the "API" blueprint, and select "Simple S3 Function", then click the Finish button to generate the project.



Select Blueprint

Choose the contents of the C# project for your AWS Lambda function.

Blueprints are Lambda projects that contain getting started code for your functions and a test project. Choose a blueprint that best aligns with your desired scenario and customize as needed.

Filter:

Empty Function
Setup the project and test project to create a Lambda function from scratch.
Custom

Detect Image Labels
Use Amazon Rekognition service to tag image files in S3 with detected labels.
S3, Rekognition

Lex Book Trip Sample
Amazon Lex getting started Book Trip sample
Custom, Lex

Order Flowers Chatbot
Amazon Lex getting started Order Flowers sample
Custom, Lex

Simple DynamoDB Function
A skeleton Lambda function to get started responding to Amazon DynamoDB stream events
DynamoDB, Simple

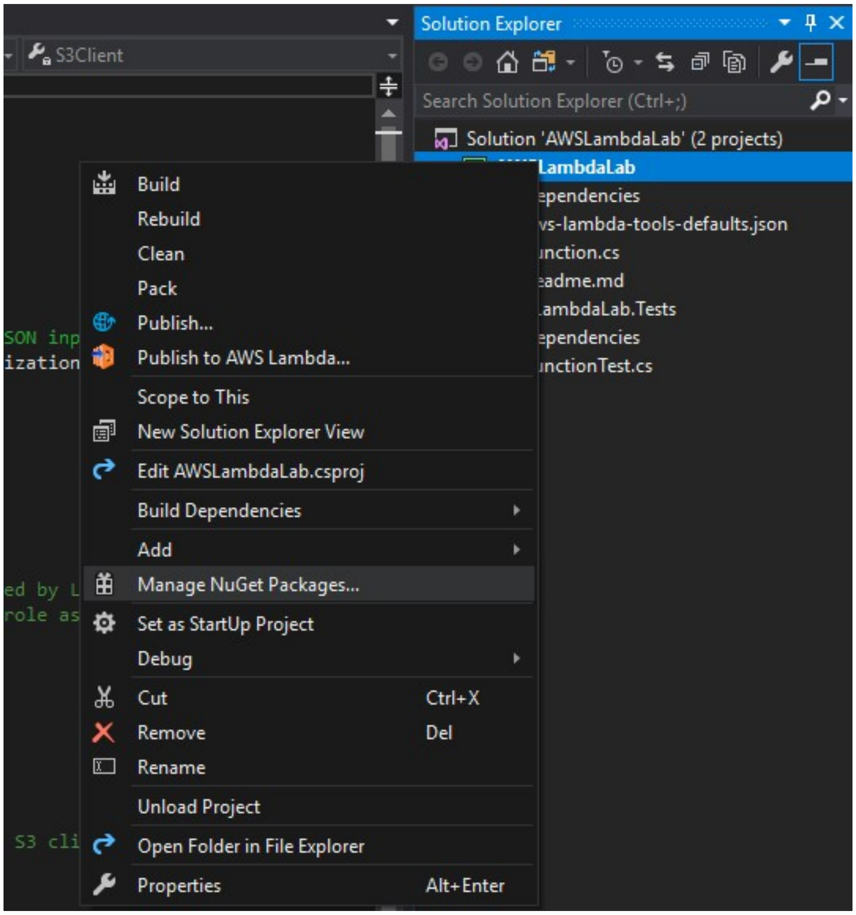
Simple Kinesis Firehose Func...
A skeleton Lambda function to get started responding to Amazon Kinesis Firehose events
KinesisFirehose, Simple

Simple Kinesis Function
A skeleton Lambda function to get started responding to Amazon Kinesis events
Kinesis, Simple

Simple S3 Function
A project for responding to S3 Event notifications
S3, Simple

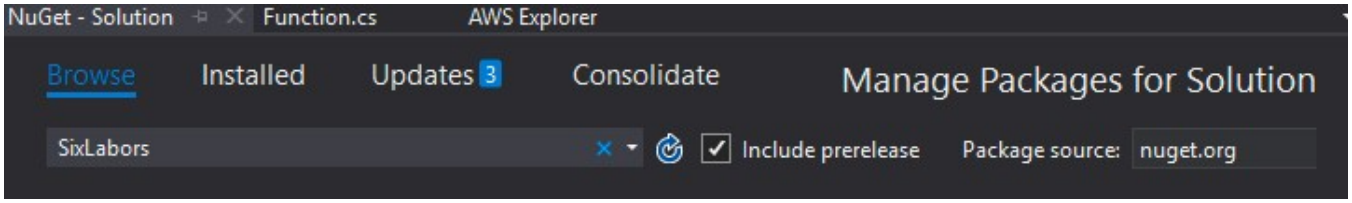
Simple SQS Function
A project for responding to SQS Event notifications
SQS, Simple

4. Right-click on the solution that you have create and select *Manage NuGet Packages*:



Note: In this Lab we will use an open-source image library to resize the picture as .net core doesn't have any built-in classes to work with the images.

a. For this Lab we will install an open-source third-party library called ImageSharp that is only available at the NuGet pre-release. Please, search **SixLabors** selecting the **pre-release** check-box.



SixLabors

☑ Include prerelease

Package source: nuget.org

b. Select and install the **SixLabors.ImageSharp** and **SixLabors.ImageSharp.Drawing** packages.

5. Replace the Function Handler Method with the code below (code available at link) in Function.cs:

```
// Copyright <YEAR> Amazon.com, Inc. or its affiliates. All Rights Reserved.
// SPDX-License-Identifier: MIT-0
public async Task<string> FunctionHandler(S3Event evnt, ILambdaContext context)
        {             string[] fileExtentions = new string[] { ".jpg",
".jpeg" };             var s3Event = evnt.Records?[0].S3;
if(s3Event == null)
            {
                return null;
            }
             try             {
foreach (var record in evnt.Records)
                {
                    LambdaLogger.Log("----> File: " + record.S3.Object.Key);
if
(!fileExtentions.Contains(Path.GetExtension(record.S3.Object.Key).ToLower()))
{
                        LambdaLogger.Log("File Extention is not supported - " +
s3Event.Object.Key);                          continue;
                    }
                    string suffix = Path.GetExtension(record.S3.Object.Key).ToLower();
Stream imageStream = new MemoryStream();                      using (var objectResponse
= await S3Client.GetObjectAsync(record.S3.Bucket.Name, record.S3.Object.Key))
using (Stream responseStream = objectResponse.ResponseStream)
                    {                          using (Image<Rgba32> image =
Image.Load<Rgba32>(responseStream))
                        {
                            image.Mutate(ctx => ctx.Resize(image.Width / 4, image.Height /
4));                             image.Save(imageStream, new
JpegEncoder());                              imageStream.Seek(0,
SeekOrigin.Begin);
                        }
                    }
                    // Creating a new S3 ObjectKey for the resized objects
string resizedObjectKey = null;                      int endSlash =
record.S3.Object.Key.ToLower().LastIndexOf("/");                      if (endSlash >
0)
                    {
                        string S3ObjectName =
record.S3.Object.Key.ToLower().Substring(endSlash+1);
int beginSlash = 0;                          if
(endSlash > 0)
                        {
                            beginSlash     =     record.S3.Object.Key.ToLower().Substring(0,
endSlash - 1).LastIndexOf("/");
                            if (beginSlash > 0)
                            {
resizedObjectKey =
record.S3.Object.Key.ToLower().Substring(0, beginSlash) + "resized-images/" + S3ObjectName;
                            }                              else
{                                 resizedObjectKey = "resized-images/" +
S3ObjectName;
                            }
                        }
}
else
{
                        resizedObjectKey = "resized-images/" +
record.S3.Object.Key.ToLower();
                    }

                    LambdaLogger.Log("----> Resized filed Key: " + resizedObjectKey);
                     await                 S3Client.PutObjectAsync(new
PutObjectRequest
                    {
                        BucketName = record.S3.Bucket.Name,
                        Key = resizedObjectKey,
                        InputStream = imageStream
                    });
                }

                LambdaLogger.Log("Processed " + evnt.Records.Count.ToString());
                 return
null;
            }
catch(Exception e)
            {                 context.Logger.LogLine($"Error getting object
{s3Event.Object.Key} from bucket {s3Event.Bucket.Name}. Make sure they exist and your
bucket is in the same region as this function.");
context.Logger.LogLine(e.Message);                 context.Logger.LogLine(e.StackTrace);
throw;
            }
        }
```

6. Make sure the following “using” statements are added to the top of Function.cs:

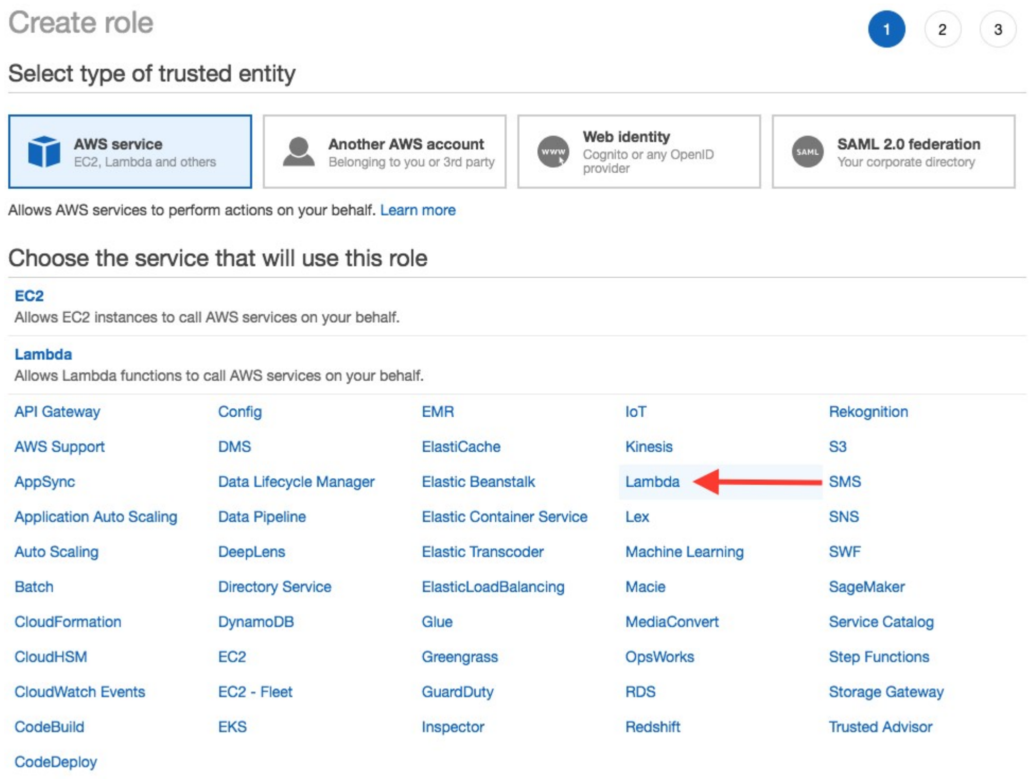
```
using System;
using System.Collections.Generic;
using System.IO; using
System.Linq;
using System.Threading.Tasks;

using Amazon.Lambda.Core;
using Amazon.Lambda.S3Events;
using Amazon.S3; using
Amazon.S3.Model;
using Amazon.S3.Util; using
SixLabors.ImageSharp;
using SixLabors.ImageSharp.Formats.Jpeg; using
SixLabors.ImageSharp.PixelFormats; using
SixLabors.ImageSharp.Processing;
```

Part 2 – Create an S3 bucket and the Lambda Role

Follow the steps to create a S3 bucket on the same region that the lambda function will be created using the AWS Management Console.

1. Sign in to the AWS Management Console and open the S3 service at https://console.aws.amazon.com/s3
2. Please, name you bucket as **dotnet-immersionday-lambda-userid** using the region that you have been using during this lab following the steps described on the ***To create an S3 bucket*** at the URL: https://docs.aws.amazon.com/AmazonS3/latest/gsg/CreatingABucket.html
3. To create the Lambda role, open the Access Management Access Service by accessing https://console.aws.amazon.com/iam
4. In the navigation pane of the IAM console, choose ***Roles***, and then choose ***Create role***.
5. For *Select* ***type of trusted entity***, choose ***AWS service***, select ***Lambda***, and select *Next:* ***Permissions.***



Create role

1 2 3

Select type of trusted entity

AWS service
EC2, Lambda and others

Another AWS account
Belonging to you or 3rd party

Web identity
Cognito or any OpenID provider

SAML 2.0 federation
Your corporate directory

Allows AWS services to perform actions on your behalf. Learn more

Choose the service that will use this role

EC2
Allows EC2 instances to call AWS services on your behalf.

Lambda
Allows Lambda functions to call AWS services on your behalf.

API Gateway
AWS Support
AppSync
Application Auto Scaling
Auto Scaling
Batch
CloudFormation
CloudHSM
CloudWatch Events
CodeBuild
CodeDeploy
Config
DMS
Data Lifecycle Manager
Data Pipeline
DeepLens
Directory Service
DynamoDB
EC2
EC2 - Fleet
EKS
EMR
ElastiCache
Elastic Beanstalk
Elastic Container Service
Elastic Transcoder
ElasticLoadBalancing
Glue
Greengrass
GuardDuty
Inspector
IoT
Kinesis
Lambda
Lex
Machine Learning
Macie
MediaConvert
OpsWorks
RDS
Redshift
Rekognition
S3
SMS
SNS
SWF
SageMaker
Service Catalog
Step Functions
Storage Gateway
Trusted Advisor

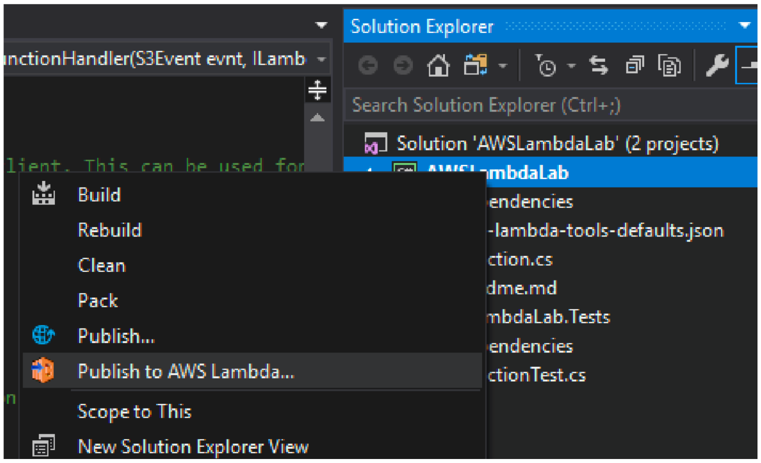
6. On the filter policies search, type "**LambdaBasic**" and select the ***AWSLambdaBasicExecutionRole*** policy. Also, type "S3Full" at the search field and select the *AmazonS3FullAccess* policy. Click on ***Next: Review*** button.

7. On the *Review* page name your role as "**LambdaBasicAndS3FullRole**", make sure you seeing the two policies added on the step above and click on the ***Create Role*** button.

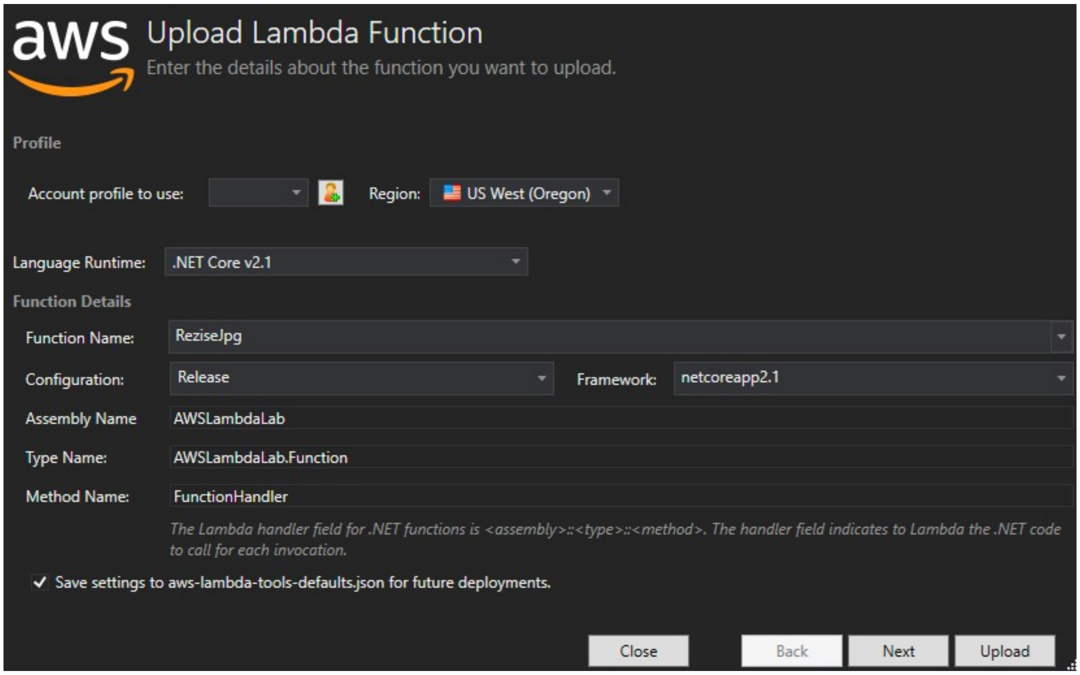
Part 3 Deploy to AWS Lambda

Follow the steps below to deploy the Lambda function.

1. Right-click your project in Solution Explorer, and select "Publish to AWS Lambda" to launch the publishing wizard. See the figure below.


nctionHandler(S3Event evnt, ILamb
lient. This can be used for
Solution Explorer
Search Solution Explorer (Ctrl+;)
Solution 'AWSLambdaLab' (2 projects)
AWSLambdaLab
endencies
-lambda-tools-defaults.json
ction.cs
dme.md
mbdaLab.Tests
endencies
ctionTest.cs
Build
Rebuild
Clean
Pack
Publish...
Publish to AWS Lambda...
Scope to This
New Solution Explorer View

2. Ensure the "Account profile to use" drop-down and "Region" drop-down are set to the profile and region you are using for today's labs. Name your Lambda Function as **Resize-Lambda-Userid,** and click **Next**.



Upload Lambda Function

Enter the details about the function you want to upload.

Profile

Account profile to use: Region: US West (Oregon)

Language Runtime: .NET Core v2.1

Function Details

Function Name: ReziseJpg

Configuration: Release Framework: netcoreapp2.1

Assembly Name AWSLambdaLab

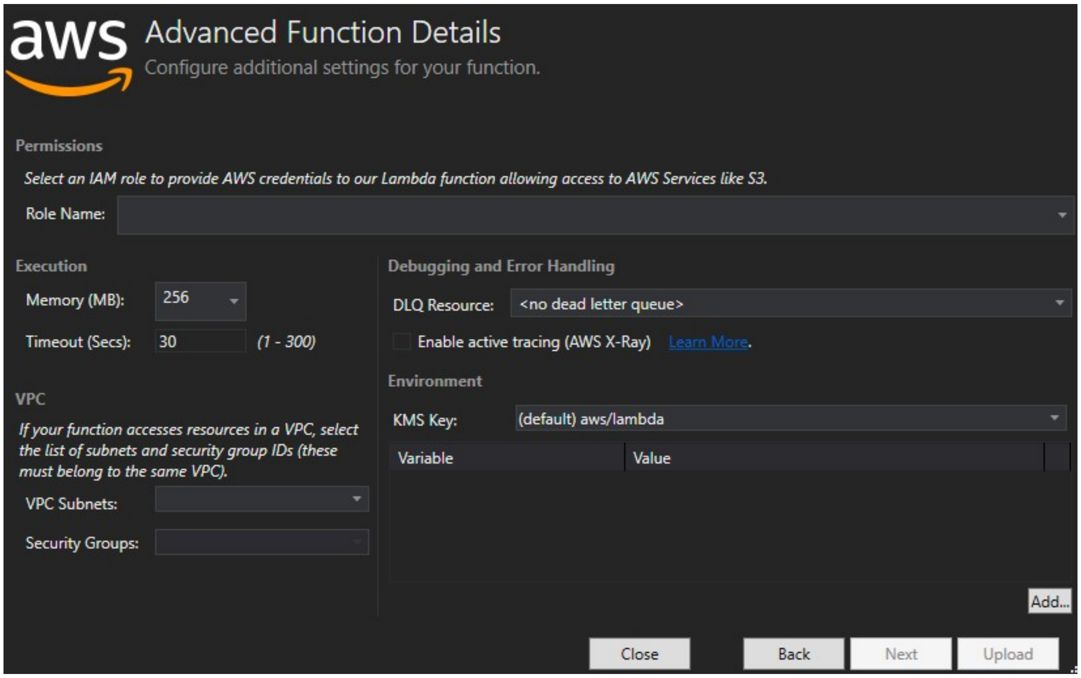
Type Name: AWSLambdaLab.Function

Method Name: FunctionHandler

The Lambda handler field for .NET functions is <assembly>::<type>::<method>. The handler field indicates to Lambda the .NET code to call for each invocation.

✓ Save settings to aws-lambda-tools-defaults.json for future deployments.

3. Select the Role Name that you have created at the Part 2 of this LAB and click on **Upload**.



Advanced Function Details

Configure additional settings for your function.

Permissions

Select an IAM role to provide AWS credentials to our Lambda function allowing access to AWS Services like S3.

Role Name:

Execution

Memory (MB): 256

Timeout (Secs): 30 *(1 - 300)*

VPC

If your function accesses resources in a VPC, select the list of subnets and security group IDs (these must belong to the same VPC).

VPC Subnets:

Security Groups:

Debugging and Error Handling

DLQ Resource: <no dead letter queue>

□ Enable active tracing (AWS X-Ray) Learn More.

Environment

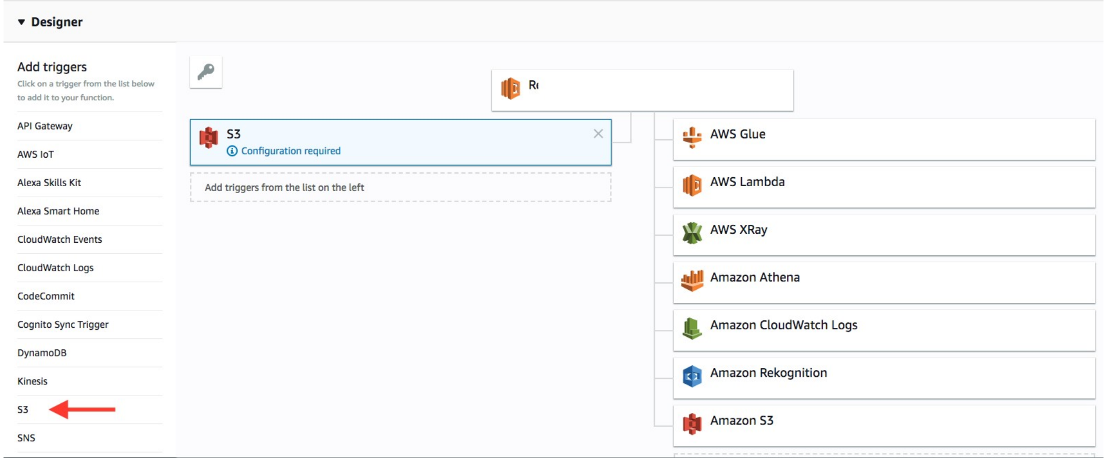
KMS Key: (default) aws/lambda

Variable	Value

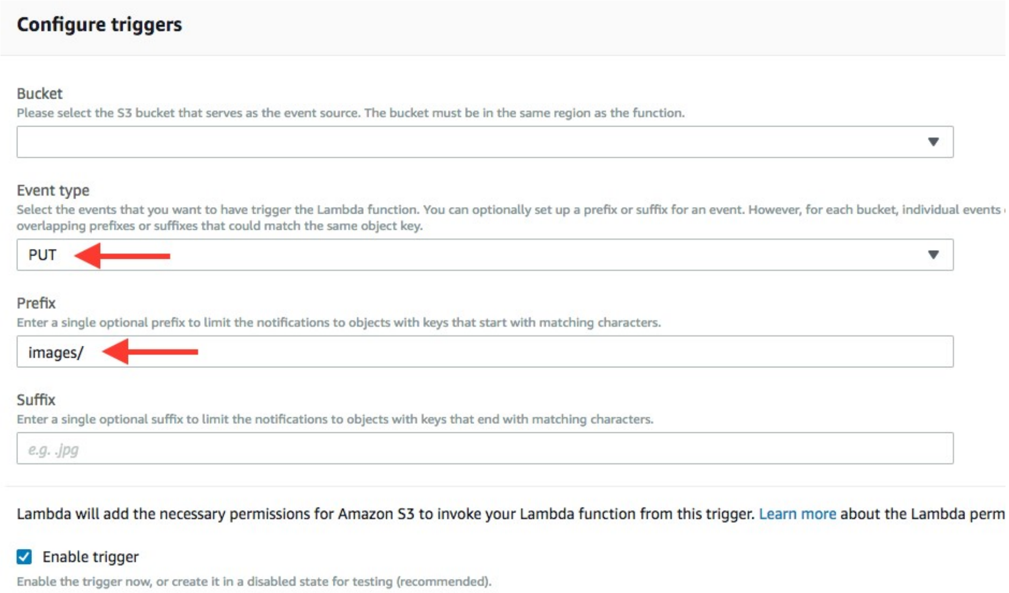
Part 4 Create and Associate the S3 Event to your Lambda.

For this lab, we’ll access the AWS Management Console to associate a S3 event to your lambda function.

1. Sign in to the AWS Management Console and open the Lambda service at https://console.aws.amazon.com/lambda
2. Click on the lambda function name you have published
3. Add a S3 trigger to the lambda function by clicking on S3 on the left panel.



4. Configure the Trigger, which you can reach by rolling down the screen; select the bucket you have created on the Part 2 on the bucket drop-down, select the **PUT** as event type, and enter **images/** as the prefix the lambda will be watching, and press **Add**.



Configure triggers

Bucket
Please select the S3 bucket that serves as the event source. The bucket must be in the same region as the function.

Event type
Select the events that you want to have trigger the Lambda function. You can optionally set up a prefix or suffix for an event. However, for each bucket, individual events
overlapping prefixes or suffixes that could match the same object key.
PUT

Prefix
Enter a single optional prefix to limit the notifications to objects with keys that start with matching characters.
images/

Suffix
Enter a single optional suffix to limit the notifications to objects with keys that end with matching characters.
e.g. .jpg

Lambda will add the necessary permissions for Amazon S3 to invoke your Lambda function from this trigger. Learn more about the Lambda perm

☑ Enable trigger
Enable the trigger now, or create it in a disabled state for testing (recommended).

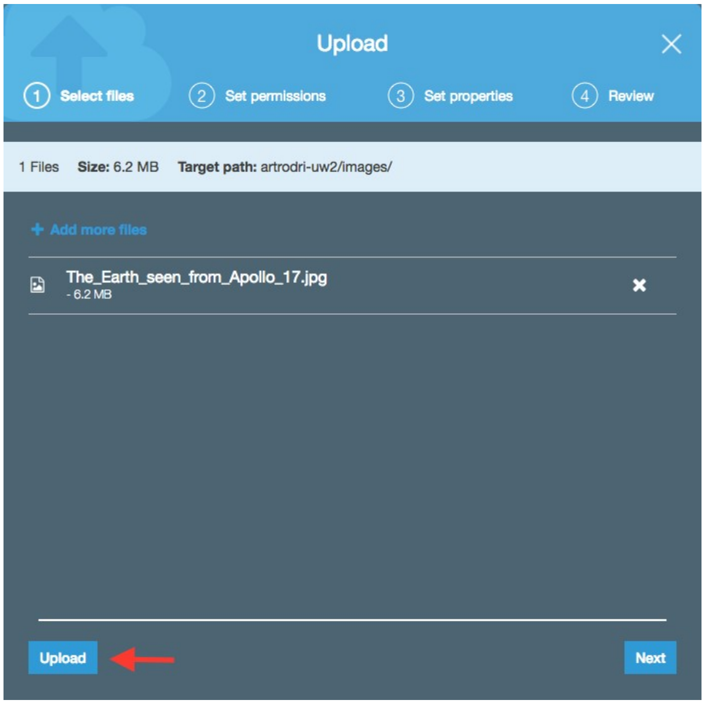
Note: The lambda function will save the resized image in a new folder called resizedimages within the same bucket. If you don't define a prefix you lambda function will enter in a recursive loop as every time you save an image in the bucket the lambda function will be triggered.

5. Click on **Save** on the top-right corner of the lambda console.

Part 5 Uploading files and check the lambda function execution.

Now it is time to upload a jpg file to the S3 bucket to test its execution.

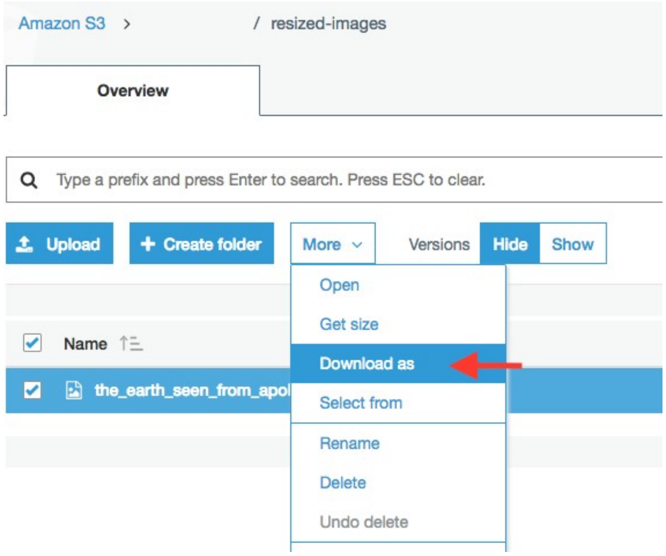
1. Sign in to the AWS Management Console and open the S3 service at https://console.aws.amazon.com/s3
2. Click on the S3 bucket you have created.
3. Create a folder called images, but selecting the **Create Folder** button, with no encryption, at the top right of the S3 console. Once you create the folder, select the folder.
4. Upload a test image into your bucket for testing. The blue marble - https://upload.wikimedia.org/wikipedia/commons/9/97/The_Earth_seen_from_Apollo_17.jpg is a great sample image for testing. Please, download the image to your local computer.
5. Click on the **Upload** button at the S3 console. In the dialog box, click on **Add files**, select the file above and click **Upload** at the dialog.



1 Files **Size:** 6.2 MB **Target path:** artrodri-uw2/images/

The_Earth_seen_from_Apollo_17.jpg
- 6.2 MB

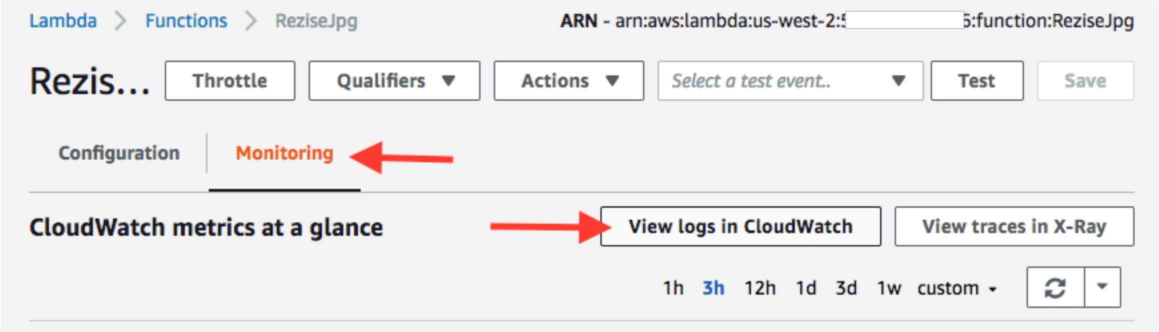
6. After a few seconds, you will notice that a new folder got created in the bucket called resized-images. Go to this folder and download the file that was resized. It should have gone from 6.2 MB to 93.2KB.



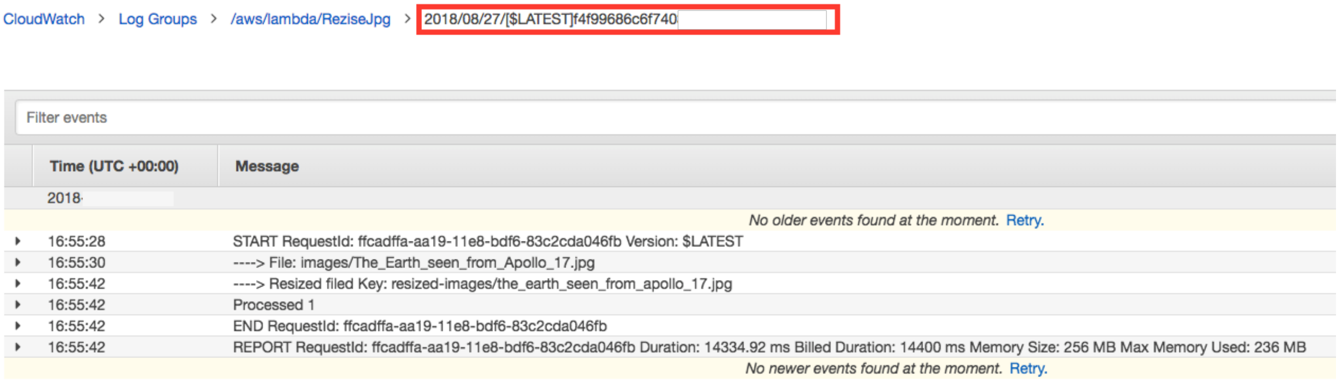
6. To check the lambda function execution, open the Lambda service at https://console.aws.amazon.com/lambda

7. Click on the lambda function that you have created for resizing the image 8.

   Select the **Monitoring** tab and click on the **View logs in CloudWatch**


Lambda > Functions > RezizeJpg
ARN - arn:aws:lambda:us-west-2:5[redacted]5:function:RezizeJpg
Rezis...
Throttle
Qualifiers
Actions
Select a test event..
Test
Save
Configuration
Monitoring
CloudWatch metrics at a glance
View logs in CloudWatch
View traces in X-Ray
1h 3h 12h 1d 3d 1w custom

9. Select the first log stream listed in the Log Group and you will see the lambda output and logs; similar to the picture below:


CloudWatch > Log Groups > /aws/lambda/RezizeJpg > 2018/08/27/[$LATEST]f4f99686c6f740[redacted]
Filter events

```
Time (UTC +00:00)   Message
2018[redacted]
                    No older events found at the moment. Retry.
16:55:28            START RequestId: ffcadffa-aa19-11e8-bdf6-83c2cda046fb Version: $LATEST
16:55:30            ----> File: images/The_Earth_seen_from_Apollo_17.jpg
16:55:42            ----> Resized filed Key: resized-images/the_earth_seen_from_apollo_17.jpg
16:55:42            Processed 1
16:55:42            END RequestId: ffcadffa-aa19-11e8-bdf6-83c2cda046fb
16:55:42            REPORT RequestId: ffcadffa-aa19-11e8-bdf6-83c2cda046fb Duration: 14334.92 ms Billed Duration: 14400 ms Memory Size: 256 MB Max Memory Used: 236 MB
                    No newer events found at the moment. Retry.
```

Congratulations! You have deployed a lambda function that is trigger by an S3 event, which performs a task defined into your lambda function. Now go build on AWS.

Part 6 – Removing all the resources.

In this part we will remove all the resources that we created in this LAB.

1. Sign in to the AWS Management Console and open the S3 service at https://console.aws.amazon.com/s3
2. Click on the row of the **dotnet-immersionday-lambda-userid** S3 bucket you have created, not on the S3 bucket name.
3. Select **Delete** on the top right of the S3 Console
4. Type the bucket name on the Delete dialog and confirm.
5. Open the Lambda service at https://console.aws.amazon.com/lambda
6. Click on the **Resize-Lambda-Userid** Lambda function name you have published
7. On the **Action** Dropdown Button select **Delete**
8. Confirm that you want to delete the Function
9. Open the IAM service at https://console.aws.amazon.com/iam
10. Click on roles on the left panel
11. Check the **LambdaBasicAndS3FullRole**
12. Click on **Delete role** button on the top left