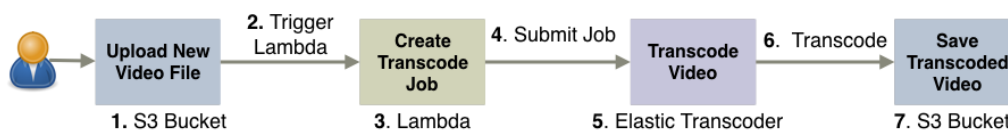


LESSON 1

In lesson 1 we are going to create the engine of our YouTube clone. Make sure you can log in to the AWS console and follow the instructions given below.

This is the system we will end up with at the end of this lesson



NOTE: PLEASE CREATE ALL YOUR RESOURCES IN THE N. VIRGINIA REGION (US-EAST-1)

1. SET YOUR REGION TO US. EAST (N. VIRGINIA)

Before we kick-off the build, log in to the AWS console, and set your region to US East (N. Virginia).

Please make sure that all resources & services you create are in the same region from here onwards.

2. CREATE 2 S3 BUCKETS

Let's begin by creating two buckets in S3. The first bucket will serve as the upload bucket for new videos. The second bucket will contain transcoded videos put there by the Elastic Transcoder.

- To create a bucket, in the AWS console click on **S3**, and then click **Create Bucket**.
- Enter a **Bucket Name** (e.g. serverless-video-upload), and choose a **region (US Standard)**.
- Click **Create** to save your bucket.
- Repeat the process again to create another bucket (e.g. serverless-video-transcoded).

Create a Bucket - Select a Bucket Name and Region Cancel x

A bucket is a container for objects stored in Amazon S3. When creating a bucket, you can choose a Region to optimize for latency, minimize costs, or address regulatory requirements. For more information regarding bucket naming conventions, please visit the [Amazon S3 documentation](#).

Bucket Name:

Region:

If the bucket name is taken, AWS will show an error message.

Set the right region to reduce costs and minimise latency. Your Lambda functions should be in the same region.

3. MODIFY BUCKET POLICY

We need to make our transcoded videos publically accessible.

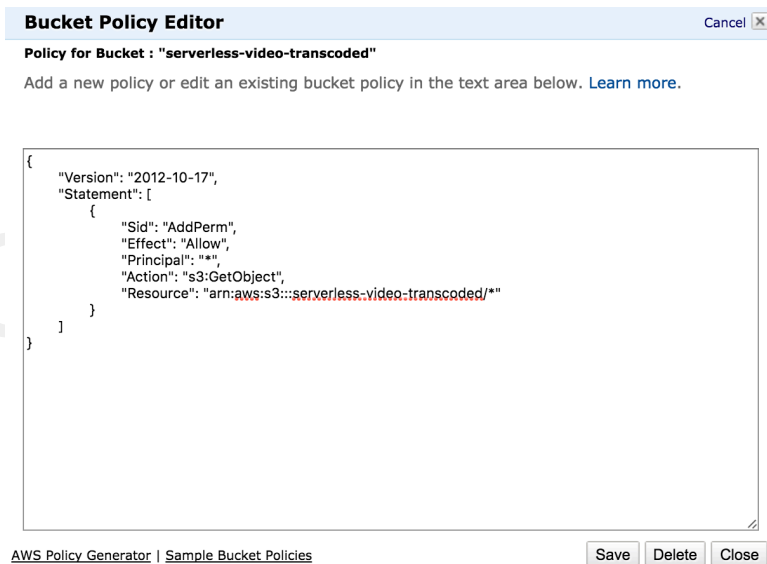
- In S3 click on the **second** bucket you have created (this will be the serverless-video-transcoded bucket).

- Expand **Permissions**
- Click **Add bucket policy**
- Type in the following to the bucket policy (you can copy below text from step3-bucket-policy.txt):

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "AddPerm",
      "Effect": "Allow",
      "Principal": "*",
      "Action": "s3:GetObject",
      "Resource": "arn:aws:s3:::<YOUR-BUCKET-NAME>/*"
    }
  ]
}
```

Make sure to substitute YOUR-BUCKET-NAME with the actual name of your transcoded bucket.

- Click **Save**



Bucket Policy Editor Cancel

Policy for Bucket : "serverless-video-transcoded"

Add a new policy or edit an existing bucket policy in the text area below. [Learn more.](#)

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "AddPerm",
      "Effect": "Allow",
      "Principal": "*",
      "Action": "s3:GetObject",
      "Resource": "arn:aws:s3:::serverless-video-transcoded/*"
    }
  ]
}
```

[AWS Policy Generator](#) | [Sample Bucket Policies](#) Save Delete Close

4. CREATE AN IAM ROLE FOR YOUR FIRST LAMBDA FUNCTION

Now we need to create an IAM role for our future Lambda functions. This role will allow functions to interact with S3 and the Elastic Transcoder.

- In the AWS console, click **Identity & Access Management** and then click **Roles**.
- Click **Create New Role** and name it **lambda-s3-execution-role**
- Click **Next Step** to proceed to Role Type selection.
- Under **Select Role Type** click **AWS Lambda**

Select Role Type

AWS Service Roles

- Amazon EC2**
Allows EC2 instances to call AWS services on your behalf. [Select](#)
- AWS Directory Service**
Allows AWS Directory Service to manage access for existing directory users and groups to AWS services. [Select](#)
- AWS Lambda**
Allows Lambda Function to call AWS services on your behalf. [Select](#)
- Amazon Redshift**
Allows Amazon Redshift Clusters to call AWS services on your behalf. [Select](#)
- Amazon API Gateway**
Allows API Gateway to call AWS resources on your behalf. [Select](#)

☐ **Role for Cross-Account Access**

☐ **Role for Identity Provider Access**

- Select the following two policies:
 - **AWSLambdaExecute**
 - **AmazonElasticTranscoderJobsSubmitter**
- Click **Next Step** to attach both policies to the role and then click **Create Role** to save.
- You will be taken back to the role summary page. Click **lambda-s3-execution-role** again to see the two attached policies:

Summary

Role ARN: arn:aws:iam::038221756127:role/lambda-s3-execution-role

Instance Profile ARN(s): /

Path: /

Creation Time: 2015-12-30 14:43 UTC+1100

Permissions

Managed Policies

The following managed policies are attached to this role. You can attach up to 10 managed policies.

[Attach Policy](#)

Policy Name	Actions
AmazonElasticTranscoderJobsSubmitter	Show Policy Detach Policy Simulate Policy
AWSLambdaExecute	Show Policy Detach Policy Simulate Policy

Inline Policies

5. CONFIGURE ELASTIC TRANSCODER

Now we need to set up an Elastic Transcoder pipeline to perform video transcoding to different formats and bitrates.

- In the AWS console click on **Elastic Transcoder** and then click **Create a New Pipeline**.
- Give your pipeline a **name**, such as 24 Hour Video, and specify the **input bucket**, which in our case is the first upload bucket. (*see figure below*)
- Leave the IAM role as it is. Elastic Transcoder creates a default IAM role automatically.
- Under Configuration for Amazon S3 Bucket for Transcoded Files and Playlists **specify the transcoded videos bucket**, which in our case was *serverless-video-transcoded*.
- The **Storage Class** can be set to **Standard**.

- We are not generating thumbnails but we should still select a bucket and a storage class. Use the second, transcoded videos bucket for it again.
- Click **Create Pipeline** to save.

Create New Pipeline

A pipeline is a queue for your transcoding jobs. You can have more than one pipeline per AWS account.

Pipeline Name:

Input Bucket:

IAM Role:

Elastic Transcoder previously created a default IAM role for this AWS account. [View the policy.](#)

Configuration for Amazon S3 Bucket for Transcoded Files and Playlists

Bucket:

Storage Class:

[+ Add Permission](#)

Configuration for Amazon S3 Bucket for Thumbnails

Bucket:

Storage Class:

[+ Add Permission](#)

You will be able to create a role for the account from this screen.

Set the output buckets for the transcoded files and thumbnails.

6. CREATE LAMBDA FUNCTION IN AWS


It is finally time to create the first Lambda function although we are not going to provide an implementation for it just yet.

- In the AWS console, click **Lambda**, and then click **Create a Lambda Function**.
- Skip over the blueprint.
- **Name** the function **transcode-video** and make sure that **Node.js 4.3** is selected in the **Runtime** dropdown.
- In the space for the **function code** enter two curly braces: `{}`. If you leave function code empty you will not be able to save.
- Under Role select **lambda-s3-execution-role**.
- Set the **timeout** to 30 seconds.
- Click **Next** to go the Review screen and from there click **Create function** to finish.

7. PREPARE & DEPLOY LAMBDA

Finally, we can have a look at the actual Lambda function and deploy it to AWS.

- Open the Lambda function provided in lesson 1 in your favourite text editor.
- In the config.js file change **ELASTIC_TRANSCODER_PIPELINE_ID** to correspond to your Elastic Transcoder pipeline ID (you can find it in the Elastic Transcoder console by clicking on the details icon):

Create New Pipeline Create New Job Edit Pause Activate Remove					
Filter: <input type="text"/>					Viewing 1 item
	Name	Input Bucket	Bucket for Transcoded Files	Bucket for Thumbnails	Status
<input type="checkbox"/>	 24-hour-video	peter-upload-bucket	peter-transcoded-bucket	peter-transcoded-bucket	Active

This is the Pipeline ID you need to copy and change in config.js

[Create New Job](#) [Edit](#) [Pause](#) [Activate](#) [Remove](#)

▼ Summary

ARN	arn:aws:elastictranscoder:us-east-1:038221756127:pipeline/1451470066051-jscnci
Name	24 Hour Video Pipeline
Pipeline ID	1451470066051-jscnci
Status	Active
Input Bucket	serverless-video-upload

The Pipeline ID needs to be set in the Transcode Video Lambda function.

You need to get your Pipeline ID and add it to the function

- **Install npm packages**

In the terminal / command-prompt, change to the directory of the function:

```
cd lesson-1/lambda/video-transcoder
```

Install npm packages by typing:

```
npm install
```

- **Zip Lambda function**

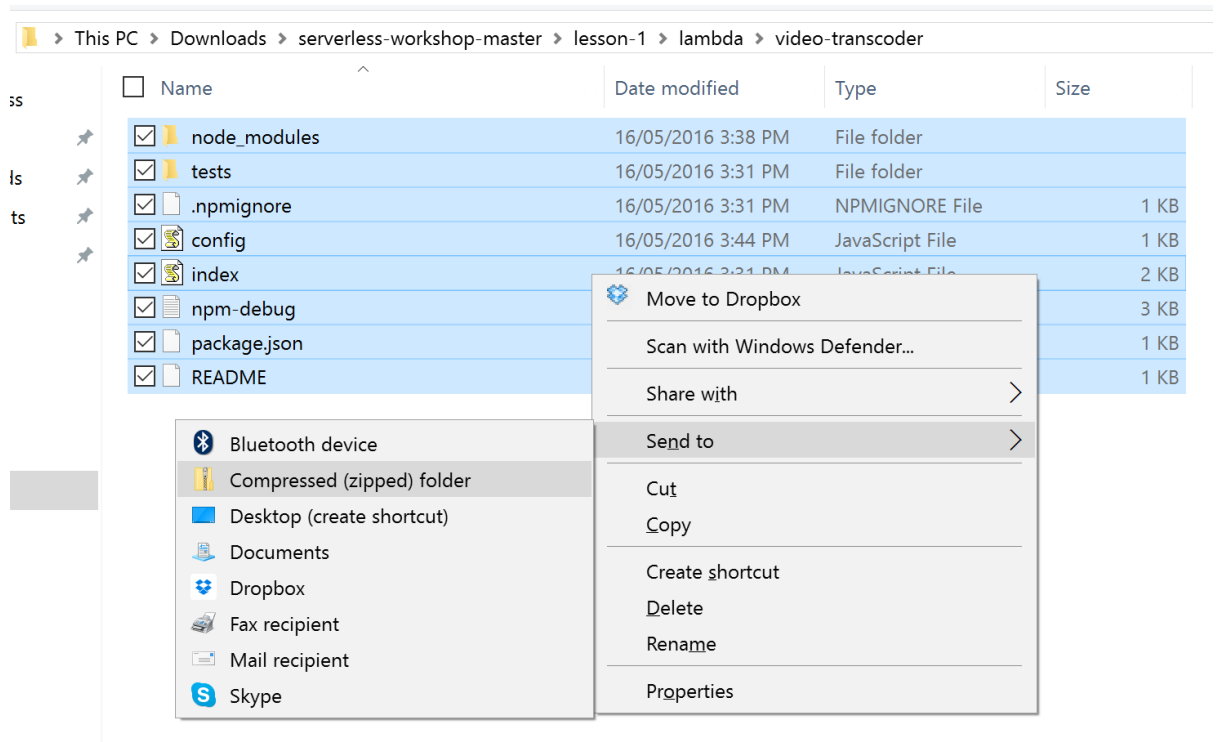
For OS X / Linux Users

Now create a ZIP file of the function, by typing:

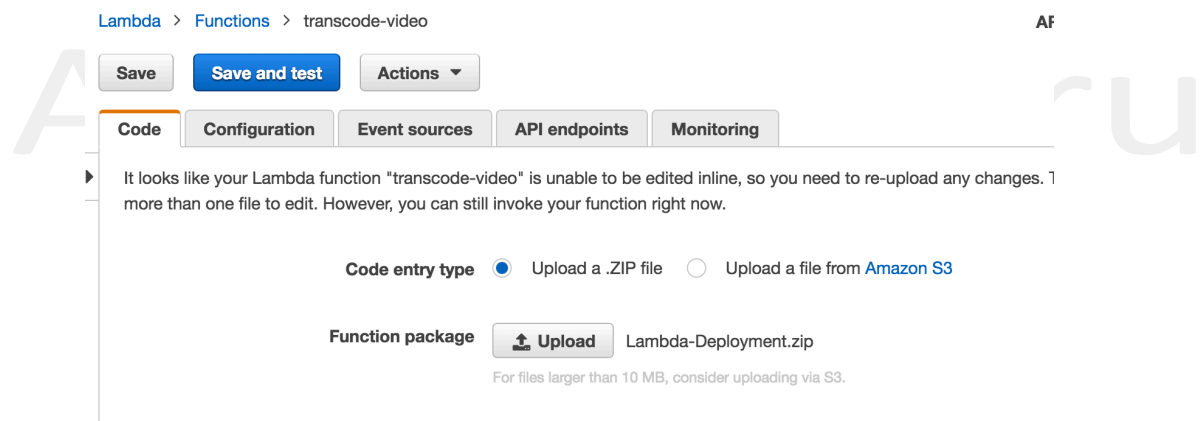
```
npm run predeploy
```

For Windows

You will need to **zip up all the files** in the **lesson-1/lambda/video-transcoder** folder via the Windows Explorer GUI, or using a utility such as 7zip. (**Note: don't zip the video-transcoder folder. Zip up the files inside of it.**)



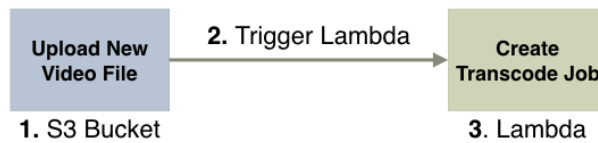
- In the AWS console click Lambda, select your function, and click Upload:



- Select the ZIP file of the Lambda function you had created earlier.
- Click the **Save** button to upload the function.

8. CONNECT S3 TO LAMBDA

The last step before we can test the function in AWS is to connect S3 to Lambda. S3 will invoke our lambda function:



- Open the upload bucket (e.g. serverless-video-upload) in the AWS console, select **Properties**, expand **Events**, and click **Add Notification**.
- Give your event a **name**, such as **Video Upload**, and in the **Events** dropdown select **ObjectCreated (All)**.
- Click the **Lambda function** radio button, right below it select the **transcode-video** Lambda function from the dropdown and save:

▼ Events

Event Notifications enable you to send alerts or trigger workflows. Notifications can be sent via [Amazon Simple Notification Service \(SNS\)](#) or [Amazon Lambda](#) (depending on the bucket location).

Name	Event(s)	Filter
Video Upload	ObjectCreated (All)	

Name

Video Upload

ⓘ

Events

ObjectCreated (All) x

ⓘ

Prefix

e.g. images/

ⓘ

Suffix

e.g. .jpg

ⓘ

Send To

☐ SNS topic
 ☐ SQS queue
 ☒ Lambda function

ⓘ

Lambda function

transcode-video

ⓘ

ObjectCreated(All) is the event needed to trigger our Lambda function.

You can optionally scope event invocations for a single suffix such as mp4.

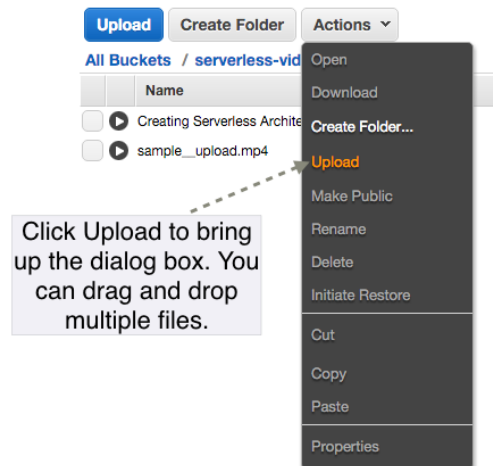
Set the Lambda function to invoke when a new object is placed in the bucket.

S3 will add the necessary permissions to invoke your Lambda function from this source bucket. See the [S3 User Guide](#) for more information.

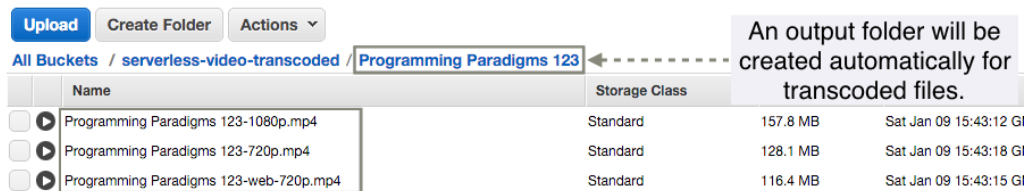
9. TESTING IN AWS

Need a video for testing? Download our test videos from: <http://bit.ly/1TEkvuR>

To test the function in AWS, upload a video to the upload bucket. To do this click the bucket, click **Actions** and then select **Upload**:



After a period of time, you should see three new videos appear in the transcoded videos bucket. These files should appear in a folder rather than in the root of the bucket:



Congratulations – you now have your very own serverless video transcoding pipeline!

Optional Exercises

At the moment, *24-Hour Video* is functional but it has a number of limitations that have been left for you to solve as an exercise. See you if you can implement a solution for the following problems:

1. A file with more than one period in its name (for example, *Lecture 1.1 – Programming Paradigms.mp4*) is going to produce transcoded files with truncated names. Implement a fix it so that filenames with multiple periods work.
2. Currently, any file uploaded to the upload bucket will trigger the workflow. The Elastic Transcoder, however, will fail if it's given invalid input (for example, a file that is not a video). Modify the first Lambda function to check the extension of the uploaded file and only submit avi, mp4, or mov files to Elastic Transcoder. Any invalid files should be deleted from the bucket.

3. The functions that we've written are somewhat unsafe. They do not always gracefully handle errors or invalid input. Go through each function and modify them to do additional error checking and handling where you see fit.
4. The current system creates three transcoded videos that are very similar. The main difference between them is the resolution and bitrate. To make the system more varied, add support for HLS and webm formats.
5. The files in the upload bucket are going to remain there until you delete them. Come up with a way to clean up the bucket automatically after 24 hours. You might want to have a look at the Lifecycle options in S3 for ideas.

A Cloud Guru