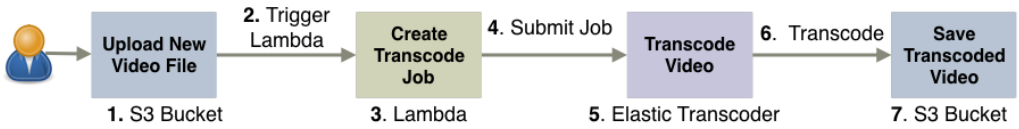
LESSON 1

In lesson 1, we are going to create the engine of our YouTube clone. Make sure you can log into 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. VIRIGINA)

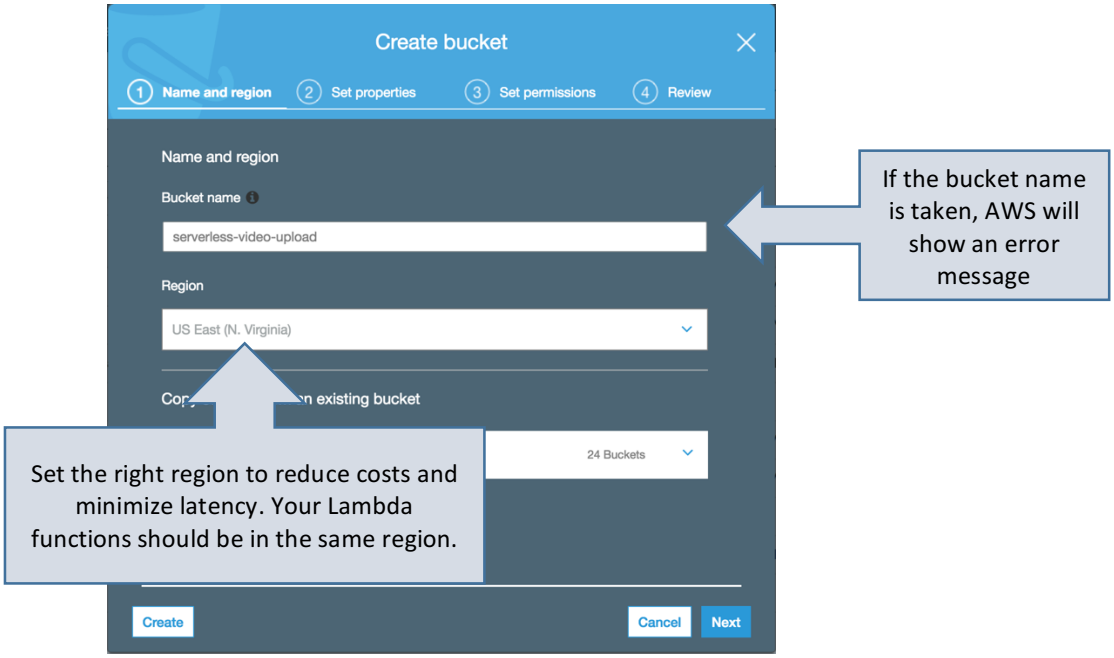
Before we kick-off the build, log in to the AWS console, and set your region to US East (N. Virginia).

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

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 the **region**: **US East (N. Virginia)**.
- Click **Create** to save your bucket.
- Repeat the process again to create another bucket (e.g. *serverless-video-transcoded*).
- Make a note of the bucket names, as you will be using them throughout this workshop.



3. MODIFY BUCKET POLICY

We need to make our transcoded videos publicly accessible.

- In S3 click on the **second** bucket you have created (this will be the serverless-video-transcoded bucket).
- Click on the **Permissions** tab
- Click **Bucket Policy**
- Enter the following to the bucket policy (you can copy below text form 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 serverless-video-transcoded bucket.

- Click **Save**

Bucket policy editor ARN: arn:aws:s3:::[redacted]

Type to add a new policy or edit an existing policy in the text area below.

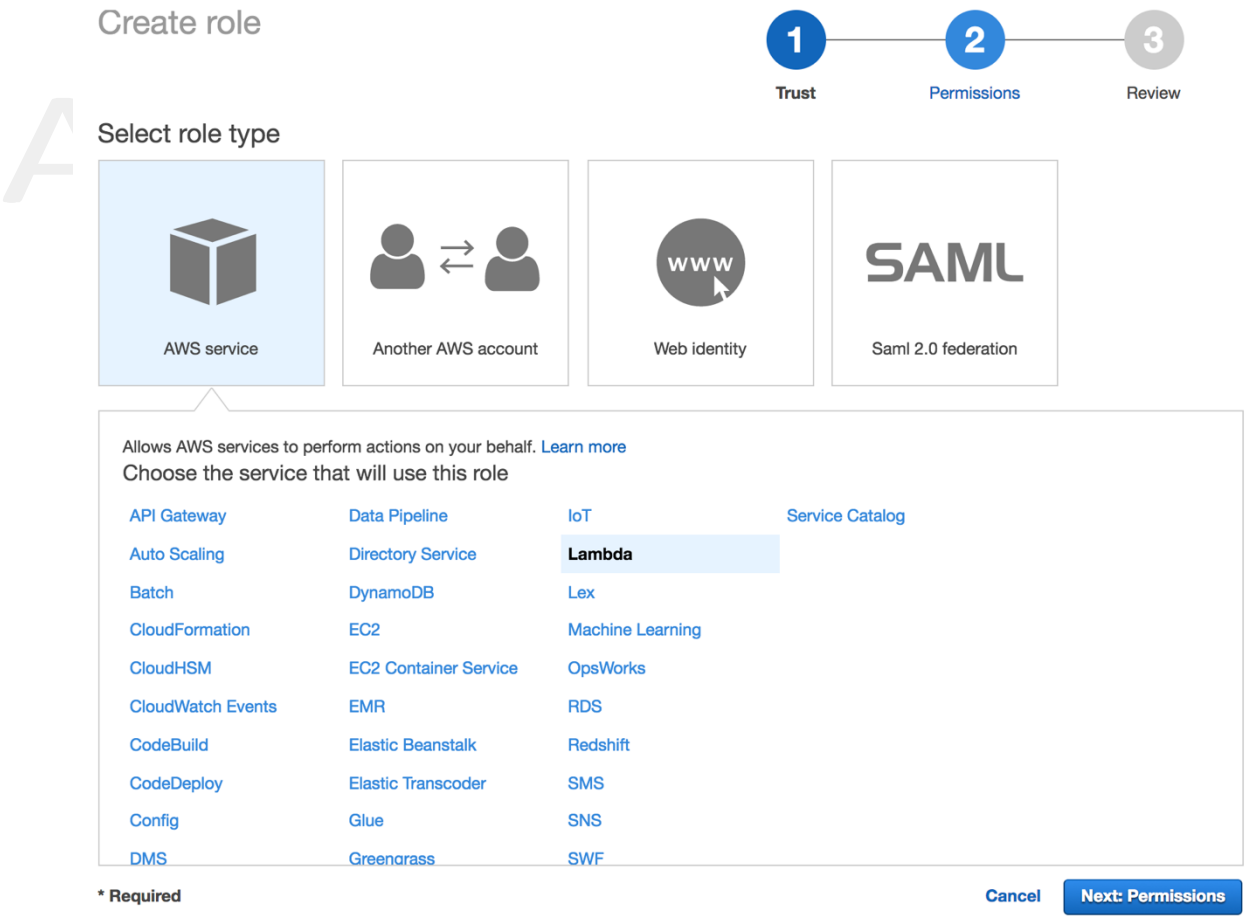
Delete | Cancel | Save

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

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.

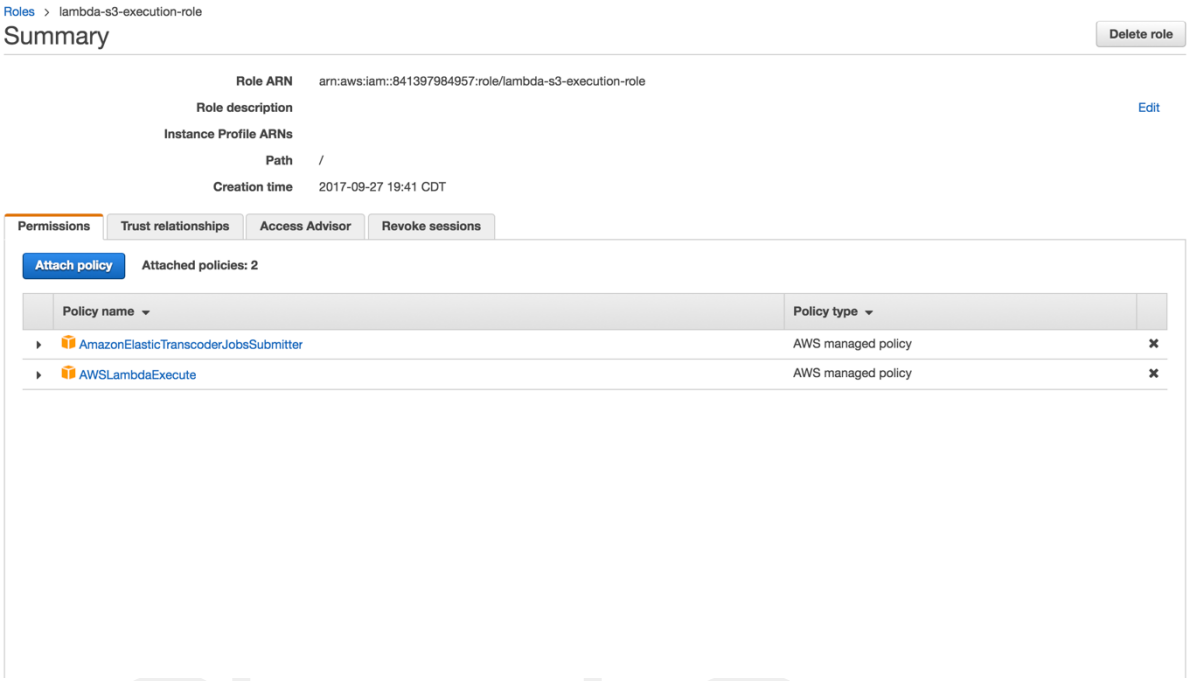
- In the AWS console's **Services** tab, click **IAM** under **Security, Identity & Compliance,** and then click **Roles** from the left navigation menu.
- Click **Create Role**
- In the **Trust** step, choose **AWS Service** and **Lambda**, and then click **Next: Permissions**



- In the Permissions step, search for and check the boxes next to:
    - **AWSLambdaExecute**
    - **AmazonElasticTranscoderJobsSubmitter**

- **Note: Make sure the names you select match exactly what is shown here.**

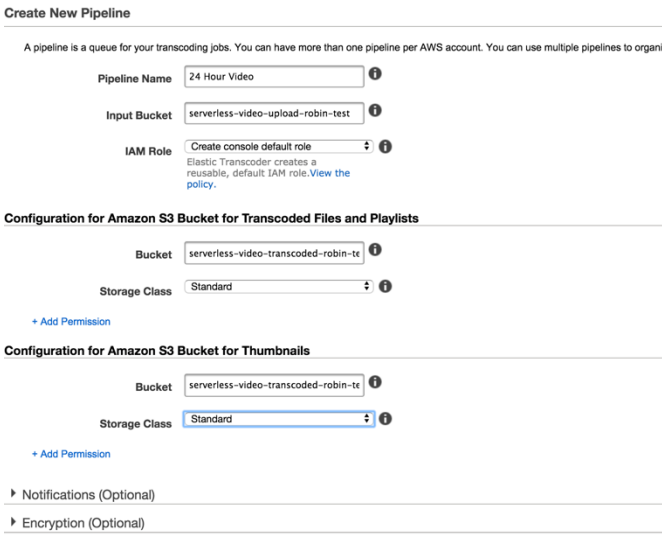
- Click **Next: Review** to attach both policies to the role.
- In the Review step, name the role **lambda-s3-execution-role**, and then click **Create role** to save.
- You will be taken back to the role summary page. Click **lambda-s3-execution-role** again to see the two attached policies:



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's **Services** tab, click on **Elastic Transcoder** under **Media Services**, 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 bucket, (e.g. *serverless-video-upload*).
- 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*.
- Set the **Storage Class** to **Standard**.
- We are not generating thumbnails but we should still select a bucket and a storage class. Use the second bucket, (*serverless-video-transcoded*) again, and once again set the **Storage Class** to **Standard**.
- Click **Create Pipeline** to save.
- Make note of the **Pipeline ID**. You'll need it soon.



6. CREATE LAMBDA FUNCTION

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's **Services** tab, click **Lambda** under **Compute**, and then click **Create function**.
- Click **Author from scratch**.
- On the **Basic information page, Name** the function *transcode-video*.
- Under **Role**, select **Choose an existing role** and then **lambda-s3-execution-role**.
- Click **Create function**.
- Once the function is created, in the **Basic settings** section, set the **Timeout** to 0 minutes, 30 seconds.
- At the top of the page, click **Save**.

7. PREPARE & DEPLOY LAMBDA

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

- **Install npm packages**
  In the terminal / command-prompt, change to the directory of the function:

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

  Install npm packages by typing:

  ```
  npm install
  ```

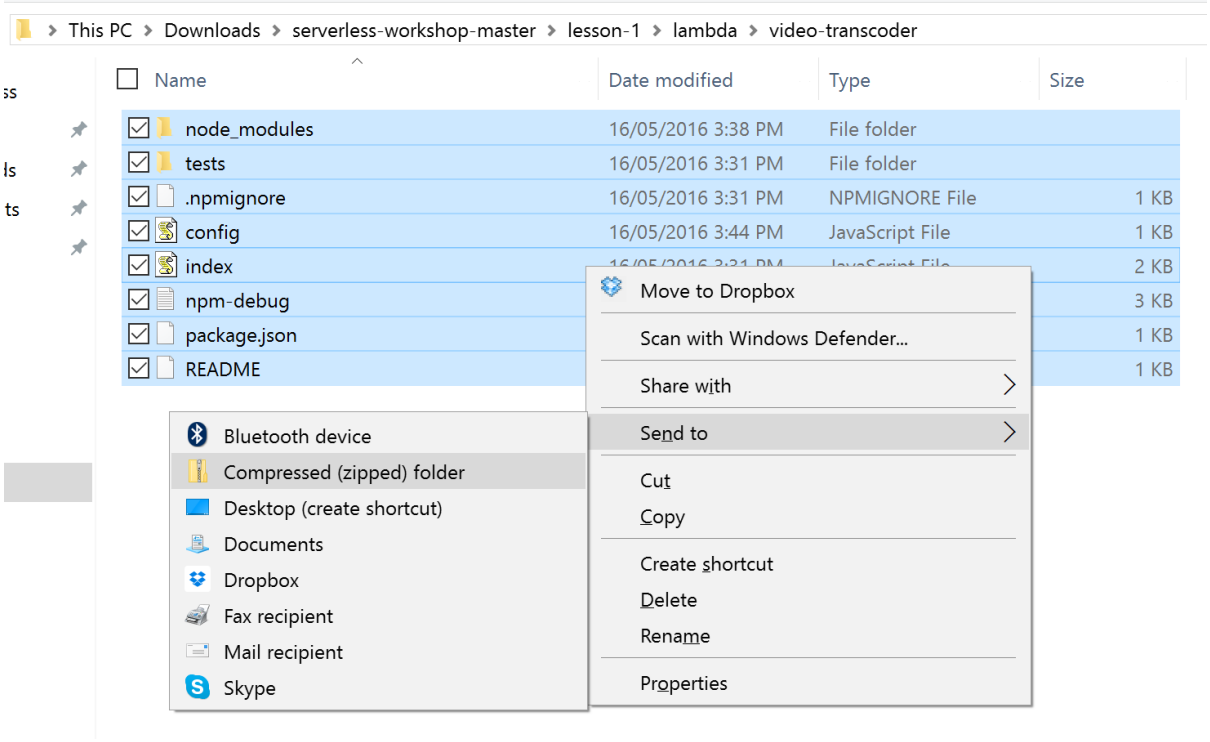
- **Zip Lambda function**

  For OS X / Linux Users
  Now create create a ZIP file of the function, by typing:

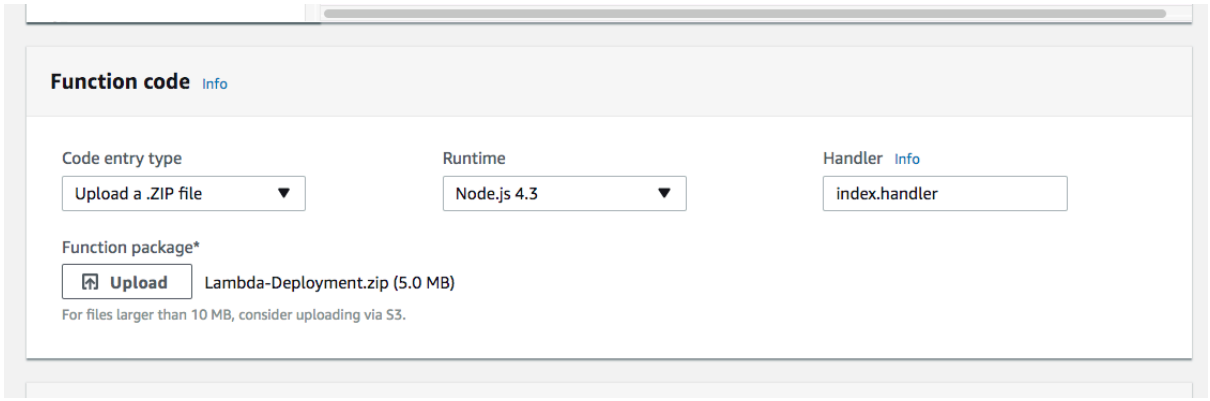
  ```
  npm run predeploy
  ```

  For Windows

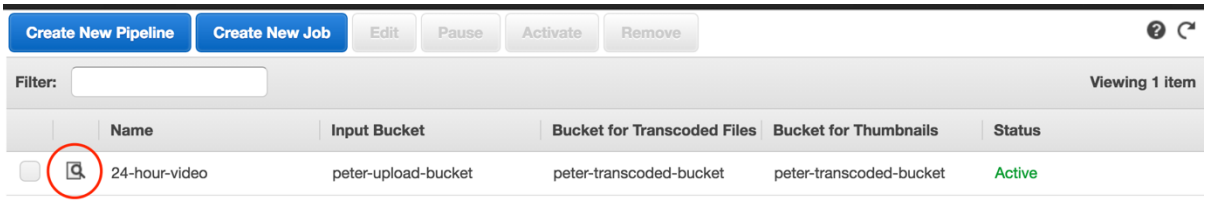
You will need to **zip up all the files** in the **lab-1/lambda/video-transcoder** folder via the Windows Explorer GUI, or using a utility such as 7zip. (**Note: don't zip the video-transcoder folder. Zip up the files inside of it**).



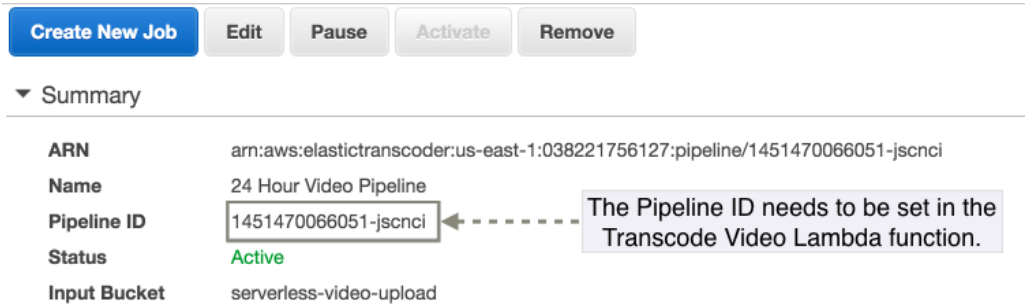
- Back in the AWS control panel, in the configuration for the *transcode-video* Lambda function:
- Under the **Function code** section, change the **Runtime** to **Node.js 4.3**.
- Set the **Code entry type** to **Upload a .ZIP file**.
- Click **Upload**:



- Select the .ZIP file of the Lambda function you created earlier.
- Scroll down to the **Environment variables**.
    - Add an environment variable with *Key* **ELASTIC_TRANSCODER_REGION** and set its *Value* to **us-east-1 (must be lower case)**
    - Add another environment variable with *Key* **ELASTIC_TRANSCODER_PIPELINE_ID** and set its *Value* to be to your Elastic Transcoder pipeline ID from step 5. (you can find it in the Elastic Transcoder console by clicking on the details icon):

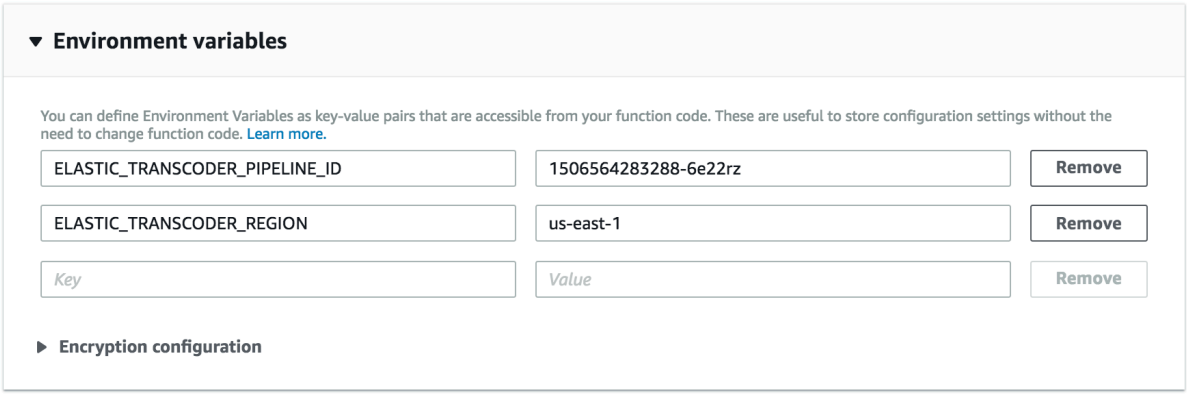


This is the Pipeline ID you need to copy into the environment variable above.



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

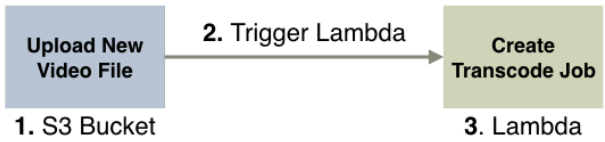
Your environment variables should look a bit like this, but the pipeline id of your elastic transcoder pipeline will be different from the one shown.



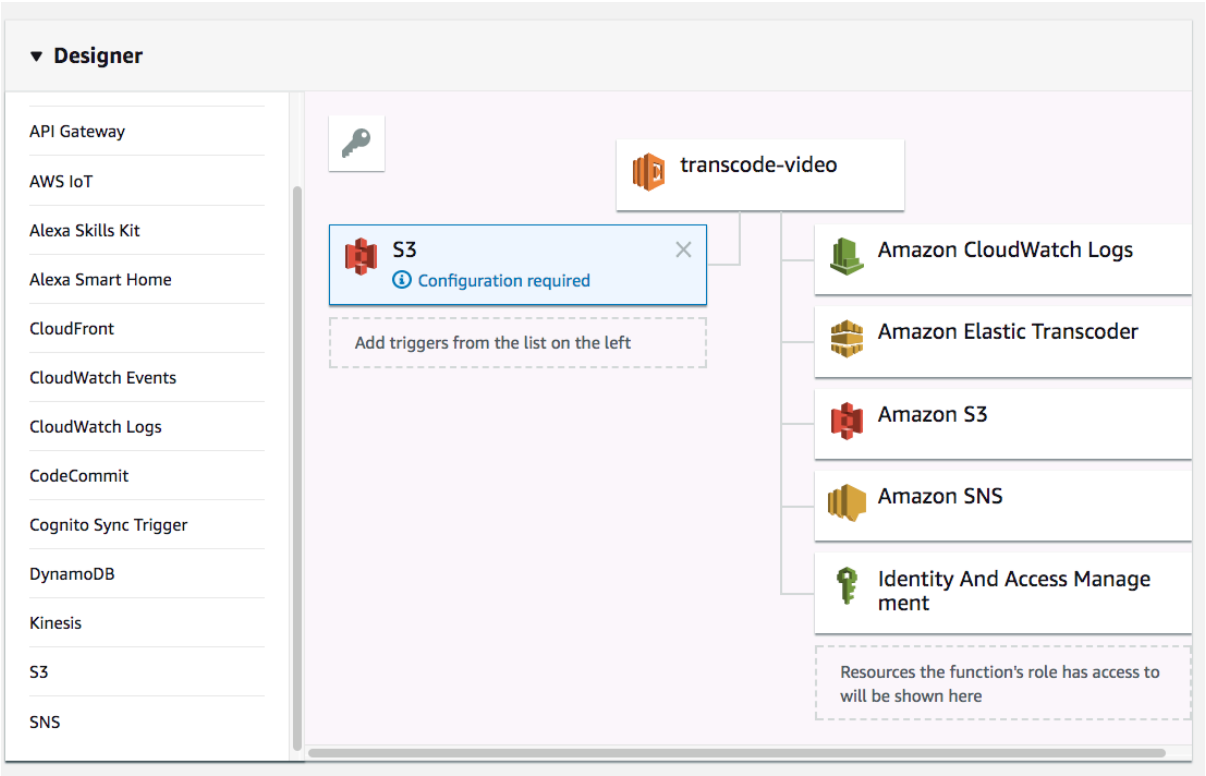
- Click the **Save** button at the top of the page to upload the function and set the environment variables.

8. CONNECT S3 TO LAMBDA

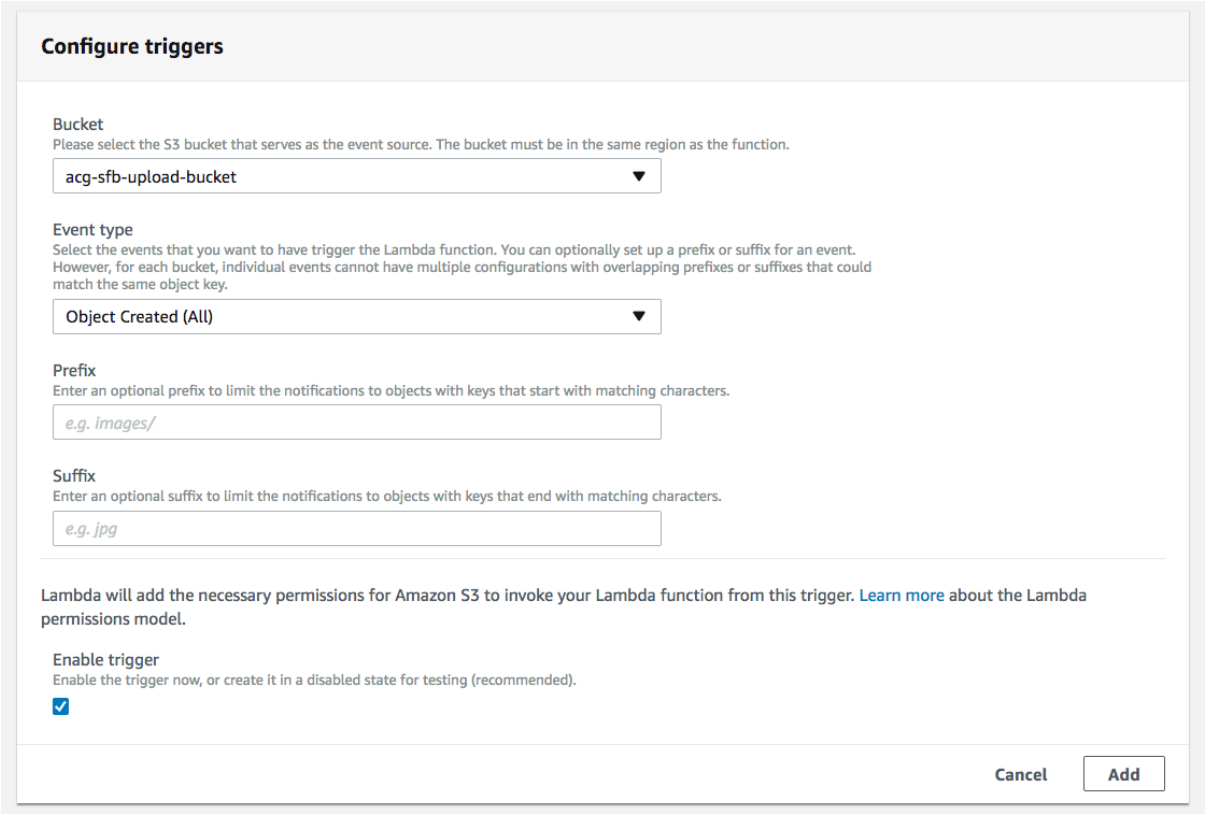
The last step before we can test the function in AWS is to connect S3 to Lambda. S3 will invoke our lambda function when a new video is uploaded:



- On the same page, scroll up to the **Designer** section
- Click on **S3** in the **Add triggers** list on the left

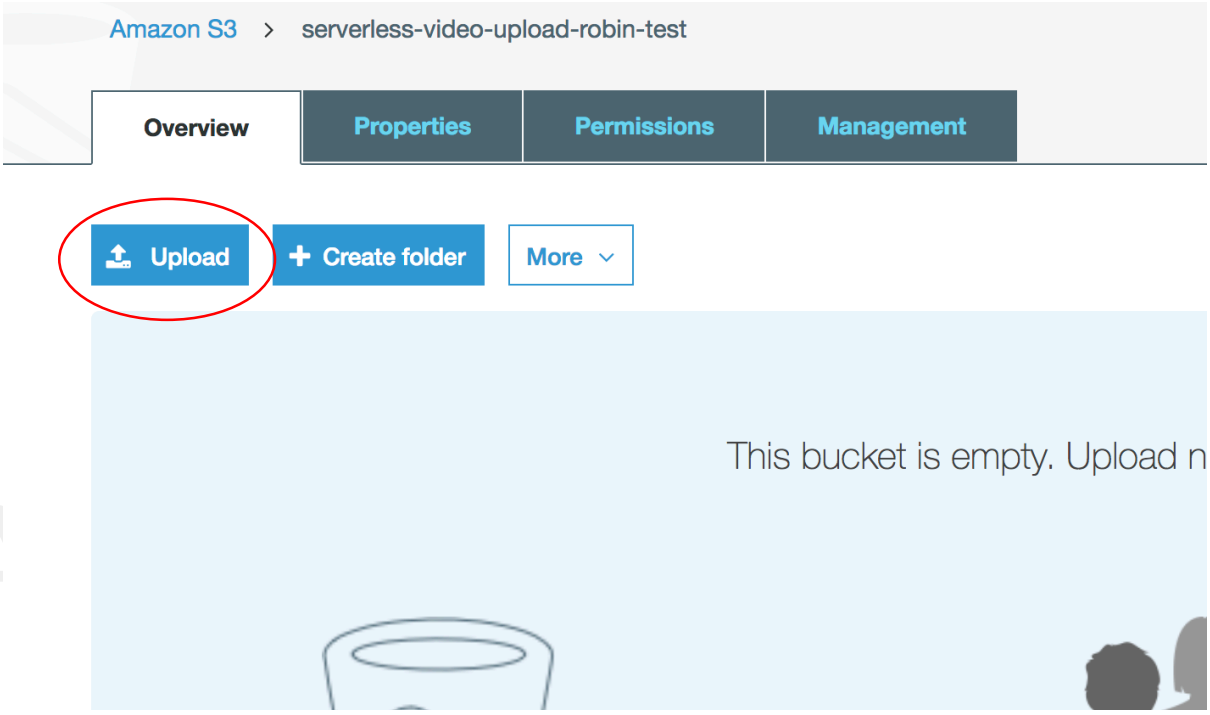


- Scroll down to the **Configure triggers** section
- Select the upload bucket (e.g. *serverless-video-upload*).
- In the event type dropdown, select ***Object Created (All)*.**
- Press **Add**
- Now click on the **Save** button up the top and AWS will link your s3 bucket and lambda function.

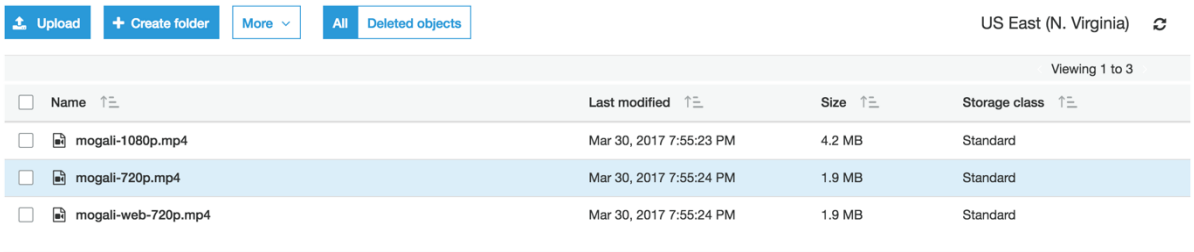


9. TESTING IN AWS

To test the function in AWS, upload a video to the upload bucket.
In the root directory of the serverless-workshop, there's a sample-videos.zip containing videos you can use to test the transcoder.
To do this, go to **S3**, navigate to the *upload* bucket, and then select **Upload**:



- Click **Add Files**, select a video file (an .avi, .mp4, or .mov), and click **Upload**. The file you selected should appear in the *upload* bucket.
- Navigate to the *transcoded* bucket, and after a short period of time (long enough to grab a cup of coffee, not long enough for a proper nap), you should see three new videos. These files will appear in a folder rather than in the root of the bucket:



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

Important: Make sure that the files appear in the transcoded bucket before moving on to the next lesson. If they don't appear after a few minutes, double check each of the steps above.

Get Your Hands Dirty

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 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.
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.