LESSON 4

In lesson 4 you are you going to continue building your image process. You've done the S3 upload function so now you need to write the faceswap function. You already have the file (faceswap.js) so now you need to write the implementation.

1. PACKAGE.JSON

In this lesson we are going to install a dependency that will be packaged up and sent along with our Lambda function to AWS. This dependency is **GraphicsMagick** for nodejs.

- Make a copy of the folder that has your Lesson 3 files and name it Lesson 4
- Open your terminal and browse to Lesson 4
- Run **npm init** from the Lesson 4 folder. This will create a package.json file.
- Name your function **serverless chatbot**. You can accept all other default settings.

After the **npm init** process is finished. We can do install **GraphicsMagick.**

- In your terminal, in the same folder as before, run **npm install gm --save**
- After the download of **GraphicsMagick** is finished you can open package.json to verify that it's there as a dependency.

```
{
  "name": "serverless-chatbot",
  "version": "1.0.0",
  "description": "Serverless Chatbot",
  "main": "faceswap.js",
  "scripts": {
    "test": "echo \"Error: no test specified\" && exit 1"
  },
  "author": "",
  "license": "ISC",
  "dependencies": {
    "gm": "^1.23.0"
  }
}
```

2. FACESWAP.JS

Open **faceswap.js** and replace its contents with the following implementation:

```
'use strict';

const aws = require('aws-sdk');
const fs = require('fs');

const gm = require('gm').subClass({
    imageMagick: true
});

const rekognition = new aws.Rekognition();
const s3 = new aws.S3();

function getEmojiBasedOnSentiment(emotion) {
  if (emotion) {
    return 'emoji/' + emotion[0].Type.toLowerCase() + '.png';
  } else {
    return 'emoji/happy.png';
  }
}
```

```
const detectFaces = function(bucket, filename) {
  return new Promise((resolve, reject) => {
    var params = {
        Image: {
        S3Object: {
          Bucket: bucket,
          Name: filename
        }
      },
      Attributes: ['ALL']
      };

    rekognition.detectFaces(params, function(err, data) {
       if (err) {
        reject(err);
       }
       else {
        resolve(data);
       }
    })
  });
}

const saveFileToSystem = function(bucket, key, facedata) {
    var file = fs.createWriteStream(process.env.TEMP_FOLDER + key);

    return new Promise((resolve, reject) => {
        var stream = s3.getObject({Bucket: bucket, Key: key})
                       .createReadStream()
                       .pipe(file);

        stream.on('error', function(error){
            reject(error);
        });

        stream.on('close', function(data){
            resolve();
        });
    });
};

const analyseImage = function(key) {
  return new Promise((resolve, reject) => {
    var image = gm(process.env.TEMP_FOLDER + key);

    image.size(function(err, size) {
        if (err) {
          reject(err);
        }
        else {
          resolve({image: image, size: size});
```

```
        }
      });
  });
}

const processFaces = function(key, imgdata, facedata) {
  const image = imgdata.image;
  const size = imgdata.size;

  return new Promise((resolve, reject) => {
      for (var i = 0; i < facedata.FaceDetails.length; i++) {
        var box = facedata.FaceDetails[i].BoundingBox;

        const left = parseInt(box.Left * size.width, 10);
        const top = parseInt(box.Top * size.height, 10);

        const width = parseInt(size.width * box.Width, 10);
        const height = parseInt(size.height * box.Height, 10);

        var dimensions = `${left}` + ',' + `${top}` + ' ' + `${width}` + ',' + `${height}`;
        var emoji = getEmojiBasedOnSentiment(facedata.FaceDetails[i].Emotions);
        image.draw('image Over ' + dimensions + ' ' + emoji);
      }
      resolve(image);
  });
}

const saveNewImageToSystem = function(image, key) {
  return new Promise((resolve, reject) => {
     image.write(process.env.TEMP_FOLDER + process.env.OUTPUT_PREFIX + key, function (error){
        if (error) {
          reject(error);
        } else {
          resolve();
        }
      });
  });
}

const uploadToBucket = function(key) {
    var bodystream = fs.createReadStream(process.env.TEMP_FOLDER + process.env.OUTPUT_PREFIX + key);

    return new Promise((resolve, reject) => {
        s3.putObject({
           Bucket: process.env.TRANSFORM_BUCKET,
           Key: key,
           Body: bodystream
        }, function(error, data){
           if (error){
            reject(error);
           } else {
```

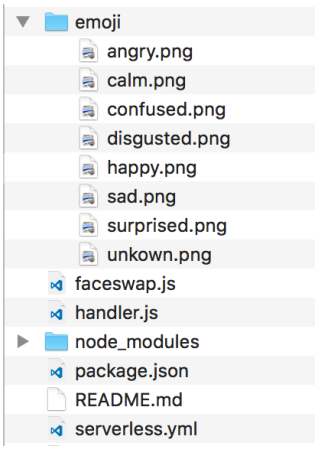
```
            resolve();
          }
        });
    });
};

module.exports.execute = (event, context, callback) => {
  const bucket = event.Records[0].s3.bucket.name;
  const key = decodeURIComponent(event.Records[0].s3.object.key.replace(/\+/g, " "));

  var fd = null;

  detectFaces(bucket, key)
    .then((facedata) => {fd = facedata; return saveFileToSystem(bucket, key, facedata)})
    .then(() => analyseImage(key))
    .then((imagedata) => processFaces(key, imagedata, fd))
    .then((image) => saveNewImageToSystem(image, key))
    .then(() => uploadToBucket(key))
    .then(() => callback(null, 'Success'))
    .catch((err) => callback(err))
};
```

Wow, that is a lot of code for a simple Lambda function. So, how does it work?

- This Lambda function is invoked by an S3 event which in our case is a file uploaded to the S3 bucket (in the previous lesson).
- The faceswap function runs and proceeds to do the following:
    - Analyse the image using the AWS Rekognition service (detectFaces)
    - Save the image file the local system (saveFileToSystem)
    - Analyse the image and get its width and height (analyseImage)
    - Process the image and replace faces with emojis (processFaces)
        - Select which emoji to use based on sentiment analysis (getEmojiBasedOnSentiment)
    - Save the new image to filesystem (saveNewImageToSystem)
    - Upload the new image to a different S3 bucket (uploadToBucket)
- All of this is done in less than 150 lines code. It can be cut down further but we leave it as an exercise to you.

3. EMOJI

We cannot do this workshop without an array of fun emojis! Check out the github source code for this lesson and grab the emoji folder. It should have 8 emojis. Copy this folder to your own working folder where **serverless.yml** resides.



4. AWS REKOGNITION

In the previous step you used AWS Rekognition to perform image analysis. This service scans any image and attempts to detect faces, landmarks, labels and signs. It can also detect features like eyes and mouth, and try to guess how a person in the photo is feeling. We need to grant our **faceswap** Lambda function access to AWS Rekognition.

- Open **serverless.yml** and add the following new iamRoleStatement:

```
iamRoleStatements:
  - Effect: Allow
    Action:
      - rekognition:DetectFaces
    Resource: '*'
```

- The old S3 role statement should still be there. Do not remove it.

5. ENVIRONMENT VARIABLES

If you look closely at the code in step 1 you will see that it refers to environment variables such as TEMP_FOLDER, OUTPUT_PREFIX, UPLOAD_BUCKET and TRANSFORM_BUCKET. The TRANSFORM_BUCKET is new and important. This is the second bucket serverless framework will create for us that will contain modified images. Update the faceswap function definition **serverless.yml** to looks as follows.

```
faceswap:
  handler: faceswap.execute
  environment:
    TEMP_FOLDER: '/tmp/'
    OUTPUT_PREFIX: 'output-'
    UPLOAD_BUCKET: ${self:custom.uploadBucket}
    TRANSFORM_BUCKET: ${self:custom.transformBucket}
  events:
    - s3:
        bucket: ${self:custom.uploadBucket}
        event: s3:ObjectCreated:*
```

6. TRANSFORM BUCKET

The other thing we need to add is the second bucket that will store the new images.

- Update **serverless.yml** and make the **custom** section look like this:

```
custom:
  uploadBucket: ${self:service}-${self:provider.stage}-uploads-ps
  transformBucket: ${self:service}-${self:provider.stage}-transformed-ps
```

You must not forget about security so update **iamRoleStatements** to look as follows

```
  iamRoleStatements:
    - Effect: Allow
      Action:
        - rekognition:DetectFaces
      Resource: '*'
    - Effect: "Allow"
      Action:
        - s3:GetObject
        - s3:PutObject
      Resource: arn:aws:s3:::${self:custom.uploadBucket}/*
    - Effect: "Allow"
      Action:
        - s3:GetObject
        - s3:PutObject
      Resource: arn:aws:s3:::${self:custom.transformBucket}/*
```

7. UPDATE SLACK FUNCTION

Last but not least, lets create an Update Slack function. We are not going to implement it now but it would be good to have it ready.

- Open **serverless.yml** and add the following under **Functions**

```
  slackupdate:
    handler: slackupdate.execute
    events:
      - s3:
          bucket: ${self:custom.transformBucket}
          event: s3:ObjectCreated:*
```

- In the same folder as **serverless.yml** create a new file called **slackupdate.js** and copy the following code to it.

```
'use strict';

module.exports.execute = (event, context, callback) => {
  console.log(event);

  callback(null);
};
```

8. DEPLOY AND AWAY

Let's deploy your functions to AWS. From the terminal run **serverless deploy**.

```
Peters-MacBook-Pro-2:Lesson 4 petersbarski$ serverless deploy
Serverless: Packaging service...
Serverless: Uploading CloudFormation file to S3...
Serverless: Uploading service .zip file to S3 (151.63 KB)...
Serverless: Updating Stack...
Serverless: Checking Stack update progress...
.....................................
Serverless: Stack update finished...
Serverless: Removing old service versions...
Service Information
service: serverless-chatbot
stage: dev
region: us-east-1
api keys:
  None
endpoints:
  POST - https://729bcwptkj.execute-api.us-east-1.amazonaws.com/dev/echo
functions:
  hello: serverless-chatbot-dev-hello
  faceswap: serverless-chatbot-dev-faceswap
  slackupdate: serverless-chatbot-dev-slackupdate
```

9. TEST

Let's test our progress so far. Go to your slack channel and upload a picture with faces in it. If you look at the source code folder you got from GitHub, you'll find a directory with sample pictures you can use for testing.

You should be able to upload an image and see a response from *botty*. Then if you jump in to the second AWS S3 transform bucket, you should see your image. Open the image to see it with emojis.

Wow! Smashing it here. But now it's time to take a little break and then move on to the next lesson.