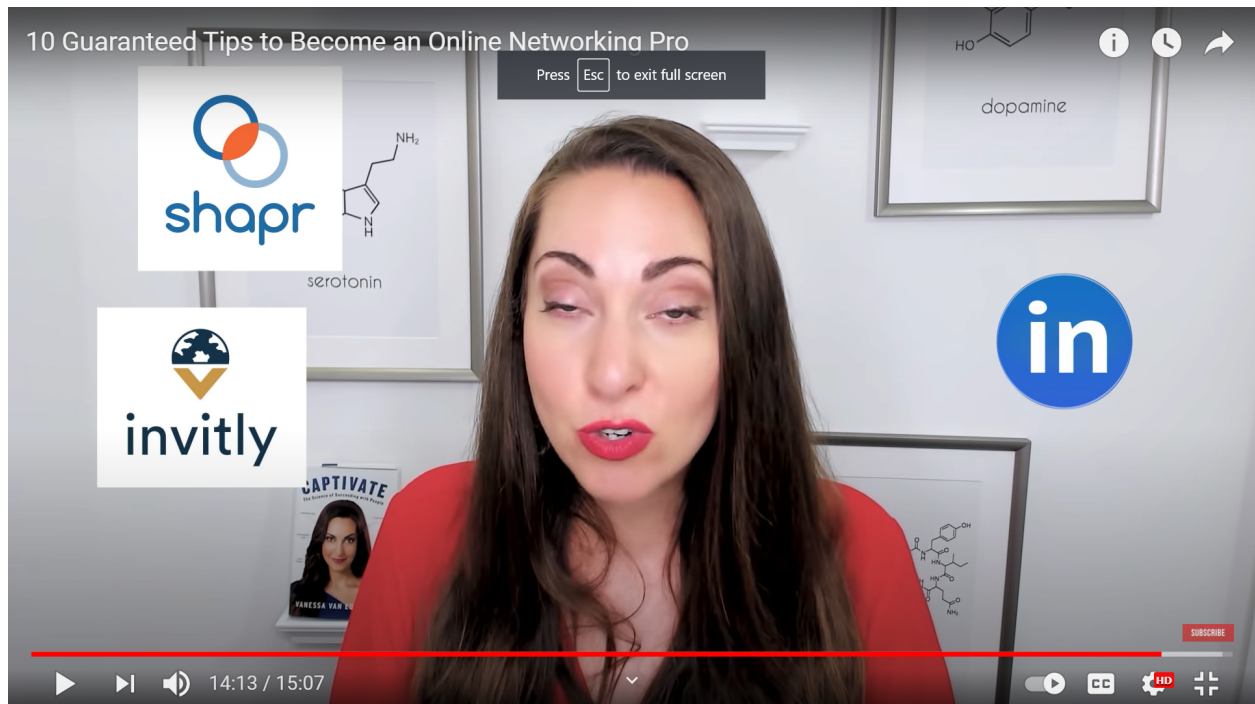# Serverless Assignment

Image Detection Application using AWS Image Rekognition, Lambda, S3, and Chalice

Input:



Output:

[{"name":"Screenshot (235).png","labels":
["Person","Human","Face","Word","Text","Female","Head","Girl","Logo","Symbol","Trademark","Crowd","Woman","Jaw","Blonde","Teen","Kid","Child","Poster","Advertisement","Paper","Page","Smile","Teeth","Mouth","Lip","Magazine"],"type":"image"}]

Working of the Application

- The application will detect the image uploaded on AWS S3 Bucket.
- The bucket is automatically configured with AWS Lambda.
- AWS Lambda will invoke AWS Image Rekognition API to detect the image and the Lambda function will stop working till it receives the results.
- Image Rekognition will take the image path from the S3 bucket.
- Then after recognizing, it will give results to the Lambda function and the Lambda function will store the result in DynamoDB.
- When the chalice is deployed, it takes the output from DynamoDB and passes it to AmazonAPI Gateway.
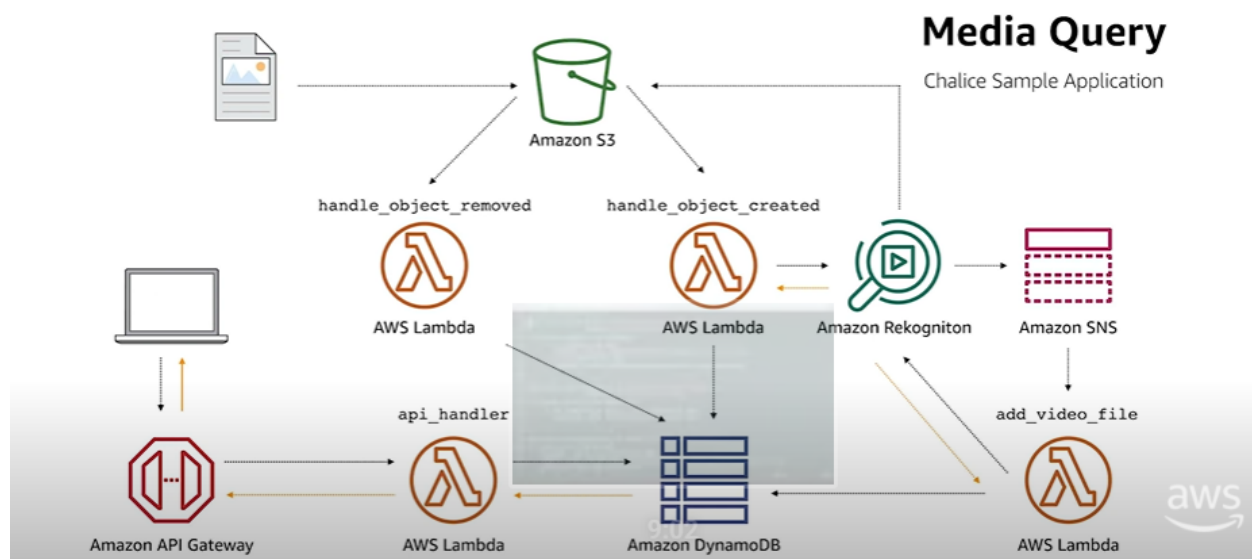
Steps to run Serverless Image Detection Application

1) Cloning AWS Chalice repository, creating a new directory, and activating a virtual environment

```
HP@LAPTOP-QOLQ7PUP MINGW64 ~
$ git clone git://github.com/aws/chalice
Cloning into 'chalice'...
remote: Enumerating objects: 14251, done.
remote: Counting objects: 100% (1194/1194), done.
remote: Compressing objects: 100% (613/613), done.
remote: Total 14251 (delta 751), reused 963 (delta 569), pack-reused 13057
Receiving objects: 100% (14251/14251), 8.60 MiB | 3.41 MiB/s, done.
Resolving deltas: 100% (10105/10105), done.

HP@LAPTOP-QOLQ7PUP MINGW64 ~
$ cp -r chalice/docs/source/samples/media-query/code media-query

HP@LAPTOP-QOLQ7PUP MINGW64 ~
$ cd media-query/

HP@LAPTOP-QOLQ7PUP MINGW64 ~/media-query
$ dir
app.py  chalicelib  recordresources.py  requirements.txt  resources.json

HP@LAPTOP-QOLQ7PUP MINGW64 ~/media-query
$ python3 -m venv /tmp/venv37

HP@LAPTOP-QOLQ7PUP MINGW64 ~/media-query
$ . /tmp/venv37/
bash: .: /tmp/venv37/: is a directory

HP@LAPTOP-QOLQ7PUP MINGW64 ~/media-query
$ |
```

```
HP@LAPTOP-QOLQ7PUP MINGW64 ~/media-query
$ python -m pip install virtualenv
Requirement already satisfied: virtualenv in c:\users\hp\anaconda3\lib\site-packages (20.8.0)
Requirement already satisfied: six<2,>=1.9.0 in c:\users\hp\anaconda3\lib\site-packages (from virtualenv) (1.15.0)
Requirement already satisfied: distlib<1,>=0.3.1 in c:\users\hp\anaconda3\lib\site-packages (from virtualenv) (0.3.2)
Requirement already satisfied: filelock<4,>=3.0.0 in c:\users\hp\anaconda3\lib\site-packages (from virtualenv) (3.0.12)
Requirement already satisfied: backports.entry-points-selectable>=1.0.4 in c:\users\hp\anaconda3\lib\site-packages (from virtualenv) (1.1.0)
Requirement already satisfied: platformdirs<3,>=2 in c:\users\hp\anaconda3\lib\site-packages (from virtualenv) (2.3.0)
WARNING: You are using pip version 21.2.4; however, version 21.3 is available.
You should consider upgrading via the 'C:\Users\HP\anaconda3\python.exe -m pip install --upgrade pip' command.

HP@LAPTOP-QOLQ7PUP MINGW64 ~/media-query
$ python -m virtualenv venv
created virtual environment CPython3.8.3.final.0-64 in 1596ms
  creator CPython3Windows(dest=C:\Users\HP\media-query\venv, clear=False, no_vcs_ignore=False, global=False)
  seeder FromAppData(download=False, pip=bundle, setuptools=bundle, wheel=bundle, via=copy, app_data_dir=C:\Users\HP\AppData\Local\pypa\virtualenv)
    added seed packages: pip==21.2.4, setuptools==58.0.4, wheel==0.37.0
  activators BashActivator,BatchActivator,FishActivator,NushellActivator,PowerShellActivator,PythonActivator

HP@LAPTOP-QOLQ7PUP MINGW64 ~/media-query
$ . venv/scripts/activate
(venv)
HP@LAPTOP-QOLQ7PUP MINGW64 ~/media-query
$ |
```

2) Install all requirements to run the application

```
HP@LAPTOP-QOLQ7PUP MINGW64 ~/media-query
$ . venv/scripts/activate
(venv)
HP@LAPTOP-QOLQ7PUP MINGW64 ~/media-query
$ pip install -r requirements.txt
Collecting boto3<1.15.0
  Downloading boto3-1.14.63-py2.py3-none-any.whl (129 kB)
Collecting jmespath<1.0.0,>=0.7.1
  Using cached jmespath-0.10.0-py2.py3-none-any.whl (24 kB)
Collecting s3transfer<0.4.0,>=0.3.0
  Downloading s3transfer-0.3.7-py2.py3-none-any.whl (73 kB)
Collecting botocore<1.18.0,>=1.17.63
  Downloading botocore-1.17.63-py2.py3-none-any.whl (6.6 MB)
Collecting python-dateutil<3.0.0,>=2.1
  Using cached python_dateutil-2.8.2-py2.py3-none-any.whl (247 kB)
Collecting urllib3<1.26,>=1.20
  Downloading urllib3-1.25.11-py2.py3-none-any.whl (127 kB)
Collecting docutils<0.16,>=0.10
  Downloading docutils-0.15.2-py3-none-any.whl (547 kB)
Collecting six>=1.5
  Using cached six-1.16.0-py2.py3-none-any.whl (11 kB)
Installing collected packages: six, urllib3, python-dateutil, jmespath, docutils, botocore, s3transfer, boto3
Successfully installed boto3-1.14.63 botocore-1.17.63 docutils-0.15.2 jmespath-0.10.0 python-dateutil-2.8.2 s3transfer-0.3.7 six-1.16.0 urllib3-1.25.11
WARNING: You are using pip version 21.2.4; however, version 21.3 is available.
You should consider upgrading via the 'C:\Users\HP\media-query\venv\Scripts\python.exe -m pip install --upgrade pip' command.
(venv)
```

3)   Installing Chalice

```
HP@LAPTOP-QOLQ7PUP MINGW64 ~/media-query
$ pip install chalice
Collecting chalice
  Downloading chalice-1.26.1-py3-none-any.whl (229 kB)
Requirement already satisfied: setuptools in c:\users\hp\media-query\venv\lib\site-packages (from chalice) (58.0.4)
Requirement already satisfied: botocore<2.0.0,>=1.14.0 in c:\users\hp\media-query\venv\lib\site-packages (from chalice) (1.17.63)
Requirement already satisfied: pip<21.4,>=9 in c:\users\hp\media-query\venv\lib\site-packages (from chalice) (21.2.4)
Collecting attrs<21.3.0,>=19.3.0
  Using cached attrs-21.2.0-py2.py3-none-any.whl (53 kB)
Collecting pyyaml<6.0.0,>=5.3.1
  Downloading PyYAML-5.4.1-cp38-cp38-win_amd64.whl (213 kB)
Requirement already satisfied: wheel in c:\users\hp\media-query\venv\lib\site-packages (from chalice) (0.37.0)
Collecting click<9.0,>=7
  Using cached click-8.0.3-py3-none-any.whl (97 kB)
Requirement already satisfied: jmespath<1.0.0,>=0.9.3 in c:\users\hp\media-query\venv\lib\site-packages (from chalice) (0.10.0)
Requirement already satisfied: six<2.0.0,>=1.10.0 in c:\users\hp\media-query\venv\lib\site-packages (from chalice) (1.16.0)
Collecting mypy-extensions==0.4.3
  Using cached mypy_extensions-0.4.3-py2.py3-none-any.whl (4.5 kB)
Collecting inquirer<3.0.0,>=2.7.0
  Using cached inquirer-2.7.0-py2.py3-none-any.whl (31 kB)
Requirement already satisfied: docutils<0.16,>=0.10 in c:\users\hp\media-query\venv\lib\site-packages (from botocore<2.0.0,>=1.14.0->chalice) (0.15.2)
Requirement already satisfied: python-dateutil<3.0.0,>=2.1 in c:\users\hp\media-query\venv\lib\site-packages (from botocore<2.0.0,>=1.14.0->chalice) (2.8.2)
Requirement already satisfied: urllib3<1.26,>=1.20 in c:\users\hp\media-query\venv\lib\site-packages (from botocore<2.0.0,>=1.14.0->chalice) (1.25.11)
Collecting colorama
  Using cached colorama-0.4.4-py2.py3-none-any.whl (16 kB)
Collecting blessed==1.17.6
  Using cached blessed-1.17.6-py2.py3-none-any.whl (76 kB)
Collecting python-editor==1.0.4
  Using cached python_editor-1.0.4-py3-none-any.whl (4.9 kB)
Collecting readchar==2.0.1
  Using cached readchar-2.0.1-py3-none-any.whl (6.9 kB)
Collecting jinxed>=0.5.4
  Using cached jinxed-1.1.0-py2.py3-none-any.whl (33 kB)
Collecting wcwidth>=0.1.4
  Using cached wcwidth-0.2.5-py2.py3-none-any.whl (30 kB)
Collecting ansicon
  Using cached ansicon-1.89.0-py2.py3-none-any.whl (63 kB)
Installing collected packages: ansicon, wcwidth, jinxed, readchar, python-editor, colorama, blessed, pyyaml, mypy-extensions, inquirer, click, attrs, chalice
Successfully installed ansicon-1.89.0 attrs-21.2.0 blessed-1.17.6 chalice-1.26.1 click-8.0.3 colorama-0.4.4 inquirer-2.7.0 jinxed-1.1.0 mypy-extensions-0.4.3 python-editor-
1.0.4 pyyaml-5.4.1 readchar-2.0.1 wcwidth-0.2.5
WARNING: You are using pip version 21.2.4; however, version 21.3 is available.
You should consider upgrading via the 'C:\Users\HP\media-query\venv\Scripts\python.exe -m pip install --upgrade pip' command.
(venv)
HP@LAPTOP-QOLQ7PUP MINGW64 ~/media-query
$
```

4)   Creating a stack to add media (images) to S3 Bucket

```
HP@LAPTOP-QOLQ7PUP MINGW64 ~/media-query
$ aws --version
aws-cli/2.2.45 Python/3.8.8 Windows/10 exe/AMD64 prompt/off
(venv)
HP@LAPTOP-QOLQ7PUP MINGW64 ~/media-query
$ aws cloudformation deploy --template-file resources.json --stack-name media-query app --capabilities CAPABILITY_IAM

Unknown options: app
(venv)
HP@LAPTOP-QOLQ7PUP MINGW64 ~/media-query
$ aws cloudformation deploy --template-file resources.json --stack-name media-query-app --capabilities CAPABILITY_IAM

Waiting for changeset to be created..
Waiting for stack create/update to complete
Successfully created/updated stack - media-query-app
(venv)
HP@LAPTOP-QOLQ7PUP MINGW64 ~/media-query
$
```

5) Configuring stack with config.json

```
(venv)
HP@LAPTOP-QOLQ7PUP MINGW64 ~/media-query
$ cat .chalice/config.json
{
  "version": "2.0",
  "app_name": "media-query",
  "stages": {
    "dev": {
      "api_gateway_stage": "api",
      "autogen_policy": false
    }
  }
}
(venv)
HP@LAPTOP-QOLQ7PUP MINGW64 ~/media-query
$ python recordresources.py --stack-name media-query-app
(venv)
HP@LAPTOP-QOLQ7PUP MINGW64 ~/media-query
$ cat .chalice/config.json
{
  "version": "2.0",
  "app_name": "media-query",
  "stages": {
    "dev": {
      "api_gateway_stage": "api",
      "autogen_policy": false,
      "environment_variables": {
        "MEDIA_TABLE_NAME": "media-query-app-MediaTable-1BCWAWLS3Y95O",
        "MEDIA_BUCKET_NAME": "media-query-app-mediabucket-1toohz76pxolg",
        "VIDEO_TOPIC_NAME": "media-query-app-VideoTopic-446G9PN5YFO9",
        "VIDEO_ROLE_ARN": "arn:aws:iam::298883717259:role/media-query-app-VideoRole-RVDXA8T4POP8",
        "VIDEO_TOPIC_ARN": "arn:aws:sns:us-west-2:298883717259:media-query-app-VideoTopic-446G9PN5YFO9"
      }
    }
  }
}
(venv)
HP@LAPTOP-QOLQ7PUP MINGW64 ~/media-query
```

6) Opening and uploading an image to S3 Bucket

```
HP@LAPTOP-QOLQ7PUP MINGW64 ~/media-query
$ start /tmp/demo/assets/sample.jfif
The system cannot find the file C:/Users/HP/AppData/Local/Temp/demo/assets/sample.jfif.
(venv)
HP@LAPTOP-QOLQ7PUP MINGW64 ~/media-query
$ start /tmp/demo/assets/sample.jfif
(venv)
HP@LAPTOP-QOLQ7PUP MINGW64 ~/media-query
$
```
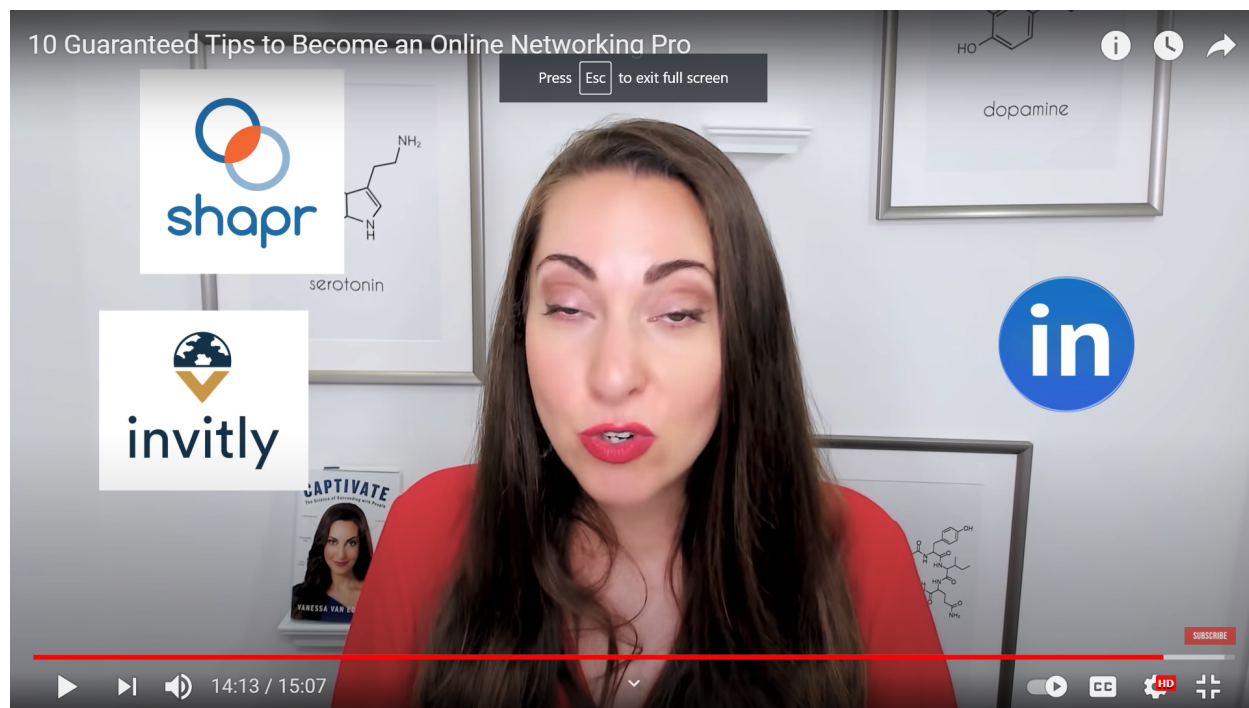
```
HP@LAPTOP-QOLQ7PUP MINGW64 ~/media-query
$ aws s3 cp /tmp/demo/assets/sample.jfif s3://media-query-app-mediabucket-1toohz76pxolg/sample.jfif
upload: ..\AppData\Local\Temp\demo\assets\sample.jfif to s3://media-query-app-mediabucket-1toohz76pxolg/sample.jfif
(venv)
HP@LAPTOP-QOLQ7PUP MINGW64 ~/media-query
$ |
```

7)   Deploying Chalice to run the application

```
HP@LAPTOP-QOLQ7PUP MINGW64 ~/media-query
$ chalice deploy
Creating deployment package.
Reusing existing deployment package.
Updating policy for IAM role: media-query-dev-handle_object_created
Updating lambda function: media-query-dev-handle_object_created
Configuring S3 events in bucket media-query-app-mediabucket-1toohz76pxolg to function media-query-dev-handle_object_created
Updating policy for IAM role: media-query-dev-handle_object_removed
Updating lambda function: media-query-dev-handle_object_removed
Configuring S3 events in bucket media-query-app-mediabucket-1toohz76pxolg to function media-query-dev-handle_object_removed
Updating policy for IAM role: media-query-dev-add_video_file
Updating lambda function: media-query-dev-add_video_file
Updating policy for IAM role: media-query-dev-api_handler
Updating lambda function: media-query-dev
Updating rest API
Resources deployed:
  - Lambda ARN: arn:aws:lambda:us-west-2:298883717259:function:media-query-dev-handle_object_created
  - Lambda ARN: arn:aws:lambda:us-west-2:298883717259:function:media-query-dev-handle_object_removed
  - Lambda ARN: arn:aws:lambda:us-west-2:298883717259:function:media-query-dev-add_video_file
  - Lambda ARN: arn:aws:lambda:us-west-2:298883717259:function:media-query-dev
  - Rest API URL: https://nahk4gwbfc.execute-api.us-west-2.amazonaws.com/api/
(venv)
HP@LAPTOP-QOLQ7PUP MINGW64 ~/media-query
```

Output:

[{"name":"Screenshot (235).png","labels":
["Person","Human","Face","Word","Text","Female","Head","Girl","Logo","Symbol","Trademark","Crowd","Woman","Jaw","Blonde","Teen","Kid","Child","Poster","Advertisement","Paper","Page","Smile","Teeth","Mouth","Lip","Magazine"],"type":"image"}]