

# Find Missing Persons by Scanning Social Media with Amazon Rekognition

MCL334

# Agenda

- Introduction
- Prerequisites
- Harnessing the power of Social Media
- Brief overview of AWS AI services
- Amazon Rekognition
- Sample architectures
- Our Rekognition application architecture
- Design and Build!
- Group presentations : Lessons Learned

# Team Introduction



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# Prerequisites

## Full Participation:

- A laptop with Internet Access and a Web Browser.
- AWS Account with full IAM privileges for:
  - CloudFormation, EC2, Lambda, S3, Rekognition, DynamoDB, Kinesis Firehose, SNS
- Access to EU-WEST-1 region.
- Setup your web stack using this AWS CloudFormation: <to-be-determined>
- A basic understanding of the AWS SDK, Amazon EC2, AWS Lambda, Amazon DynamoDB and Amazon SNS.

## Follow Along:

- A neighbor that loves to share!

## Resources:

- <https://reinvent-2017-mcl334.s3.amazonaws.com/>

\$25 AWS Credits are available at the end of the workshop

# Harnessing the power of Social Media

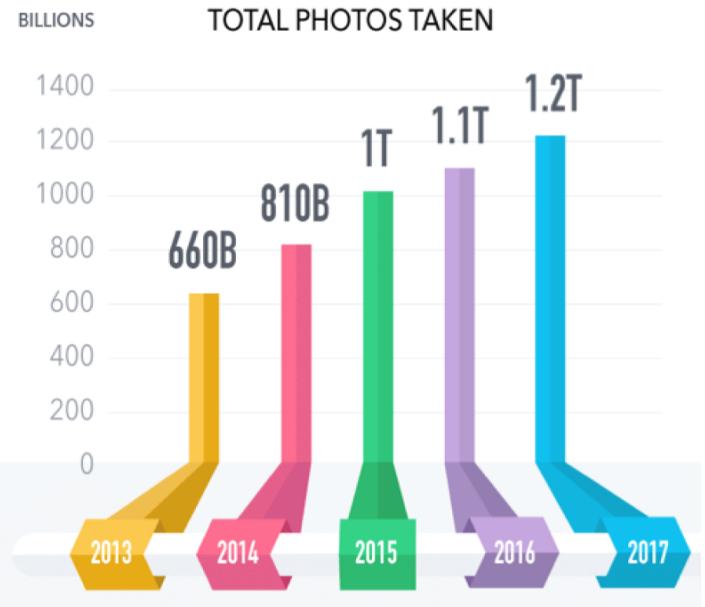
# Images – explosive growth trends

# 1.2 Trillion

photos will be taken in 2017

Proving the adage 'you'll never have fewer digital pictures than before', the number of photos taken worldwide is expected to grow again in 2017.

Compound Annual Growth Rate



Source: InfoTrends Worldwide Consumer Photos Captured and Stored.

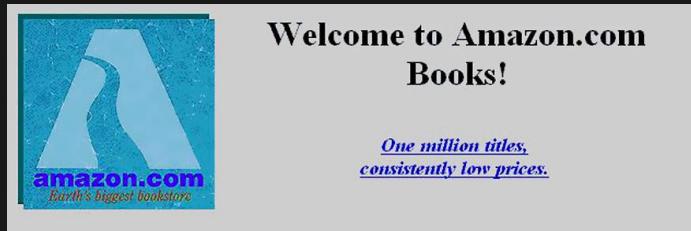
2013 -2017 prepared for Mylio.

# The scenario

- When a person is reported missing, we are given one or more photos of the missing person
- If possible, we get additional information of friends within their social media circle
- Using the reference photo(s), scan the relevant social media feeds to look for photos containing people
- Use Rekognition to determine the probability of the missing person being in that photo
- Take the necessary action based on the confidence score

# Brief overview of AWS AI services

# Artificial Intelligence at Amazon



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# Artificial Intelligence at Amazon

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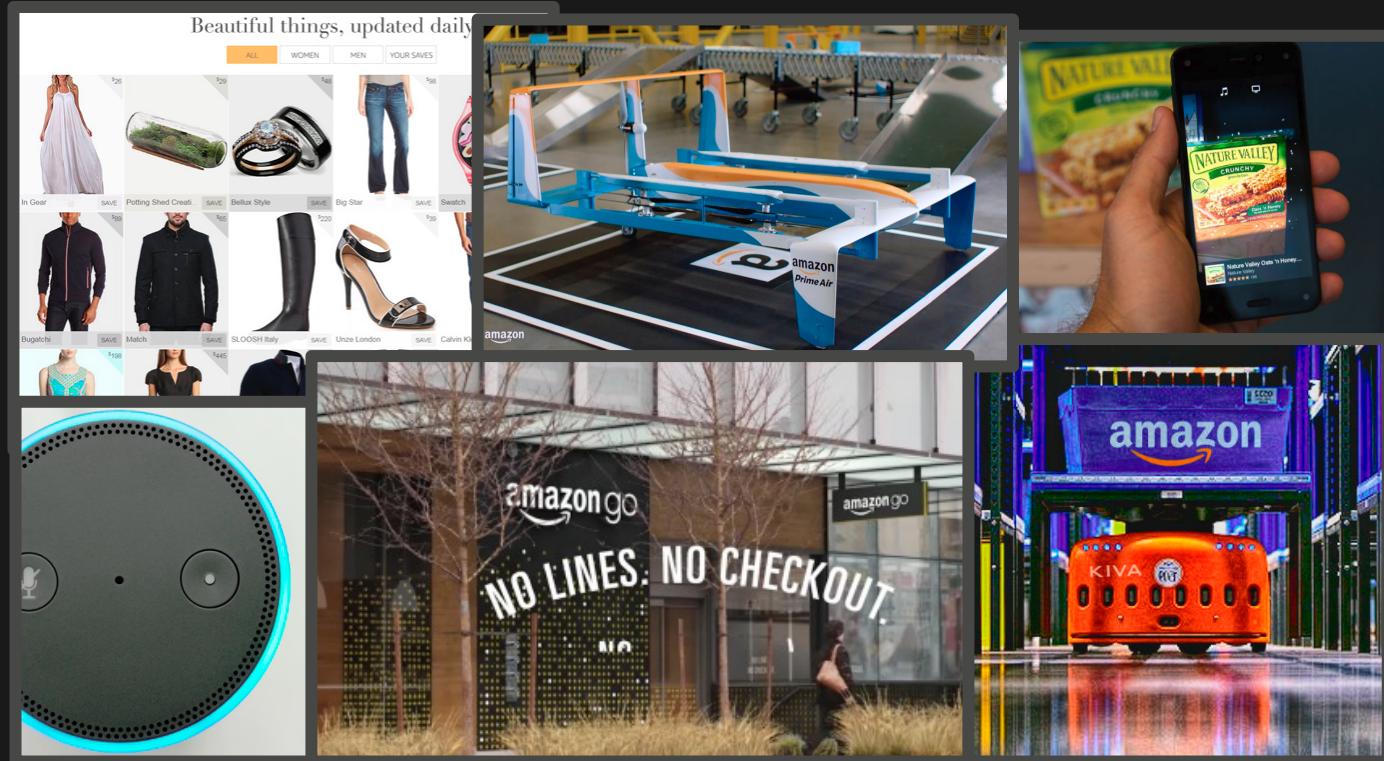
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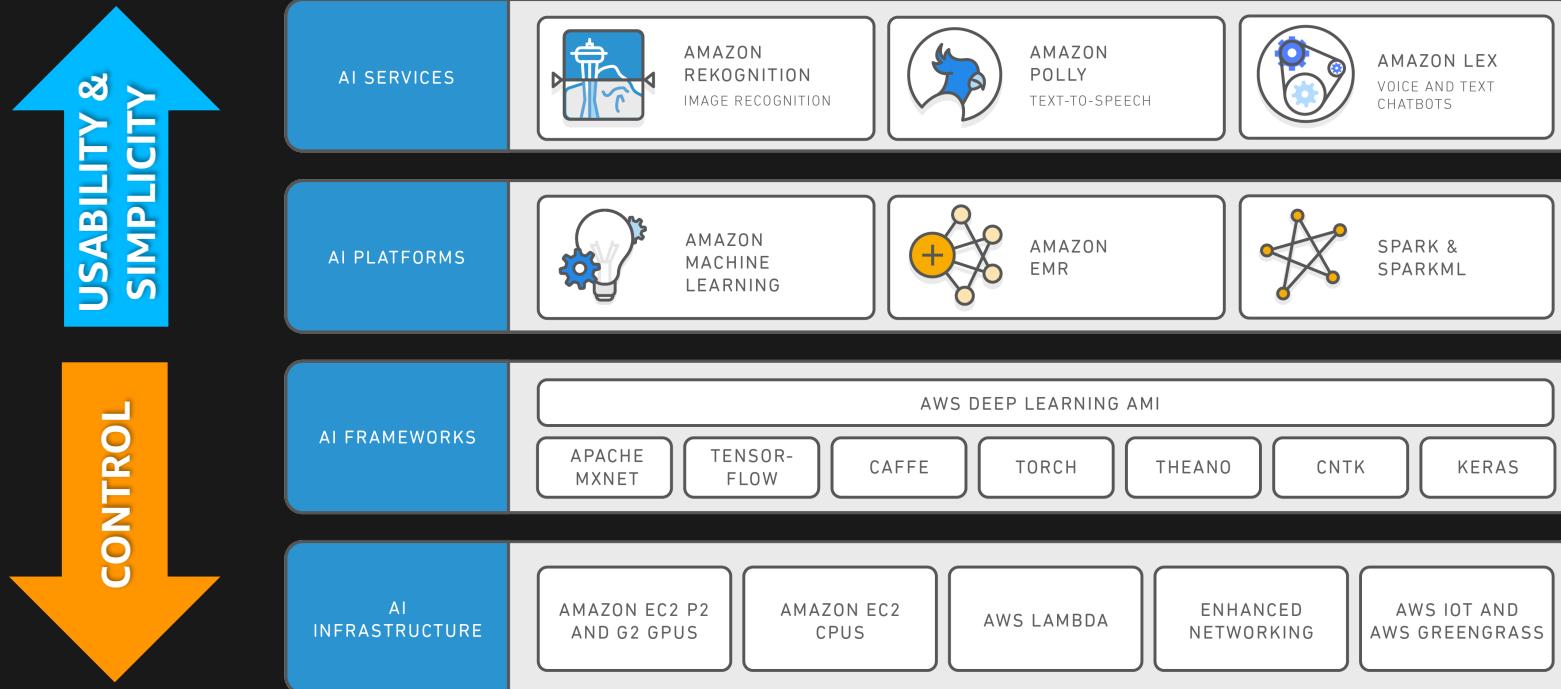
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# Artificial Intelligence at Amazon



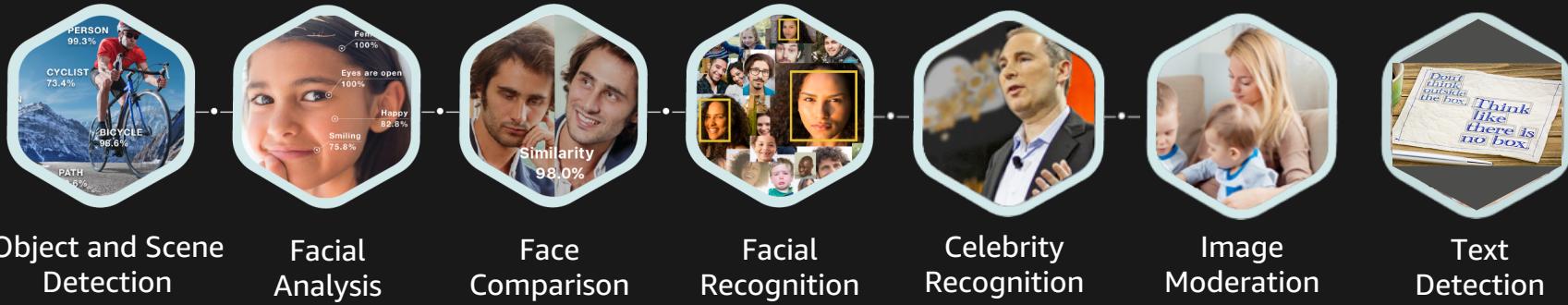
# AI Solutions for Every Developer



# Amazon Rekognition

## Deep Learning-Based Image Recognition Service

# Deep Learning-Based Image Recognition Service

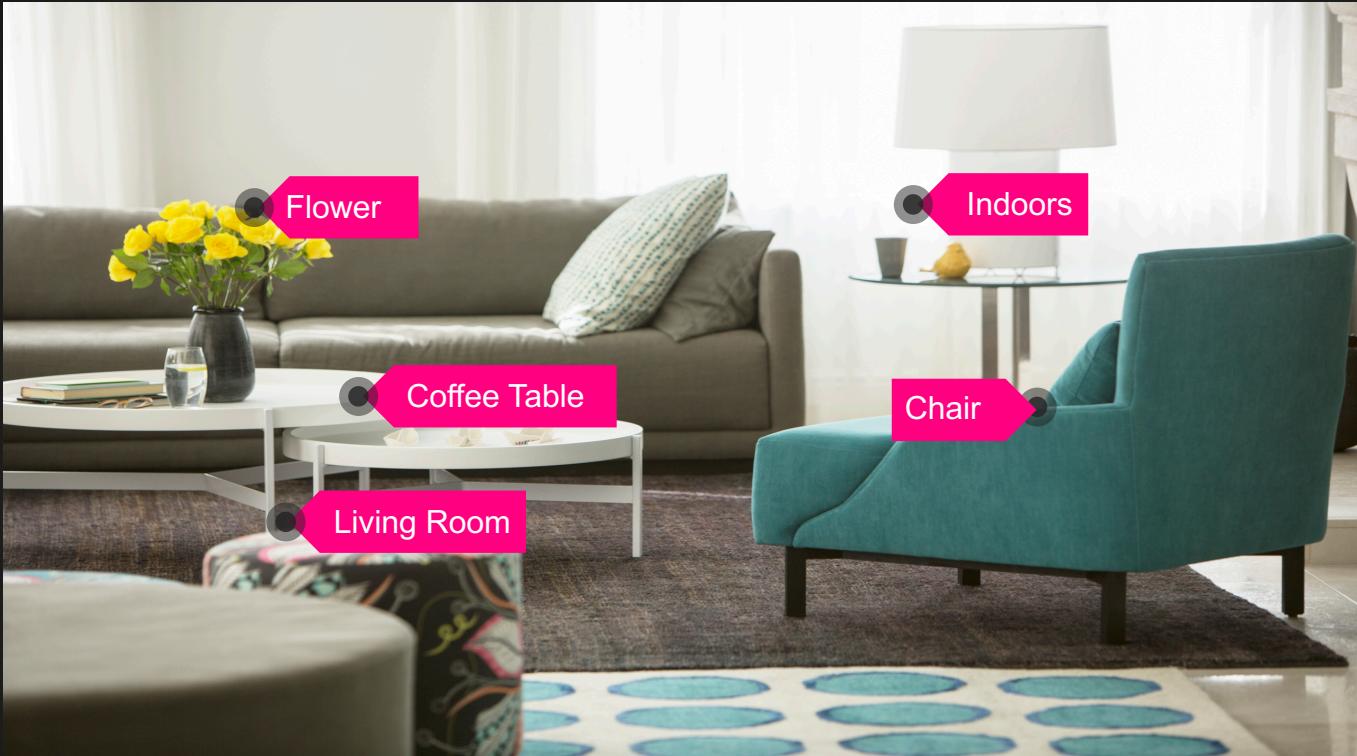


Extract rich metadata from visual content

# Rekognition Data Privacy

- Amazon Rekognition is pre-trained and comes with the ability to:
  - detect thousands of labels, including text
  - detect faces under a variety of conditions
  - represent a face with a compact set of feature vectors.
- Amazon Rekognition APIs do not store the images that are submitted for analysis.
- For face collections, Amazon Rekognition only stores face representations as face metadata in the form of feature vectors, and not as identifiable face image crops.

# Object and Scene Detection



# Object Detection Response



DetectLabels

Couch	98.4%
Furniture	98.4%
Chair	90.1%
Apartment	72.9%
Indoors	72.9%
Interior Design	72.9%
Living Room	72.9%
Room	72.9%
Coffee Table	70.6%
Table	70.6%
Flower Arrangement	70%
Ikebana	70%
Plant	70%
Potted Plant	70%
Vase	70%

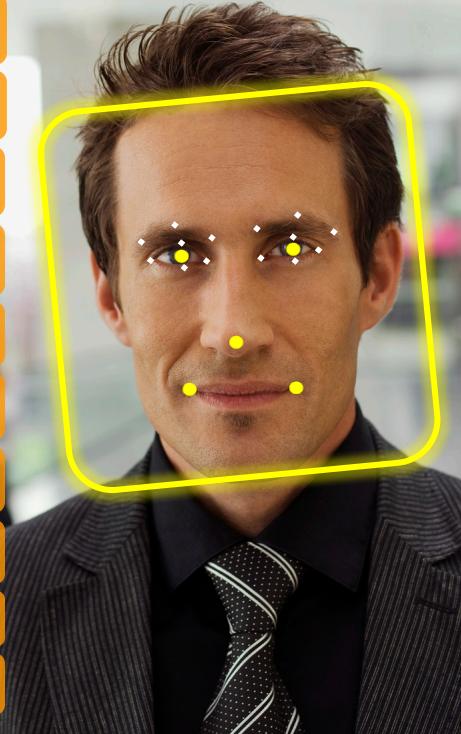
```
{ "Labels": [   { "Confidence": 98.40992736816406, "Name": "Couch" },   { "Confidence": 98.40992736816406, "Name": "Furniture" },   { "Confidence": 90.19068145751953, "Name": "Chair" },   { "Confidence": 72.92642974853516, "Name": "Apartment" },   { "Confidence": 72.92642974853516, "Name": "Indoors" },   { "Confidence": 72.92642974853516, "Name": "Interior Design" },   { "Confidence": 72.92642974853516, "Name": "Living Room" },   { "Confidence": 72.92642974853516, "Name": "Room" },   { "Confidence": 70.6645278930664, "Name": "Coffee Table" },   { "Confidence": 70.6645278930664, "Name": "Table" },   { "Confidence": 70.08317565917969, "Name": "Flower Arrangement" },   { "Confidence": 70.08317565917969, "Name": "Ikebana" },   { "Confidence": 70.08317565917969, "Name": "Plant" },   { "Confidence": 70.08317565917969, "Name": "Potted Plant" },   { "Confidence": 70.08317565917969, "Name": "Vase" }, ... ]}
```

# Facial Analysis



# Facial Analysis

<b>Age Range</b>	<b>38-59</b>
<b>Beard:</b> False	<b>84.3%</b>
<b>Emotion:</b> Happy	<b>86.5%</b>
<b>Eyeglasses:</b> False	<b>99.6%</b>
<b>Eyes Open:</b> True	<b>99.9%</b>
<b>Gender:</b> Male	<b>99.9%</b>
<b>Mouth Open:</b> False	<b>86.2%</b>
<b>Mustache:</b> False	<b>98.4%</b>
<b>Smile:</b> True	<b>95.9%</b>
<b>Sunglasses:</b> False	<b>99.8%</b>



<b>Quality</b>
Brightness 52.5%
Sharpness 99.9%
<b>Bounding Box</b>
Height: 0.36716..
Left: 0.40222..
Top: 0.23582..
Width: 0.27222..
<b>Landmarks</b>
EyeLeft
EyeRight
Nose
MouthLeft
MouthRight
LeftPupil
RightPupil
LeftEyeBrowLeft
LeftEyeBrowRight
LeftEyeBrowUp
...

# Face Detection Response



DetectFaces



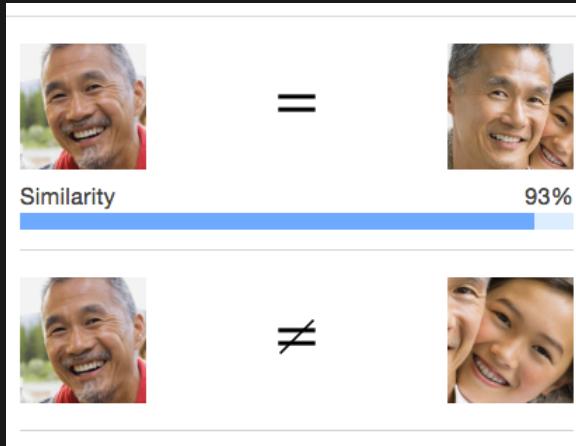
	>
looks like a face	99.9%
appears to be female	100%
age range	26 - 43 years old
smiling	95.9%
appears to be happy	99.3%
not wearing glasses	99.9%
not wearing sunglasses	99%
eyes are open	99.8%
mouth is open	99.6%
does not have a mustache	96.1%
does not have a beard	99.8%

```
{ "FaceDetails": [   {"AgeRange": { "High": 43, "Low": 26 },   "Beard":      {"Confidence":99.85540771484375, "Value":false},   "BoundingBox": { "Height": 0.2491258680820465,   "Left": 0.24662360548973083,   "Top": 0.3715035021305084,   "Width": 0.16735173761844635 },   "Confidence": 99.99932861328125,   "Emotions": [     {"Confidence":99.39989471435547, "Type":"HAPPY"},     {"Confidence":2.1347522735595703,"Type":"CONFUSED"},     {"Confidence":0.5798757076263428,"Type":"CALM"} ],   "Eyeglasses": { "Confidence":99.91224670410156, "Value": false},   "EyesOpen": { "Confidence":99.80206298828125, "Value":true},   "Gender": { "confidence":100, "value":"Female"},   "MouthOpen": { "Confidence":99.6885986328125, "Value":true},   "Mustache": { "confidence":96.18856048583984, "Value":false},   "Pose": { "Pitch": 3.2236437797546387,   "Roll": 2.146042585372925,   "Yaw": 0.5983592867851257 },   "Quality": { "Brightness": 44.612152099609375,   "Sharpness": 89.90251922607422 },   "Smile": { "Confidence":95.92080688476562,   "Value": true } }, ... ] }
```

# Face Comparison Response



CompareFaces



```
{ "FaceMatches": [ { "Face": { "BoundingBox": { "Height": 0.5161678791046143, "Left": 0.3005032241344452, "Top": 0.12452299892902374, "Width": 0.36951833963394165 }, "Confidence": 99.99421691894531, "Landmarks": [ { ... } ], "Pose": { "Pitch": 0.1339939534664154, "Roll": 9.199385643005371, "Yaw": 17.92048454284668 }, "Quality": { "Brightness": 64.16256713867188, "Sharpness": 99.9945297241211 } }, "Similarity": 93 }...], "SourceImageFace": { "BoundingBox": { "Height": 0.3388024866580963, "Left": 0.26048025488853455, "Top": 0.30257830023765564, "Width": 0.21571022272109985 }, "Confidence": 99.99761962890625 }, ... }
```

# Celebrity Recognition Response



A screenshot of a celebrity recognition interface. It shows a small thumbnail of Jeff Bezos's face followed by his name, "Jeff Bezos", and a "Learn More" link. Below the thumbnail, the text "Match confidence" is followed by "100%".

```
{ "CelebrityFaces": [ { "Face": { "BoundingBox": { "Height": 0.6766666769981384, "Left": 0.273333340883255, "Top": 0.09833333641290665, "Width": 0.4511111080646515 }, "Quality": { "Brightness": 56.59690475463867, "Sharpness": 99.9945297241211 } }, "Id": "1SK7cR8M", "MatchConfidence": 100, "Name": "Jeff Bezos", "Urls": [ "www.imdb.com/name/nm1757263" ] } ], "UnrecognizedFaces": [] }
```

RecognizeCelebrities

# Image Moderation Response



DetectModerationLabels

Suggestive	84.7%
Female Swimwear Or Underwear	84.7%

Top-Level Category	Second-Level Category
Explicit Nudity	Nudity
	Graphic Male Nudity
	Graphic Female Nudity
	Sexual Activity
	Partial Nudity
Suggestive	Female Swimwear Or Underwear
	Male Swimwear Or Underwear
	Revealing Clothes

```
{"ModerationLabels": [ { "Confidence":84.76228332519531, "Name": "Suggestive", "ParentName": "" }, { "Confidence":84.76228332519531, "Name": "Female Swimwear or Underwear", "ParentName": "Suggestive" } ] }
```

# Text Detection Response



DetectText

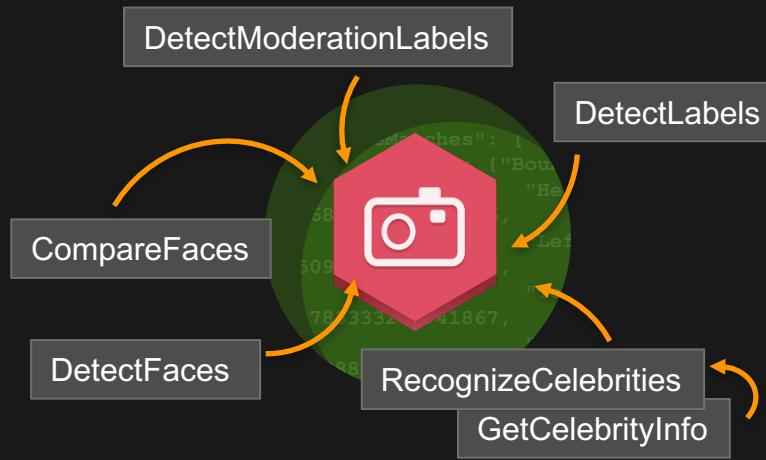
▼ Results      US English only

| IT'S |  
| MONDAY |  
| but | keep |  
| Smiling |

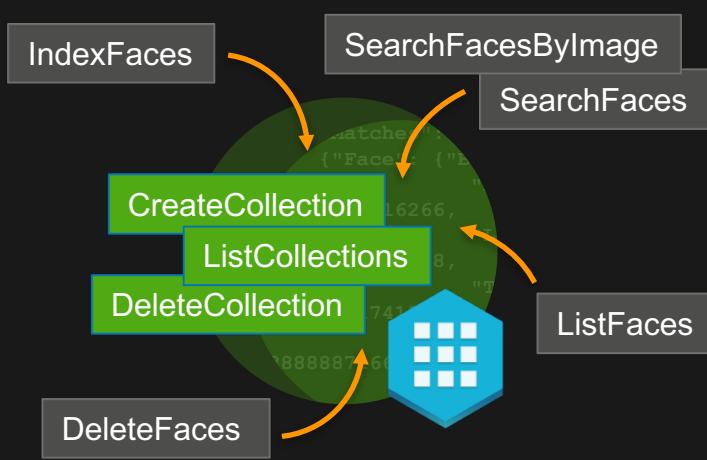
```
{ "TextDetections": [ { "Confidence": 97.4773178100586, "DetectedText": "IT'S", "Geometry": { "BoundingBox": { "Height": 0.10191240906715393, "Left": 0.6658040285110474, "Top": 0.18162749707698822, "width": 0.15050667524337769 }, "Polygon": [ { "X": 0.6658040285110474, "Y": 0.18162749707698822 }, { "X": 0.816310703754425, "Y": 0.18183693289756775 }, { "X": 0.8162477016448975, "Y": 0.2837493419647217 }, { "X": 0.6657410264015198, "Y": 0.28353992104530334 } ] }, "Id": 0, "Type": "LINE" }, { "Confidence": 92.7912368774414, "DetectedText": "MONDAY", "Geometry": { ... }... { "Confidence": 96.57958984375, "DetectedText": "but", ... } }
```

# Amazon Rekognition API operations

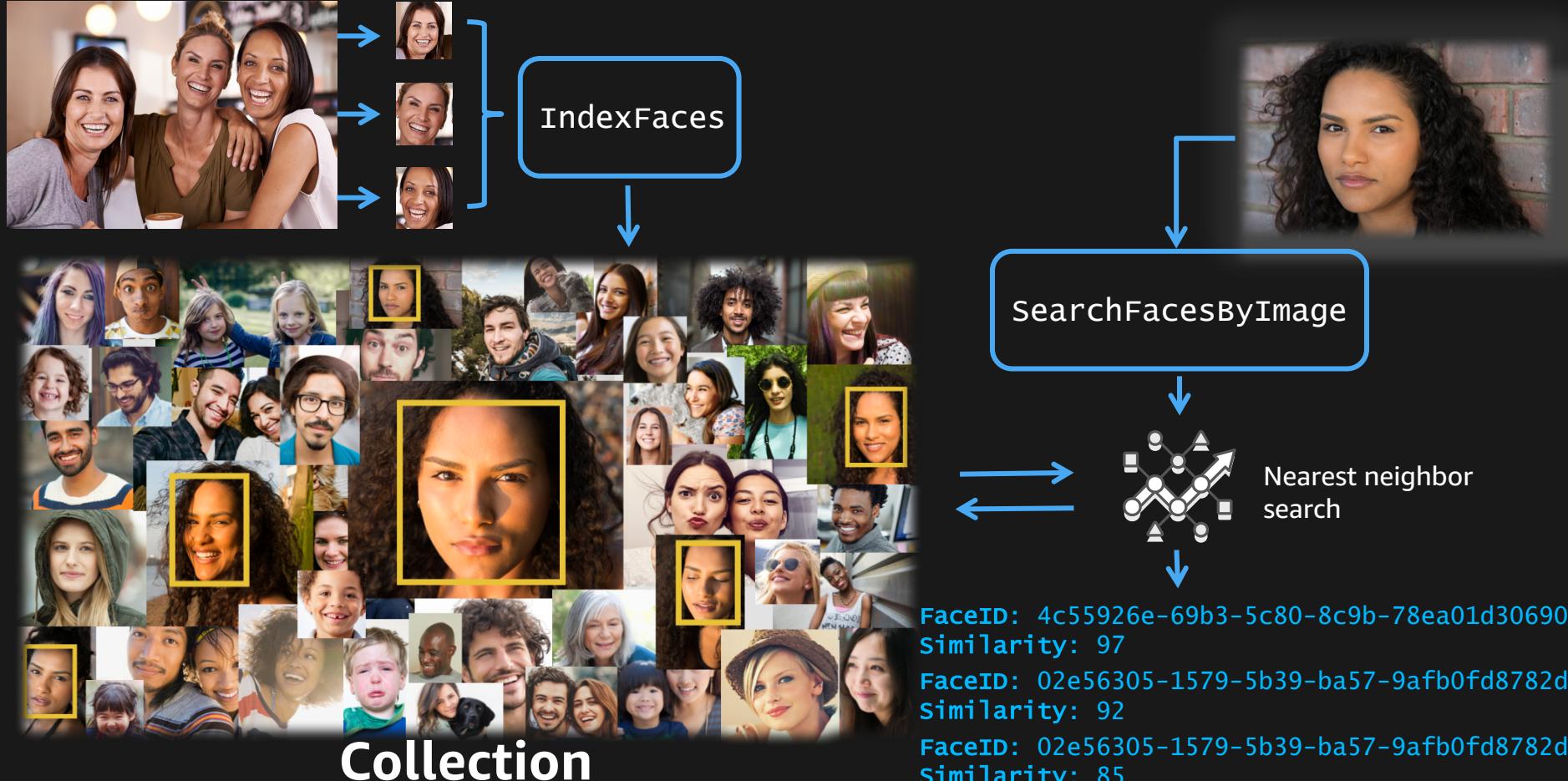
# Non-Storage API Operations



# Storage-Based API Operations



*Amazon Rekognition's computer vision API operations can be grouped into non-storage API operations, and storage-based API operations*



# Interfacing with Amazon Rekognition

Build, test, and deploy for [Amazon Rekognition](#) using SDKs & API calls



Android



iOS



Java



JavaScript



.NET



Node.js



PHP



Python



Ruby



Xamarin



AWS CLI

or use the [AWS CLI](#)

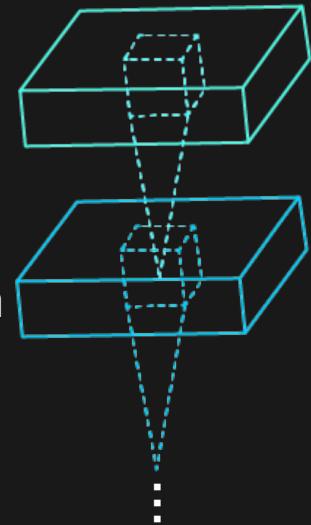
```
aws rekognition detect-labels --image \
  "S3Object={Bucket=mybucket,Name=image.jpg}" | \
grep -E '(Vehicle|Automobile|Car)' | mail -s "Alert! Car on Property!" me@site.com
```

or use the [rich console](#)

<https://console.aws.amazon.com/rekognition/home>

# Optimizing your input & requests

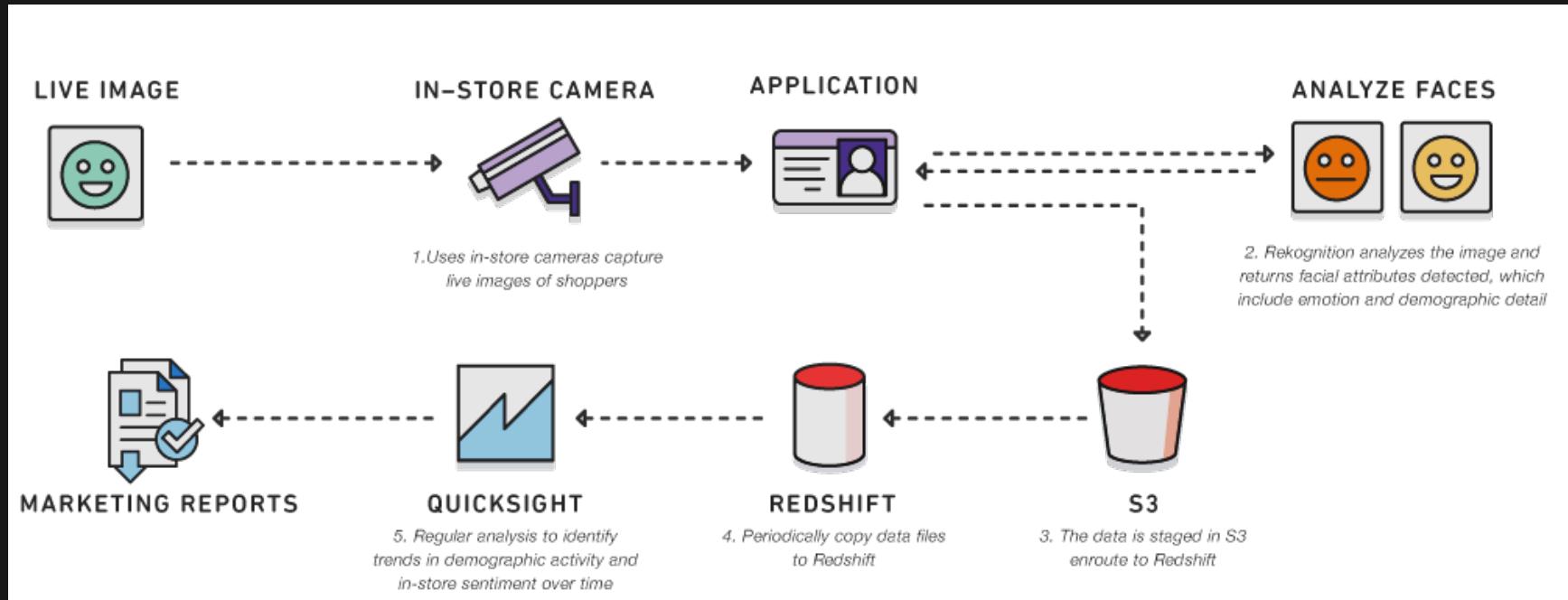
- Amazon S3 input for API calls—max image size of 15 MB
- 5 MB limit for non-S3 (Base 64 encoded) API calls
- Minimum image resolution (x or y) of 80 pixels
- Image data supported in PNG or JPG format
- Max number of faces in a single face collection is 1 million
- The max matching faces the search API returns is 4096
- Size of face should occupy 5%+ of image for detection
- Collections are for faces!



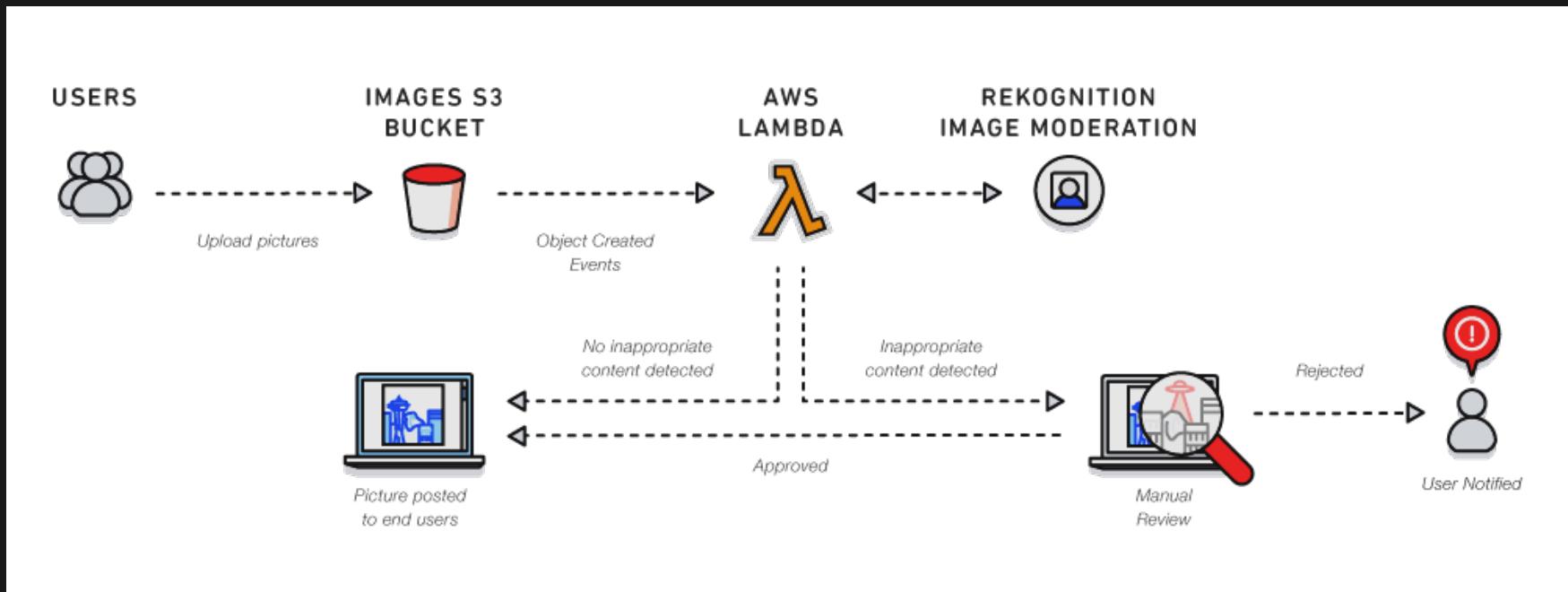
*Use Amazon CloudWatch to observe and issue alerts on Amazon Rekognition metrics*

# Sample Architectures using Rekognition

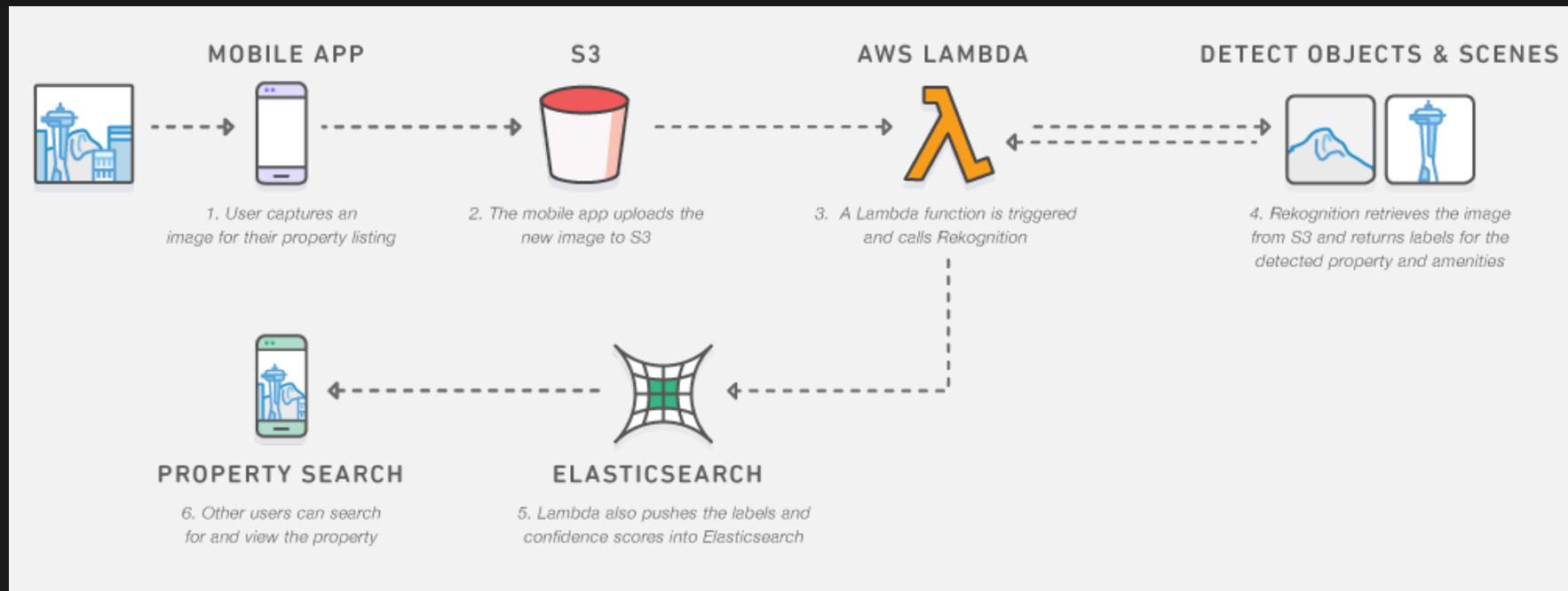
# Sentiment Analysis



# Image Moderation



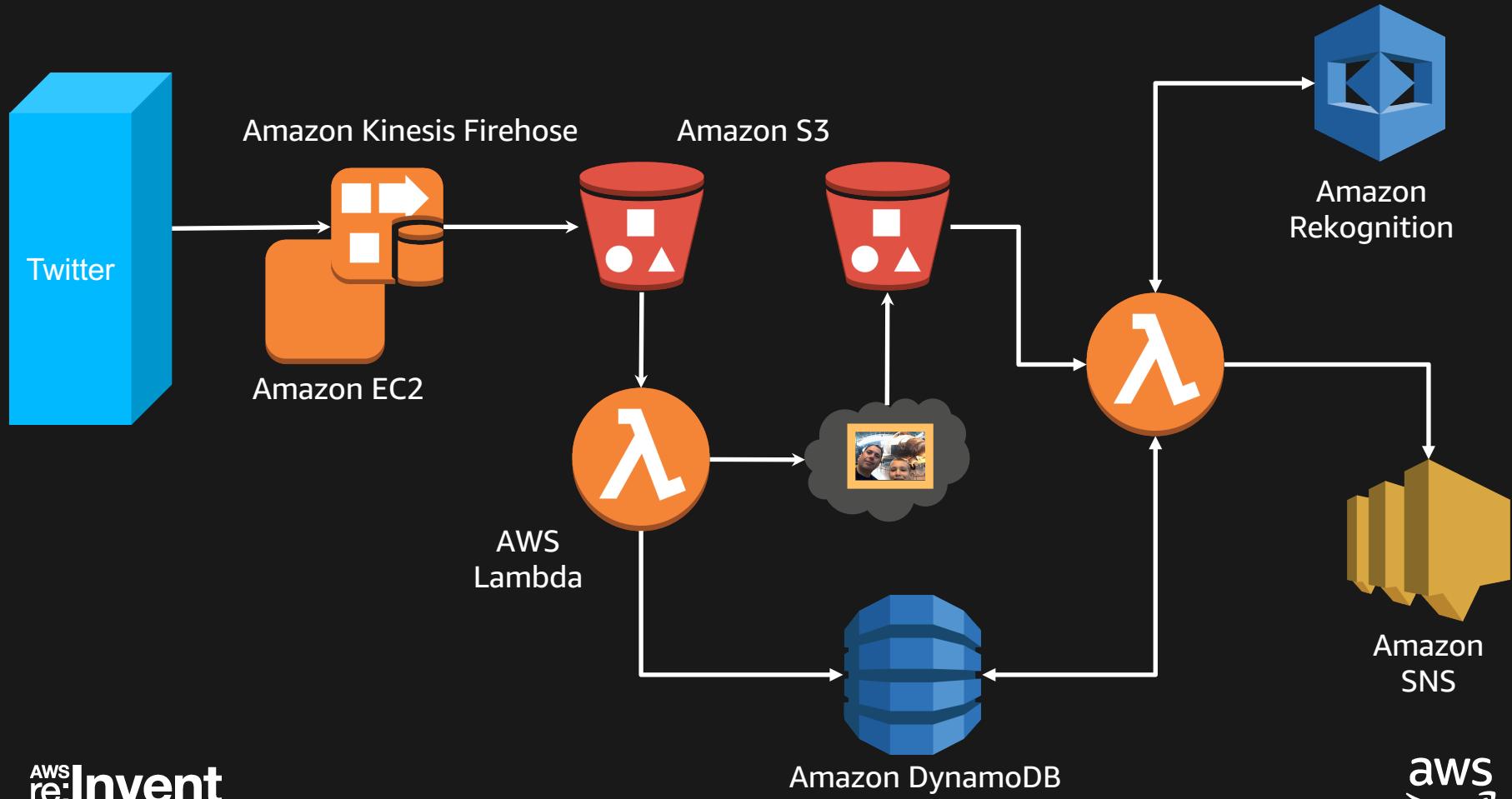
# Searchable Image Library



# Our Rekognition Application Architecture: Key Components Overview

## **"Loosely coupled systems"**

**The looser they are coupled,  
the bigger they will scale,  
the more fault tolerant they will be,  
the less dependencies they will have,  
the faster you will innovate.**



# Amazon Kinesis Firehose



- Reliably ingest, transform, and deliver batched, compressed, and encrypted data to Amazon S3, Amazon Redshift, and Amazon Elasticsearch
- Point and click setup
- Zero administration
- Seamless elasticity

# AWS Lambda



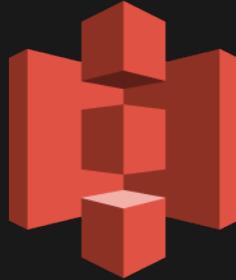
- Run your code in the cloud
- Fully managed and highly-available
- Triggered through API or state changes in your setup
- Scales automatically
- Node.js (JavaScript), Python, Java (Java 8 compatible), and C# (using the .NET Core runtime)
- Charged per 100ms execution time

# AWS DynamoDB



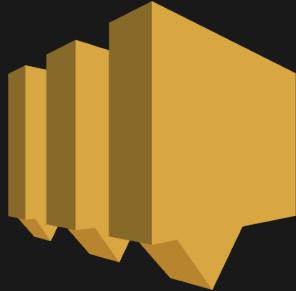
- NoSQL Database
- Seamless scalability
- Zero administration
- Single digit millisecond latency

# Amazon Simple Storage Service (S3)



- Store anything
- Object storage
- Scalable
- 99.99999999% durability
- Extremely low cost

# Amazon Simple Notification Service (SNS)



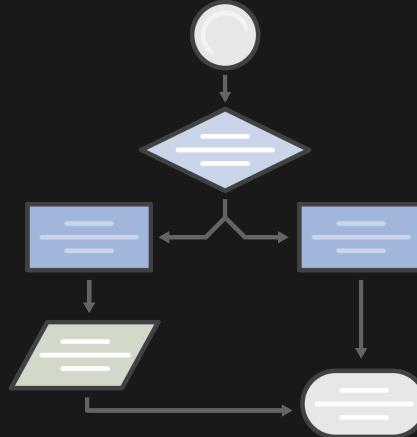
- Fast, reliable, scalable fully managed pub-sub service
- Message notifications pushed to subscribers
- Use topics to fan out messages to:
  - Amazon SQS queues
  - HTTP endpoints (web servers)
  - AWS Lambda functions
  - Mobile push, SMS, and email

# Live Demo!



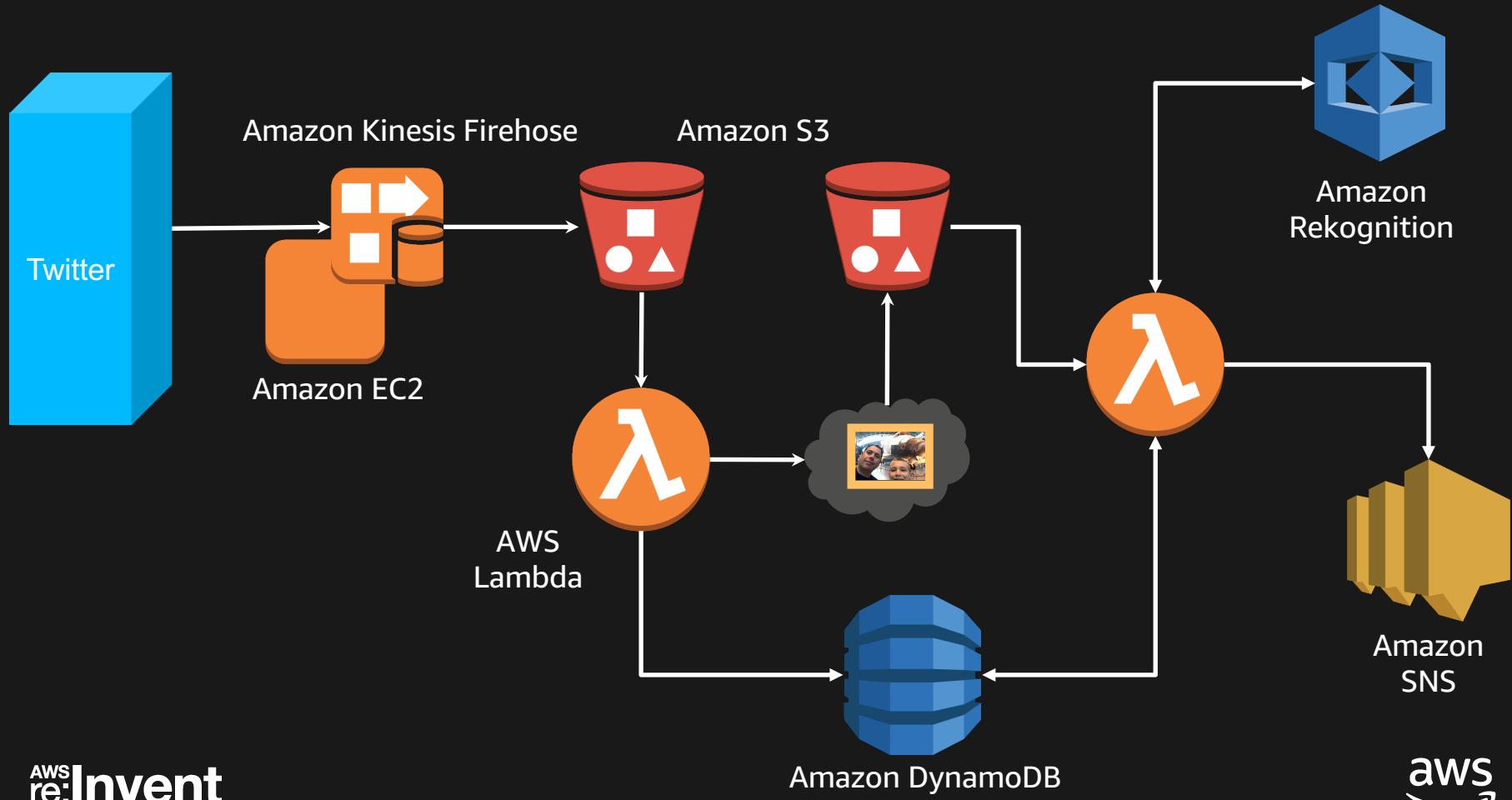
# Design & Build!

- Think about making use of:
  - Amazon Kinesis
  - AWS Lambda
  - Amazon S3
  - Amazon SNS
  - Amazon DynamoDB



- **Remember: Show & Tell**
  - Save some time to share your solution with us





# Don't Forget: Clean up



- Ensure any resources used in this Workshop are terminated
    - Delete the CloudFormation Stack
- AND/OR**
- Terminate EC2 instances
  - Delete S3 objects
  - Delete DynamoDB tables
  - Remove Lambda triggers on S3 buckets

**\$25 AWS Credits are available at the end of the workshop**

# COMPARISON

CLICK TO ADD TEXT

CLICK TO ADD TEXT

# THREE CONTENT

# FOUR CONTENT - GRAPHICS

CLICK TO ADD TEXT

CLICK TO ADD TEXT

CLICK TO ADD TEXT

CLICK TO ADD TEXT

# SIX CONTENT - GRAPHICS

CLICK TO ADD TEXT



THANK YOU!

CLICK TO ADD TEXT