



**AWS  
re:Invent**

# Tech Media Update

re:Invent 2016

Julien Simon, Principal Technical Evangelist, AWS  
julsimon@amazon.fr  
@julsimon

Bruxelles, 16/03/2017

# AWS Is Transforming The IT Industry

A man in a blue t-shirt and jeans stands on a stage, gesturing with his hands. The stage is lit with blue light, and the background is a large screen displaying the title. The audience is visible in the foreground, mostly in silhouette.

**AWS re:Invent 2016**

**Las Vegas**

**Over 30,000**

**participants**

**Over 400 sessions**

# Agenda

## 1. Mass Migration

- Data Migration
- Application Migration
- VMware on AWS

## 2. Artificial Intelligence

- AI @ Amazon
- Amazon Lex
- Amazon Polly
- Amazon Rekognition

# Mass Migration



**GE is migrating 9,000 workloads over to AWS**

**Intends to reduce the number of datacenters from 34 down to 4**

# GE Oil & Gas

| Business Agility   | Operational Resilience  | Cost Avoidance   | Workforce Productivity   | Operational Costs  |
|--|---|--|--|--|
| <ul style="list-style-type: none"><li>• 77% faster to deliver business applications</li><li>• Rapid experimentation</li><li>• Reduced technical debt</li><li>• Streamlined M&amp;A activity</li></ul>        | <ul style="list-style-type: none"><li>• 98% reduction in P1/P0's</li><li>• Improved security posture</li><li>• 15 cloud services created</li><li>• Improved performance</li></ul> | <ul style="list-style-type: none"><li>• 52% average TCO savings</li><li>• 80% cloud first adoption</li></ul> | <ul style="list-style-type: none"><li>• 15 automated bots developed</li><li>• 8 cloud migration parties</li><li>• Shift to self-service culture</li><li>• DevOps in Practice</li></ul> | <ul style="list-style-type: none"><li>• 35% reduction in compute assets (792)</li><li>• 50 applications decommissioned</li><li>• \$14M YOY Savings</li></ul> |
| <div><div><div>\$14.2M Investment</div><div>+</div><div>18 Months</div><div>+</div><div>Progress Focus</div><div>=</div><div>311 Apps in Cloud</div><div>&amp;</div><div>\$14M YOY Savings</div></div></div> |   |  |  |  |

# Enel use AWS to transform the company

“

*Through the shift to AWS we achieved  
a saving of up to 50% in storage costs,  
20% in computational power, and  
reduced the time required to provision  
from 3-4 weeks to two days*

**Fabio Veronese**

Head of ICT Solution Center Infrastructure & Networks  
Head of Infrastructure and Technological Services



”

Enel operates in more than 30 countries, serving 61 million customers with a 1.9 million kilometers of grid network. Enel has been listed by Fortune 5<sup>th</sup> out of 50 companies that can change the world.

10,000 servers...

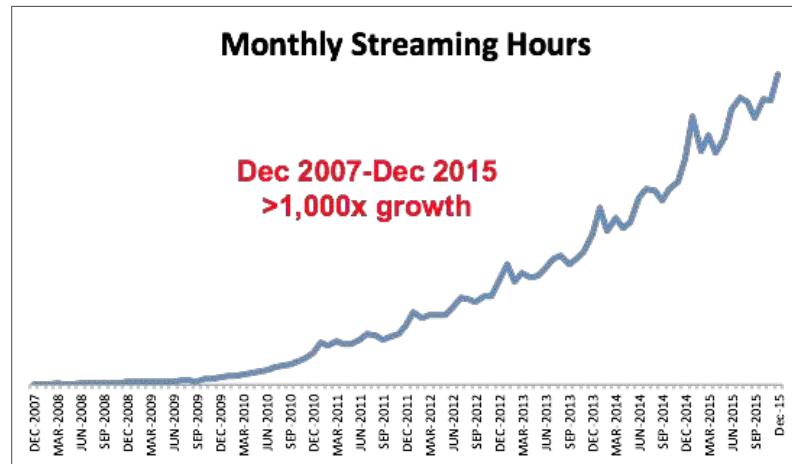
6 Petabytes of storage...

Migrated in 9 months

# Netflix complete their migration to AWS

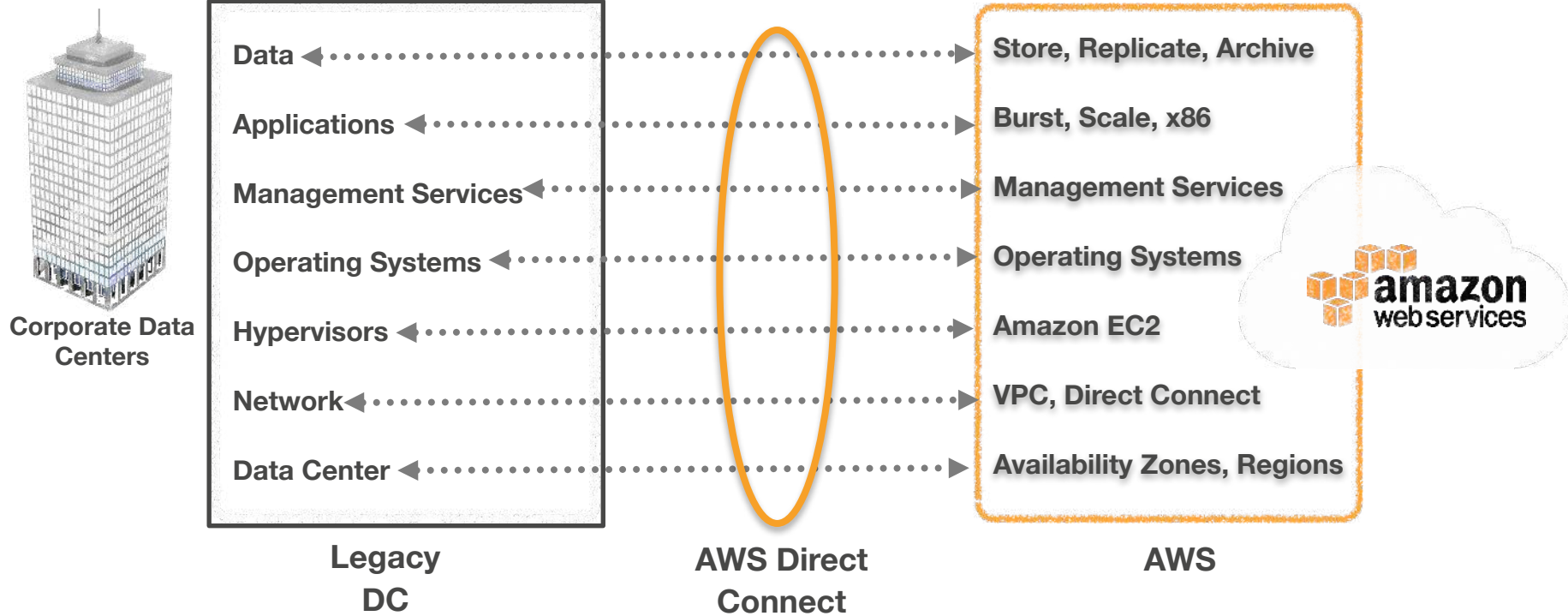
*“Our journey to the cloud at Netflix began in August of 2008, when we experienced a major database corruption (...) That is when we realized that we had to move away from vertically scaled single points of failure (...) We chose AWS as our cloud provider because it provided us with the **greatest scale** and the **broadest set of services and features**.”* Yury Izrailevsky, VP Cloud and Platform Engineering

# NETFLIX

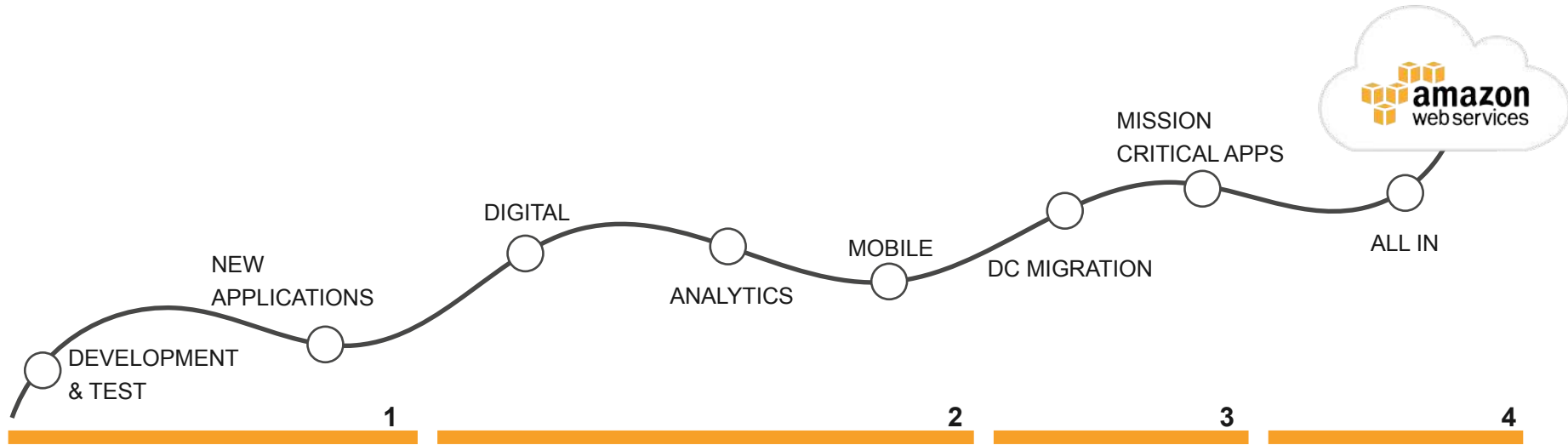




# Hybrid Architecture



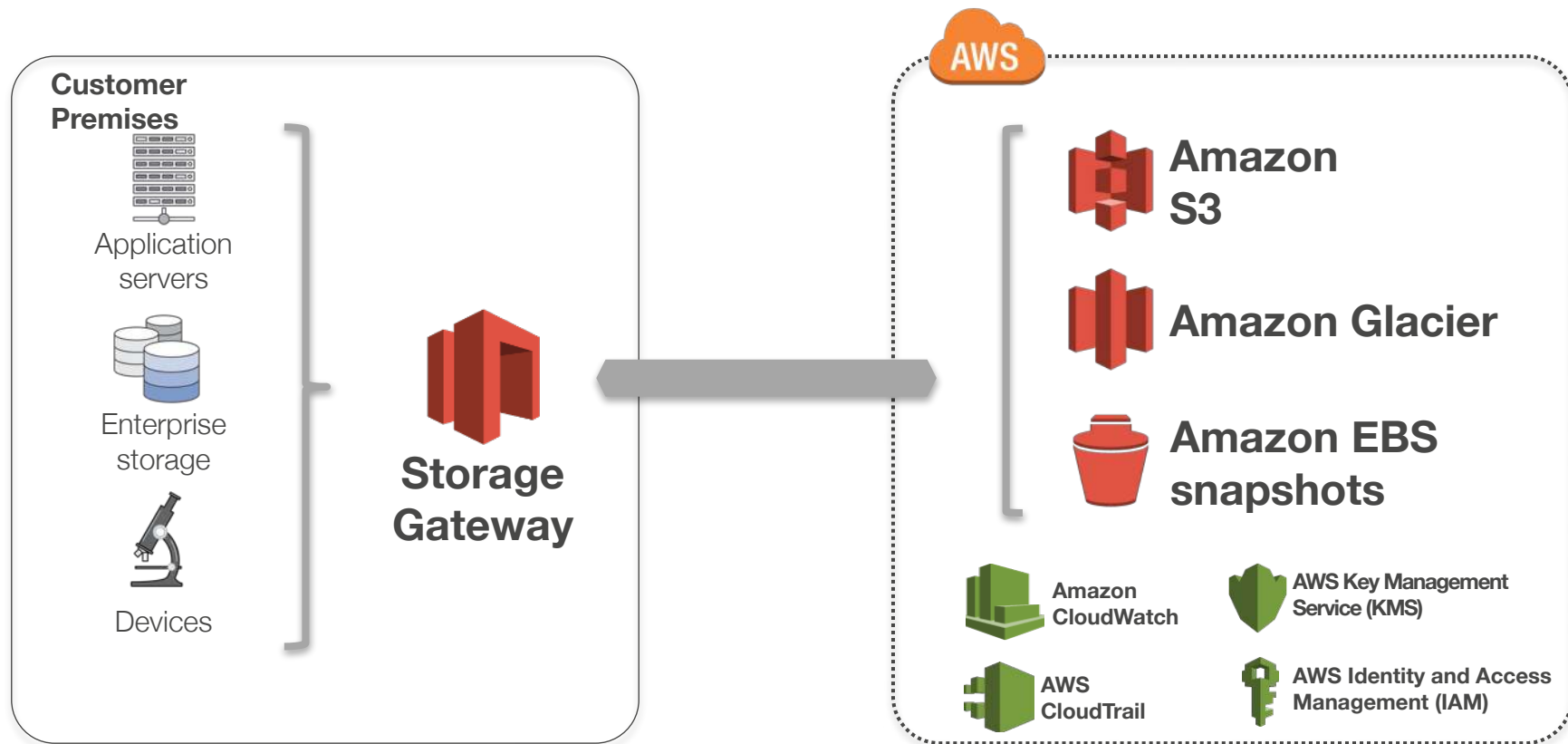
# The road to the Cloud



# **Mass Migration**

**Data Migration**

# Hybrid storage with Storage Gateway



# AWS Storage Gateway – Files, volumes and tapes



**File gateway:** NFS interface for S3 buckets



**Volume gateway:** iSCSI block interface



**Tape gateway:** iSCSI virtual tape library (VTL) interface

# AWS Snowball: Petabyte-scale transfers

Over 5 billion objects  
moved



E-ink display



Hardened,  
tamper-resistant  
case  
(8.5G impact)



100 TB,  
10GE network



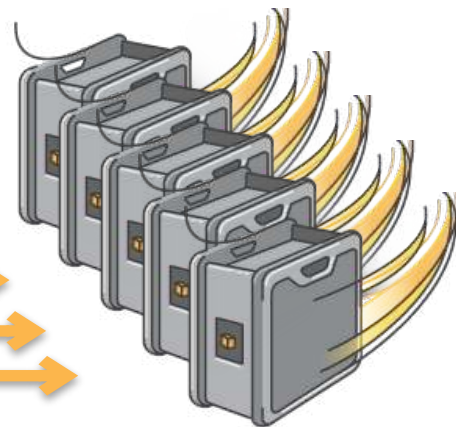
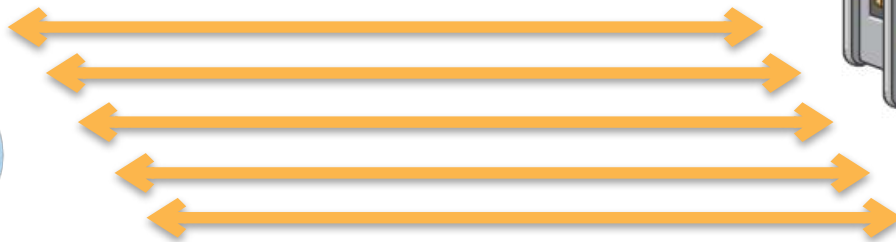
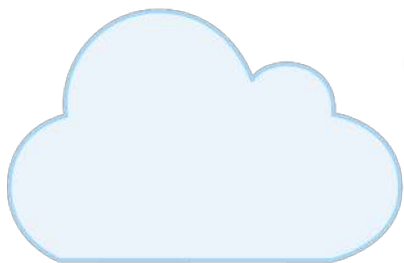
End-to-end  
encryption

# How much data is 100 Terabytes?

- 1 year of Blu-ray movies
- 20 million songs (about 75 years of music)

## Internet throughput

| Utilization | 500 Mbps | 150 Mbps |
|-------------|----------|----------|
| 25%         | 74 days  | 247 days |



# DigitalGlobe : how can we transfer 100 Petabytes?





# DigitalGlobe : how can we transfer 100 Petabytes?



# AWS Snowmobile: 100 PB in a truck

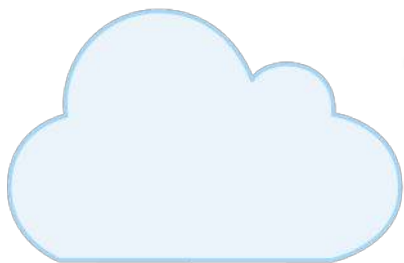


# How much data is 100 Petabytes?

- 1,000 years of Blu-ray movies
- 20 billion songs (about 75,000 years of music)

## Internet throughput

| Utilization | 50 Gbps  | 10 Gbps   |
|-------------|----------|-----------|
| 50%         | 370 days | 1851 days |

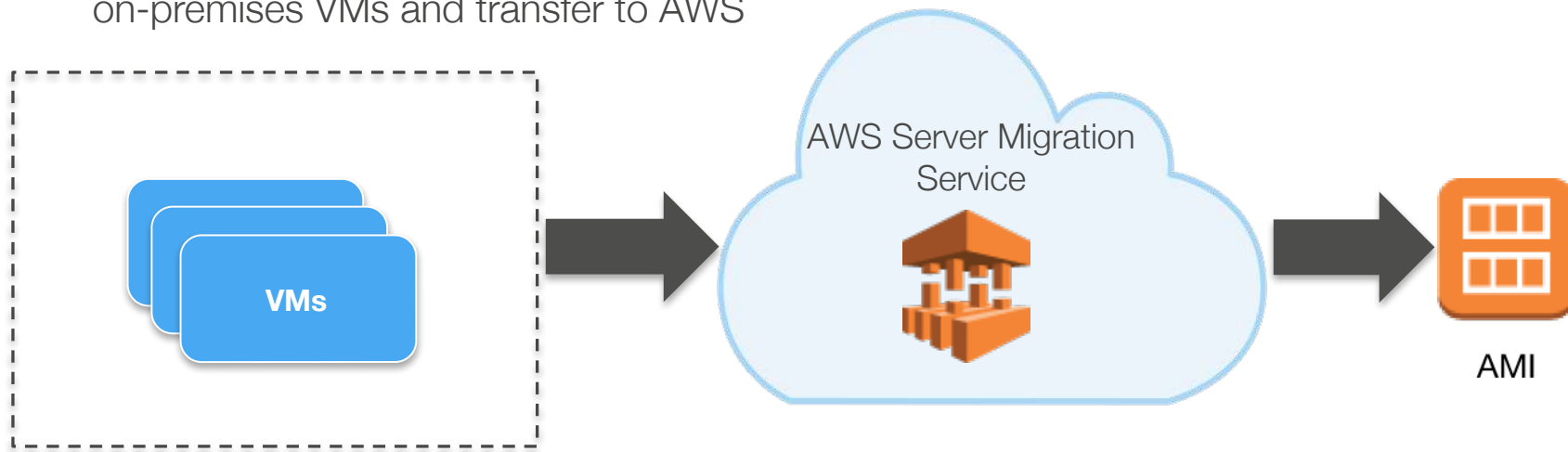


# **Mass Migration**

**Database & Application Migration**

# AWS Server Migration Service

- Support VMware VMs migration with the initial release
  - Windows & Linux support
- Agentless VM migration
- Capture incremental changes made to on-premises VMs and transfer to AWS
- Create migration waves
- AWS Management Console and API/CLI access
- Launch EC2 instances from Amazon Machine Images (AMI)

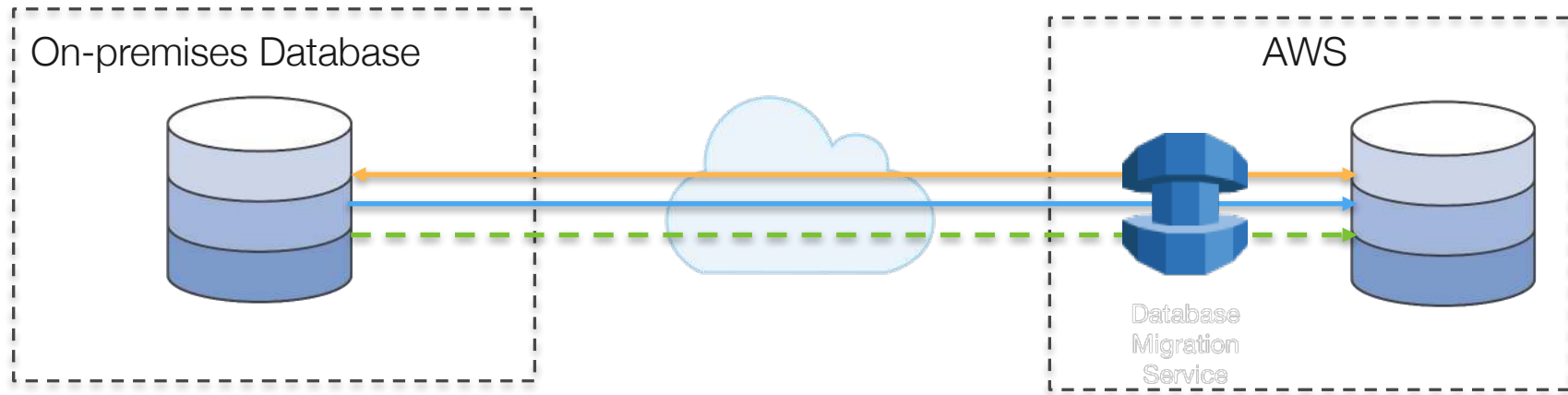


# AWS Database Migration Service

**18,000+ databases  
moved**

- Keep your applications running during the migration
- Start a replication instance
- Configure both database endpoints
- Select tables, schemas, or databases

- Switch applications over to the target at your convenience as AWS DMS keeps the target database in sync.
- Wide support of databases
  - Homogeneous migrations (ex: Oracle to Oracle)
  - Heterogeneous migrations (ex: Oracle to Amazon Aurora)



# Partnering to deliver a game-changing solution

**vmware®**

+

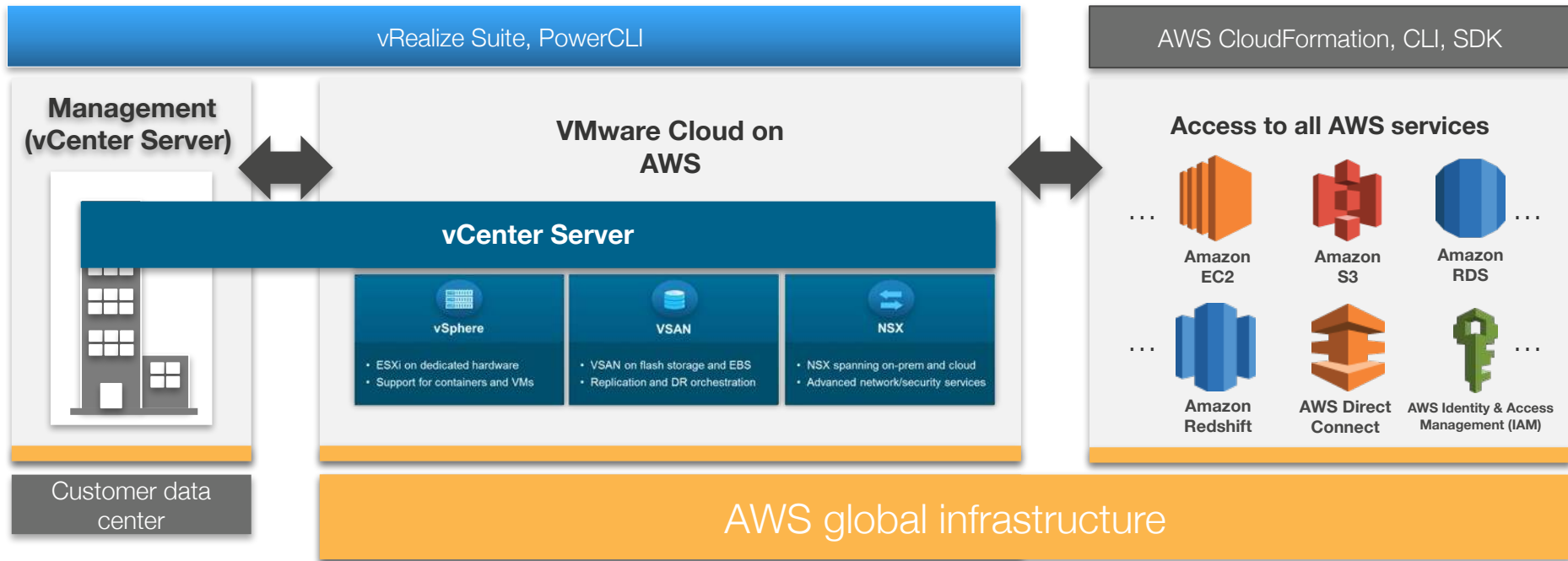


- ✓ **Leading private compute, storage, and network virtualization capabilities**
- ✓ **Support for broad range of workloads**
- ✓ **De facto standard for the on-premises enterprise**

- ✓ **Global scale and reach**
- ✓ **Flexible consumption economics**
- ✓ **Broadest set of cloud services**
- ✓ **Elastic infrastructure on demand**

Uniting the leaders in private and public cloud services

# Introducing VMware Cloud on AWS





# **Artificial Intelligence**

# Artificial Intelligence At Amazon

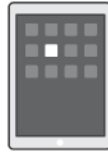
Thousands Of Employees Across The Company Focused on AI



Discovery &  
Search



Fulfilment &  
Logistics



Enhance  
Existing Products



Define New  
Categories Of  
Products



Bring Machine  
Learning To All



| JUST ASK



# Machine Learning / AI on AWS Today

- **Zillow**
  - Zestimate (using Apache Spark)
- **Howard Hughes Corp**
  - Lead scoring for luxury real estate purchase predictions
- **FINRA**
  - Anomaly detection, sequence matching, regression analysis, network/tribe analysis
- **Netflix**
  - Recommendation engine
- **Pinterest**
  - Image recognition search
- **Fraud.net**
  - Detect online payment fraud
- **DataXu**
  - Leverage automated & unattended ML at large scale (Amazon EMR + Spark)
- **Mapillary**
  - Computer vision for crowd sourced maps
- **Hudl**
  - Predictive analytics on sports plays
- **Upserve**
  - Restaurant table mgmt & POS for forecasting customer traffic
- **TuSimple**
  - Computer Vision for Autonomous Driving
- **Clarifai**
  - Computer Vision APIs

# Amazon AI: Three New Deep Learning Services



**Poll  
y**

Life-like Speech



**Rekogniti  
on**

Image Analysis



**Le  
x**

Conversational  
Engine

# **Artificial Intelligence**

**Amazon Polly**

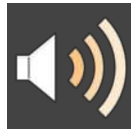
# Amazon Polly

- A service that converts text into lifelike speech
- Offers 47 lifelike voices across 24 languages
- Low latency responses enable developers to build real-time systems
- Developers can store, replay and distribute generated speech

# Amazon Polly: Quality

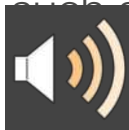
## Natural sounding speech

A subjective measure of how close TTS output is to human speech.



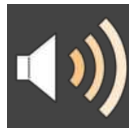
## Accurate text processing

Ability of the system to interpret common text formats such as abbreviations, numerical sequences, homographs etc.



*Today in Las Vegas, NV it's 54°F.*

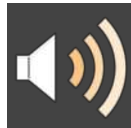
*"We live for the music", live from the Madison Square Garden.*



## Highly intelligible

A measure of how comprehensible speech is.

*"Peter Piper picked a peck of pickled peppers."*





# Amazon Polly: Language Portfolio

## EMEA:

- British English
- Danish
- Dutch
- French
- German
- Icelandic
- Italian
- Norwegian
- Polish
- Portuguese
- Romanian
- Russian
- Spanish
- Swedish
- Turkish
- Welsh
- Welsh English

## Americas:

- Brazilian Portuguese
- Canadian French
- English (US)
- Spanish (US)

## A-PAC:

- Australian English
- Indian English
- Japanese

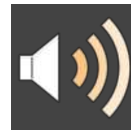


# Amazon Polly features: SSML

## Speech Synthesis Markup Language

is a W3C recommendation, an XML-based markup language for speech synthesis applications

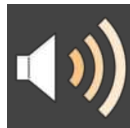
```
<speak>  
  My name is Kuklinski. It is spelled  
  <prosody rate='x-slow'>  
    <say-as interpret-as="characters">Kuklinski</say-as>  
  </prosody>  
</speak>
```



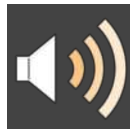
# Amazon Polly features: Lexicons

**Enables developers to customize the pronunciation of words or phrases**

*My daughter's name is Kaja.*



```
<lexeme>  
  <grapheme>Kaja</grapheme>  
  <grapheme>kaja</grapheme>  
  <grapheme>KAJA</grapheme>  
  <phoneme>"kaI.ə</phoneme>  
</lexeme>
```



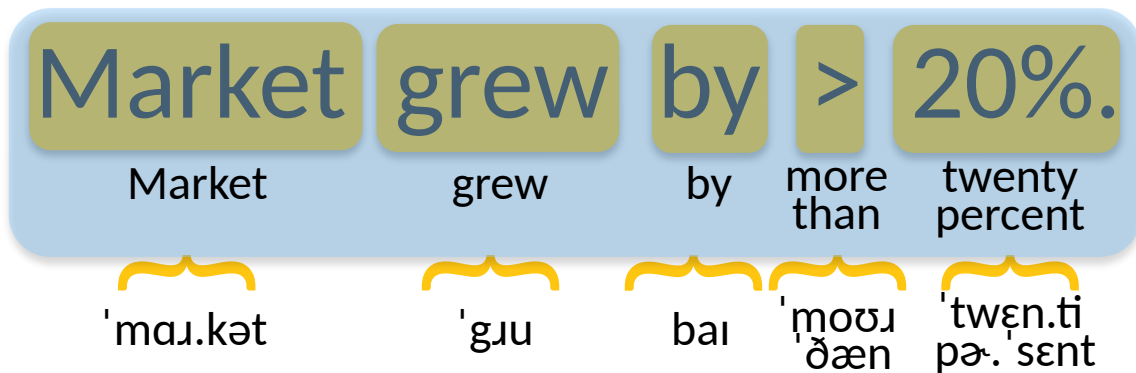
# Main Challenges of Text-to-Speech

**Goal:** Convert text into intelligible, accurate, and natural speech

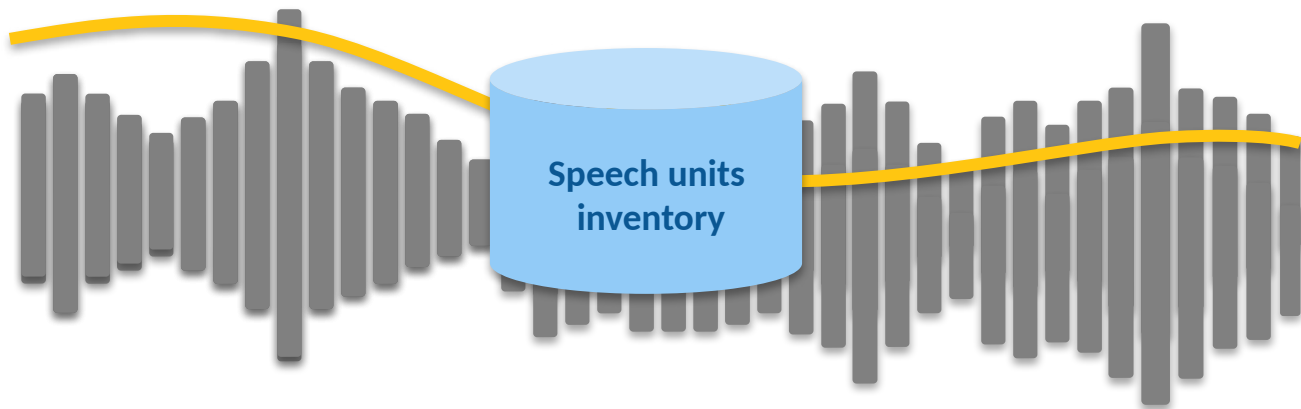
## Challenges:

- Homographs: words written identically that have different pronunciation  
*I **live** in Las Vegas vs This presentation broadcasts **live** from Las Vegas*
- Text normalization: disambiguation of abbreviations, acronyms, units  
*'**St.**' expanded as '**street**' or '**saint**'*
- Conversion of text to phonemes (Grapheme-to-Phoneme) in languages with complex mapping such as English e.g. ***tough**, **through**, **though***
- Foreign words (***déjà vu***), proper names (***François Hollande***), slang (***ASAP, LOL***) etc.

# TEXT PROCESSING



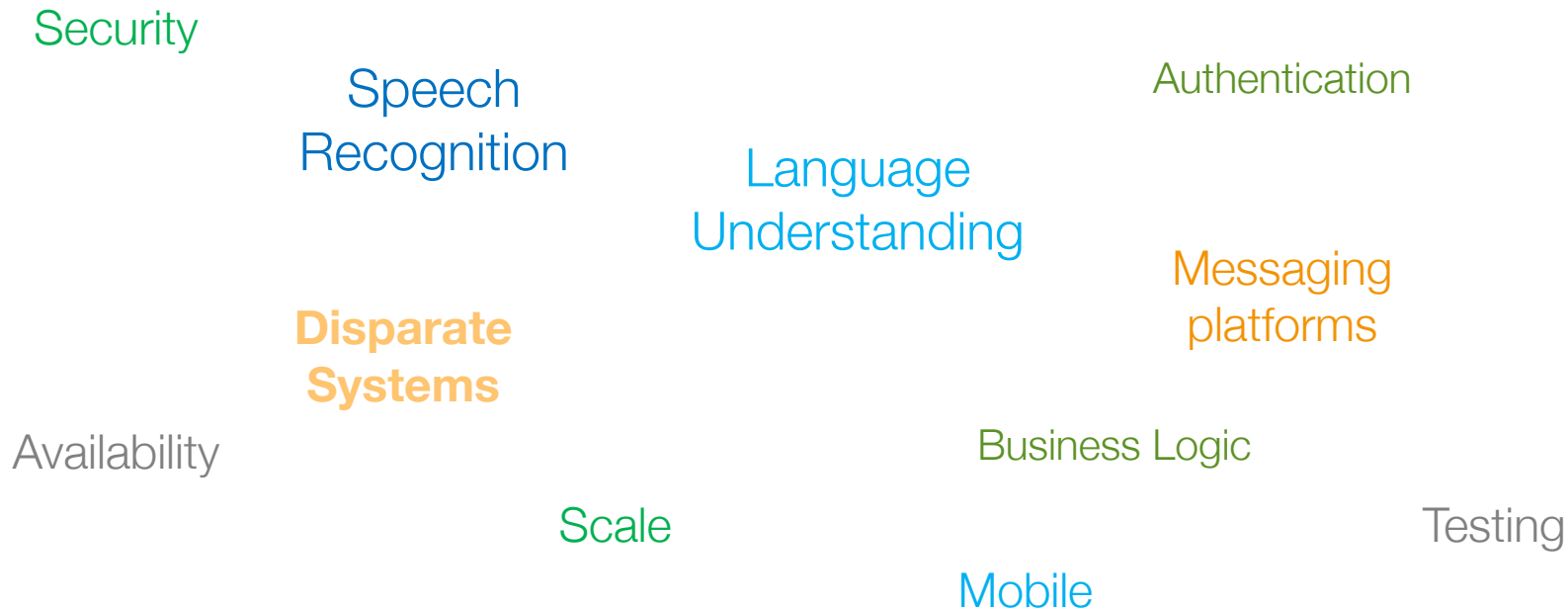
# UNIT REPRESENTATION



# **Artificial Intelligence**

**Amazon Lex**

# Developer Challenges



**Conversational interfaces need to combine a large number of sophisticated algorithms and technologies**

# Text and Speech Language Understanding



Powered by the same Deep Learning technology as Alexa



# Amazon Lex – Use Cases



## Informational Bots

Chatbots for everyday consumer requests

- News updates
- Weather information
- Game scores ....



## Application Bots

Build powerful interfaces to mobile applications

- Book tickets
- Order food
- Manage bank accounts ....



## Enterprise Productivity Bots

Streamline enterprise work activities and improve efficiencies

- Check sales numbers
- Marketing performance
- Inventory status ....



## Internet of Things (IoT) Bots

Enable conversational interfaces for device interactions

- Wearables
- Appliances
- Auto ....

# Amazon Lex - Benefits



Easy to use



High quality Text and Speech Language Understanding



Seamlessly deploy and scale



Built-in integration with the AWS platform



Cost effective

# Utterances

I'd like to book a hotel

I want to make my hotel reservations

Can you help me book my hotel?

I want to book a hotel in New York City

# Lex Bot Structure

## BookHotel



### Intents

An Intent performs an action in response to natural language user input

### Utterances

Spoken or typed phrases that invoke your intent

### Slots

Slots are input data required to fulfill the intent

### Fulfillment

Fulfillment mechanism for your intent



# Slots

| Slot        | Type | Values                              |
|-------------|------|-------------------------------------|
| destination | City | New York City, Seattle, London, ... |
| Check In    | Date | Valid dates                         |
| Check Out   | Date | Valid dates                         |

# Slot Elicitation

I'd like to book a hotel

Sure what city do you want to book?

New York City

**City**  
New York City

What date do you check in?

Nov 30th

**Check In**  
11/30/2016

# Fulfillment



Intents and slots passed to AWS Lambda function for business logic implementation.

**AWS Lambda  
Integration**



User input parsed to derive intents and slot values. Output returned to client for further processing.

**Return to Client**

# **Artificial Intelligence**

## **Amazon Rekognition**



# Amazon Rekognition

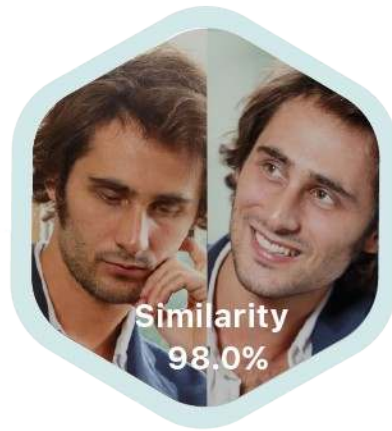
Deep learning-based image recognition service  
Search, verify, and organize millions of images



Object and Scene  
Detection



Facial  
Analysis



Face  
Comparison



Facial  
Recognition

# Amazon Rekognition API



## Object and Scene Detection

Detect objects, scenes, and concepts in images

DetectLabels

```
{  
  "Confidence": 94.62968444824219,  
  "Name": "adventure"  
},  
{  
  "Confidence": 94.62968444824219,  
  "Name": "boat"  
},  
{  
  "Confidence": 94.62968444824219,  
  "Name": "rafting"  
},  
. . .
```

# Amazon Rekognition API

## Facial Analysis

Detect face and key facial characteristics



[  
{

```
"BoundingBox": {  
  "Height": 0.3449999988079071,  
  "Left": 0.096666666388511658,  
  "Top": 0.27166667580604553,  
  "Width": 0.23000000417232513  
},  
"Confidence": 100,  
"Emotions": [  
  {"Confidence": 99.1335220336914,  
   "Type": "HAPPY" },  
  {"Confidence": 3.3275485038757324,  
   "Type": "CALM"},  
  {"Confidence": 0.31517744064331055,  
   "Type": "SAD"}  
],  
"Eyeglasses": {"Confidence": 99.8050537109375,  
  "Value": false},  
"EyesOpen": {"Confidence": 99.99979400634766,  
  "Value": true},  
"Gender": {"Confidence": 100,  
  "Value": "Female"}
```

DetectFaces



# Using Rekognition for Facial Analysis

- Photo printing service can recommend the best photos to their users
- Online dating applications can improve their match recommendations using face attributes
- Retail businesses can understand the demographics and sentiment of in-store customers
- Ad-tech services can display dynamic and personalized content to customers



# Amazon Rekognition API

## Face Comparison

Face-based user verification



CompareFaces

```
{
  "FaceMatches": [
    {
      "Face": {
        "BoundingBox": {
          "Height": 0.2683333456516266,
          "Left": 0.5099999904632568,
          "Top": 0.1783333271741867,
          "Width": 0.17888888716697693,
          "Confidence": 99.99845123291016,
          "Similarity": 96
        },
        "SourceImageFace": {
          "BoundingBox": {
            "Height": 0.23983436822891235,
            "Left": 0.28333333134651184,
            "Top": 0.351423978805542,
            "Width": 0.1599999964237213,
            "Confidence": 99.99344635009766
          }
        }
      }
    },
    {
      "Face": {
        "BoundingBox": {
          "Height": 0.2383333295583725,
          "Left": 0.6233333349227905,
          "Top": 0.3016666769981384,
          "Width": 0.15888889133930206,
          "Confidence": 99.71249389648438,
          "Similarity": 0
        }
      }
    }
  ],
  "SourceImageFace": {
    "BoundingBox": {
      "Height": 0.23983436822891235,
      "Left": 0.28333333134651184,
      "Top": 0.351423978805542,
      "Width": 0.1599999964237213,
      "Confidence": 99.99344635009766
    }
  }
}
```

# Amazon Rekognition API

## Face Recognition

Index and Search faces in a collection



IndexFaces

SearchFacesByImage

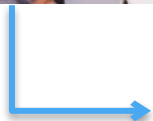
Index

Collection

Search



# Amazon Rekognition API

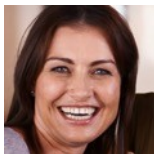


IndexFace



```
{  
  f7a3a278-2a59-5102-a549-a12ab1a8cae8,  
  02e56305-1579-5b39-ba57-9afb0fd8782d,  
  4c55926e-69b3-5c80-8c9b-78ea01d30690  
}
```

Face



transformed

Face ID & vector<float>

f7a3a278-2a59-5102-a549-a12ab1a8cae8  
&  
v1

02e56305-1579-5b39-ba57-9afb0fd8782d  
&  
v2

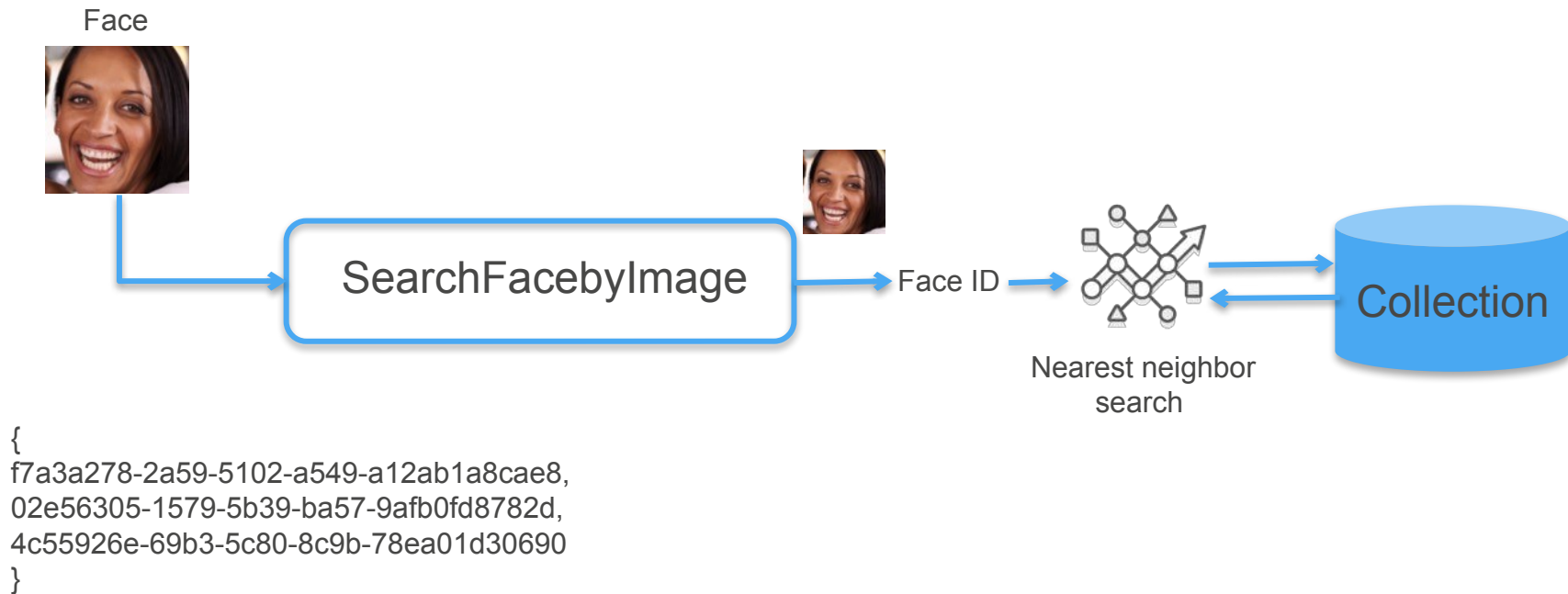
4c55926e-69b3-5c80-8c9b-78ea01d30690  
&  
v3

stored



Collection

# Amazon Rekognition API







**AWS  
re:Invent**

**Thank you!**

Julien Simon, Principal Technical Evangelist, AWS

julsimon@amazon.fr

@julsimon