

Machine Learning on Amazon Web Services



4FriendsOnly.com
Internet Technologies AG

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Overview

- Introduction of Author and Company
- Our way to Amazon Web Services (AWS)
 - What is AWS and why we choose it?
 - Some of our Customers on AWS
- The AWS Machine Learning Stack
- Our Recommendation Engine



The E-Commerce Experts

- 4FriendsOnly.com Internet Technologies AG

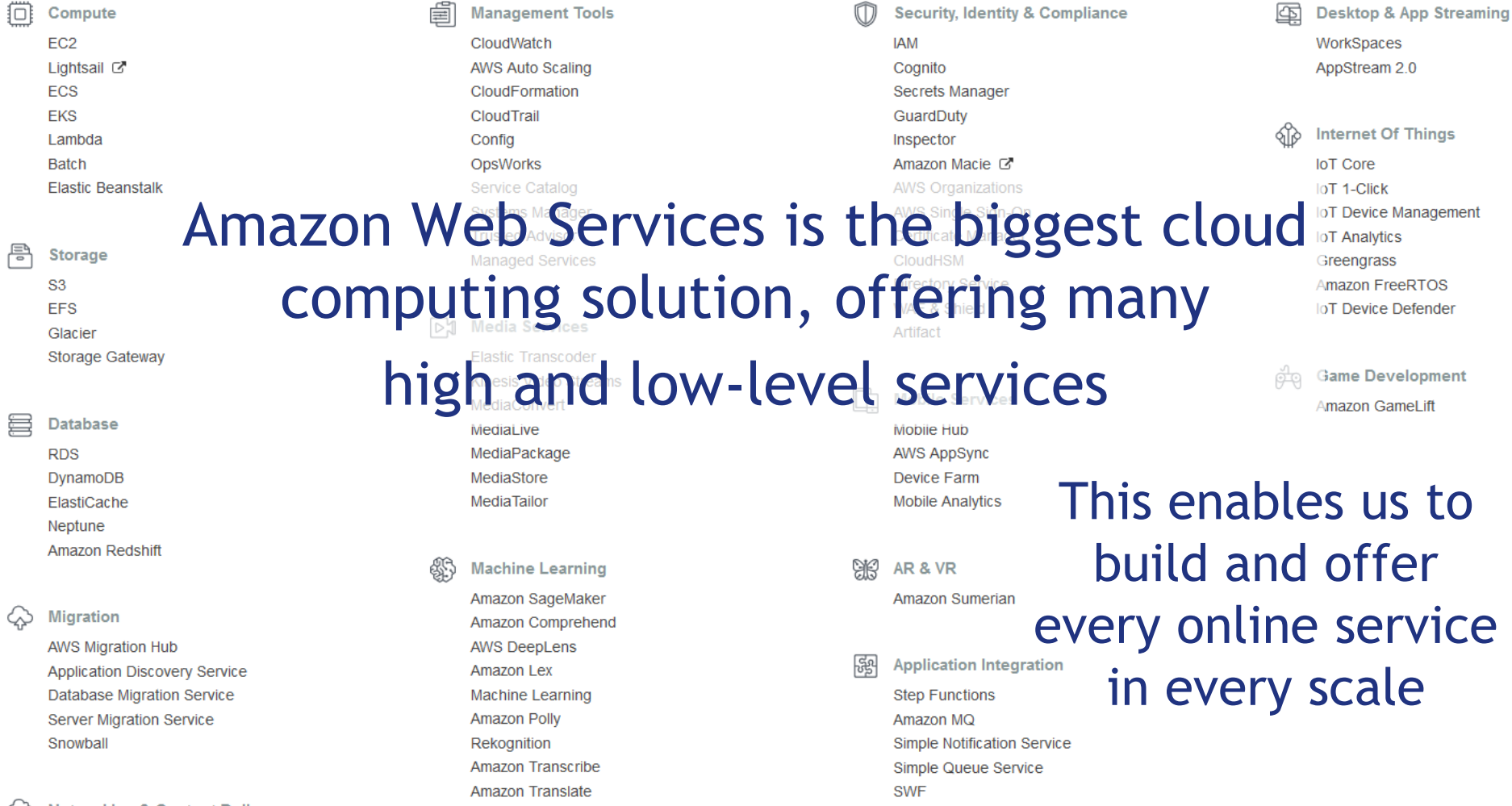
- Founded in 2000 as Spin-Off of Fraunhofer IDMT & University
- Well-known shareholder is Prof. Brandenburg (the MP3 inventor)
- CEO, lecturer and main owner: Dr. Jürgen Nützel
- Located in the new TTI (Technology Terminal Ilmenau)
- Intershop partner since 2010
- Experience with Intershop Technology e.g. at Ebay, BMW, Jacobs, Sportscheck, Zamro, Limmert, Town & Country, Papier LIEBL, Stoffe.de ...
- Company focus is on
 - E-Commerce
 - Mobile Development
 - Cloud-Computing
- Amazon AWS Partner



What is Amazon Web Services?

Amazon Web Services is the biggest cloud computing solution, offering many high and low-level services

This enables us to build and offer every online service in every scale

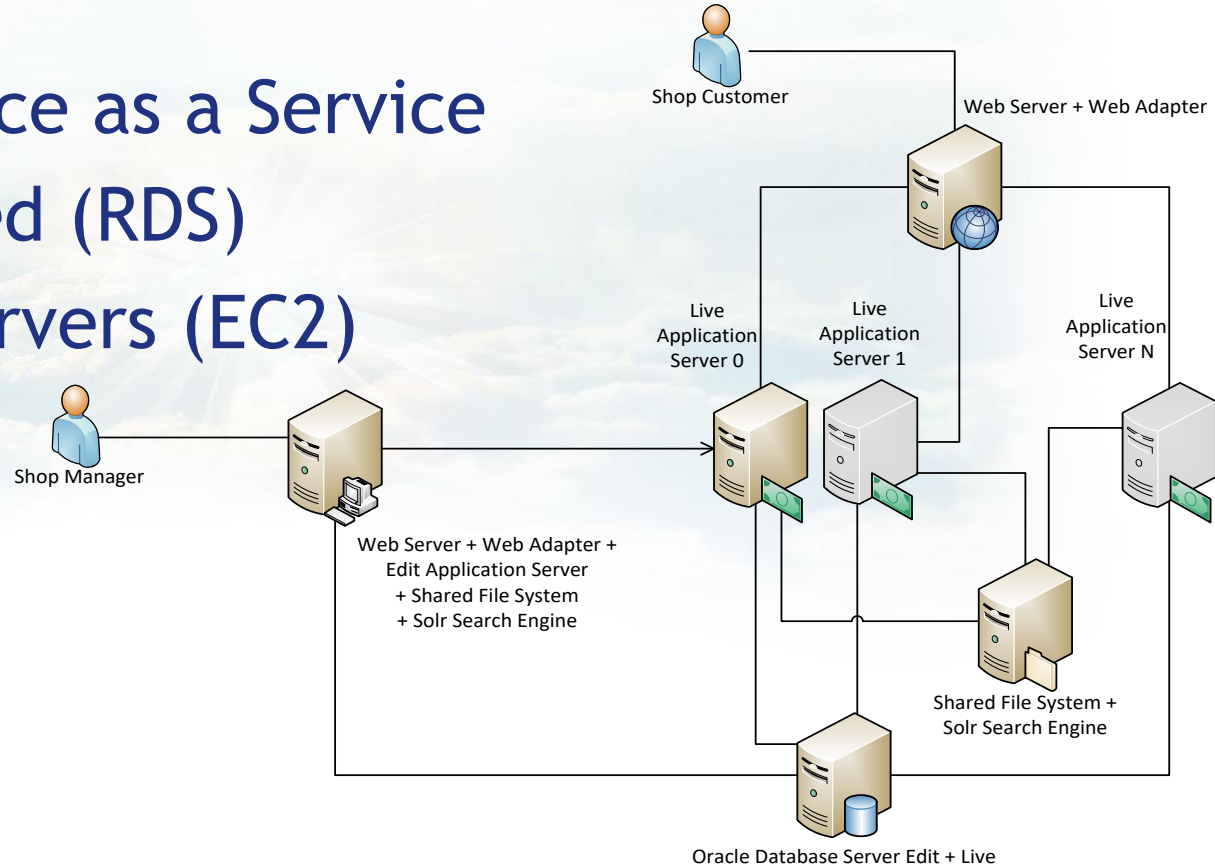


The image shows a screenshot of the AWS Management Console interface. On the left, there are several service categories: Compute (EC2, Lightsail, ECS, EKS, Lambda, Batch, Elastic Beanstalk), Storage (S3, EFS, Glacier, Storage Gateway), Database (RDS, DynamoDB, ElastiCache, Neptune, Amazon Redshift), Migration (AWS Migration Hub, Application Discovery Service, Database Migration Service, Server Migration Service, Snowball), and Networking & Content Delivery. In the center, a dropdown menu is open, displaying a list of AWS Regions: US East (N. Virginia), US East (Ohio), US West (N. California), US West (Oregon), Asia Pacific (Mumbai), Asia Pacific (Seoul), Asia Pacific (Singapore), Asia Pacific (Sydney), Asia Pacific (Tokyo), Canada (Central), **EU (Frankfurt)** (highlighted with an orange bar), EU (Ireland), EU (London), EU (Paris), and South America (São Paulo). On the right, more service categories are visible: Security, Identity & Compliance (IAM, Cognito, Secrets Manager, GuardDuty, Amazon Macie, AWS Organizations, AWS Single Sign-On, Certificate Manager, CloudHSM, Directory Service, WAF & Shield, Artifact), Desktop & App Streaming (WorkSpaces, AppStream 2.0), Internet Of Things (IoT Core, IoT 1-Click, IoT Device Management, IoT Analytics, Greengrass, Amazon FreeRTOS, IoT Device Defender), and Game Development (Amazon GameLift). The text "... and this world wide" is overlaid in the center of the image.

... and this world wide

Why we choose AWS?

- Offer E-Commerce as a Service
- Oracle DB needed (RDS)
- Several Linux Servers (EC2)



Some of our Customers on AWS

Electro Wholesale, Gebrüder LIMMERT AG from Salzburg

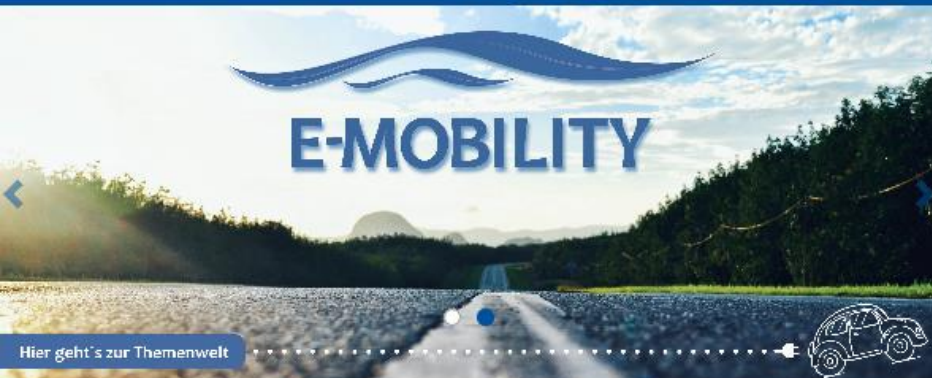
www.limmert.com

160 employees
make
60 million euros
turnover.
25% online



Alle Kategorien ▾

Suche nach Schlagwort, Artikelnummer, Kategorien ...



Ihre Empfehlungen



8718291840473 Philips CoreLineWaterpr



72001-0101 FLIR Wärmebildkamera C2-P



637-12702545ng6 Molto Luce 2GO STR-E



151000000300 SCHULTE EVOLINE PLUG

A House Configurator for Town & Country

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flexibel



stufenlos



familienfreundlich



Massivhaus
Bungalow 131

NEU



Kontakt



The customer starts
after buying a
certain house type



Outside is
finshed

 Außen



Meine
Bemusterung

Flair 125



 Innen



Inside is work
in progress

Machine Learning on AWS

The mission of Amazon:
*Put Machine Learning in the hands of
every developer and data scientist*

The AWS Machine Learning Stack

Application Services

API-driven services:

Rekognition Rekognition Video Polly Transcribe Translate Comprehend Lex

Platforms

Amazon SageMaker Amazon DeepLens

Frameworks

Develop sophisticated models with any framework

Apache MXNet Caffe2 CNTK PyTorch TensorFlow Theano Torch | Keras Gluon

Infrastructure

Auto-scaling clusters of GPUs for large scale training, or run inference on trained models.

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Amazon Rekognition

Amazon Rekognition

Metrics

Demos

Object and scene detection

Image moderation

Facial analysis

Celebrity recognition

Face comparison

Text in image

Video Demos

Video analysis

Additional Resources

Getting started guide

Download SDKs

Developer resources

Pricing

FAQ



Results



looks like a face	99.9 %
appears to be female	9. %
age range	29 - 45 years old
smiling	99 %
appears to be happy	99.7 %
not wearing glasses	93.7 %
not wearing sunglasses	99.9 %
eyes are open	99.9 %
mouth is closed	99.2 %
has a mustache	74.6 %
does not have a beard	77.2 %

Amazon Rekognition

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Forum



▼ Results



looks like a face	99.9 %
appears to be male	99.9 %
age range	60 - 90 years old
smiling	95.2 %
appears to be happy	87 %
wearing glasses	99.9 %
not wearing sunglasses	99.3 %
eyes are closed	98.2 %
mouth is closed	98.4 %
does not have a mustache	50.6 %
does not have a beard	69.9 %

Face comparison

Reference face

Comparison faces



Results



=



Similarity

97 %



≠



≠



≠



Amazon Polly

Text In, Life-like Speech Out

- **Input text**
 - You can provide the input as plain text or in Speech Synthesis Markup Language (SSML) format.
- **Available voices**
 - 52 voices across 25 languages
- **Output format**
 - MP3, Ogg Vorbis or PCM
- **The other direction: Amazon Transcribe**

Amazon Translate

Text übersetzen

Sprachen wechseln

Quellsprache

Autom. (auto) ▼

Hallo, liebe Konferenzteilnehmer, ich möchte Ihnen die Übersetzungsmöglichkeiten von Amazon Translate zeigen.

109 Zeichen, 112 von 5000 Bytes genutzt. [Informationen](#)

Erkannte Sprache: Deutsch (de)

Zielsprache

Englisch (en) ▼

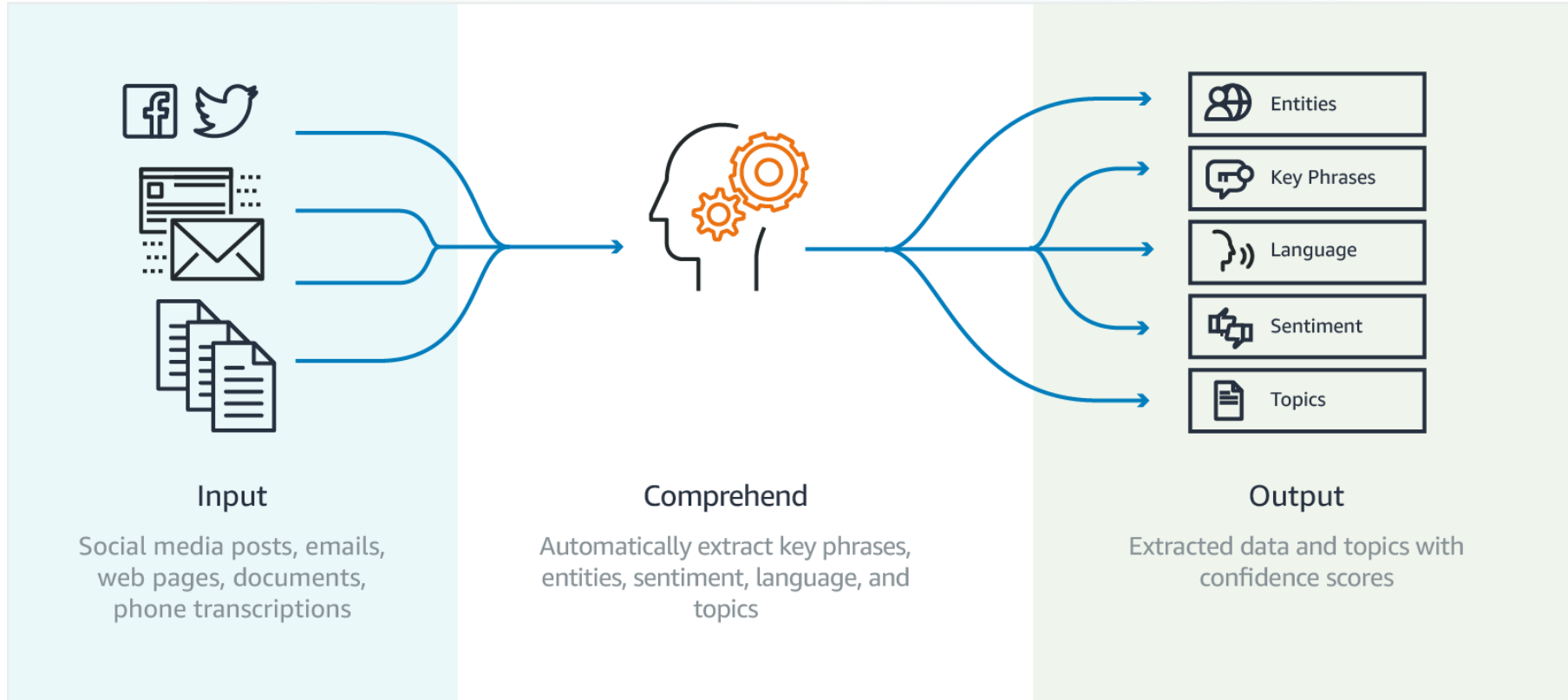
Hello, dear conference attendees, I would like to show you the translation capabilities of Amazon Translate.

Englisch ist die einzige unterstützte Zielsprache für die erkannte Quellsprache.

Ist dies die Übersetzung, die Sie erwartet haben? Bitte hinterlassen Sie uns Ihr [Feedback](#)

Amazon Comprehend

Natural Language Processing and Text Analytics



Amazon Comprehend

Example: negative customer review



Roll over image to zoom in

California Costumes

California Costumes Women's Bavarian Bar Maid Costume

★★★★☆ 360 customer reviews

| 10 answered questions

Price: **\$28.79 - \$67.70**

& Free Return on some sizes and colors

Fit: As expected (62%)

Size:

Select Size Chart

Color: Red/Olive

- 100% Polyester
- Imported
- Hand Wash
- Includes dress, hair bows and pettiskirt

★★★★☆ **Weird Sizing. Order up and cross your fingers.**

By JTaub on October 26, 2016

Size: Small Color: Red/Olive | Verified Purchase

The skirt is shorter than pictured and I am only 5' 2". The midsection is tight (I am only 120 lbs and ordered a small fits size 6-8). the top doesn't come up far enough to cover the chest, and the top back is too big. Worst costume ever. The quality of materials was good for the price, but I had to return it.

Helpful

Not Helpful

Comment Report abuse

<https://www.amazon.com/California-Costumes-Womens-Bavarian-Costume/dp/B007FMC7N4>

Entities Key phrases Language Sentiment Syntax

Results

Sentiment

Neutral	Positive	Negative	Mixed
0.00 confidence	0.00 confidence	0.98 confidence	0.01 confidence

JSON

Request and response of GetEntities API. See next steps in the [Documentation](#)

Request

```
{
  "Text": "The skirt is shorter than pictured and I am only 5' 2''. The midsection is tight (I am only 120 lbs and ordered a small fits size 6-8). the top doesn't come up far enough to cover the chest, and the top back is too big. Worst costume ever. The quality of materials was good for the price, but I had to return it.",
  "LanguageCode": "en"
}
```

Copy to Clipboard

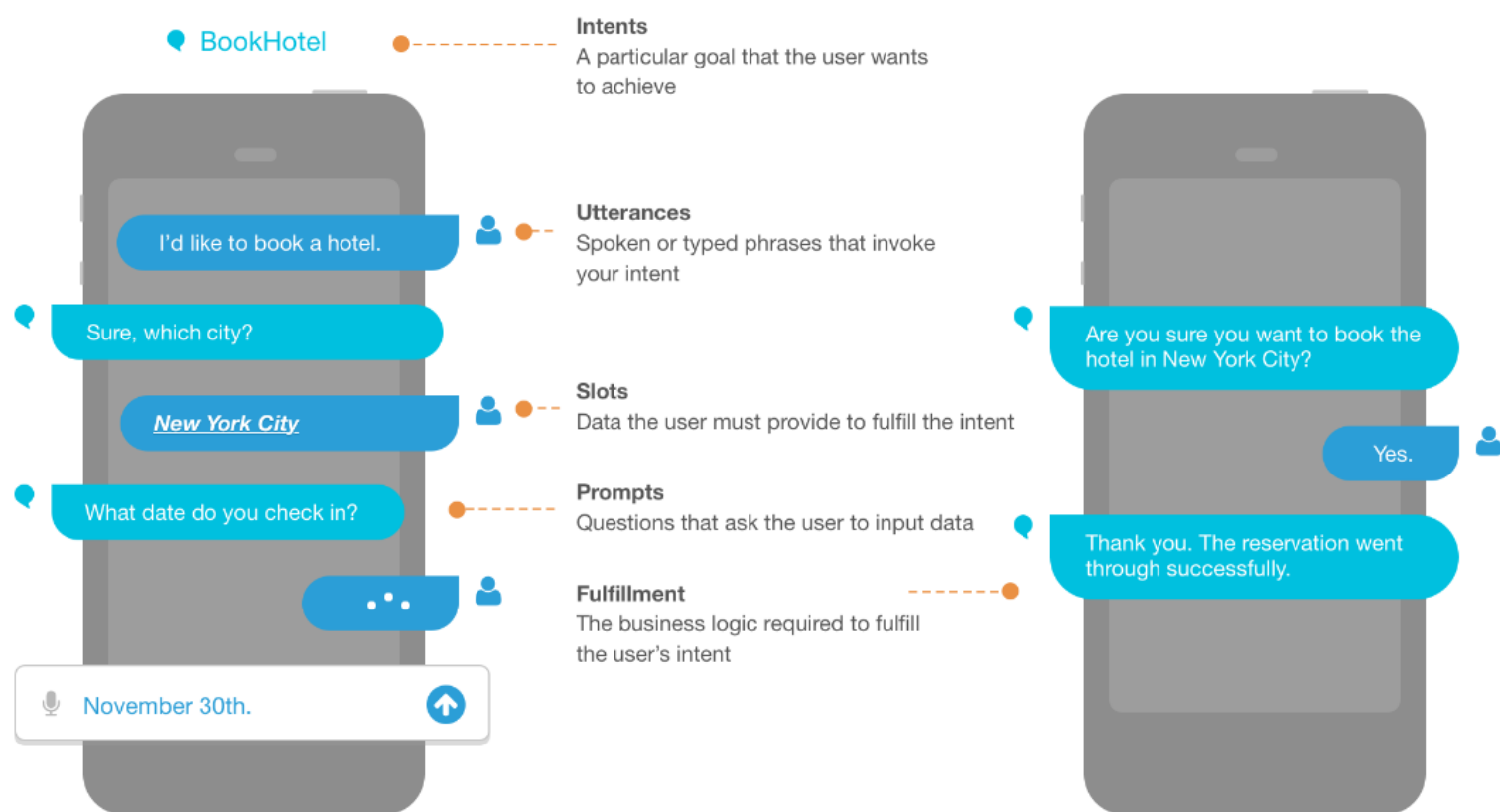
Response

```
{
  "Sentiment": {
    "Sentiment": "NEGATIVE",
    "SentimentScore": {
      "Positive": 0.00009700398368295282,
      "Negative": 0.9878684878349304,
      "Neutral": 0.00013041505008004606,
      "Mixed": 0.011904070153832436
    }
  }
}
```

Copy to Clipboard

Amazon Lex

Key Concepts



Amazon Lex

Create the bot

BookCar

BookHotel

Slot types

RoomTypeValues

Error Handling

▼ Sample utterances ⓘ

e.g. I would like to book a flight.

Book a {Nights} night stay in {Location}

I want a make hotel reservations

Book a hotel

▼ Lambda initialization and validation ⓘ

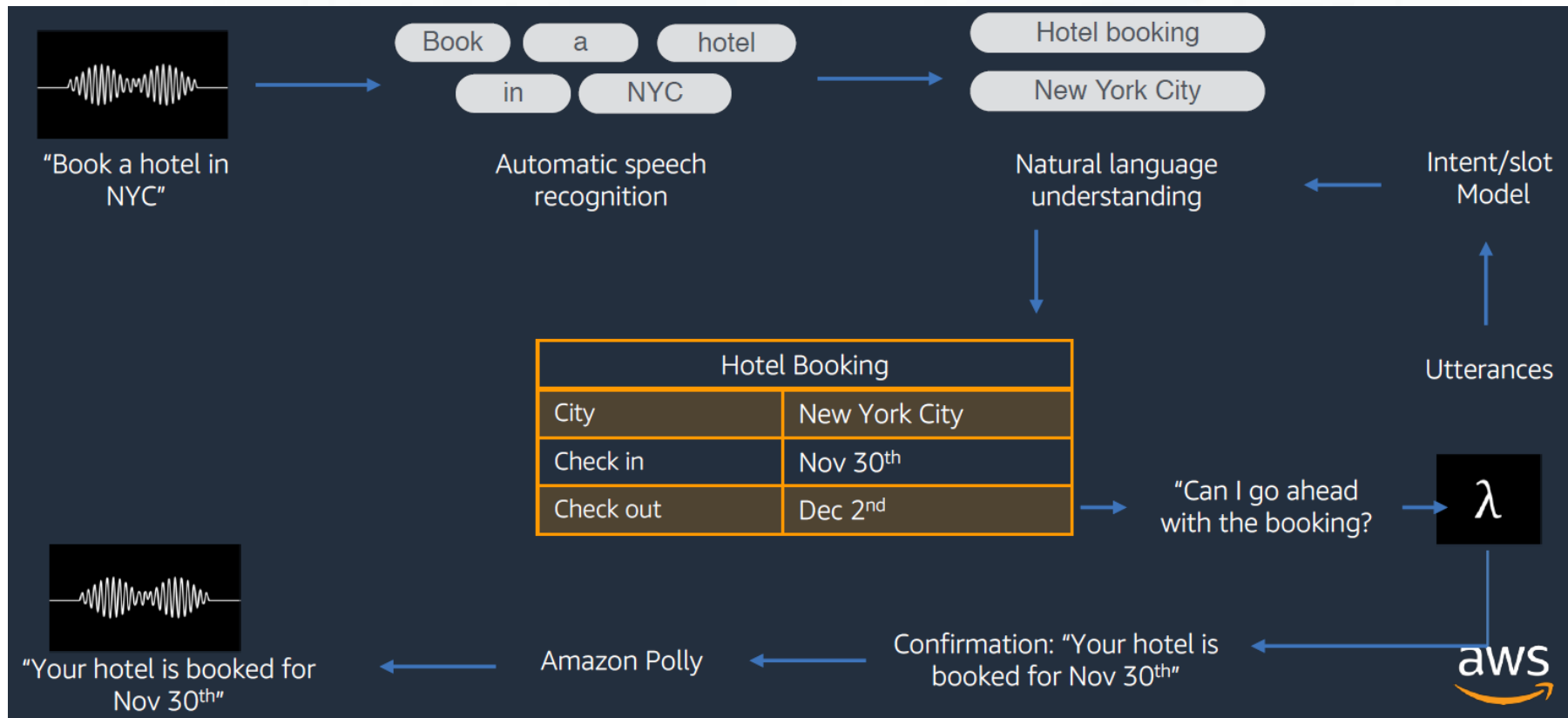
☐ Initialization and validation code hook

▼ Slots ⓘ

Priority	Required	Name	Slot type	Version	Prompt		
		e.g. Location	e.g. AMAZON.US_CITY ▼		e.g. What city?	⚙️	+
1.	▼ ✓	Location	AMAZON.US_CITY ▼	Built-in ▼	What city will you be s	⚙️	✕
2.	^ ▼ ✓	CheckInDate	AMAZON.DATE ▼	Built-in ▼	What day do you want	⚙️	✕
3.	^ ▼ ✓	Nights	AMAZON.NUMBER ▼	Built-in ▼	How many nights will y	⚙️	✕
4.	^ ✓	RoomType	RoomTypeValues ▼	1 ▼	What type of room woi	⚙️	✕

Amazon Lex

Overview



Our Product Recommendation-Engine

... for (one of) our AWS customer(s)

VERKAUF NUR AN GEWERBE!

Sofortgeschenke Unternehmen Vergleichen Ust. exkl. inkl.

Papier
LIEBL

Suche nach Schlagwort, Artikelnummer, Kategorien ...

Anmelden | Registrieren
Direktbestellung

REDUCED SHOP
GUARANTEE TÜV Rheinland
Management
System
ISO 9001:2008
www.papierlieb.de

Verpackung Bürobedarf Gastronomie Hygiene Betriebsausstattung Hardware Software Themen 0 ARTIKEL

Business Papier
Qualität die überzeugt.

Angebotspreis gültig bis 31.10.2018

xerox

über 5%

Context sensitive recommendations
Context: time, user, device

Our Product Recommendation-Engine

- ML using neural networks not suitable
 - Too many outputs needed
- Using the Jaccard similarity coefficient

$$J(A, B) = \frac{|A \cap B|}{|A \cup B|} = \frac{|A \cap B|}{|A| + |B| - |A \cap B|}.$$

https://en.wikipedia.org/wiki/Jaccard_index

- Technology: Simple AWS EC2 instance
 - Two Node.js scripts:
 - One script for the real-time tracking (similar to Google Analytics)
 - One for the real-time recommendation calculation

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AMIs (Amazon Machine Images)

with Deep learning Frameworks

The AWS Deep Learning AMIs support all the popular deep learning frameworks allowing you to define models and then train them at scale. Built for Amazon Linux and Ubuntu, the AMIs come pre-configured with:



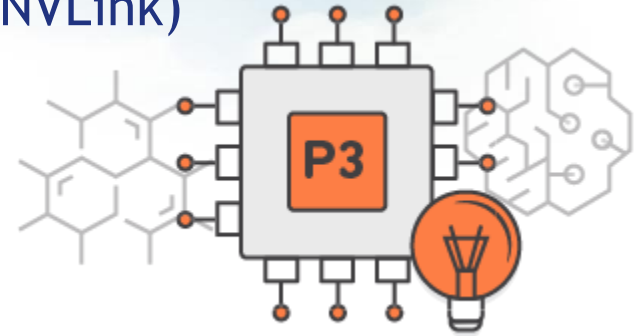
theano

PYTORCH



Infrastructure

- Amazon EC2 P3 Instances
- The fastest, most powerful GPU instances in the cloud
 - Up to eight NVIDIA Tesla V100 GPUs
 - 1 PetaFLOPs of computational performance
 - 14x better than P2
 - 300 GB/s GPU-to-GPU communication (NVLink)
 - 9X better than P2
 - 16GB GPU memory with 900 GB/sec peak GPU memory bandwidth
- 3\$/hour



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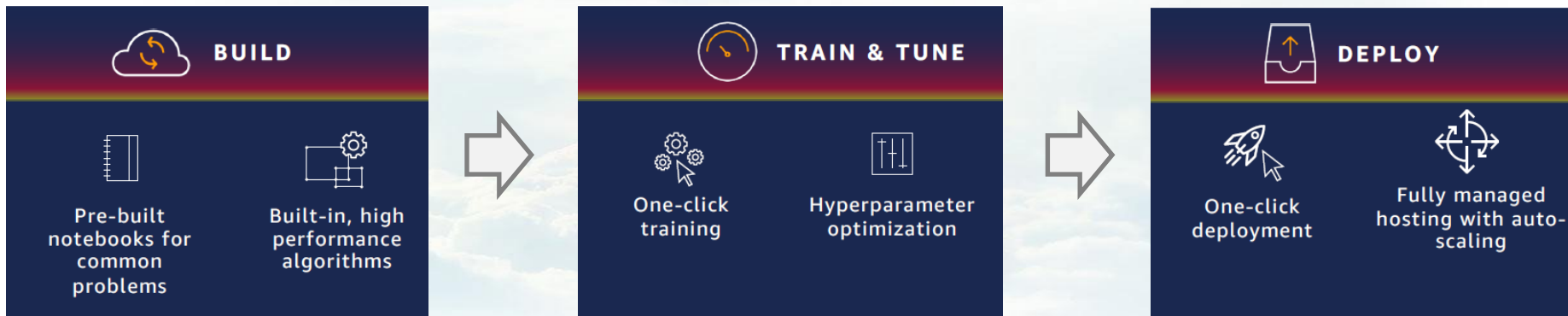
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Amazon SageMaker

Build, train, tune, and host your own models



Fully-managed notebook instances

For training data exploration and preprocessing, Amazon SageMaker provides fully managed instances running **Jupyter notebooks** that include example code for common model training and hosting exercises.

Deployment without engineering effort

After training, SageMaker provides the model artifacts and scoring images to you for deployment to Amazon EC2 or anywhere else.

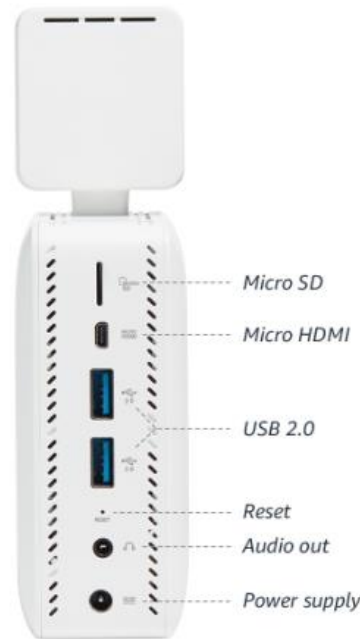
<https://aws.amazon.com/sagemaker/pricing/>

AWS DeepLens

Deep learning-enabled video camera

With over 100 GFLOPS of compute power on the device, it can process deep learning predictions on HD video for real time.

AWS DeepLens integrates with Amazon Rekognition for advanced image analysis, Amazon SageMaker for training models, and with Amazon Polly to create speech-enabled projects.



Weight: 296.5g

AWS DeepLens

Sample Project DeepAds

DeepAds is an advertising platform allowing real-time targeting of consumers based on a set of distinct and learned characteristics.

DeepAds distinguishes consumers based on their gender, so variations on product adverts are served up differently to females and males.



Real-time targeting of consumers based on a set of distinct and learned features.

https://aws.amazon.com/deeplens/community-projects/DeepAds_Advertising/

Thank you

Follow us on Meetup:

<https://www.meetup.com/de-DE/Ilmenau-Amazon-Web-Services-Meetup/>



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