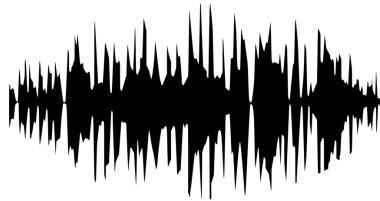# Machine Learning Section

Amazon Rekognition

- Find **objects, people, text, scenes** in **images and videos** using ML
- **Facial analysis** and **facial search** to do user verification, people counting
- Create a database of "familiar faces" or compare against celebrities
- Use cases:
  - Labeling
  - Content Moderation
  - Text Detection
  - Face Detection and Analysis (gender, age range, emotions…)
  - Face Search and Verification
  - Celebrity Recognition
  - Pathing (ex: for sports game analysis)
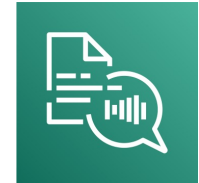
https://aws.amazon.com/rekognition/

Amazon Transcribe

- Automatically **convert speech to text**
- Uses a **deep learning process** called **automatic speech recognition** (ASR) to convert speech to text quickly and accurately
- **Automatically remove Personally Identifiable Information (PII) using Redaction**
- Use cases:
  - transcribe customer service calls
  - automate closed captioning and subtitling
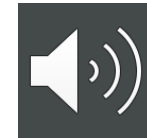 - generate metadata for media assets to create a fully searchable archive

"Hello my name is Stéphane.
I hope you're enjoying the course!

Amazon Polly

- Turn text into lifelike speech using deep learning
- Allowing you to create applications that talk

Hi! My name is Stéphane
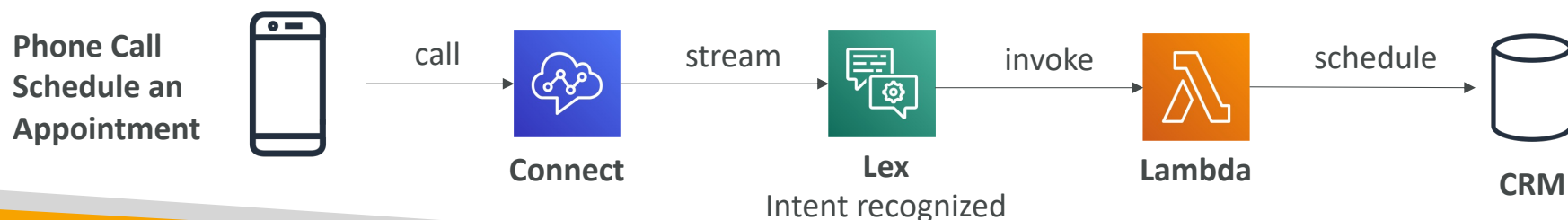*and this is a demo of Amazon Polly*

Amazon Translate

- Natural and accurate **language translation**
- Amazon Translate allows you to **localize content** - such as websites and applications - for **international users**, and to easily translate large volumes of text efficiently.

Source language

Auto (auto) ▼

Hi my name is Stéphane

⇄

Target language

French (fr) ▼

Bonjour, je m'appelle Stéphane.

Portuguese (pt) ▼

Oi, meu nome é Stéphane.

Hindi (hi) ▼

हाय मेरा नाम स्टीफन है

Amazon Lex & Connect

- **Amazon Lex:** (same technology that powers Alexa)
  - Automatic Speech Recognition (ASR) to convert speech to text
  - Natural Language Understanding to recognize the intent of text, callers
  - Helps build chatbots, call center bots

- **Amazon Connect:**
  - Receive calls, create contact flows, cloud-based **virtual contact center**
  - Can integrate with other CRM systems or AWS
  - No upfront payments, 80% cheaper than traditional contact center solutions

Phone Call
Schedule an
Appointment
→ call → **Connect** → stream → **Lex**
Intent recognized → invoke → **Lambda** → schedule → **CRM**
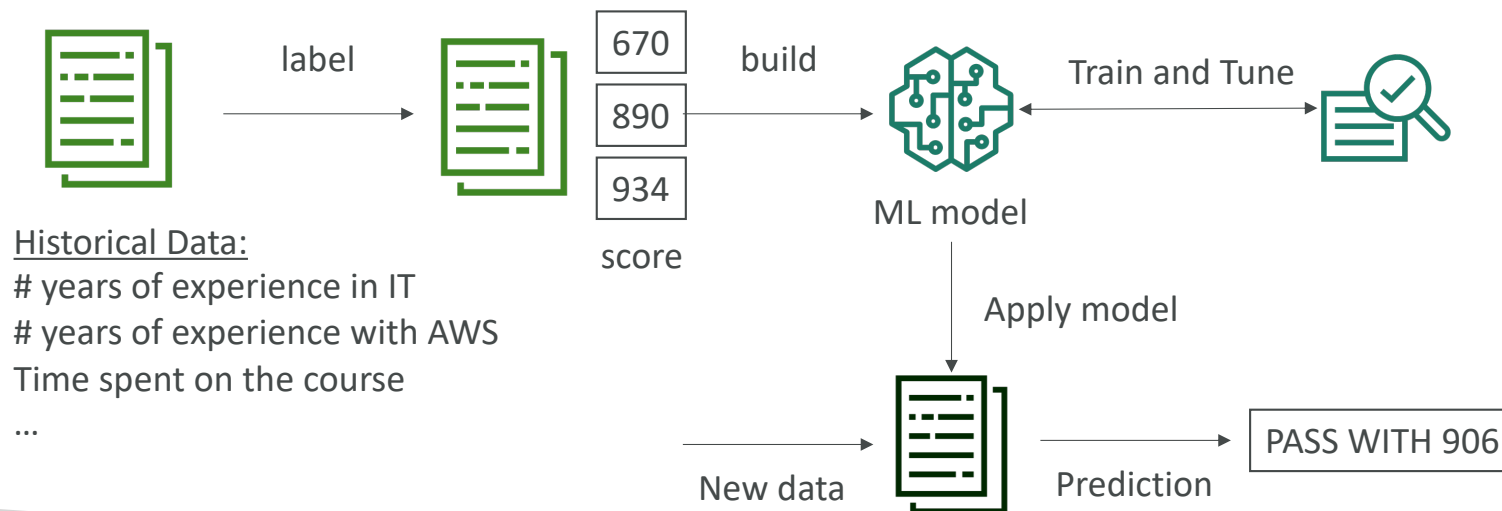
Amazon Comprehend

- For **Natural Language Processing – NLP**
- Fully managed and serverless service
- Uses machine learning to find insights and relationships in text
  - Language of the text
  - Extracts key phrases, places, people, brands, or events
  - Understands how positive or negative the text is
  - Analyzes text using tokenization and parts of speech
  - Automatically organizes a collection of text files by topic
- Sample use cases:
  - analyze customer interactions (emails) to find what leads to a positive or negative experience
  - Create and groups articles by topics that Comprehend will uncover

Amazon SageMaker

- Fully managed service for developers / data scientists to build ML models
- Typically, difficult to do all the processes in one place + provision servers
- Machine learning process (simplified): predicting your exam score

| | label | | 670 | build | | Train and Tune | |

Historical Data:
years of experience in IT
years of experience with AWS
Time spent on the course
...

670
890
934
score

ML model

Apply model
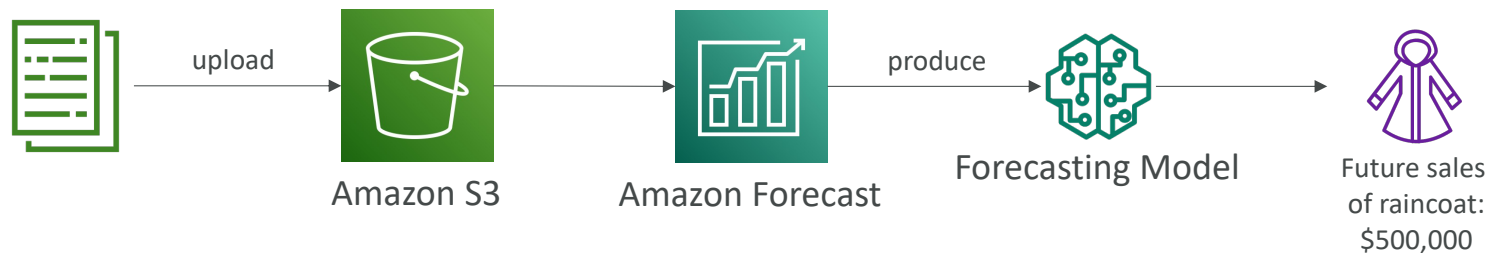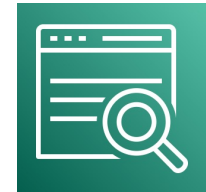
New data

Prediction

PASS WITH 906

Amazon Forecast

- Fully managed service that uses ML to deliver highly accurate forecasts
- Example: predict the future sales of a raincoat
- 50% more accurate than looking at the data itself
- Reduce forecasting time from months to hours
- Use cases: Product Demand Planning, Financial Planning, Resource Planning, …
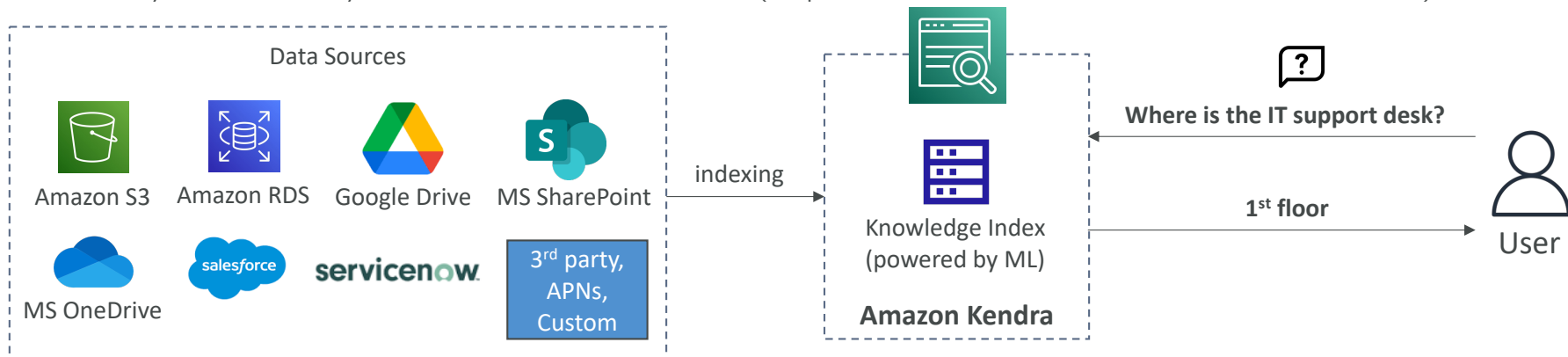
Historical Time-series Data:
Product features
Prices
Discounts
Website traffic
Store locations
…

upload → Amazon S3 → Amazon Forecast → produce → Forecasting Model → Future sales of raincoat: $500,000
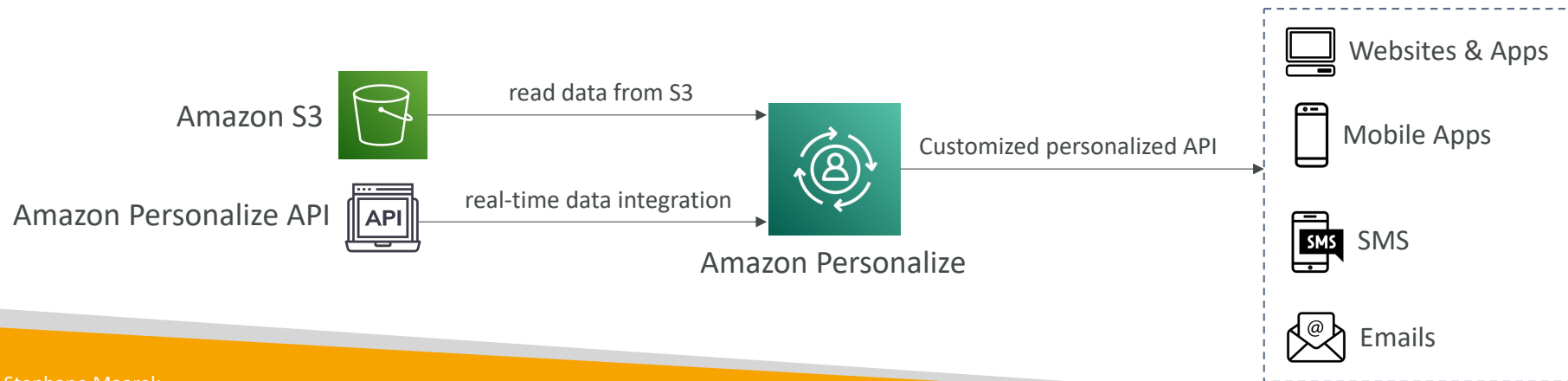
www.datacumulus.com

Amazon Kendra

- Fully managed **document search service** powered by Machine Learning
- Extract answers from within a document (text, pdf, HTML, PowerPoint, MS Word, FAQs…)
- Natural language search capabilities
- Learn from user interactions/feedback to promote preferred results **(Incremental Learning)**
- Ability to manually fine-tune search results (importance of data, freshness, custom, …)

Data Sources

Amazon S3 Amazon RDS Google Drive MS SharePoint

MS OneDrive salesforce servicenow 3rd party, APNs, Custom

indexing

Knowledge Index (powered by ML)

Amazon Kendra

Where is the IT support desk?

1st floor
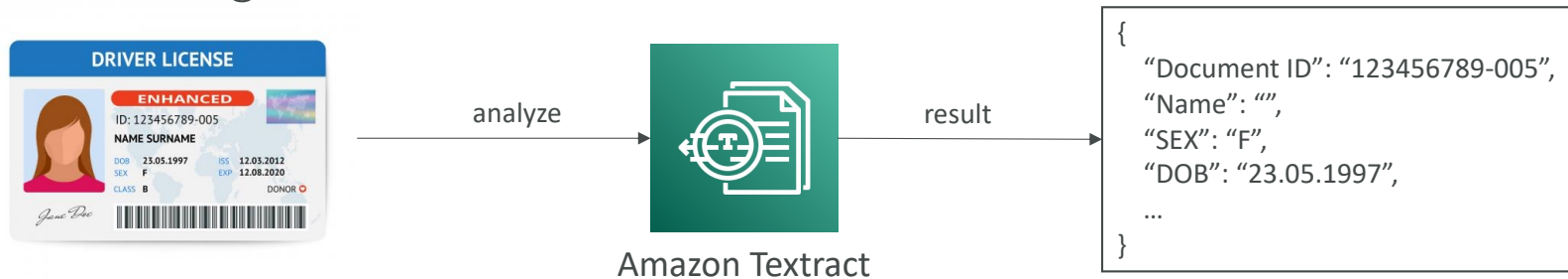
User

Amazon Personalize

- Fully managed ML-service to build apps with real-time personalized recommendations
- Example: personalized product recommendations/re-ranking, customized direct marketing
  - Example: User bought gardening tools, provide recommendations on the next one to buy
- Same technology used by Amazon.com
- Integrates into existing websites, applications, SMS, email marketing systems, …
- Implement in days, not months (you don't need to build, train, and deploy ML solutions)
- Use cases: retail stores, media and entertainment…

Amazon S3 → read data from S3 →

Amazon Personalize API → real-time data integration →

Amazon Personalize → Customized personalized API →

- Websites & Apps
- Mobile Apps
- SMS
- Emails

Amazon Textract

- Automatically extracts text, handwriting, and data from any scanned documents using AI and ML

analyze → Amazon Textract → result

```
{
    "Document ID": "123456789-005",
    "Name": "",
    "SEX": "F",
    "DOB": "23.05.1997",
    ...
}
```

- Extract data from forms and tables

- Read and process any type of document (PDFs, images, …)

- Use cases:
  - Financial Services (e.g., invoices, financial reports)
  - Healthcare (e.g., medical records, insurance claims)
  - Public Sector (e.g., tax forms, ID documents, passports)

AWS Machine Learning - Summary

- **Rekognition:** face detection, labeling, celebrity recognition
- **Transcribe:** audio to text (ex: subtitles)
- **Polly:** text to audio
- **Translate:** translations
- **Lex:** build conversational bots – chatbots
- **Connect:** cloud contact center
- **Comprehend:** natural language processing
- **SageMaker:** machine learning for every developer and data scientist
- **Forecast:** build highly accurate forecasts
- **Kendra:** ML-powered search engine
- **Personalize:** real-time personalized recommendations
- **Textract:** detect text and data in documents