Machine Learning

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)

Amazon Rekognition – Content Moderation

- Detect content that is inappropriate, unwanted, or offensive (image and videos)
- Used in social media, broadcast media, advertising, and e-commerce situations to create a safer user experience
- Set a Minimum Confidence Threshold for items that will be flagged
- Flag sensitive content for manual review in Amazon Augmented AI (A2I)
- Help comply with regulations

Image

Amazon Rekognition

Confidence Level and Threshold

Optional Manual review in **A2I**

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
- Supports Automatic Language Identification for multi-lingual audio
- 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 Polly – Lexicon & SSML

- Customize the pronunciation of words with Pronunciation lexicons
    - Stylized words: St3ph4ne => "Stephane"
    - Acronyms: AWS => "Amazon Web Services"
- Upload the lexicons and use them in the SynthesizeSpeech operation

- Generate speech from plain text or from documents marked up with Speech Synthesis Markup Language (SSML) – enables more customization
    - emphasizing specific words or phrases
    - using phonetic pronunciation
    - including breathing sounds, whispering
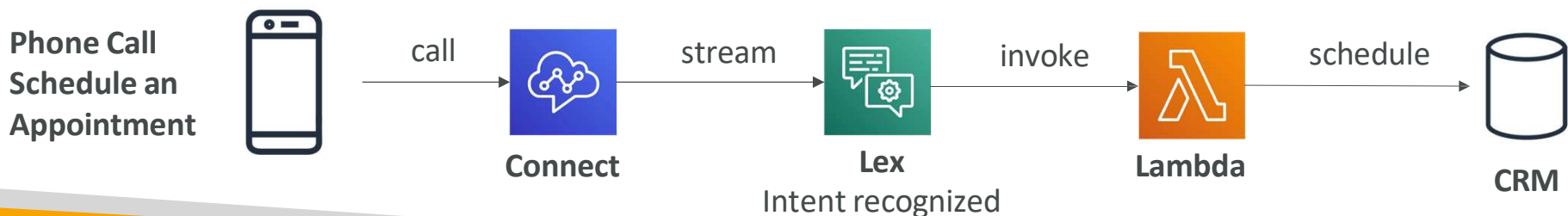   - using the Newscaster speaking style

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
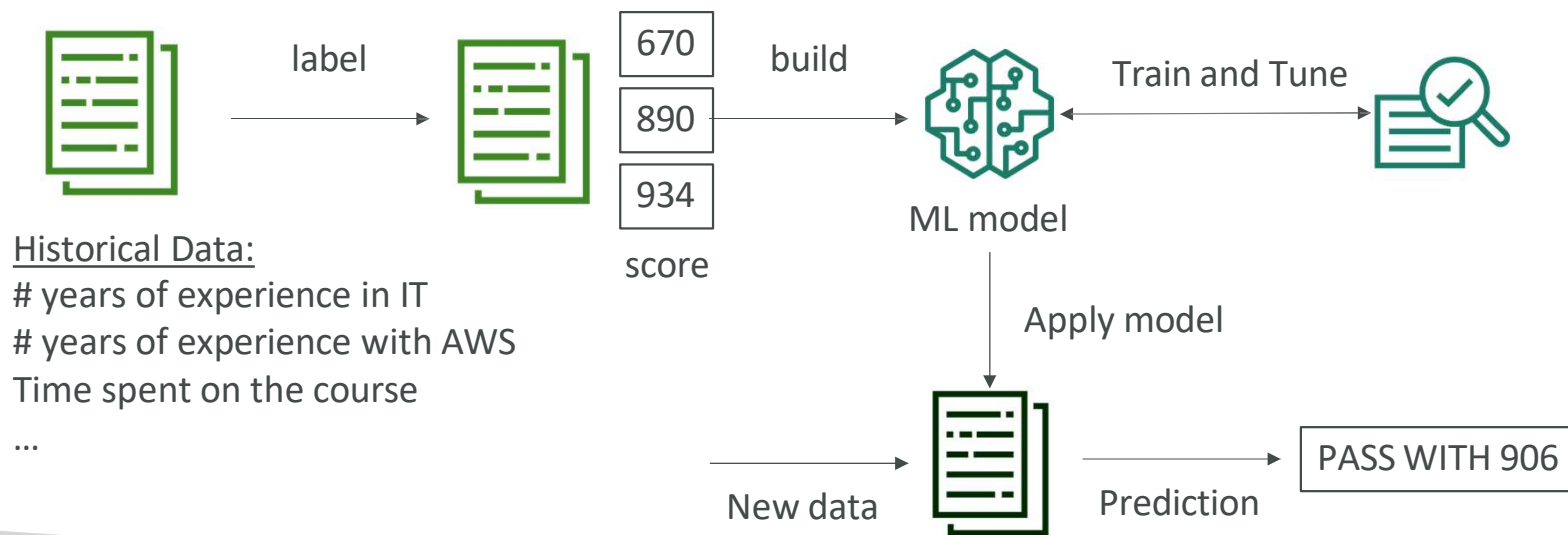
Amazon Comprehend Medical

- Amazon Comprehend Medical detects and returns useful information in unstructured clinical text:
  - Physician's notes
  - Discharge summaries
  - Test results
  - Case notes
- Uses NLP to detect Protected Health Information (PHI) - *DetectPHI* API
- Store your documents in Amazon S3, analyze real-time data with Kinesis Data Firehose, or use Amazon Transcribe to transcribe patient narratives into text that can be analyzed by Amazon Comprehend Medical.

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
890
934
score

build

ML model

Train and Tune

Apply model

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

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
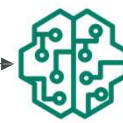Prices
Discounts
Website traffic
Store locations
...

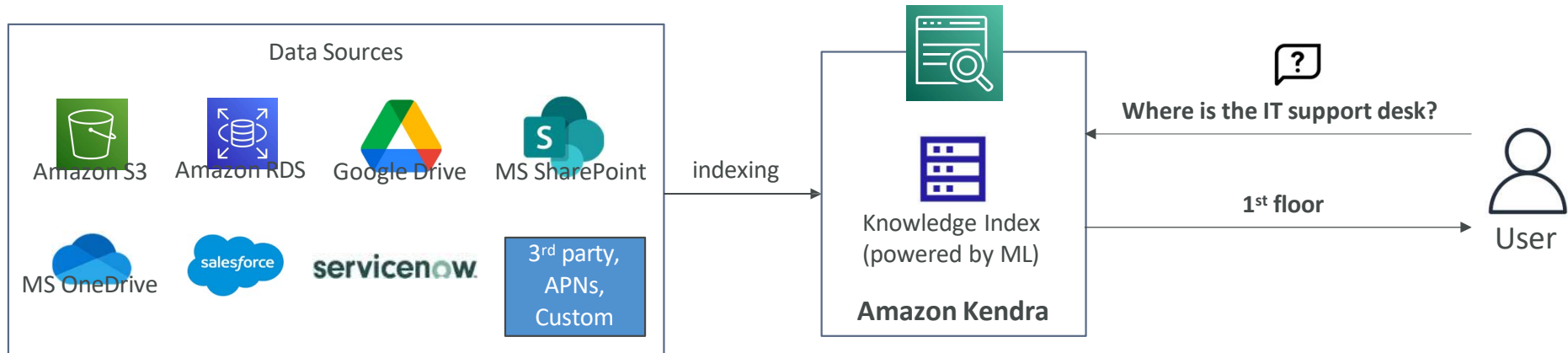upload → Amazon S3 → Amazon Forecast → produce → Forecasting Model → Future sales of raincoat: $500,000
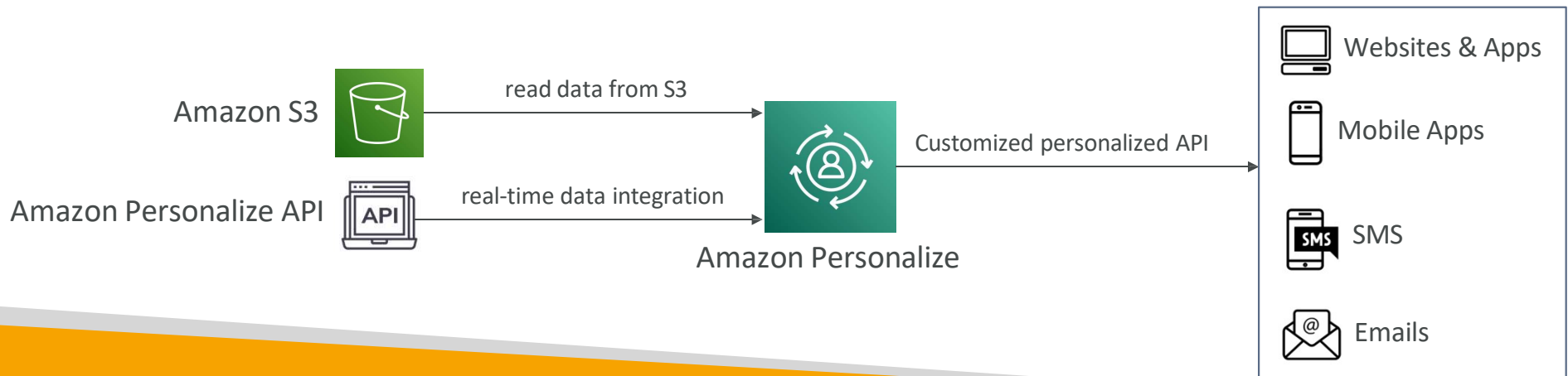
Amazon Kendra

- 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, ...)
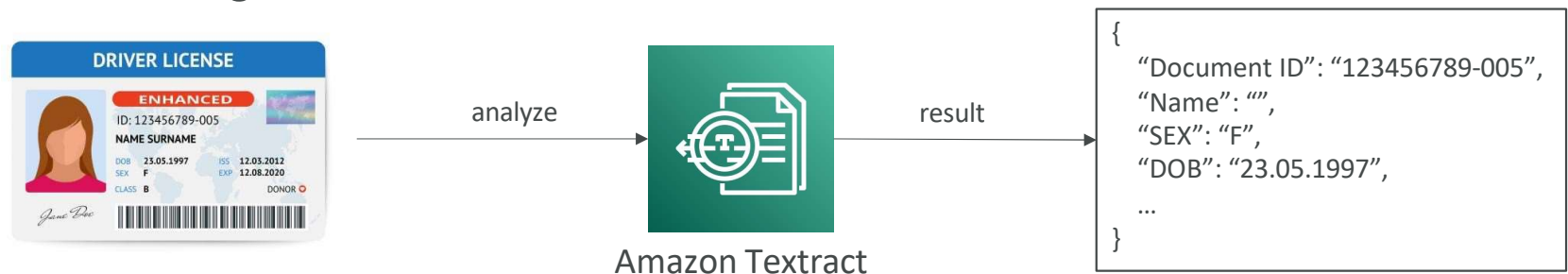
Amazon Personalize

- 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 Textract

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

- 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