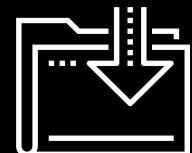


# Introduction to AWS Machine Learning and Robo Advisors

Fintech  
Lesson 15.1



# Class Objectives

---

By the end of this class, you'll be able to:



Describe the applications of CUIs in finance and banking.



Identify the scope and the limits of the AWS free tier offers.



Explain Amazon Lex and its main features.



Build and test a robo advisor by using Amazon Lex.



**WELCOME**

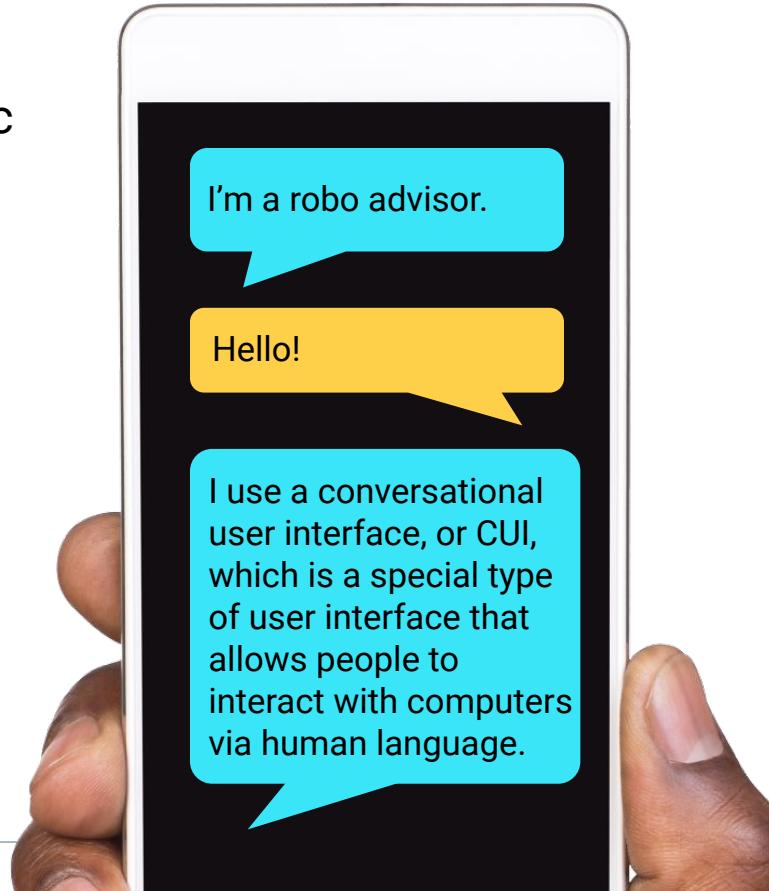


This is the **last module** of the machine learning section of the boot camp.

# Introduction to AWS Machine Learning and Robo Advisors (1 of 2)

---

In this module, you'll use your current Python and machine learning skills to build a robotic advisor, or robo advisor.



# Introduction to AWS Machine Learning and Robo Advisors (2 of 2)

---

Conversational user interfaces (CUIs) are an evolution in the way that we communicate with computers.



With CUIs, we can speak with computers or mobile devices by using human language via either voice or text.



CUIs are transforming machine learning applications by understanding human language.



When computers and people can interact via human language, that's called **natural language processing (NLP)**.

# CUIs in Finance (1 of 3)

---

Common examples:

Apple Siri



Amazon Alexa



Google Assistant



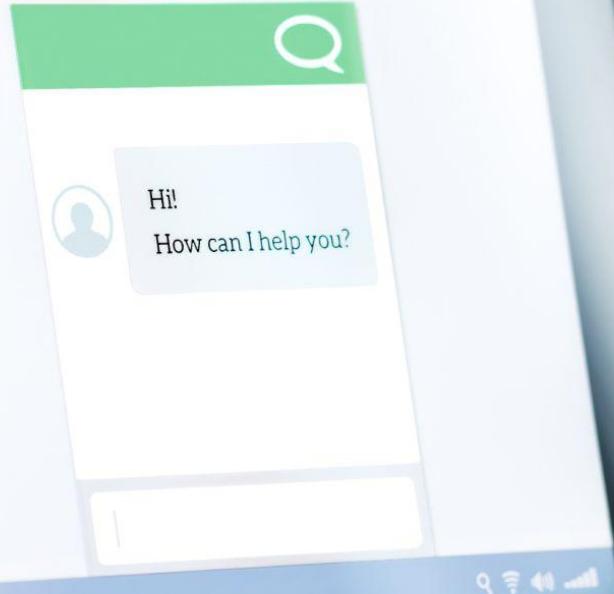
# CUIs in Finance (2 of 3)

---

When robo advisors use CUIs to provide financial advice or other information to customers, they're disrupting the field of finance.

And thanks to the power of cloud services, millions of people can reach these CUIs.

Robo advisors and cloud services are not only essential in finance, but they're driving innovation in enterprises that were previously traditional and skeptical of adopting information technologies.



# CUIs in Finance (3 of 3)

---

By the end of this module, you'll gain two valuable skills for financial services:

01

Creating CUIs to build robo advisors

02

Managing cloud services to both deploy a robo advisor and enhance machine learning models



Although we're still in the early days of CUIs, financial institutions are seeking innovative ways to engage with customers and offer 24-7 communication channels.

So, understanding how to use this technology to create a robo advisor is becoming an increasingly in-demand skill for fintech professionals.

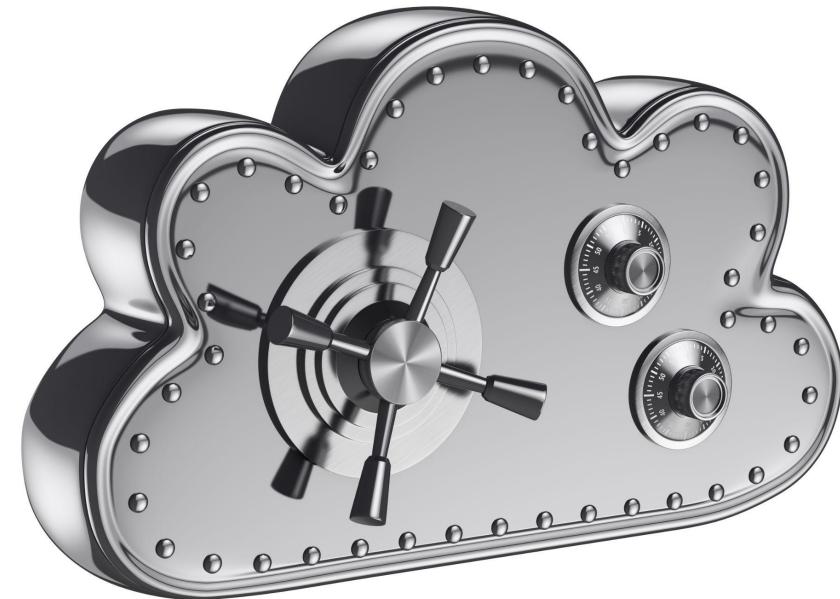
# CUIs and Cloud Security

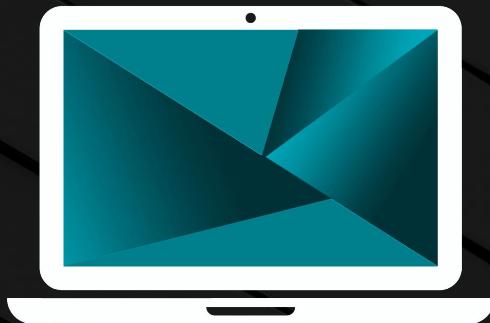
---

In the early stages of cloud computing, financial firms and governments perceived it as a nonsecure technology. But, cloud security has matured enough in recent years that it has earned the trust of financial institutions and government agencies.

According to a [study that Accenture and WSP conducted in collaboration with Microsoft](#), organizations that use cloud services gain the greatest cost savings.

This happens especially because of reduced energy use and a more efficient allocation of technology resources and personnel.





# Instructor Demonstration

---

## Challenge Review

# NLP chatbot

> Test bot (Latest)

 Ready. Build complete.

I want to invest for retirement

[Clear chat history](#)

 Chat with your bot...

Inspect response

Hide

When you chat with your bot, you can see the fulfillment state of your intent and the response here.

# Questions?





# Instructor Demonstration

---

## AWS Account Checkup

# AWS Account Checkup

---

To succeed in this module's activities, make sure that you've created the following required resources (as the [AWS Account Setup Guide](#) specifies):



An AWS account



An administrator user



AWS usage alerts



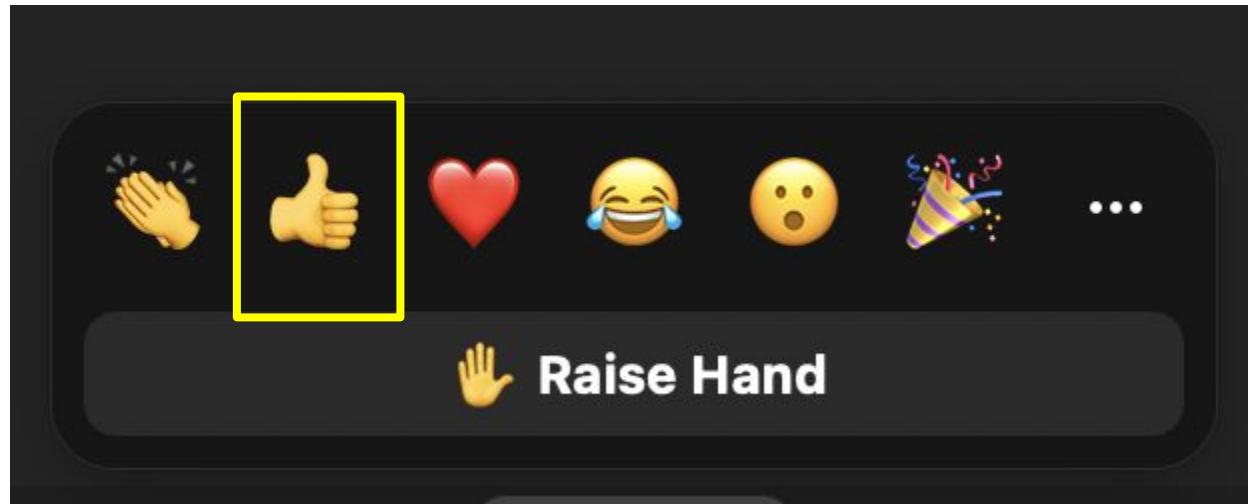
An Amazon Simple Storage Service (Amazon S3) bucketpulse checkquestion

# Zoom Meeting Reactions

---

In the Zoom window, find the default emoji reactions.

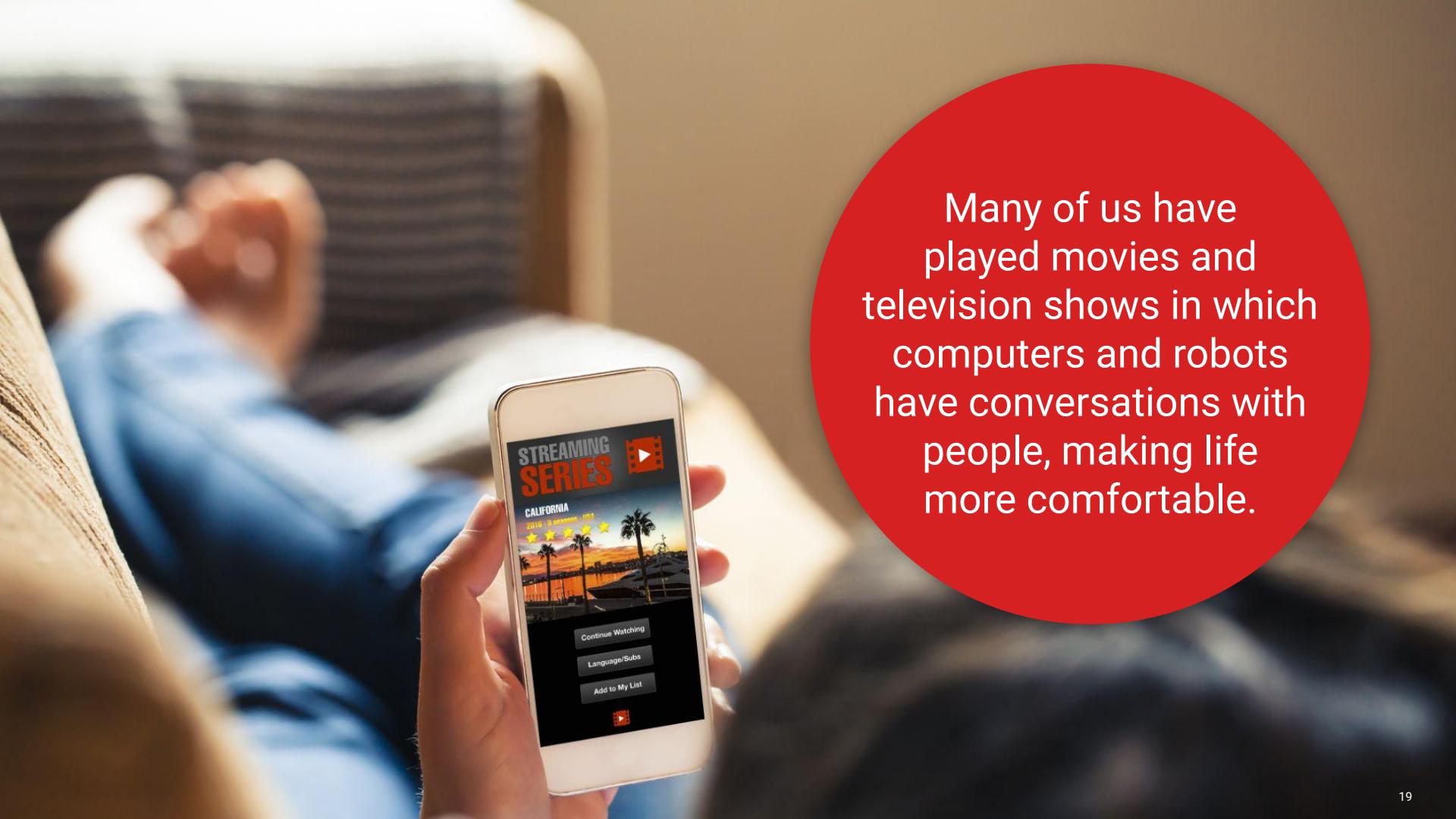
If you've successfully created and configured the AWS resource that we're checking, select the **thumbs up emoji**.



# Questions?



# Applications of NLP in Finance

A photograph showing a person's hands holding a white smartphone. The screen displays a mobile application for a streaming service. The app's interface includes the text "STREAMING SERIES" in large red letters, "CALIFORNIA" below it, and "2018 - 3 seasons 100+ episodes" followed by a five-star rating. There is also a small play button icon. At the bottom of the screen, there are three buttons labeled "Continue Watching", "Language/Subs", and "Add to My List". The background of the image is a blurred indoor setting, suggesting a living room.

Many of us have played movies and television shows in which computers and robots have conversations with people, making life more comfortable.



Thanks to NLP,  
we can create software  
applications that interact  
with people via spoken  
or written dialogues.

# Applications of NLP in Finance (1 of 2)

---

NLP is an exciting area of machine learning that widely intersects the fields of research in computer science, statistics, linguistics, and other disciplines.

**The fintech industry uses NLP in various contexts, such as:**



Sentiment analysis



Quantitative trading



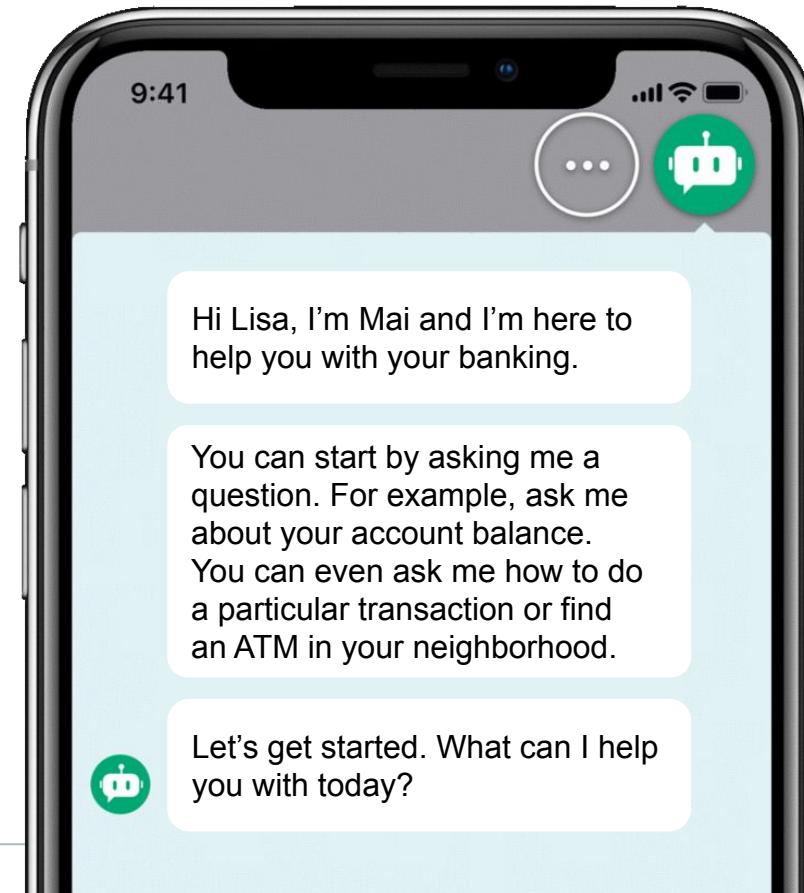
Fraud detection



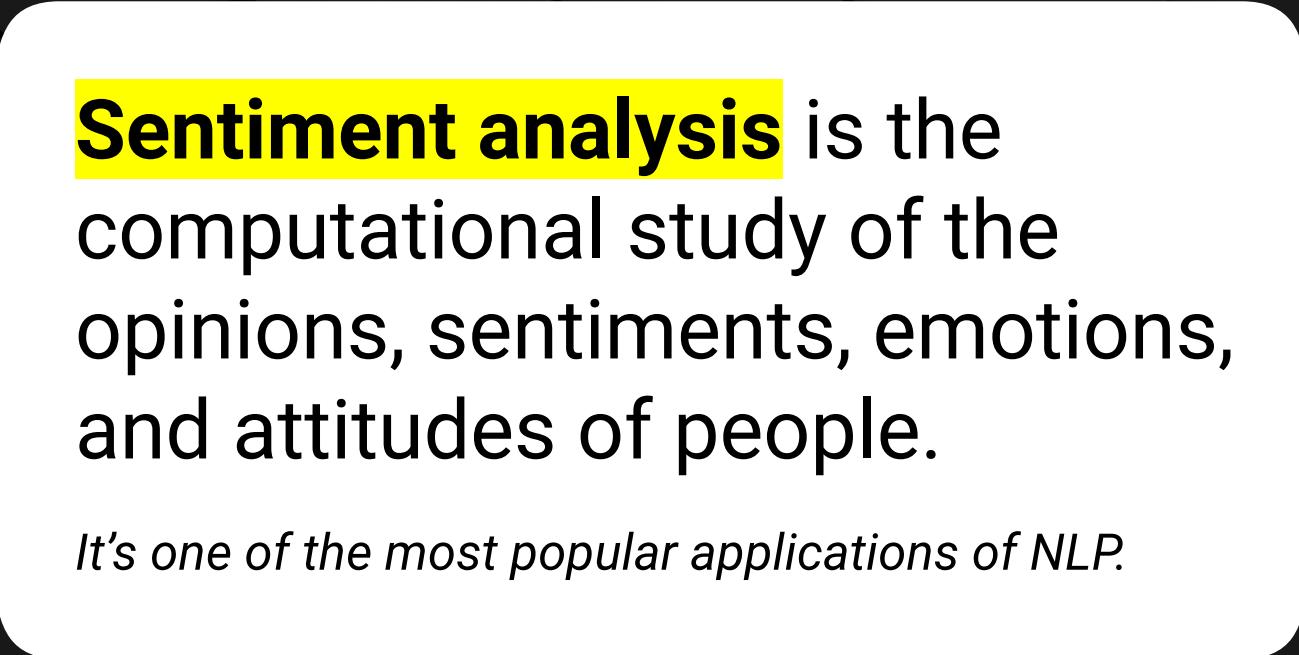
Chatbots for client interaction

# Applications of NLP in Finance (2 of 2)

In the fintech industry, chatbots make up one of the most common applications of CUIs.



# Sentiment Analysis



**Sentiment analysis** is the computational study of the opinions, sentiments, emotions, and attitudes of people.

*It's one of the most popular applications of NLP.*

# Sentiment Analysis (1 of 3)

---

Although sentiment analysis is normally tied to marketing, the fintech world has given it significant attention because of its wide range of applications.

These include:



Customer service



Competition benchmarking



Investment assistance



News and social media analysis

# Sentiment Analysis (2 of 3)

---

With sentiment analysis, we can answer questions like:

**Will a stock that's  
unpopular on  
social media open  
with a loss today?**



# Sentiment Analysis (3 of 3)

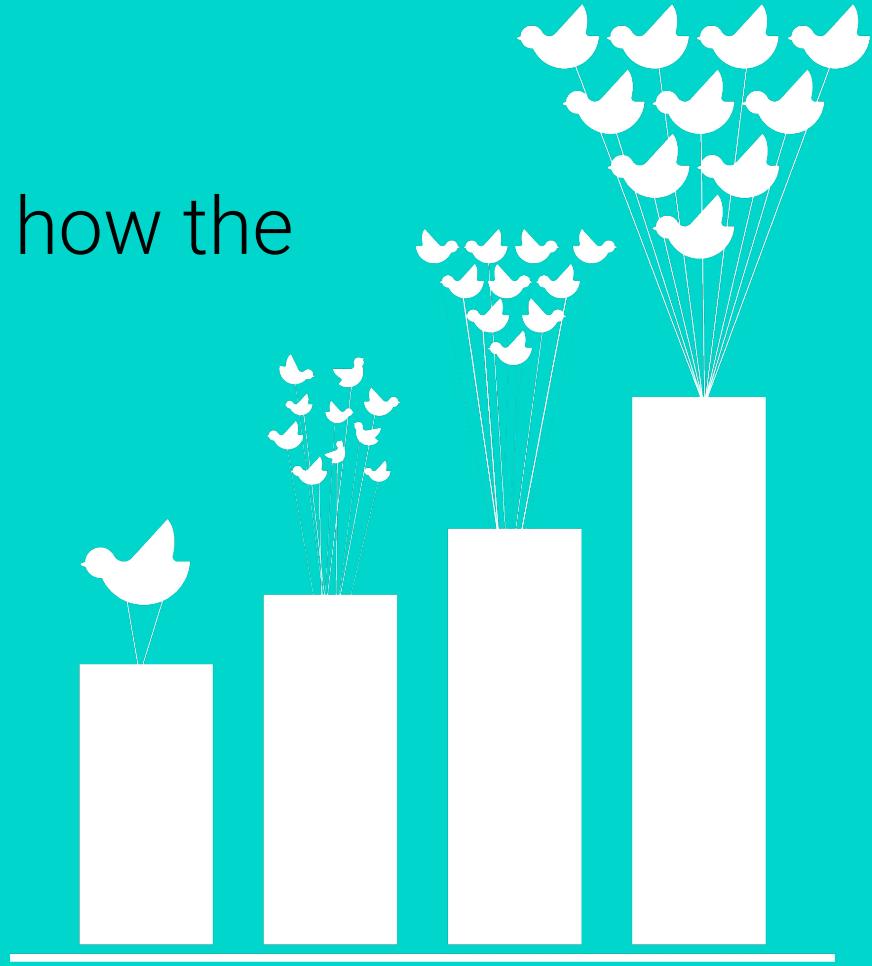
Besides analyzing social media, we can use sentiment analysis to understand what news headlines express about a stock—for the purpose of supporting investment decisions.

For example, on September 8, 2020, Tesla (TSLA) shares lost 21% of their value after Standard & Poor's declined to add Tesla to the S&P 500.

The news about this decision influenced the sentiments of traders about TSLA shares—and the TSLA stock price slumped!



Sentiments can impact how the stock market behaves.



# Sentiment Analysis and NLP

Thanks to NLP, we can assess the impact and gain additional insights for making better financial decisions.

By using NLP, we can introduce sentiment analysis as part of a trading strategy—specifically, to predict the effects of breaking news or social media on the stock market.



Although traders don't formally use sentiment analysis, several researchers are working toward integrating it into trading strategies.

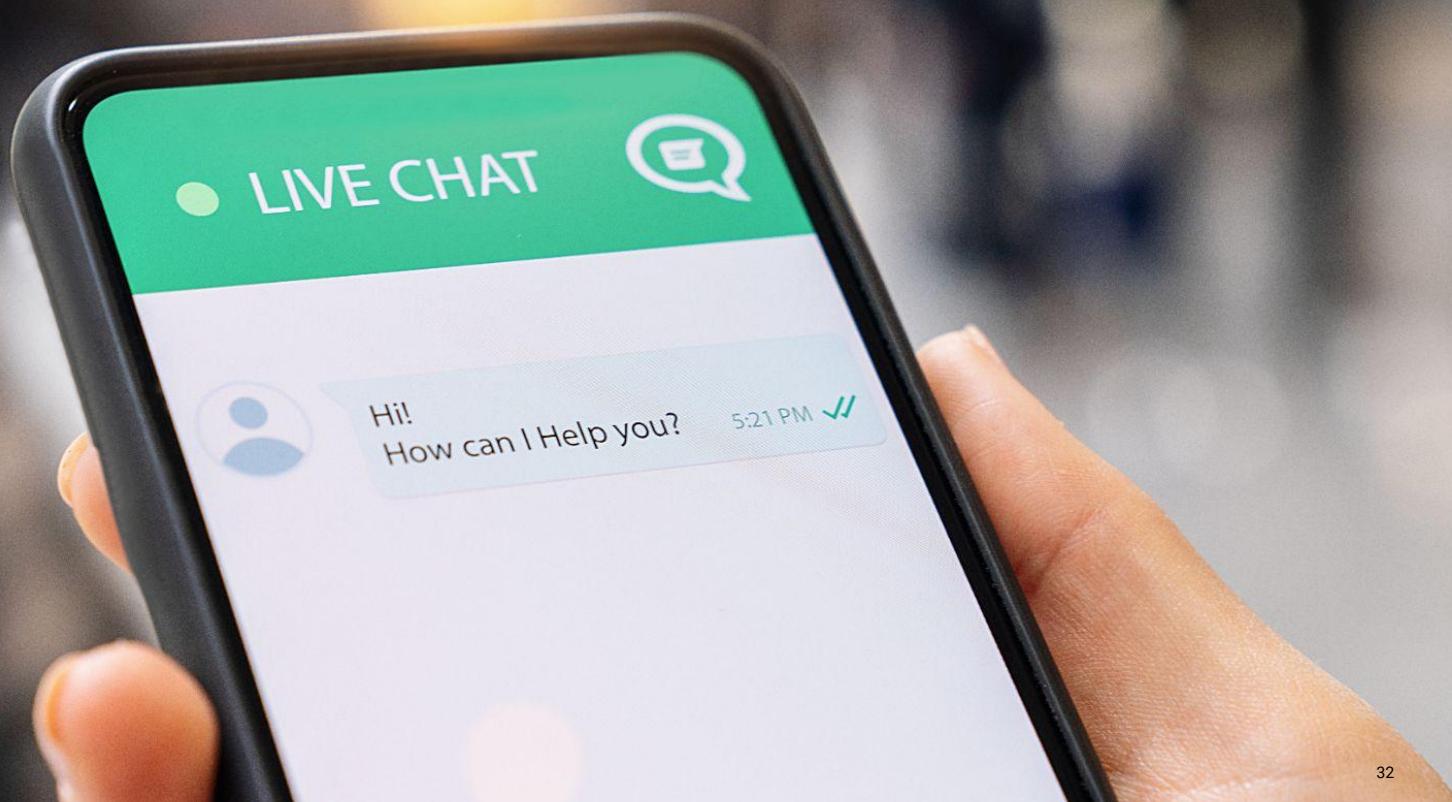


# Conversational User Interfaces

In the early years of computing history, people used to communicate with computers by using text interfaces. These required entering instructions that were not human friendly.



Thanks to advances in NLP, we can now communicate with computer systems by using human language via voice or text that goes through CUIs.



# CUIs

---

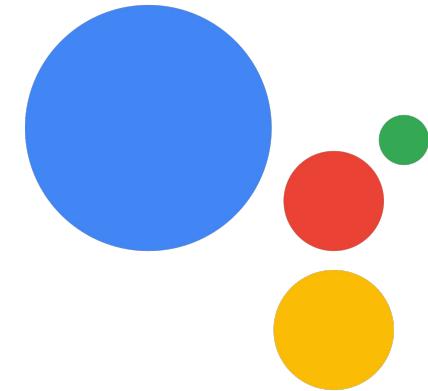
The chatbot is the most common application of the CUI. Amazon Alexa, Apple Siri, and Google Assistant are the most popular examples of this type of interface.



Amazon Alexa



Apple Siri



Google Assistant



In this module's Challenge assignment,  
you'll use [Amazon Lex](#) to create a robo  
advisor for an investment portfolio.

**Amazon Lex** is the NLP technology that uses Alexa, which is the virtual assistant that Amazon developed.

# CUIs and Robo Advisors

---

Financial services providers are using CUIs to offer robo advisors as an additional communication channel for customers.



Fidelity Go<sup>SM</sup>



# Benefits of CUIs

---

The most relevant benefits of this technology include the following:



Support and advice



A customized experience



Efficiency

# CUIs: Support and Advice

---

Because of chatbots, financial institutions can offer 24-7 support and advice to customers.

They can also reduce operational costs through this enhancement of the customer experience, especially by offering fast-paced communication.



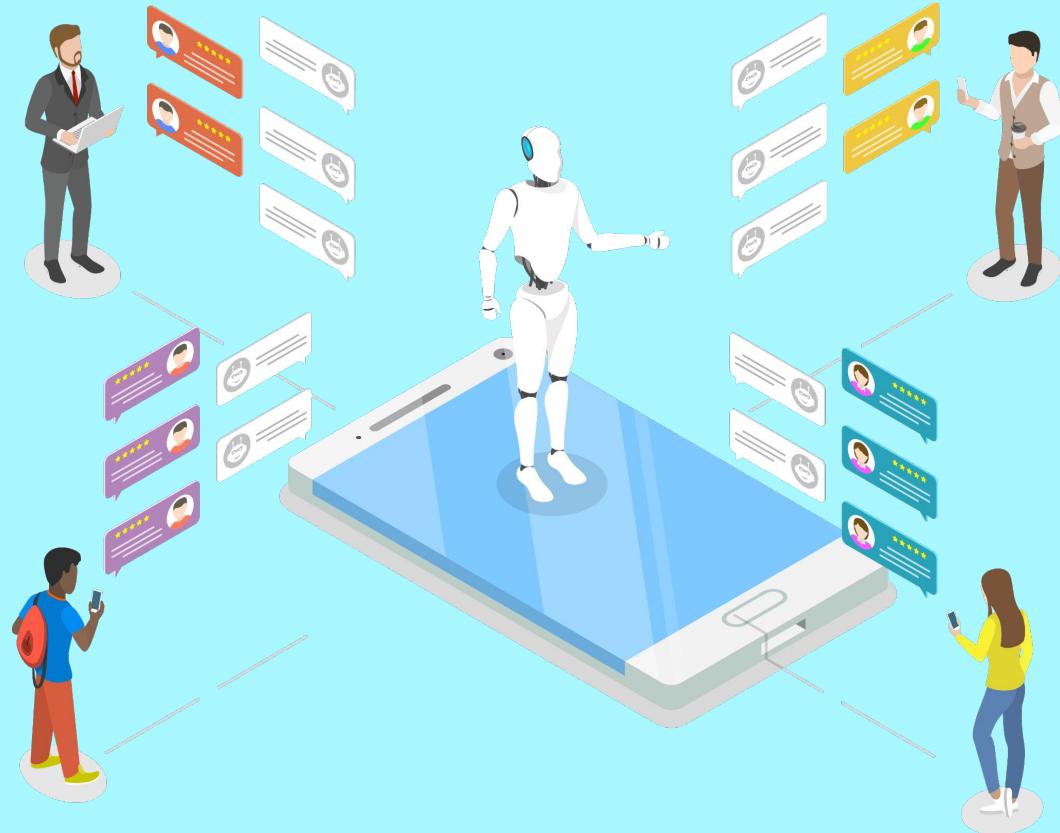
# CUIs: A Customized Experience

---

By using NLP and sentiment analysis, chatbots understand how people communicate.

Financial institutions can thus respond more appropriately to customer needs.

The machine learning algorithms behind chatbots can learn how a customer behaves—and then offer a customized experience.



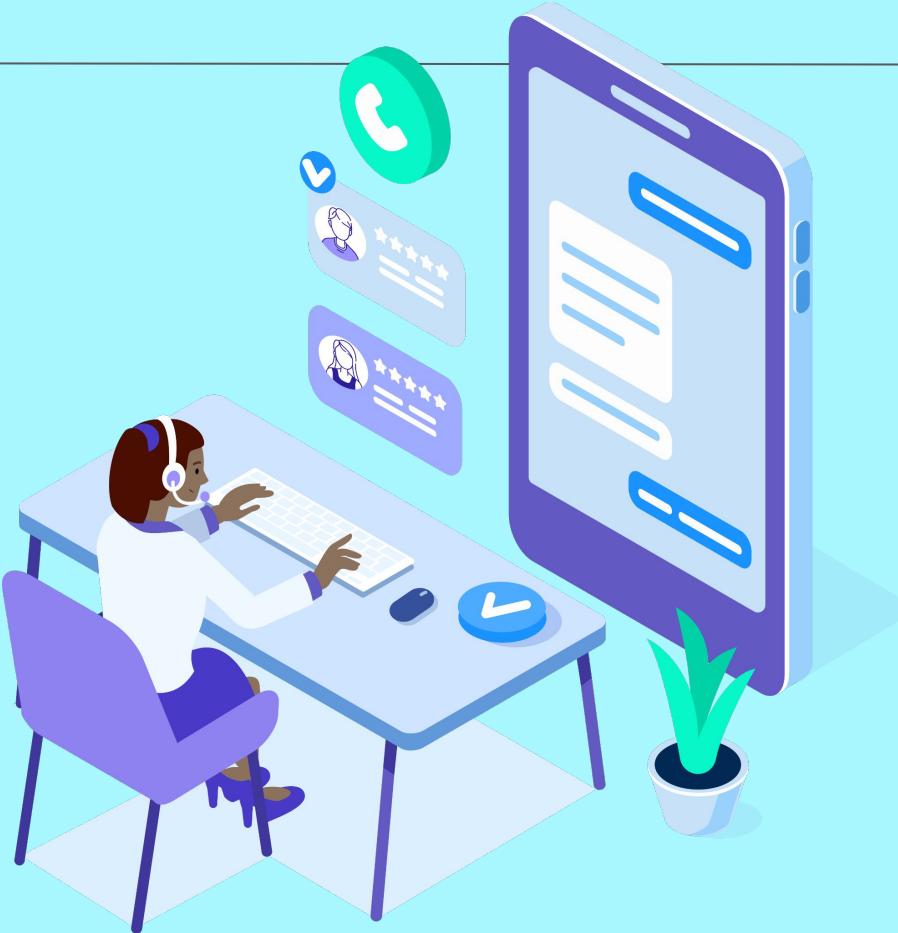
# CUIs: Efficiency

---

CUIs boost employee satisfaction.

This is particularly true in call centers, where operators will respond to fewer calls about common questions that a chatbot can answer.

The operators can then focus their efforts on responding to complex financial issues.



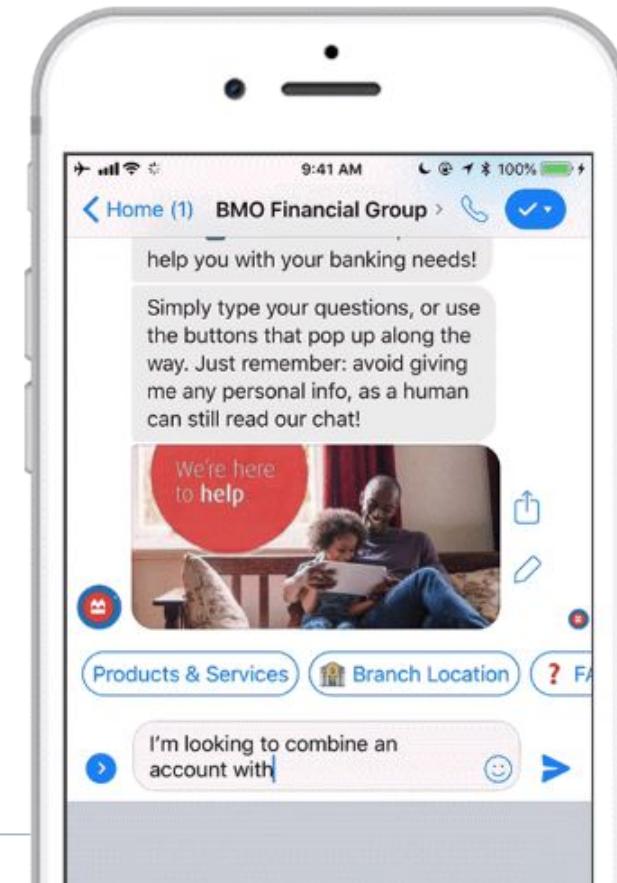


According to Juniper Research,  
banks will annually save **\$7.3 billion**  
by 2023 thanks to chatbot use.

# Chatbot Use Case 1

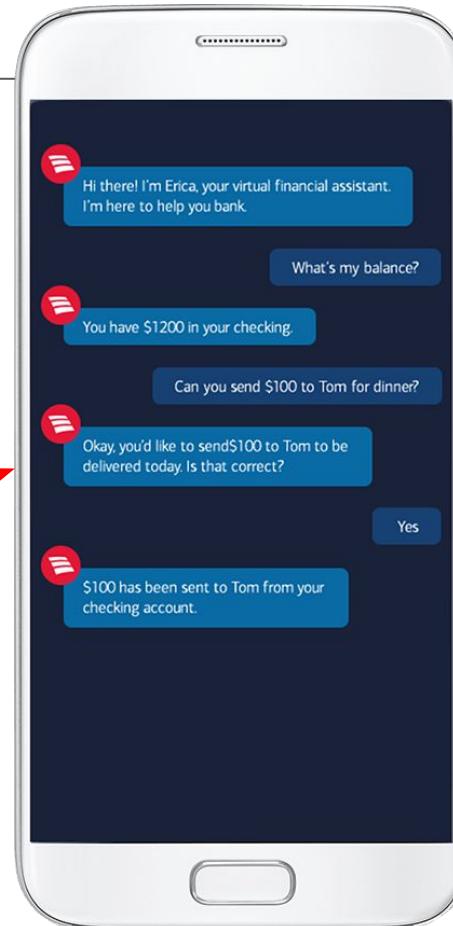
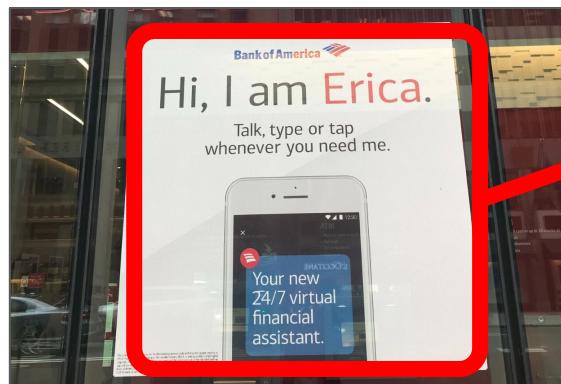
In Canada, Bank of Montreal uses a chatbot named BMO Bolt so that customers can contact the bank 24-7 via Facebook or Twitter for questions about products, foreign exchange rates, branch locations, and ATM locations.

**BMO Bolt™** from



# Chatbot Use Case 2

Bank of America launched Erica to provide a digital banking experience that includes voice communication, in-app messaging, and predictive analytics. By December 2021, Erica had reached more than 17 million users.



**Erica** from **BankofAmerica** 

# Questions?





# Introduction to Amazon Lex

**Amazon Lex** is an AWS service that developers can use to create CUIs.

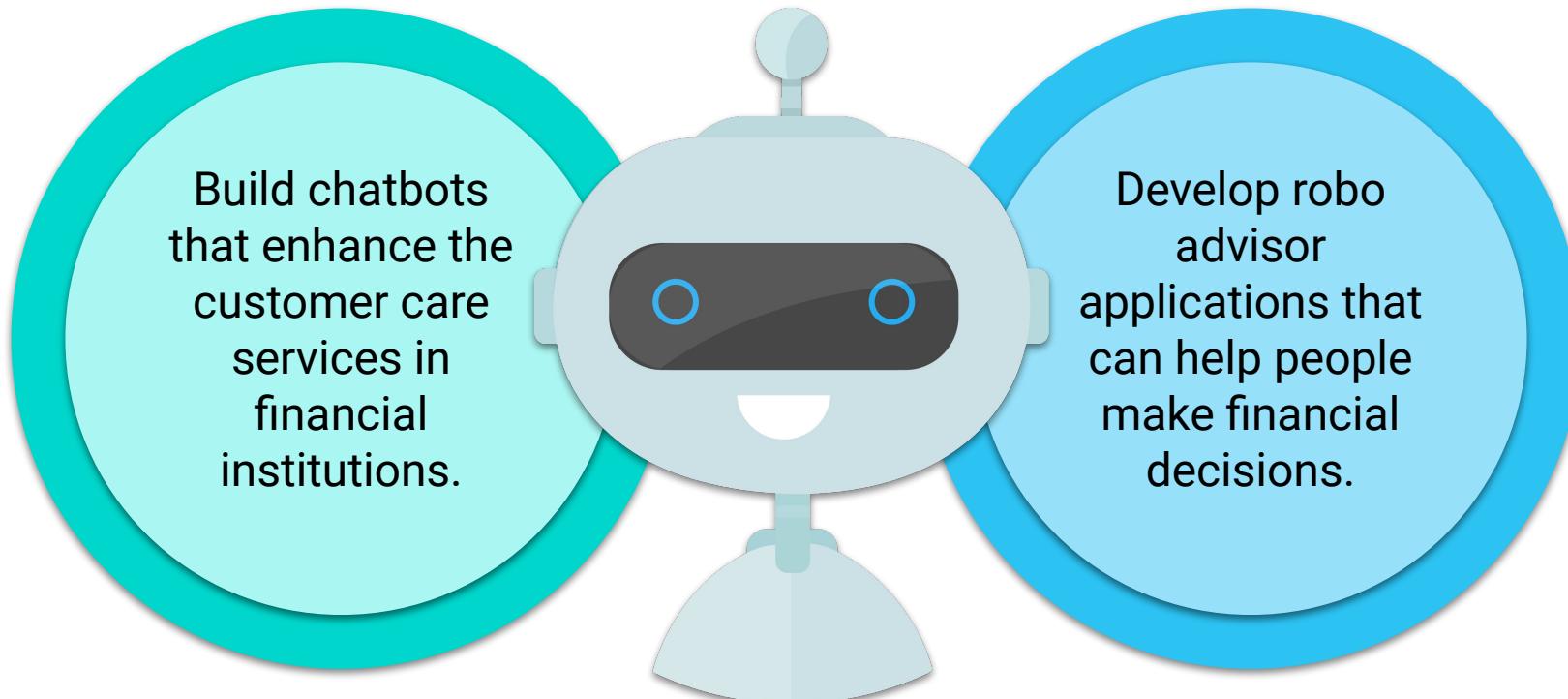
This service uses the same machine learning technology that powers Amazon Alexa.



# Introduction to Amazon Lex (1 of 3)

---

As a fintech professional using Amazon Lex, you'll be able to:



# Introduction to Amazon Lex (2 of 3)

---

Amazon Lex features include:

<b>Automatic speech recognition</b>	Amazon Lex uses automatic speech recognition to convert speech to text. It then uses NLP to recognize the intent of the text.
<b>Deep learning algorithms</b>	Amazon Lex captures all the complexity of deep learning algorithms. So, using Amazon Lex requires no coding, and neither does creating a CUI.
<b>Third-party application integration</b>	With Amazon Lex, you can integrate third-party applications (like Slack or Facebook Messenger) and other AWS services (like Amazon S3 or Amazon SageMaker). With AWS Lambda, you can also use your own Python code to create custom functionality that extends Amazon Lex.

# Introduction to Amazon Lex (3 of 3)

---

Getting started with Amazon Lex is straightforward:

01

Create a bot, and configure it to understand the user's goals, or intent.

02

Test the bot on the Amazon Lex console.

# AWS Management Console

Everything you need to access and manage the AWS cloud — in one web interface.

[Create a Free Account](#)[Already have an account? Sign in](#)

The AWS Management Console brings the unmatched breadth and depth of AWS right to your computer or mobile phone with a secure, easy-to-access, web-based portal. Discover new services, manage your entire account, build new applications, and learn how to do even more with AWS.



## Console Overview

- Discover and experiment with over 150 AWS services, many of which have [free trials](#)
- Build your cloud-based applications in [any AWS data center throughout the world](#)
- Manage and monitor [users](#), [service usage](#), [health](#), and [monthly billing](#)
- Get [in-console help](#) from AWS Support

[Create a Free Account](#)

## Additional Resources

- [Learn about AWS Pricing »](#)
- [Find SDKs, Command Line Tools, and more tools to access AWS »](#)



## Important



Amazon Lex and the other AWS cloud services that we'll learn in this module will support the channel that we enable.

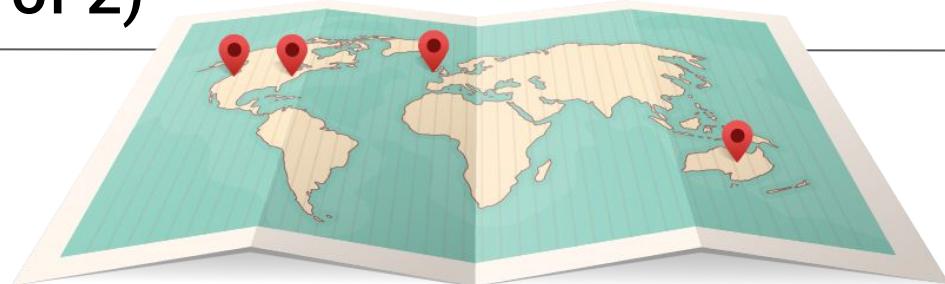
**Amazon Lex supports two versions. In this module, we'll work with Version 1.**

Do not switch to the Amazon Lex V2 console.

# AWS Supported Regions (1 of 2)

Amazon Lex is available in only some [AWS regions](#).

For Lex V1, these regions are:



- |  |                          |   |                        |
|--|--------------------------|---|------------------------|
|  | US East (N. Virginia)    |  | Europe (Frankfurt)     |
|  | US West (Oregon)         |  | Europe (Ireland)       |
|  | Asia Pacific (Singapore) |  | Europe (London)        |
|  | Asia Pacific (Sydney)    |  | AWS GovCloud (US-West) |
|  | Asia Pacific (Tokyo)     |   |                        |

# AWS Supported Regions (2 of 2)

In this module, we'll use the US West (Oregon) region for Lex V1.

The screenshot shows the AWS Management Console homepage. On the right side, there is a sidebar titled "AWS Regions" listing various AWS regions. A yellow arrow points from the text above to the "US West (Oregon) us-west-2" entry, which is highlighted with a yellow box. Other regions listed include US East (N. Virginia), US East (Ohio), US West (N. California), Africa (Cape Town), Asia Pacific (Hong Kong), Asia Pacific (Mumbai), Asia Pacific (Seoul), Asia Pacific (Singapore), Asia Pacific (Sydney), Asia Pacific (Tokyo), Canada (Central), Europe (Frankfurt), Europe (Ireland), Europe (London), Europe (Milan), Europe (Paris), Europe (Stockholm), Middle East (Bahrain), and South America (São Paulo).

Region	Region ID
US East (N. Virginia)	us-east-1
US East (Ohio)	us-east-2
US West (N. California)	us-west-1
US West (Oregon)	us-west-2
Africa (Cape Town)	af-south-1
Asia Pacific (Hong Kong)	ap-east-1
Asia Pacific (Mumbai)	ap-south-1
Asia Pacific (Seoul)	ap-northeast-2
Asia Pacific (Singapore)	ap-southeast-1
Asia Pacific (Sydney)	ap-southeast-2
Asia Pacific (Tokyo)	ap-northeast-1
Canada (Central)	ca-central-1
Europe (Frankfurt)	eu-central-1
Europe (Ireland)	eu-west-1
Europe (London)	eu-west-2
Europe (Milan)	eu-south-1
Europe (Paris)	eu-west-3
Europe (Stockholm)	eu-north-1
Middle East (Bahrain)	me-south-1
South America (São Paulo)	sa-east-1



The **bot** is the core component  
of Amazon Lex.

# Amazon Lex Bot

---

A bot performs automated tasks such as:

Three overlapping circles, each with a blue outline and a white background, representing three different automated tasks. The circles overlap in a triangular pattern.

Booking  
a hotel

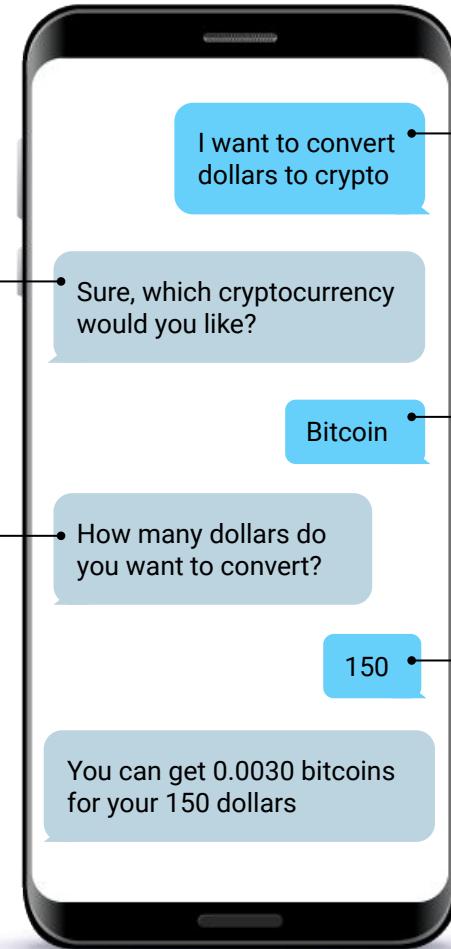
Making a  
wire transfer

Suggesting  
an investment  
portfolio

# A sample conversation between a user and a bot:

**Utterance:** A spoken or typed phrase that indicates the intent

**Prompt:** A question that asks the user to input data



convertDollars

**Intent:** The goal that the user wants to achieve

**Slot:** A place for data that the user must provide to fulfill the intent

**Fulfillment:** The business logic that's required to fulfill the intent



## Instructor Demonstration

---

# Setting Up a Bot with Amazon Lex

# Questions?





# Activity: Setting Up a Bitcoin Fear & Greed Robo Advisor

In this activity, you'll set up an Amazon Lex bot that will implement a robo advisor.

Suggested Time:

---

15 Minutes



Time's Up! Let's Review.

# Questions?





Countdown timer

15:00

(with alarm)

Break



# Bringing an Amazon Lex Bot to Life

# Bringing an Amazon Lex Bot to Life

---

In this activity, you'll:

- Learn how to add intents and utterances to an Amazon Lex bot for interacting with a user by using human language.
- Continue building the bot that converts dollars to bitcoins.





## Instructor Demonstration

---

Bringing an Amazon Lex Bot to Life

# Questions?





# Activity: Adding User Interaction to the Robo Advisor

In this activity, you'll add an intent to provide user interaction to the robo advisor that you created earlier.

Suggested Time:

---

20 Minutes



Time's Up! Let's Review.

# Questions?





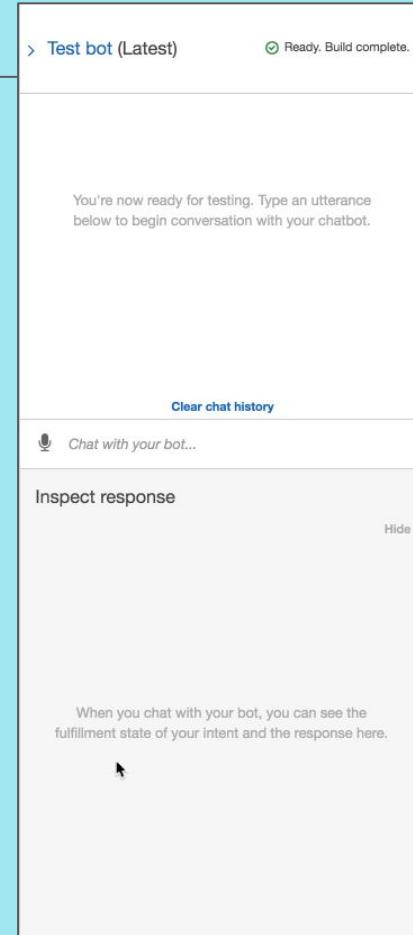
## Instructor Demonstration

---

Building and Testing an Amazon Lex Bot

# Building and Testing an Amazon Lex Bot

This is a sample animation of the Amazon Lex bot running a sample dialog.



# Questions?





# Activity: Building and Testing the Robo Advisor

In this activity, you'll build and test your Bitcoin Fear & Greed robo advisor.

Suggested Time:

---

15 Minutes



Time's Up! Let's Review.

# Questions?





# Recap

---

In today's class, you learned that:



NLP is disrupting the finance industry with multiple applications, where chatbots enable better customer communications.



AWS is a leading cloud platform that you can use to build chatbots—for implementing automated communication channels with customers by using human language.



You can create and test a chatbot with just a few clicks and without code.



## Next Class

You'll learn how to enhance the interaction between a bot and a person by adding business logic rules. To do so, you'll use Python and another AWS service, named AWS Lambda.

# Questions?



*The  
End*