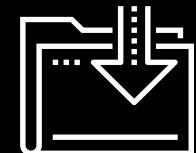


# Running Machine Learning Models in the Cloud

Fintech  
Lesson 15.3



# Class Objectives

---

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



Explain how Amazon SageMaker Studio works and use it to deploy machine learning models.



Identify fintech business cases for which you can use Amazon SageMaker to enhance decision making.



Orchestrate a machine learning cloud solution by combining AWS services.



**WELCOME**

# Introduction to Machine Learning Models in the Cloud

A photograph of a young woman with curly brown hair, wearing a bright orange sweatshirt, sitting on a light-colored couch. She is looking down at a silver laptop keyboard. A yellow mug is held in her left hand. A tabby cat is lying on the couch next to her, looking towards the camera. In the background, there's a bookshelf filled with books and a large window. A yellow speech bubble is overlaid on the left side of the image.

To create prototypes of  
machine learning models,  
we can mostly use our  
personal computers.

But for placing a model  
in a production environment,  
we need **cloud services**.

# Introduction to Machine Learning Models in the Cloud (1 of 3)

---

Cloud services, like those that AWS offers:



Ease the creation, testing, and deployment of machine learning models in the cloud.



Allow hundreds or even thousands of people to reach and use those models.



Provide more computing power to process large datasets than we have when using our personal computers.

# Introduction to Machine Learning Models in the Cloud (2 of 3)

In today's class, you'll learn how to create, fit, and deploy a machine learning model in the cloud by using Amazon SageMaker.

The screenshot shows the Amazon SageMaker landing page. At the top, there's a navigation bar with links for Contact Us, Support, English, My Account, Sign In, and Create an AWS Account. Below that is a secondary navigation bar with links for Products, Solutions, Pricing, Documentation, Learn, Partner Network, AWS Marketplace, Customer Enablement, Events, Explore More, and a search icon. The main content area has a blue header bar with the text "Get Started with Amazon SageMaker Ground Truth | Learn how you can build highly accurate training datasets »". Below this, there's a breadcrumb trail with "Machine Learning" and a back arrow. The main title is "Amazon SageMaker" with the subtitle "Build, train, and deploy machine learning (ML) models for any use case with fully managed infrastructure, tools, and workflows". A large orange "Get Started with SageMaker" button is prominently displayed. The page is divided into three main sections: "Business analysts" (with an icon of a person looking at a chart), "Data scientists" (with an icon of a person working on a laptop), and "ML engineers" (with an icon of two people working on gears). Each section contains a brief description and a link to "SageMaker for [user type]".

Products Solutions Pricing Documentation Learn Partner Network AWS Marketplace Customer Enablement Events Explore More Q

Contact Us Support English My Account Sign In Create an AWS Account

Amazon SageMaker Overview Features Pricing FAQs By Role Resources Getting Started Customers Partners

Get Started with Amazon SageMaker Ground Truth | Learn how you can build highly accurate training datasets »

« Machine Learning

## Amazon SageMaker

Build, train, and deploy machine learning (ML) models for any use case with fully managed infrastructure, tools, and workflows

[Get Started with SageMaker](#)

**Business analysts**

Make ML predictions using a visual interface with SageMaker Canvas.

[SageMaker for business analysts »](#)

**Data scientists**

Prepare data and build, train, and deploy models with SageMaker Studio.

[SageMaker for data scientists »](#)

**ML engineers**

Deploy and manage models at scale with SageMaker MLOps.

[SageMaker for ML engineers »](#)

# Introduction to Machine Learning Models in the Cloud (3 of 3)

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[SageMaker](#), an AWS service, offers an extensive library of machine learning models that are optimized for the cloud and that we can use with Python.

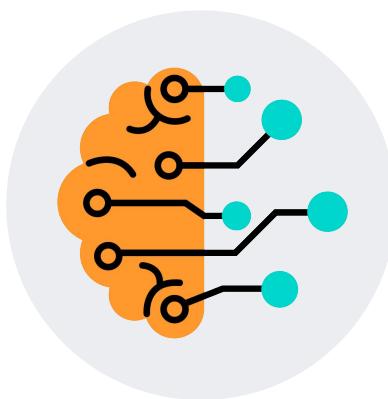
- For a fintech professional, being able to orchestrate a cloud-based machine learning solution that combines various AWS services is a valuable skill.
- After completing this class, you'll be able to use the power of the cloud to run machine learning models.



# **Fintech and the Computing Power of Cloud Services**

# Fintech and the Computing Power of Cloud Services

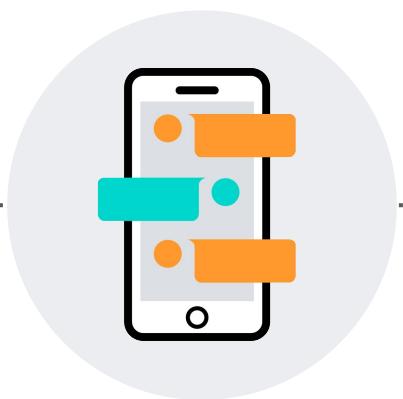
The **cloud** refers to the on-demand availability of computer resources, such as:



Computer  
processing power



Data storage



Chatbots



Serverless  
applications

One of the greatest advantages of cloud computing is that we don't need physical access to the hardware. Instead, we access the hardware through the internet (via public or private networks).



# Fintech and the Computing Power of Cloud Services

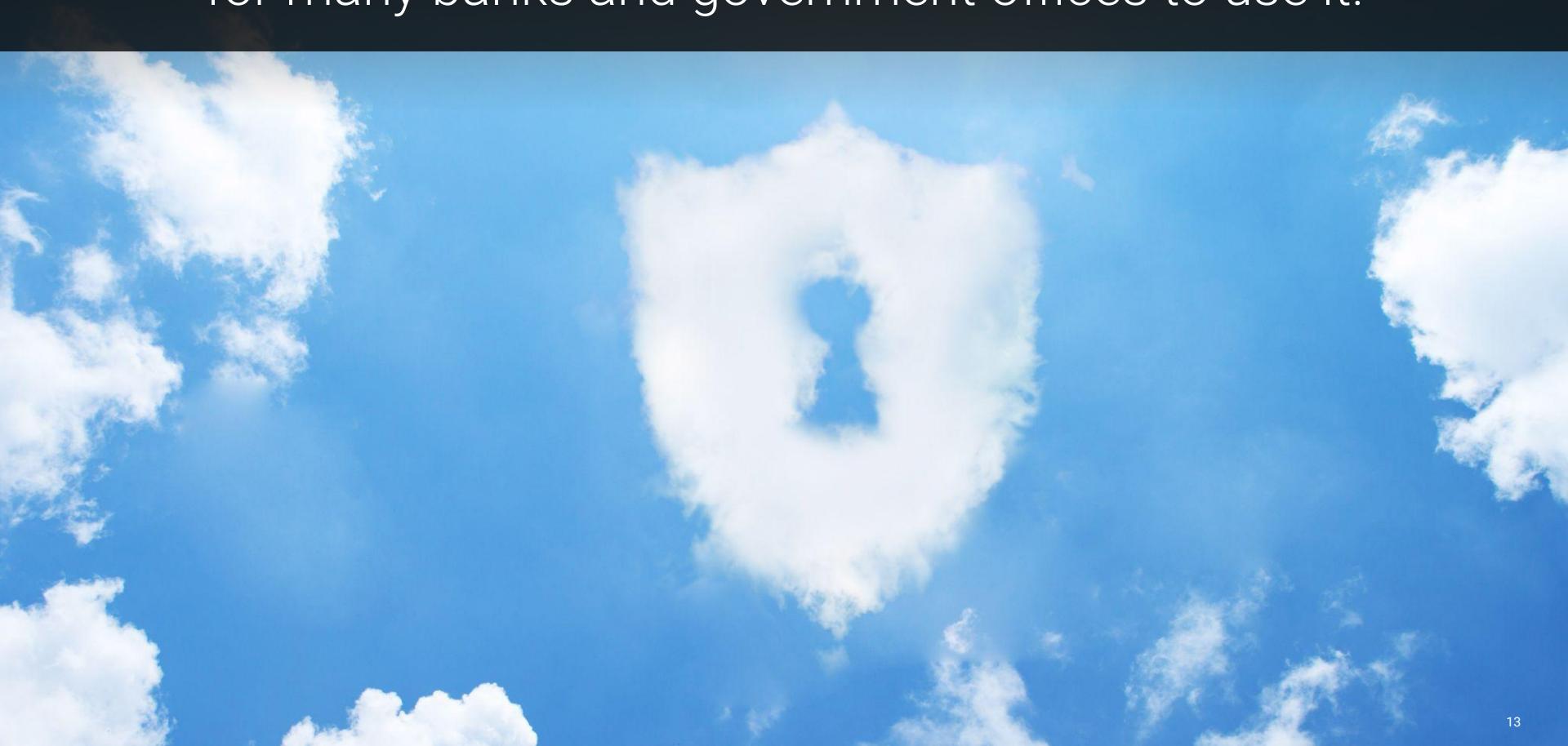
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Normally, you pay as you go for what you use—sometimes down to the second or the byte—with little or no up-front costs.

- Cloud services usually charge like utility services do (think of an electricity bill).
- Cloud computing usually costs less than having your own hardware.
- That's because of the economics of scale (and no up-front costs for the physical hardware, setup, or provisioning).



Cloud computing is also considered secure enough for many banks and government offices to use it.



Some  
well-known  
cloud service  
providers:



Google Cloud

# Cloud Service Models

| Model                                     | Definition   | Example  |
|---|--|--|
| <b>Infrastructure as a service (IaaS)</b> | Supplies APIs for accessing various infrastructure elements, such as servers, virtual machines, storage solutions, load balancers, and network interfaces.             | <a href="#">Azure Virtual Machines</a>  |
| <b>Platform as a service (PaaS)</b>       | Supplies a platform on which customers can develop, run, and manage applications—without the complexity of building and maintaining their own physical infrastructure. | <a href="#">Amazon Web Services</a>     |
| <b>Software as a service (SaaS)</b>       | Refers to a software licensing and delivery model, which licenses software that's centrally hosted on a subscription basis.  | <a href="#">Microsoft Office 365</a>    |
| <b>Function as a service (FaaS)</b>       | Offers the ability to deploy individual functions in the cloud that run in response to events. FaaS is also known as serverless computing.                             | <a href="#">AWS Lambda</a>              |

# Fintech and the Computing Power of Cloud Services

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Cloud computing is becoming a game changer in financial services, because it:



Reduces operational costs.



Improves productivity.



Allows for advanced data analytics that can lead to a competitive advantage over the long term.

Instead of having large IT departments, financial institutions today are partnering with technology companies to deliver joint solutions in the cloud.



# Cloud-Powered Partnerships: Case Study 1

In 2020, [AWS and HWBC made a strategic deal](#) to support the digital transformation efforts of HSBC.

The image shows a screenshot of a FinTech Ranking news article. The header features the site's logo 'FINTECH RANKING' in large, bold, black letters. Below the logo is a navigation bar with links to 'FINTECH NEWS', 'GLOBAL TRENDS', 'BLOCKCHAIN', 'INSPIRASIA', 'BANKS', 'CONTACT', and 'ADVERTISING'. A search icon is also present. The main content area has a decorative background of abstract green and blue circular patterns. The article title is 'AWS AND HSBC STRIKE GLOBAL CLOUD BANKING DEAL'. Below the title, there is a photo of a woman in a server room, a short summary, and two paragraphs of detailed text. To the right of the main content, there is a sidebar with a book cover for 'The FIRST FINTECH BANK'S ARRIVAL' by Vladislav Solodkiy, a bio for the author, and a logo for 'ayannah'.

FINTECH NEWS ▾ GLOBAL TRENDS ▾ BLOCKCHAIN INSPIRASIA ▾ BANKS CONTACT ADVERTISING

Home > 2020 > July > 15 > Banks > AWS and HSBC strike global cloud banking deal

BANKS | JULY 16, 2020

## AWS AND HSBC STRIKE GLOBAL CLOUD BANKING DEAL

VIA ALTFI

Amazon Web Services and HSBC have struck a long-term strategic deal as the bank as it gears up to drive a long term digital transformation

As part of a multi-year, global agreement, HSBC will make AWS technology available across the bank's lines of business, starting with customer-facing applications and application modernisation in its Global Wealth & Personal Banking business.

The FIRST FINTECH BANK'S ARRIVAL  
From Book to Bank in 12 Months  
Vladislav Solodkiy

Get the new book by Vladislav Solodkiy

ayannah

# Cloud-Powered Partnerships: Case Study 2

[Google partnered with Deutsche Bank to deliver cloud services.](#)

The screenshot shows a news article from Financial News. The header features the 'fn' logo, 'Financial News', 'Reliability in times of volatility Try 30 days for £40', and a 'SIGN IN' button. Below the header is a navigation bar with links to 'News', 'Commentary', 'Asset Management', 'Investment Banking', 'Crypto', 'People', 'Newsletters', 'Events', and 'List'. The main article is titled 'Deutsche Bank, Google to enter strategic partnership' and is categorized under 'INVESTMENT BANKING'. It is written by Pietro Lombardi and published on Tuesday July 7, 2020 at 7:28 am. The article discusses the strategic partnership between Deutsche Bank AG and Alphabet's Google, which will provide the German bank with cloud services and lead to the creation of new products for clients. The parties have signed a letter of intent, while a multiyear contract should be signed in the coming months, the German bank said on 7 July. Below the article are social media sharing icons for Twitter, Facebook, LinkedIn, Email, and Print.

**Recommended**

BlackRock, Vanguard could see voting power curbed as lawmakers line up new rules

Bob Diamond on brutal working hours for junior bankers: 'I'd do it again in a nanosecond'

Deutsche Bank's Frankfurt headquarters raided by German authorities

SEC chair Gary Gensler says there is more crypto pain to come

**INVESTMENT BANKING**

## Deutsche Bank, Google to enter strategic partnership

By Pietro Lombardi

Tuesday July 7, 2020 7:28 am

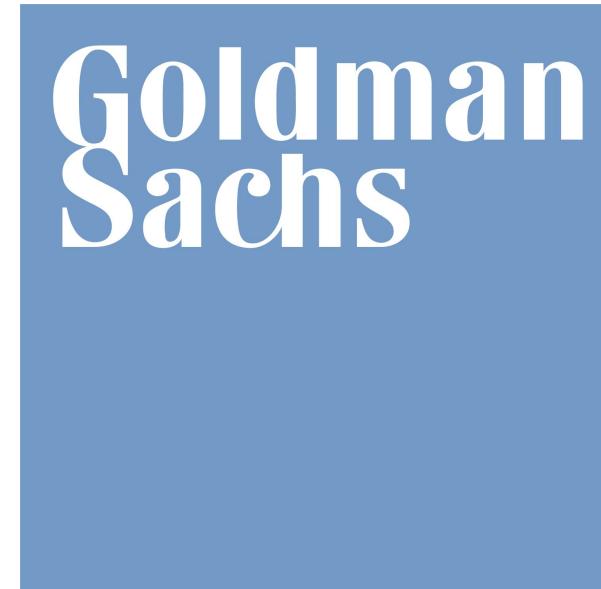
Deutsche Bank AG and Alphabet's Google are launching a strategic partnership that will provide the German bank with cloud services and lead to the creation of new products for clients.

The parties have signed a letter of intent, while a multiyear contract should be signed in the coming months, the German bank said on 7 July.

# Cloud-Powered Partnerships: Case Study 3

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Google also partnered with Goldman Sachs, one of the world's leading investment management firms, to drive innovation to solve problems for its clients as quickly as possible.



# Drawbacks of the Cloud

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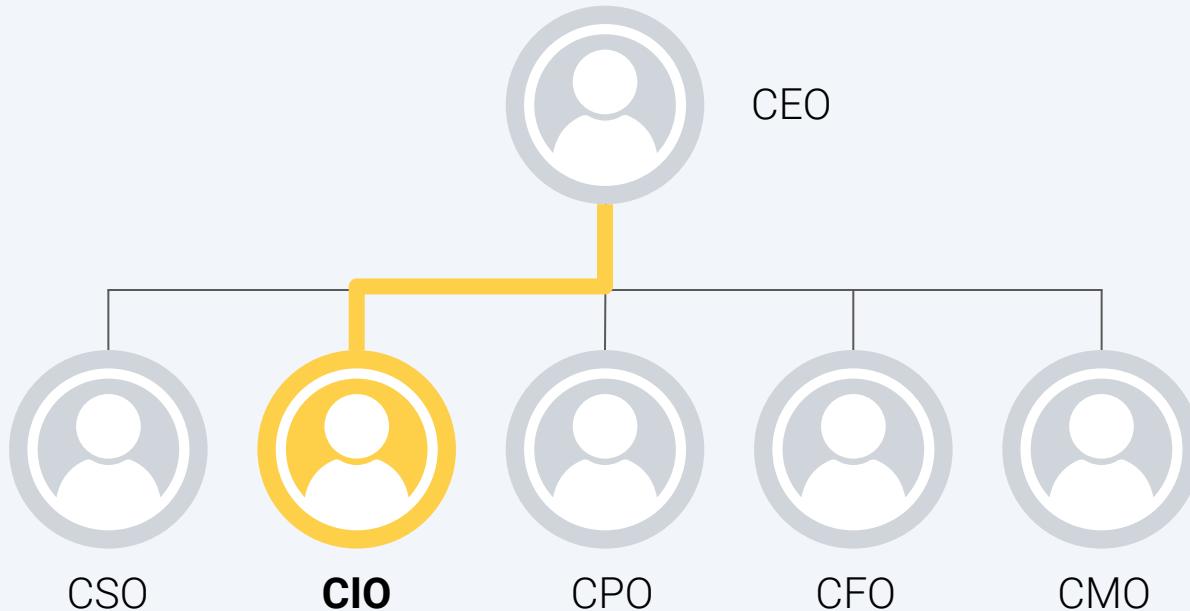


## Drawbacks:

- Trusting a third-party provider with your data. (But, encryption can address this.)
- Compromising privacy and confidentiality.
- Depending on the provider's service level agreements for addressing issues.
- Failing hardware incidents, with less oversight of their resolution.
- Sharing hardware with other tenants. The bad behavior of other tenants can affect your resources.
- Having downtime, including periods of planned maintenance that are out of your control.

# Technology Adoption: Then

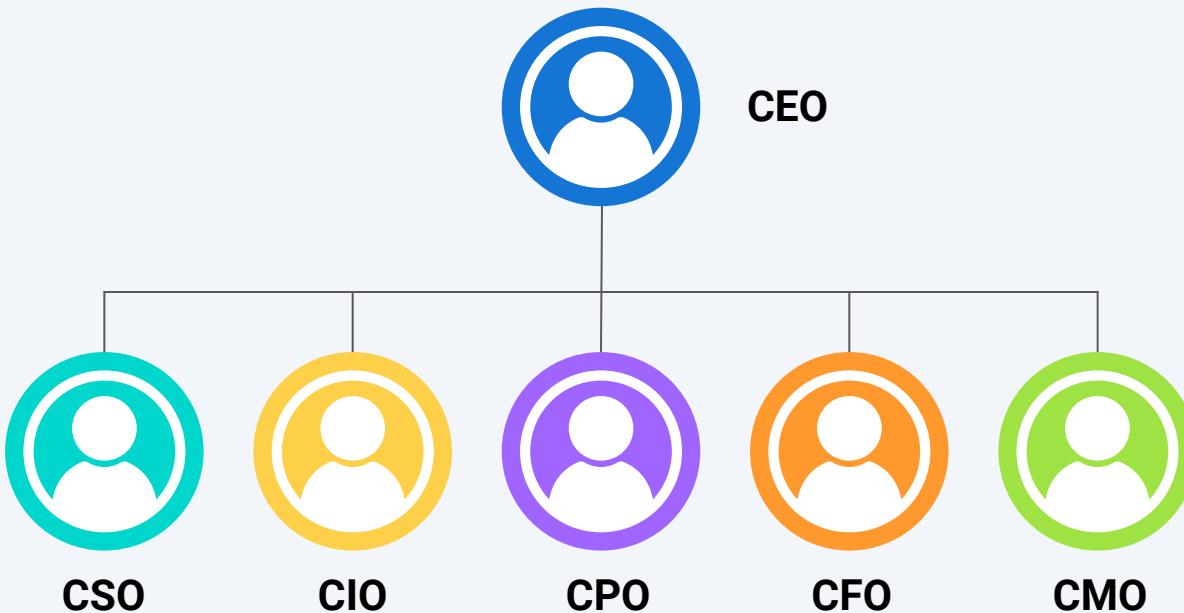
For many years in the financial industry, the **chief information officer (CIO)** had the responsibility of making most of the decisions about technology.



# Technology Adoption: Now

---

Today, technology impacts all the functional areas of a financial organization. That's why it's crucial to involve all the C-level executives in the adoption of new technologies—like machine learning applications and cloud services.





As fintech professionals, you might become C-level executives or offer expert advice as consultants.

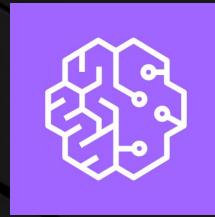
So, it's important to break the paradigm that technology is only for techies and recognize that **technology is for everyone**.



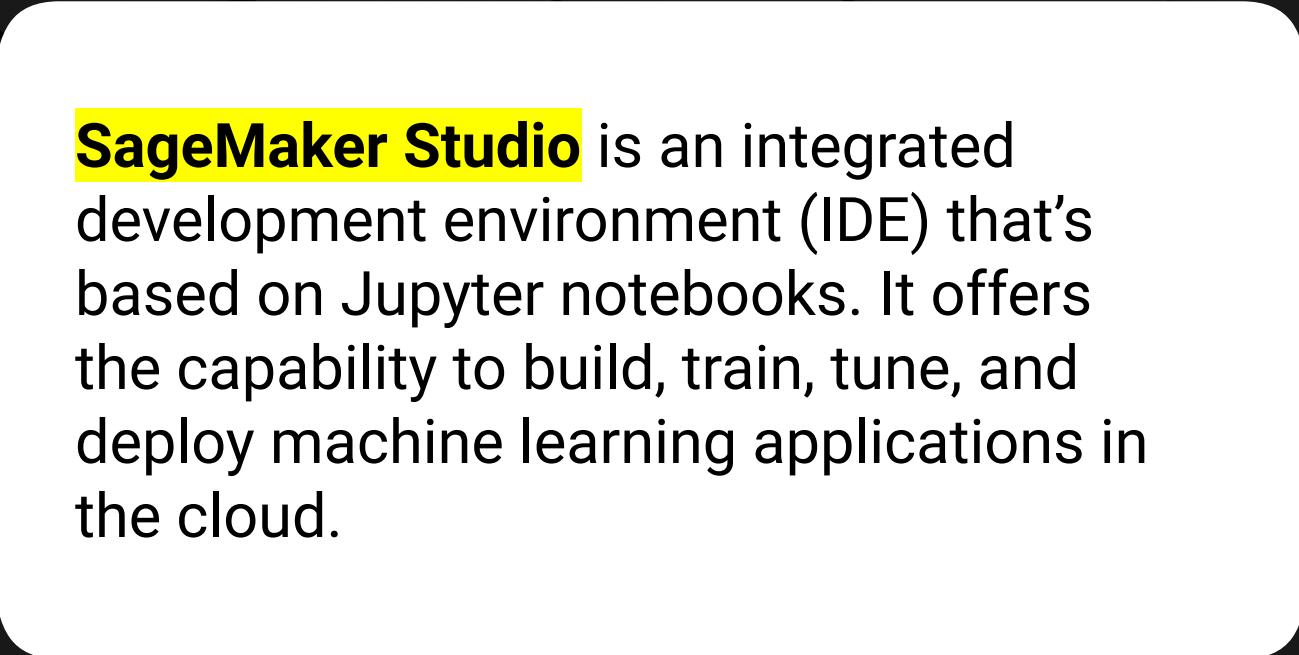
Financial services demand accurate and secure computing power—especially when deploying machine learning solutions as part of their services. AWS provides a platform, named **Amazon SageMaker**, that provides such a capability.

# Questions?





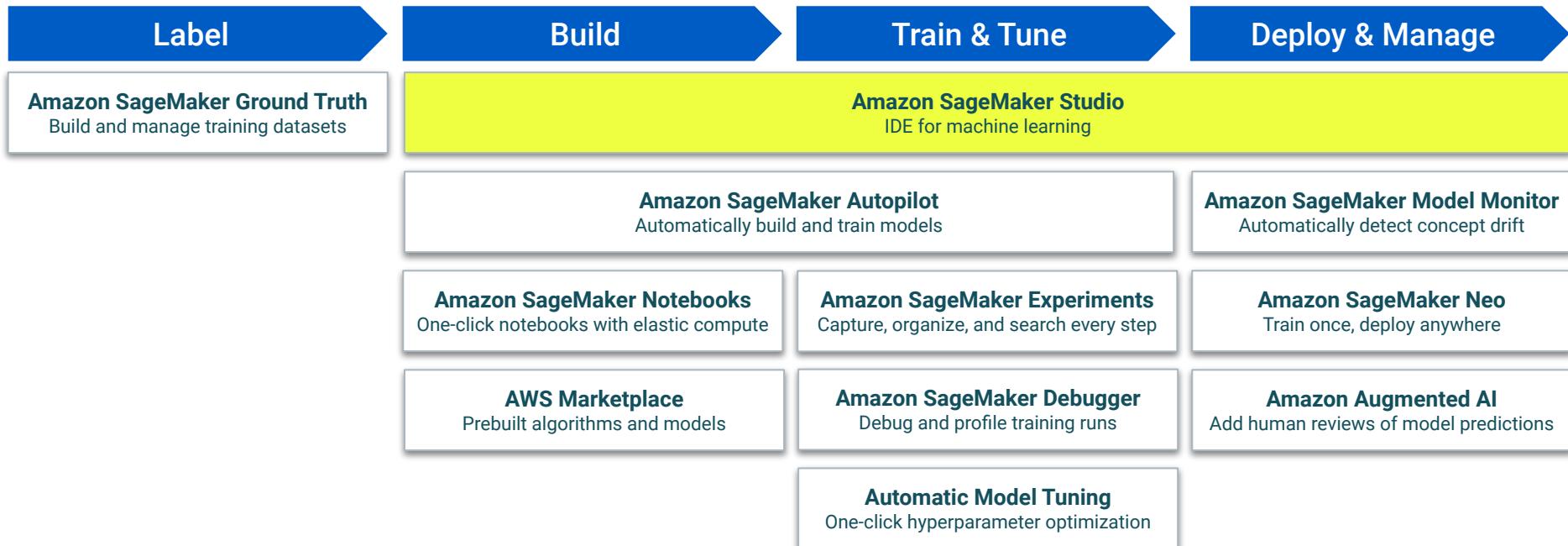
# Getting Started with Amazon SageMaker Studio



**SageMaker Studio** is an integrated development environment (IDE) that's based on Jupyter notebooks. It offers the capability to build, train, tune, and deploy machine learning applications in the cloud.

# Amazon SageMaker Components

Part of the AWS family, the SageMaker PaaS consists of four main components:





# Getting Started with Amazon SageMaker Studio

Suggested Time:

---

30 Minutes

# Questions?





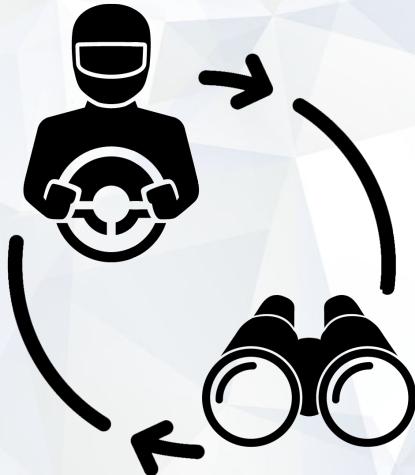
## Instructor Demonstration

---

Load and Preprocess the Data in  
Amazon SageMaker Studio

# Questions?





## Pair Programming Activity:

# Preventing Money Laundering with Amazon SageMaker – Data Preparation

In this activity, you'll gain practical experience with using SageMaker Studio to prepare the data for a machine learning application.

Suggested Time:

15 Minutes



Time's Up! Let's Review.

# Questions?





Countdown timer

15:00

(with alarm)

Break





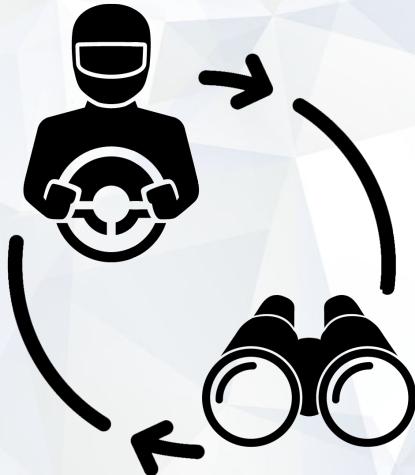
## Instructor Demonstration

---

Deploy a Machine Learning Model in  
Amazon SageMaker Studio

# Questions?





## Pair Programming Activity:

# Preventing Money Laundering with Amazon SageMaker – Model Deployment

In this activity, you will use the data that you prepared in an earlier activity to train a machine learning model to predict whether a cash or transfer bank transaction is potentially money laundering fraud.

Suggested Time:

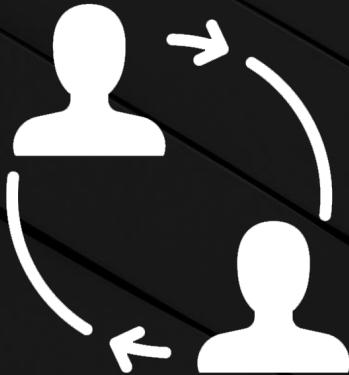
15 Minutes



Time's Up! Let's Review.

# Questions?





# Deleting AWS Resources

Suggested Time:

---

20 Minutes

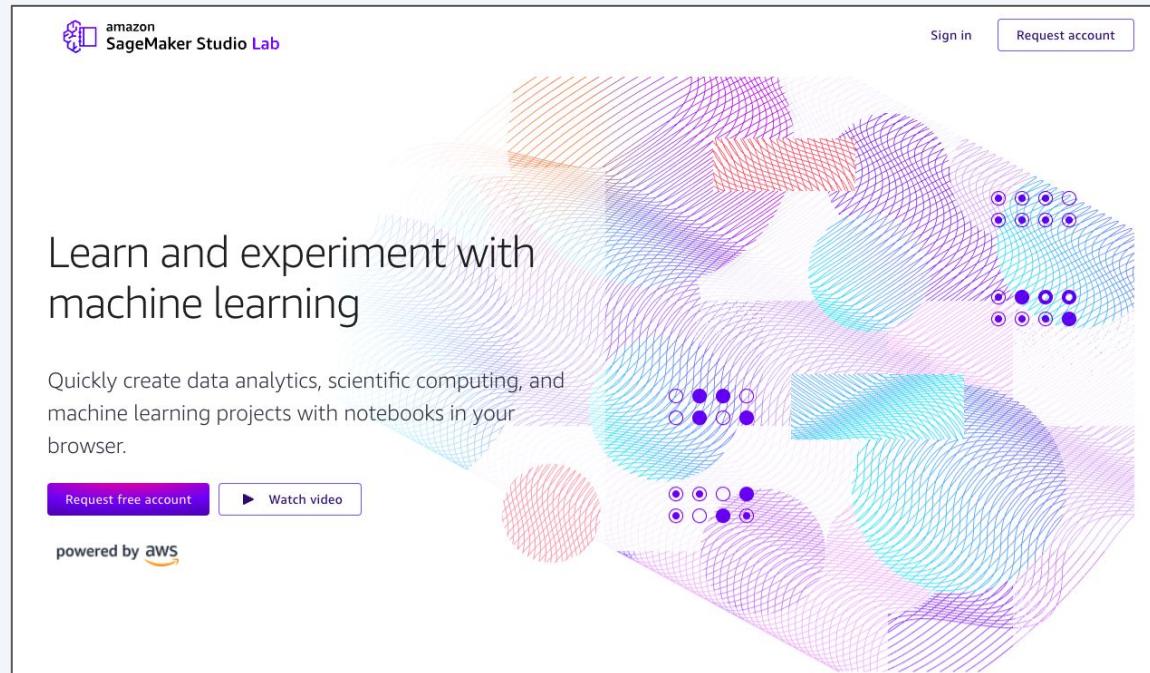
# Questions?





# Recap (1 of 3)

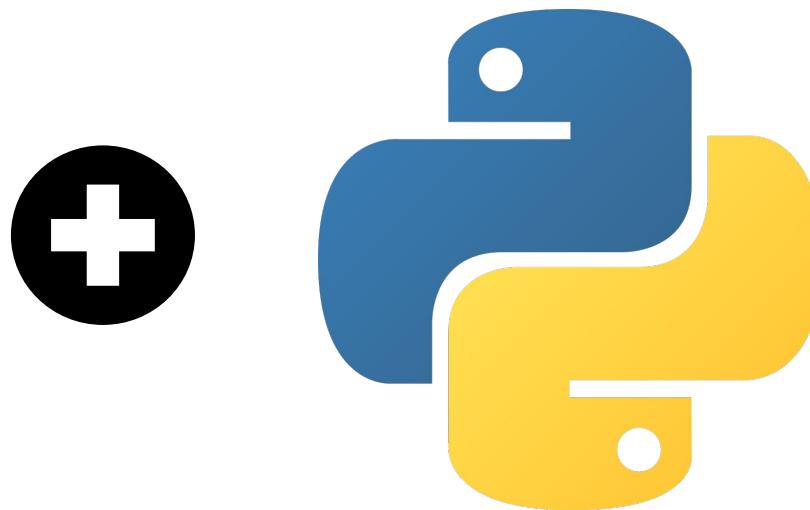
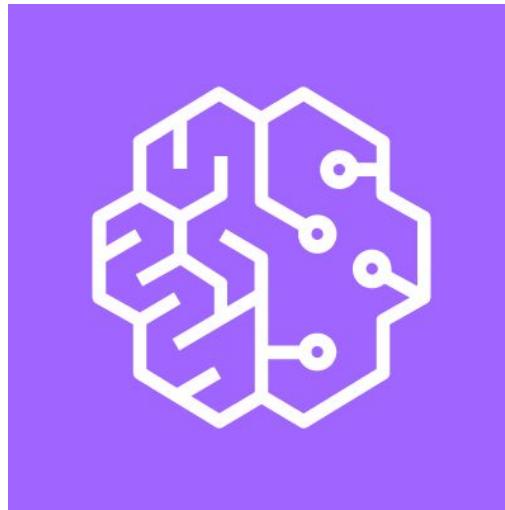
In today's class, you learned how to create, fit, and deploy a machine learning model in the cloud by using Amazon SageMaker.



## Recap (2 of 3)

---

Amazon SageMaker offers an extensive library of machine learning models that are optimized for the cloud and that we can use with Python.



# Recap (3 of 3)

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You can now do the following:



Set up Amazon SageMaker Studio on your own.



Create and run a Jupyter notebook within Amazon SageMaker Studio.



Load, preprocess, build, and then deploy a machine learning model within Sagemaker Studio.

You've combined your Python skills with the power of the cloud to deploy a machine learning model.





# Challenge

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Although this week's Challenge doesn't require SageMaker, it remains a valuable skill in the fintech job market.



SageMaker is a service that you can connect to other AWS services to build end-to-end machine learning applications.

# Amazon SageMaker Customers

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Thousands of companies use Sagemaker.



Securing Today. Shaping Tomorrow.™



THOMSON REUTERS

# Questions?



*The  
End*