

AWS雲端應用導入教學經驗分享 (Experiences Sharing of Introducing AWS Cloud Applications into Teaching)

講者：資管所 戴敏育 老師

時間：2021年3月16日（二） 12:10 – 13:10

地點：國立臺北大學 行政大樓第4會議室

主辦單位：國立臺北大學 教學發展中心

戴敏育 副教授

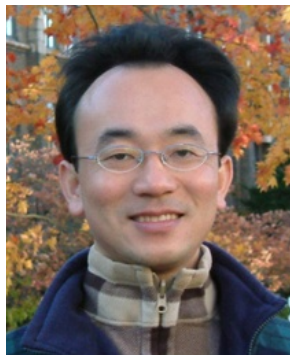
Min-Yuh Day, Ph.D, Associate Professor

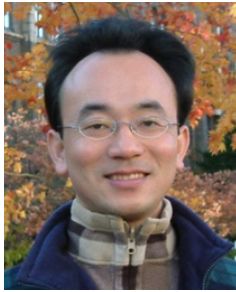
國立臺北大學 資訊管理研究所

Institute of Information Management, National Taipei University

<https://web.ntpu.edu.tw/~myday>

2021-03-16





戴敏育 博士 (Min-Yuh Day, Ph.D.)

aws educate | Cloud Ambassador

2020 Cohort



國立臺北大學 資訊管理研究所 副教授
中央研究院 資訊科學研究所 訪問學人
國立臺灣大學 資訊管理 博士



Publications Co-Chairs, IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM 2013-)

Program Co-Chair, IEEE International Workshop on Empirical Methods for Recognizing Inference in Text (IEEE EM-RITE 2012-)

Publications Chair, The IEEE International Conference on Information Reuse and Integration (IEEE IRI)



Outline

- **AWS雲端應用導入教學**
- **如何在課程理論中融入AWS概念**
- **如何帶領學生進行實作**

- Amazon Web Services (AWS)
 - 全球廣泛採納的雲端平台，透過全球資料中心提供超過175項功能完整的服務，包含資料庫、運算分析、網路、開發人員工具、資訊安全和企業應用等，不但能在AWS上運行 R, Python, C++ 等程式語言，也可延伸至AI與機器學習、區塊鏈、物聯網、資料湖 (Data Lake)、大數據分析、遊戲開發及電子商務等多樣化的應用情境中。
- 推動AWS雲創學院發展
 - 期望鼓勵全校各院系相關課程教師，於教學中導入雲端概念與AWS應用，透過帶領學生實作練習，增進學生學習成效以及和產業接軌的機會。

- 企業雲端運算入門 (Foundation of Business Cloud Computing)
 - (BA4, NTPU) (Spring 2021)
- 大數據分析 (Big Data Analytics)
 - (MBA, IM, NTPU) (Fall 2020)
- 軟體工程 (Software Engineering)
 - (MBA, IM, NTPU) (Fall 2020)
- 雲端服務架構實務 (Cloud Services Architecting Practices)
 - (MI4, TKU) (Spring 2021, Fall 2020, Spring 2020, Fall 2019)

企業雲端運算入門

(Foundation of Business Cloud Computing)

雲端概念概述

(Cloud Concepts Overview)

企業雲端運算入門 (Foundation of Business Cloud Computing) (BA4, NTPU) (Spring 2021)
(AWS Academy Cloud Foundations; ACF) (AWS Certified Cloud Practitioner)
(BA4, NTPU) (3 Credits, Elective) (U4010) (自主學習課程)(商業智慧與大數據分析學士學分學程)
(1092) (國立台北大學企管系4A, 4B) (選修3學分) (授課教師：謝榮桂，戴敏育) (2021.02 - 2021.06)
(週三 Wed, 6, 7, 8, 14:10-17:00) (台北大學三峽校區 文3F10_L)

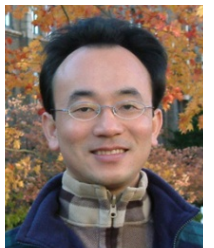


謝榮桂 (Jung-Kuei Hsieh), 戴敏育 (Min-Yuh Day)

National Taipei University

國立臺北大學

2021-02-24





國立臺北大學

109學年度第2學期 課程大綱

Spring 2021 (2021.02 - 2021.06)

- 課程名稱：企業雲端運算入門
(Foundation of Business Cloud Computing)
- 應修系級 Major：企業管理學系4A, 4B,
商業智慧與大數據分析學士學分學程
- 授課教師 Instructor：謝榮桂 戴敏育
- 選修類別 Required/Elective：選 (Elective)
- 學分 Credit(s)：3 學分
- 週三 Wed, 6, 7, 8, 14:10-17:00
- (台北大學三峽校區 文3F10_L)

(自主學習課程)

教學目標



- 本課程主要介紹亞馬遜公司的雲端運算服務 **Amazon Web Services (AWS)**，對於想要全面瞭解企業雲端運算概念的同學，本課程將詳細介紹
雲概念、
AWS 核心服務、
安全性、
架構、
定價和相關支援等服務，
並以通過認證 **AWS Certified Cloud Practitioner** 為目標。



Course Objectives

- This course introduces **Amazon Web Services (AWS)**, the cloud computing service of Amazon.
- For students who want to fully understand the concept of enterprise cloud computing, this course will introduce the AWS Academy Cloud Foundations.
- Topics include **Cloud Concepts Overview, Cloud Economics and Billing, AWS Global Infrastructure Overview, AWS Cloud Security, Networking and Content Delivery, Cloud Compute, Cloud Storage, Cloud Databases, Cloud Architecture, Cloud Automatic Scaling and Monitoring.**
- The course objective is training students to pass the certification of **AWS Certified Cloud Practitioner.**

Course Outline



1. Cloud Concepts Overview
2. Cloud Economics and Billing
3. AWS Global Infrastructure Overview
4. AWS Cloud Security
5. Networking and Content Delivery
6. Cloud Compute
7. Cloud Storage
8. Cloud Databases
9. Cloud Architecture
10. Cloud Automatic Scaling and Monitoring

課程大綱 (Syllabus)



週次 (Week)	日期 (Date)	內容 (Subject/Topics)
1	2021/02/24	雲端概念概述 (Cloud Concepts Overview)
2	2021/03/03	雲端經濟與計費 (Cloud Economics and Billing)
3	2021/03/10	AWS全球基礎設施概述 (AWS Global Infrastructure Overview)
4	2021/03/17	AWS雲端安全 (AWS Cloud Security)
5	2021/03/24	網路和內容交付 (Networking and Content Delivery)
6	2021/03/31	雲端計算 (Cloud Compute)

課程大綱 (Syllabus)



週次 (Week)	日期 (Date)	內容 (Subject/Topics)
7	2021/04/07	雲端儲存 (Cloud Storage)
8	2021/04/14	雲端數據庫 (Cloud Databases)
9	2021/04/21	雲端架構 (Cloud Architecture)
10	2021/04/28	雲端自動擴展和監控 (Cloud Automatic Scaling and Monitoring)
11	2021/05/05	學生自主學習 (Self-learning)
12	2021/05/12	學生自主學習 (Self-learning)

課程大綱 (Syllabus)



週次 (Week)	日期 (Date)	內容 (Subject/Topics)
13	2021/05/19	學生自主學習 (Self-learning)
14	2021/05/26	雲端專案成果報告與討論 (Cloud Project Presentation and Discussion)
15	2021/06/02	學生自主學習 (Self-learning)
16	2021/06/09	學生自主學習 (Self-learning)
17	2021/06/16	學生自主學習 (Self-learning)
18	2021/06/23	期末專案成果報告 (Final Project Presentation)

AWS Certification

Professional

Two years of comprehensive experience designing, operating, and troubleshooting solutions using the AWS Cloud



Associate

One year of experience solving problems and implementing solutions using the AWS Cloud

SAA



Architect

Operations

Developer

Foundational

Six months of fundamental AWS Cloud and industry knowledge

CLF



Cloud Practitioner

Specialty

Technical AWS Cloud experience in the Specialty domain as specified in the exam guide



AWS Certified Cloud Practitioner (CLF-C01)



1

AWS Certified Solutions Architect – Associate (SAA-C02)

2





AWS Certified Cloud Practitioner

- This certification provides individuals in a larger variety of cloud and technology roles with a way to validate their AWS Cloud knowledge and enhance their professional credibility.
- This exam covers four domains, including cloud concepts, security, technology, and billing and pricing.





AWS Certified Solutions Architect – Associate

- This certification validates your ability to effectively demonstrate knowledge of how to architect and deploy secure and robust applications on AWS technologies.
- This exam is for anyone with at least one year of hands-on experience designing available, cost-efficient, fault-tolerant, and scalable and distributed systems on AWS.



AWS Academy and Certifications

- **AWS Academy Cloud Foundations (ACF)**

- **AWS Certified Cloud Practitioner**
(CLF-C01) (2021/05)

- <https://aws.amazon.com/certification/certified-cloud-practitioner/>



- **AWS Academy Cloud Architecting (ACA)**

- **AWS Certified Solutions Architect – Associate**
(SAA-C02)

- <https://aws.amazon.com/certification/certified-solutions-architect-associate/>



<https://aws.amazon.com/training/awsacademy/>

AWS Academy and Certifications

- **AWS Academy Cloud Foundations (ACF)**

- **AWS Certified Cloud Practitioner (CLF-C01)** (2021/05)

- <https://aws.amazon.com/certification/certified-cloud-practitioner/>

- **AWS Cloud Practitioner Essentials (Second Edition)**

- <https://aws.amazon.com/training/course-descriptions/cloud-practitioner-essentials/>

- **AWS Technical Essentials**

- <https://aws.amazon.com/training/course-descriptions/essentials/>

- **AWS Academy Cloud Architecting (ACA)**

- **AWS Certified Solutions Architect – Associate (SAA-C02)**

- <https://aws.amazon.com/certification/certified-solutions-architect-associate/>

- **Architecting on AWS**

- <https://aws.amazon.com/training/course-descriptions/architect/>

<https://aws.amazon.com/training/awsacademy/>

1



2





AWS Certified Cloud Practitioner (CLF-C01)

Domain	% of Examination
Domain 1: Cloud Concepts	26%
Domain 2: Security and Compliance	25%
Domain 3: Technology	33%
Domain 4: Billing and Pricing	16%
TOTAL	100%



AWS Certified Solutions Architect – Associate (SAA-C02)

Domain	% of Examination
Domain 1: Design Resilient Architectures	30%
Domain 2: Design High-Performing Architectures	28%
Domain 3: Specify Secure Applications and Architectures	24%
Domain 4: Design Cost-Optimized Architectures	18%
TOTAL	100%

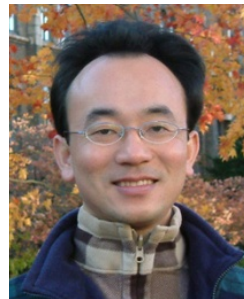
軟體工程 (Software Engineering)

雲端運算與雲軟體架構 (Cloud Computing and Cloud Software Architecture)

1091SE07

MBA, IM, NTPU (M5118) (Fall 2020)

Tue 2, 3, 4 (9:10-12:00) (B8F40)



Min-Yuh Day

戴敏育

Associate Professor

副教授

Institute of Information Management, National Taipei University

國立臺北大學 資訊管理研究所

<https://web.ntpu.edu.tw/~myday>

2020-11-03



課程大綱 (Syllabus)

週次 (Week)	日期 (Date)	內容 (Subject/Topics)
1	2020/09/15	軟體工程概論 (Introduction to Software Engineering)
2	2020/09/22	軟體產品與專案管理：軟體產品管理，原型設計 (Software Products and Project Management: Software product management and prototyping)
3	2020/09/29	敏捷軟體工程：敏捷方法、Scrum、極限程式設計 (Agile Software Engineering: Agile methods, Scrum, and Extreme Programming)
4	2020/10/06	功能、場景和故事 (Features, Scenarios, and Stories)
5	2020/10/13	軟體架構：架構設計、系統分解、分散式架構 (Software Architecture: Architectural design, System decomposition, and Distribution architecture)
6	2020/10/20	軟體工程個案研究 I (Case Study on Software Engineering I)

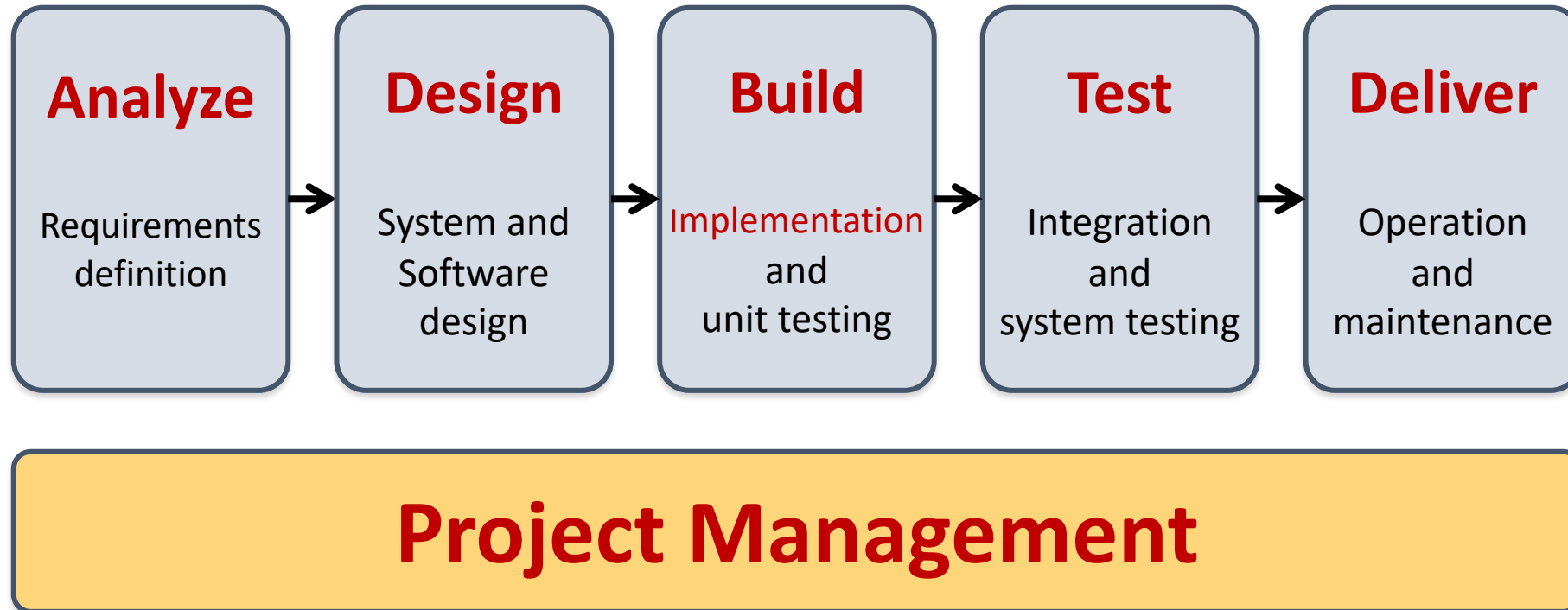
課程大綱 (Syllabus)

週次 (Week)	日期 (Date)	內容 (Subject/Topics)
7	2020/10/27	基於雲的軟體：虛擬化和容器、軟體即服務 (Cloud-Based Software: Virtualization and containers, Everything as a service, Software as a service)
8	2020/11/03	雲端運算與雲軟體架構 (Cloud Computing and Cloud Software Architecture)
9	2020/11/10	期中報告 (Midterm Project Report)
10	2020/11/17	微服務架構：RESTful服務、服務部署 (Microservices Architecture, RESTful services, Service deployment)
11	2020/11/24	軟體工程產業實務 (Industry Practices of Software Engineering)
12	2020/12/01	安全和隱私 (Security and Privacy)

課程大綱 (Syllabus)

週次 (Week)	日期 (Date)	內容 (Subject/Topics)
13	2020/12/08	軟體工程個案研究 II (Case Study on Software Engineering II)
14	2020/12/15	可靠的程式設計 (Reliable Programming)
15	2020/12/22	測試：功能測試、測試自動化、 測試驅動的開發、程式碼審查 (Testing: Functional testing, Test automation, Test-driven development, and Code reviews)
16	2020/12/29	DevOps和程式碼管理： 程式碼管理和DevOps自動化 (DevOps and Code Management: Code management and DevOps automation)
17	2021/01/05	期末報告 I (Final Project Report I)
18	2021/01/12	期末報告 II (Final Project Report I)

Software Engineering and Project Management



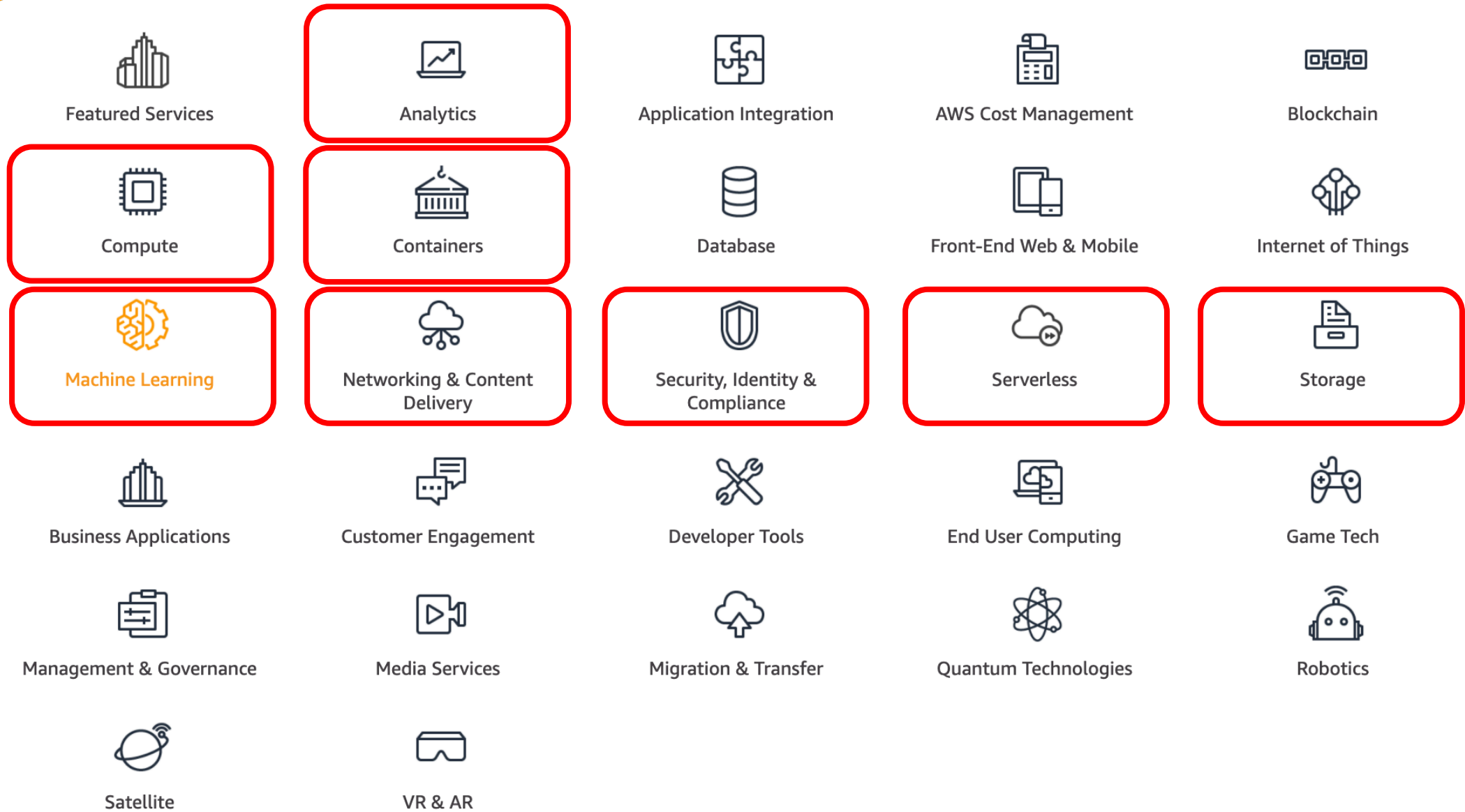
Outline

- AWS雲端應用導入教學
- 如何在課程理論中融入AWS概念
- 如何帶領學生進行實作

- **智慧金融量化分析 (Artificial Intelligence in Finance and Quantitative)**
 - 國立台北大學資管所碩士班 (Fall 2021)
- **人工智慧文本分析 (Artificial Intelligence for Text Analytics)**
 - 國立台北大學資管所碩士班 (Fall 2021)
- **人工智慧 (Artificial Intelligence)**
 - 國立台北大學資管所碩士班 (Spring 2021)
- **資料探勘 (Data Mining)**
 - 國立台北大學資管所碩士班 (Spring 2021)
(電子商務碩士學分學程)



AWS Products and Services





AWS Services

- Amazon **EC2**
 - Virtual servers in the cloud
- Amazon **Simple Storage Service (S3)**
 - Scalable storage in the cloud
- Amazon **Aurora**
 - High performance managed relational database
- Amazon **DynamoDB**
 - Managed NoSQL database
- Amazon **RDS**
 - Managed relational database service for MySQL, PostgreSQL, Oracle, SQL Server, and MariaDB

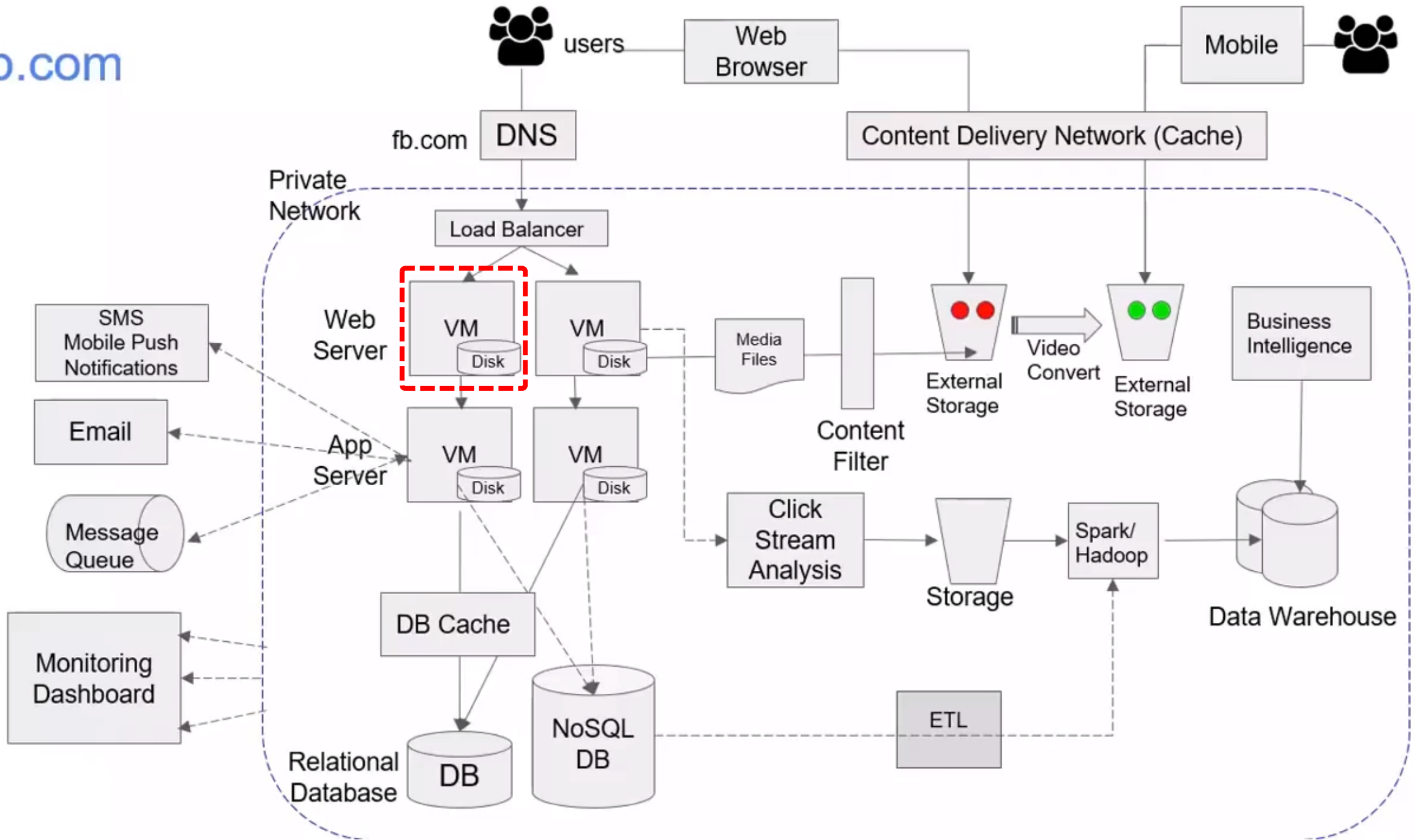


AWS Services

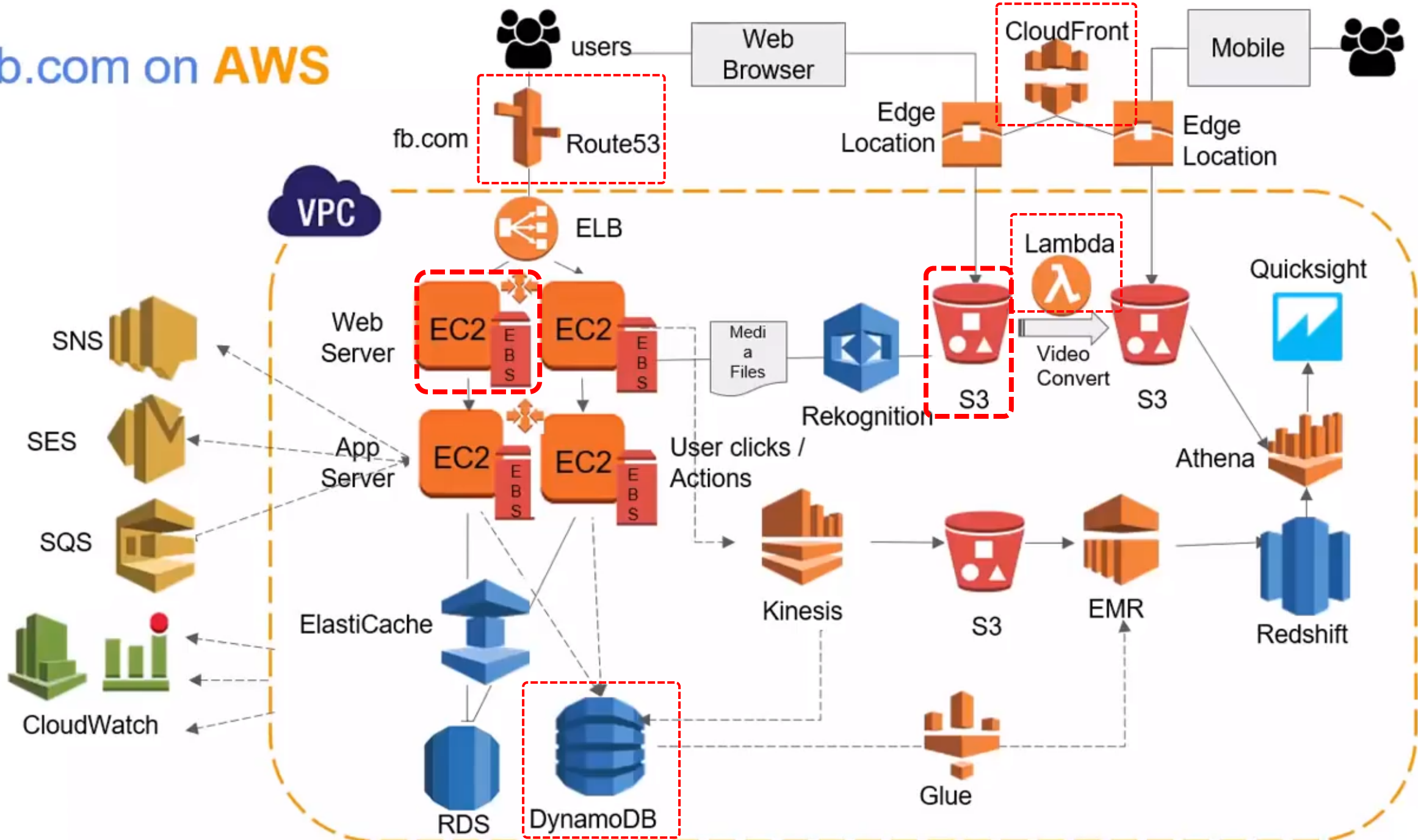
- **AWS Lambda**
 - Run code without thinking about servers
- **AWS Elastic Beanstalk**
 - Run and manage web apps
- **Amazon VPC**
 - Isolated cloud resources
- **Amazon Lightsail**
 - Launch and manage virtual private servers
- **Amazon SageMaker**
 - Build, train, and deploy machine learning models at scale



Web Application with AWS Core Services

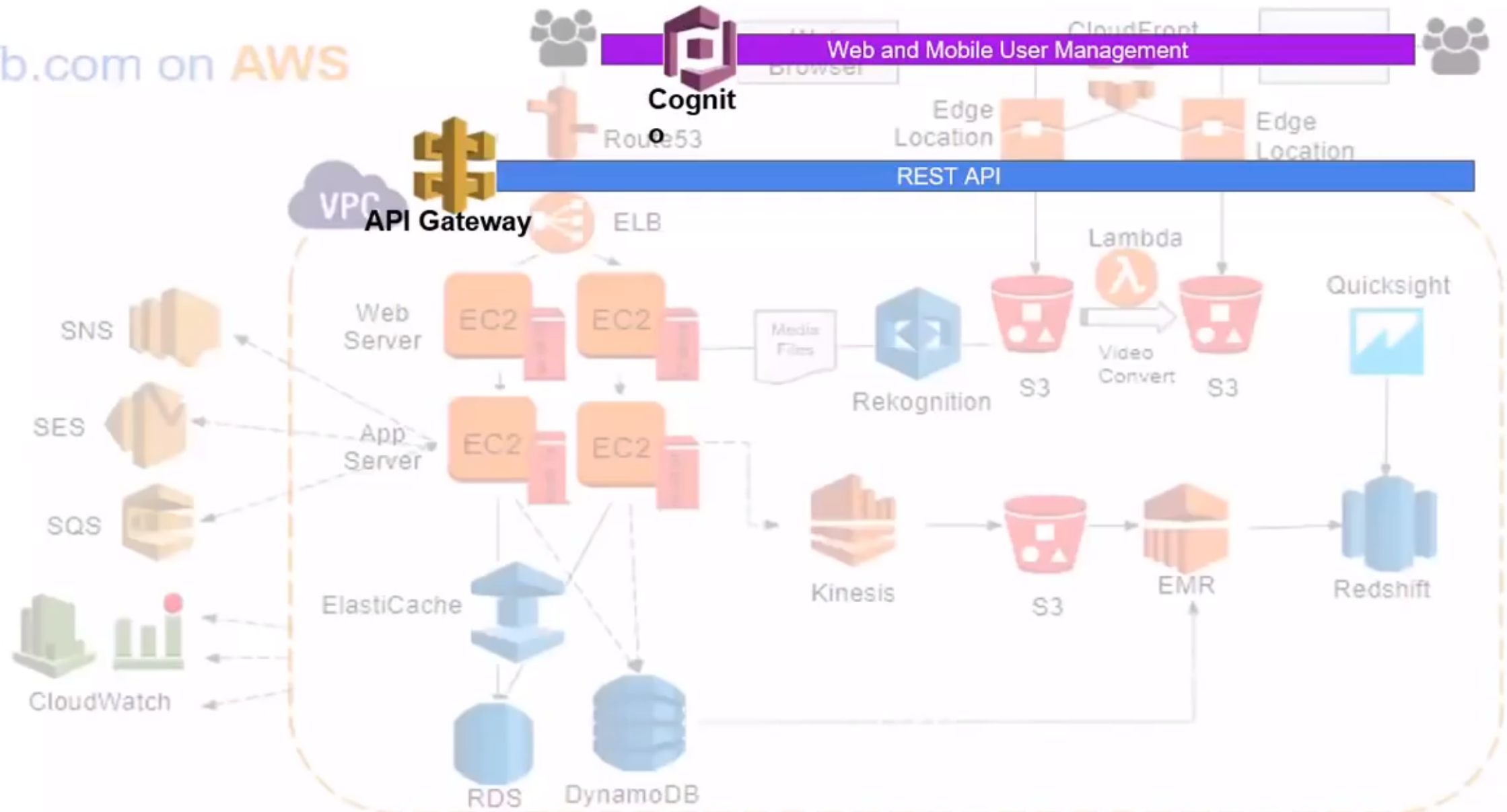


fb.com on AWS

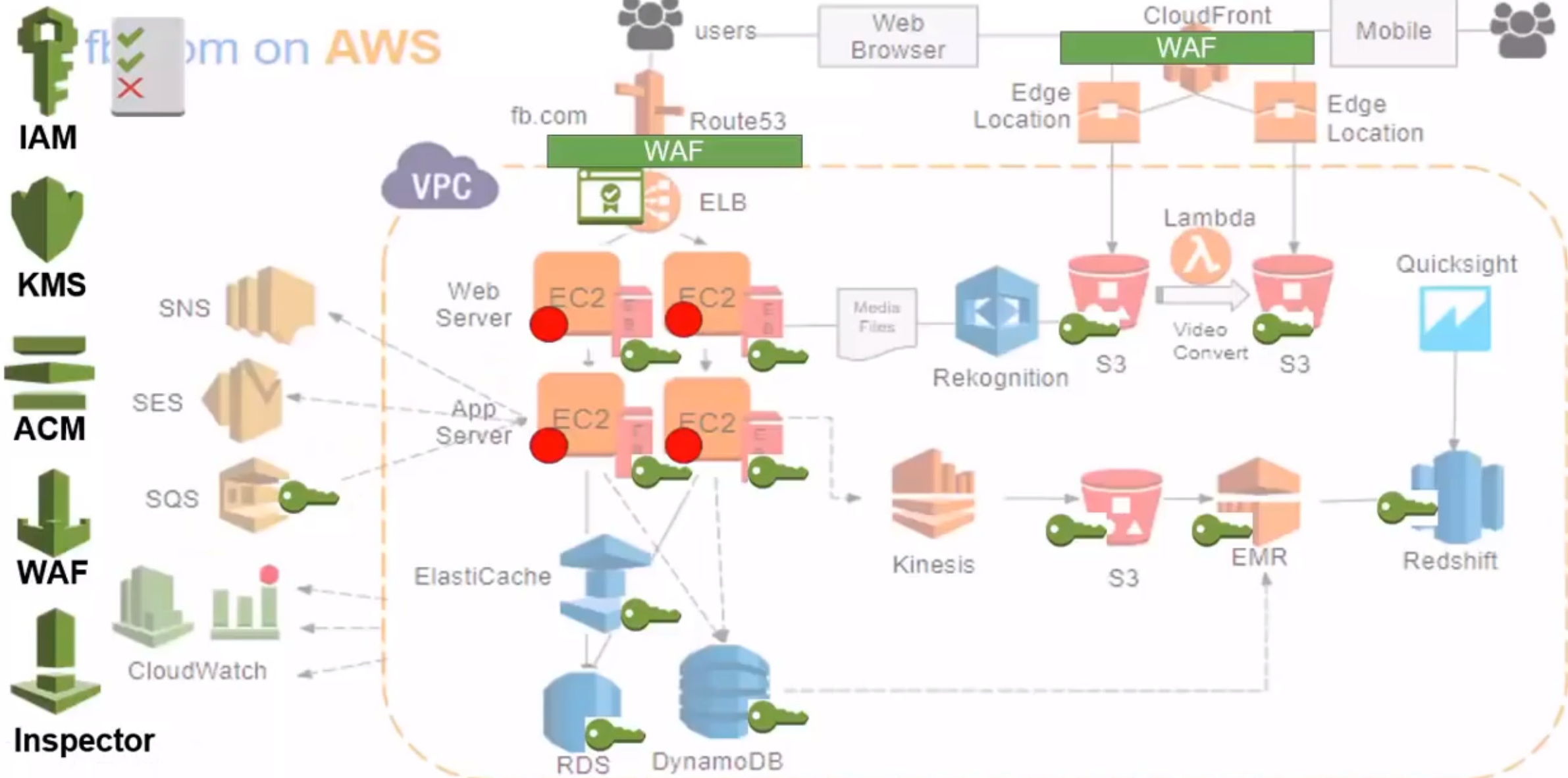


AWS Application Services

fb.com on AWS

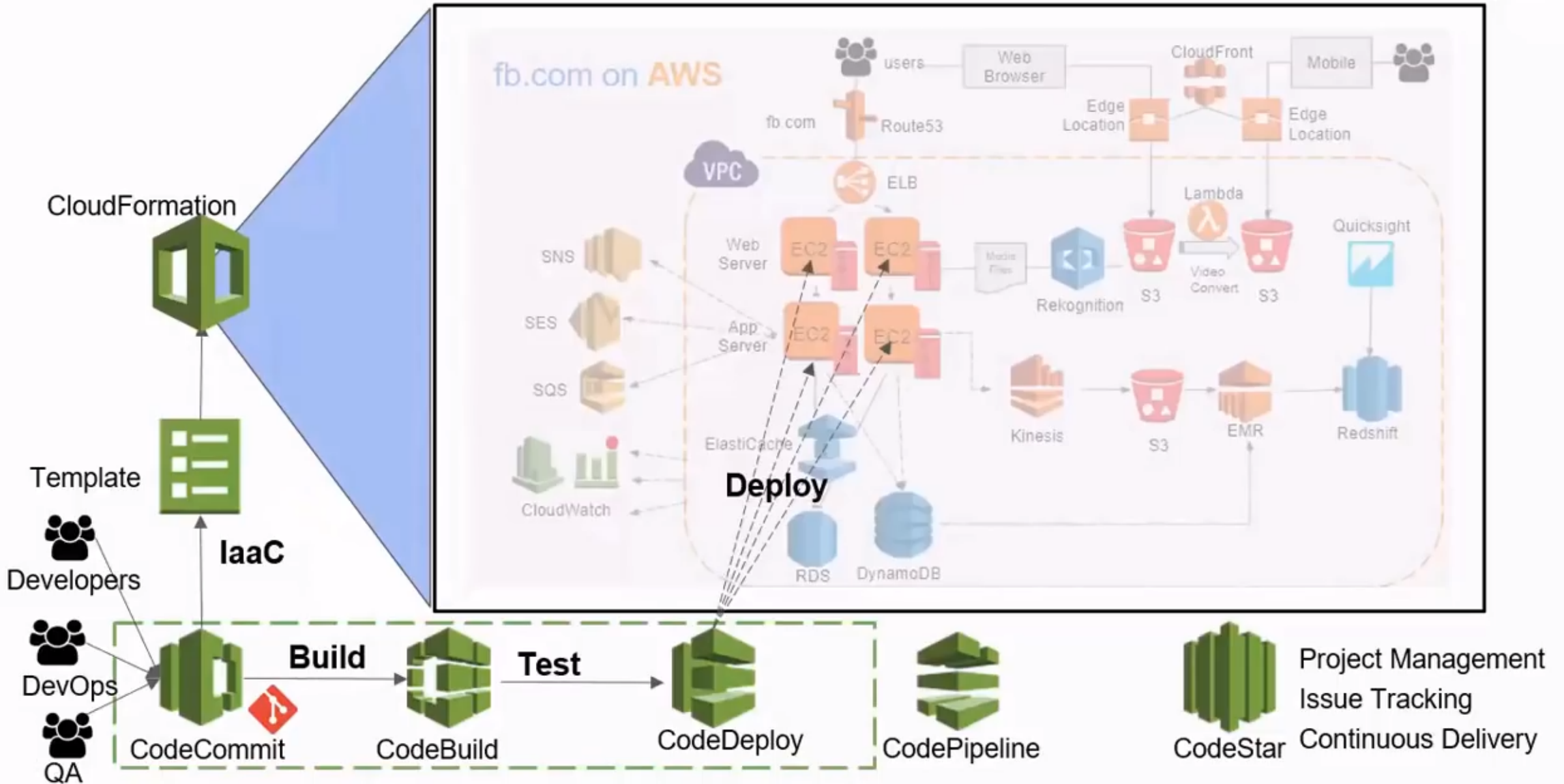


AWS Security Services



AWS Development and DevOps Services

AWS Region



Outline

- **AWS雲端應用導入教學**
- **如何在課程理論中融入AWS概念**
- **如何帶領學生進行實作**

如何帶領學生進行實作

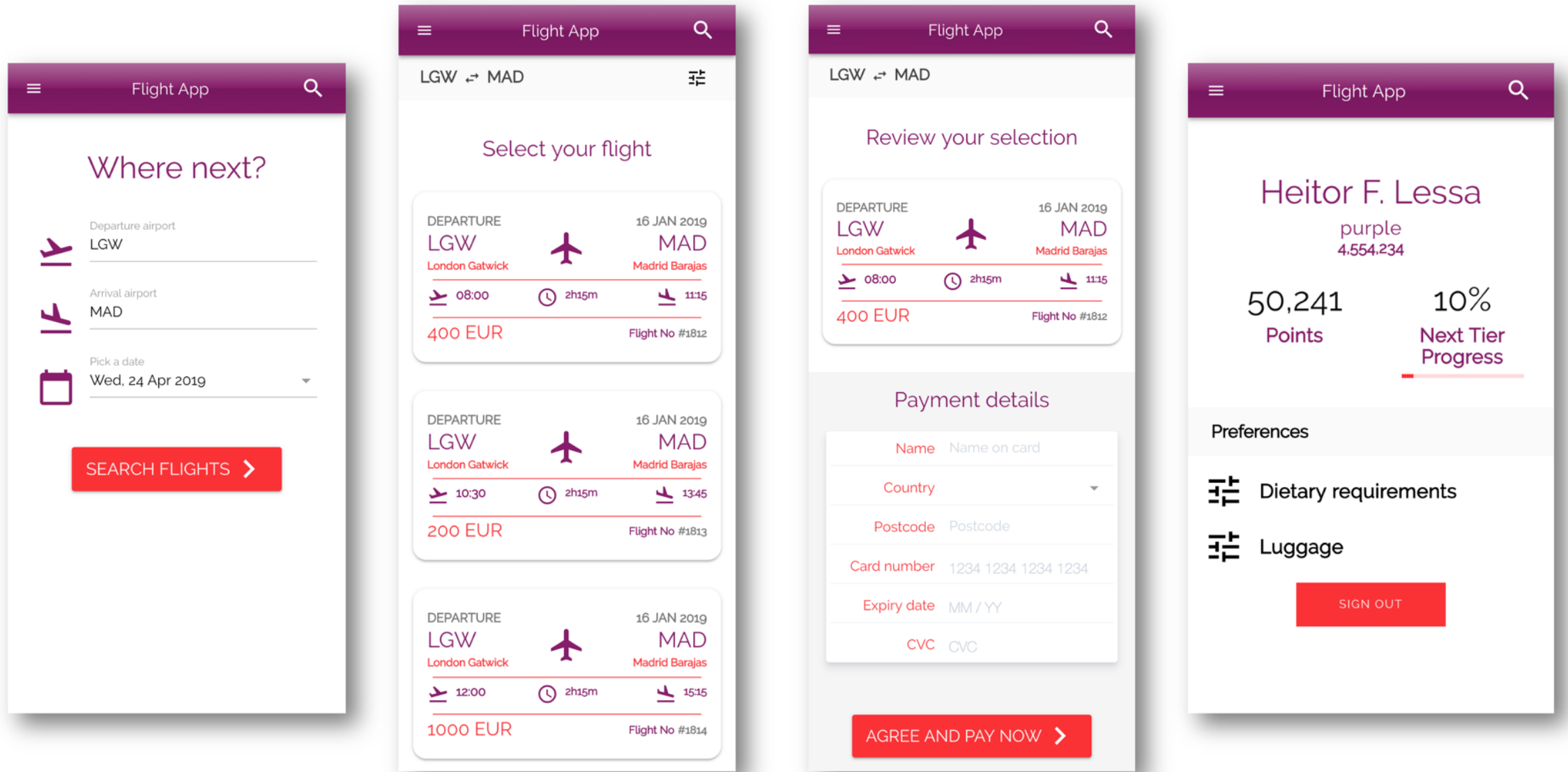
1. [AWS Academy](#) (Application: ntpu aws app)
(<https://awsacademy.instructure.com/> , Vocareum Labs)
2. [AWS Educate](#)
3. [AWS Free Tier](#)
4. [AWS Training](#)
5. [AWS Cloud Practitioner Essentials \(Second Edition\)](#)
6. [AWS Certified Cloud Practitioner](#)
7. [AWS Educate User Guide for Students](#)
8. AWS Academy Cloud Foundations (ACF)
 - AWS_ACF_M01 ~ AWS_ACF_M10

<https://web.ntpu.edu.tw/~myday/teaching.htm>



AWS Serverless Architecture

aws AWS Serverless Airline Booking





AWS Serverless Airline Booking Stack

UI/UX



Quasar framework



Vue.js



AWS Amplify



Stripe Elements

Data/Lang



Amazon DynamoDB



Python



Typescript



JavaScript

API/Auth



AWS AppSync



Amazon API Gateway



Amazon Cognito

Messaging



Amazon SNS

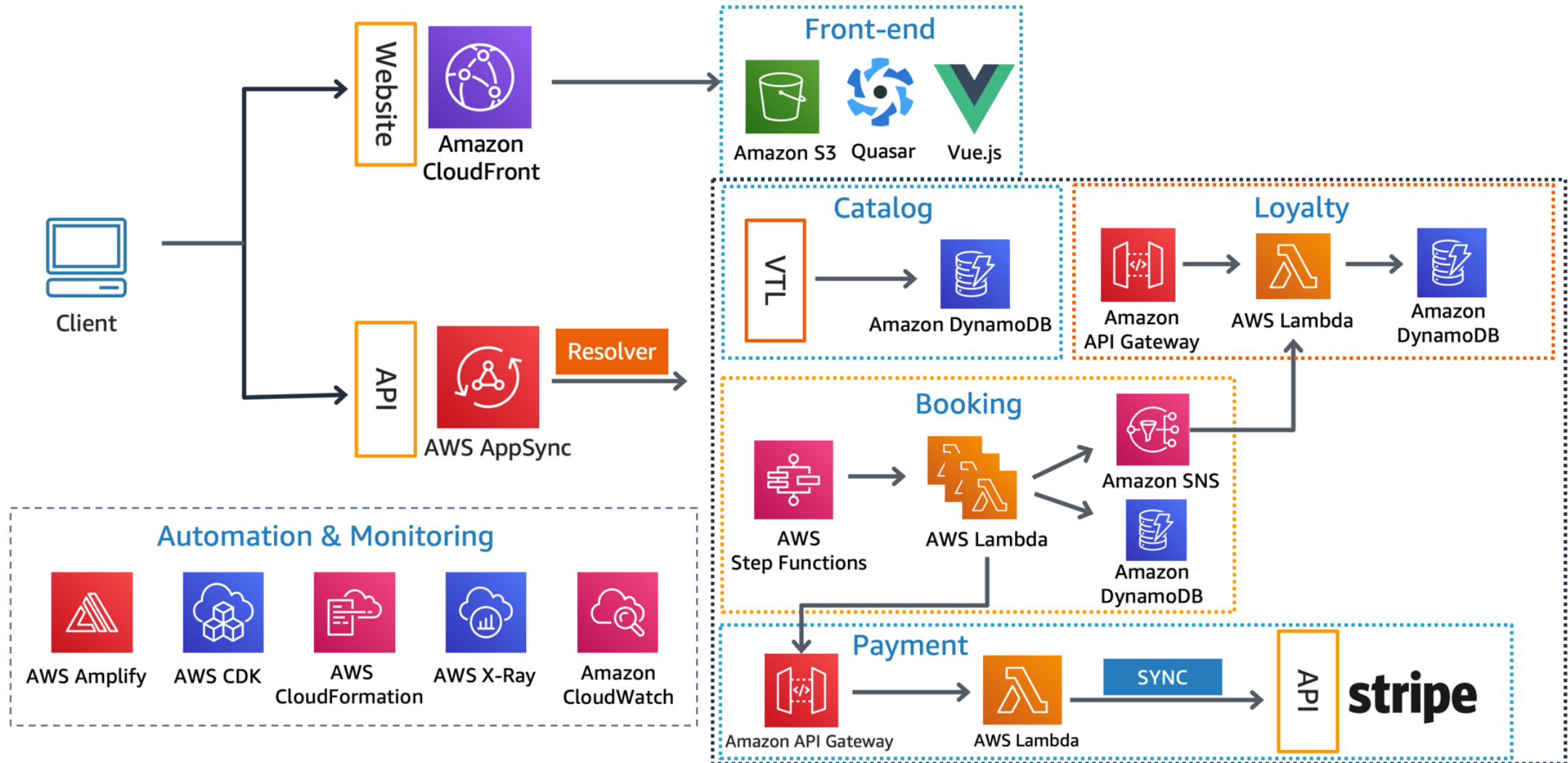


AWS Step Functions



AWS Serverless Airline Booking

High level infrastructure architecture

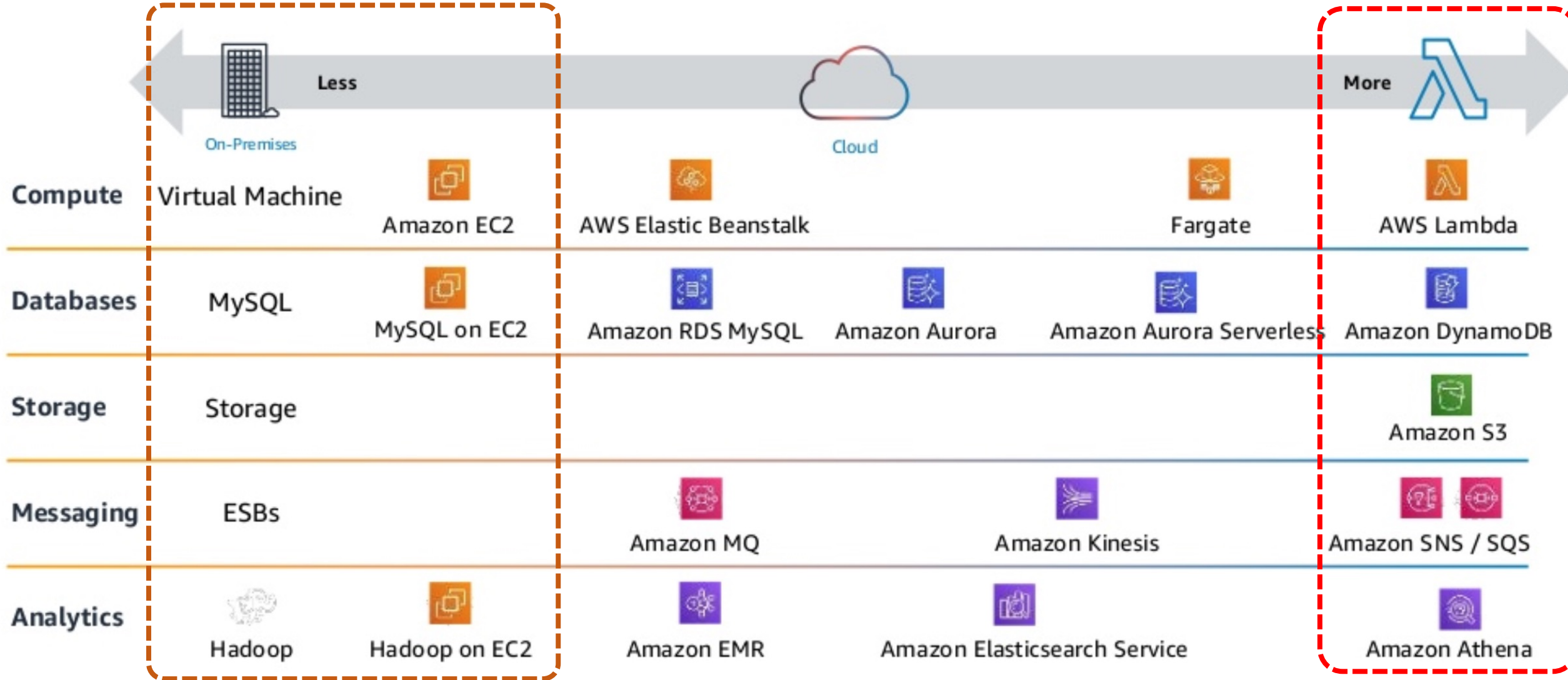


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AWS Serverless Architecture

AWS Operational Responsibility Models





Build a Serverless Web Application



Build a Serverless Web Application

Projects on AWS:

Build a Serverless Web Application

with AWS Lambda, Amazon API Gateway, Amazon S3, Amazon DynamoDB, and Amazon Cognito



Introduction

1

Host a static website

2

Manage users

3

Build a serverless backend

4

Deploy a RESTful API

5

Terminate resources

Overview

In this tutorial, you'll create a simple serverless web application that enables users to request unicorn rides from the [Wild Rydes](#) fleet. The application will present users with an HTML based user interface for indicating the location where they would like to be picked up and will interface on the backend with a RESTful web service to submit the request and dispatch a nearby unicorn. The application will also provide facilities for users to register with the service and log in before requesting rides.

Application Architecture

AWS Experience: Beginner

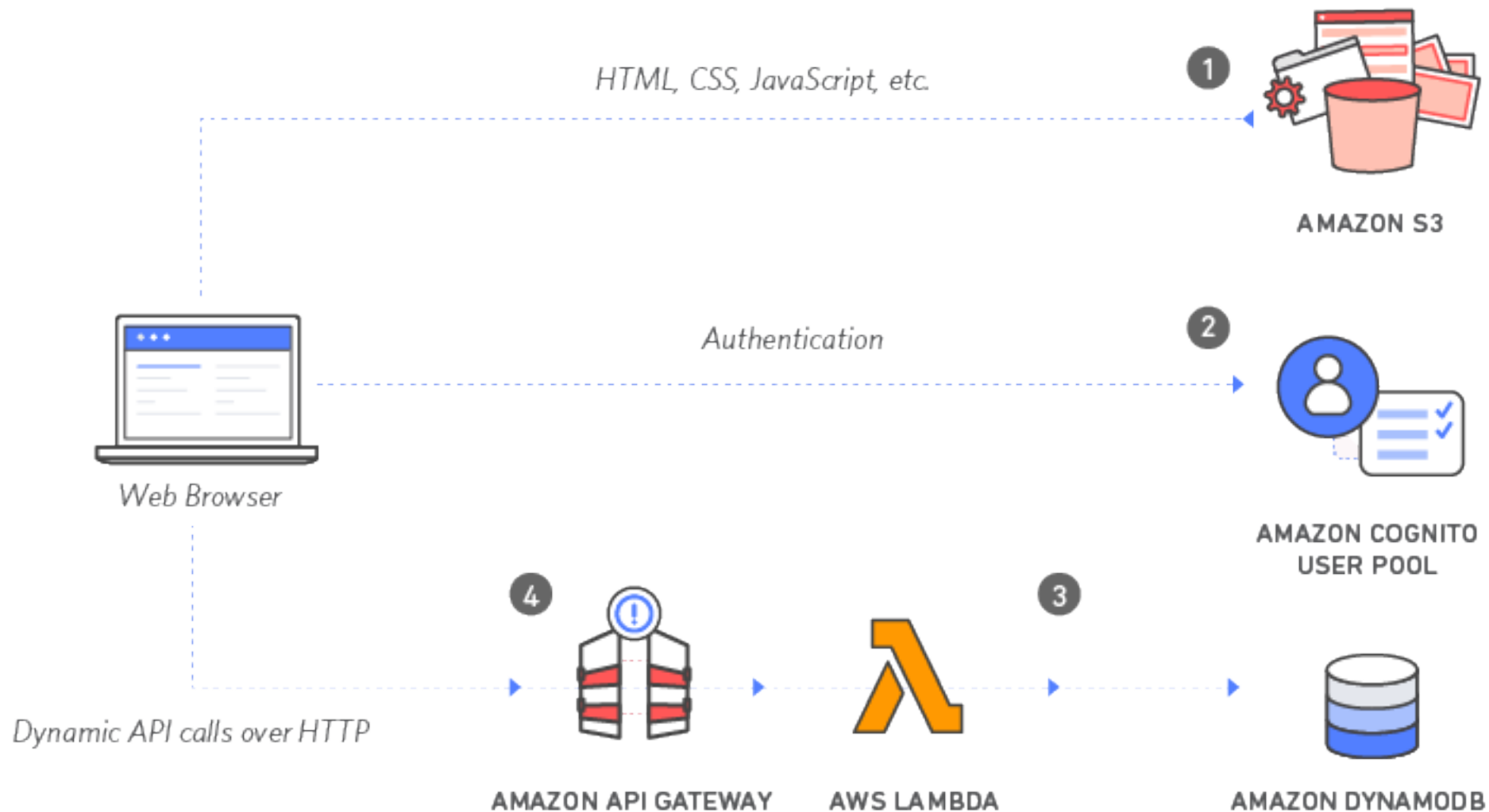
Time to complete: 2 hours

Cost to complete: Each service used in this architecture is eligible for the [AWS Free Tier](#). If you are outside the usage limits of the Free Tier, completing this tutorial will cost you less than \$0.25*.



Build a Serverless Web Application

with Amazon S3, AWS Lambda, Amazon API Gateway, Amazon DynamoDB, and Amazon Cognito

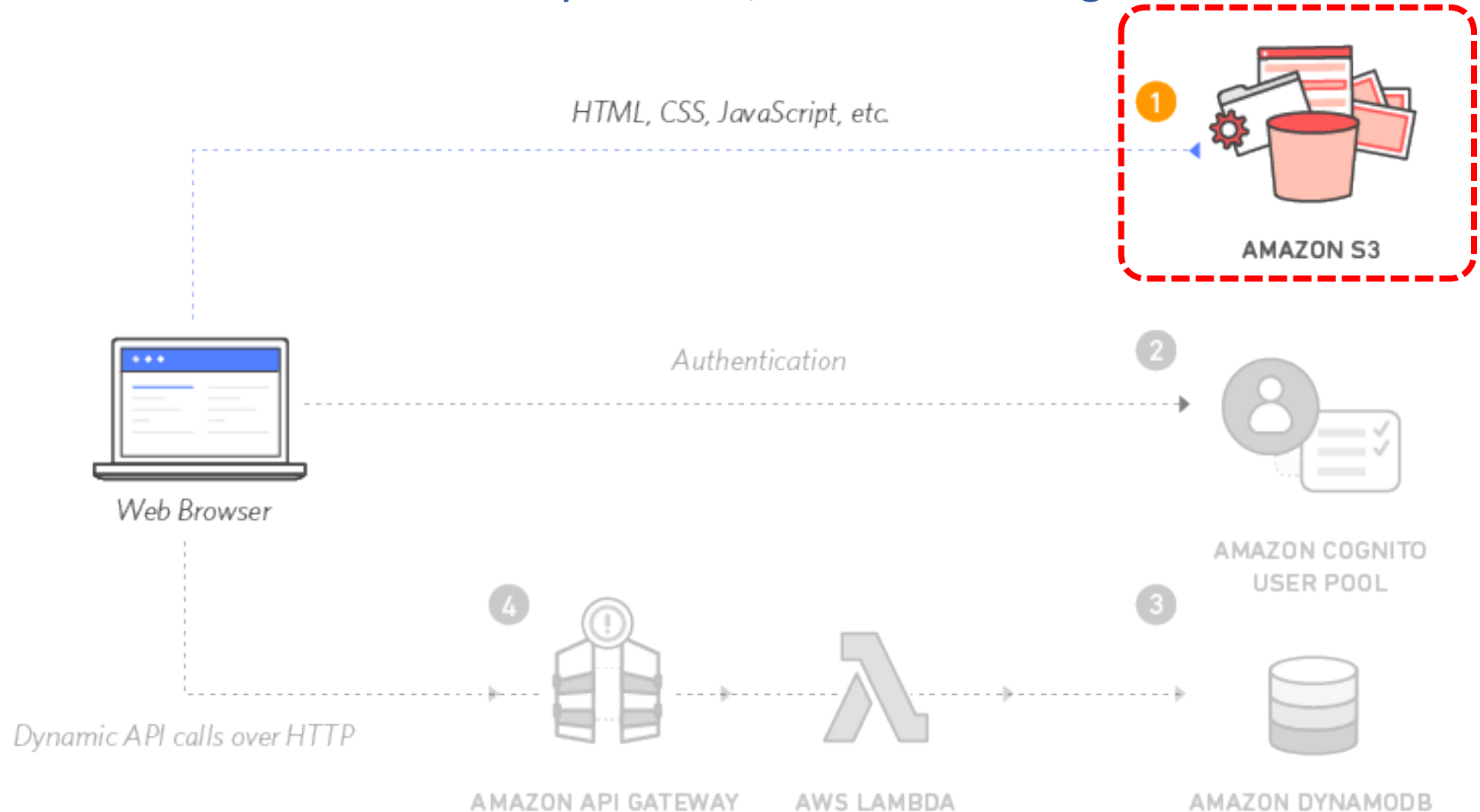




Build a Serverless Web Application

with Amazon S3, AWS Lambda, Amazon API Gateway, Amazon DynamoDB, and Amazon Cognito

1





Build a Serverless Web Application

with Amazon S3, AWS Lambda, Amazon API Gateway, Amazon DynamoDB, and Amazon Cognito

1

Static Web Hosting

Amazon S3 hosts static web resources including HTML, CSS, JavaScript, and image files which are loaded in the user's browser.

HTML, CSS, JavaScript, etc.



AMAZON S3



AMAZON COGNITO
USER POOL



AMAZON DYNAMODB



Build a Serverless Web Application

with Amazon S3, AWS Lambda, Amazon API Gateway, Amazon DynamoDB, and Amazon Cognito

2





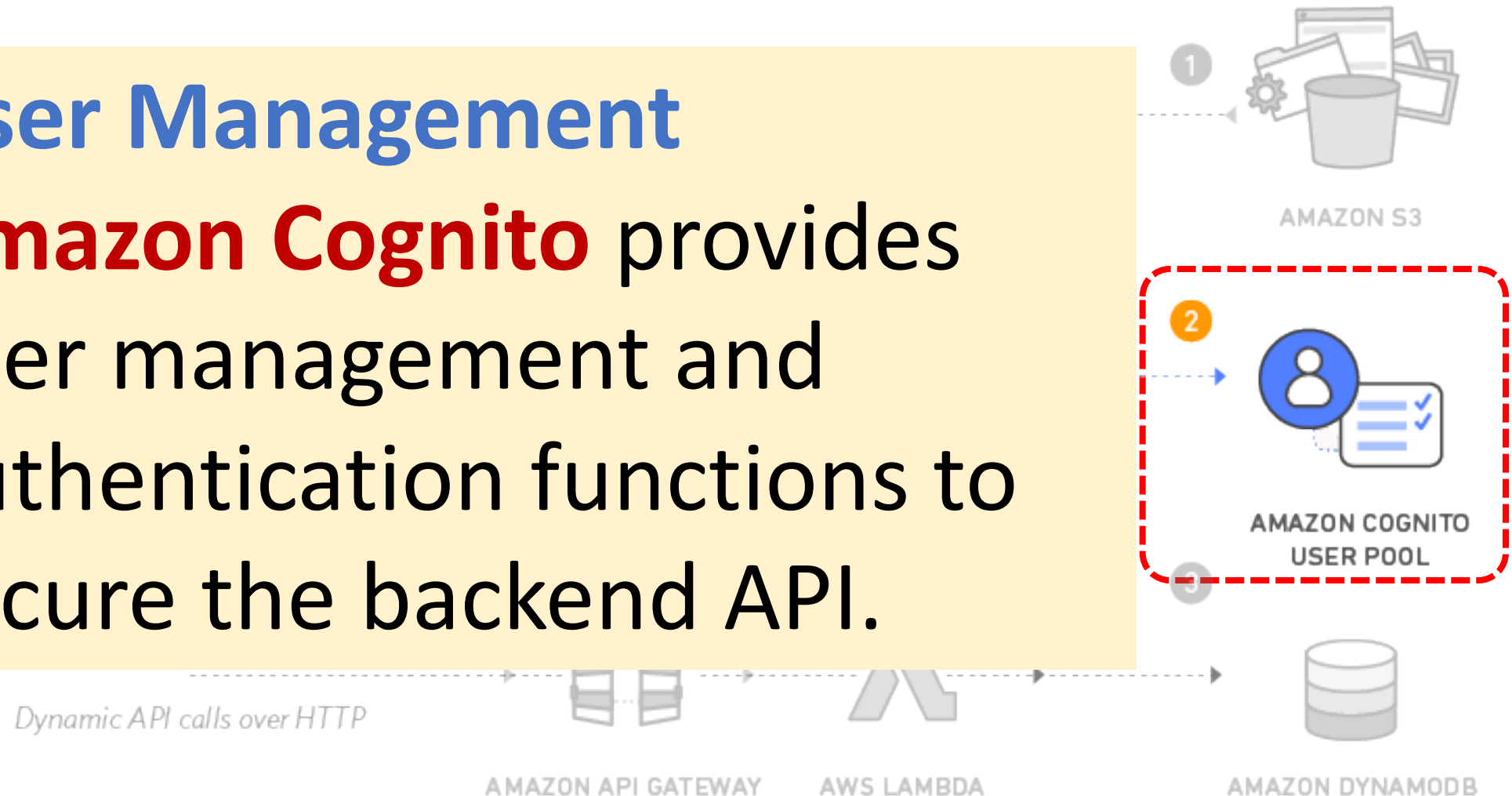
Build a Serverless Web Application

with Amazon S3, AWS Lambda, Amazon API Gateway, Amazon DynamoDB, and Amazon Cognito

2

User Management

Amazon Cognito provides user management and authentication functions to secure the backend API.

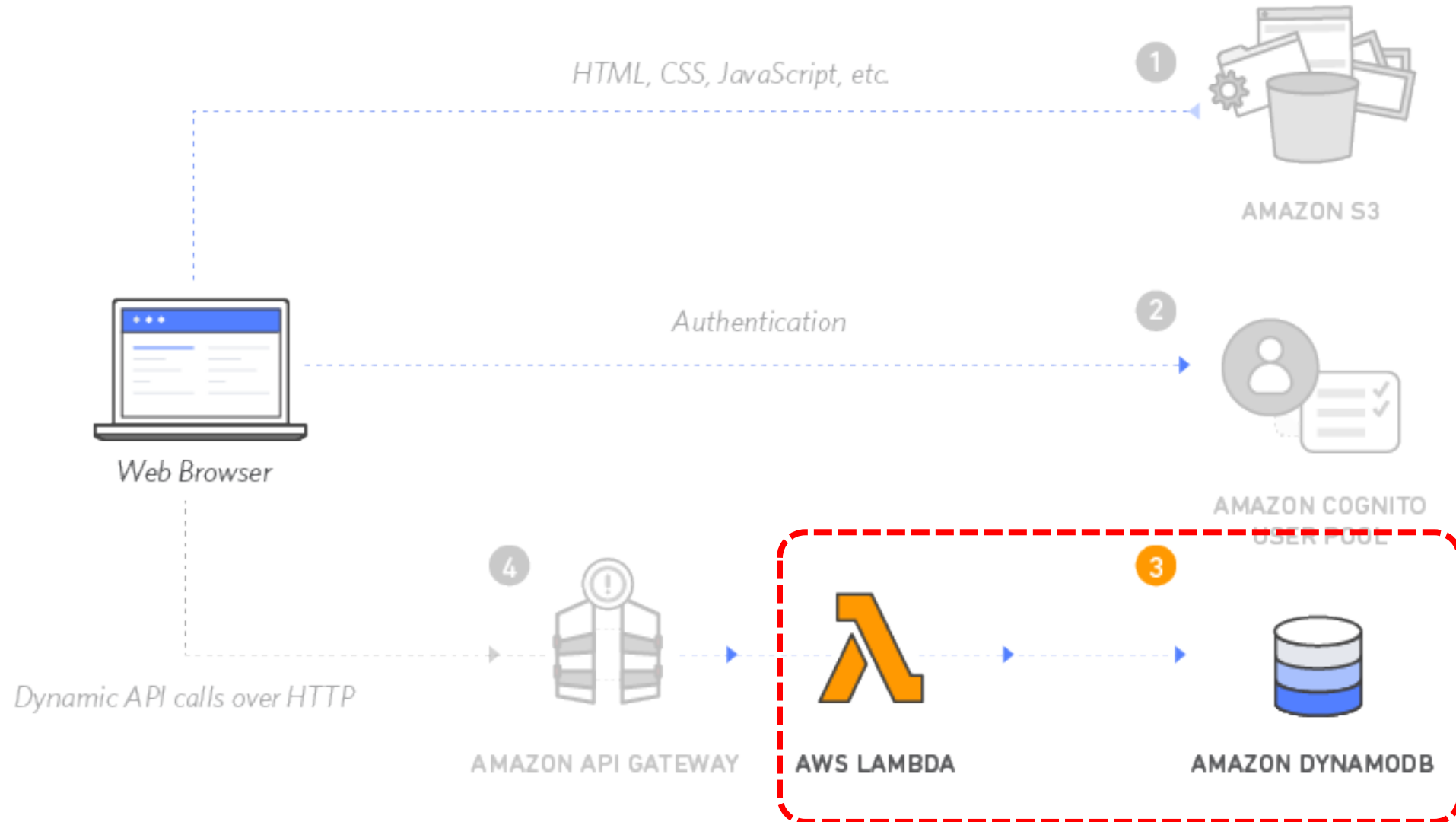




Build a Serverless Web Application

with Amazon S3, AWS Lambda, Amazon API Gateway, Amazon DynamoDB, and Amazon Cognito

3





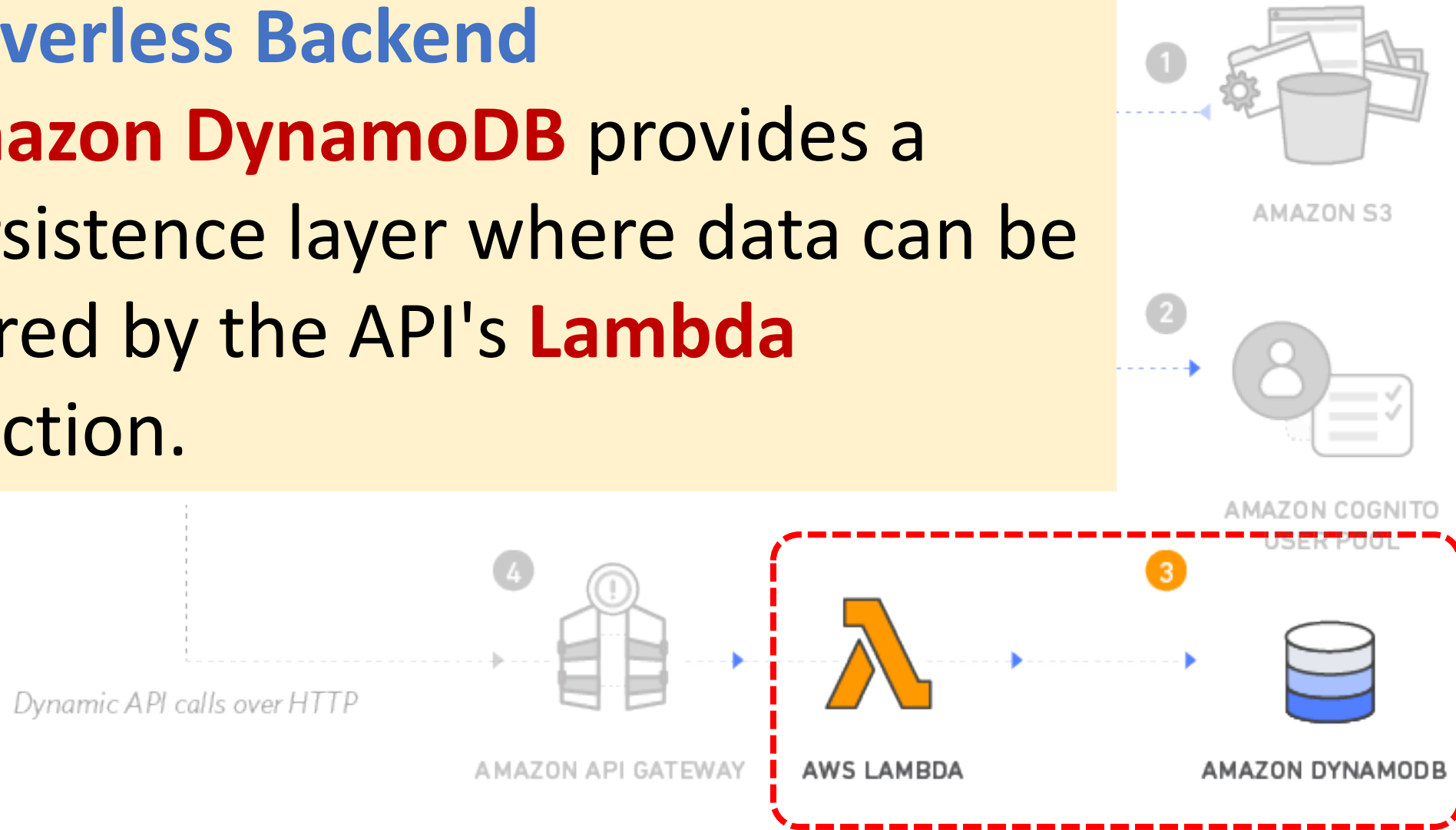
Build a Serverless Web Application

with Amazon S3, AWS Lambda, Amazon API Gateway, Amazon DynamoDB, and Amazon Cognito

3

Serverless Backend

Amazon DynamoDB provides a persistence layer where data can be stored by the API's **Lambda** function.

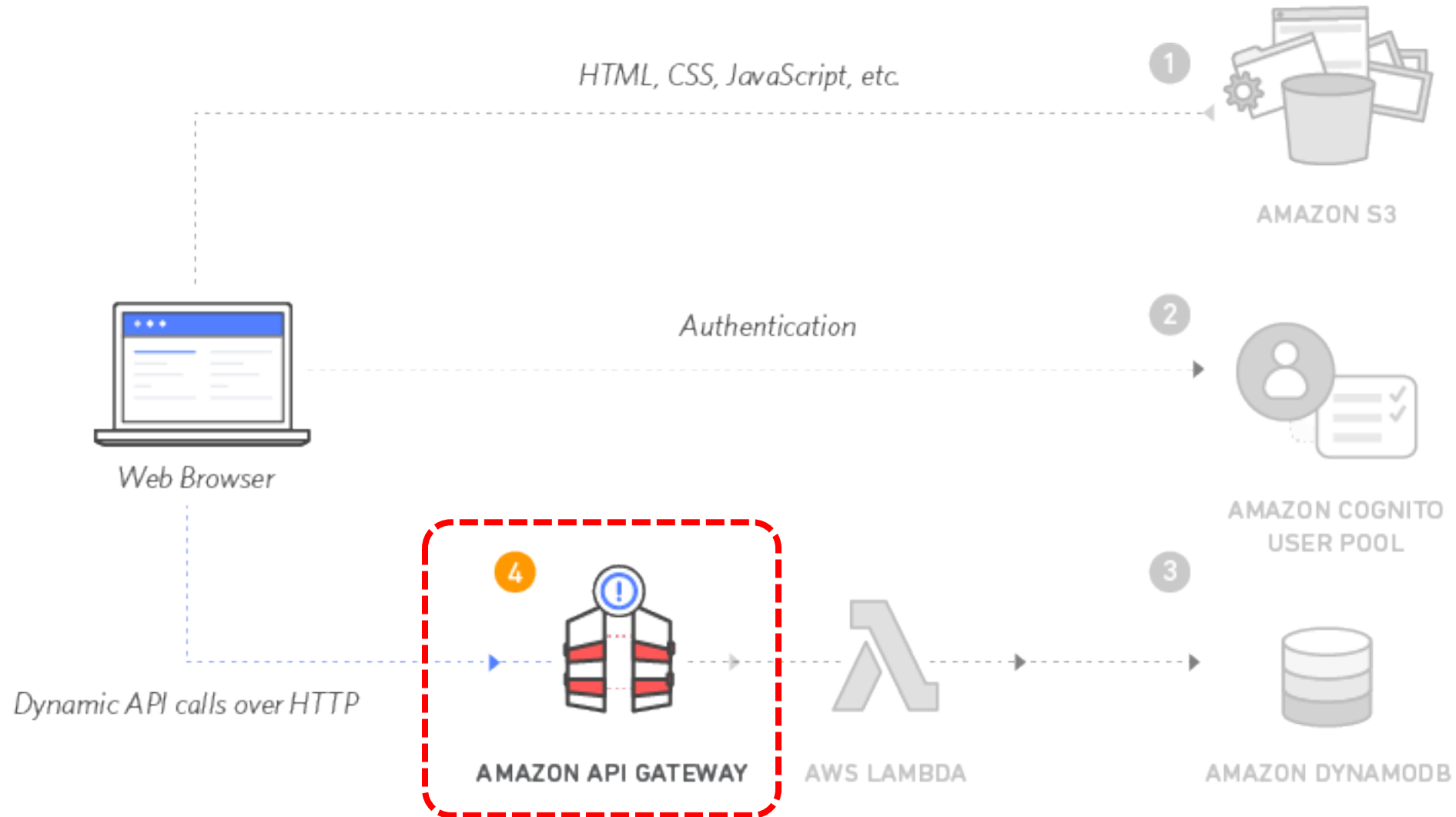




Build a Serverless Web Application

with Amazon S3, AWS Lambda, Amazon API Gateway, Amazon DynamoDB, and Amazon Cognito

4





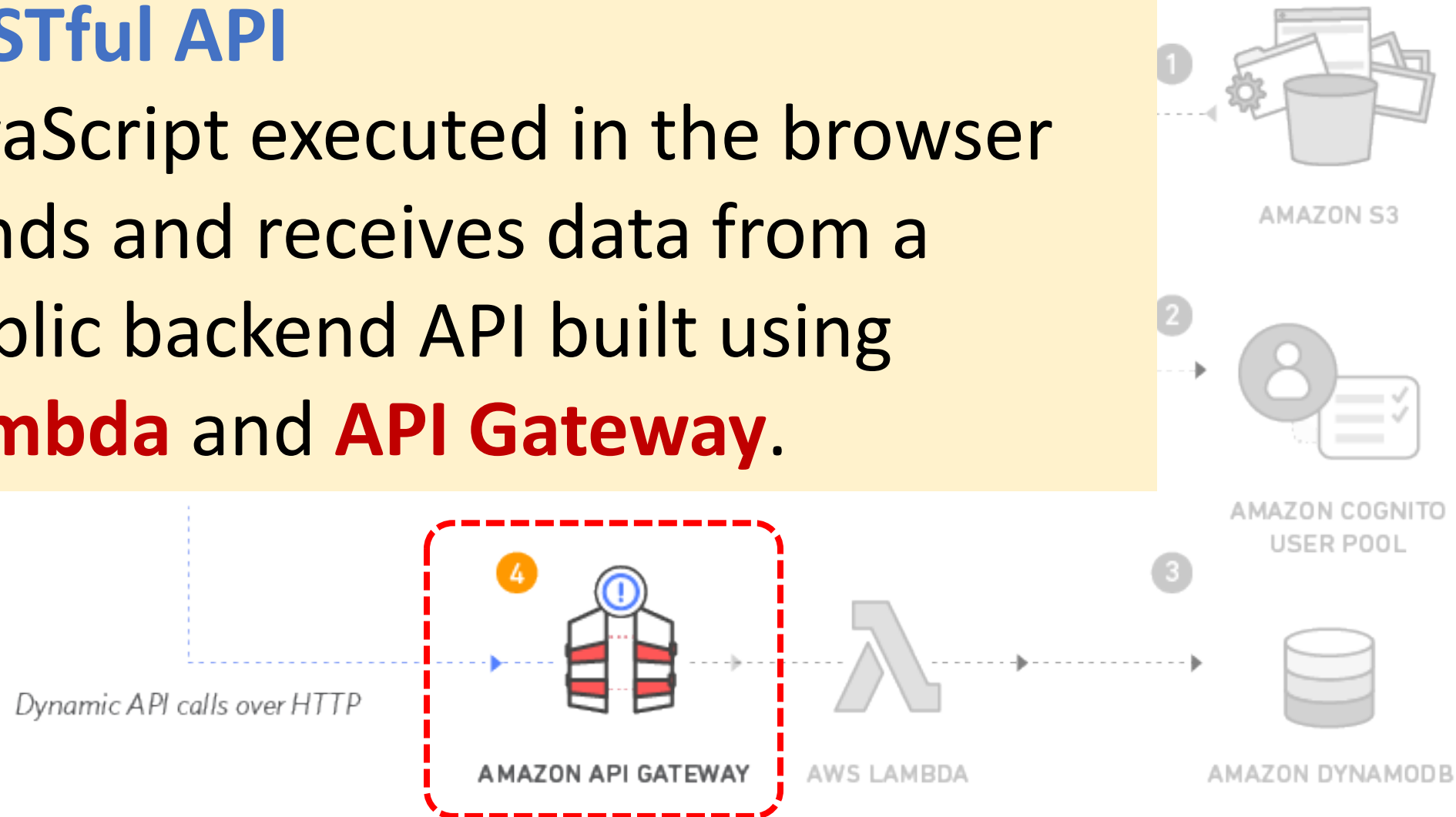
Build a Serverless Web Application

with Amazon S3, AWS Lambda, Amazon API Gateway, Amazon DynamoDB, and Amazon Cognito

4

RESTful API

JavaScript executed in the browser sends and receives data from a public backend API built using **Lambda** and **API Gateway**.





Build a Serverless Web Application

with Amazon S3, AWS Lambda, Amazon API Gateway,
Amazon DynamoDB, and Amazon Cognito

5 Terminate resources

Resource Cleanup

You will terminate an **Amazon S3** bucket, an **Amazon Cognito** User Pool, an **AWS Lambda** function, an **IAM** role, a **DynamoDB** table, a **REST API**, and a **CloudWatch** Log.

It is a best practice to **delete resources** you are no longer using to avoid unwanted charges.

Summary

- **AWS雲端應用導入教學**
- **如何在課程理論中融入AWS概念**
- **如何帶領學生進行實作**

Q & A

AWS雲端應用導入教學經驗分享

(Experiences Sharing of Introducing AWS Cloud Applications into Teaching)

講者：資管所 戴敏育 老師

時間：2021年3月16日（二） 12:10 – 13:10

地點：國立臺北大學 行政大樓第4會議室

主辦單位：國立臺北大學 教學發展中心

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2021-03-16

