

Software Engineering

Cloud Computing and Cloud Software Architecture

1102SE07

MBA, IM, NTPU (M5010) (Spring 2022)

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

Min-Yuh Day, Ph.D,
Associate Professor

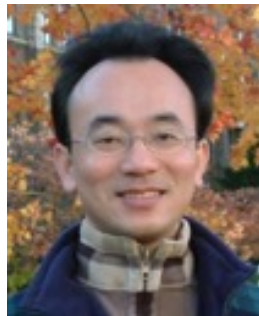
Institute of Information Management, National Taipei University

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

2022-04-27



<https://meet.google.com/ish-gzmy-pmo>



Syllabus

Week Date Subject/Topics

- | | | |
|----------|-------------------|---|
| 1 | 2022/02/23 | Introduction to Software Engineering |
| 2 | 2022/03/02 | Software Products and Project Management:
Software product management and prototyping |
| 3 | 2022/03/09 | Agile Software Engineering:
Agile methods, Scrum, and Extreme Programming |
| 4 | 2022/03/16 | Features, Scenarios, and Stories |
| 5 | 2022/03/23 | Case Study on Software Engineering I |
| 6 | 2022/03/30 | Software Architecture: Architectural design,
System decomposition, and Distribution architecture |

Syllabus

Week	Date	Subject/Topics
7	2022/04/06	Make-up holiday (No Classes)
8	2022/04/13	Midterm Project Report
9	2022/04/20	Cloud-Based Software: Virtualization and containers, Everything as a service, Software as a service
10	2022/04/27	Cloud Computing and Cloud Software Architecture
11	2022/05/04	Microservices Architecture, RESTful services, Service deployment
12	2022/05/11	Industry Practices of Software Engineering [Invited Talk: "Agile Principles Patterns and Practices in FinTech and Digital Transformation", Invited Speaker: Shihyu (Alex) Chu, Senior Industry Analyst/Program Manager, Market Intelligence & Consulting Institute (MIC)]

Syllabus

Week	Date	Subject/Topics
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13	2022/05/18	Case Study on Software Engineering II
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14	2022/05/25	Security and Privacy; Reliable Programming; Testing: Test-driven development, and Code reviews; DevOps and Code Management: DevOps automation
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15	2022/06/01	Final Project Report I
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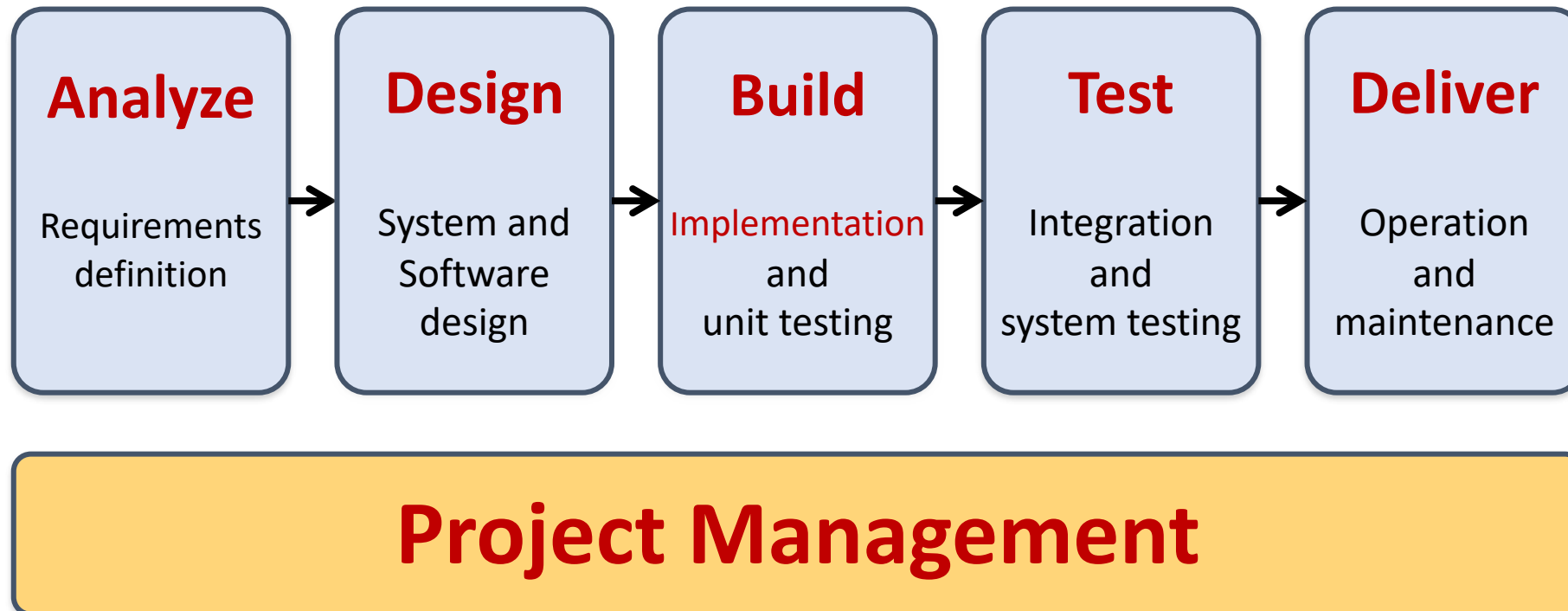
16	2022/06/08	Final Project Report II
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17	2022/06/15	Self-learning
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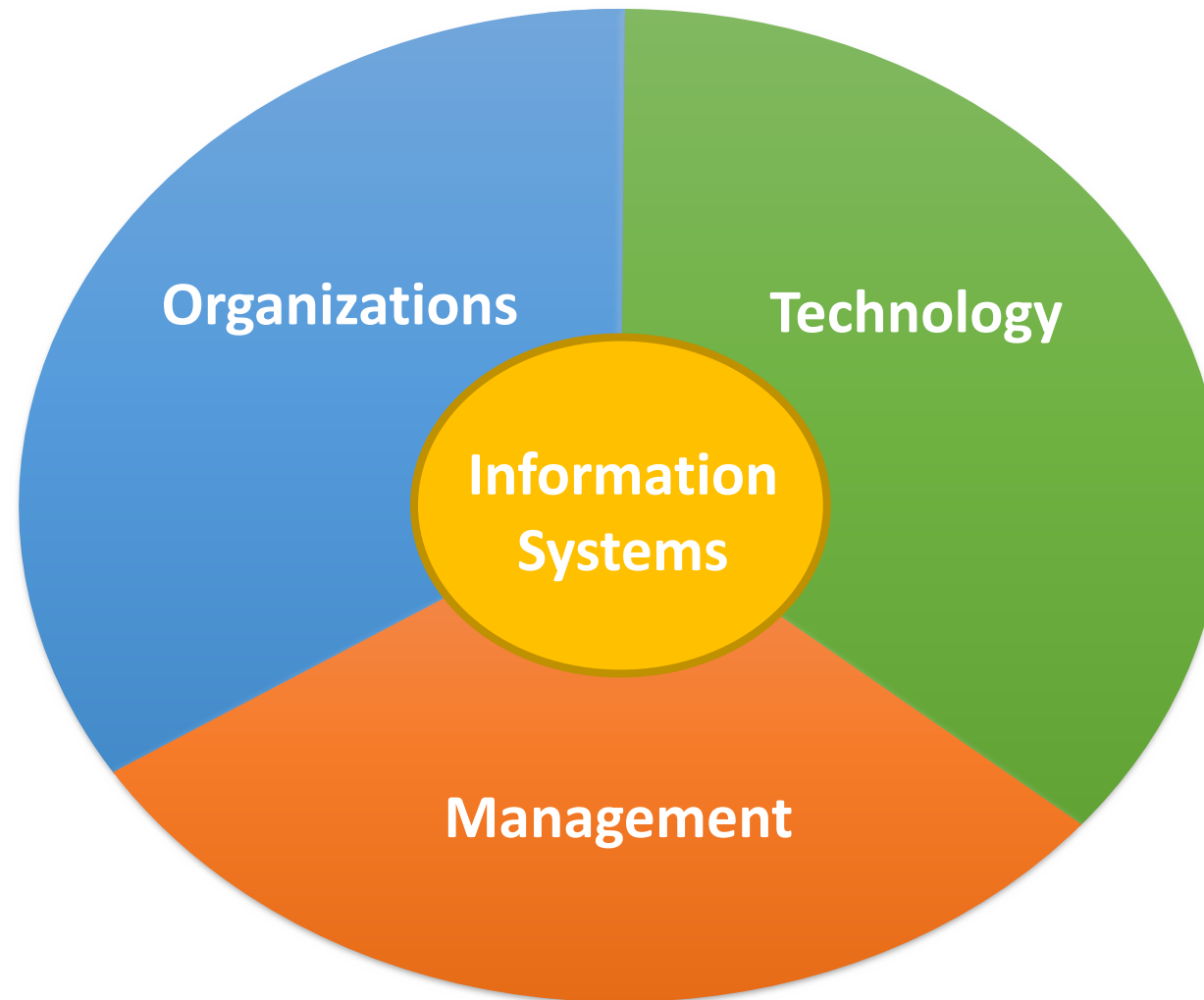
18	2022/06/22	Self-learning
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Cloud Computing and Cloud Software Architecture

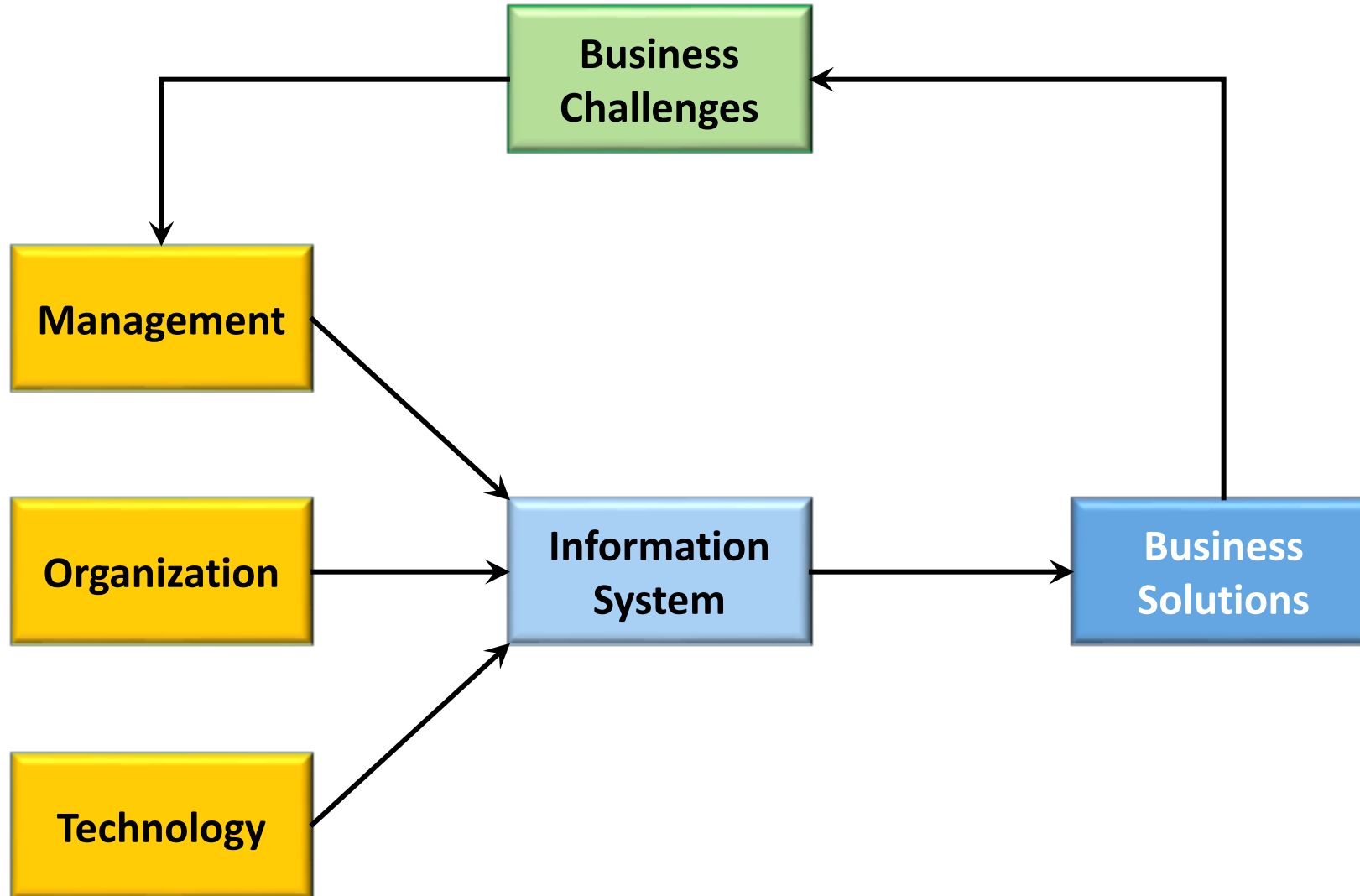
Software Engineering and Project Management



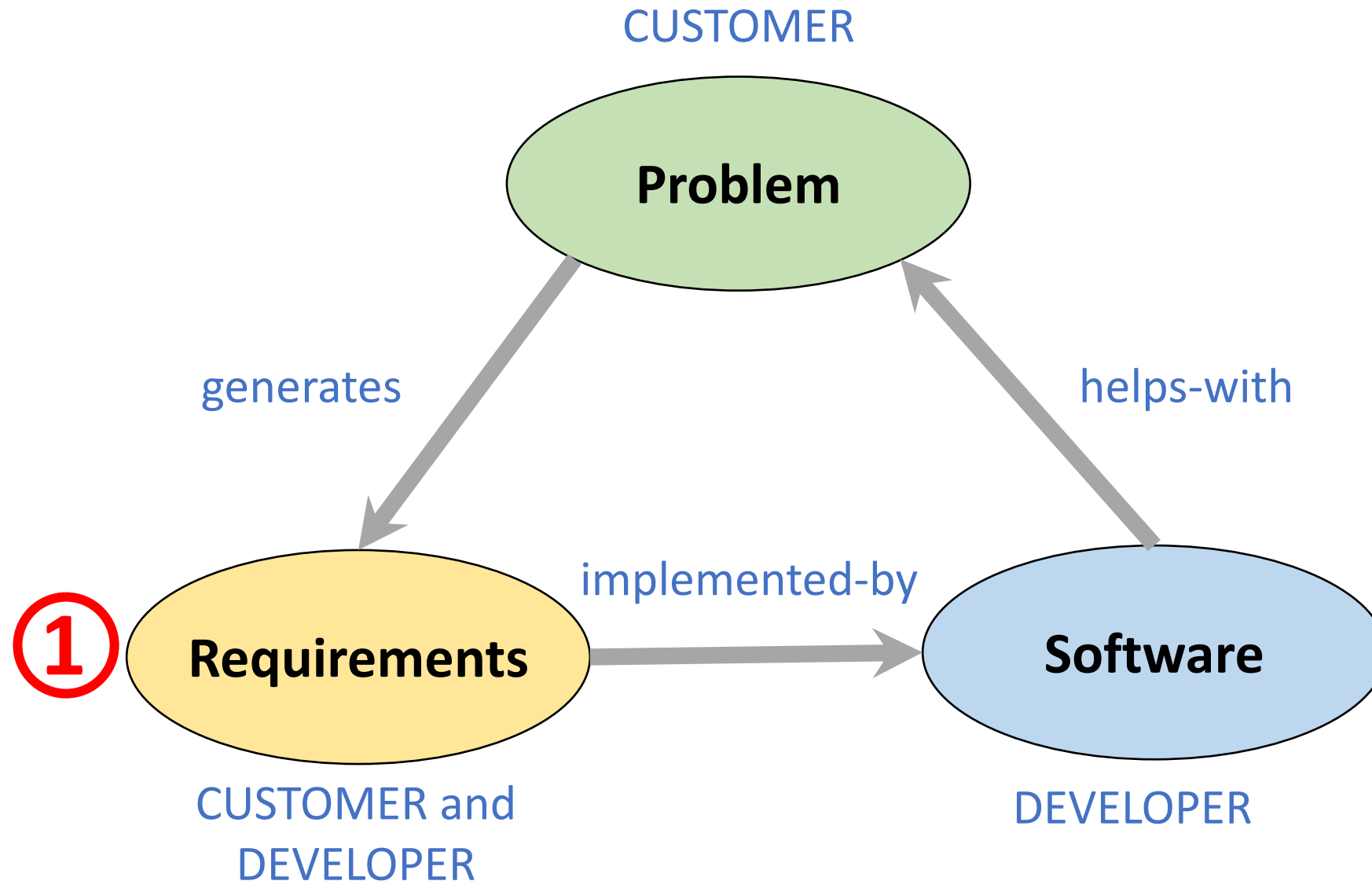
Information Management (MIS) Information Systems



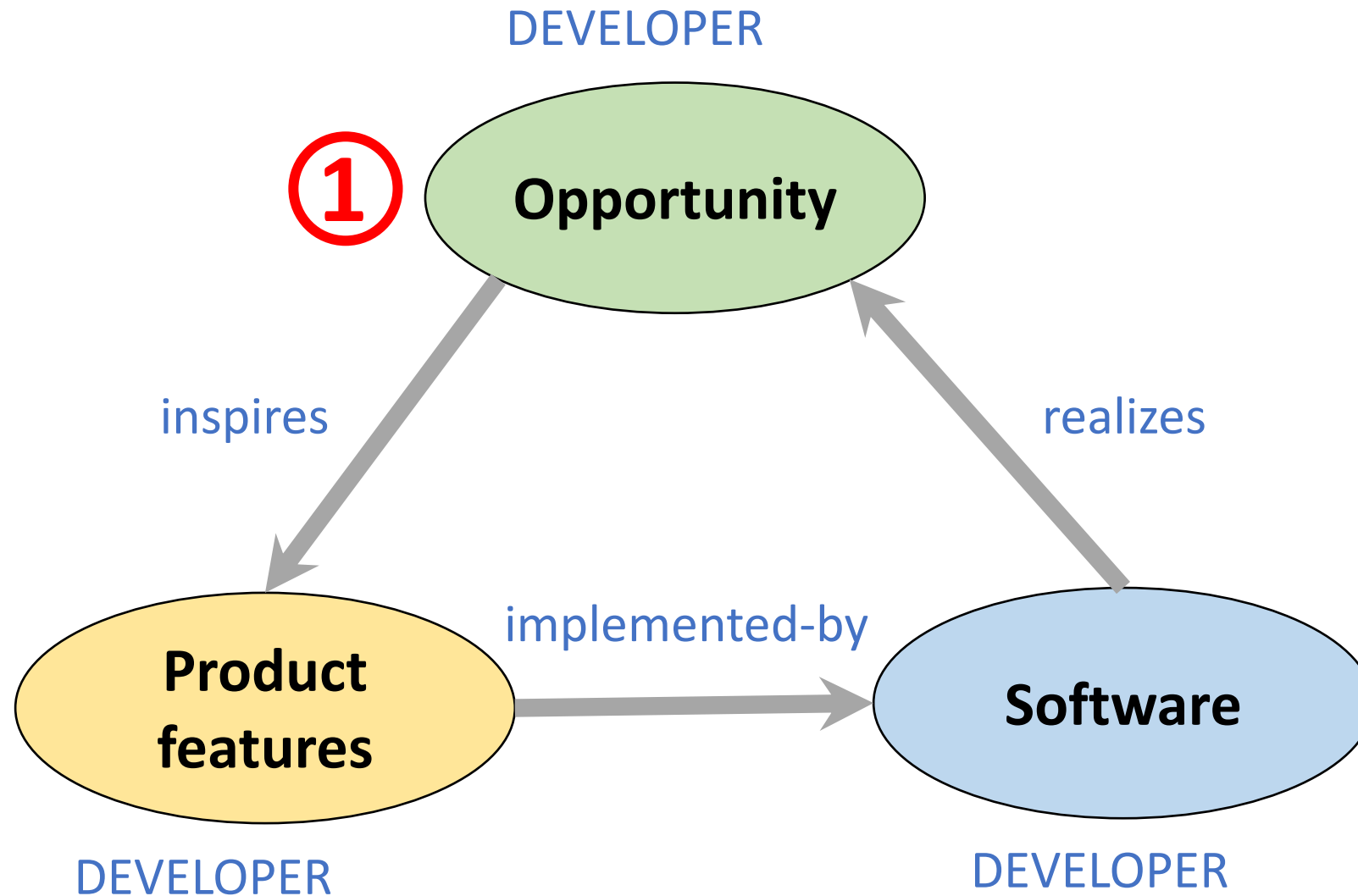
Fundamental MIS Concepts



Project-based software engineering

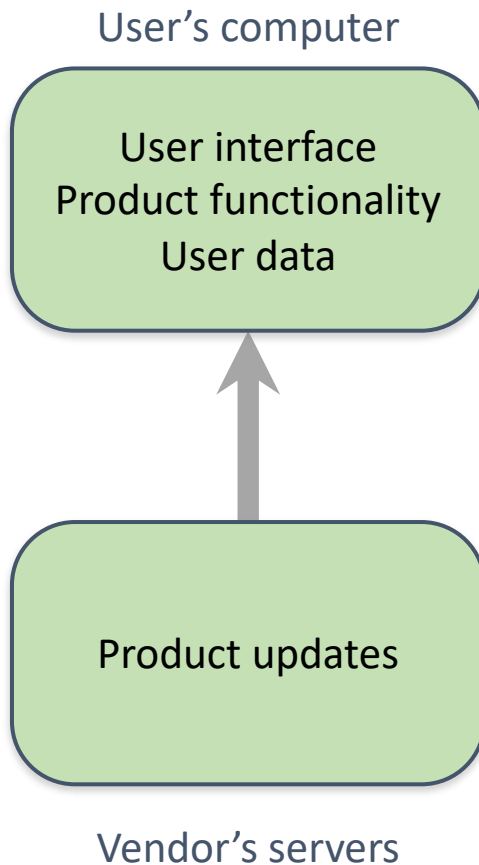


Product software engineering

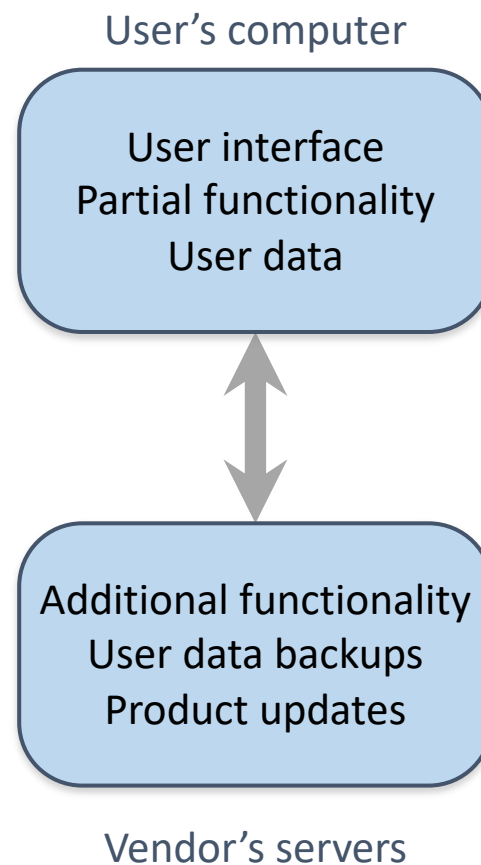


Software execution models

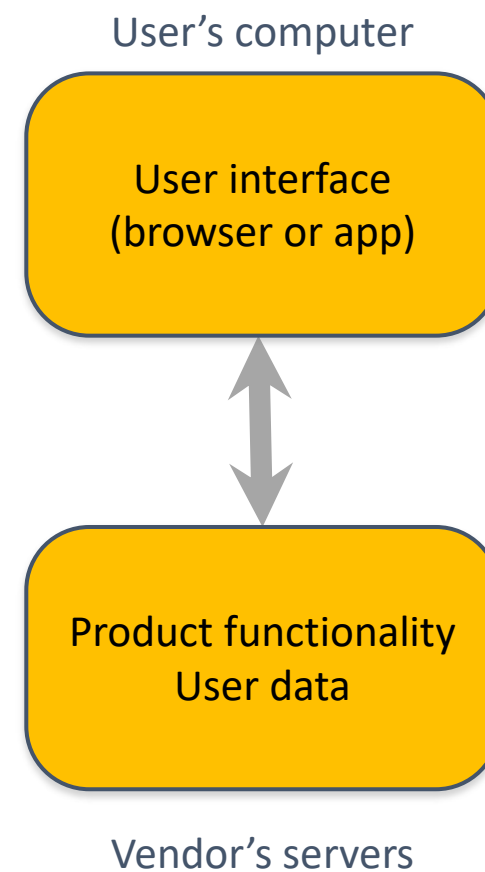
Stand-alone execution



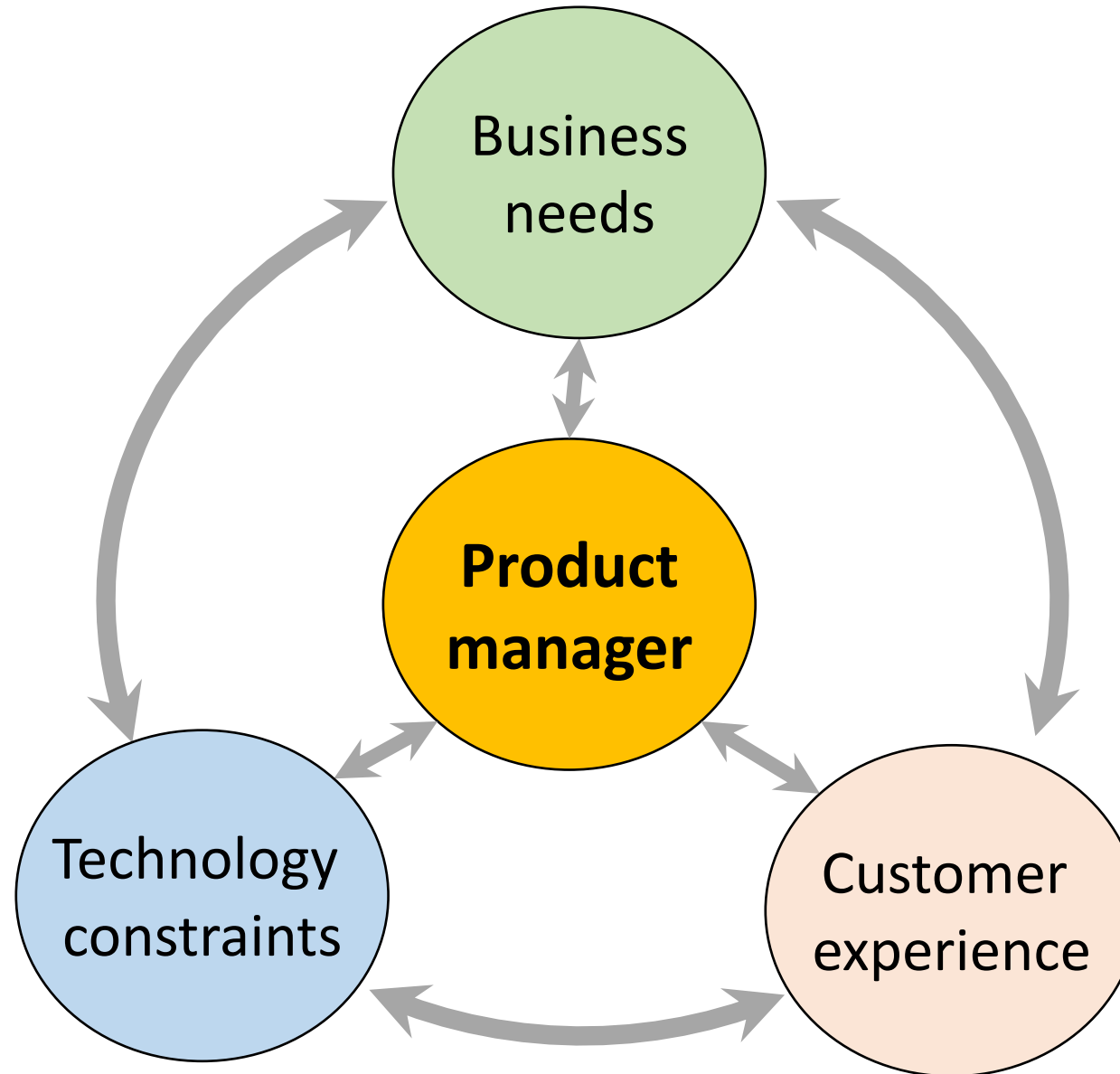
Hybrid execution



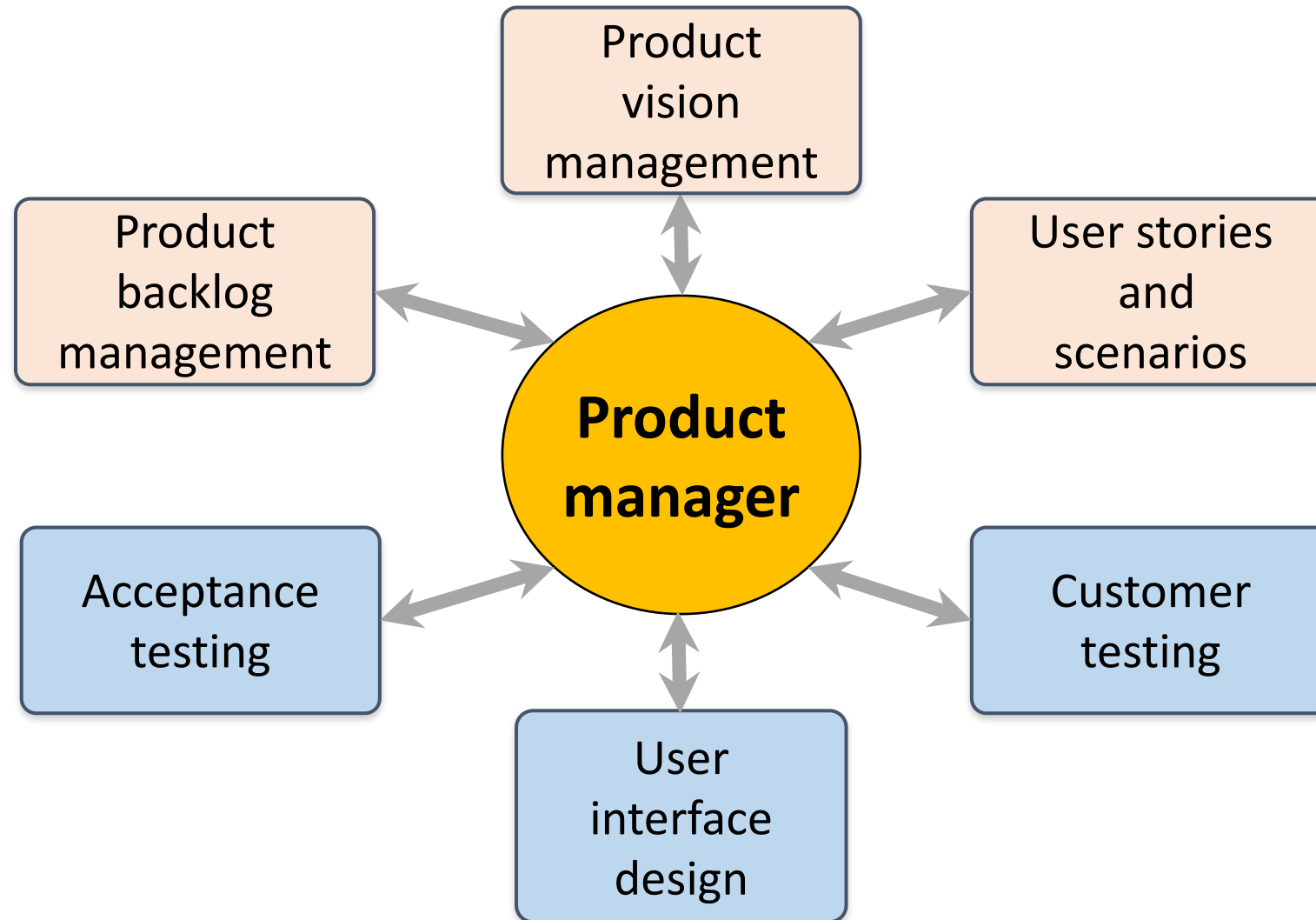
Software as a service



Product management concerns

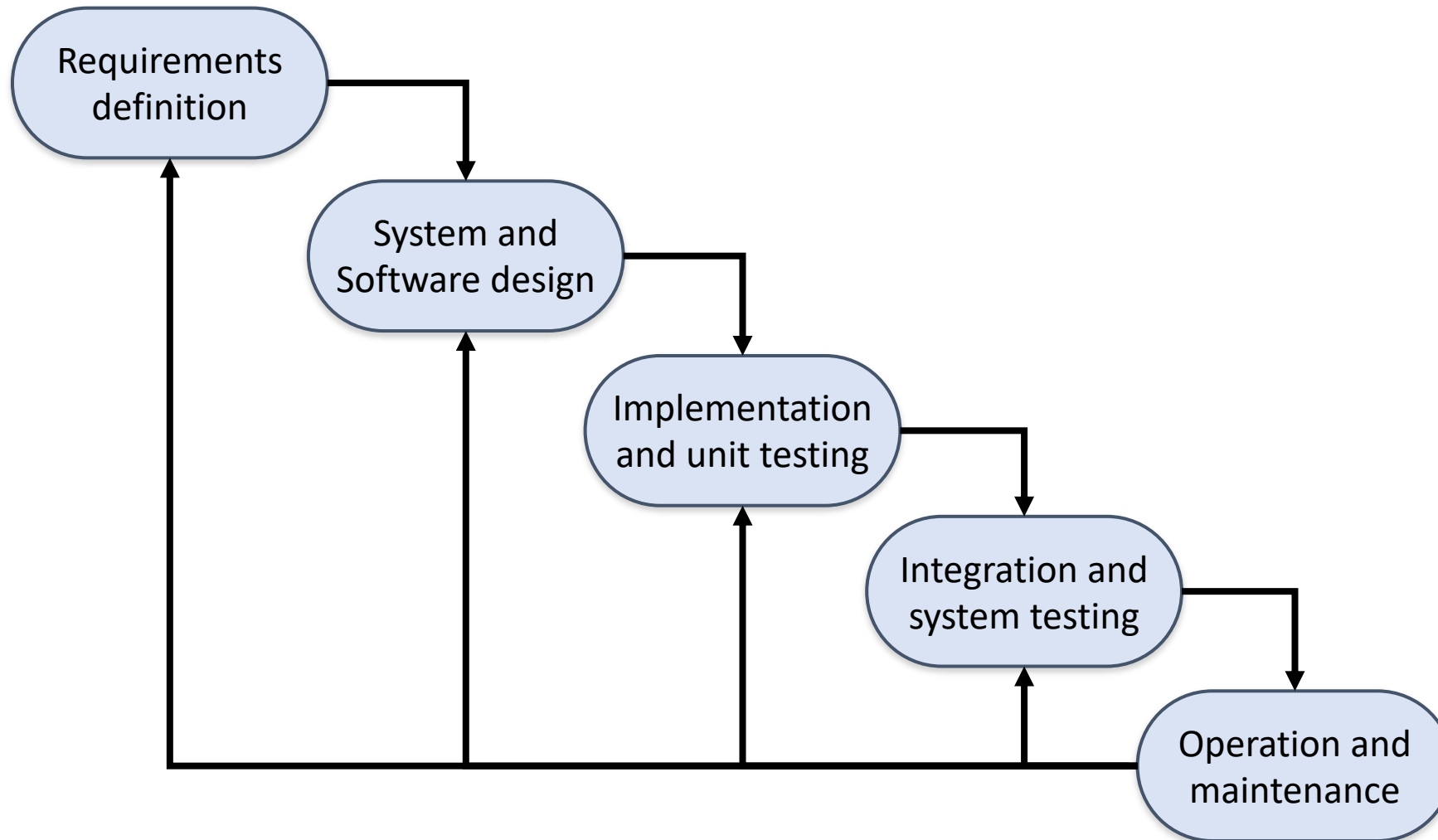


Technical interactions of product managers



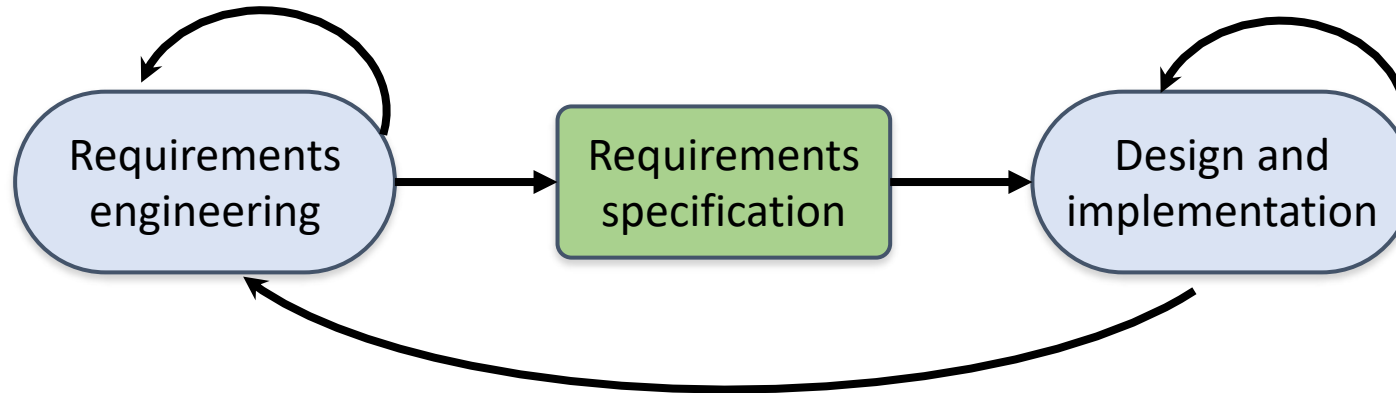
Software Development Life Cycle (SDLC)

The waterfall model



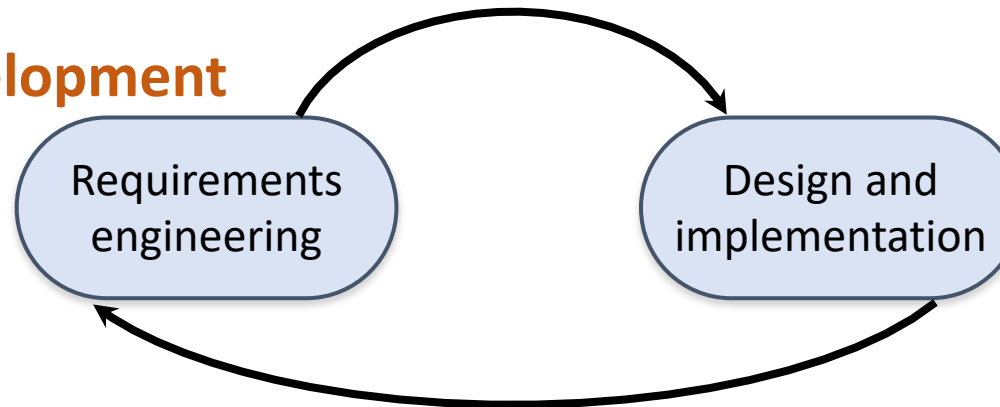
Plan-based and Agile development

Plan-based development

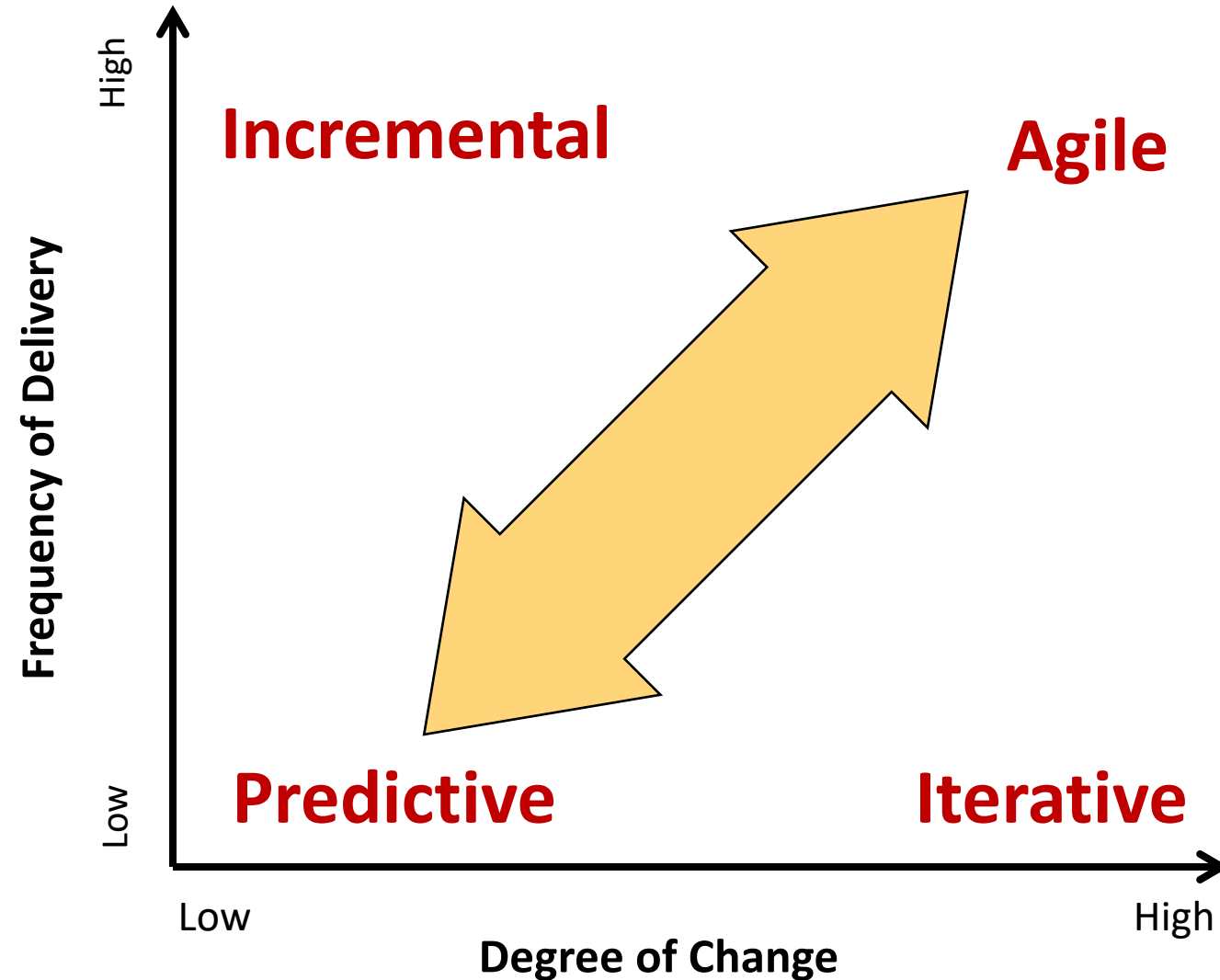


Requirements change requests

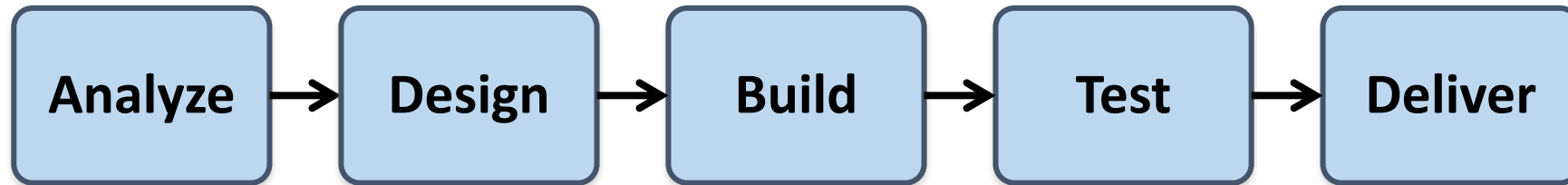
Agile development



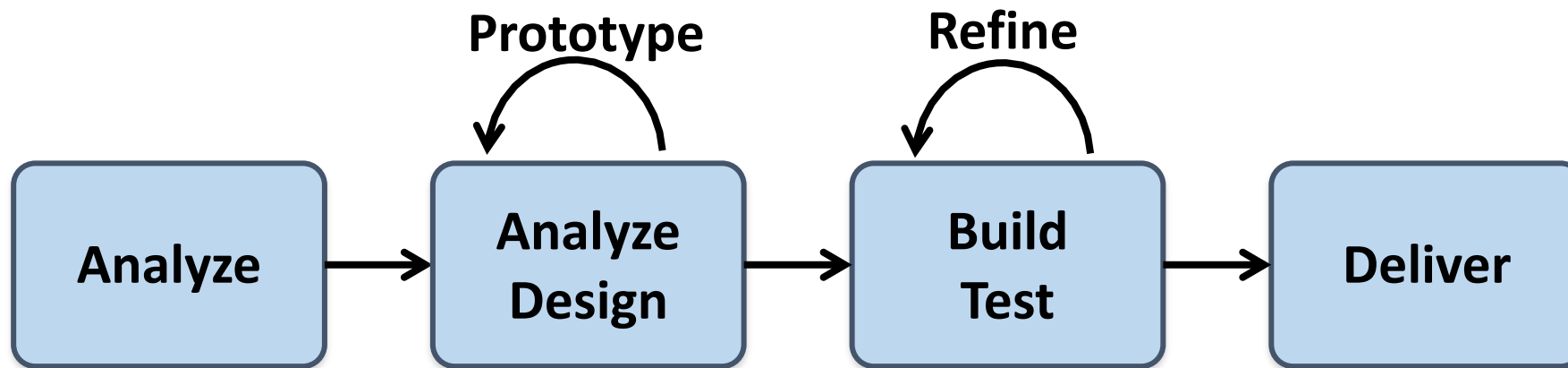
The Continuum of Life Cycles



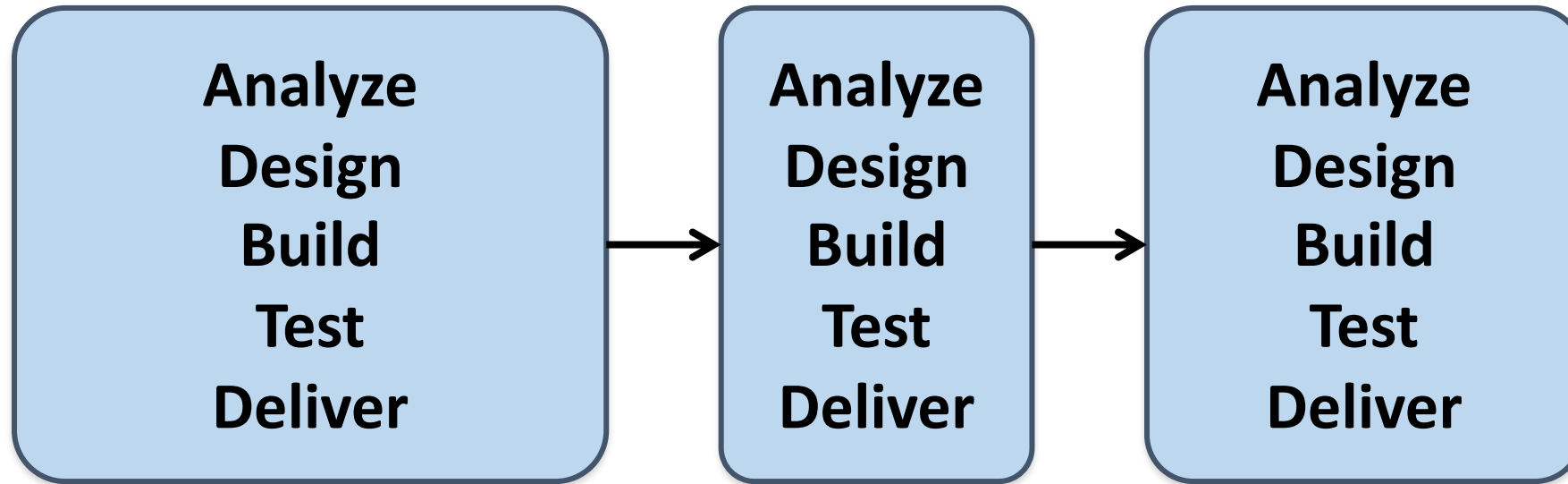
Predictive Life Cycle



Iterative Life Cycle

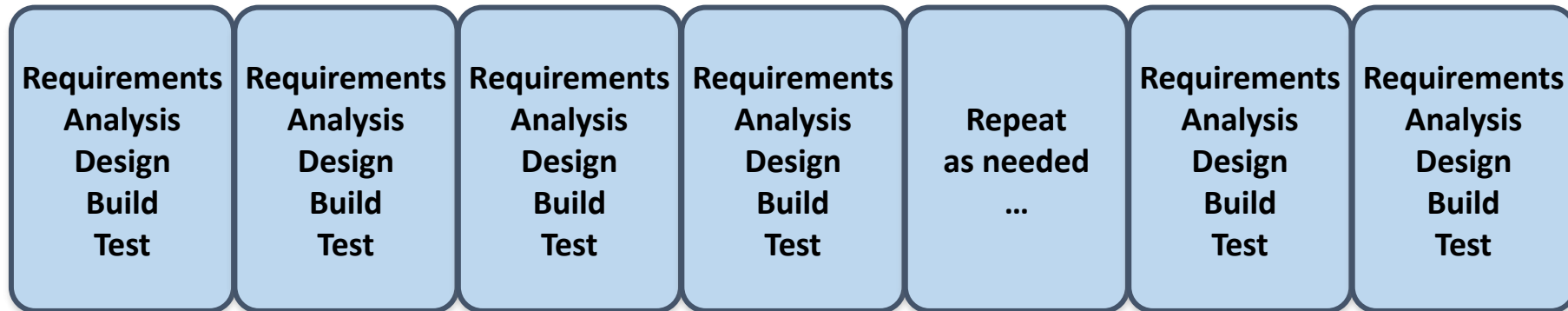


A Life Cycle of Varying-Sized Increments

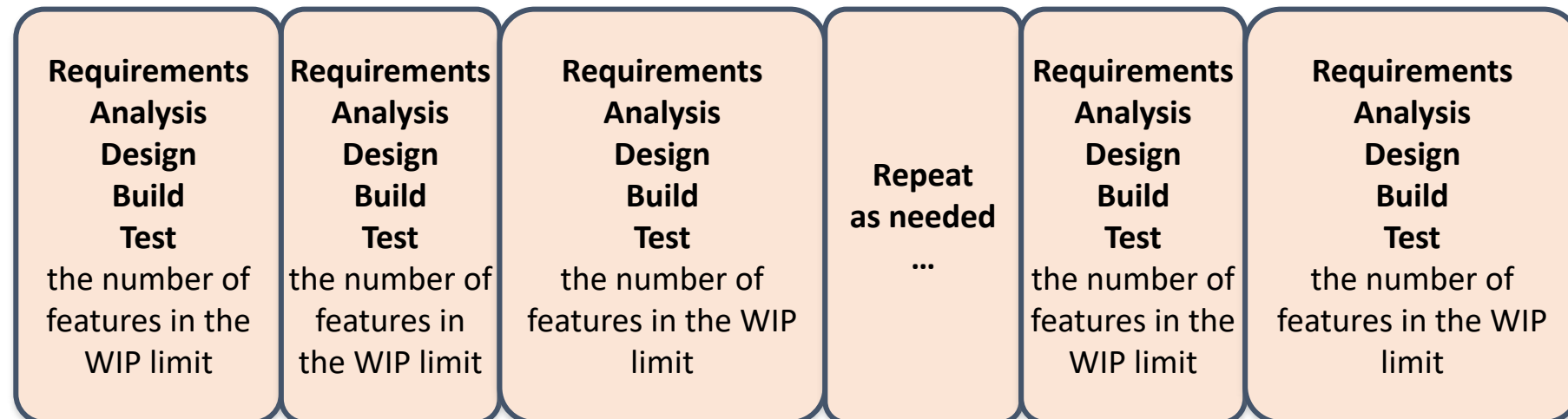


Iteration-Based and Flow-Based Agile Life Cycles

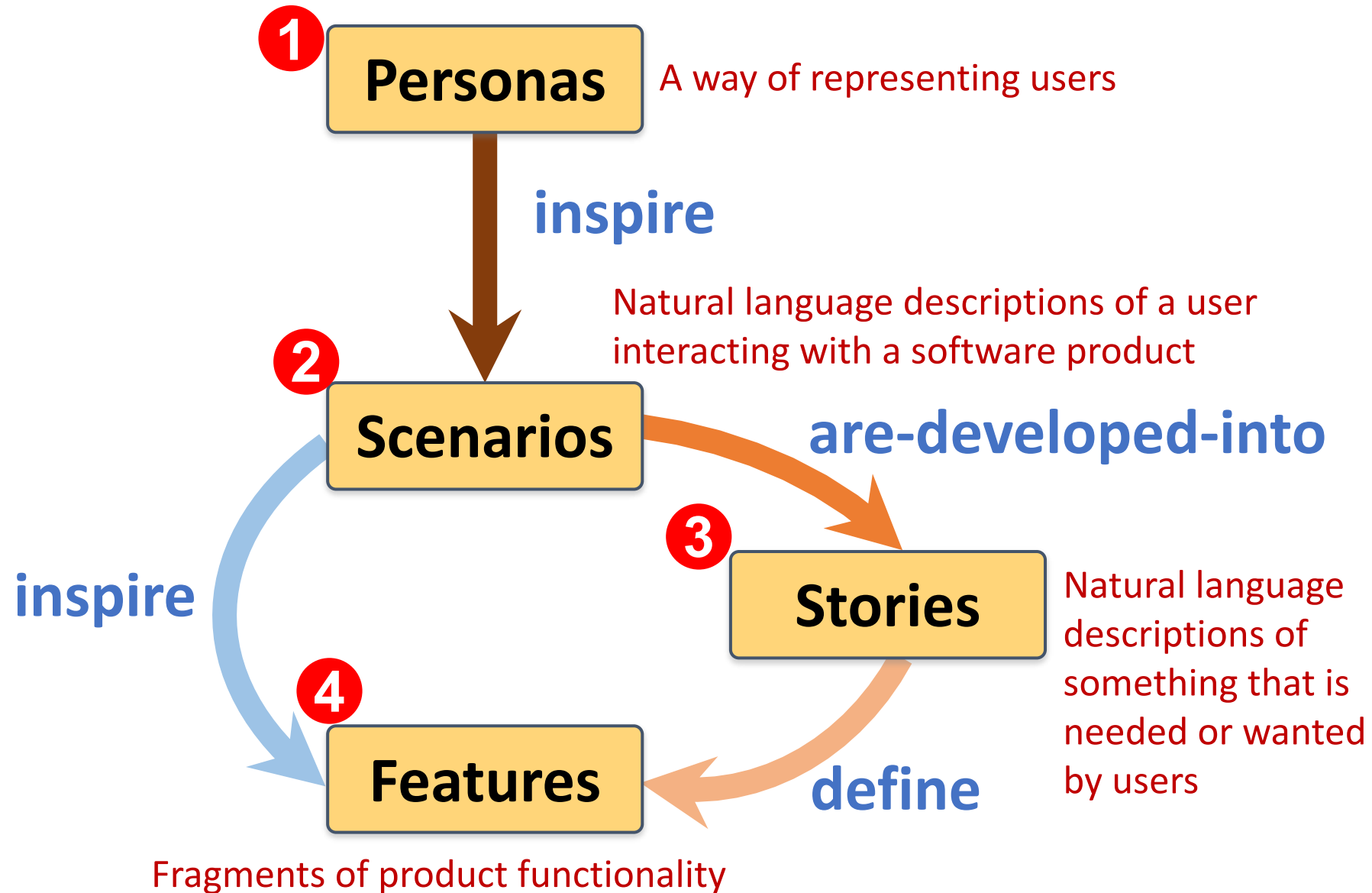
Iteration-Based Agile



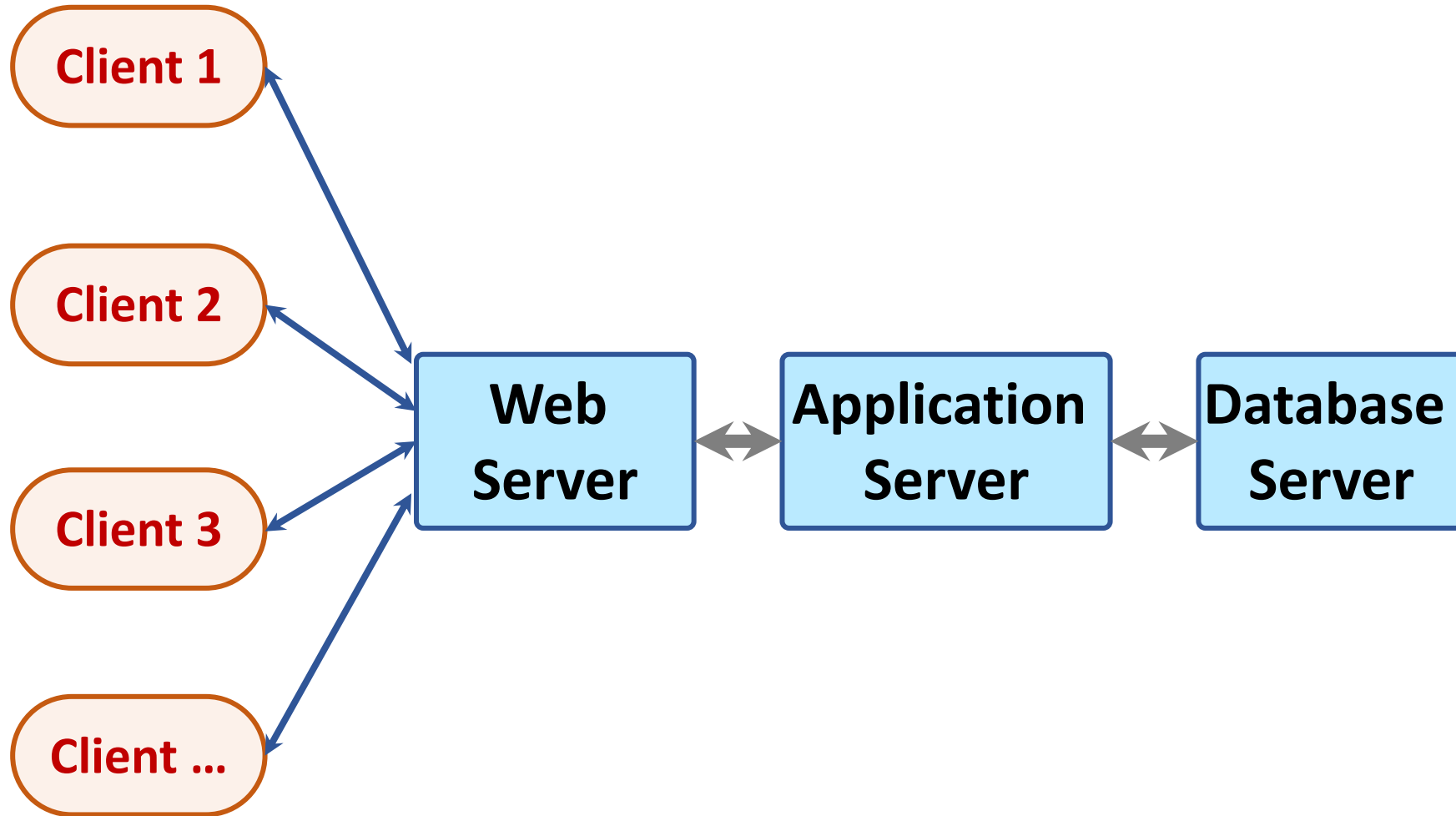
Flow-Based Agile



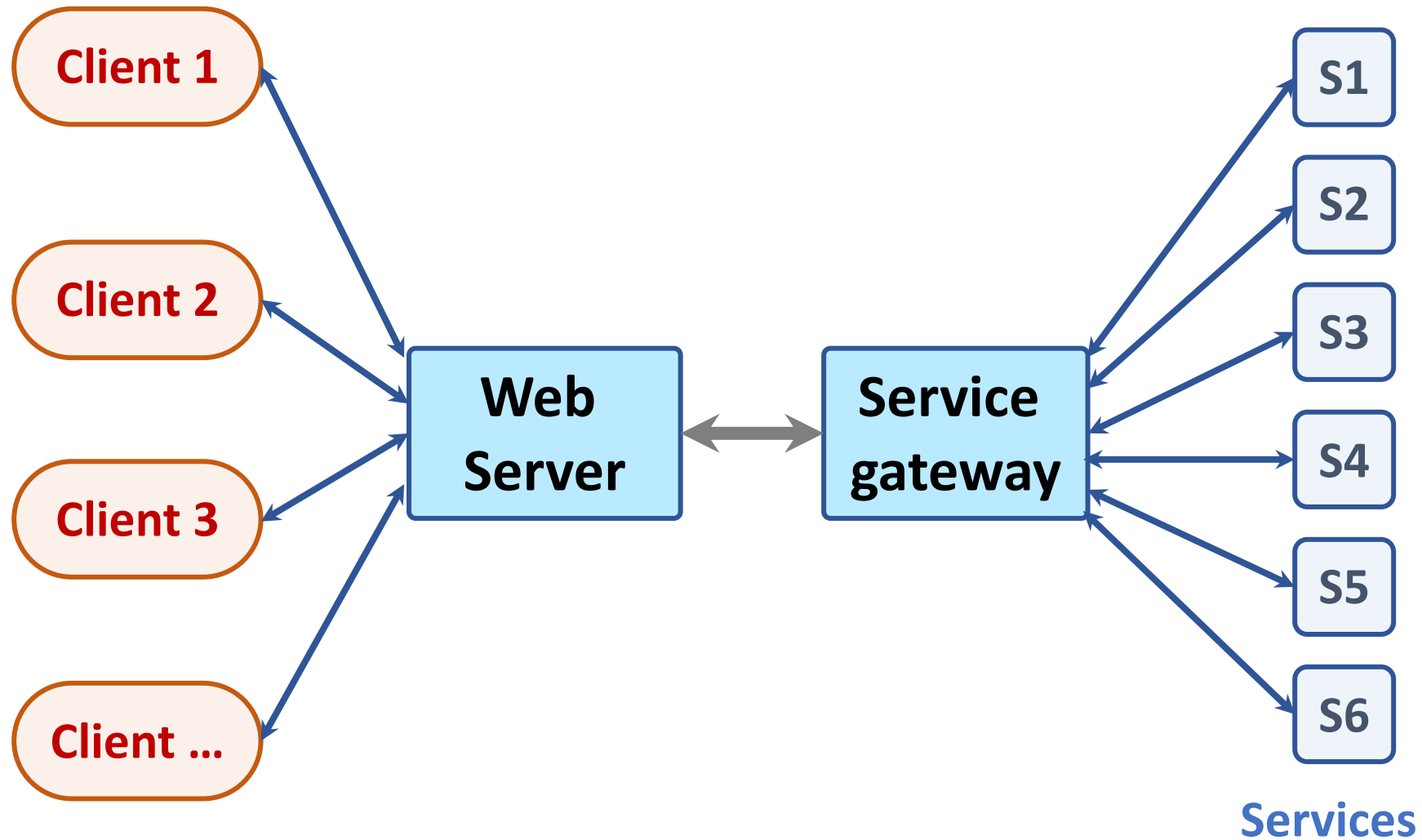
From personas to features



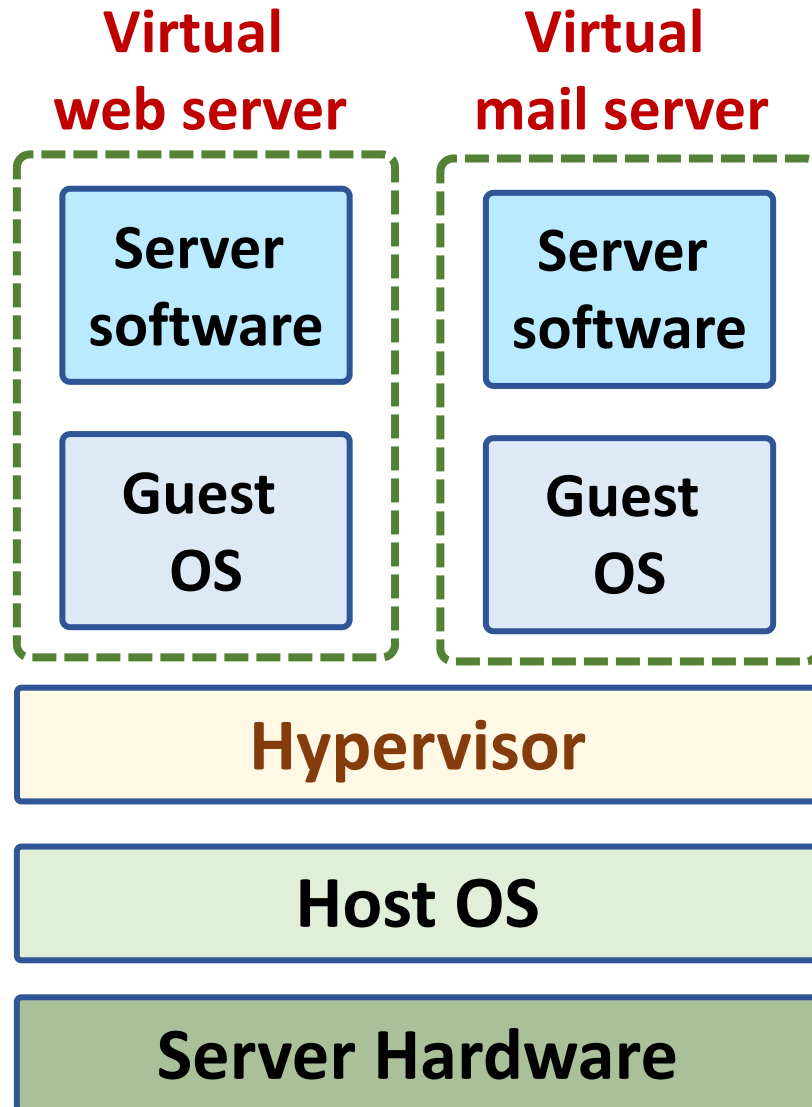
Multi-tier client-server architecture



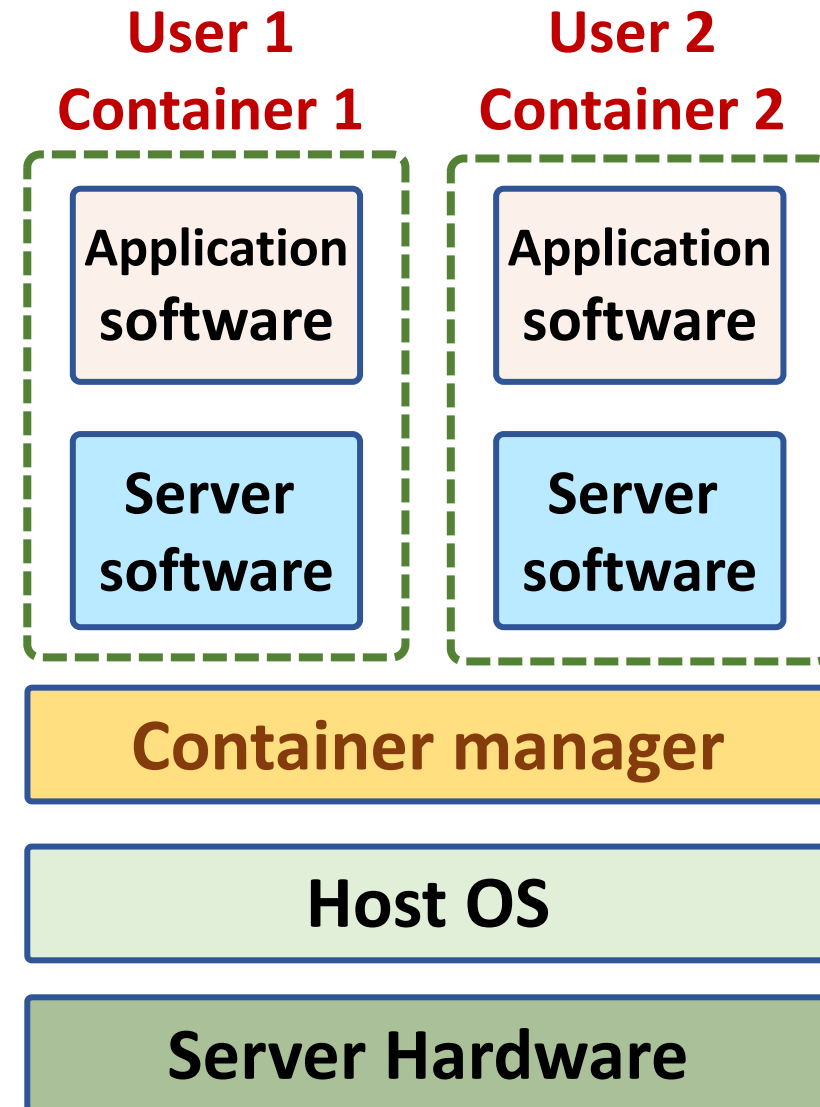
Service-oriented Architecture



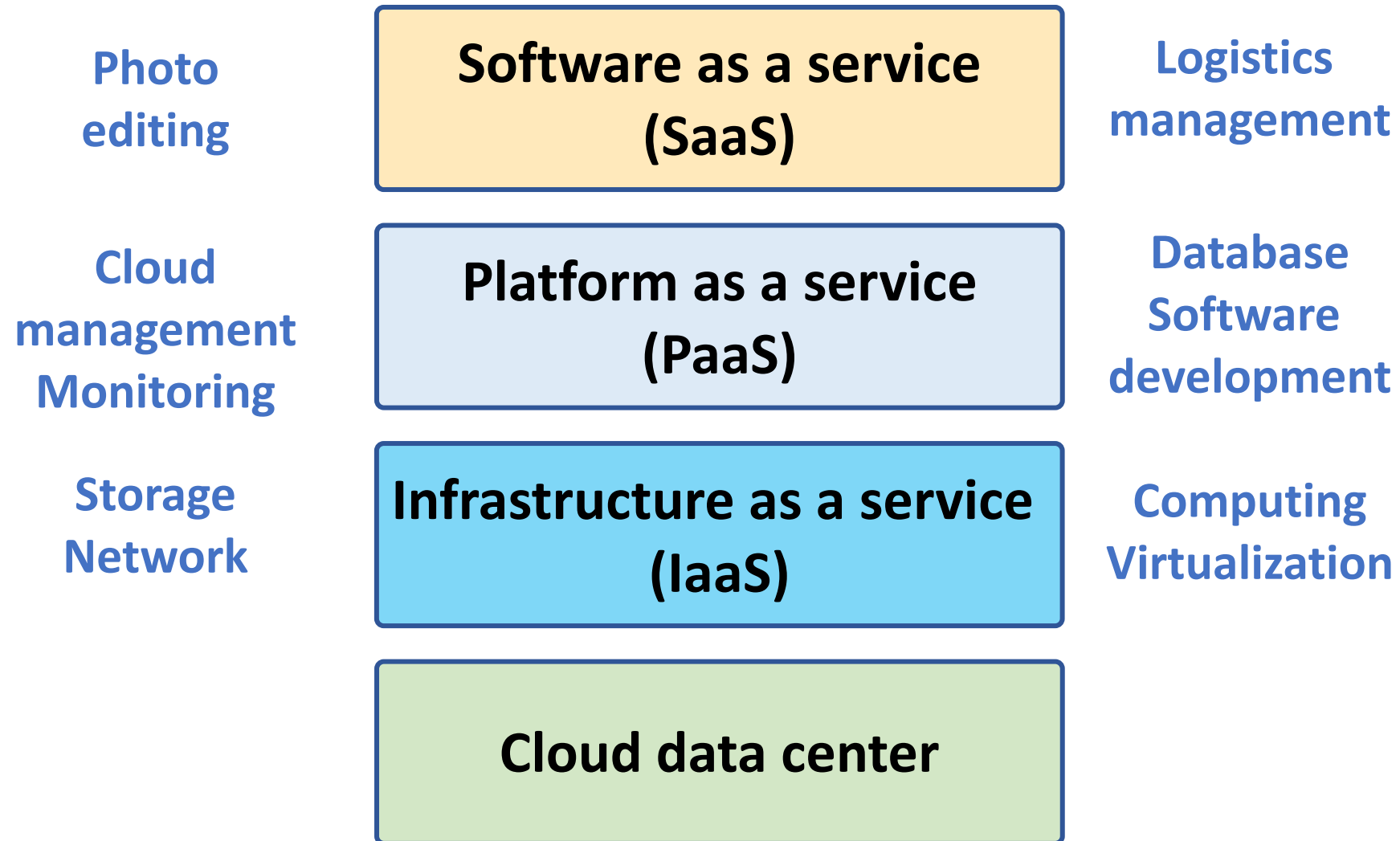
VM



Container



Everything as a service

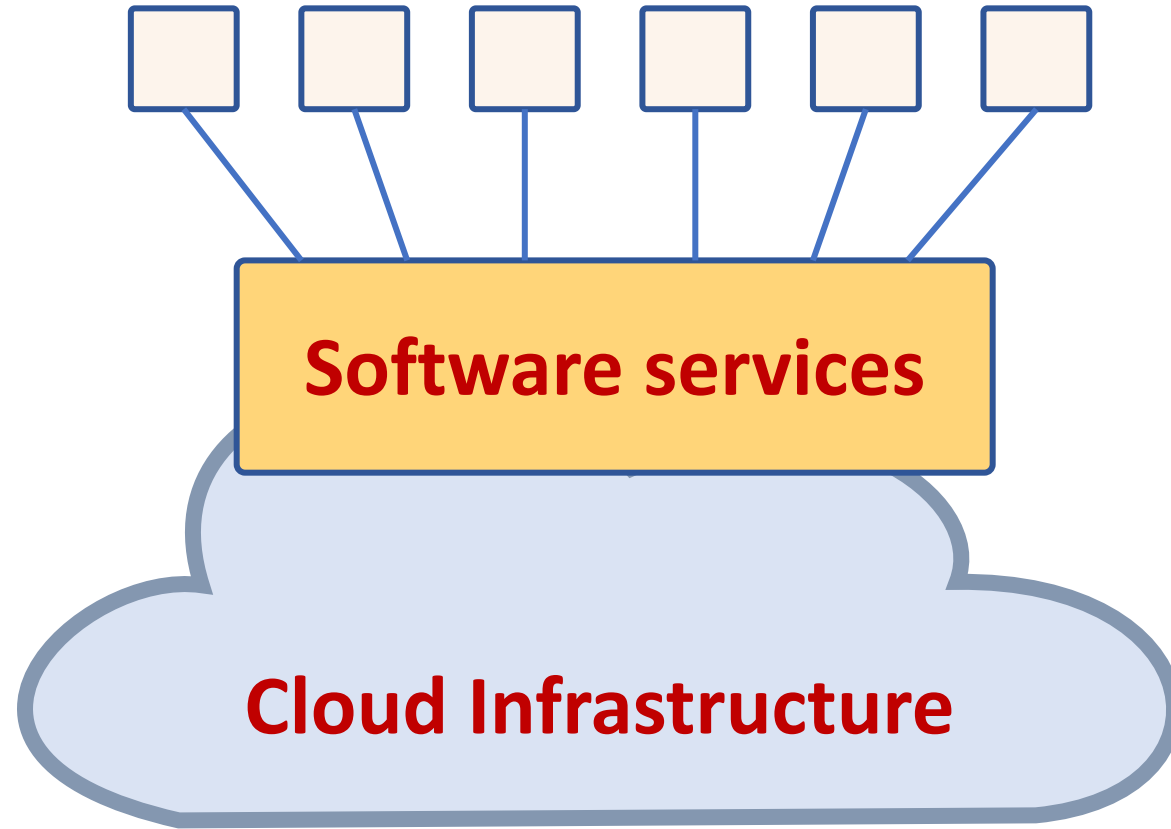


Software as a service

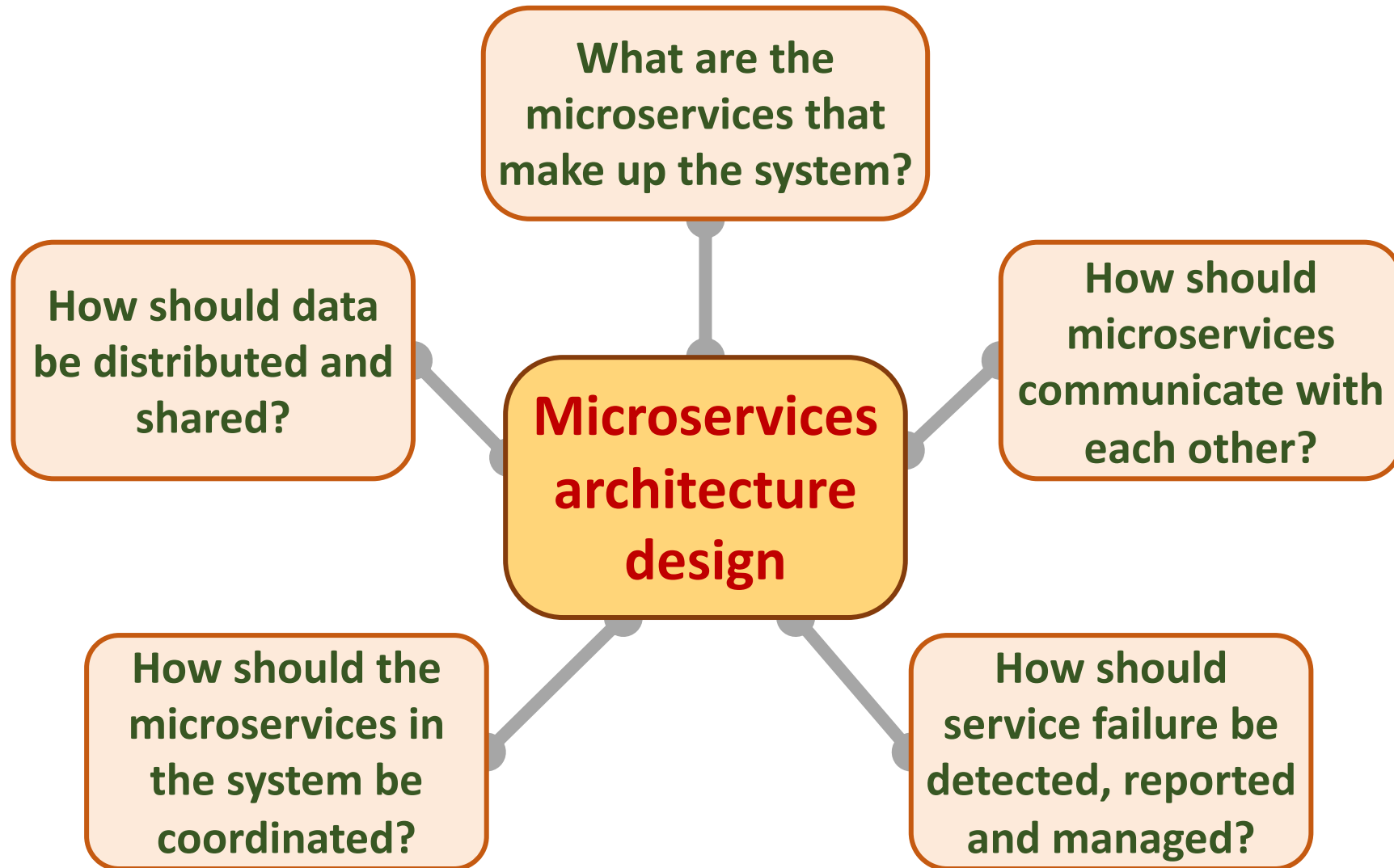
Software
customers

Software
provider

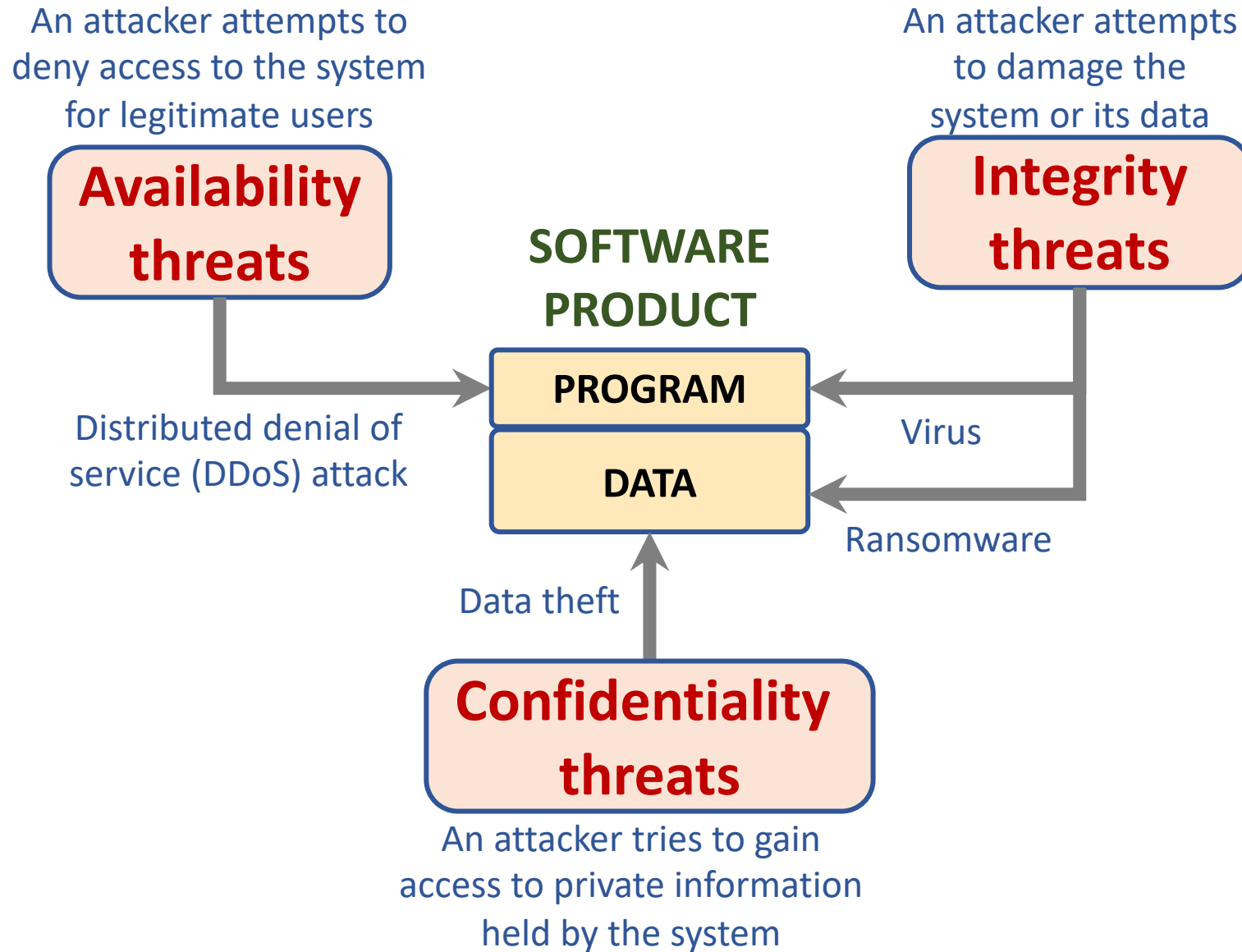
Cloud
provider



Microservices architecture – key design questions



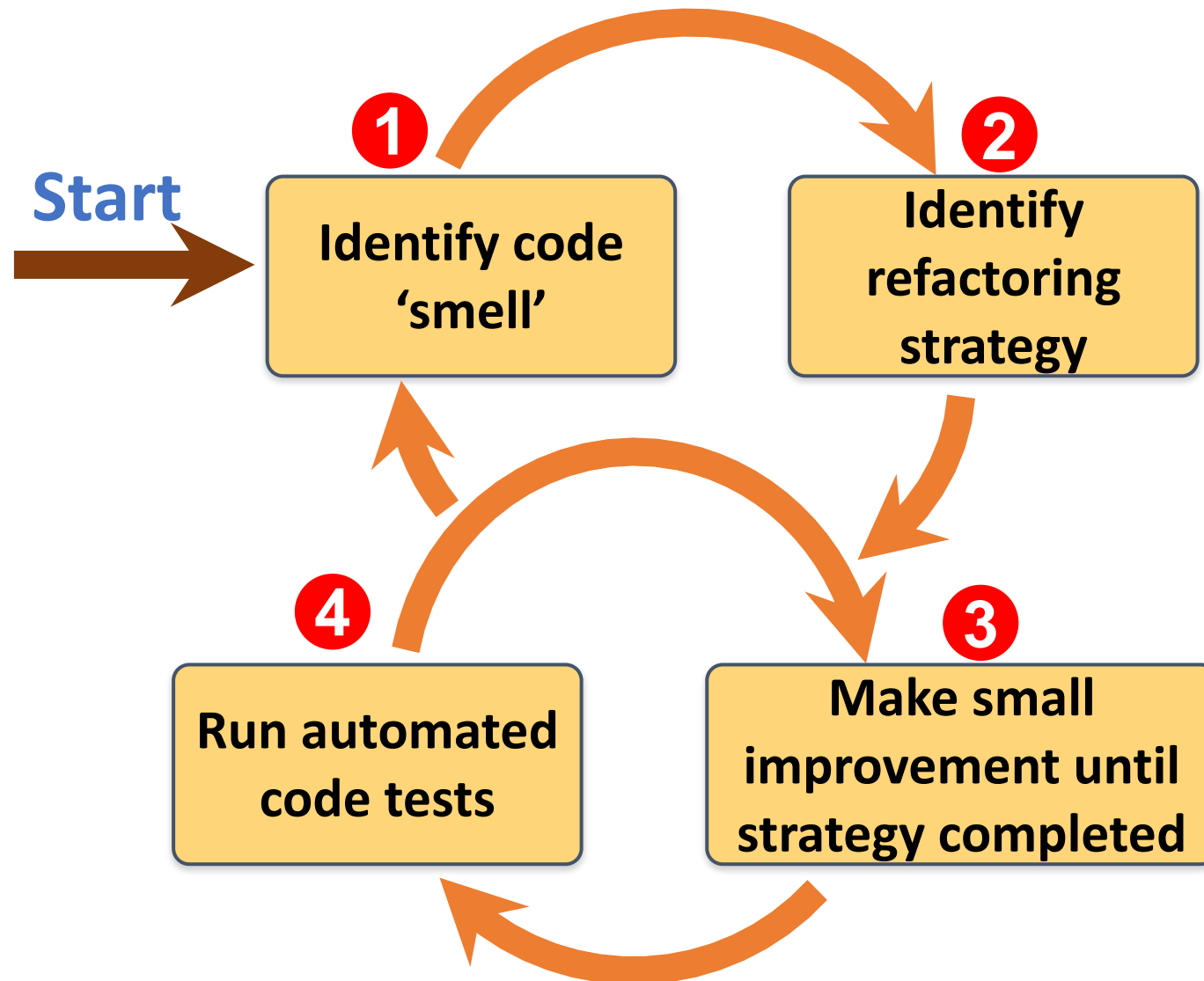
Types of security threat



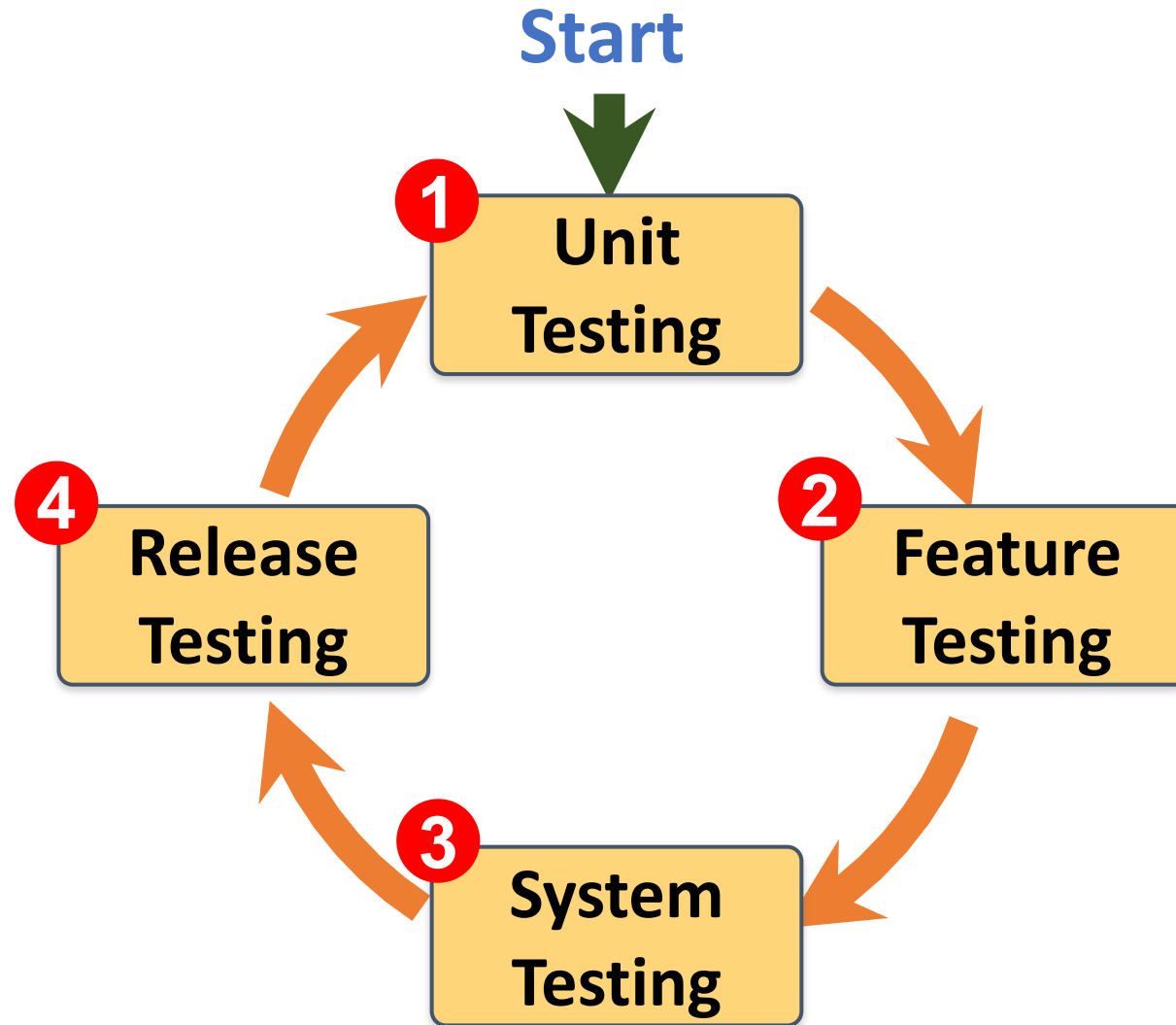
Software product quality attributes



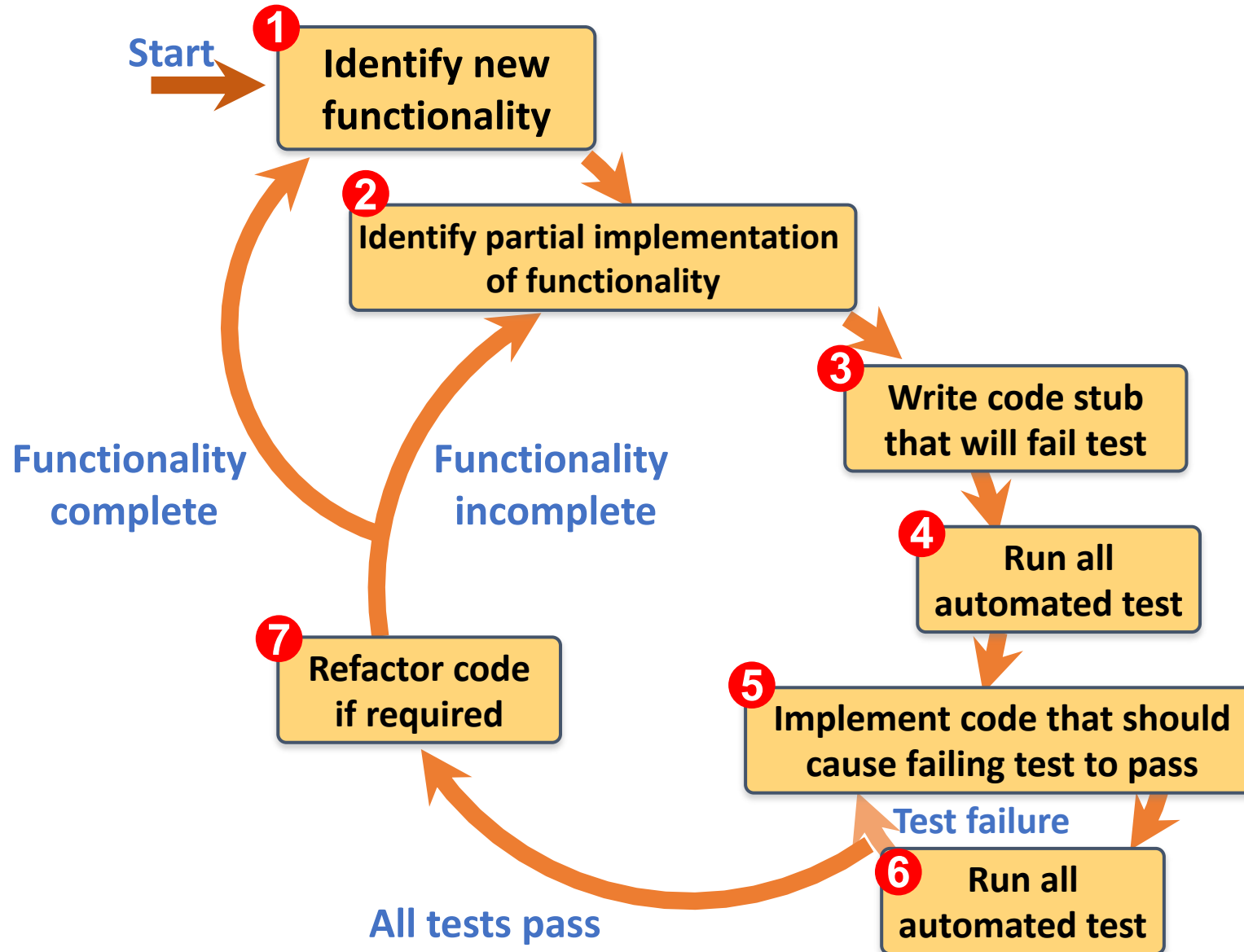
A refactoring process



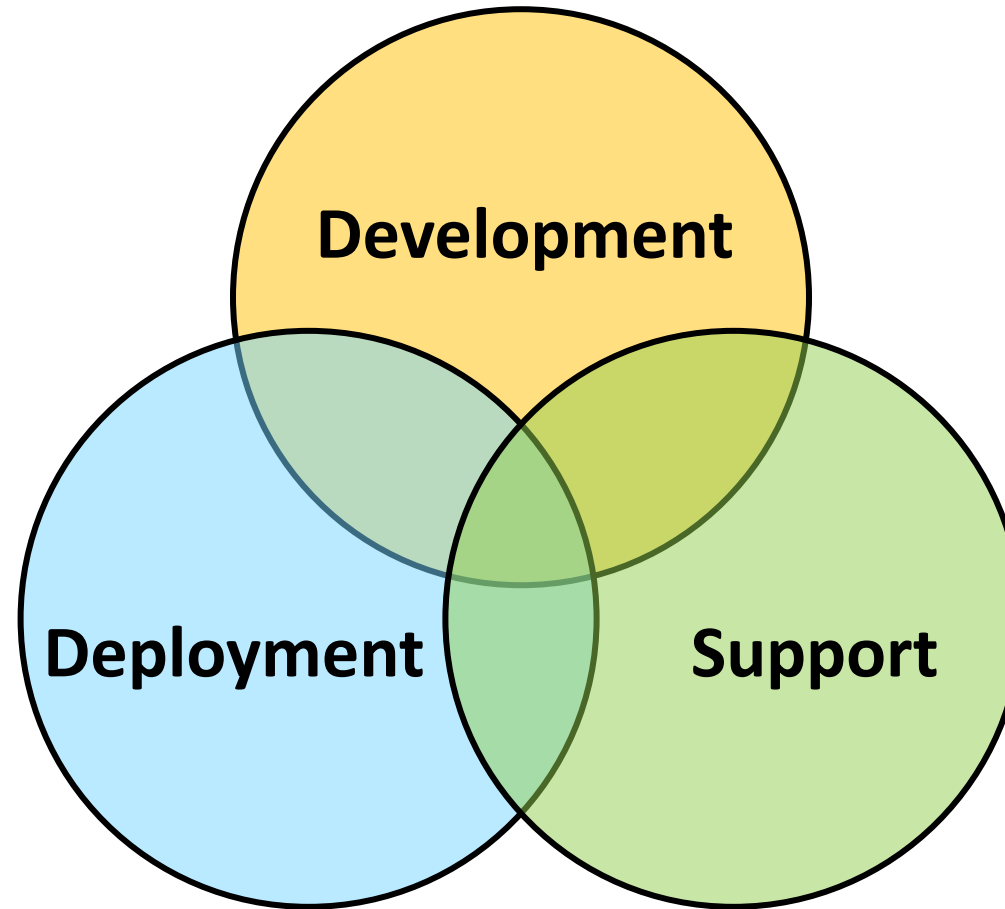
Functional testing



Test-driven development (TDD)

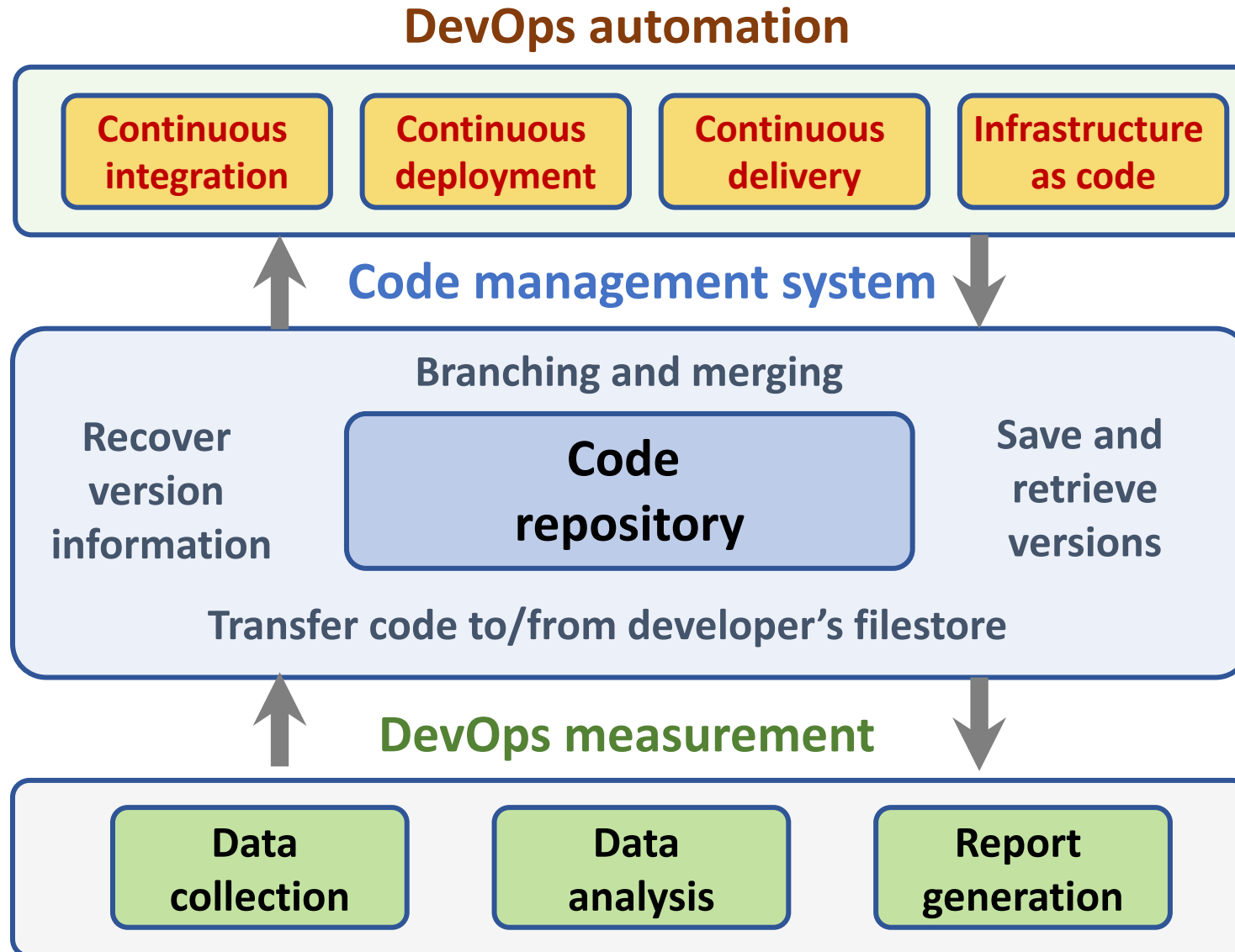


DevOps



Multi-skilled DevOps team

Code management and DevOps



Cloud Computing and Cloud Software Architecture

Outline

- **Cloud Computing and Cloud Software Architecture**
- **AWS Certified Cloud Practitioner (CLF-C01)**
- **AWS Certified Solutions Architect – Associate (SAA-C02)**
- **Web Application with AWS Core Services**
- **AWS Serverless Architecture**
- **Build a Serverless Web Application with Amazon S3, AWS Lambda, Amazon API Gateway, Amazon DynamoDB, and Amazon Cognito**

AWS Certifications





AWS Products and Services



Analytics



Application Integration



AR & VR



AWS Cost Management



Blockchain



Business Applications



Compute



Customer Engagement



Database



Developer Tools



End User Computing



Game Tech



Internet of Things



Machine Learning



Management & Governance



Media Services



Migration & Transfer



Mobile



Networking & Content
Delivery



Quantum Technologies



Robotics



Satellite



Security, Identity &
Compliance



Storage



AWS Compute



Compute

Amazon EC2

Virtual servers in the cloud

Amazon EC2 Auto Scaling

Scale compute capacity to meet demand

Amazon Elastic Container Registry

Store and retrieve docker images

Amazon Elastic Container Service

Run and manage docker containers

Amazon Elastic Kubernetes Service

Run managed Kubernetes on AWS

Amazon Lightsail

Launch and manage virtual private servers

AWS Batch

Run batch jobs at any scale

AWS Elastic Beanstalk

Run and manage web apps

AWS Fargate

Run containers without managing servers or clusters

AWS Lambda

Run code without thinking about servers

AWS Outposts

Run AWS infrastructure on-premises

AWS Serverless Application Repository

Discover, deploy, and publish serverless applications

AWS Wavelength

Deliver ultra-low latency applications for 5G devices

VMware Cloud on AWS

Build a hybrid cloud without custom hardware



AWS Database



Database

Amazon Aurora

High Performance Managed Relational Database

Amazon DynamoDB

Managed NoSQL Database

Amazon DocumentDB (with MongoDB compatibility)

Fully managed document database

Amazon ElastiCache

In-memory Caching System

Amazon Managed Apache Cassandra Service

Managed Cassandra-compatible database

Amazon Neptune

Fully Managed Graph Database Service

Amazon Quantum Ledger Database (QLDB)

Fully managed ledger database

Amazon RDS

Managed Relational Database Service for MySQL, PostgreSQL, Oracle, SQL Server, and MariaDB

Amazon RDS on VMware

Automate on-premises database management

Amazon Redshift

Fast, Simple, Cost-effective Data Warehousing

Amazon Timestream

Fully managed time series database

AWS Database Migration Service

Migrate Databases with Minimal Downtime



AWS Storage



Storage

Amazon Simple Storage Service (S3)

Scalable Storage in the Cloud

Amazon FSx for Lustre

High-performance file system integrated with S3

AWS Backup

Centralized backup across AWS services

CloudEndure Disaster Recovery

Highly automated disaster recovery

Amazon Elastic Block Store (EBS)

EC2 block storage volumes

Amazon FSx for Windows File Server

Fully managed Windows native file system

AWS Snow Family

Physical devices to migrate data into and out of AWS

Amazon Elastic File System (EFS)

Fully managed file system for EC2

Amazon S3 Glacier

Low-cost Archive Storage in the Cloud

AWS Storage Gateway

Hybrid Storage Integration



AWS Networking & Content Delivery



Networking & Content
Delivery

Amazon VPC

Isolated Cloud Resources

Amazon API Gateway

Build, Deploy, and Manage APIs

Amazon CloudFront

Global Content Delivery Network

Amazon Route 53

Scalable Domain Name System

AWS PrivateLink

Securely Access Services Hosted on AWS

AWS App Mesh

Monitor and control microservices

AWS Cloud Map

Application resource registry for microservices

AWS Direct Connect

Dedicated Network Connection to AWS

AWS Global Accelerator

Improve application availability and performance

AWS Transit Gateway

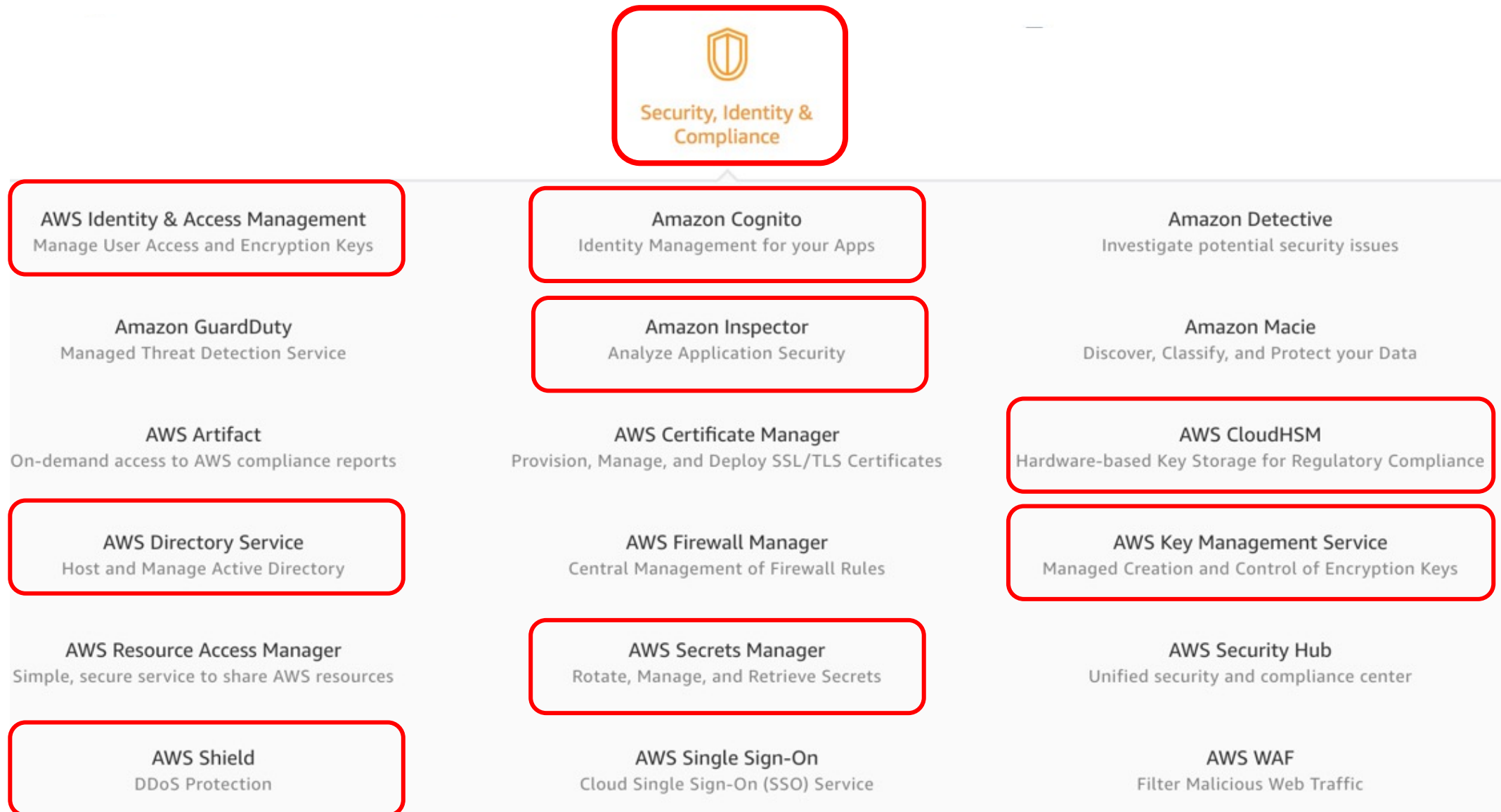
Easily scale VPC and account connections

Elastic Load Balancing

Distribute incoming traffic across multiple targets



AWS Security, Identity & Compliance





AWS Cost Management



AWS Cost Management

AWS Cost Explorer

Analyze Your AWS Cost and Usage

AWS Budgets

Set Custom Cost and Usage Budgets

AWS Cost and Usage Report

Access Comprehensive Cost and Usage Information

Reserved Instance Reporting

Dive Deeper into Your Reserved Instances (RIs)

Savings Plans

Save up to 72% on compute usage with flexible pricing



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

Available AWS Certifications

3

Professional

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

SAP



2

Associate

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

SAA



1

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 Certification




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AWS Certification

Professional

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



Specialty

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



Associate

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



2

SAA

Architect

Operations

Developer

Foundational

Six months of fundamental AWS Cloud and industry knowledge

Cloud Practitioner



1

CLF



AWS Certification

**Format**

65 questions; either multiple choice or multiple response

**Type**

Foundational

**Delivery Method**

Testing center or online proctored exam

**Time**

90 minutes to complete the exam

**Cost**

100 USD (Practice Exam: 20 USD)

**Language**

Available in English, Indonesian (Bahasa), Japanese, Korean, and Simplified Chinese

Foundational

Six months of fundamental AWS
Cloud and industry knowledge

Cloud
Practitioner





AWS Certification



Format

65 questions; either multiple choice or multiple response



Type

Associate



Delivery Method

Testing center or online proctored exam



Time

130 minutes to complete the exam



Cost

150 USD (Practice exam: 20 USD)



Language

Available in English, Japanese, Korean, and Simplified Chinese

Associate

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



Architect



Operations



Developer



AWS Certification

Professional

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



Format

75 questions; either multiple choice or multiple response



Type

Professional



Delivery Method

Testing center or online proctored exam



Time

180 minutes to complete the exam



Cost

300 USD (Practice Exam: 40 USD)



Language

Available in English, Japanese, Korean, and Simplified Chinese



AWS Certification



Format

65 questions; either multiple choice or multiple response



Type

Associate



Delivery Method

Testing center or online proctored exam



Time

130 minutes to complete the exam



Cost

150 USD (Practice exam: 20 USD)



Language

Available in English, Japanese, Korean, and Simplified Chinese

Associate

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



Architect



Operations



Developer



AWS Certification



Format

65 questions; either multiple choice or multiple response



Type

Associate



Delivery Method

Testing center or online proctored exam



Time

130 mins to complete the exam



Cost

150 USD (Practice exam: 20 USD)



Language

Available in English, Japanese, Korean, and Simplified Chinese

Associate

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



Architect



Operations



Developer



AWS Certification

Professional

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



Format

75 questions; either multiple choice or multiple response



Type

Professional



Delivery Method

Testing center or online proctored exam



Time

180 minutes to complete the exam



Cost

300 USD (Practice exam: 40 USD)



Language

Available in English, Japanese, Korean, and Simplified Chinese



AWS Certification

Specialty

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



Format

65 questions; either multiple choice or multiple response



Type

Specialty



Delivery Method

Testing center or online proctored exam



Time

180 minutes to complete the exam



Cost

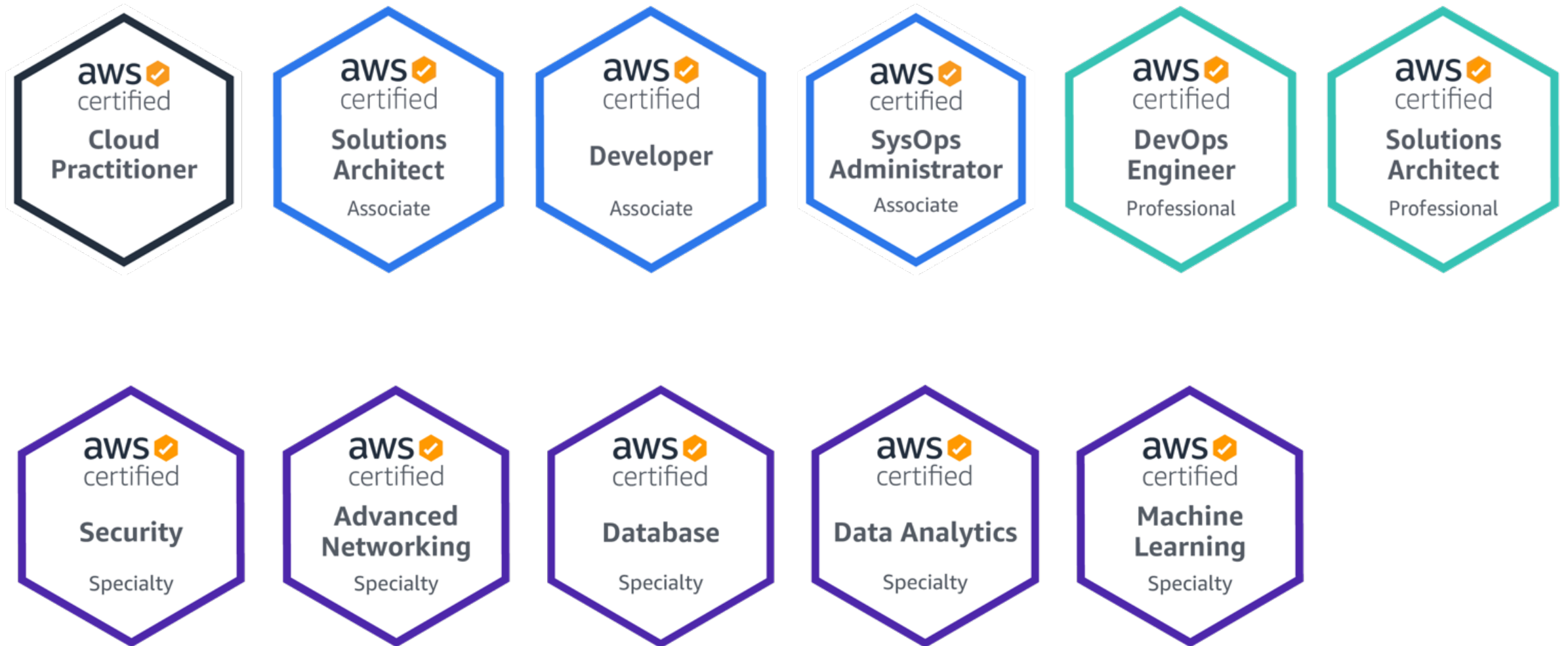
300 USD (Practice exam: 40 USD)



Language

Available in English, Japanese, Korean, and Simplified Chinese

AWS Certifications Roadmap



AWS Certifications Roadmap

Cloud Architect



AWS Certifications Roadmap

Cloud Developer



AWS Certifications Roadmap

DevOps



AWS Certifications Roadmap

Data Analytics / Machine Learning



AWS Certifications Roadmap

Security



AWS Certified Cloud Practitioner (CLF-C01)





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 (SAA-C02)





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)**

- <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/>

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%

AWS Certified Cloud Practitioner (CLF-C01)





AWS Certified Cloud Practitioner (CLF-C01)

- **Domain 1: Cloud Concepts**
 - **1.1 Define the AWS Cloud and its value proposition**
 - **1.2 Identify aspects of AWS Cloud economics**
 - **1.3 List the different cloud architecture design principles**



AWS Certified Cloud Practitioner (CLF-C01)

- **Domain 2: Security and Compliance**
 - 2.1 Define the AWS shared responsibility model
 - 2.2 Define AWS Cloud security and compliance concepts
 - 2.3 Identify AWS access management capabilities
 - 2.4 Identify resources for security support



AWS Certified Cloud Practitioner (CLF-C01)

- **Domain 3: Technology**
 - **3.1 Define methods of deploying and operating in the AWS Cloud**
 - **3.2 Define the AWS global infrastructure**
 - **3.3 Identify the core AWS services**
 - **3.4 Identify resources for technology support**



AWS Certified Cloud Practitioner (CLF-C01)

- **Domain 4: Billing and Pricing**
 - **4.1 Compare and contrast the various pricing models for AWS**
 - **4.2 Recognize the various account structures in relation to AWS billing and pricing**
 - **4.3 Identify resources available for billing support**

AWS Certified Solutions Architect – Associate (SAA-C02)





AWS Certified Solutions Architect – Associate (SAA-C02)

- **Domain 1: Design **Resilient** Architectures**
 - **1.1 Design a multi-tier architecture solution**
 - **1.2 Design highly available and/or fault-tolerant architectures**
 - **1.3 Design decoupling mechanisms using AWS services**
 - **1.4 Choose appropriate resilient storage**



AWS Certified Solutions Architect – Associate (SAA-C02)

- **Domain 2: Design **High-Performing** Architectures**
 - 2.1 Identify elastic and scalable compute solutions for a workload
 - 2.2 Select high-performing and scalable storage solutions for a workload
 - 2.3 Select high-performing networking solutions for a workload
 - 2.4 Choose high-performing database solutions for a workload



AWS Certified Solutions Architect – Associate (SAA-C02)

- **Domain 3: Design **Secure** Applications and Architectures**
 - **3.1 Design secure access to AWS resources**
 - **3.2 Design secure application tiers**
 - **3.3 Select appropriate data security options**



AWS Certified Solutions Architect – Associate (SAA-C02)

- **Domain 4: Design **Cost-Optimized** Architectures**
 - 4.1 Identify cost-effective storage solutions
 - 4.2 Identify cost-effective compute and database services
 - 4.3 Design cost-optimized network architectures



AWS Certifications

Exam Pricing

Exam Type	Price in USD
Foundational	\$100
Associate	\$150
Professional	\$300
Specialty	\$300



AWS Certified Security – Specialty

validates expertise in securing data and workloads in the AWS Cloud



AWS Certified Security - Specialty

- AWS Certified Security – Specialty is intended for individuals who perform a security role and have at least two years of hands-on experience securing AWS workloads.
 - Five years of IT security experience in designing and implementing security solutions and at least two years of hands-on experience in securing AWS workloads
 - Working knowledge of AWS security services and features of services to provide a secure production environment and an understanding of security operations and risks
 - Knowledge of the AWS shared responsibility model and its application; security controls for workloads on AWS; logging and monitoring strategies; cloud security threat models; patch management and security automation; ways to enhance AWS security services with third-party tools and services; and disaster recovery controls, including BCP and backups, encryption, access control, and data retention
 - Understanding of specialized data classifications and AWS data protection mechanisms, data-encryption methods and AWS mechanisms to implement them, and secure internet protocols and AWS mechanisms to implement them
 - Ability to make tradeoff decisions with regard to cost, security, and deployment complexity to meet a set of application requirements



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.





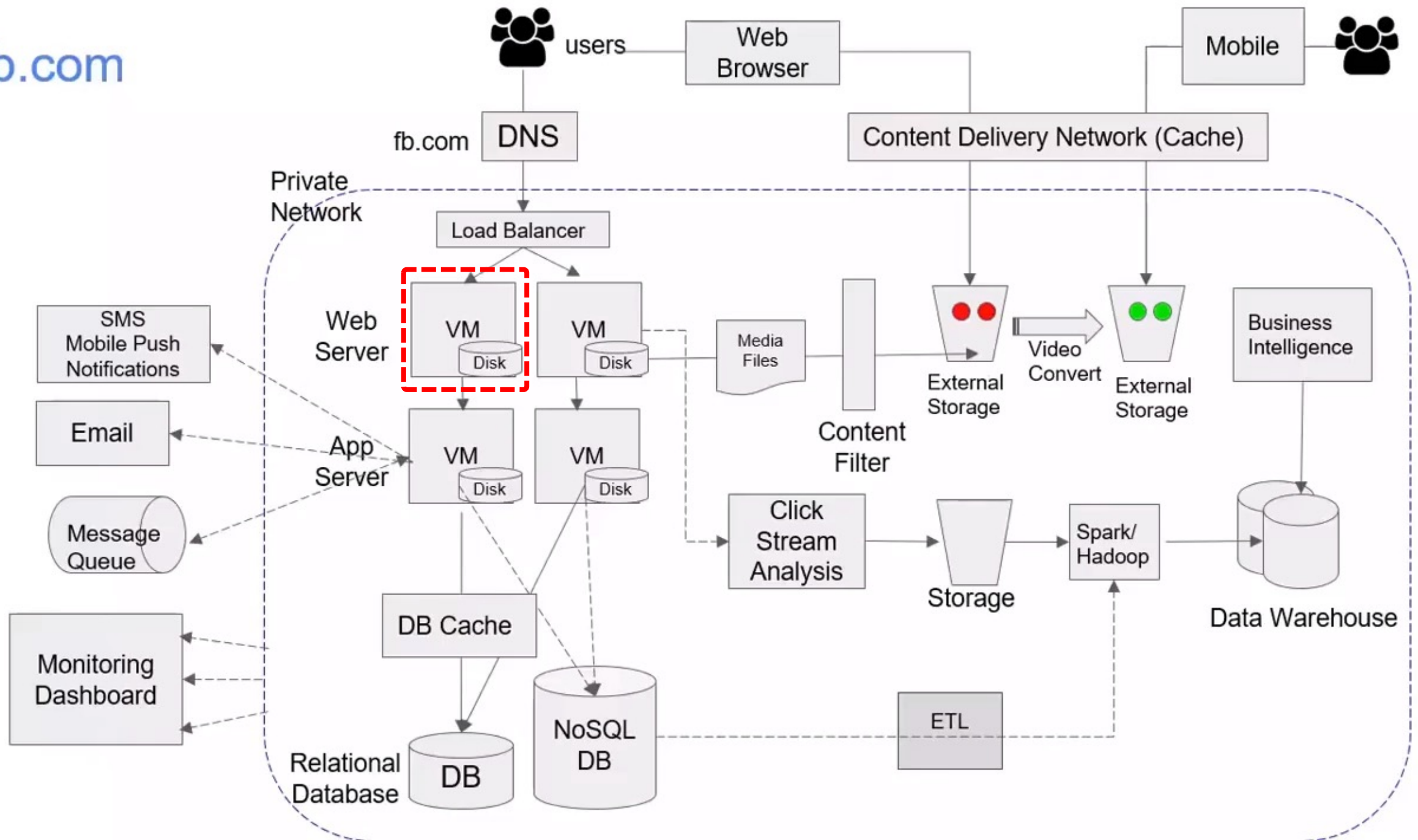
AWS Certified Solutions Architect – Associate

- **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.**

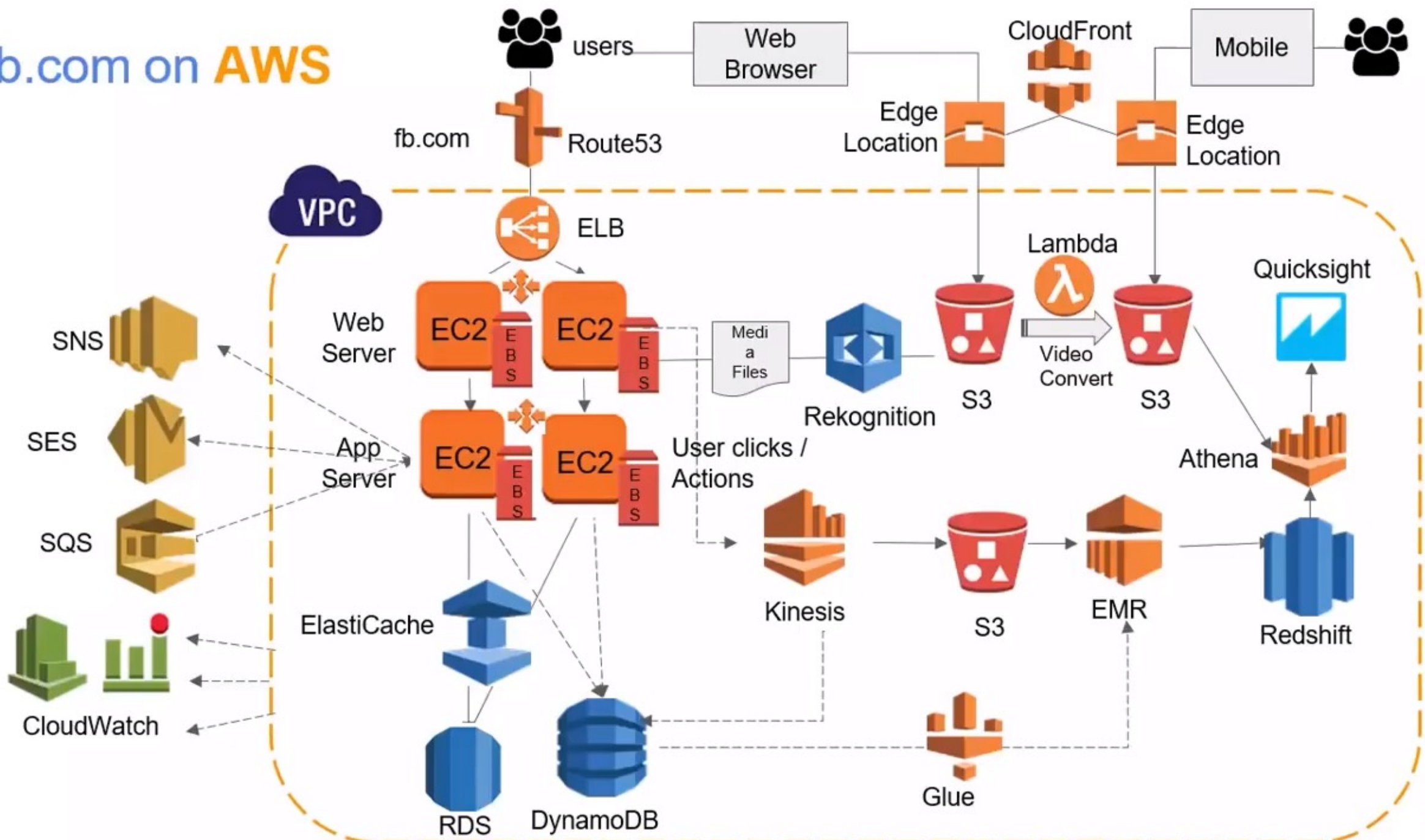




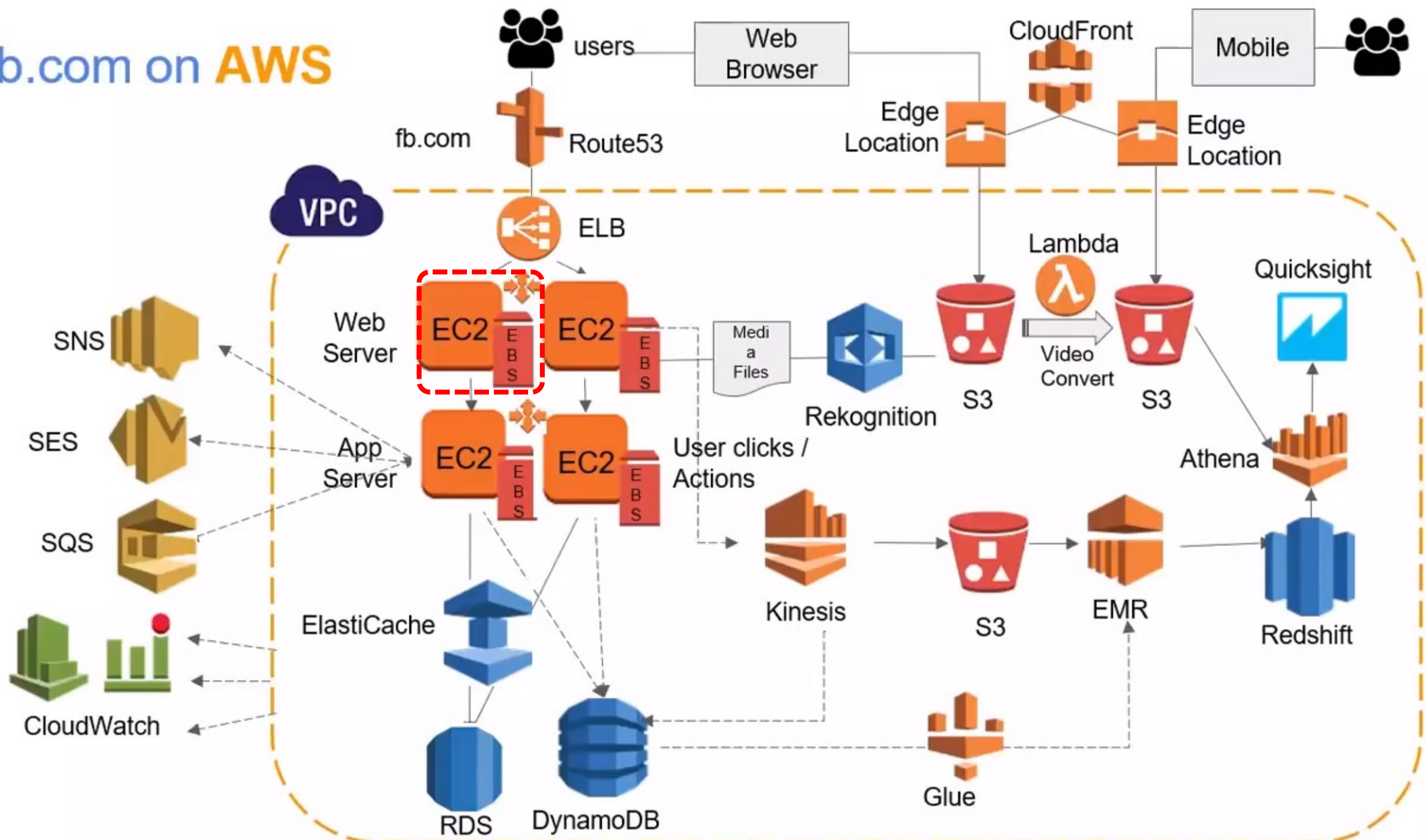
Web Application with AWS Core Services



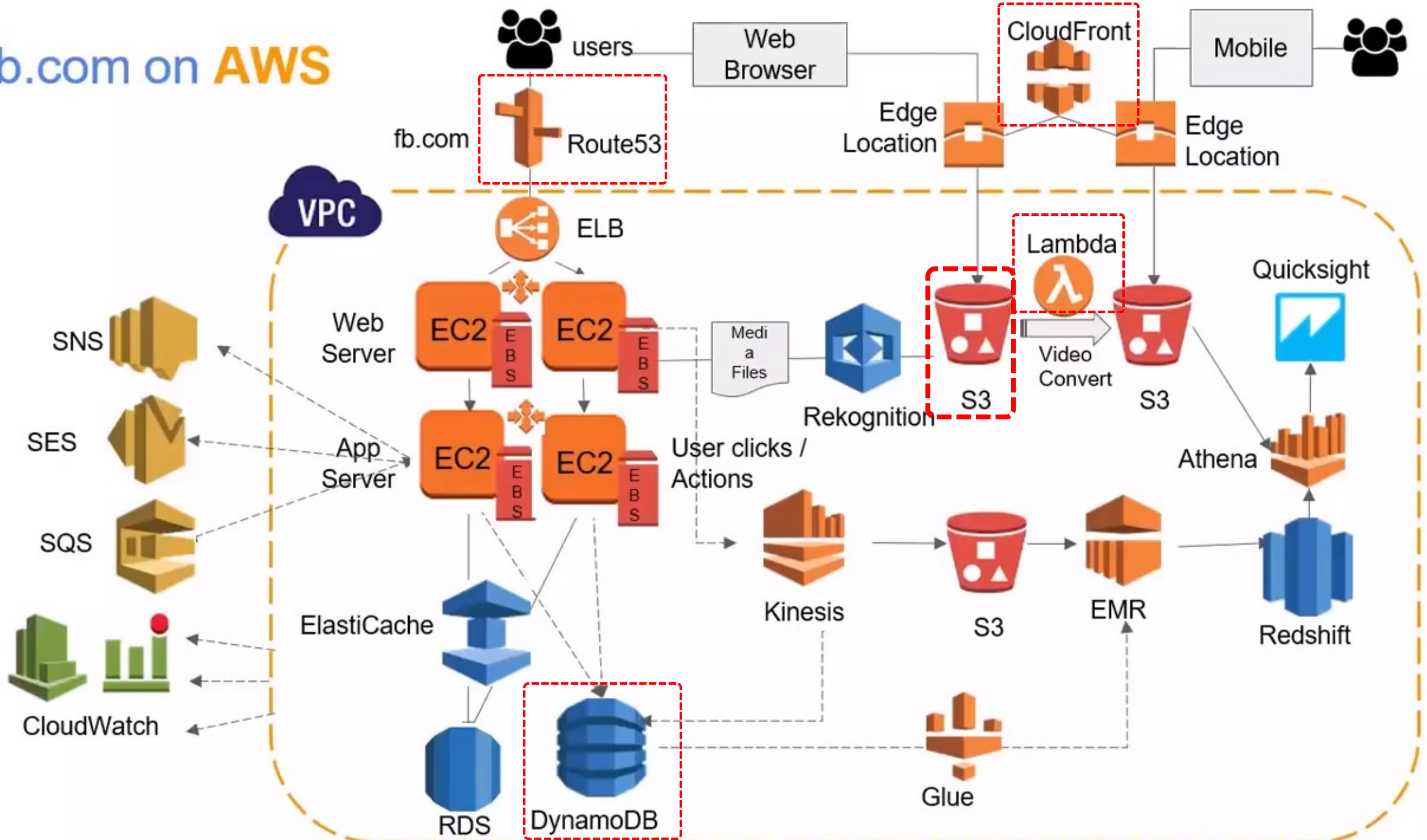
fb.com on AWS



fb.com on AWS

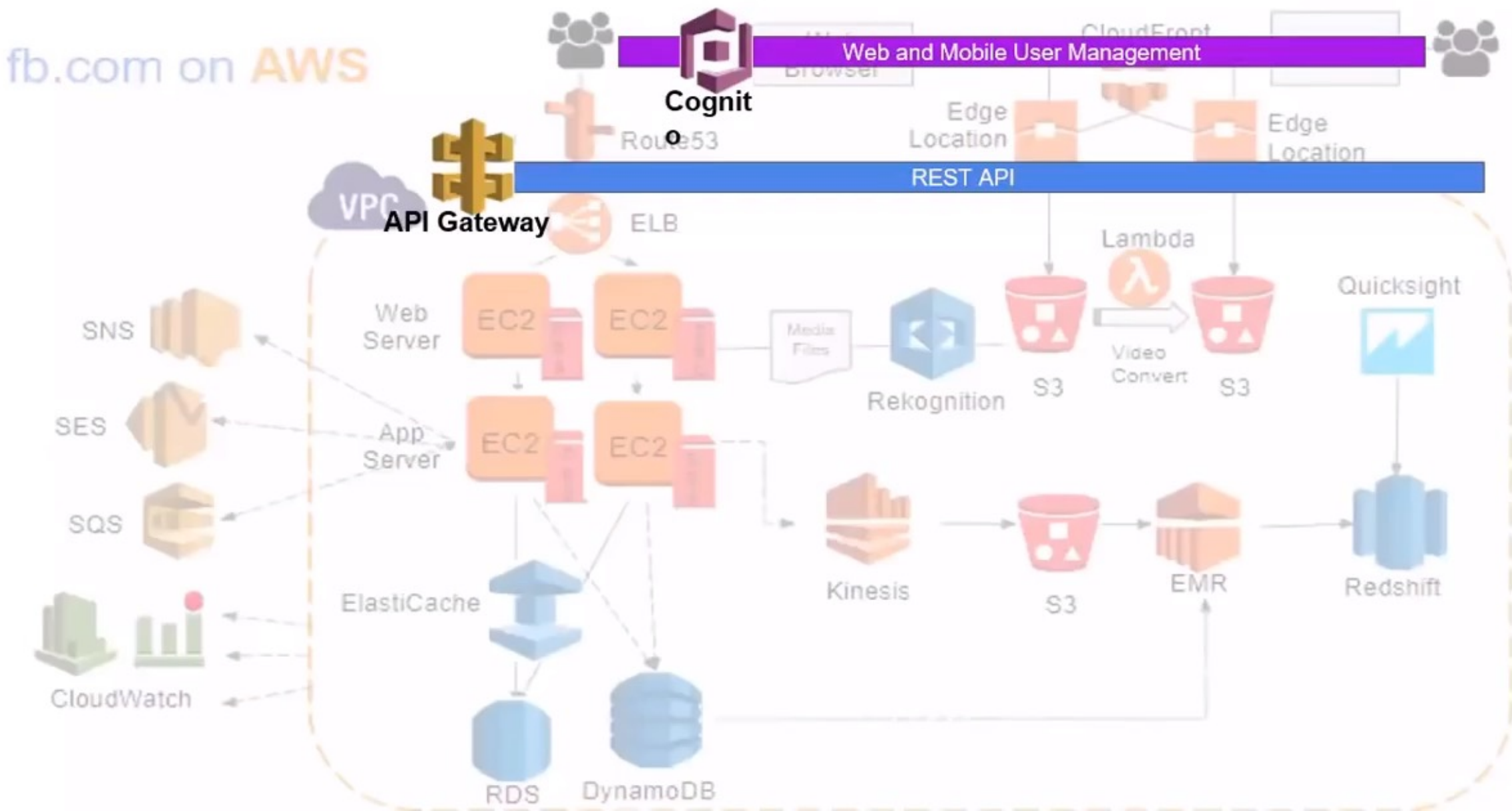


fb.com on AWS

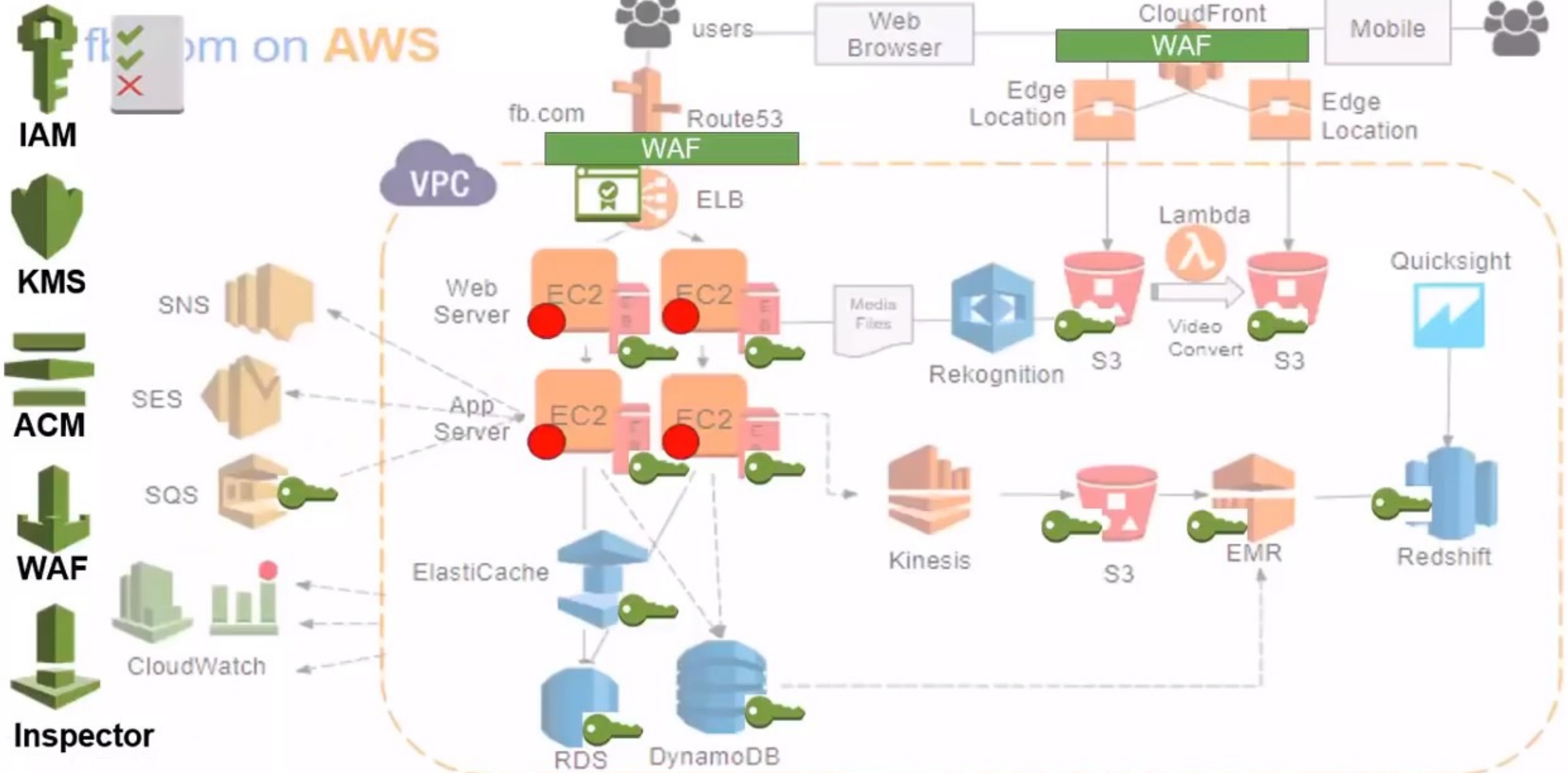


Source: AWS Training Center (2019), Introduction to AWS Services, <https://youtu.be/Z3SYDTMP3ME>

AWS Application Services

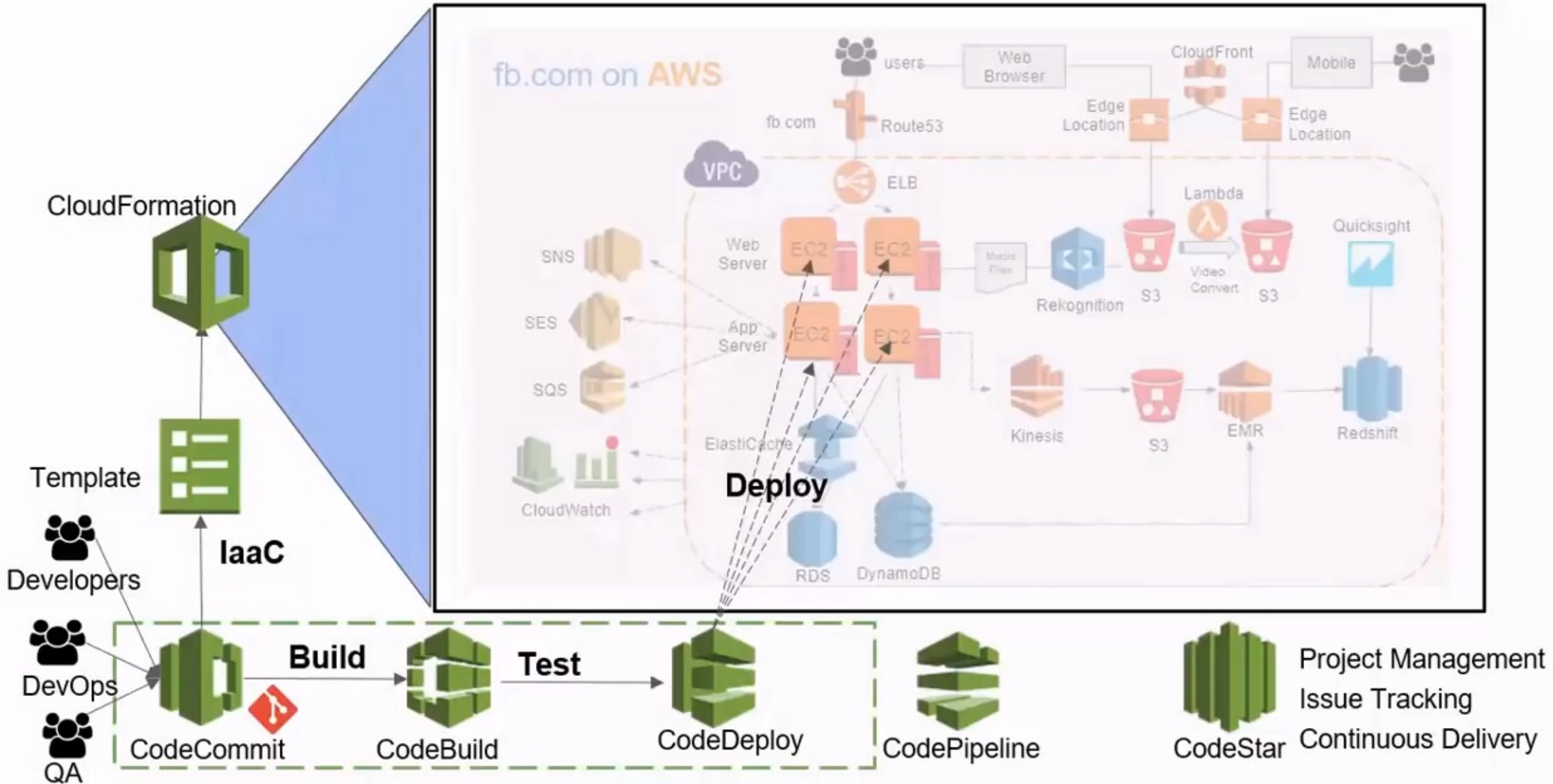


AWS Security Services



AWS Development and DevOps Services

AWS Region





AWS Serverless Architecture

aws AWS Serverless Airline Booking

The image displays four sequential screens of a mobile flight booking application, all featuring a purple header with a hamburger menu icon, the text 'Flight App', and a search icon.

- Screen 1: Where next?** This screen prompts the user to select a departure airport (LGW), arrival airport (MAD), and a date (Wed. 24 Apr 2019). A red button labeled 'SEARCH FLIGHTS >' is at the bottom.
- Screen 2: Select your flight** This screen shows three flight options from LGW to MAD on 16 JAN 2019. Each option includes the departure airport (London Gatwick), arrival airport (Madrid Barajas), time, duration, price, and flight number.
 - Option 1: 08:00, 2h15m, 1135, 400 EUR, Flight No #s812
 - Option 2: 10:30, 2h15m, 1345, 200 EUR, Flight No #s813
 - Option 3: 12:00, 2h15m, 1535, 1000 EUR, Flight No #s814
- Screen 3: Review your selection** This screen displays the selected flight details: DEPARTURE LGW (London Gatwick) to MAD (Madrid Barajas) on 16 JAN 2019, departing at 08:00, arriving at 11:15, with a duration of 2h15m, for a price of 400 EUR. The flight number is #s812. Below this is a 'Payment details' section with fields for Name, Country, Postcode, Card number (1234 1234 1234 1234), Expiry date (MM / YY), and CVC. A red button labeled 'AGREE AND PAY NOW >' is at the bottom.
- Screen 4: User Profile** This screen shows the user's name (Heitor F. Lessa), a purple profile picture, and a membership number (4.554.234). It also displays '50,241 Points' and '10% Next Tier Progress'. Below this is a 'Preferences' section with options for 'Dietary requirements' and 'Luggage'. A red button labeled 'SIGN OUT' is at the bottom.



AWS Serverless Airline Booking Stack

UI/UX



Quasar framework



Vue.js

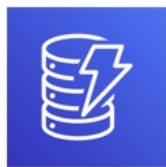


AWS Amplify



Stripe Elements

Data/Lang



Amazon DynamoDB



Python

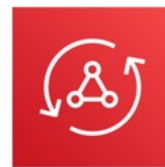


Typescript



JavaScript

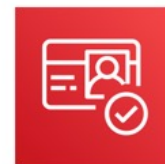
API/Auth



AWS AppSync



Amazon API Gateway



Amazon Cognito

Messaging



Amazon SNS

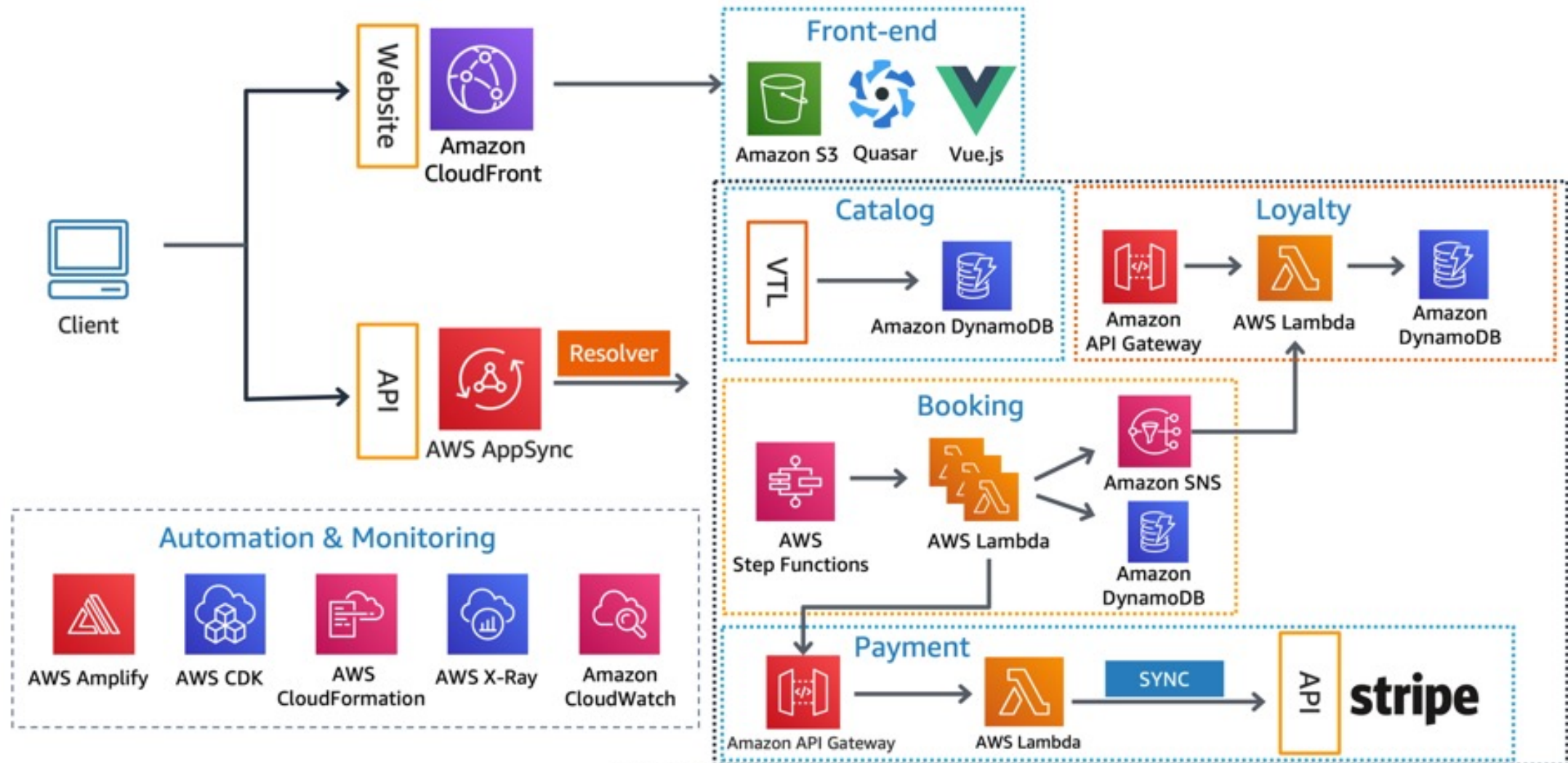


AWS Step Functions



AWS Serverless Airline Booking

High level infrastructure architecture

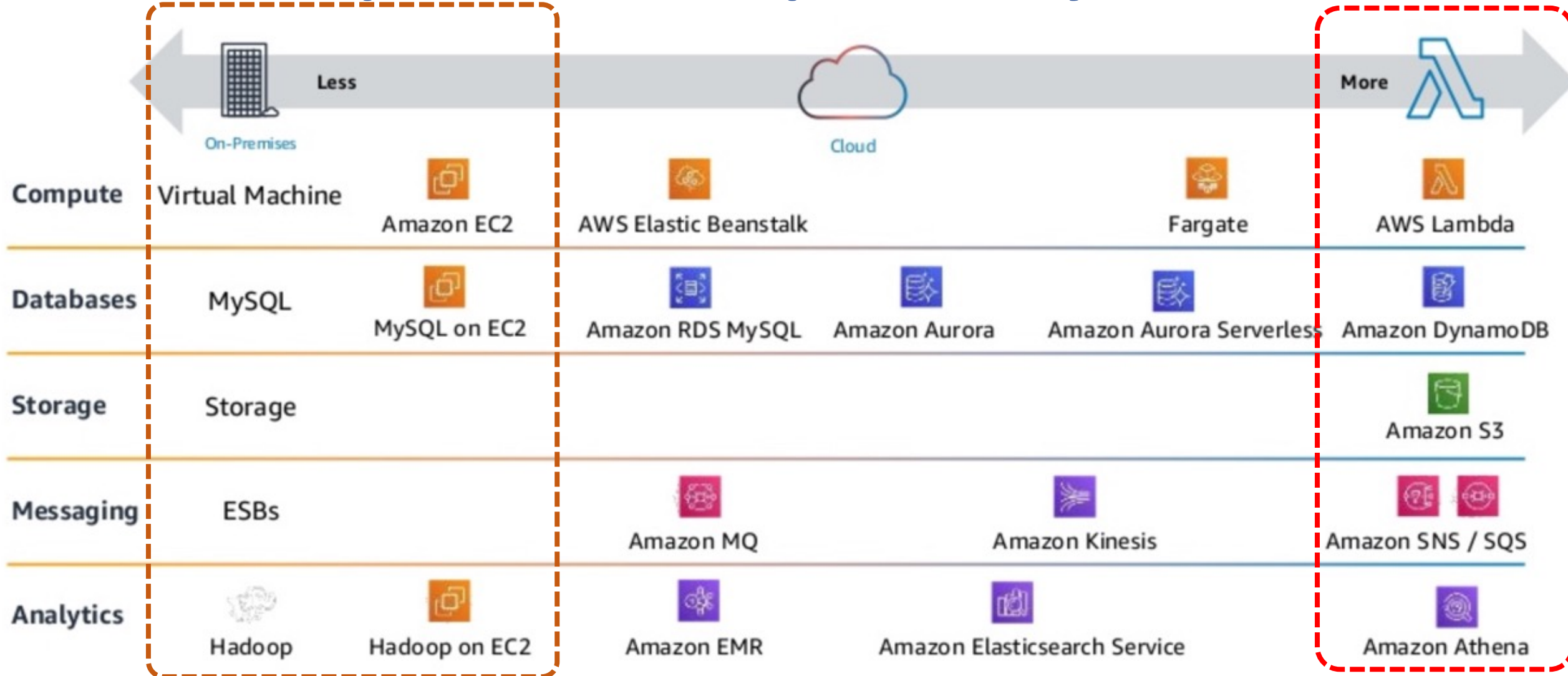


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AWS Serverless Architecture

AWS Operational Responsibility Models





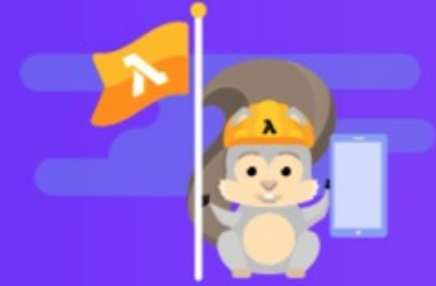
Build a Serverless Web Application

aws 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

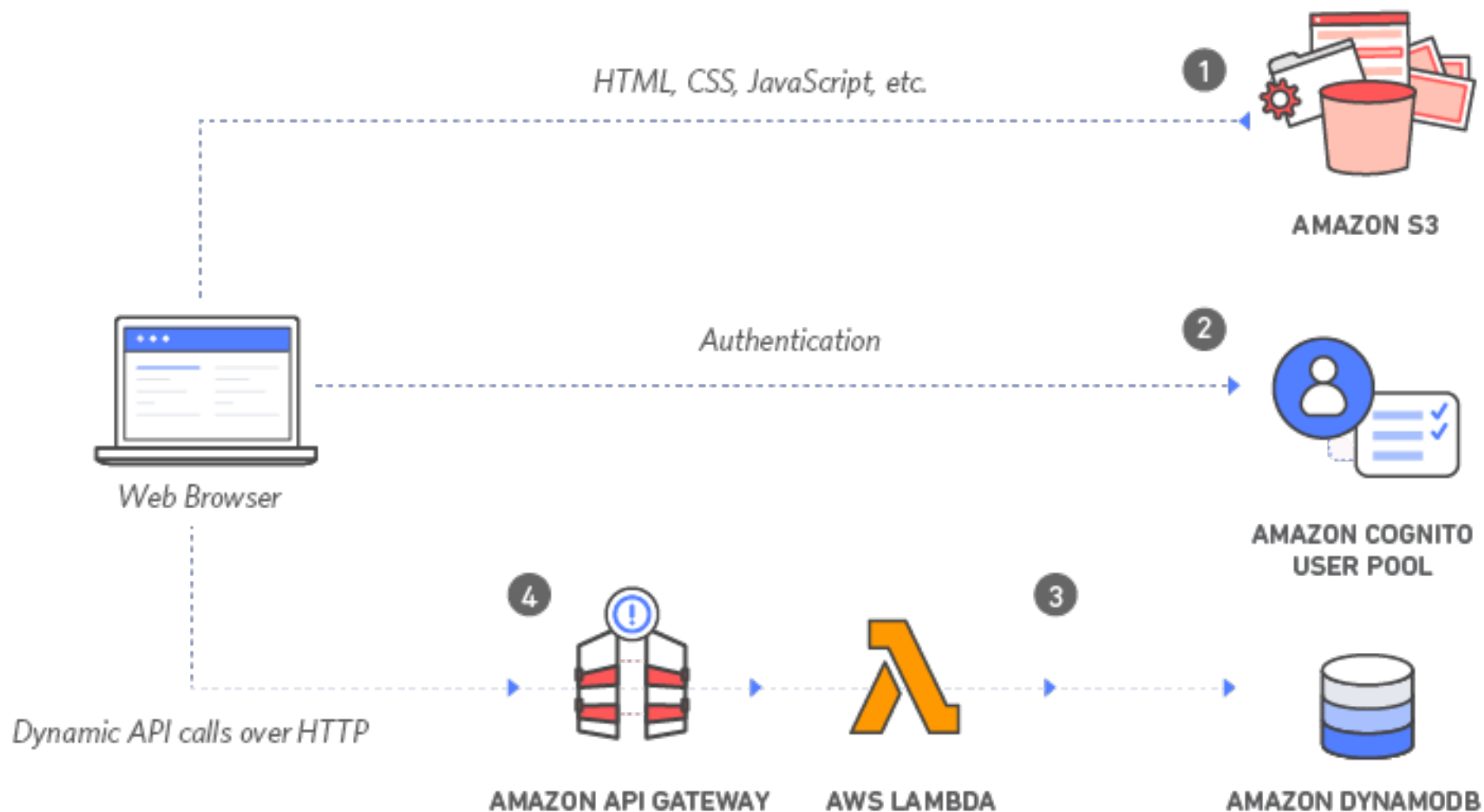
Time to complete: 2 hours

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

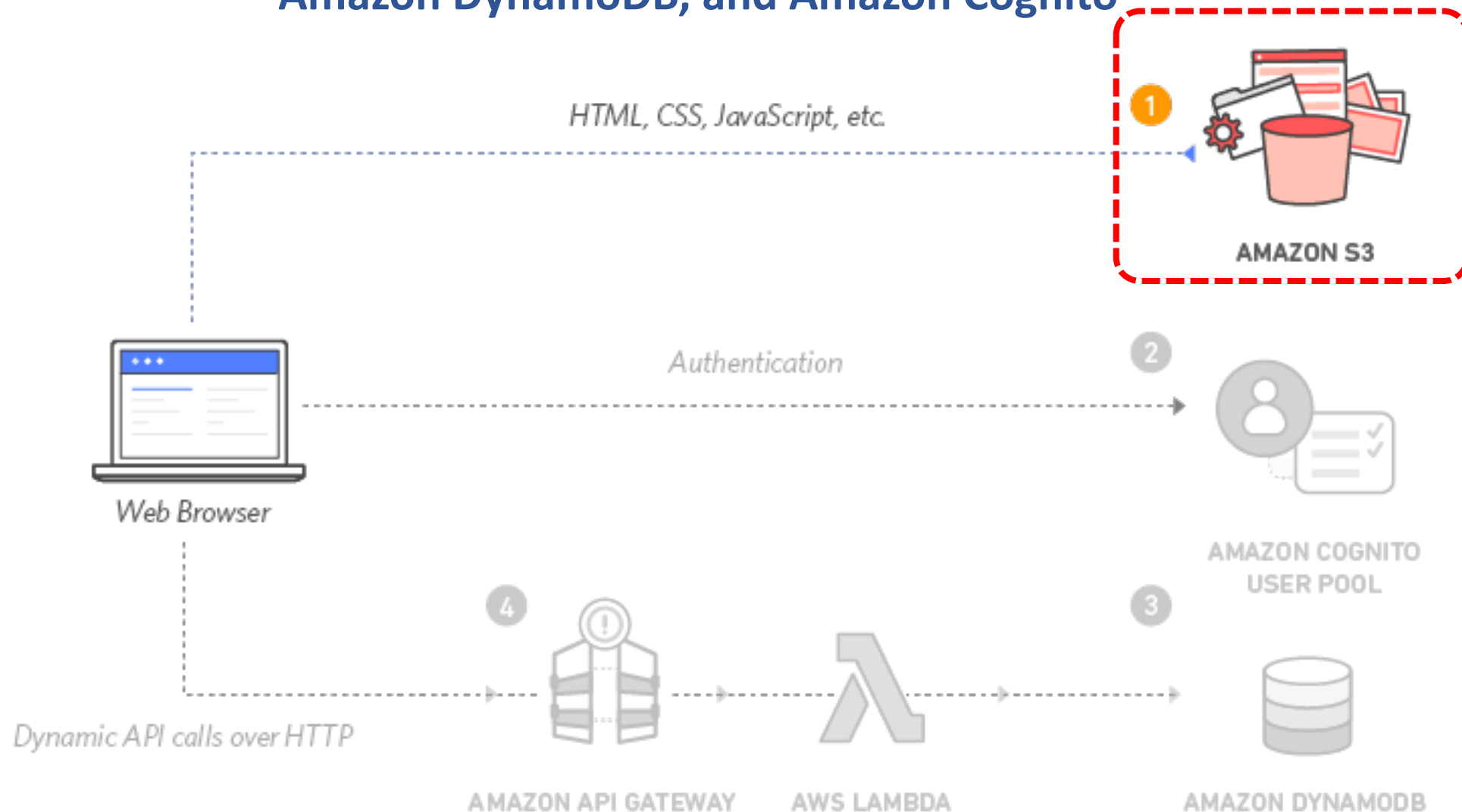




Build a Serverless Web Application

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.

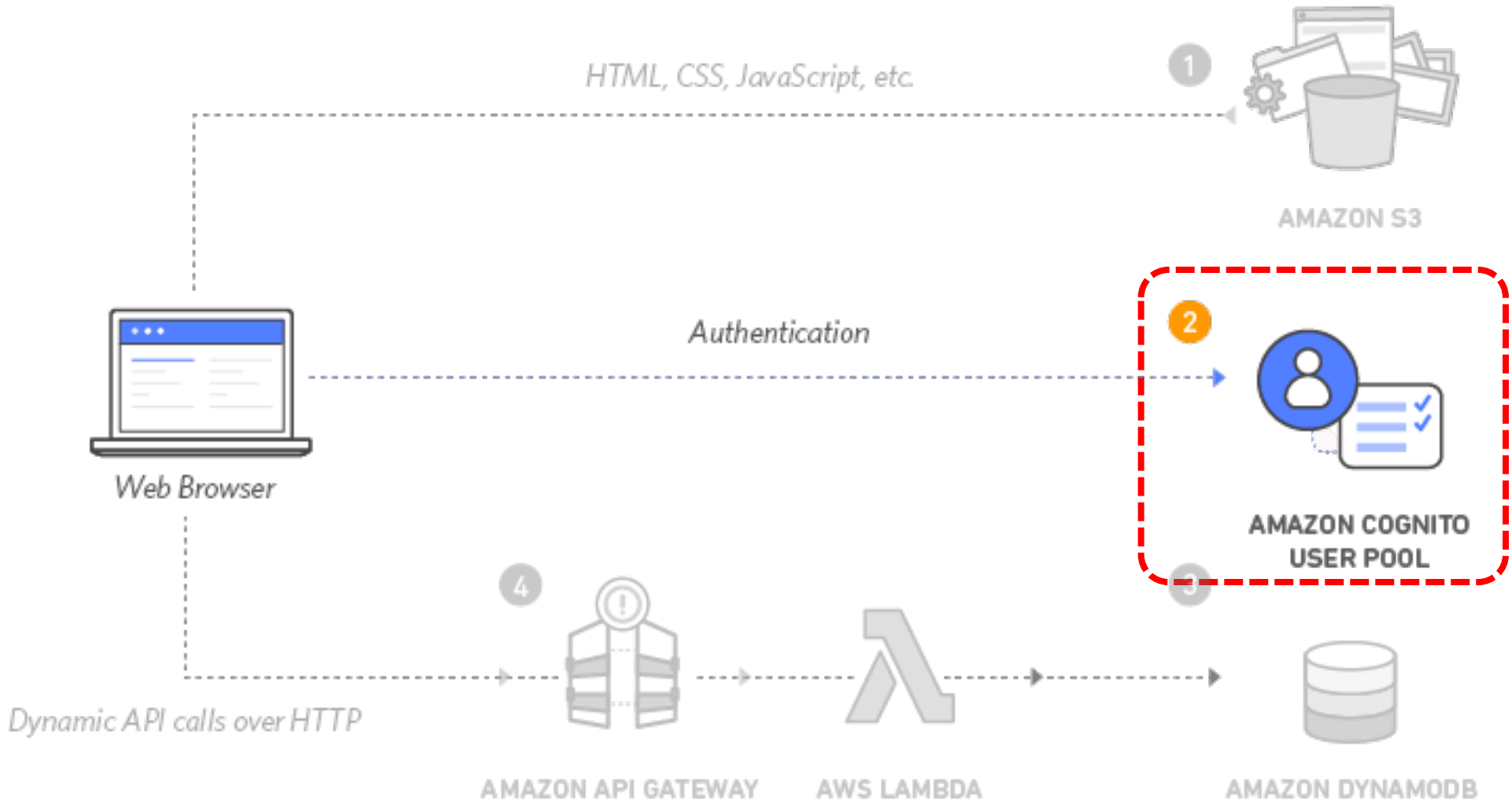




Build a Serverless Web Application

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

2





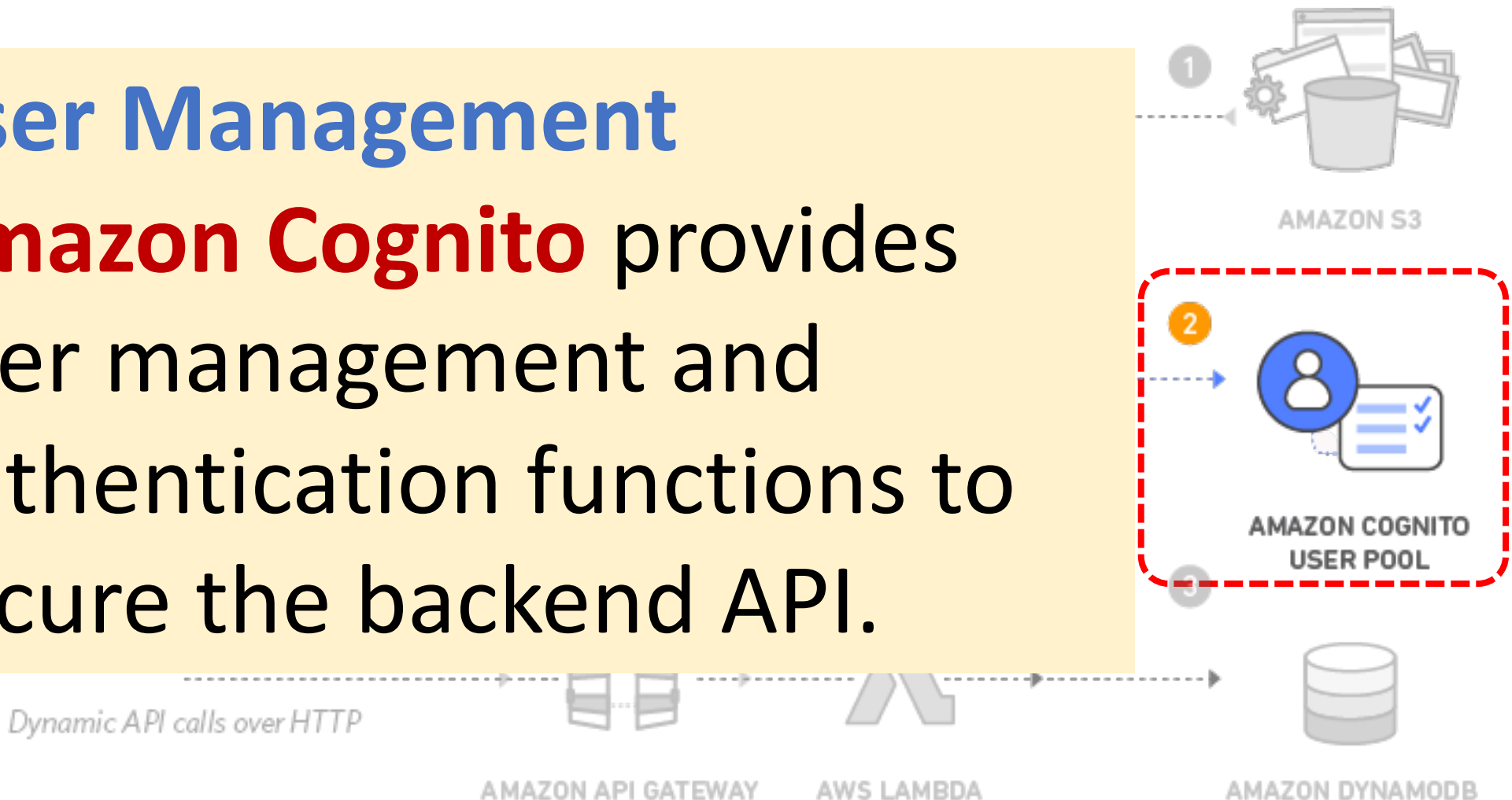
Build a Serverless Web Application

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.

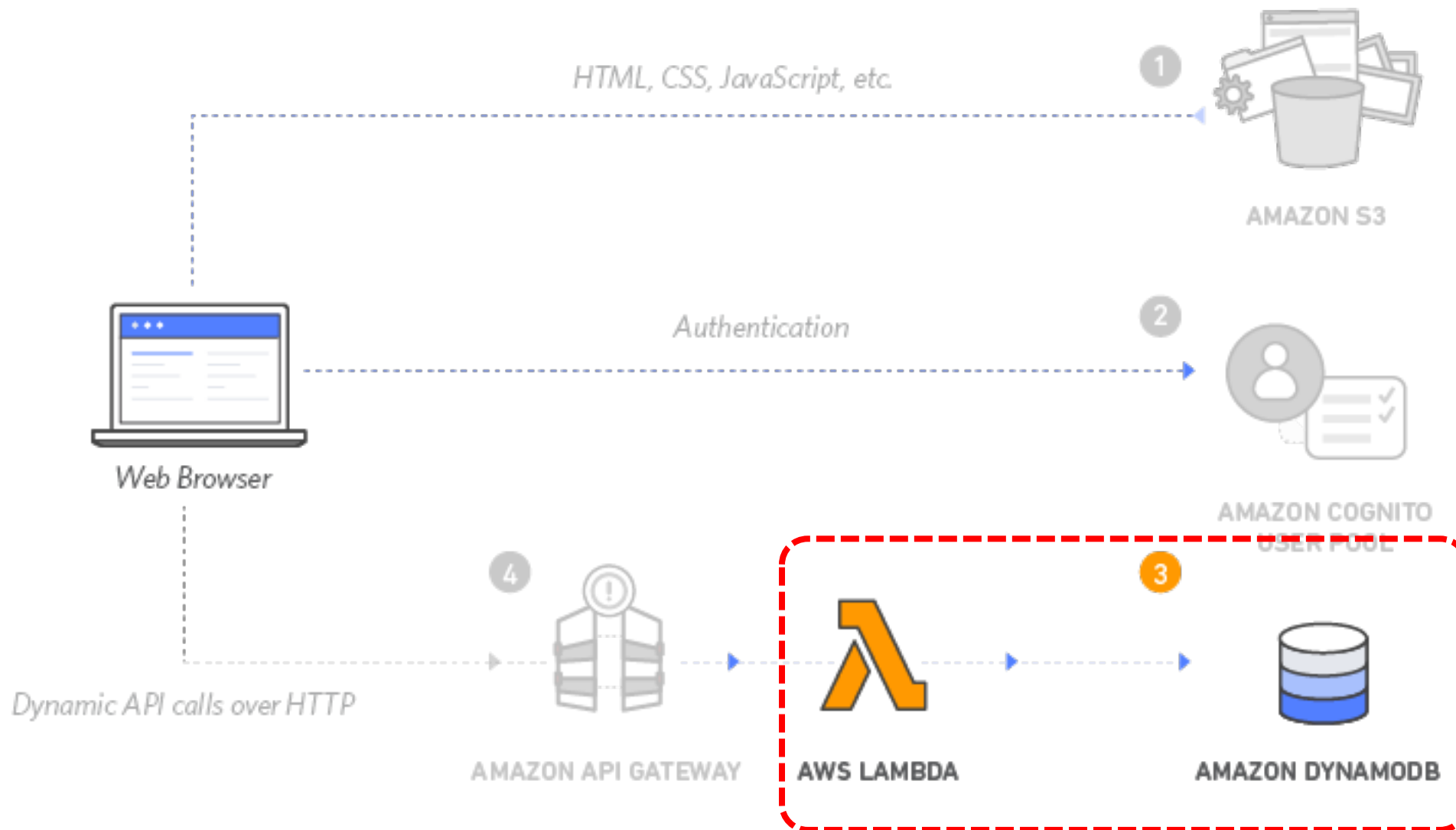




Build a Serverless Web Application

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

3





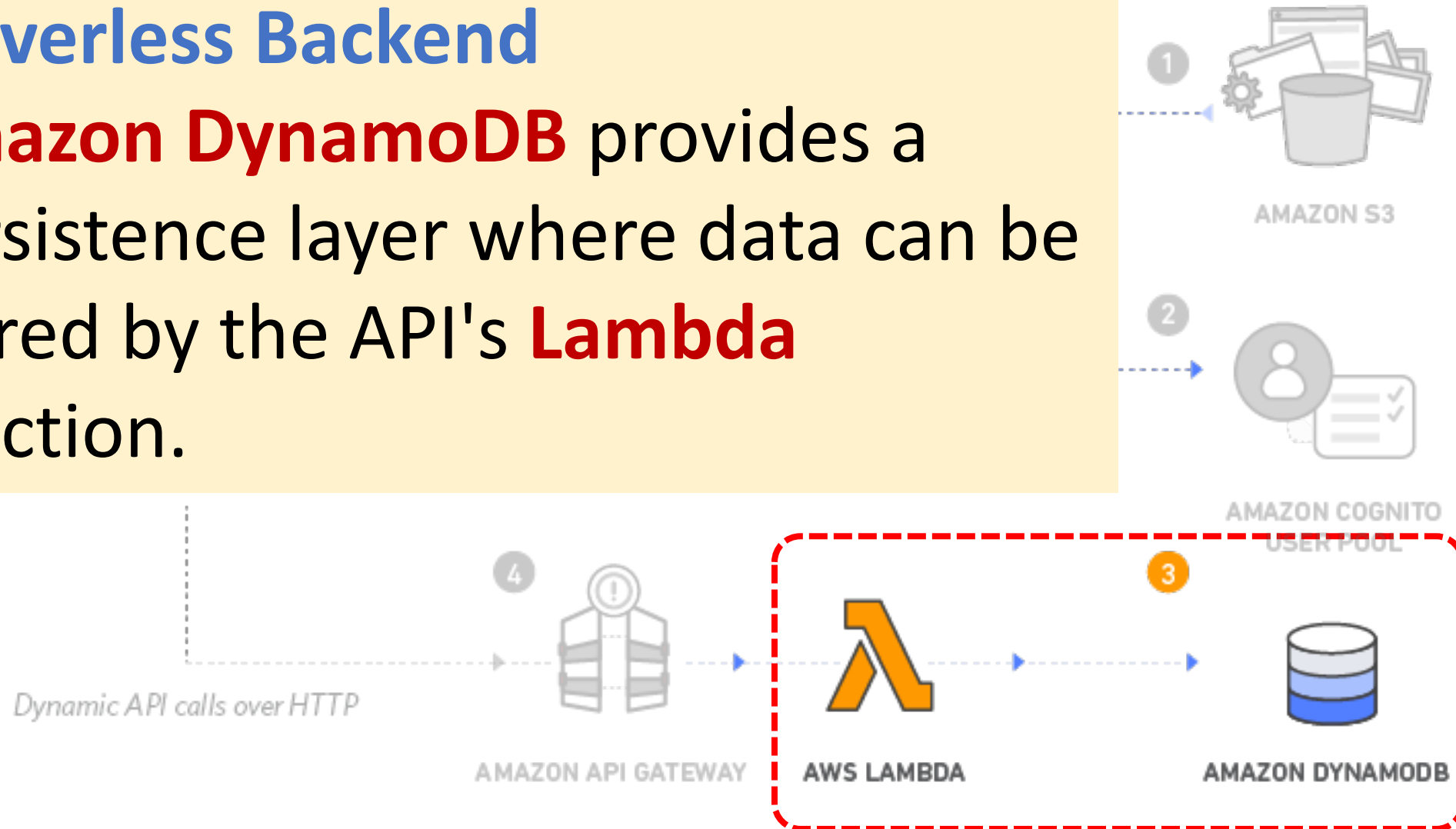
Build a Serverless Web Application

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.

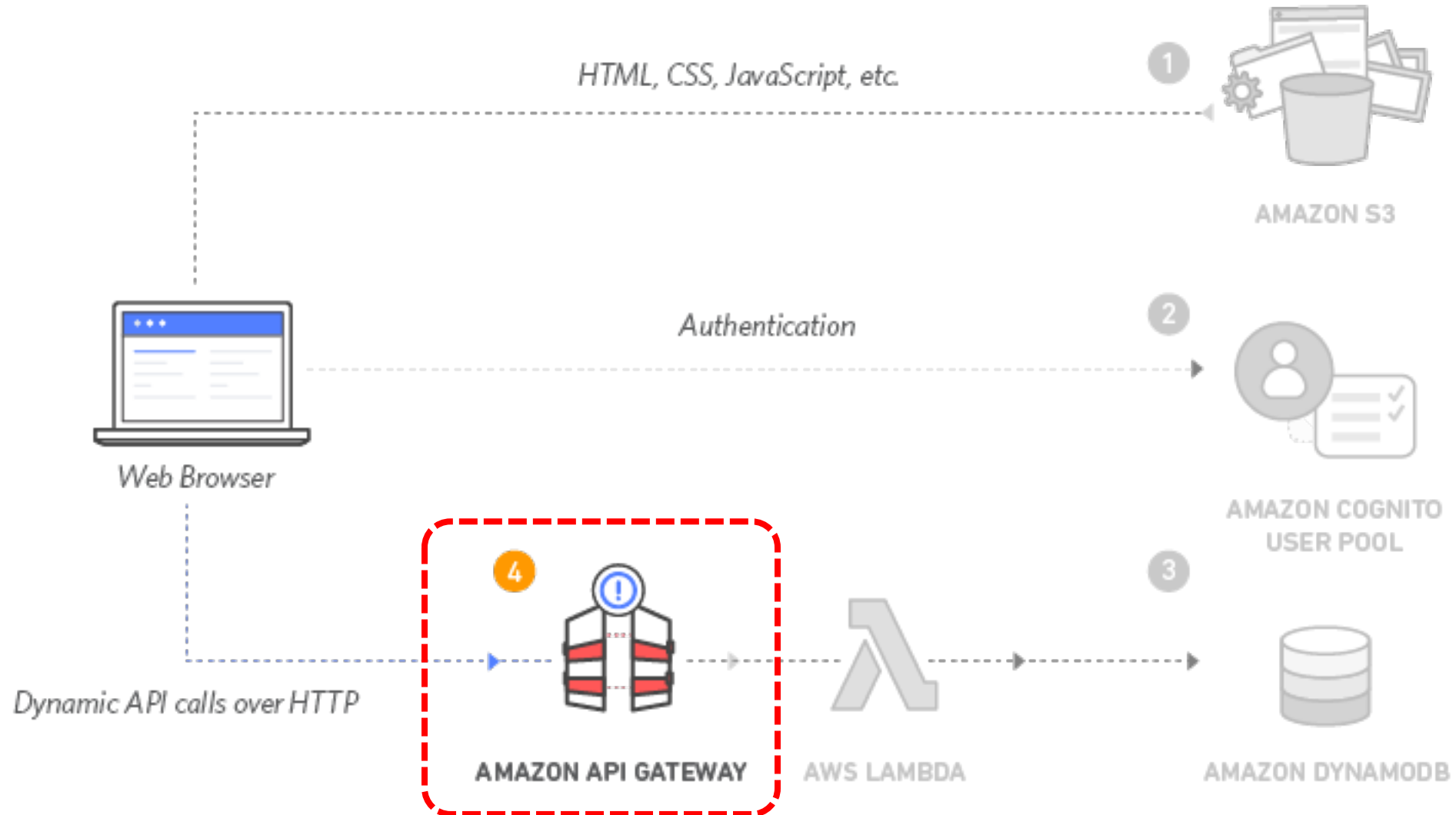




Build a Serverless Web Application

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

4





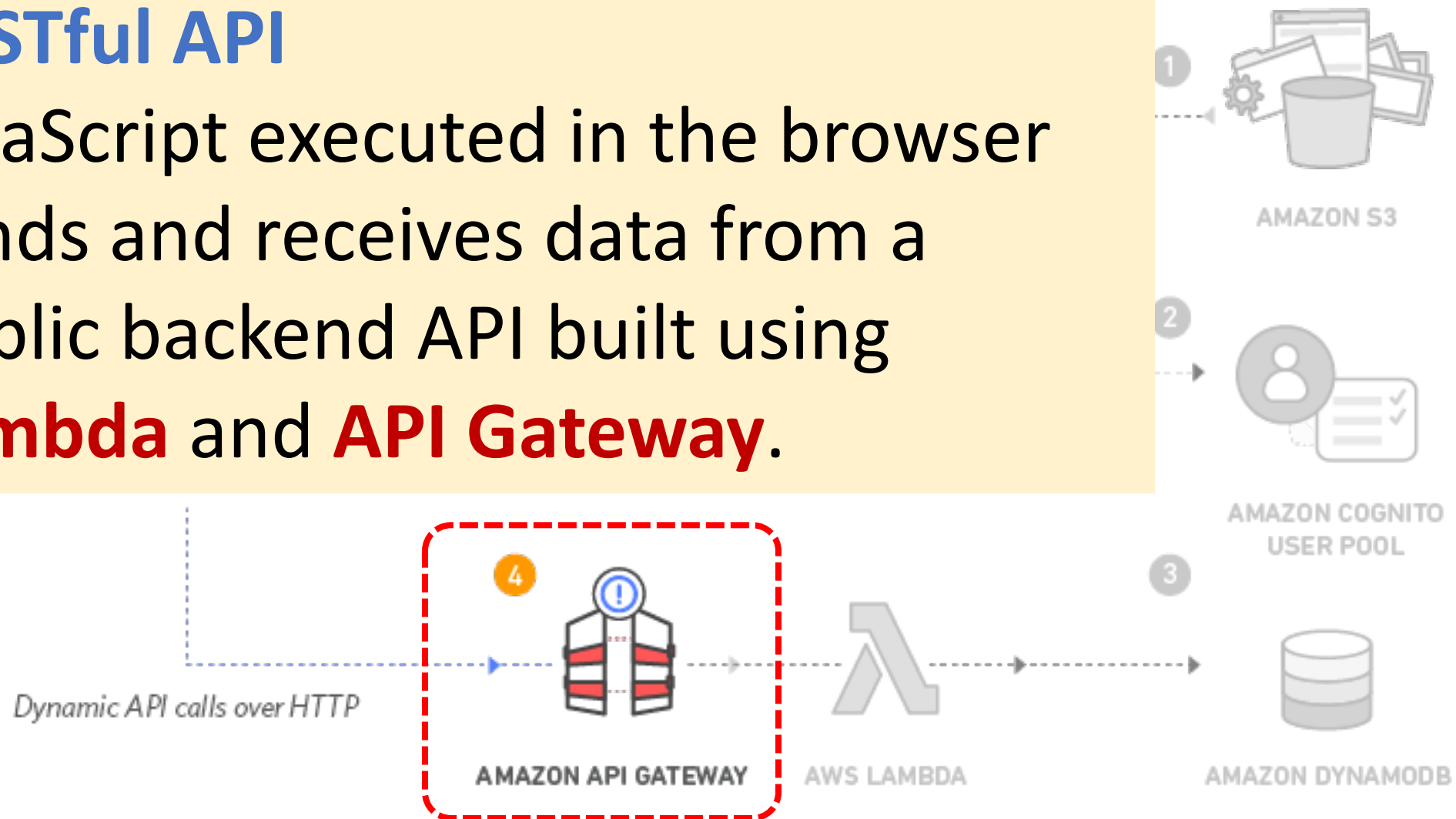
Build a Serverless Web Application

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

- **Cloud Computing and Cloud Software Architecture**
- **AWS Certified Cloud Practitioner (CLF-C01)**
- **AWS Certified Solutions Architect – Associate (SAA-C02)**
- **Web Application with AWS Core Services**
- **AWS Serverless Architecture**
- **Build a Serverless Web Application with Amazon S3, AWS Lambda, Amazon API Gateway, Amazon DynamoDB, and Amazon Cognito**

References

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- **AWS Certified Solutions Architect – Associate**
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