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Key Use cases and Common Architecture Patterns for Building Modern Apps

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Agenda

Computing in Modern Applications

AWS Lambda and Event-Driven Computing

Container Services at AWS

How much do you want to manage?

1

Does self-managing infrastructure improve your business results?

2

Do you have expertise?
Is the extra effort worth it?

Computing in modern applications

AWS Lambda

Event-driven
serverless compute

Amazon ECS

Fully-managed
container orchestration

Amazon EKS

Fully-managed
container orchestration
with Kubernetes

Similarities in approaches

	Containers	Serverless
Abstraction from complexity	✓	✓
Fully-managed by AWS	✓	✓
Broad ecosystem of partners	✓	✓
Support wide range of use cases and workloads	✓	✓
Deep integration with AWS infrastructure, security, and management services	✓	✓

Differences in approaches

Containers

- Compute-oriented
- More easily manage infrastructure
- Infrastructure consumption-based pricing

Serverless

- Event-oriented
- Abstract away infrastructure
- Request-based pricing

Many customers run both!

Most customers use a combination

80%

of AWS container services customers have also adopted Lambda

Source: https://www.datadoghq.com/state-of-serverless/

Choosing a Serverless Compute Strategy: AWS Lambda

Why customers choose Lambda

1

Desire or need get applications and features to market rapidly

2

They have teams that focus primarily on code—not operations

3

No limitations from existing instance or container platforms

What does serverless mean?

No infrastructure provisioning, no management

Automatic scaling

Pay-for-use

Highly available and secure

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Common use cases

IT automation

Data processing

Event-Driven Architectures

Web applications

Machine learning

AWS Lambda

Event-driven serverless compute

Event

A signal that status has changed

What makes an application “event-driven?”

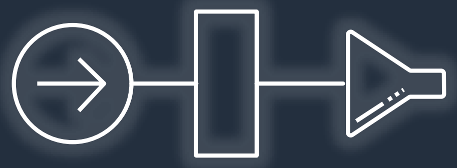
An ‘event’ is simply a change in state

Events trigger and communicate between decoupled services

EDAs consist of a producer, a router, and a consumer

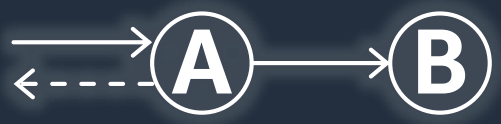
Decouple services can be scaled, updated, and deployed independently

Event-driven architectures drive reliability and scalability



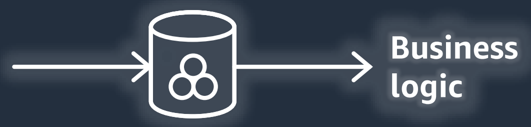
Event routers

Abstract producers and consumers from each other



Asynchronous events

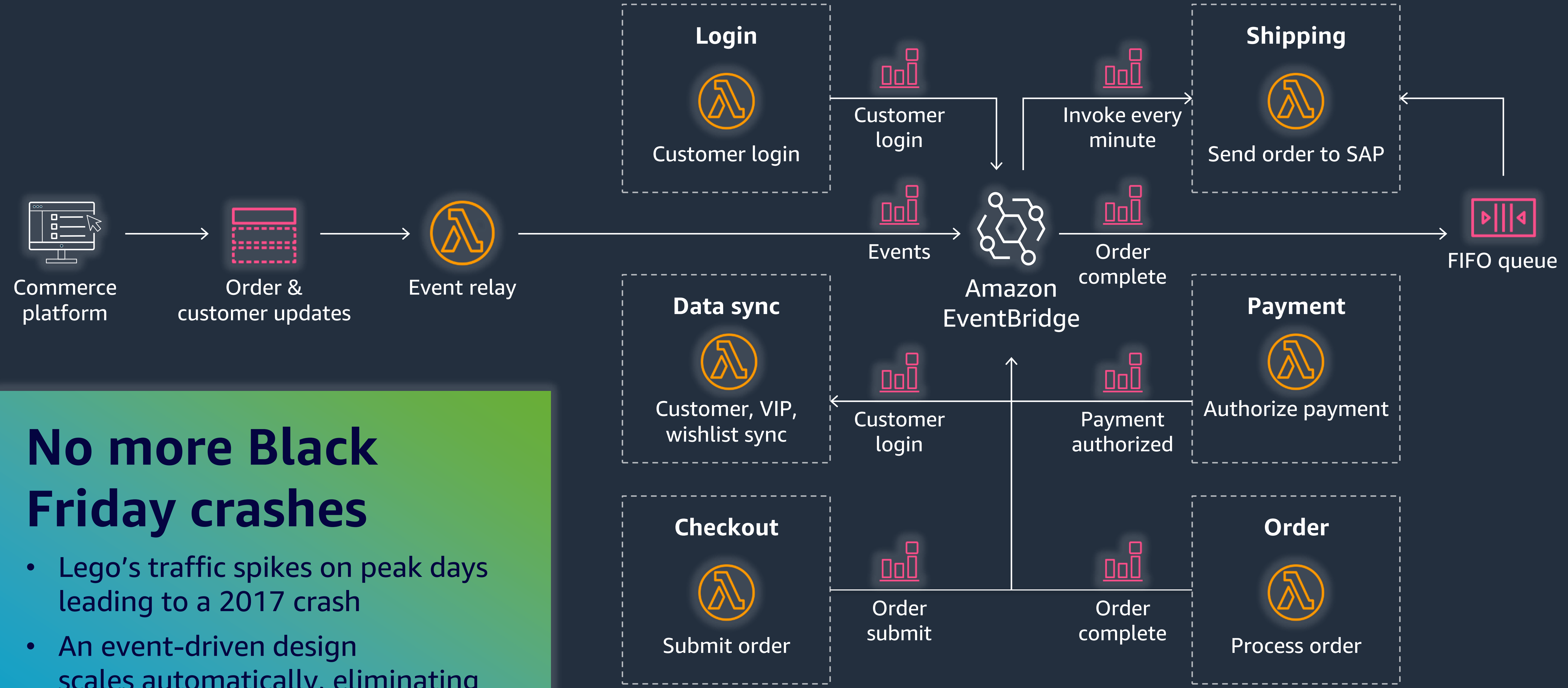
Improve responsiveness and reduce dependencies



Event stores

Buffer messages until services are available to process

Lego uses an event-driven design for scalability



No more Black Friday crashes

- Lego's traffic spikes on peak days leading to a 2017 crash
- An event-driven design scales automatically, eliminating this problem

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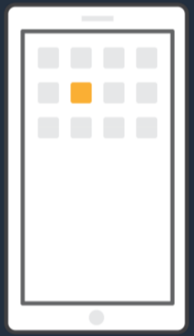
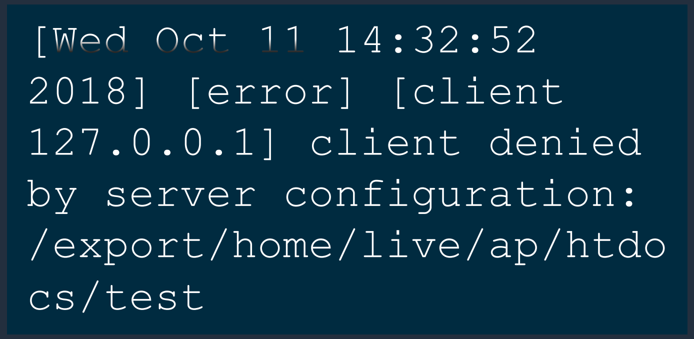
Serverless Stream Processing with Lambda

High volume data produced continuously from a large variety of sources at a high velocity



Mobile apps

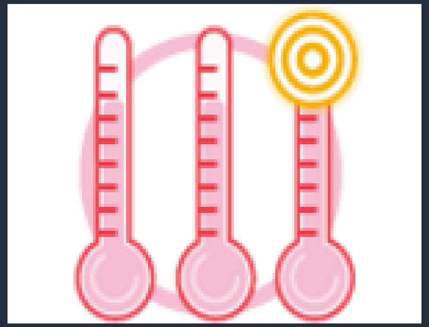
Web clickstream



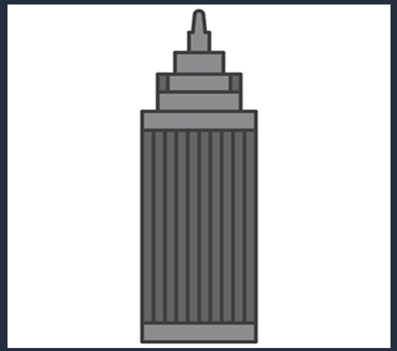
```
[Wed Oct 11 14:32:52
2018] [error] [client
127.0.0.1] client denied
by server configuration:
/export/home/live/ap/htdo
cs/test
```

Application logs

Metering records

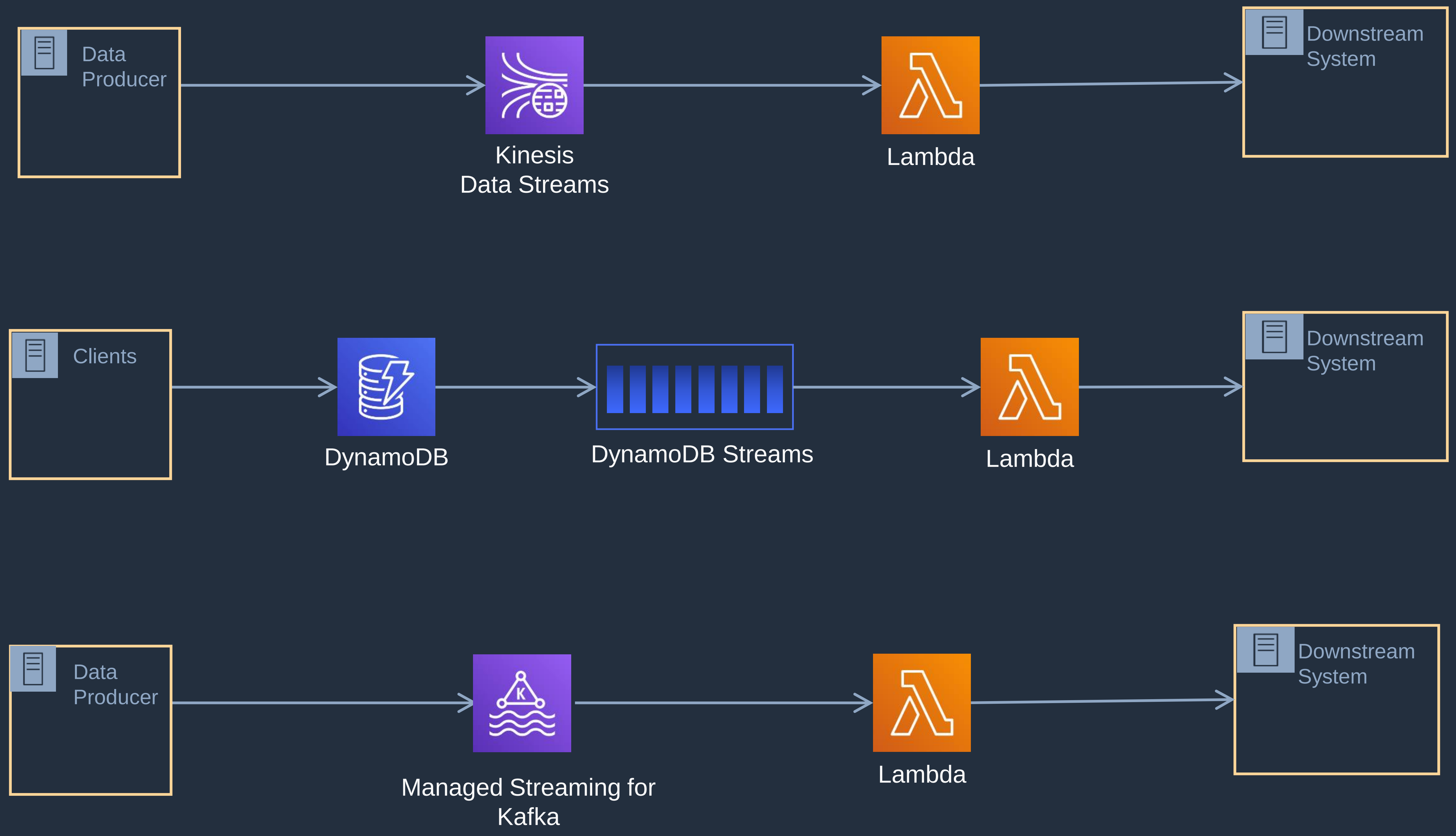


IoT sensors



Smart buildings

Serverless Stream Processing



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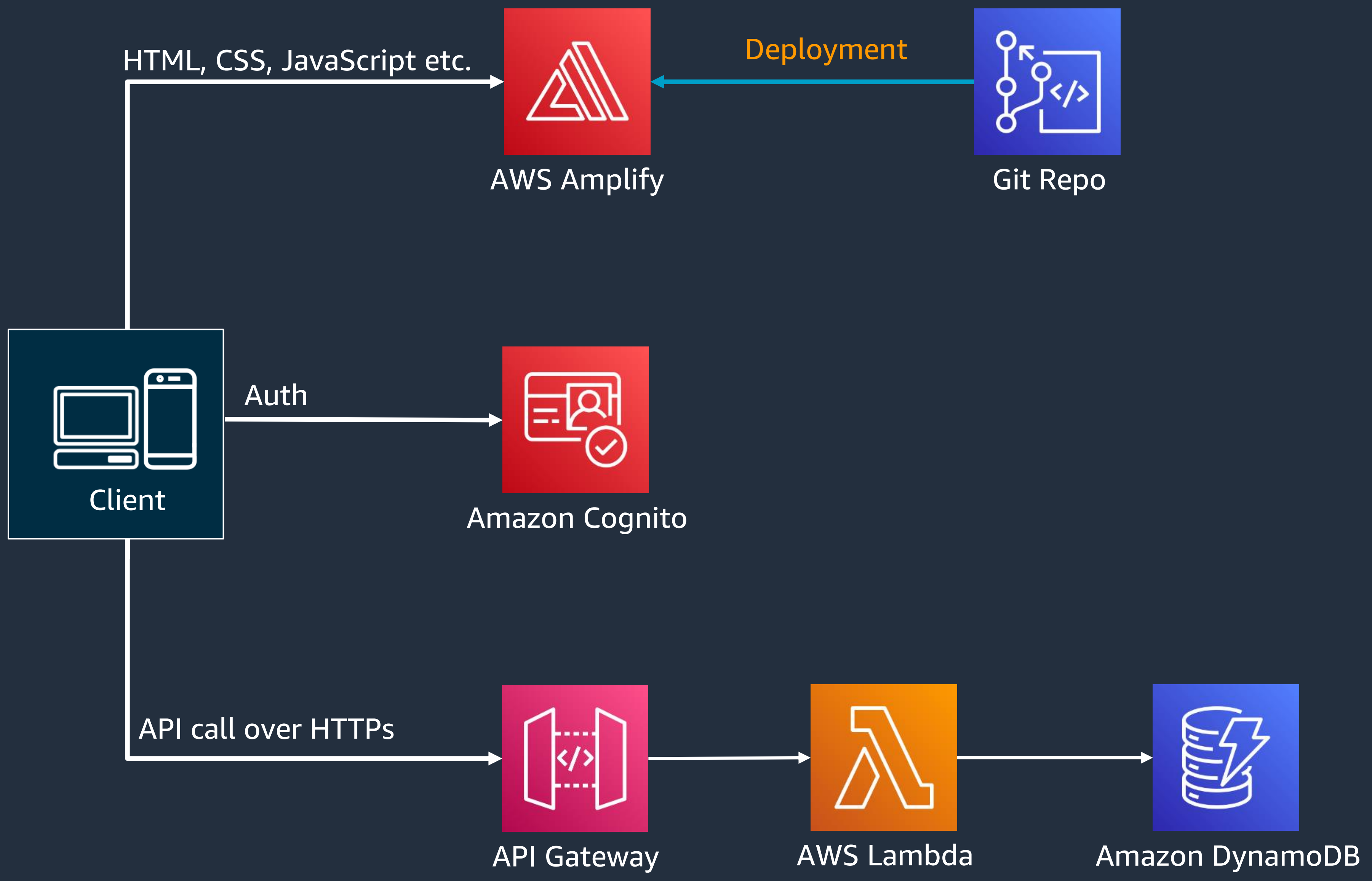
Serverless Web Applications



Static Web Hosting

AWS Amplify

HTML, CSS, JavaScript, and Image
SPA (React, Angular, VUE)
Server-side rendering (Next.js and Nuxt.js)

User Management

Amazon Cognito

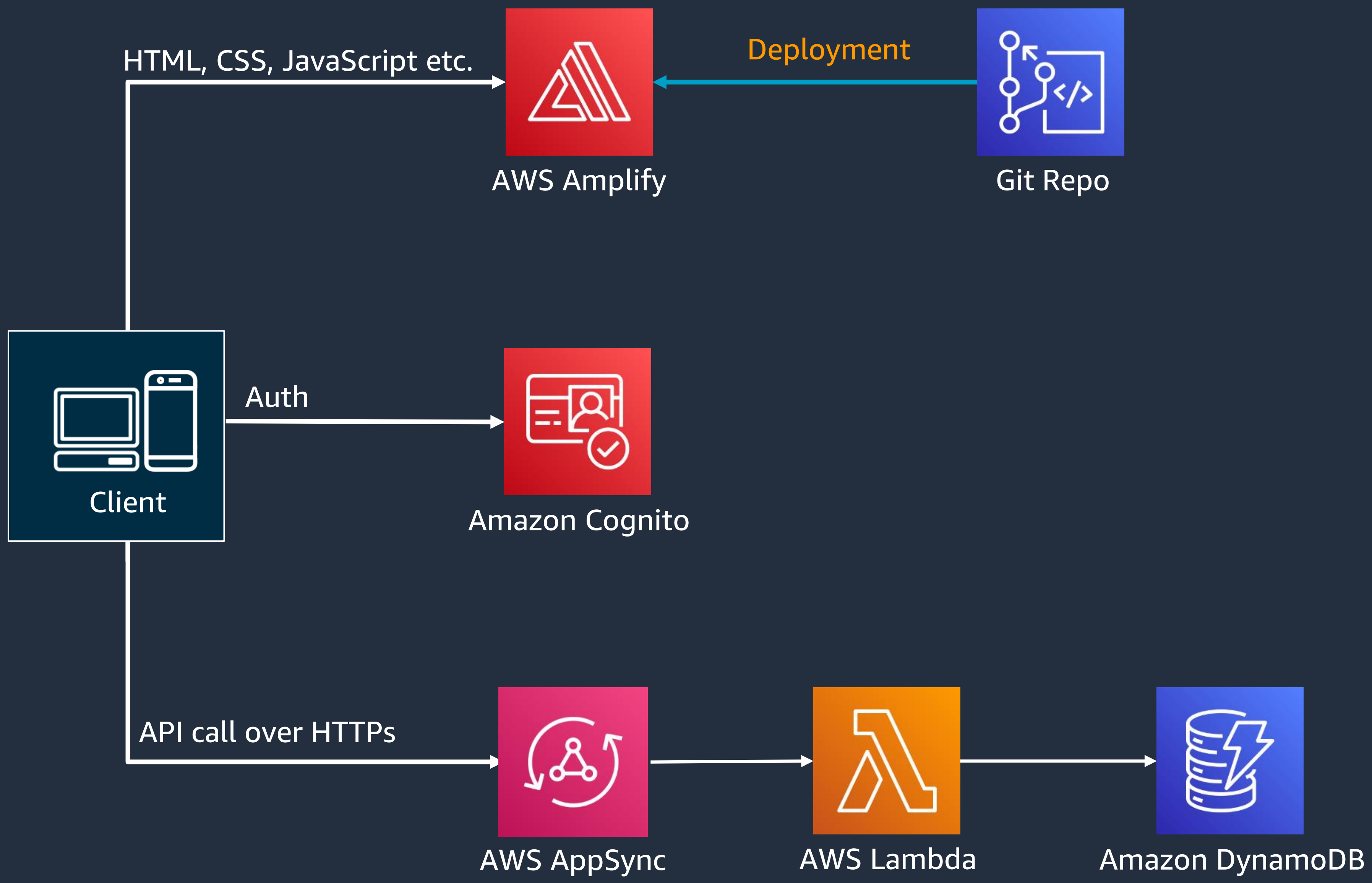
user management
authentication for backend API

Serverless Backend

API Gateway, Lambda

public backend API built using
Lambda and API Gateway

Serverless Web Applications



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User Management

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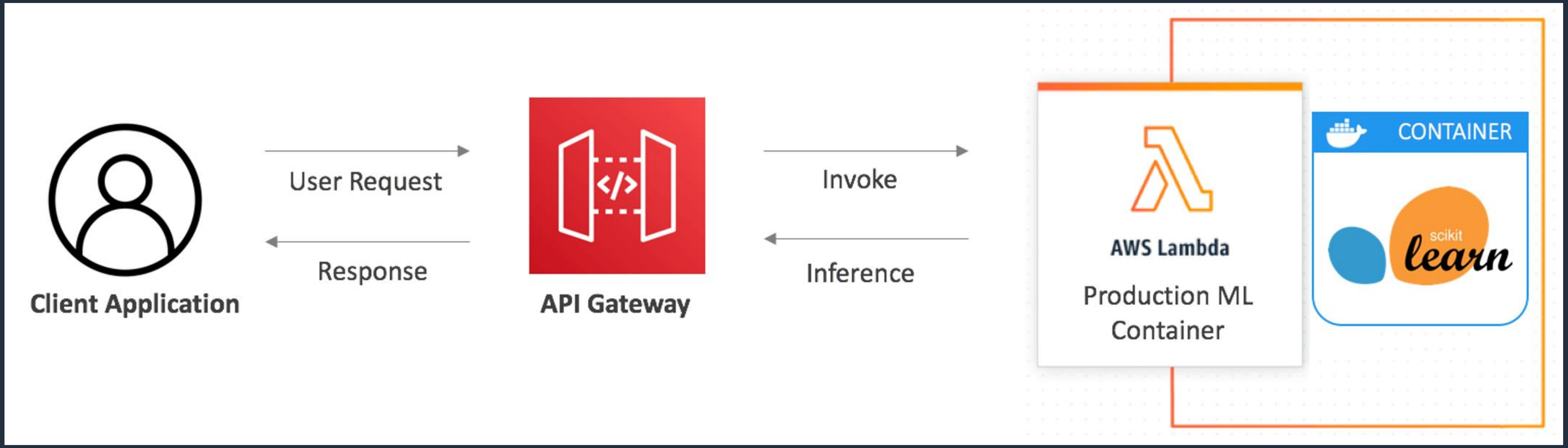
GraphQL Serverless Backend

AppSync, Lambda

public backend API built using
Lambda and AppSync

Machine learning in Lambda



- Package Lambda Functions as Container Images
  - This allows for larger code/dependencies: 10Gb
- SAM templates for Machine Learning make it easy to get started with popular frameworks
  - Pytorch, TensorFlow, SciKit-Learn, XGBoost

Packaging functions as container images

- Use a consistent set of tools for containers and Lambda-based applications
- Deploy large applications with AWS-provided or third-party images of up to 10GB
- Benefit from sub-second automatic scaling, high availability, 140 native service integrations, and pay-for-use billing model

DRIVING AGILITY AT COCA-COLA

“What would normally be a complex architecture—with the amount of security, precision, and latency required—is simplified by using services like AWS Lambda to create a magical experience for the user.”

—Michael Connor
Chief Architect, Coca-Cola Freestyle

Choosing a Containers Strategy

Why customers choose containers

Familiarity or preference—you know what you like!

Portability and community support

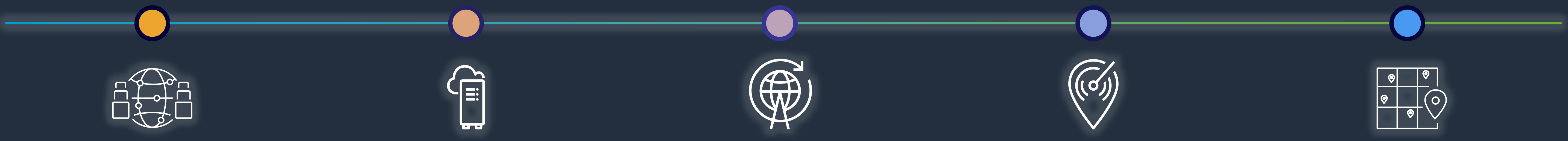
Specific requirements for managing and configuring your infrastructure

Fargate Spot??

No boundaries: Run containers where you like

Customers have workloads, workflows, and application portfolios that span AWS, on-premises, and other clouds

AWS is pushing the boundaries with AWS Outposts, AWS Wavelength, AWS Local Zones, and now on-premises, edge, and hybrid capabilities



Customer infrastructure

AWS Outposts

AWS Wavelength

AWS Local Zones

AWS Regions

EKS Anywhere

ECS Anywhere

Choosing your container environment

Amazon ECS

Powerful simplicity

- Fully managed containers orchestration
- Opinionated solution for containers
- Reduced time to build and deploy
- Fewer decisions needed

Amazon EKS

Open flexibility

- If you are invested in Kubernetes
- Vibrant ecosystem and community
- Consistent open-source APIs
- Easier to run K8s resiliently and at-scale

AWS Fargate

Serverless

- No servers to manage
- Pay only for resources when used
- Eliminate capacity planning
- Supports both EKS and ECS

Many customers run a mix of all three!

Operating containers at scale is challenging

Security

Do we have vulnerabilities on our hosts?

Maintenance

How are we handling ongoing AMI management, logging, & monitoring?

Capacity

Is the size of our cluster properly sized and can we scale as-needed?

Cost

Are we being efficient with our spend?

Focus

Do we spend more time on our infrastructure than our applications?

Fargate is used for a wide variety of use cases

Web Applications

Data Processing

Machine Learning

CI/CD

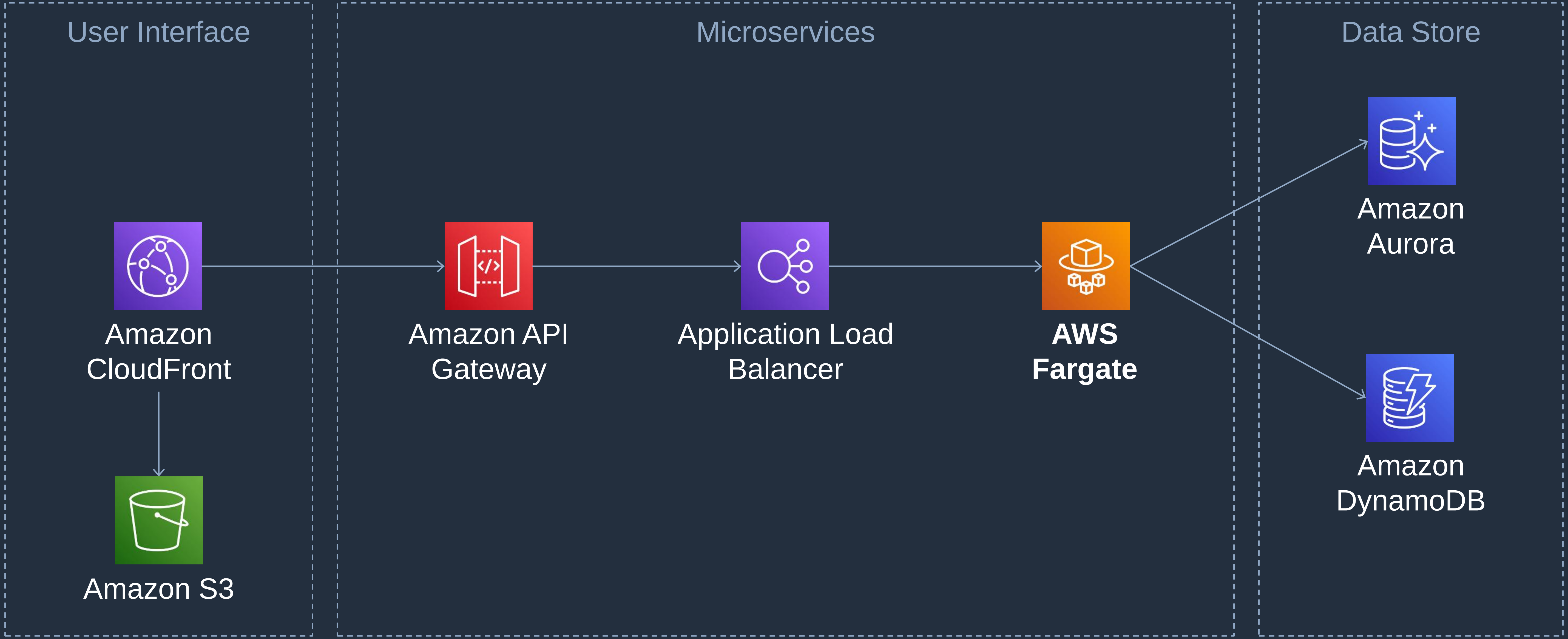
Mobile Applications

Gaming Platforms

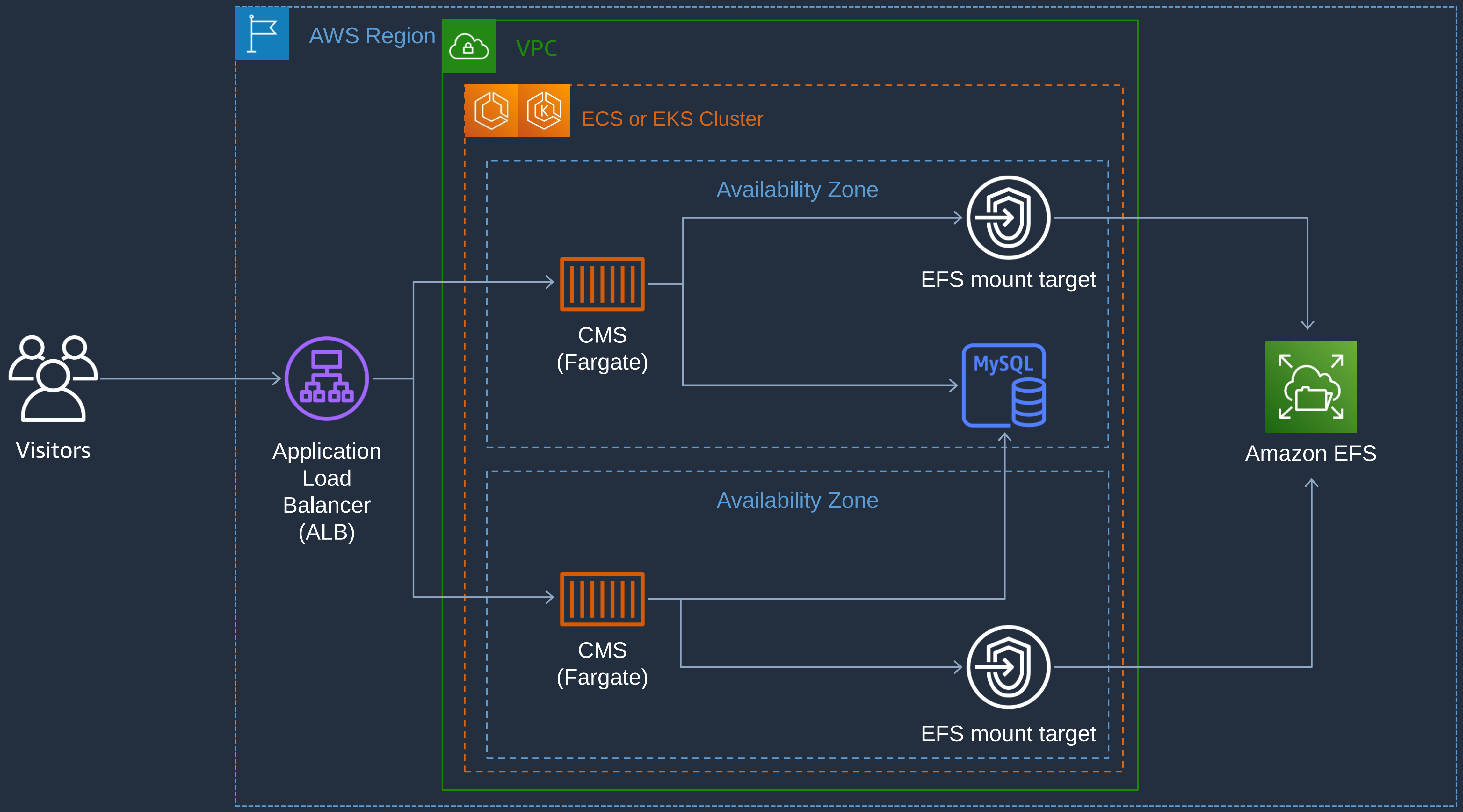
Platform as a Service (PaaS)

Internet of Things

Sample microservices architecture



Sample WordPress on AWS Fargate + Amazon EFS



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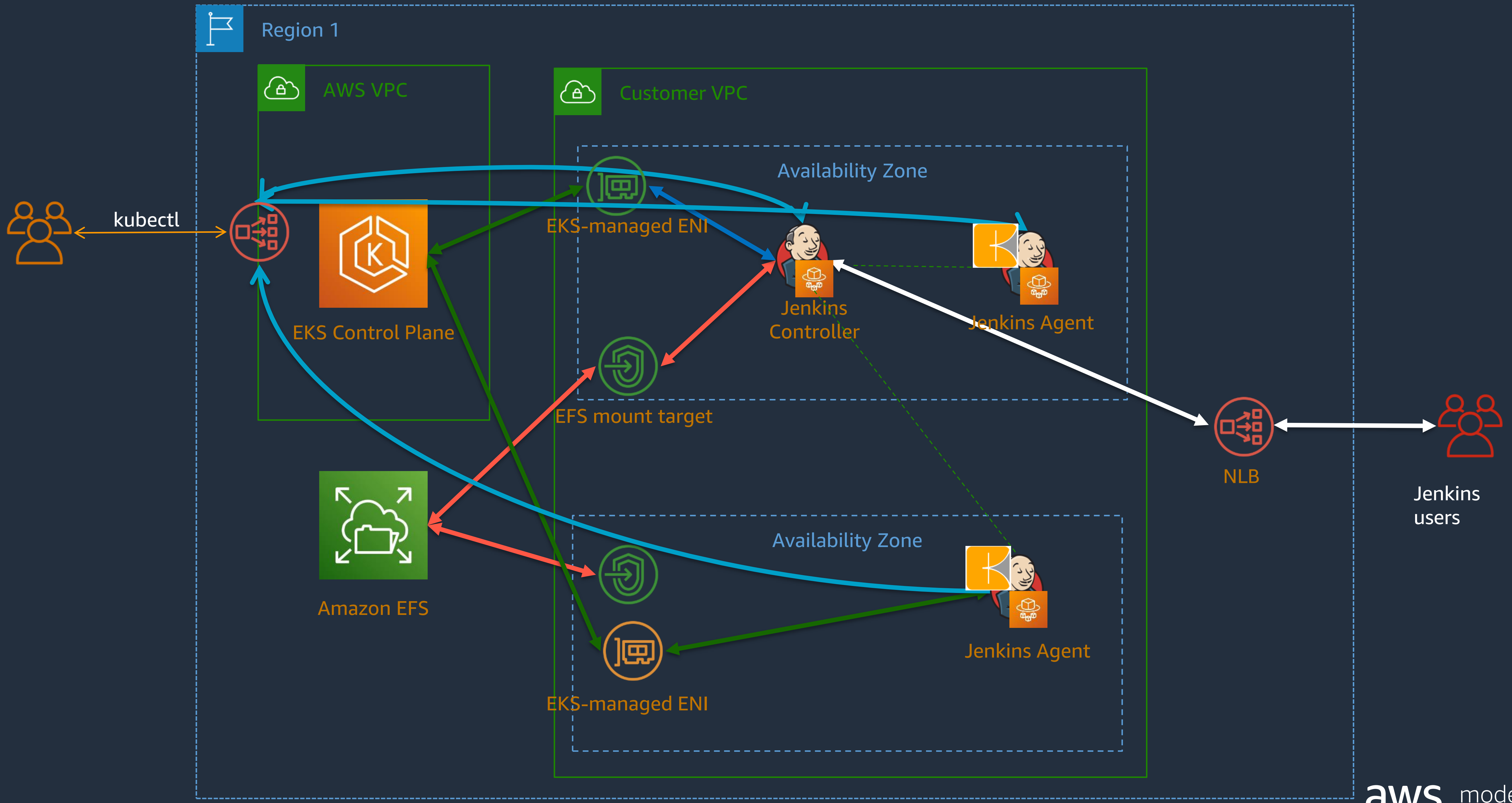
CI CD on Fargate



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