Serverless and Devops

Immersion Day

Presented for GE Avio, Italy

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July 22-23, 2020

Agenda - https://ge-aws-avio-srv-imm-day.learn-the-cloud.com/agenda/

DAY 1 (CEST) – Thursday, July 22

1:00 – 1:45 Overview of Serverless on AWS

1:45 – 3:10 LAB: Building a Serverless Web Application

3:10 – 3:50 Event Driven Architectures

3:50 – 5:20 LAB: Serverless Document Processing

5:20 – 6:00 Serverless Architectures and Patterns

Agenda - https://ge-aws-avio-srv-imm-day.learn-the-cloud.com/agenda/

DAY 2 (CEST) – Friday, July 23

1:00 – 1:45 Overview of CI/CD for Serverless Applications

1:45 – 3:00 LAB: CI/CD for Serverless

3:00 – 3:45 Serverless Observability (Monitoring, etc)

3:45 – 4:30 Overview of Containers on AWS

4:30 – 6:00 LAB: CICD with Blue/Green deployments to EKS using CDK

Serverless on AWS

Immersion Day

Jason Hoog, AWS Solution Architect

July 22, 2021

Overview of Serverless

What does the future look like?

ALL THE CODE YOU EVER WRITE IS BUSINESS LOGIC

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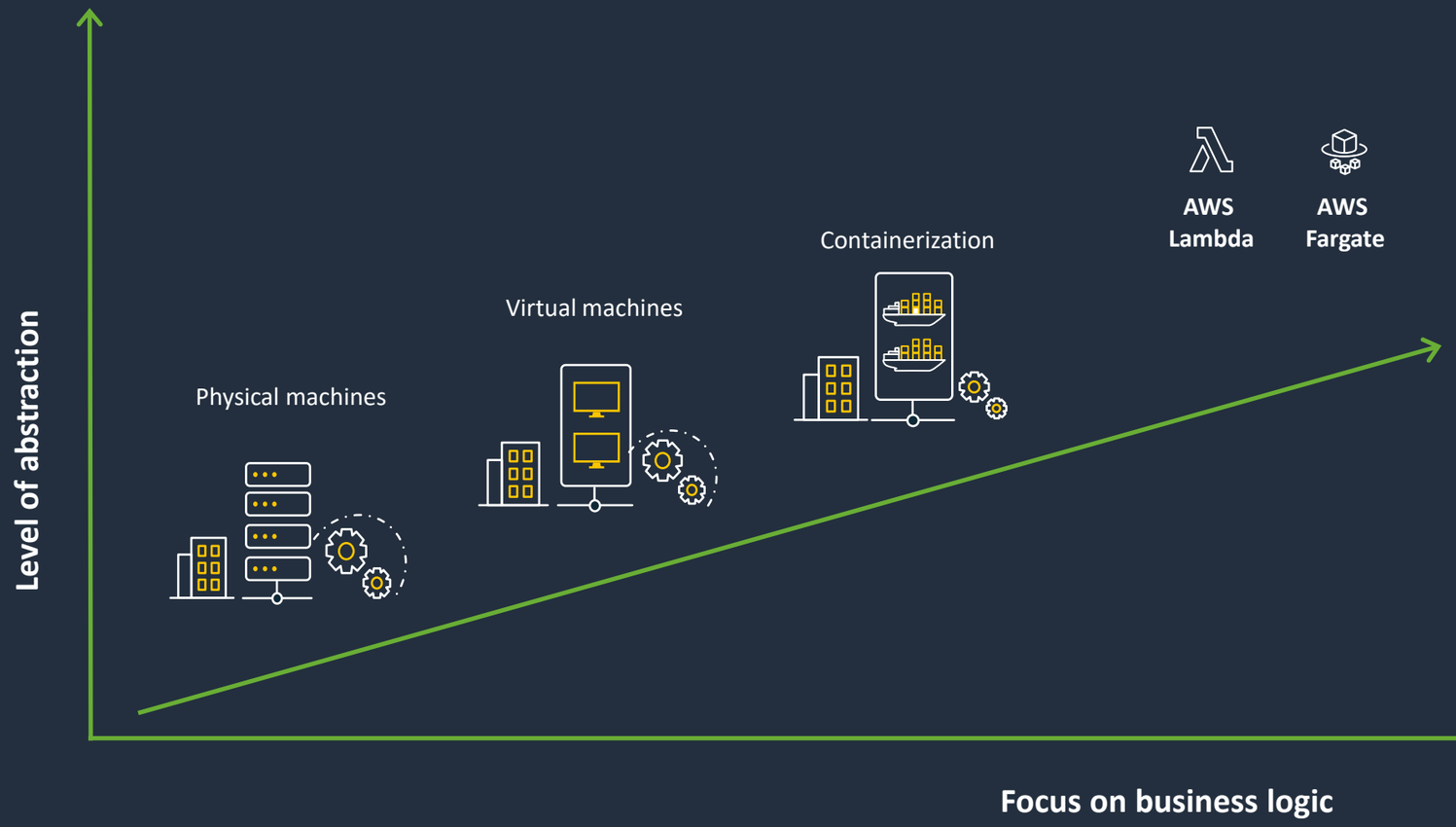
There’s a paradigm shift happening



Serverless

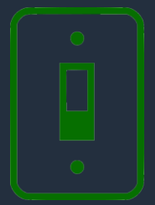
- Continuous scaling
- Fault tolerance built-in
- Pay for value
- Zero maintenance
- Focus on business value

What is serverless?

No infrastructure provisioning, no management

Automatic scaling

Pay for value



Highly available and secure

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Serverless applications span many different categories of services

Compute


AWS Lambda


AWS Fargate

Data stores


Amazon Simple Storage Service (Amazon S3)


Amazon Aurora Serverless


Amazon DynamoDB

Integration


Amazon API Gateway


Amazon Simple Queue Service (Amazon SQS)


Amazon Simple Notification Service (Amazon SNS)


AWS Step Functions


AWS AppSync

AWS operational responsibility models

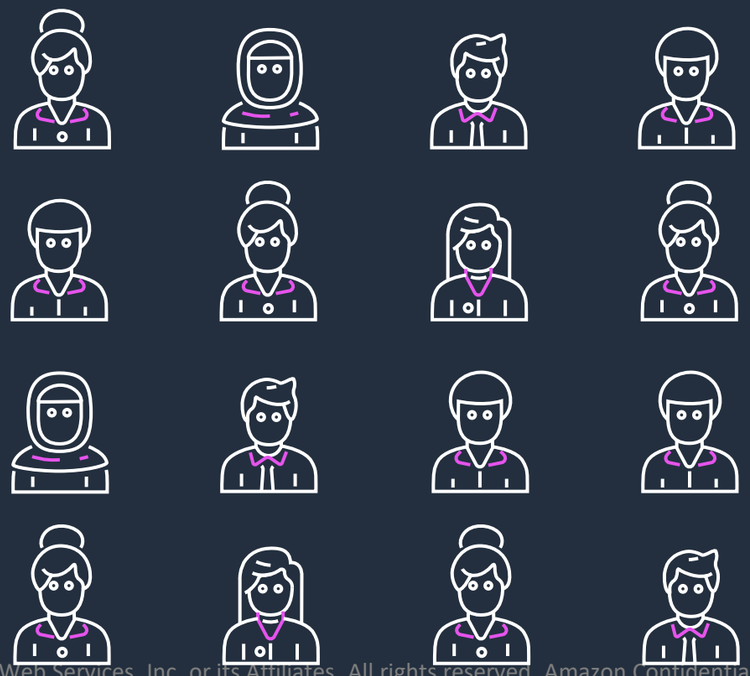
Compute	Virtual machine	Amazon EC2	AWS Elastic Beanstalk		Fargate	Lambda
Databases	MySQL	MySQL on Amazon EC2	Amazon RDS for MySQL	Amazon RDS	Amazon Aurora	DynamoDB
Storage	Storage					S3
Messaging	ESBs		Amazon MQ	Amazon Kinesis		EventBridge/SQS/SNS
Analytics	Hadoop	Hadoop on EC2	EMR	Amazon Elasticsearch Service		Amazon Athena

CIO’s say that 80% of developers’ time is spent on the operations and maintenance of applications and only 20% of the time is actually spent on innovation

Source: Deloitte 2019

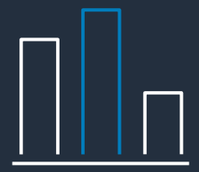
Serverless adoption is growing fast

HUNDREDS
OF THOUSANDS
of customers



TRILLIONS
of Lambda executions
per month

Why are customers building with a serverless-first strategy?



Agility

Performance

Cost

Security

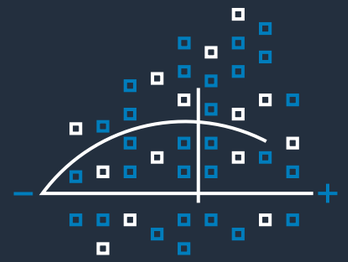
Driving agility at Coca-Cola

"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

What are customers building?

IT Automation



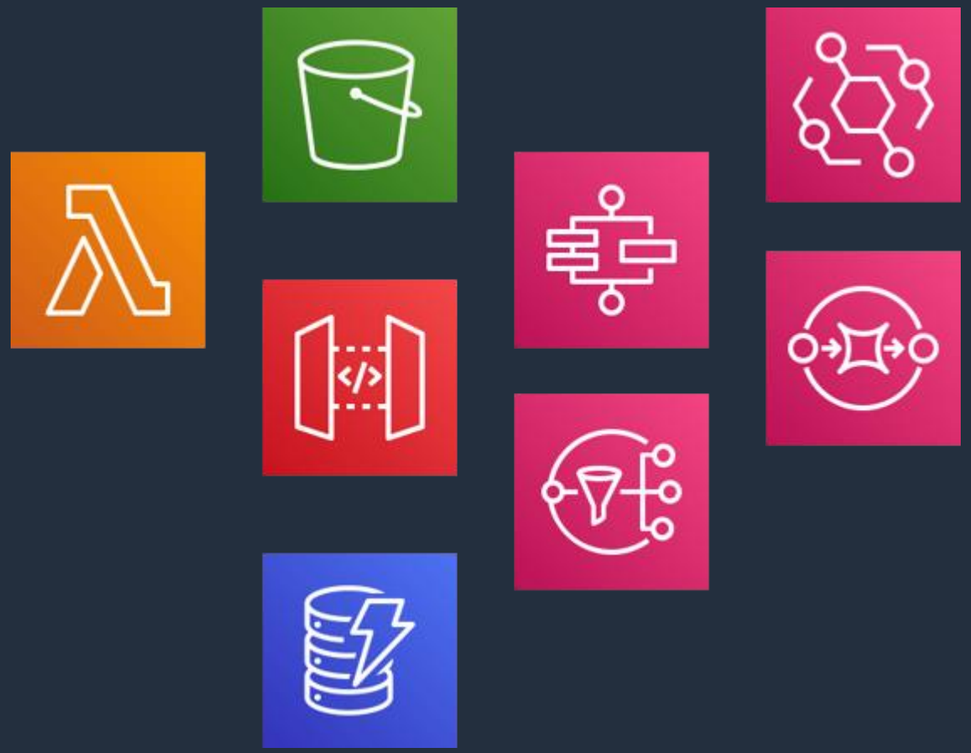
Data processing

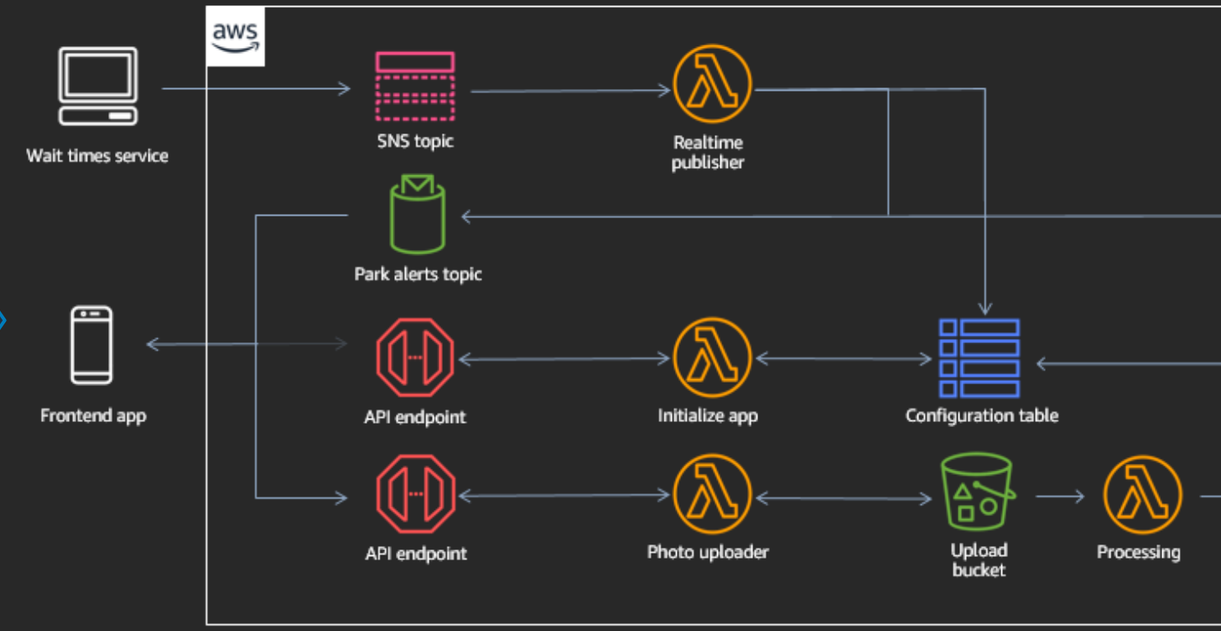
Web applications

Machine Learning

Building new applications

Small pieces, loosely joined





Compute operational models

Least

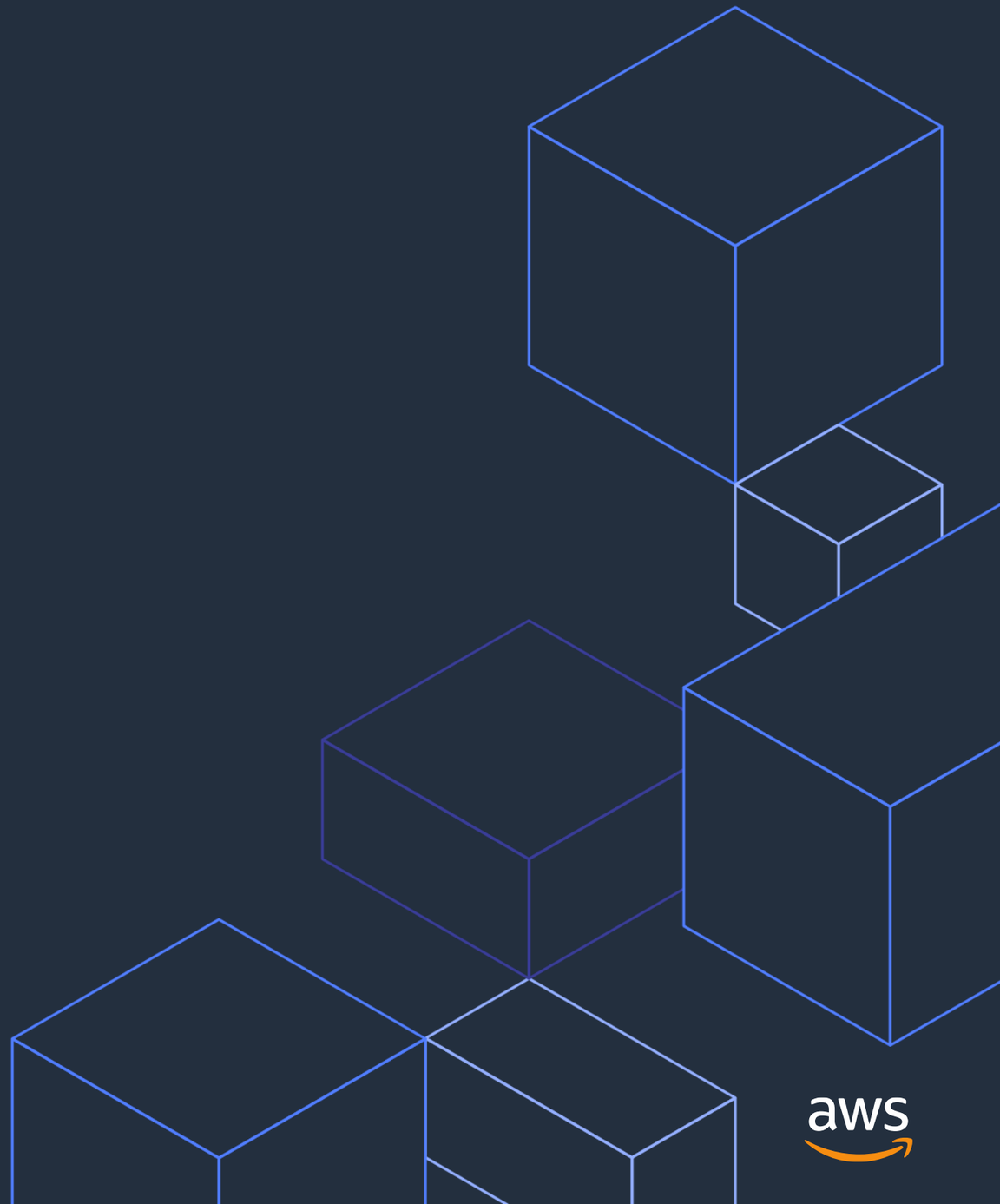
What you manage

Most

	AWS manages	Customer manages	
AWS Lambda Serverless functions	Data source integrations Physical hardware, software, networking, and facilities Provisioning	Application code	
AWS Fargate Serverless containers	Container orchestration, provisioning Cluster scaling Physical hardware, host OS/kernel, networking, and facilities	Application code Data source integrations Security config and updates Network config	Management tasks
Amazon ECS/EKS Container-management -as-a-service	Container orchestration control plane Physical hardware software, networking, and facilities	Application code Data source integrations Work clusters	Security config and updates, network config, firewall, management tasks
Amazon EC2 Infrastructure-as-a-Service	Physical hardware software, networking, and facilities	Application code Data source integrations Scaling Security config and updates Network config Management tasks	Provisioning, managing scaling and patching of servers

AWS Lambda

Event-driven function-as-a-service

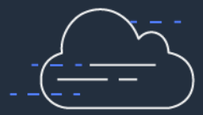


Serverless Architecture

Event Source

Changes in data state

Requests to endpoints



Changes in resource state

Function

Node.js
Python
Java
C#
Go
Ruby
Bring Your Own

Services / Other

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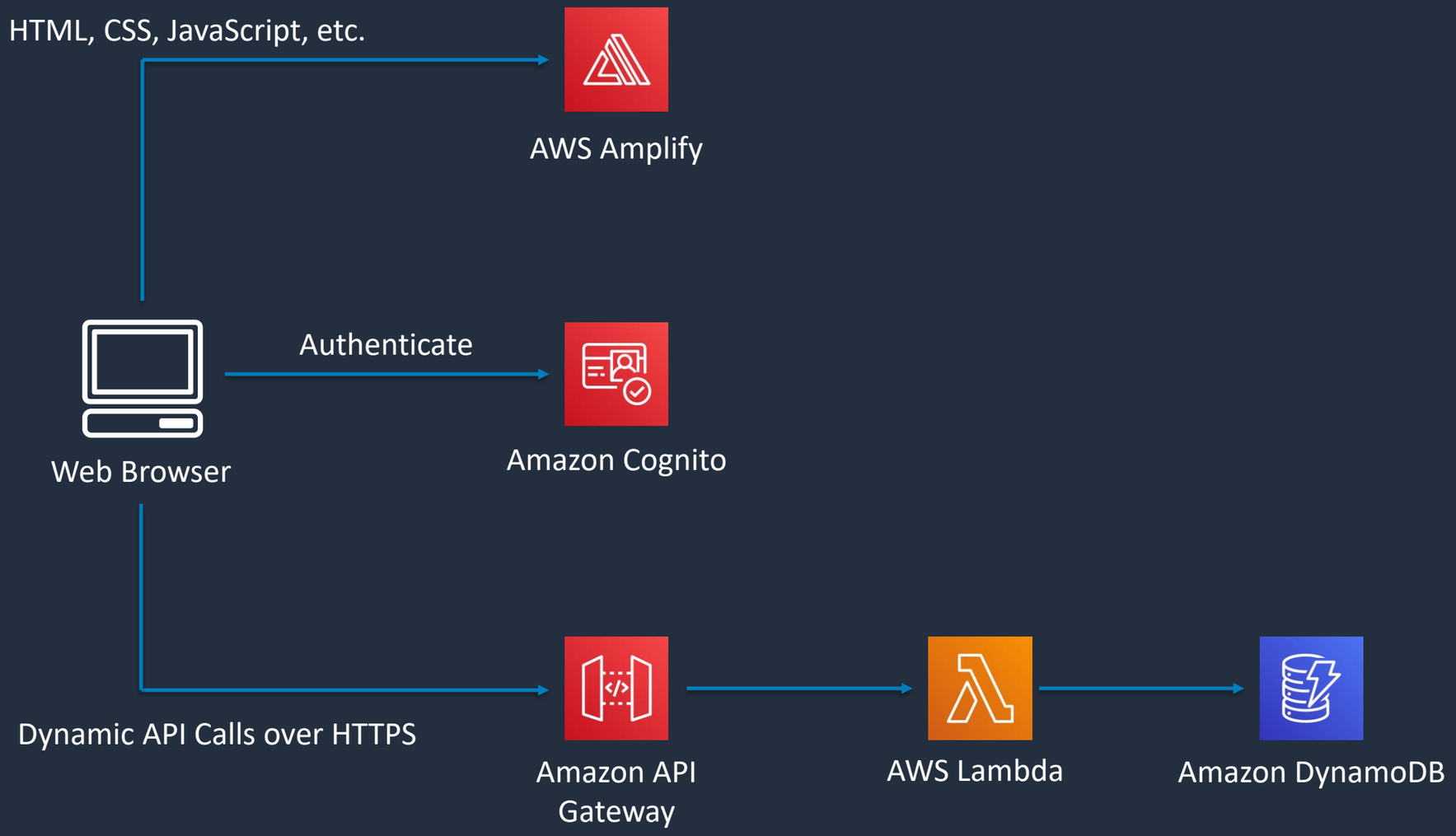
Serverless Web Architecture*



** You will be building this later!*

Anatomy of a Lambda Function

Handler function

- Function executed on invocation
- Processes incoming event

Event

- Invocation data sent to function
- Shape differs by event source

Context

- Additional information from Lambda service
- Examples: request ID, time remaining

app.py

```
def handler(event, context):
  msg = ‘Hello {}’.format(
                event[‘name’]
              )
  return { ‘message’: msg }
```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Lambda Function Configuration

Power Rating

- Select between 128MB and 10GB
- CPU and network allocated proportionally
- Power tune to balance cost and speed

Permissions Model

- Execution Role grants function access to resources via IAM
- Function Policy controls invocation

Lambda Function Configuration

Timeout

- Up to 15 minutes

- Synchronous vs Asynchronous
- API Gateway timeout = 30 sec

Network Access

- Configure access to VPC
- Security Group rules apply

- VPC does not enhance security of function

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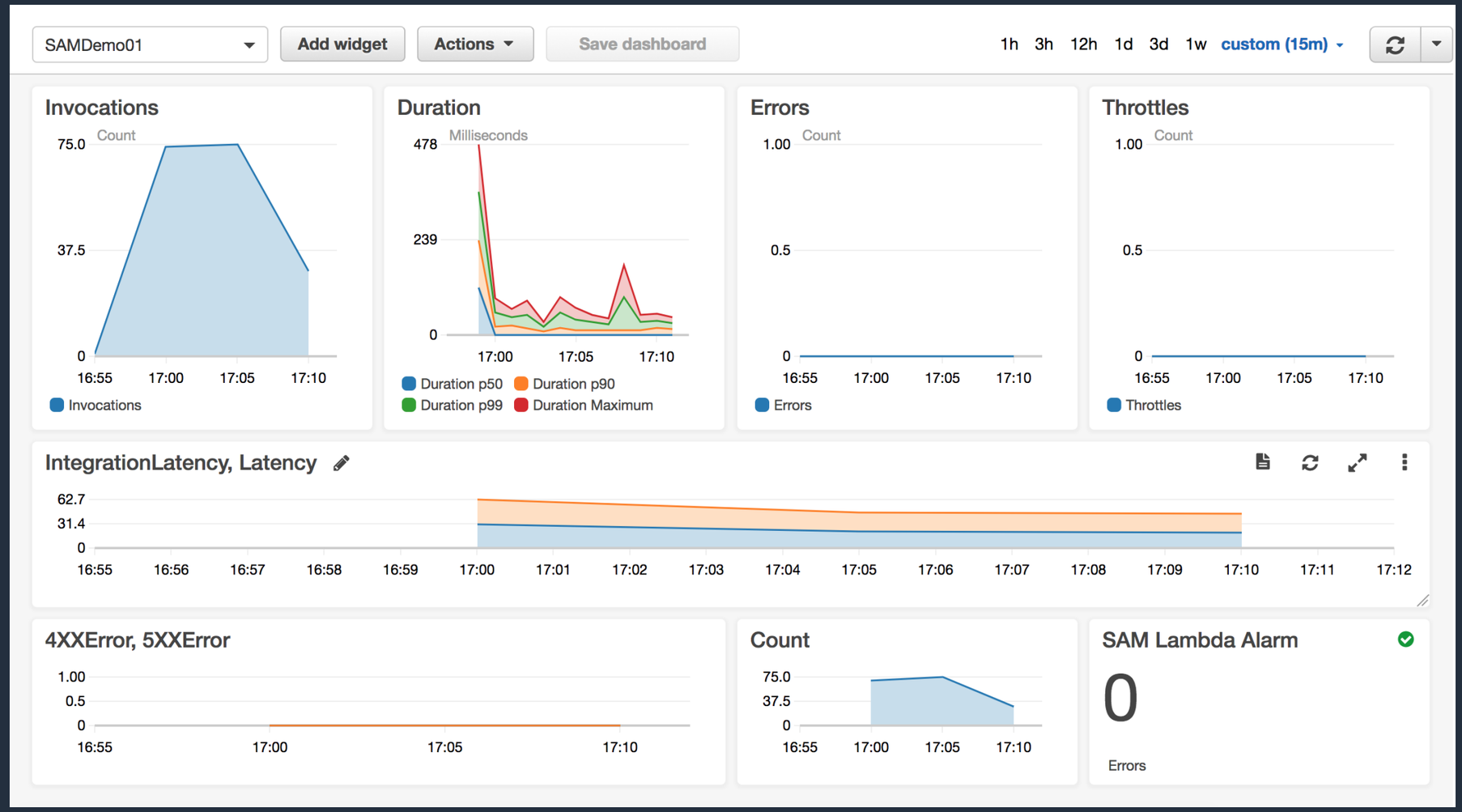
Built in monitoring



A few items to keep in mind…

- Functions are stateless, no affinity to underlying infrastructure
- Event triggers an invocation
- Lambda can handle a wide variety of event sources
    - Depending on event source, payload differs
    - Some event sources are batched (e.g. S3, SQS)
- Lambda service manages scaling, invocation
- Lambda service team manages platform security

- Build something!

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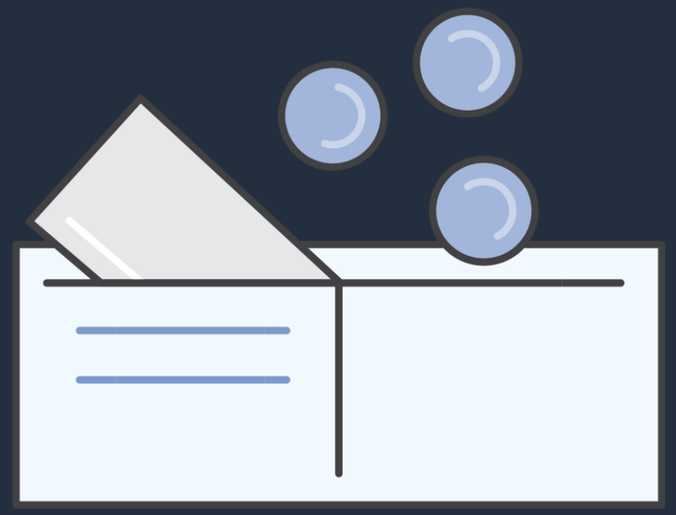
Fine-grained pricing



Free Tier

1M requests and 400,000 GBs of compute.

Every month, every customer.

- Pay for value
  - Priced by power rating
  - Charged in **1ms** increments
  - Low per-request charge
- No minimum
- Never pay for idle

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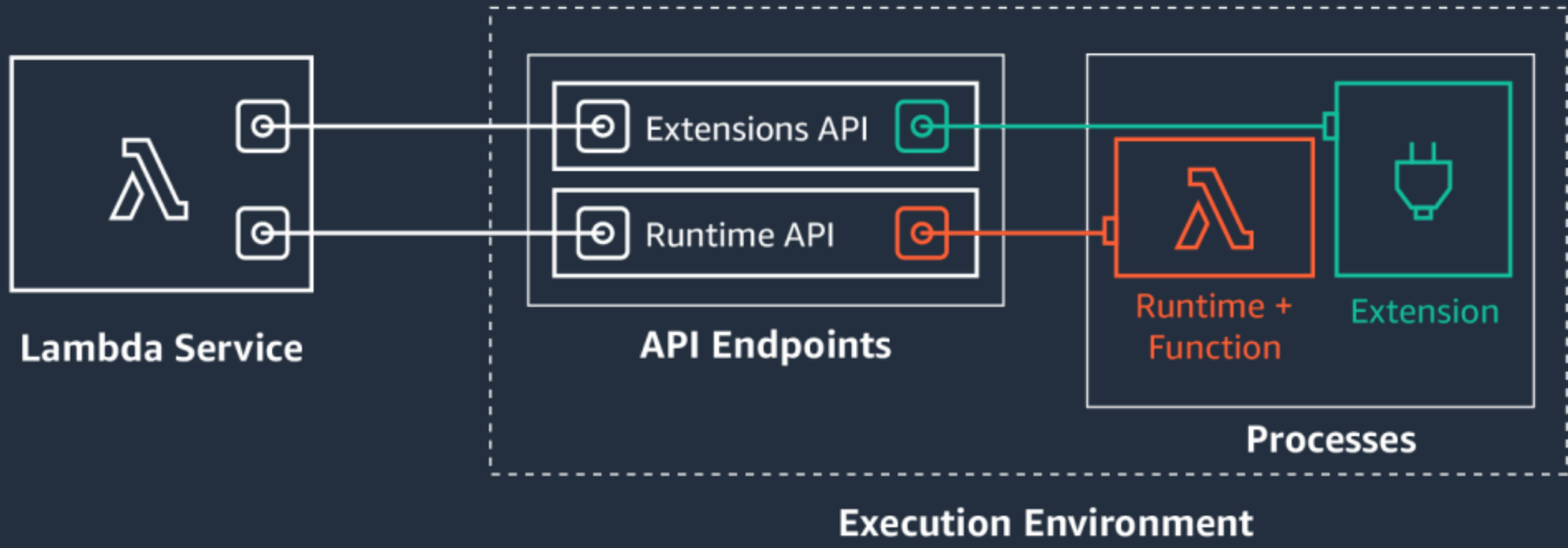
AWS Lambda container image support

AWS Lambda supports packaging and deploying 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 10 GB
- Benefit from subsecond automatic scaling, high availability, 140 native service integrations, pay for use billing model

AWS Lambda extensions simplify operations



Extensions Partners

HashiCorp · APPDYNAMICS · Check Point SOFTWARE TECHNOLOGIES LTD · DATADOG · dynatrace · epsagon · honeycomb.io

Coralogix · lumigo · New Relic · SignalFx a Splunk company · THUNDRA · sumo logic · STACKERY

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Refactoring applications

Traditional three-tier application architecture

Web servers

Presentation layers

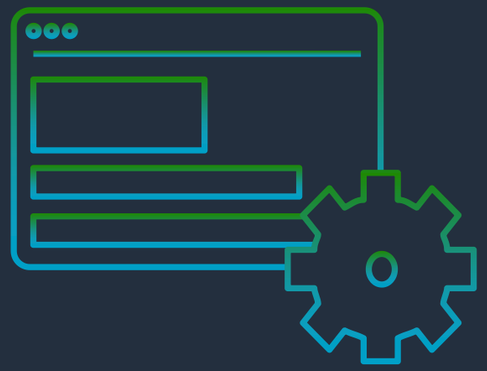
Application servers

Business logic

Database servers

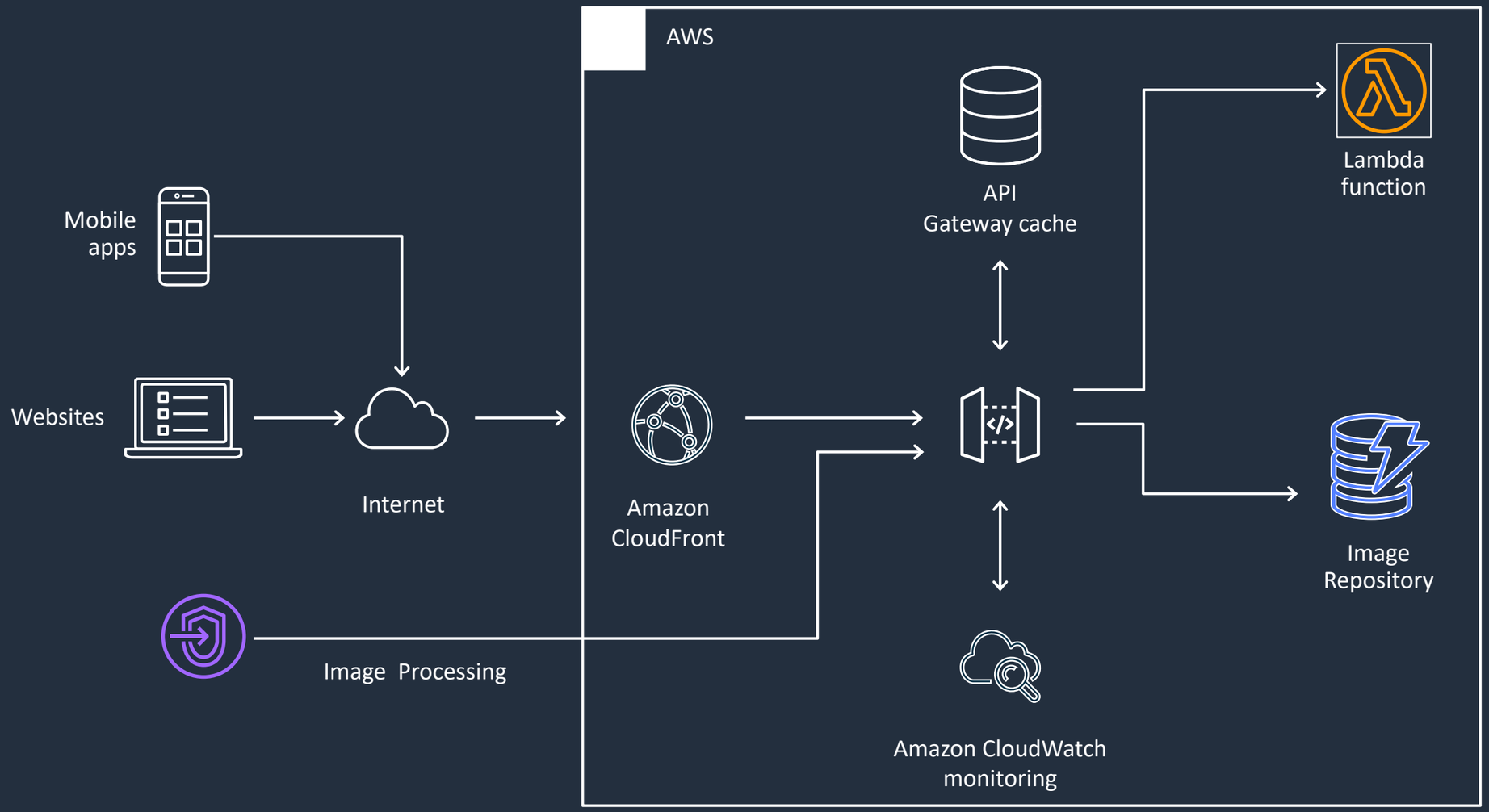
Data layer

A modern three-tier application architecture



APIs are the front door of microservices

Realtor.com uses APIs between services



"We process 800 million images per day through Amazon API Gateway..."

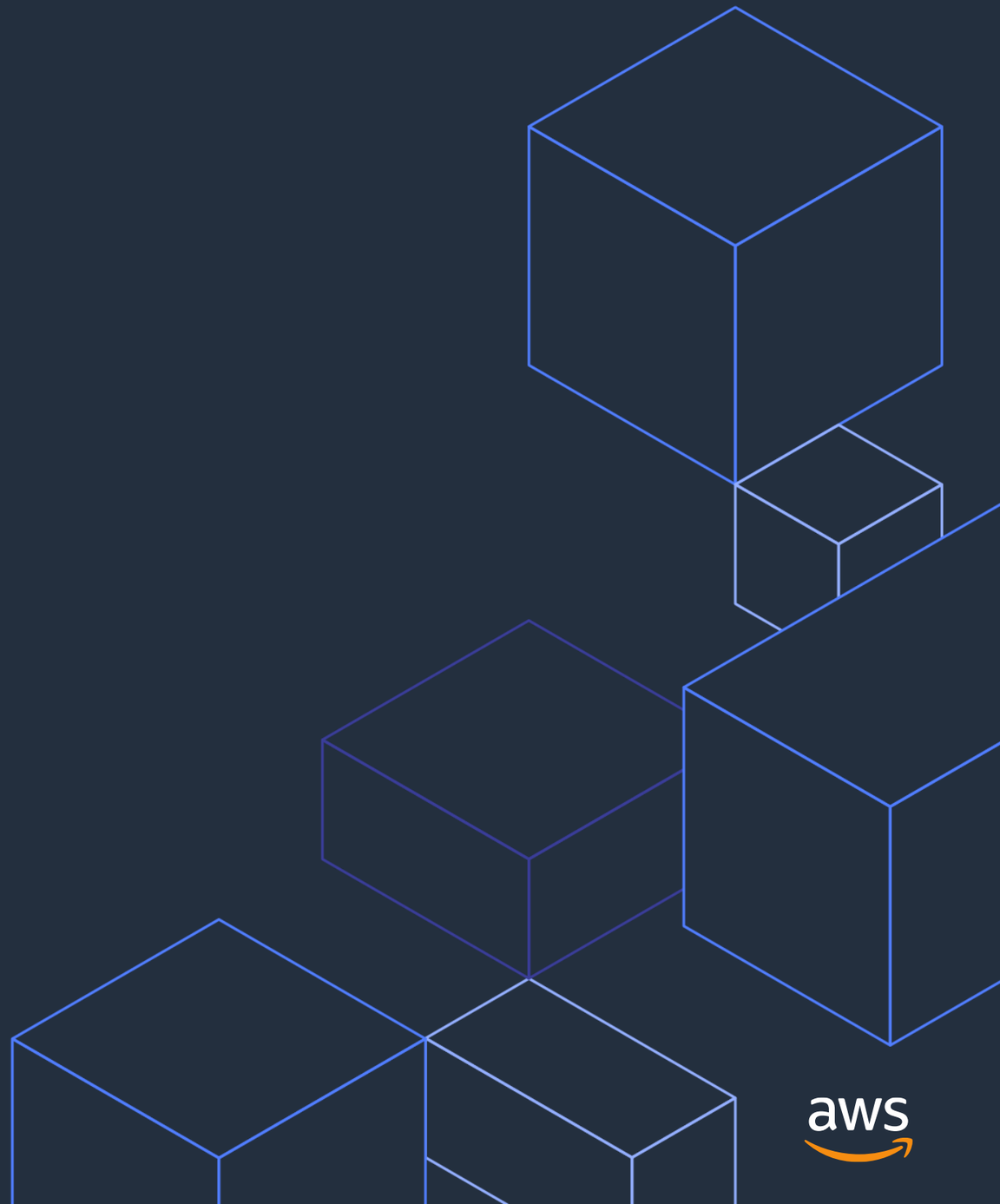
Kuntal Shah,

SVP Engineering, Realtor.com

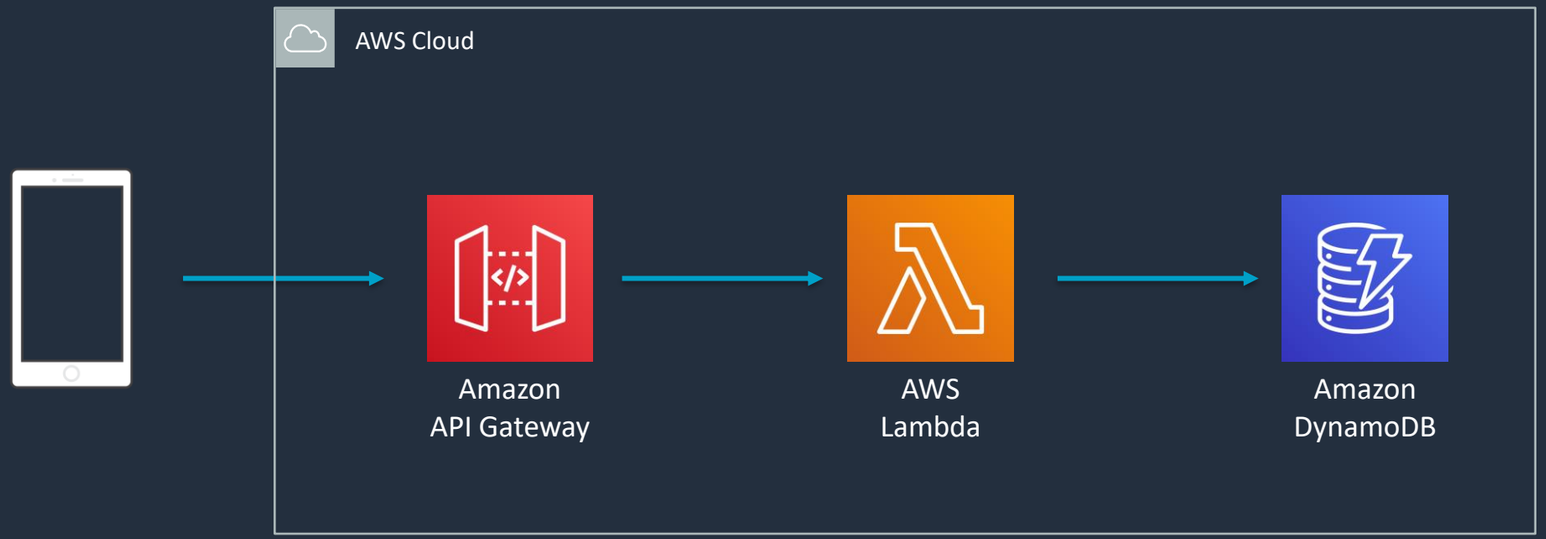
realtor.com®

Amazon API Gateway

Build and manage application interfaces



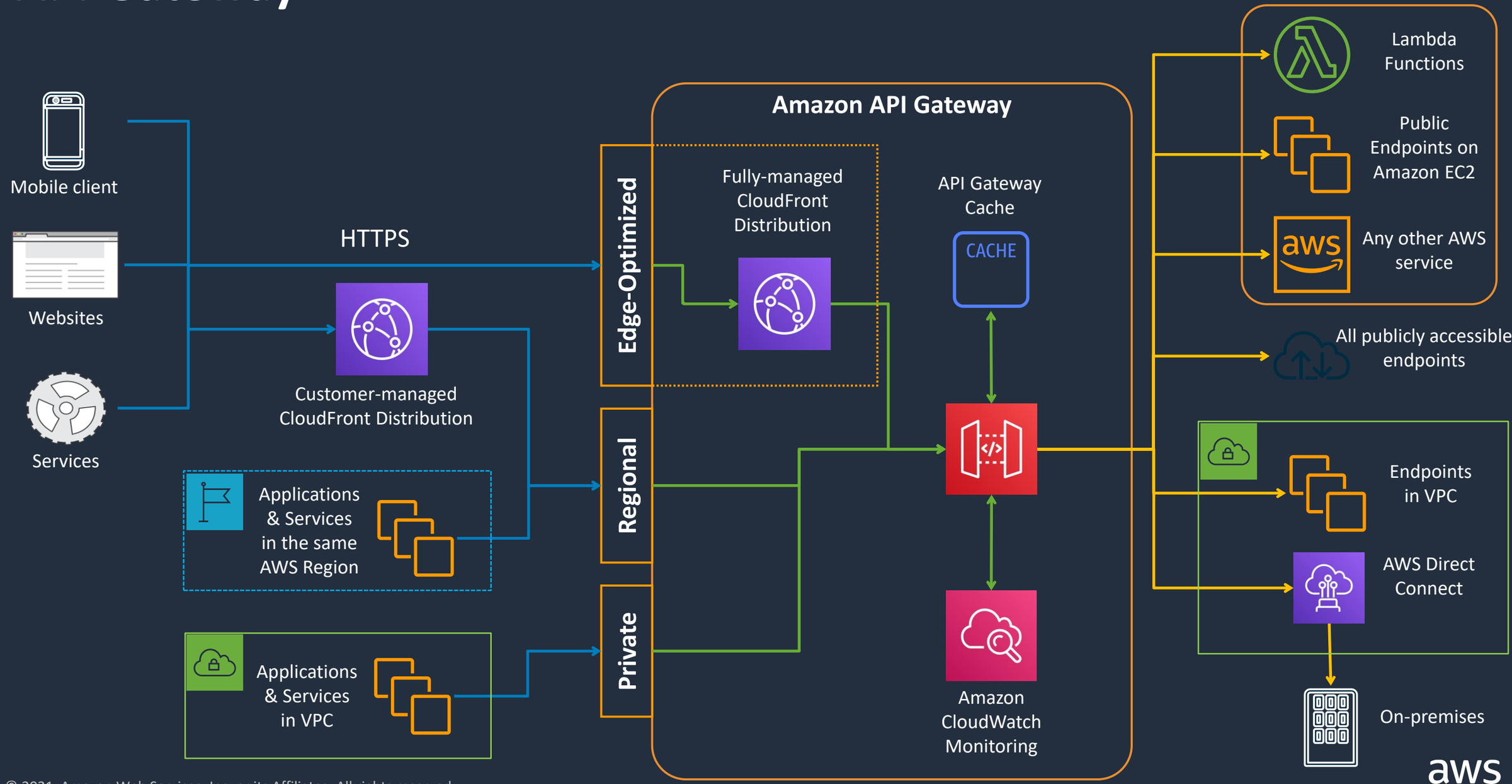
API Gateway is a front door…



…and alleviates common concerns so developers can focus on business logic

- Throttling
- Caching
- Authorization
- API Keys
- Usage Plans
- Request/Response Mapping

API Gateway

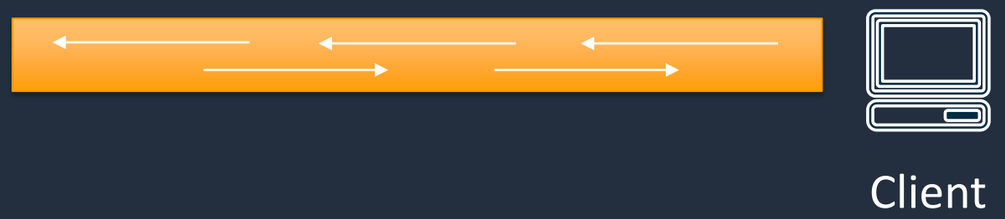


Support for multiple API types

RESTful: HTTP APIs & REST APIs

- Request / Response
- HTTP Methods like GET, POST, etc
- Short-lived communication
- Stateless

WebSocket APIs



- Serverless WebSocket
- Two-way communication channel
- Long-lived communication
- Stateful

REST versus WebSocket APIs

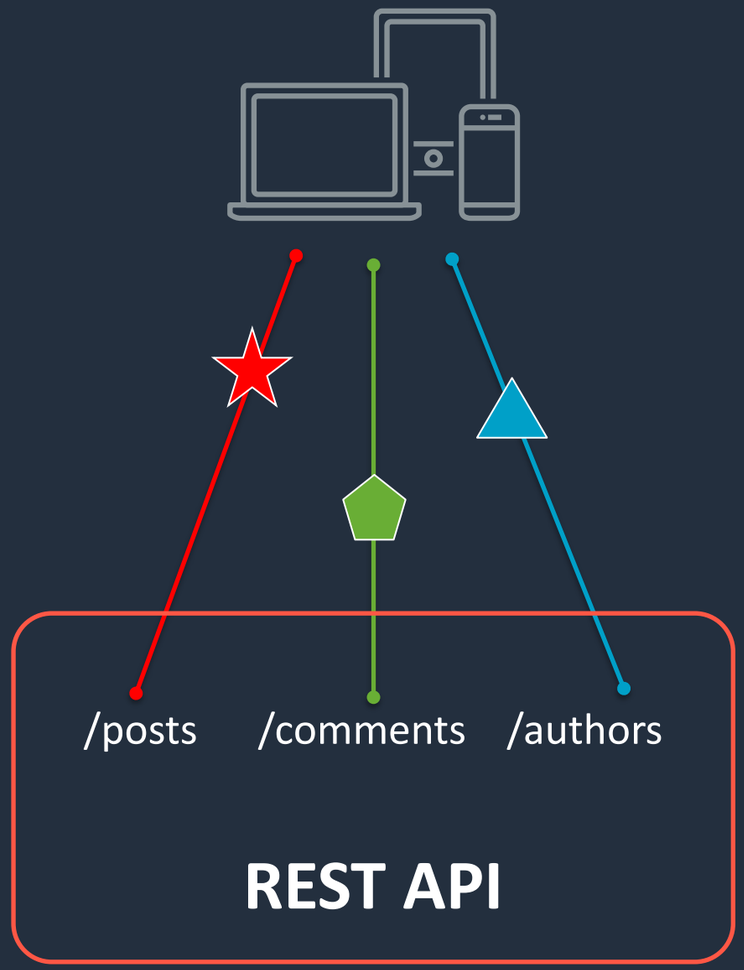
REST

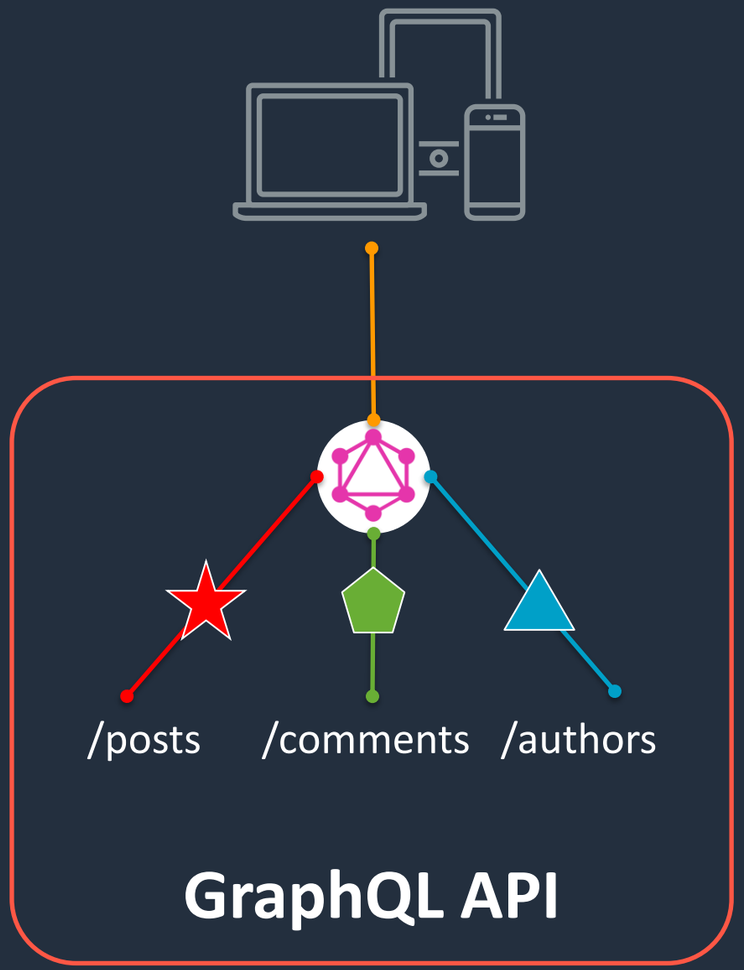
- Web services over HTTP
- Flexible
- Stateless
- Two flavors:
    - HTTP API (faster, cheaper)
    - REST API (more features)

WebSocket

- Two-way communication between application and clients
- Persistent connection, stateful
- Useful for:
    - Chat
    - Gaming
    - Data streaming
    - Real-time updates

Or consider GraphQL for data-heavy applications





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Serverless is more than compute

COMPUTE


AWS
Lambda


AWS
Fargate

DATA STORES


Amazon
S3


Amazon Aurora
Serverless


Amazon
DynamoDB

INTEGRATION


Amazon
EventBridge

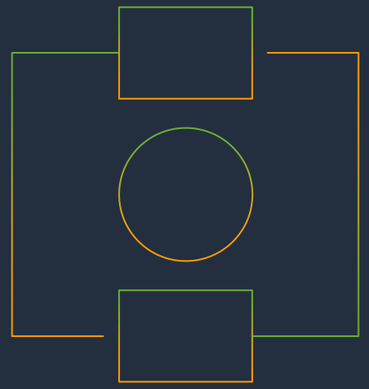

Amazon
API Gateway


Amazon
SQS


Amazon
SNS

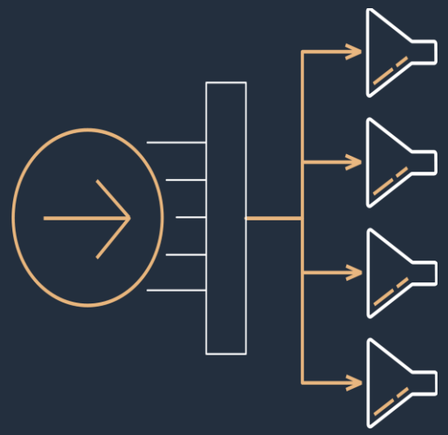

AWS
Step Functions


AWS
AppSync



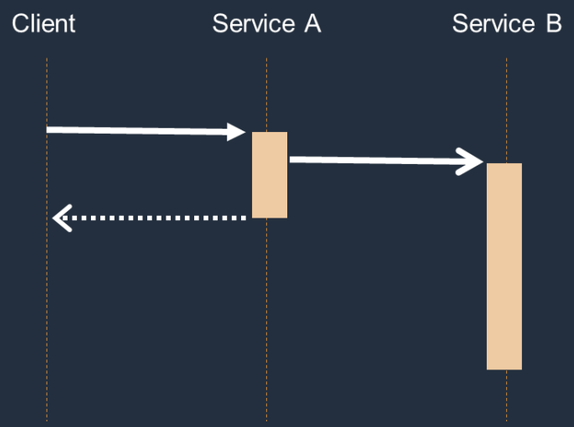
Events are the connective tissue of modern applications

Event-driven architectures drive reliability and scalability



Event Routers

Abstract producers and consumers from each other



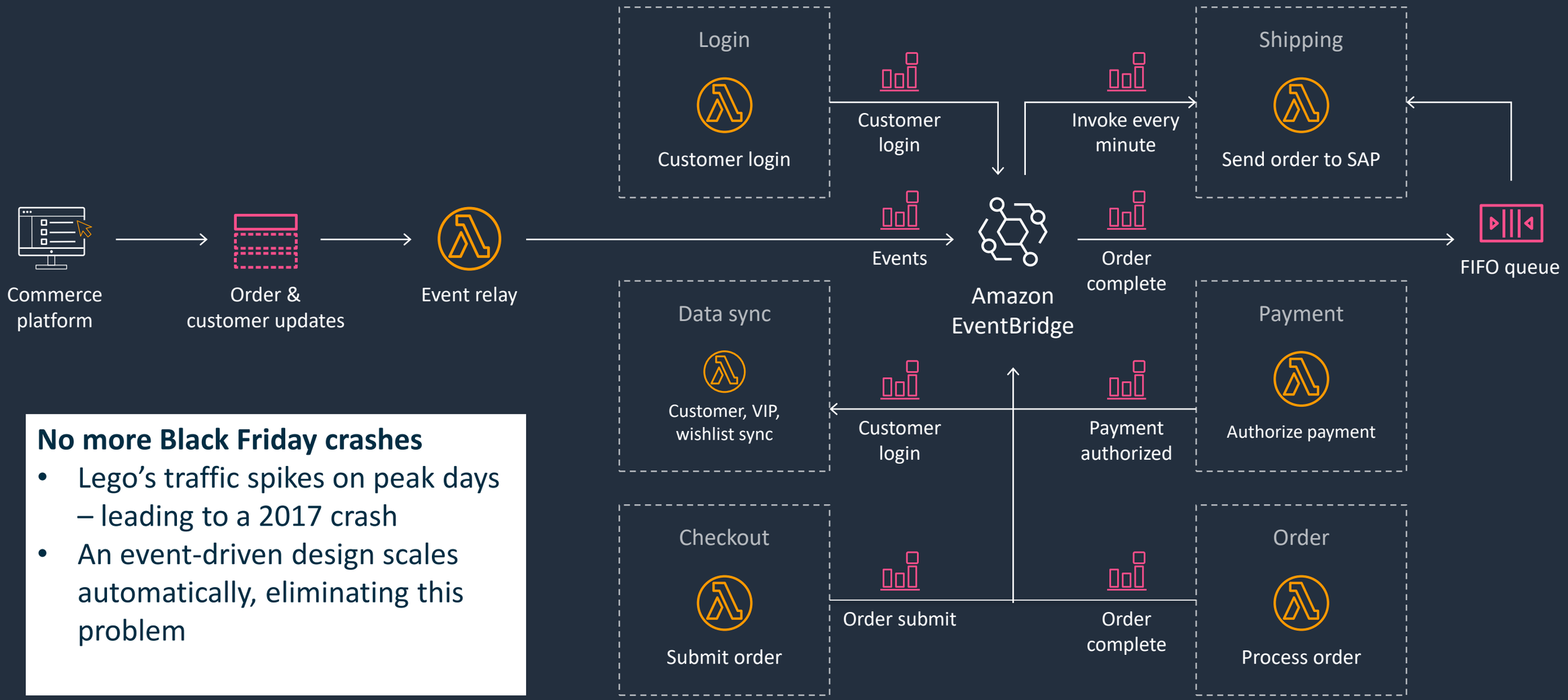
Asynchronous Events

Improve responsiveness and reduce dependencies

Event Stores

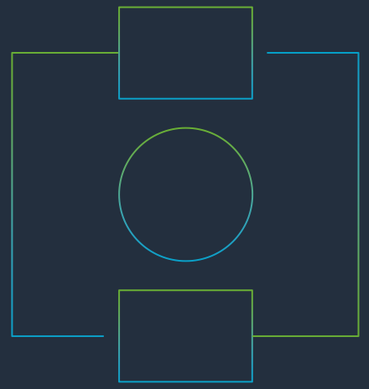
Buffer messages until services are available to process

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



Decoupling state from servers improves resilience and handles error cases better

When should I use serverless?

An age old question

Serverless fits numerous use cases

Typical early serverless uses include:

- IT Automation
- Microservices
- Data processing

If the workload is event-driven, stateless, and can be performed in under 15 minutes … it may be a good fit for serverless

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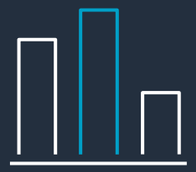
Serverless is about innovation

Increased agility

New extensions, OCI, and tooling



Excellent performance

10 GB memory, provisioned concurrency

High value

1 millisecond billing, Savings Plans

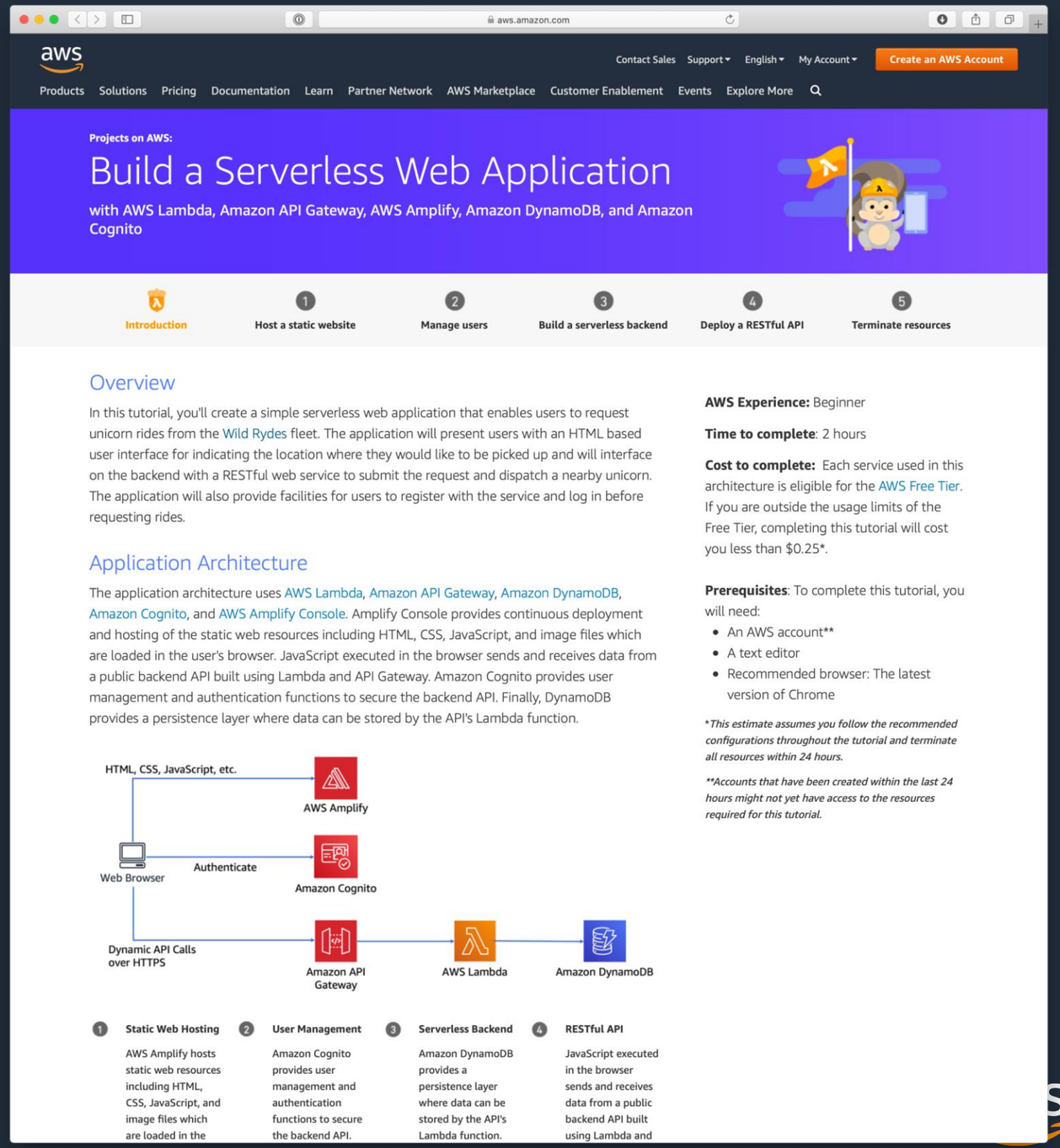
A complete portfolio

Comprehensive suite of services

Hands-on Workshop

Build a unicorn ride sharing start-up!

- Authentication
- Static frontend
- Full serverless!



Thank you!

https://aws.amazon.com/serverless/