Modern Applications on AWS

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Agenda

- What is App Modernization
- Monolith to Microservices
- Modernization – Technology Decisions
  - Architectural Patterns
  - Operational Model
  - Storage
  - Development & Deployment – Devops
  - Management & Governance
- Security
- Well-Architected Pillar

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Modern Application – What ?

Building applications today and continuously improve this automated, business focused solutions in the future

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Modern Application – Benefits

Faster to Market

Release features faster

Increased rate of innovation

Focus on Business Logic

Reduced costs

Total Cost of Ownership

More reliable applications

Decouple systems

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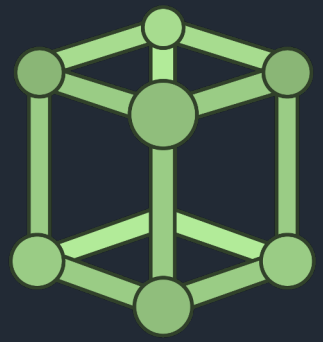
Monolith to Microservices - Amazon



Amazon.com in 2001
- 1 Monolith
- 1 Oracle for all

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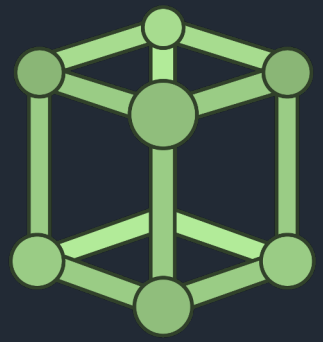

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2 pizza Teams
- Agile
- Ownership & autonomy
- Devops for innovation

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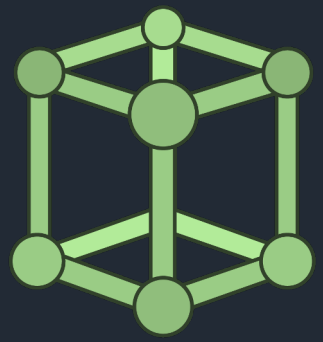
Monolith to Microservices - Amazon

Gradually creating events and APIs for various components



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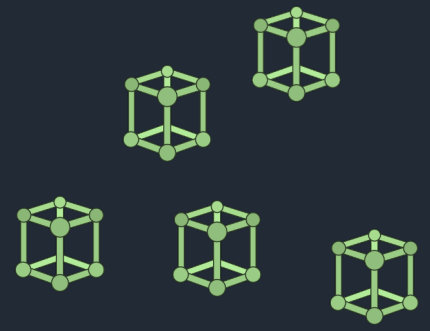

Amazon.com Today
- 1000+ Microservices
- 100+ Different Databases
- 60+ Million Deployment / year

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What is a Microservice ?

- Single Purpose (Monolith does everything)

- Black Boxes to each others

- Communication through APIs

- You build it you run it

- Isolated: Different technology which leads to usage of the right tool

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Technology Decisions for Modernization

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APIs are the front door

- Service communicate with each other
- Front door of microservices
- Avoid Chaos with repository of well described APIs

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API Gateway

API Gateway

Serverless Unified API frontend (EC2, Lambda)

Authenticate and Authorize (E.g: Cognito)

Network protection: Throttling and DDOS

Throttling and monetize API usage

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Event-driven - architecture pattern

Events: how a system might react to changes.

Explicitly send to some system

A process creates an event, services can react on their own

Command

Observable

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Event-driven – new benefits

Event Routers: Loosly coupled, the producer is not aware of the consumers (Abstraction)
AWS Service: EventBridge

Asynchronous Events : No need to wait for a response (Better resilience and responsiveness)

Event Stores: Buffer / Holding until consumers are ready
AWS Services: AWS SQS, Amazon MQ

Easy Extension or Modification in the future

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Amazon EventBridge

EventBridge

Serverless bus service

- Fully managed and serverless
- Integrate with AWS Services and Saas providers (Zendesk, MongoDB)
- Easily build event-driven architecture
- Cost optimized
- 17+ target Services

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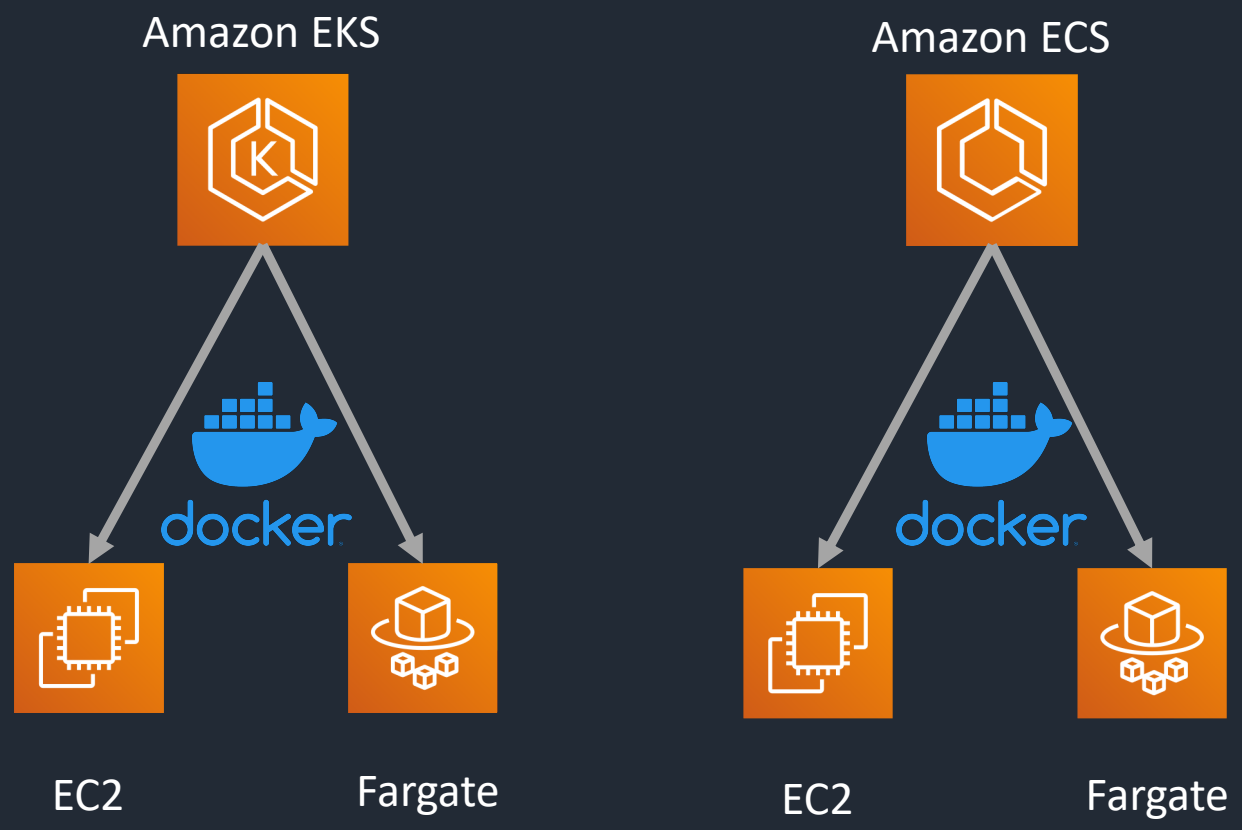
Microservices - Containers

Orchestration Tools

Launch Type



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Operational Model – Heavy Lifting

Physical Machines

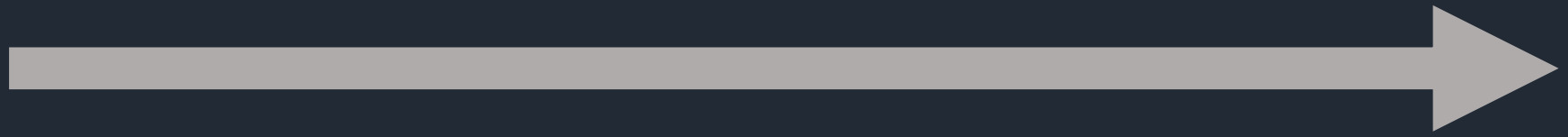
Virtual Machines

Containerization

AWS Fargate

AWS Lambda

Serverless



Business Logic, Abstraction:
Offload the undifferentiated heavy Lifting

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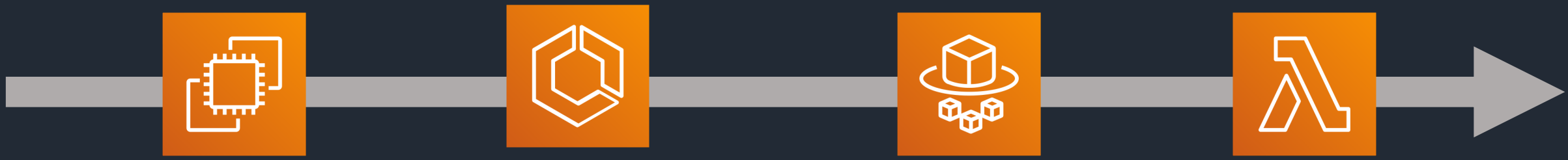
Operational Model – Heavy Lifting

Less responsibilities



	Amazon EC2	ECS / EKS	AWS Fargate	AWS Lambda
AWS	• Physical hardware software, networking, and facilities	• Container orchestration control plane • Physical hardware software, networking, and facilities	• Container orchestration, provisioning • Cluster scaling • Physical hardware, host OS/kernel, networking, and facilities	• Data source integrations • Physical hardware, software, networking, and facilities • Provisioning
You	• Application code • Data source integrations • Security config and updates, network config • Provisioning, managing scaling and patching of servers	• Application code • Data source integrations • Work Clusters • Security config and updates, network config • Tasks Management	• Application code • Data source integrations • Security config and updates, network config • Tasks Management	• Application code

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Operational Model – AWS do the Heavy Lifting

Less Operational Load for all workloads with Managed services

Amazon DynamoDB

Amazon S3

Amazon Athena

Amazon SQS

Amazon SNS

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Operational Model – Serverless

Achieve the maximum value from the Cloud

No Server to manage

Auto Scaling out of the box

Pay for usage

High Availability and less operations

- Build and Think in Business not Infrastructure
- Operate on Business Events (e.g: cart order) and not run rate

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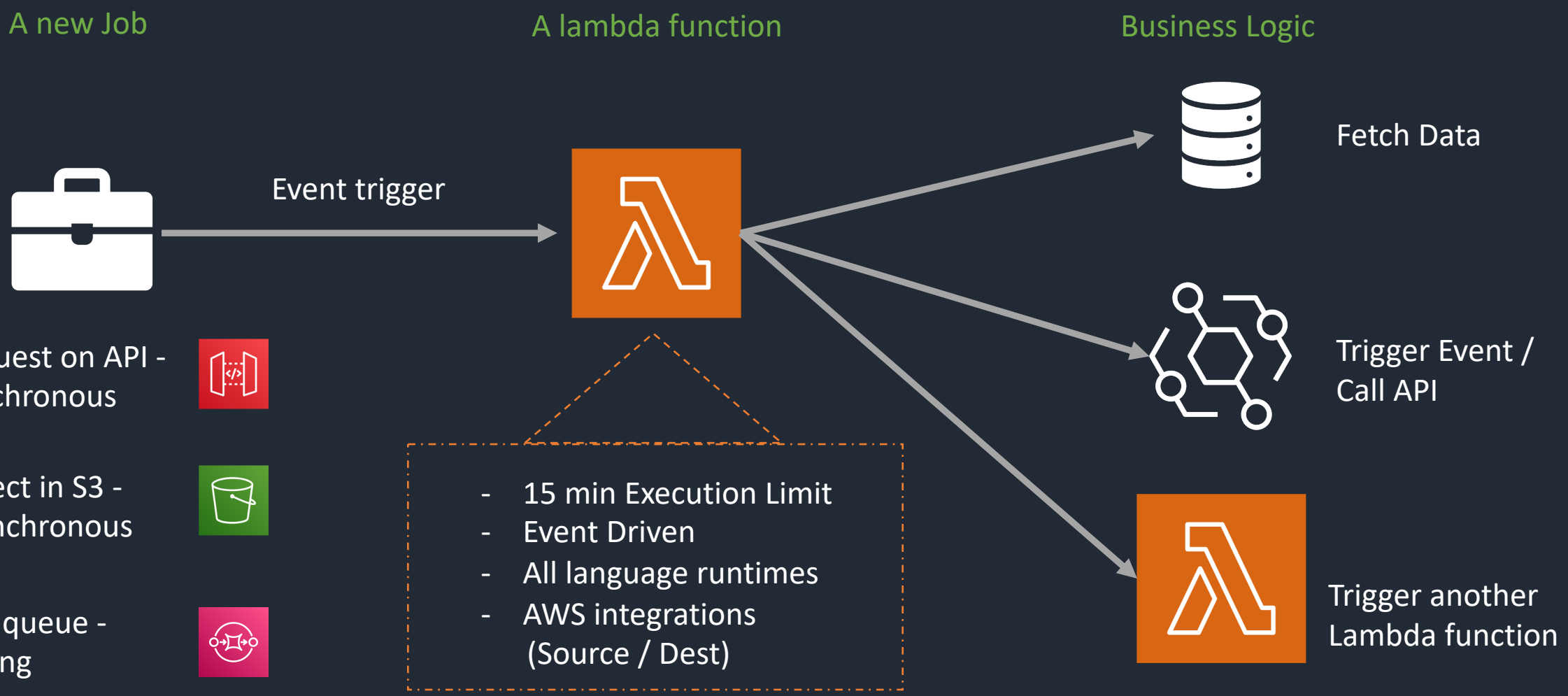
Lambda – Event Based



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AWS Lambda

Web Apps | Backend | Data Processing | Chatbots | Amazon Alexa | IT Automation

Amazon S3

Amazon DynamoDB

AWS CodeCommit

Amazon Cloudwatch

Amazon API Gateway

AWS IoT

Amazon SNS

A lot more...

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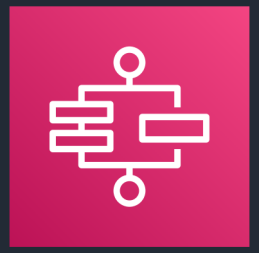
Orchestration

15 min execution with event trigger shows limits: Complex Logic, Long running job, Try/catch



AWS Step Functions

- Orchestrate complex job
- Integration with other AWS services
- Define in JSON
- Visualize in Console
- Monitor Executions

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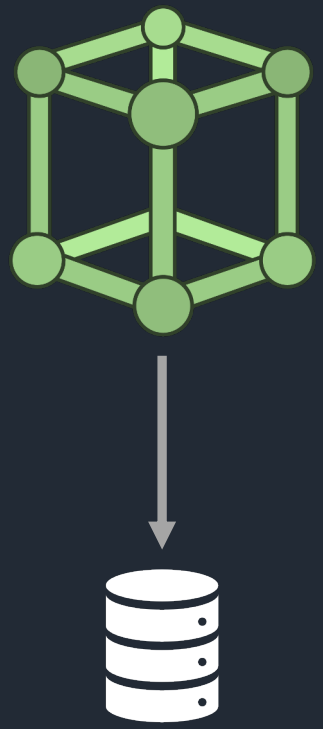
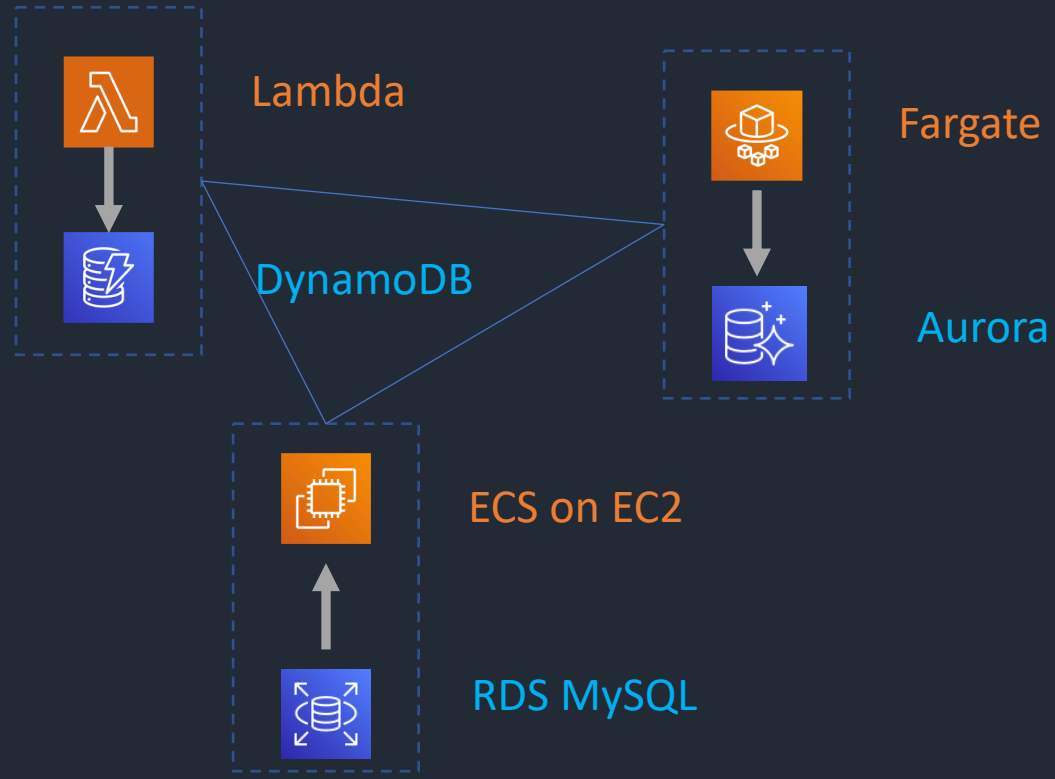
Data management – Right tool for the job

Monolith System



Single Source of Truth Database

Problems: Scalability and Fault Tolerance



Loosly coopled, own scalability, reliability, security

+15 purpose built DB

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Traditional three-tier app

Separation of Skills and Responsibilities

Presentation

Web Servers

Business Logic

App Servers

Data

Database Servers

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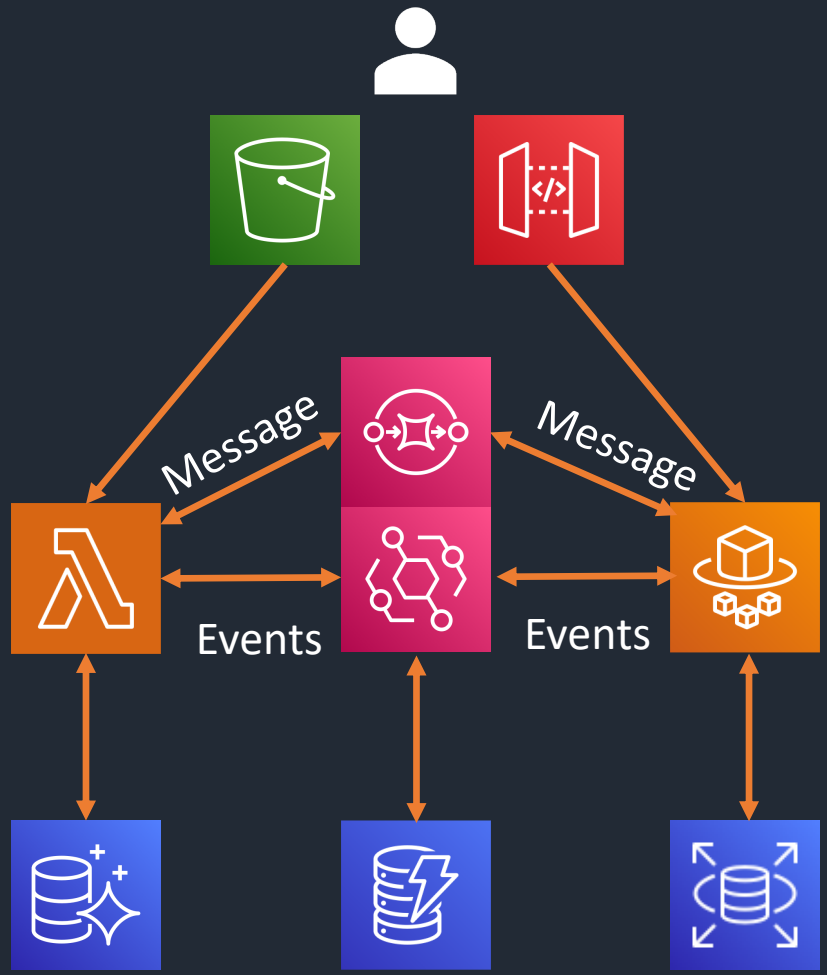
Modern three-tier app – a single microservice

- APIs Communication
- Stateless
- Purpose Built Databases
- Events + Queues = Loosly coupled & Scalability



Presentation

Business Logic

Data

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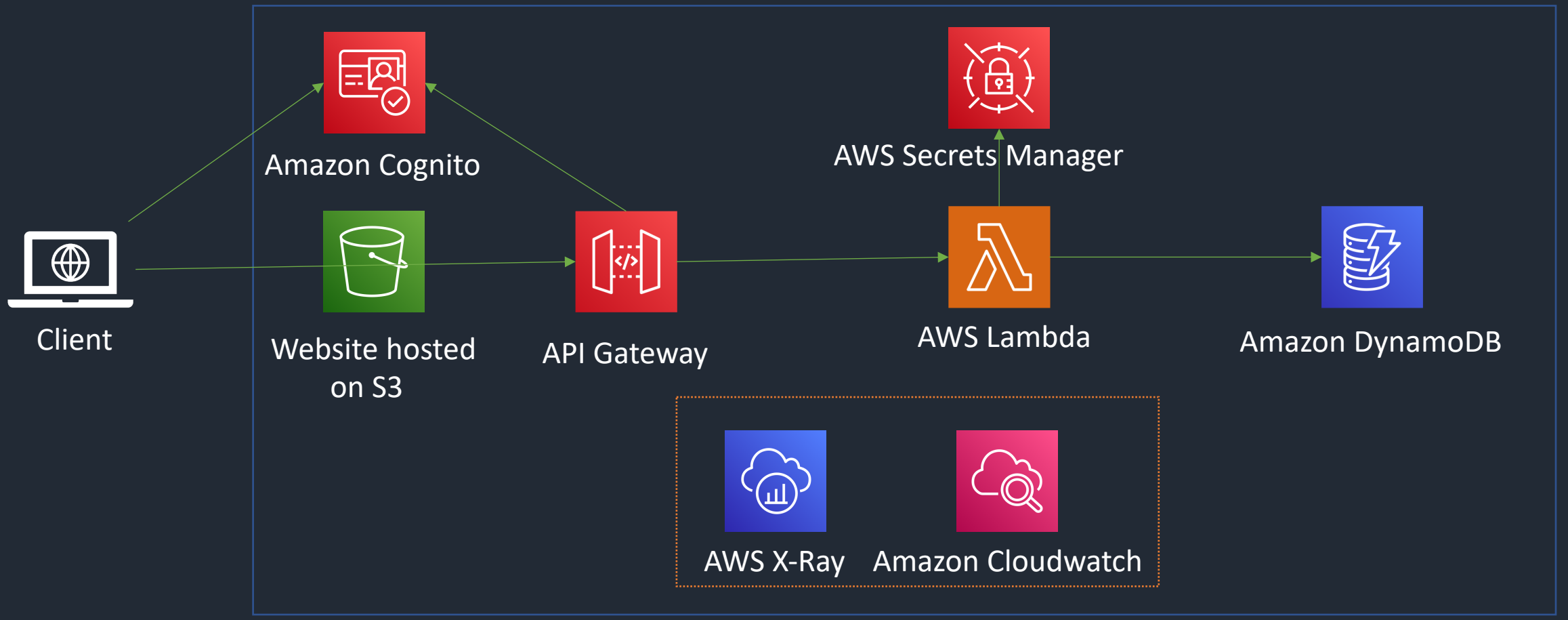
Modern three-tier app – REST example



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Devops – Developer Tools

Amazon CodeCommit

Amazon CodeBuild

Amazon CodeDeploy

Amazon CodePipeline

You Build it you Run it - Pipeline

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Devops – Developer Tools

Amazon CodeStar

AWS Command Line

AWS Cloud9

AWS SDK

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AWS Infrastructure as Code

AWS CloudFormation:

- Infrastructure as code
- Easy to provision and manage a collection of related AWS resources
- Input .yaml file and output provisioned AWS resources
- Optimized for infrastructure

AWS SAM:

- CloudFormation extension optimized for serverless
- New serverless resources: functions, APIs, and tables
- Supports anything CloudFormation supports

AWS Cloud Development Kit (CDK):

- Programming output in Cloudformation stack
- Supports TypeScript, JavaScript, Python, Java, and C#/.Net

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Framework Amplify

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Benefits of Modern App

Scales to
millions of users

Global availability

Responds
in milliseconds

Handles
petabytes of data

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Well Architected Framework

5 pillars to evaluate architectures

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Thank you !

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