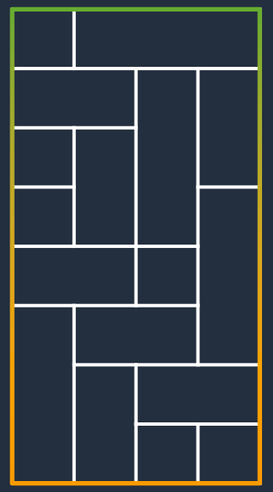
Serverless First Call Deck

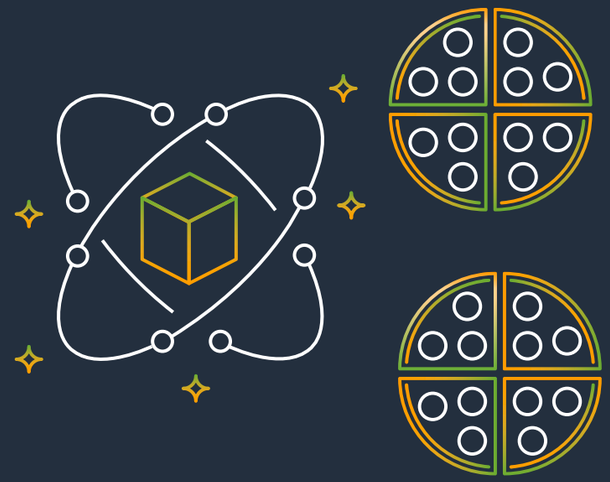
Development transformation at Amazon: 2001–2002

Lesson learned: decompose for agility

2001 ----------> **2002**



monolithic application
+ teams



microservices
+ 2 pizza teams

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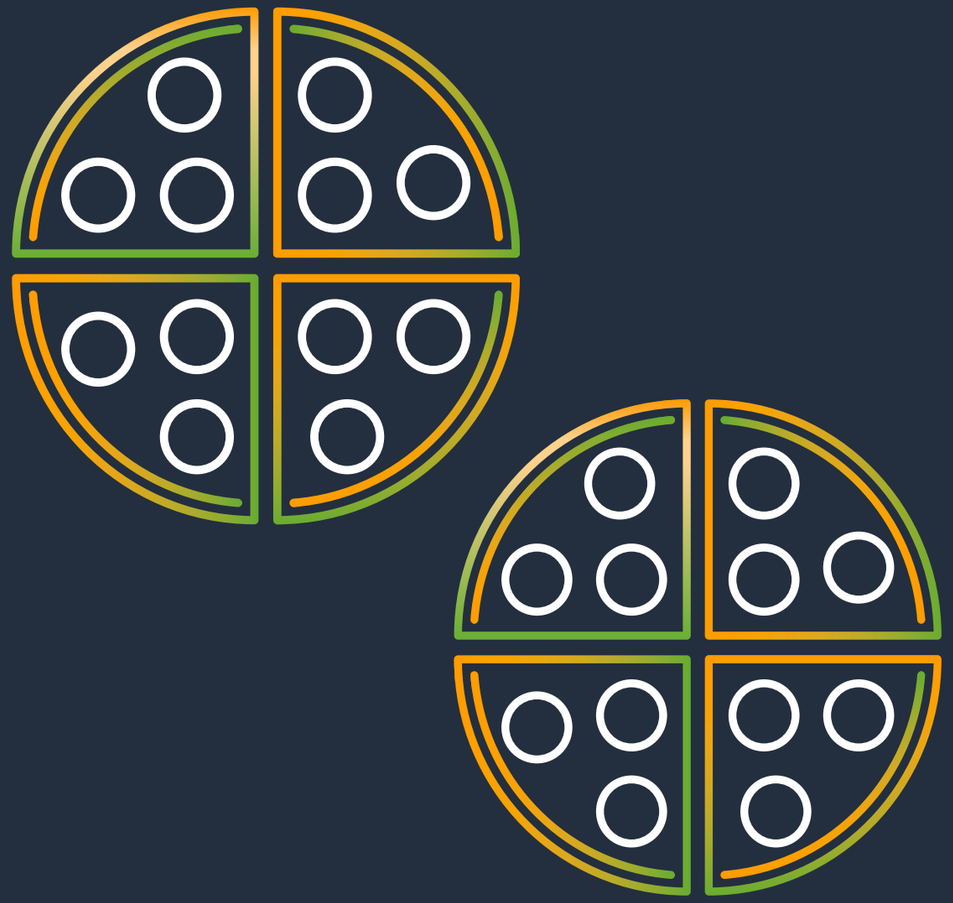
Two-pizza teams



Full ownership

Full accountability

“DevOps”

Focused innovation

What changes have to be made in this new world?

Architectural patterns

Operational model

Software delivery

Changes to the architectural patterns

When the impact of change is small, release velocity can increase

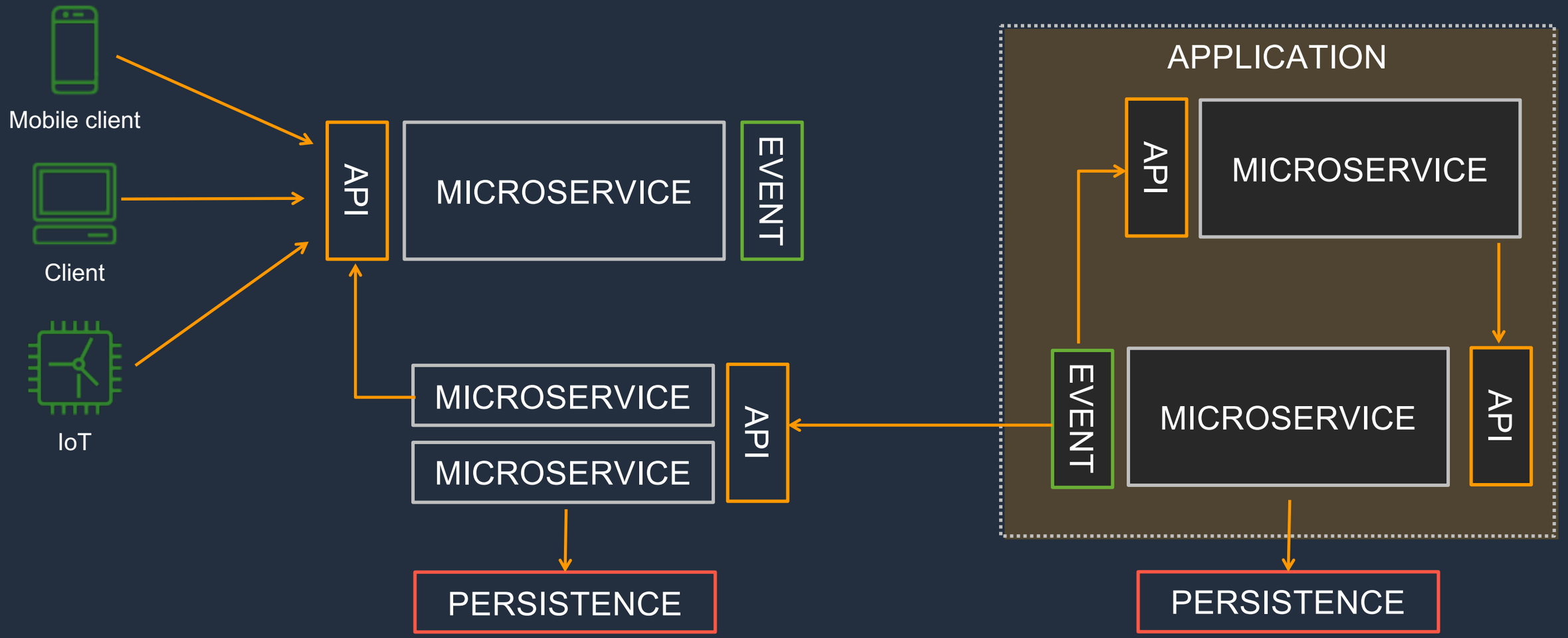
Monolith

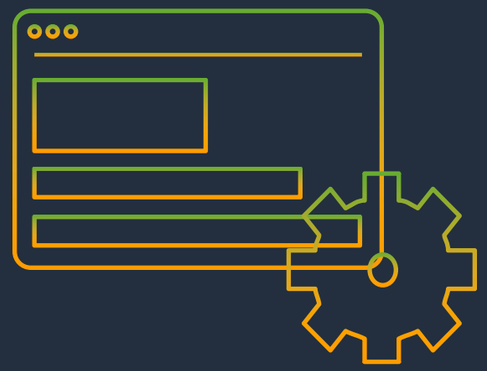
Does everything

Microservices

Does one thing

Microservices architectures





APIs are the front door of microservices

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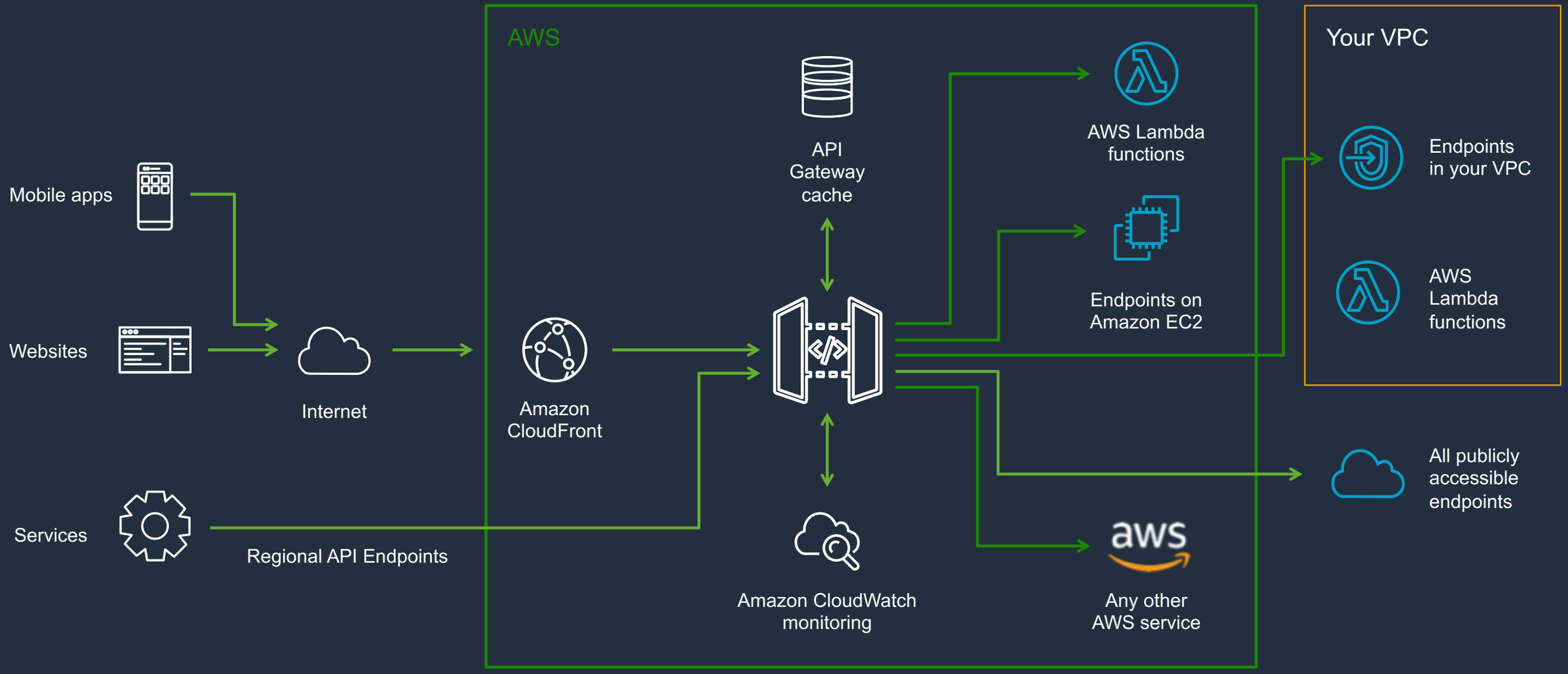
Manage APIs with API Gateway



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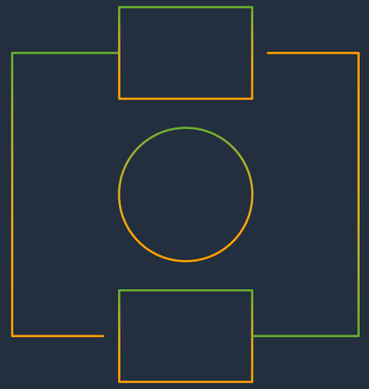

Event-driven architectures

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Decouple state from code using messaging

Messaging

Amazon Simple Queue Service

Queues

Simple

Fully-managed

Any volume

Amazon Simple Notification Service

Pub/sub

Simple

Fully-managed

Flexible

Amazon CloudWatch Events

Synchronization

Rapid

Fully-managed

Real-time

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And data streams

Data Stream Capture

Amazon Kinesis Data Streams

Ingest

Data streams

Data processing

Real-time

Amazon Dynamo DB

Data Store

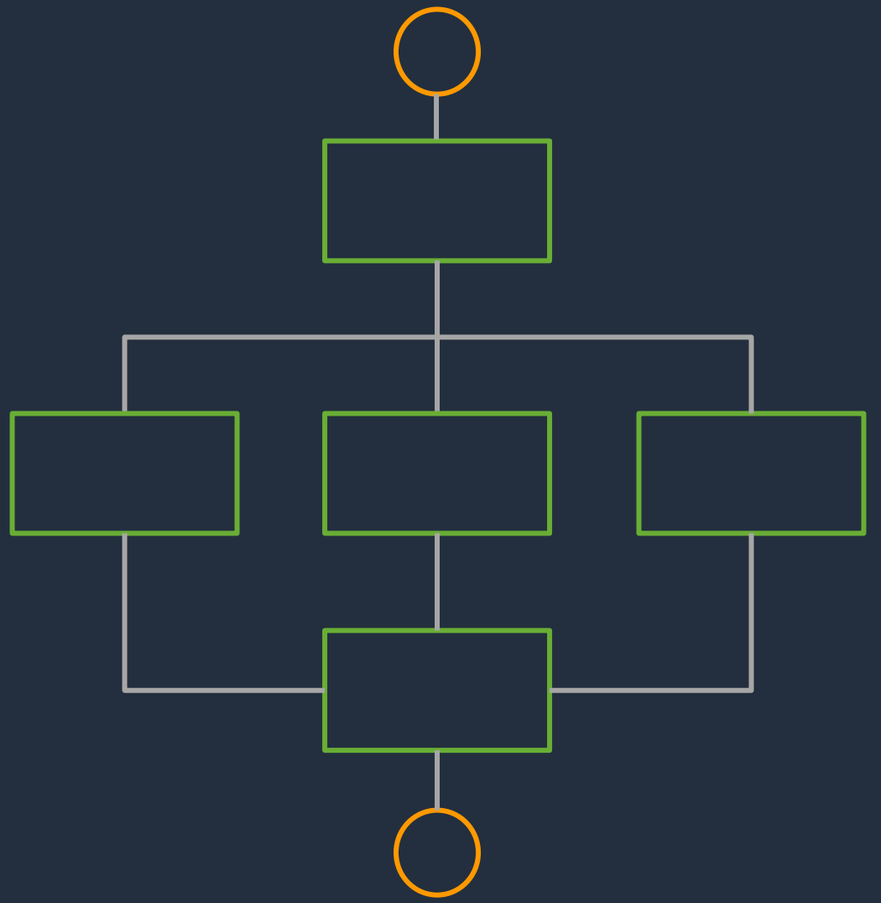
Microservices

Performance at scale

Fast and Flexible

Build workflows to orchestrate everything

Track status of data and execution



Remove redundant code

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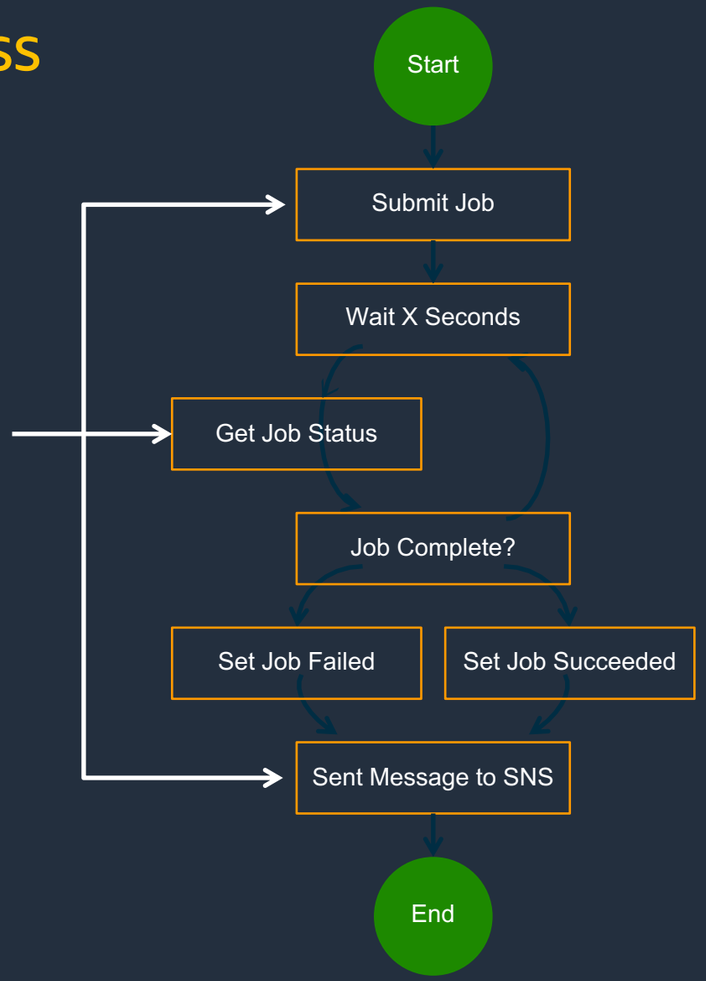
Simpler integration, less code

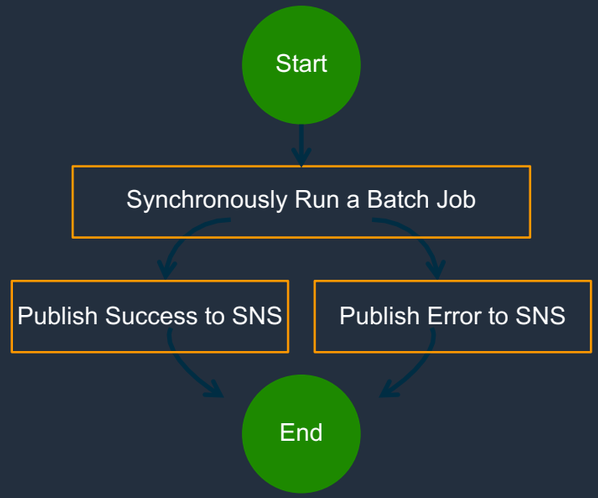
With serverless polling

AWS Lambda functions



With new service integration

No Lambda functions



Cloud-native architectures are small pieces, loosely joined

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Changes to the operational model

Isn’t all of this very hard now that we have lots of pieces to operate?

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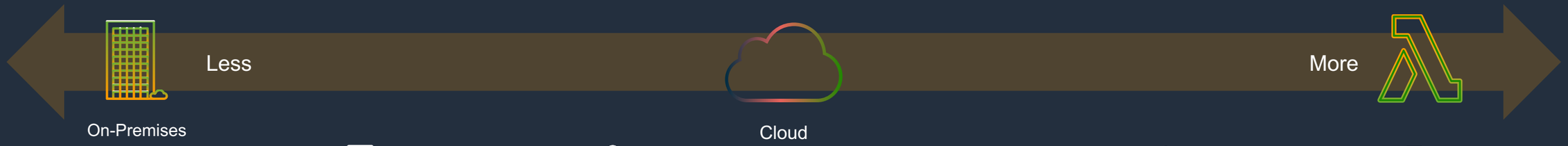
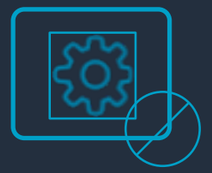
AWS operational responsibility models



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

What is serverless?



No infrastructure provisioning, no management

Automatic scaling

Pay for value

Highly available and secure

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Serverless is an operational model that spans many different categories of services

COMPUTE


AWS Lambda


AWS Fargate

DATA STORES


Amazon S3


Amazon Aurora Serverless


Amazon DynamoDB

INTEGRATION


Amazon API Gateway


Amazon SQS


Amazon SNS


AWS Step Functions


AWS AppSync

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Let’s focus on compute for now

AWS Lambda

Serverless event-driven code execution

Short-lived

All language runtimes

Data source integrations

AWS Fargate

Serverless compute engine for containers

Long-running

Bring existing code

Fully-managed orchestration

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Comparison of operational responsibility

	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
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
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

Making development easier with AWS Lambda

Accessible for all developers

Support for all runtimes with Lambda Layers and Runtime API

ISO, PCI, HIPAA, SOC, GDPR, and FedRamp compliances

Greater productivity

Toolkits for popular IDEs:

VSCode, IntelliJ, and PyCharm

Simplified deployment with nested apps

Enable new application patterns

15 minute functions

SQS for Lambda

Automatic Load Balancing for Lambda

Support for Kinesis Data Streams Enhanced Fan-Out and HTTP/2

Trillions of executions every month for hundreds of thousands of active customers

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Lambda Layers

Lets functions easily share code: Upload layer once, reference within any function

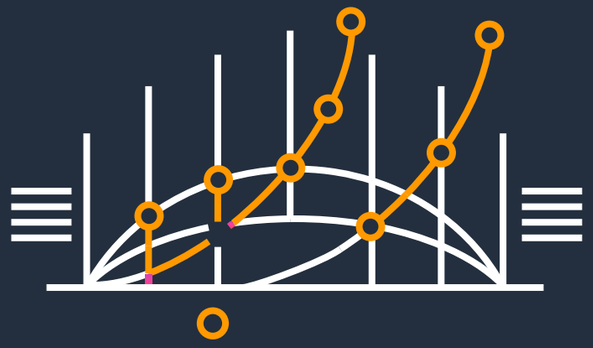
Promote separation of responsibilities, lets developers iterate faster on writing business logic

Built in support for secure sharing by ecosystem

Accelerating Fargate and Lambda with Firecracker

Security

Speed by design



Scale and efficiency

Firecracker is open sourced to enable broad access and innovation

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Changes to the delivery of software

How do I develop and deploy code in a serverless microservices architecture?

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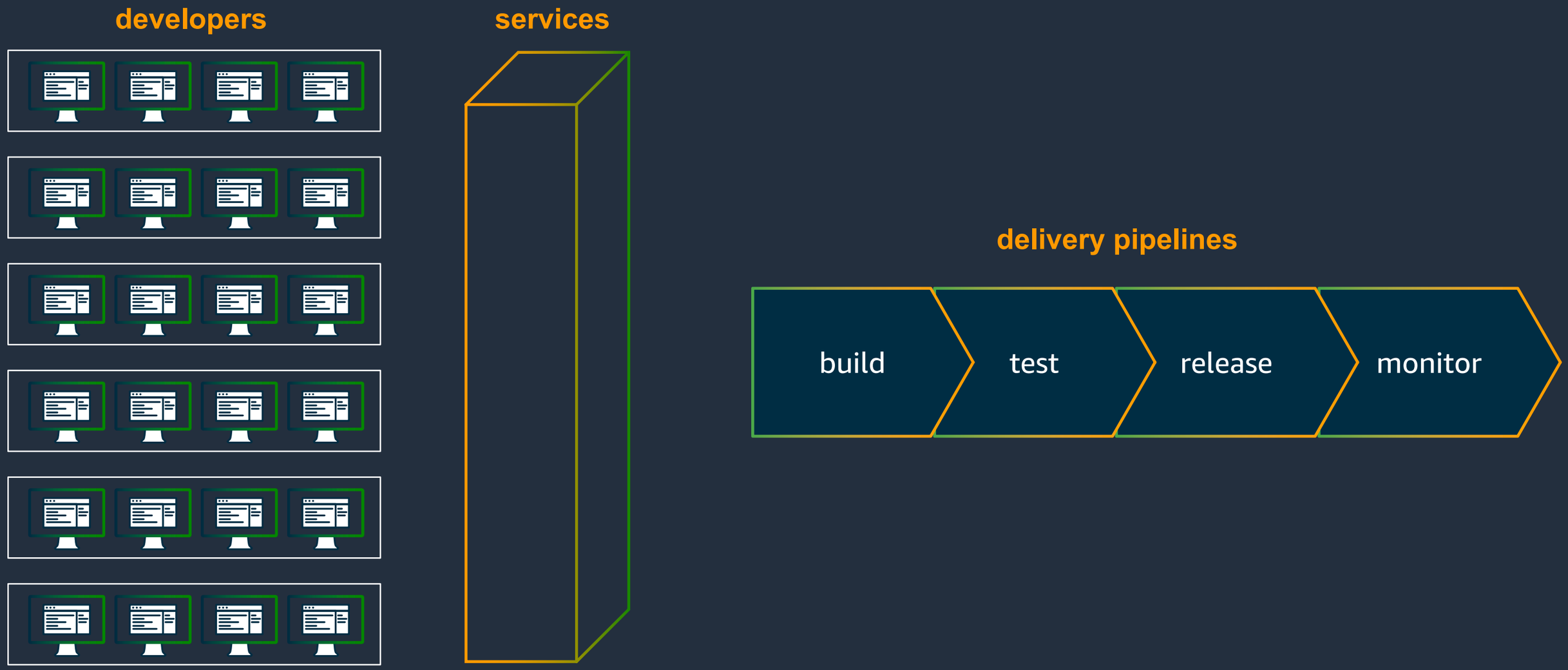
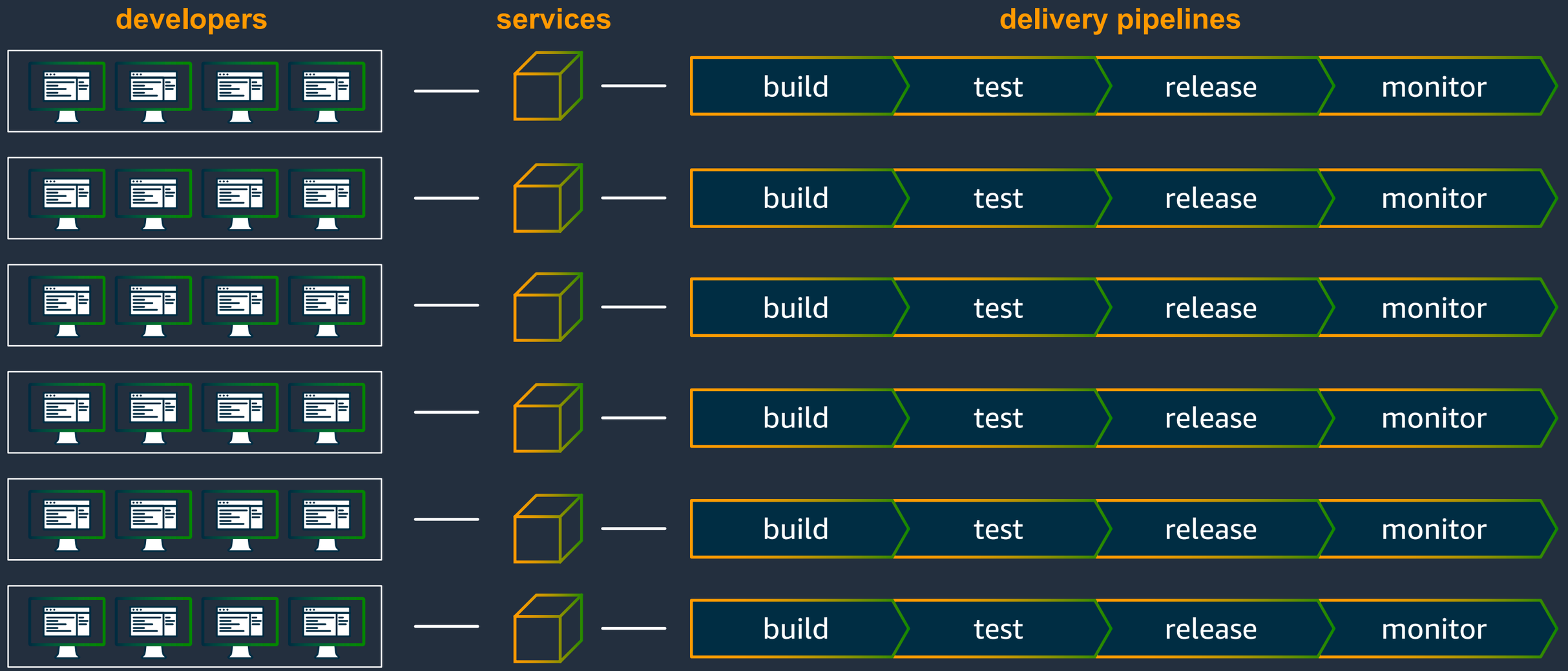
Monolith development lifecycle



Microservice development lifecycle



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Best practices

Decompose for agility
(microservices, 2 pizza teams)

Automate everything

Standardized tools

Belts and suspenders
(governance, templates)

Infrastructure as code

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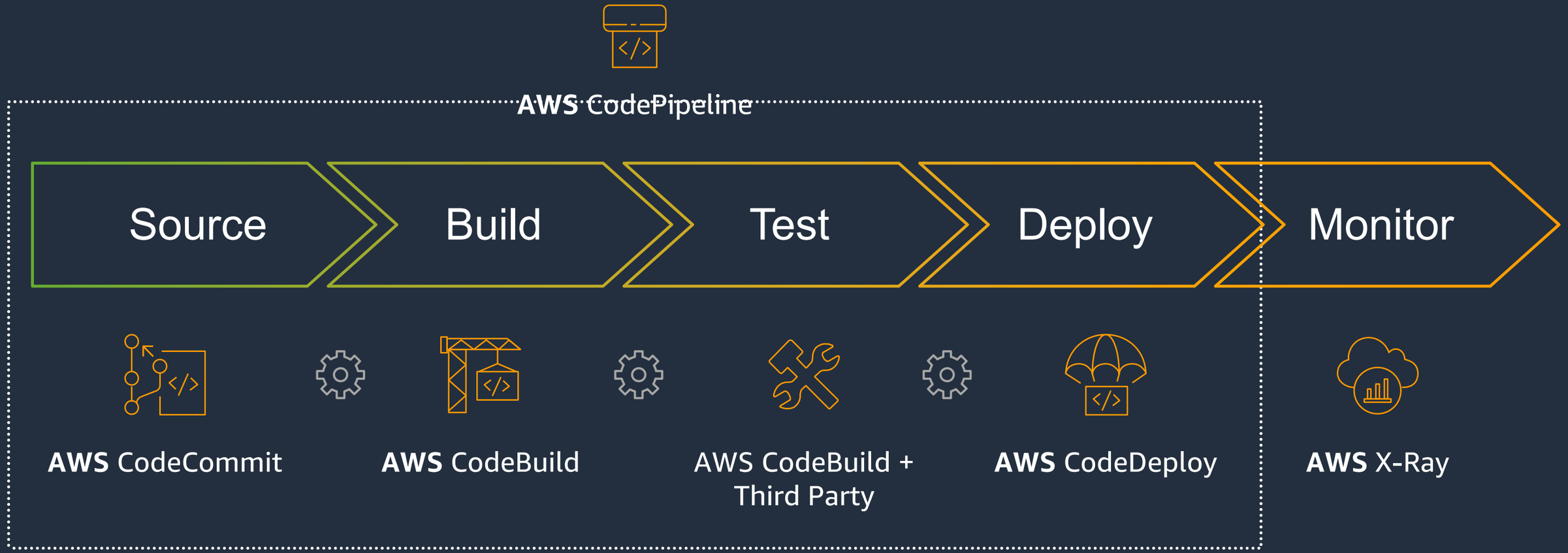
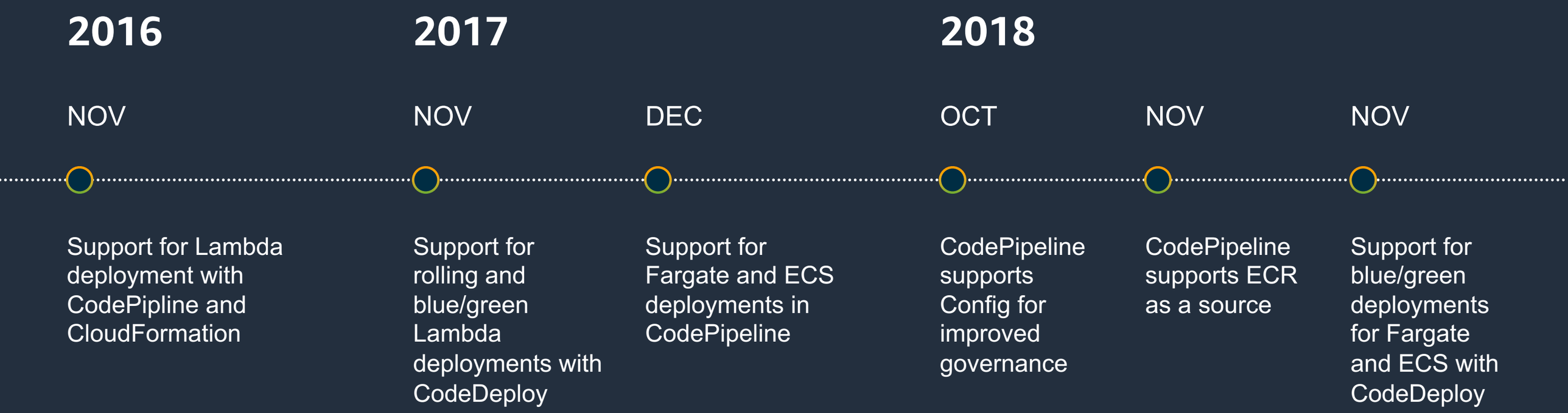
AWS Developer Tools for CI/CD



AWS Developer Tools are focused on supporting containers and Lambda



AWS X-Ray is Built for Modern Applications

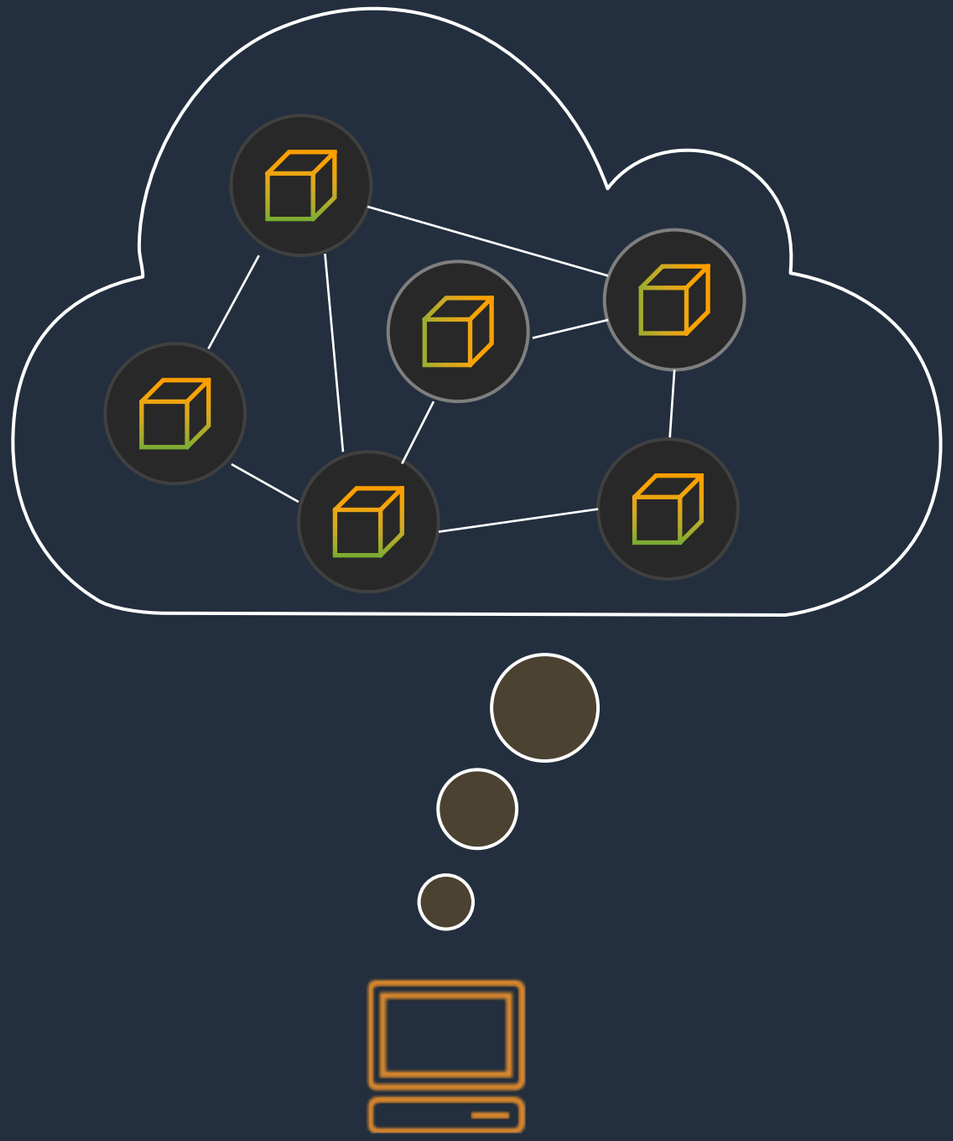
Analyze and debug issues quickly

End-to-end view of individual services

Identify customer impact

Support for Serverless

How do I edit and debug my serverless application code?



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Author and debug Lambda applications on AWS using your favorite IDEs

AWS Cloud9

Python, Node

AWS Toolkit for PyCharm

Python

Developer Preview

AWS Toolkit for IntelliJ

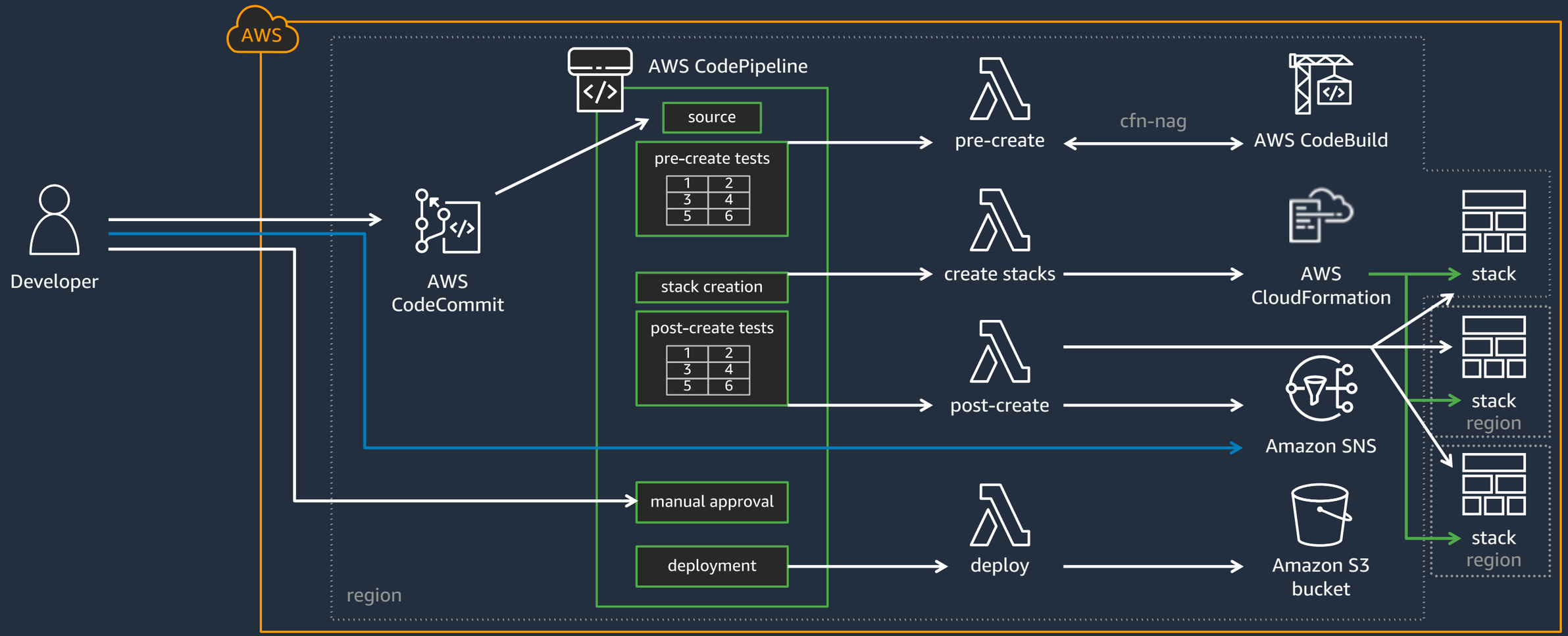
Java, Python

Developer Preview

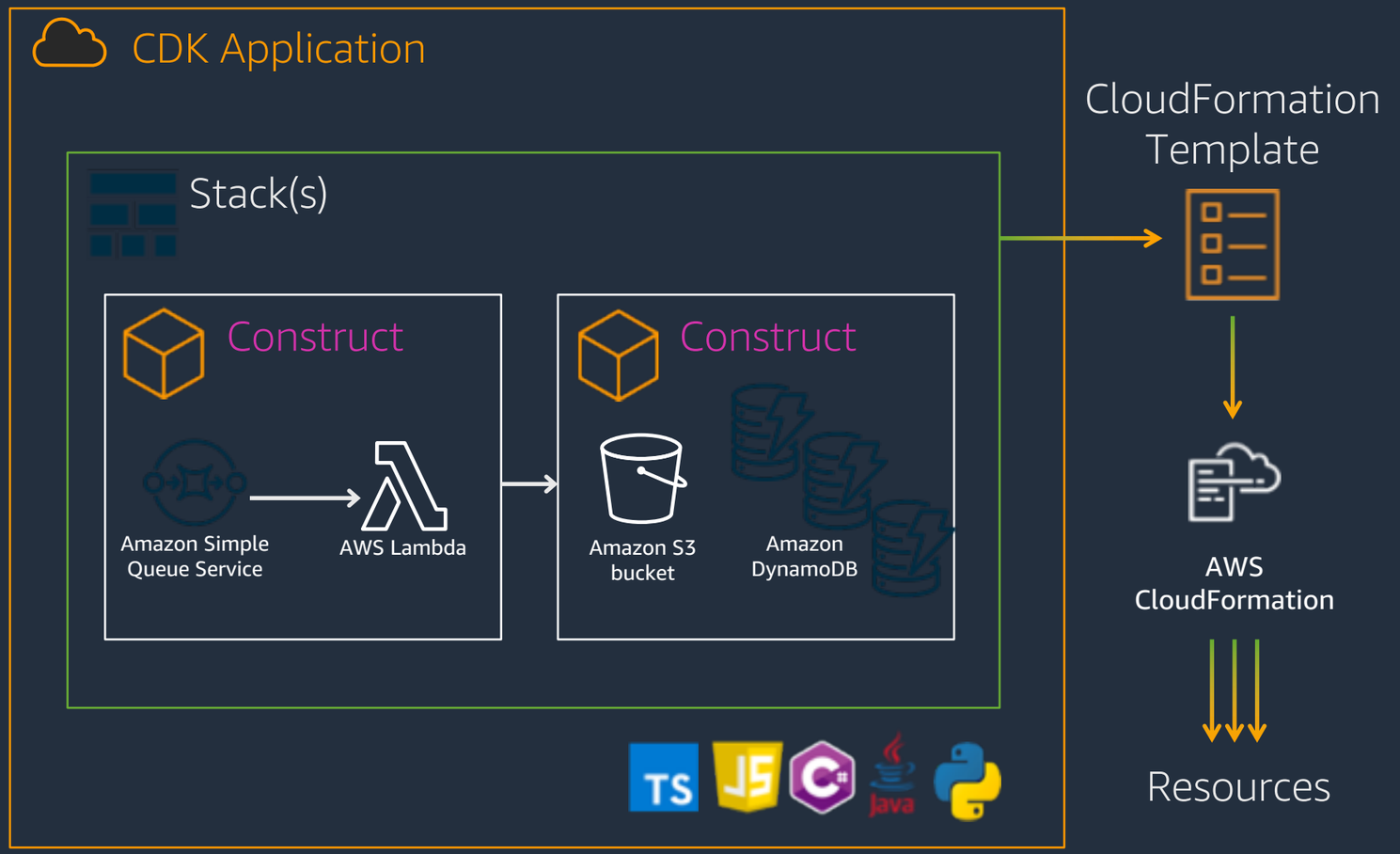
AWS Toolkit for Visual Studio Code

.NET, Node

How can we best model and provision our infrastructure?



AWS Cloud Development Kit



Application models simplify building serverless applications

AWS SAM

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AWS customers are pioneering modern applications

reduced overall compute costs by 95%

cut processing time from 36 hours to 10 seconds

created a stock trade validation system in 3 months

releases over 50+ deployments per hour

Common Adoption Patterns

Leap-frog adoption

Organic adoption

Incremental refactoring

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Conclusion

We are building a cloud that best supports your modern application development needs, and we are innovating across the entire stack: from the hypervisor layer to the application construction layer.