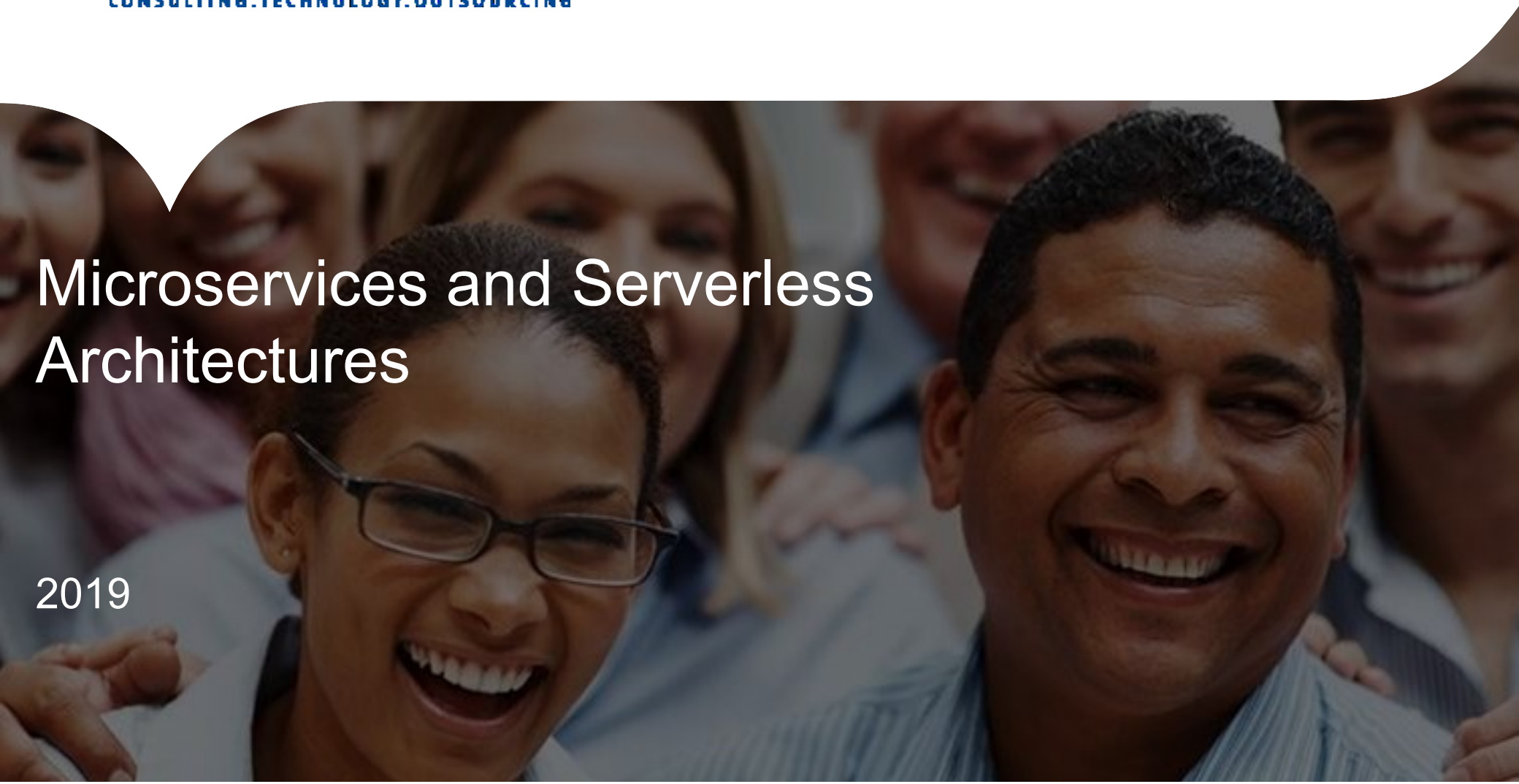
Capgemini
CONSULTING.TECHNOLOGY.OUTSOURCING



Microservices and Serverless Architectures

2019

People matter, results count.

Agenda

1. Building Microservices
2. Container Services
3. Going Serverless
4. Lab: Implementing Serverless Architecture with AWS Managed Services

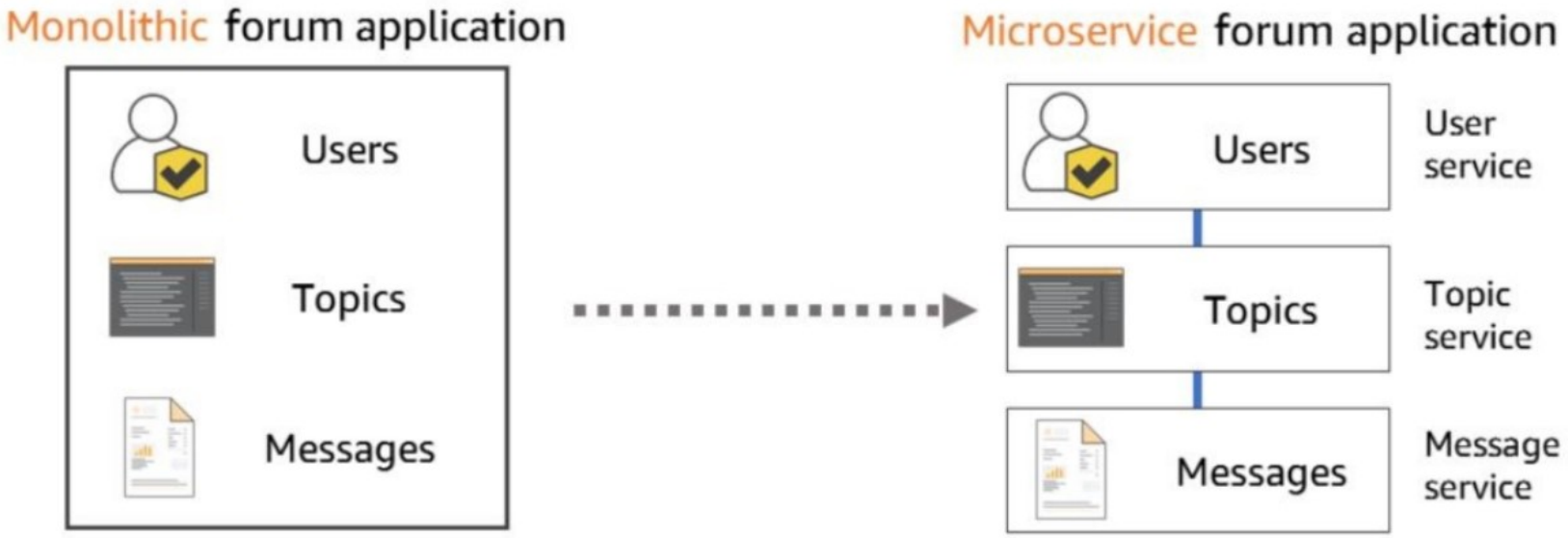
Building Microservices

What are Microservices?

Applications composed of independent services that communicate over well-defined APIs

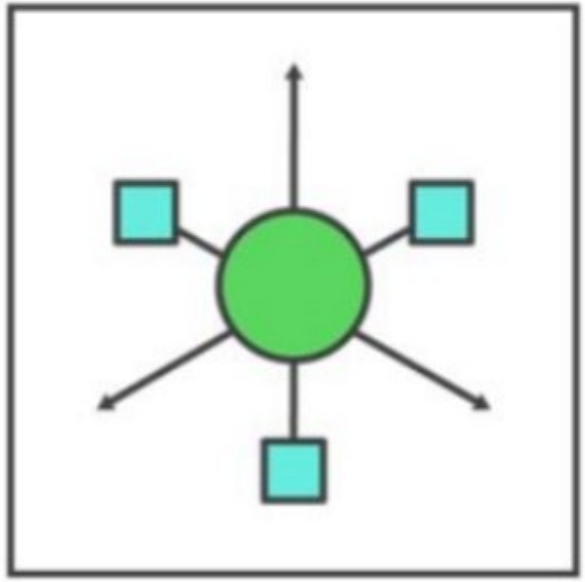
What are Microservices?

Applications composed of independent services that communicate over well-defined APIs

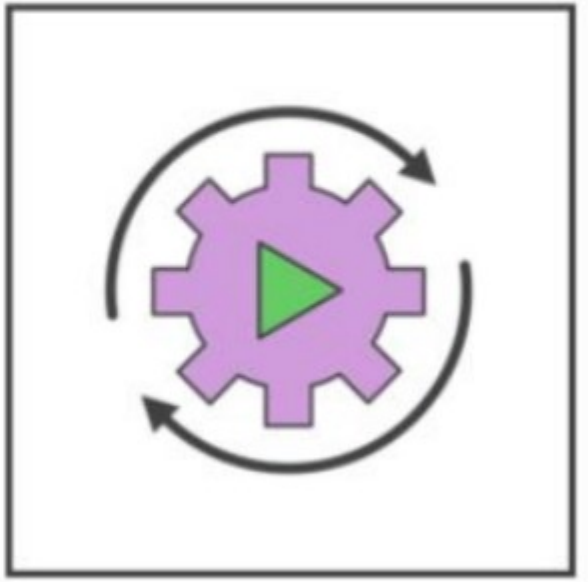


Characteristics of Microservices

Autonomous



Specialized



Container Services

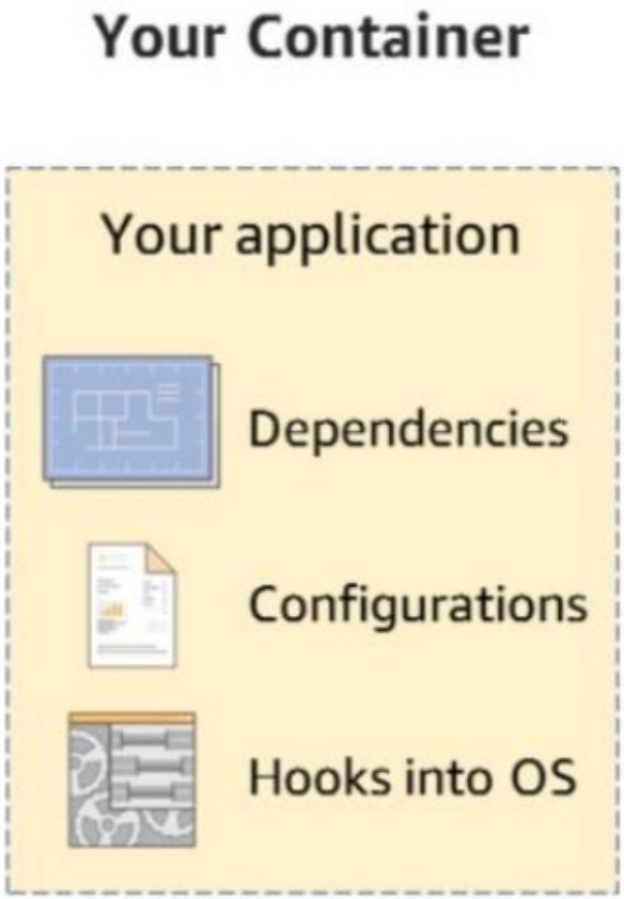
Lets Talk About Containers

Repeatable

Self-contained execution environments

Faster to wind up and down than VMs

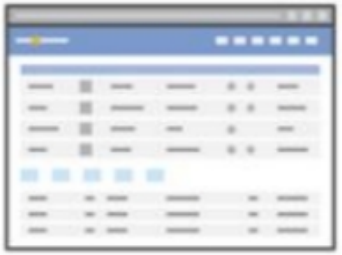
What is Container?



What Problems can Containers Solve?

Getting software to run reliably in different environments

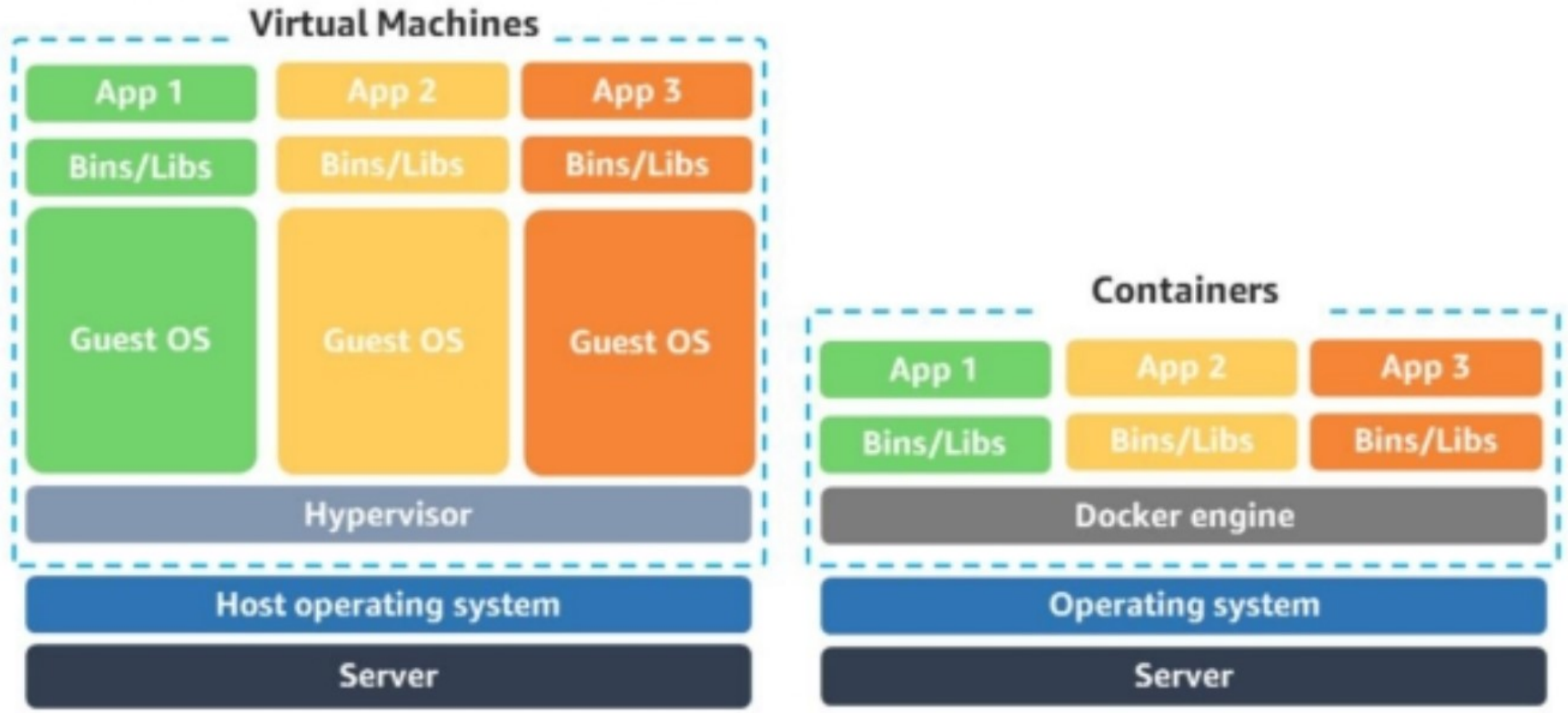
Developer's workstation



Production

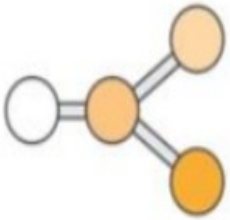
Test environment

Containers Vs. Virtual Machines



Amazon Elastic Container Service (Amazon ECS)

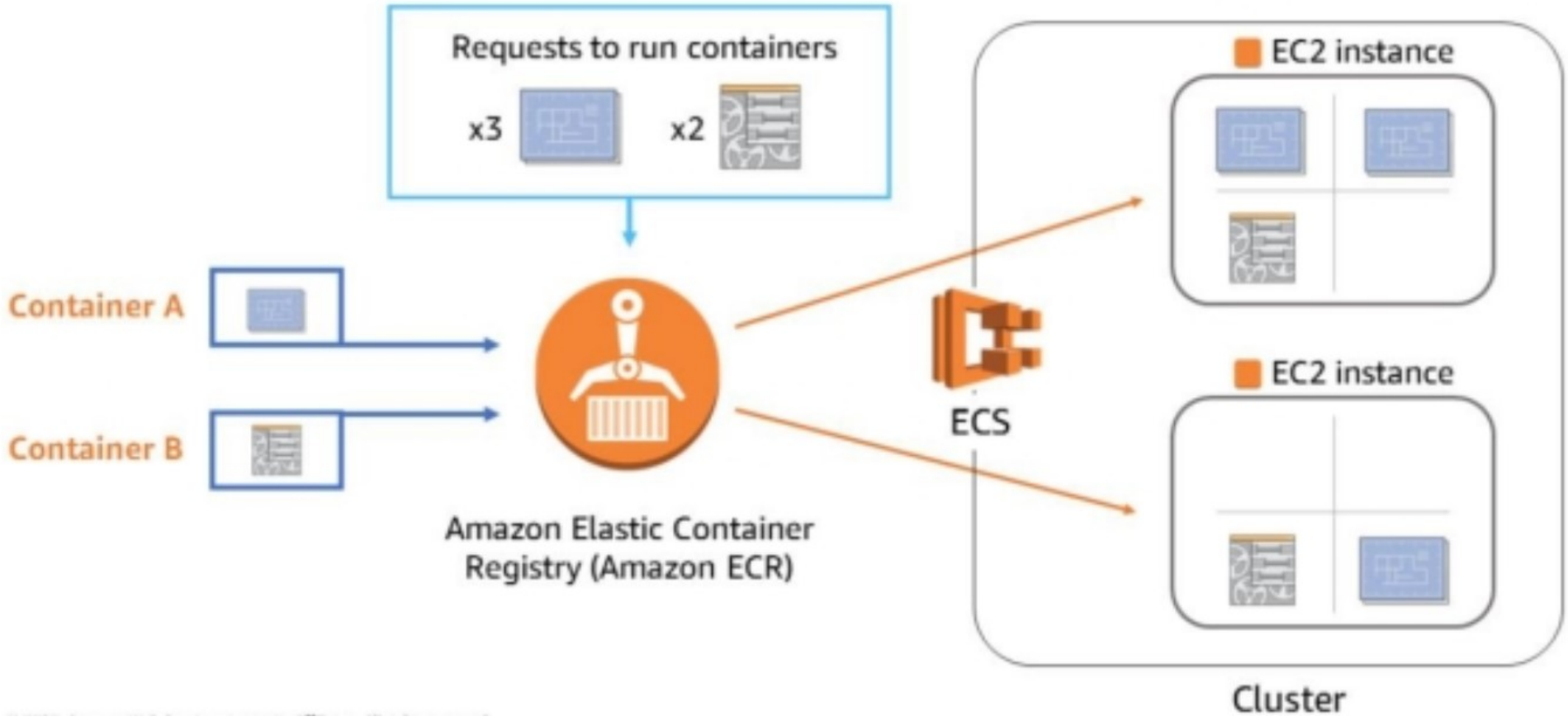
Orchestrates the execution of containers



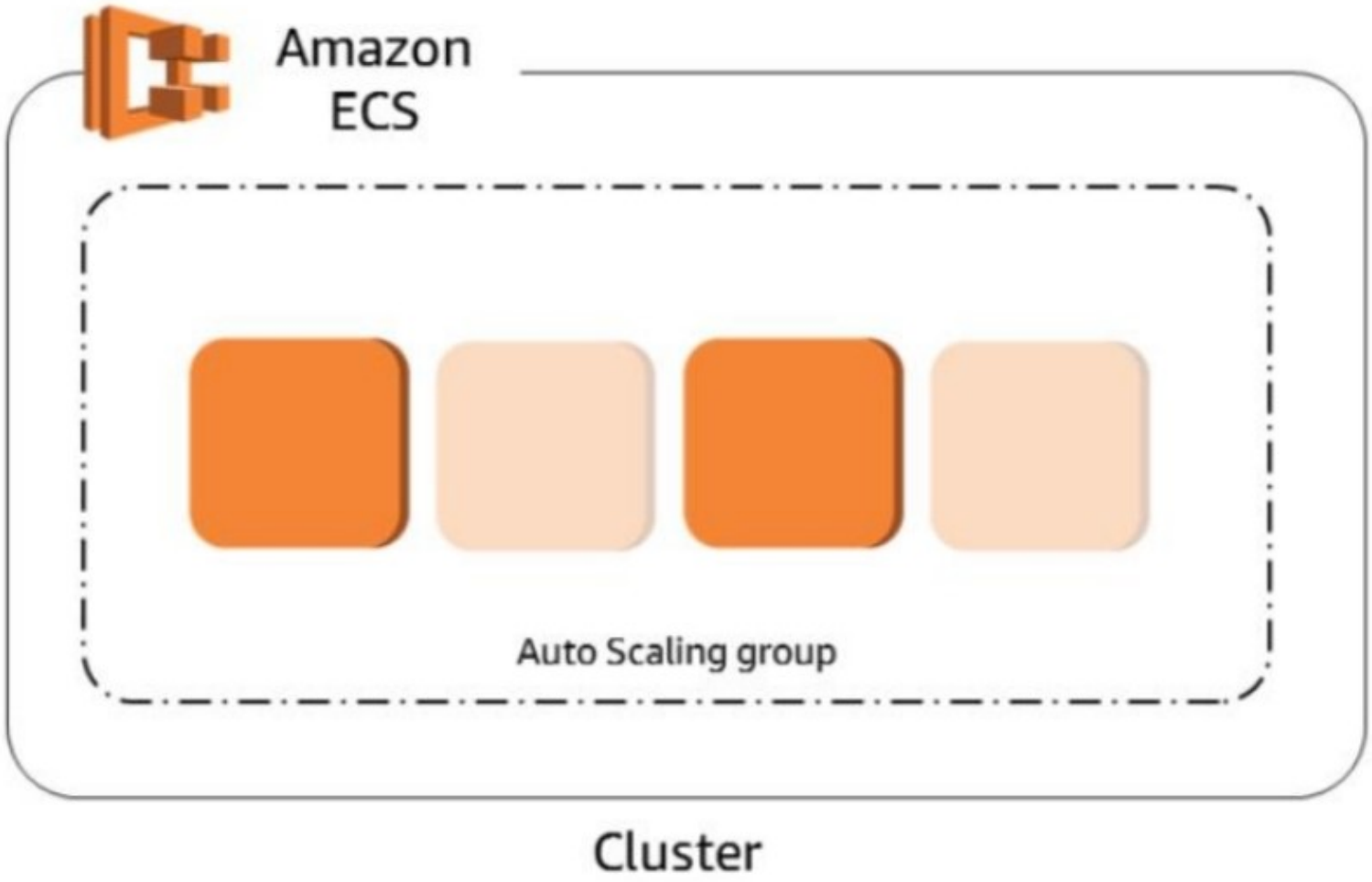
Maintains and scales the fleet of nodes running your containers

Removes the complexity of standing up the infrastructure

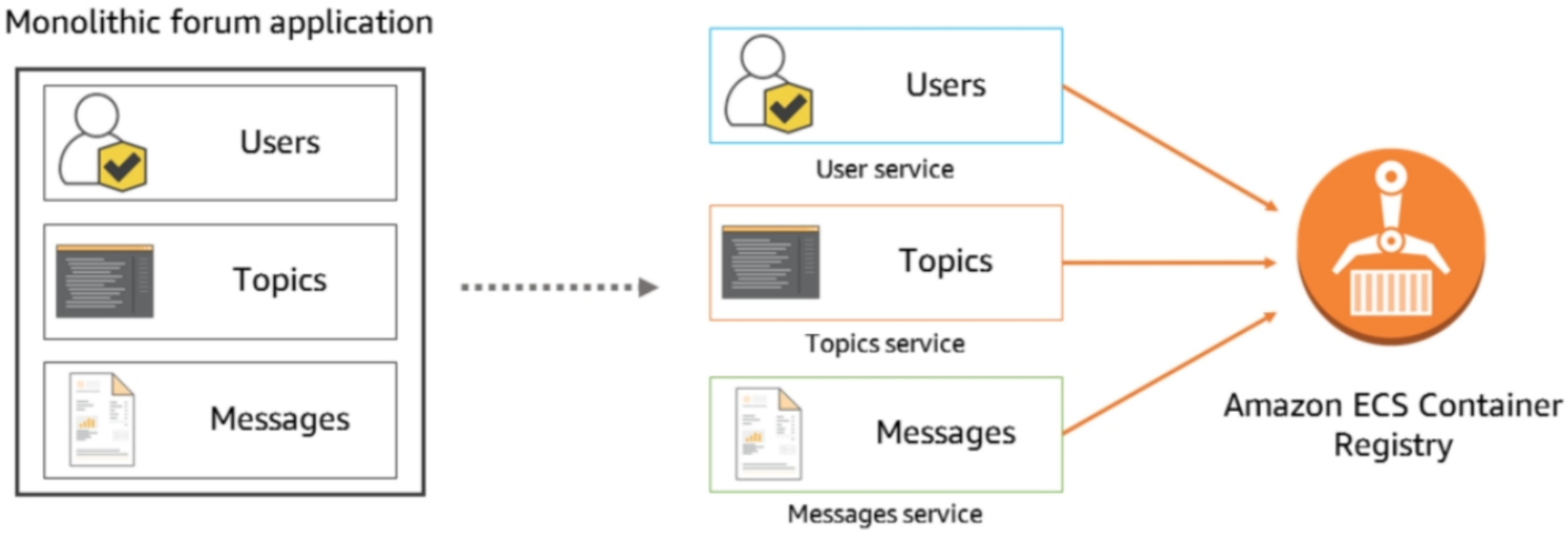
Working with Amazon ECS



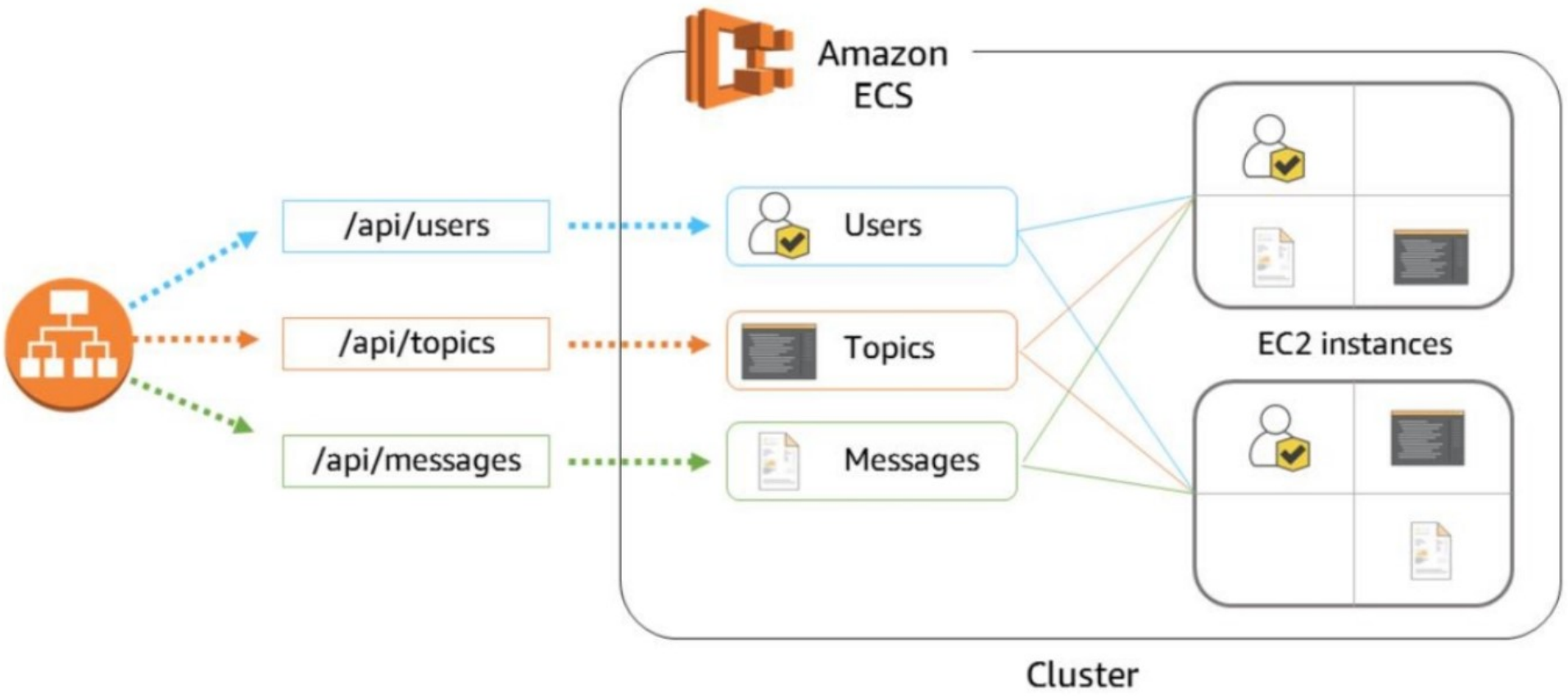
You can Automatic Scale the Number of Available EC2 Instances for Amazon ECS



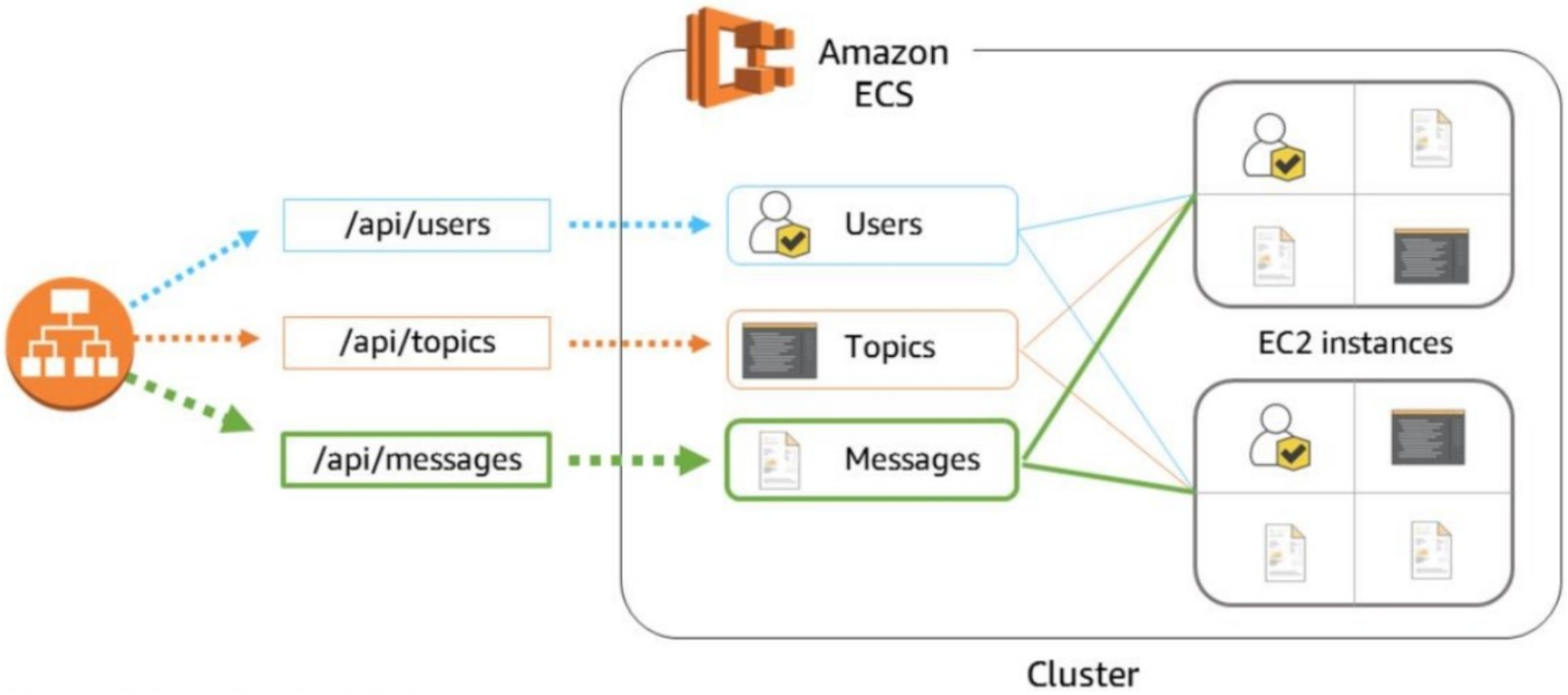
Monolithic Application to Container-Based Microservices



Monolithic to Container-Based Microservices



Monolithic to Container-Based Microservices



AWS Fargate

Fully managed container service

- Provisioning and managing clusters
- Management of runtime environment
- Scaling

Going Serverless

Is Your Architecture Efficient?

Are you using whole instances to support services that perform only

one function?

Is Your Architecture Efficient?

Are you using whole instances to support services that perform only

one function?

Leveraging **other services** to manage

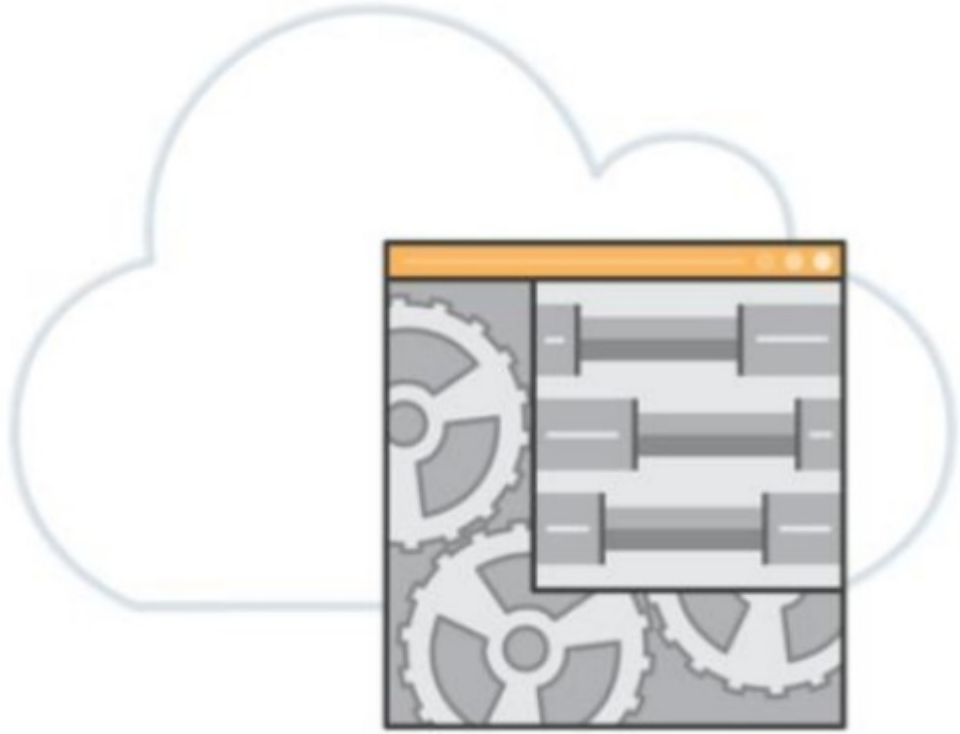
HA and FT

Monitoring fleet health

Capacity

What is serverless computing?

Building and running apps and services **without managing servers**



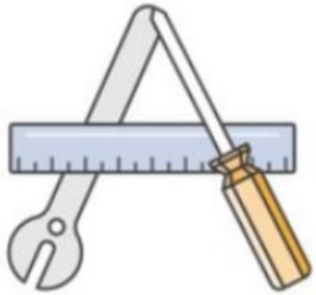
AWS Lambda

- Fully managed compute service
- Runs stateless code
- Supports Node.js, Java, Python, C#, Go and Ruby
- Runs your code on a schedule or in response to events (e.g., changes to data in an Amazon S3 bucket or an Amazon DynamoDB table)
- Can run at the edge

AWS Lambda – How it Works?

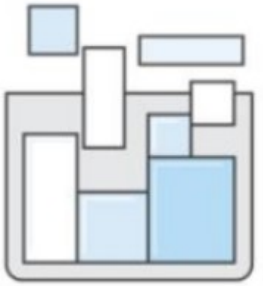
AWS Lambda –Event Source

Benefits of Serverless Computing



Focus on your application, not configuration

Use compute resources only upon request



Build a microservice architecture

Simulated Slot Machine Browser Game


```
lambda.invoke(pullParams, function(error, data)
{
 if (error) {
 prompt(error);
 } else {
 pullResults = JSON.parse(data.Payload);
 }
});
```

```
{
 isWinner: false,
 leftWheelImage : {S : 'cherry.png'},
 midWheelImage : {S : 'puppy.png'},
 rightWheelImage : {S : 'robot.png'}
}
```

AWS Lambda

AWS Lambda handles:

- Servers
- Capacity needs
- Deployment
- Scaling and fault tolerance
- OD or language updates
- Metrics and logging

AWS Lambda

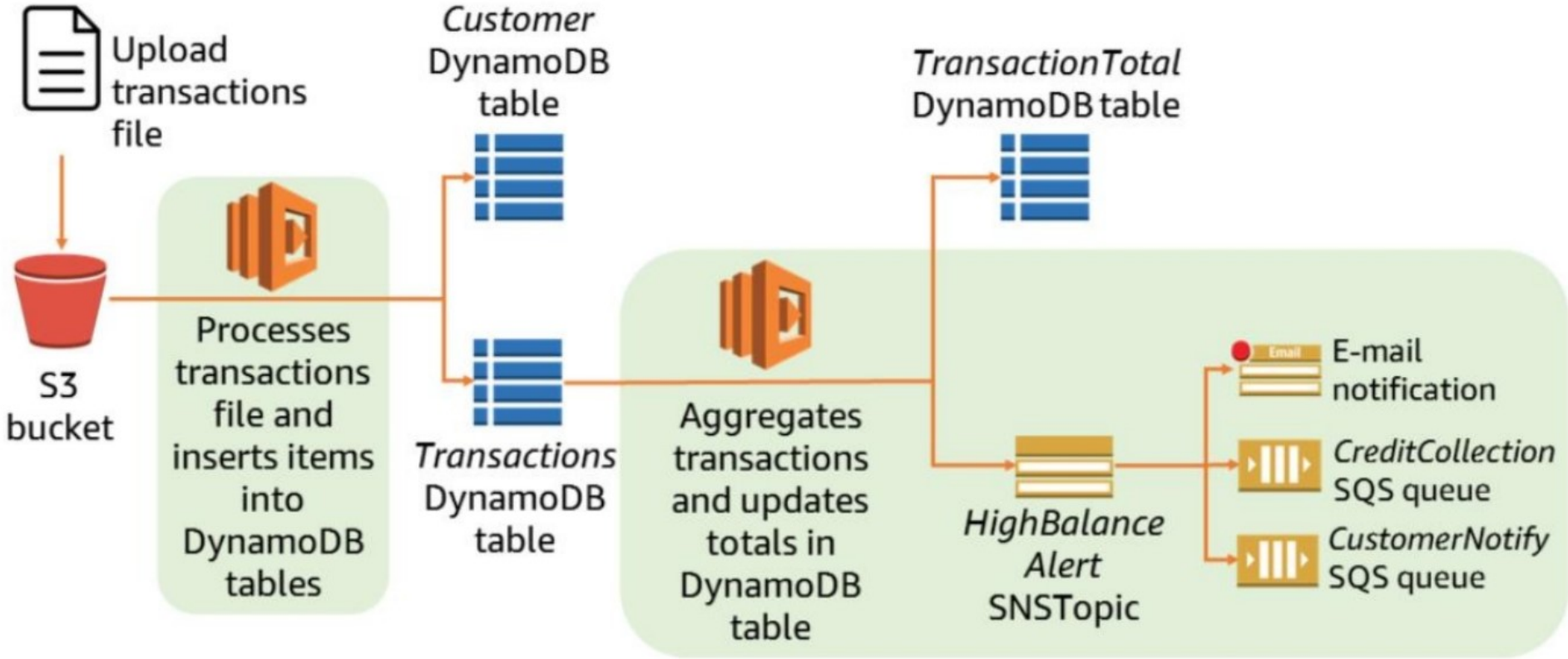
AWS Lambda handles:

- Servers
- Capacity needs
- Deployment
- Scaling and fault tolerance
- OD or language updates
- Metrics and logging

AWS Lambda enables you to:

- Bring your own code(even native libraries)
- Run code in parallel
- Create back ends, event handlers, and data processing systems
- Never pay for idling resources

Example: Amazon S3 and AWS Lambda for Order Processing



Amazon API Gateway

Allows you to create APIs that act as "front doors" for your applications

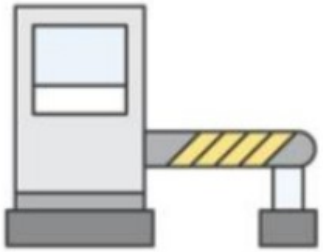
Handles up to hundreds of thousands of concurrent API calls

Can handle workloads running on:

- Amazon EC2
- AWS Lambda
- Any web application

API Gateway Protects You

API Gateway



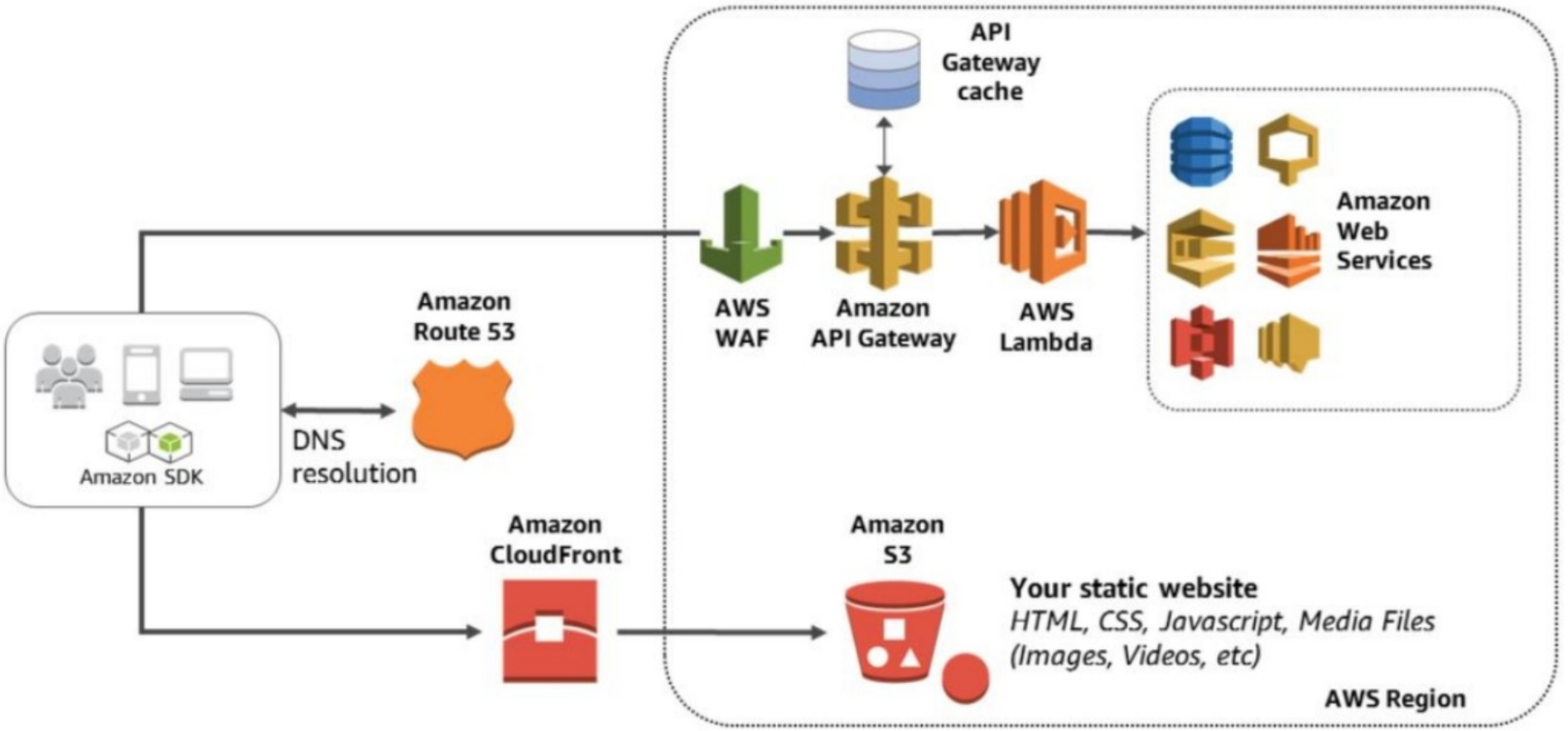
Prevents exposing endpoints

Protection from DDoS and injection attacks

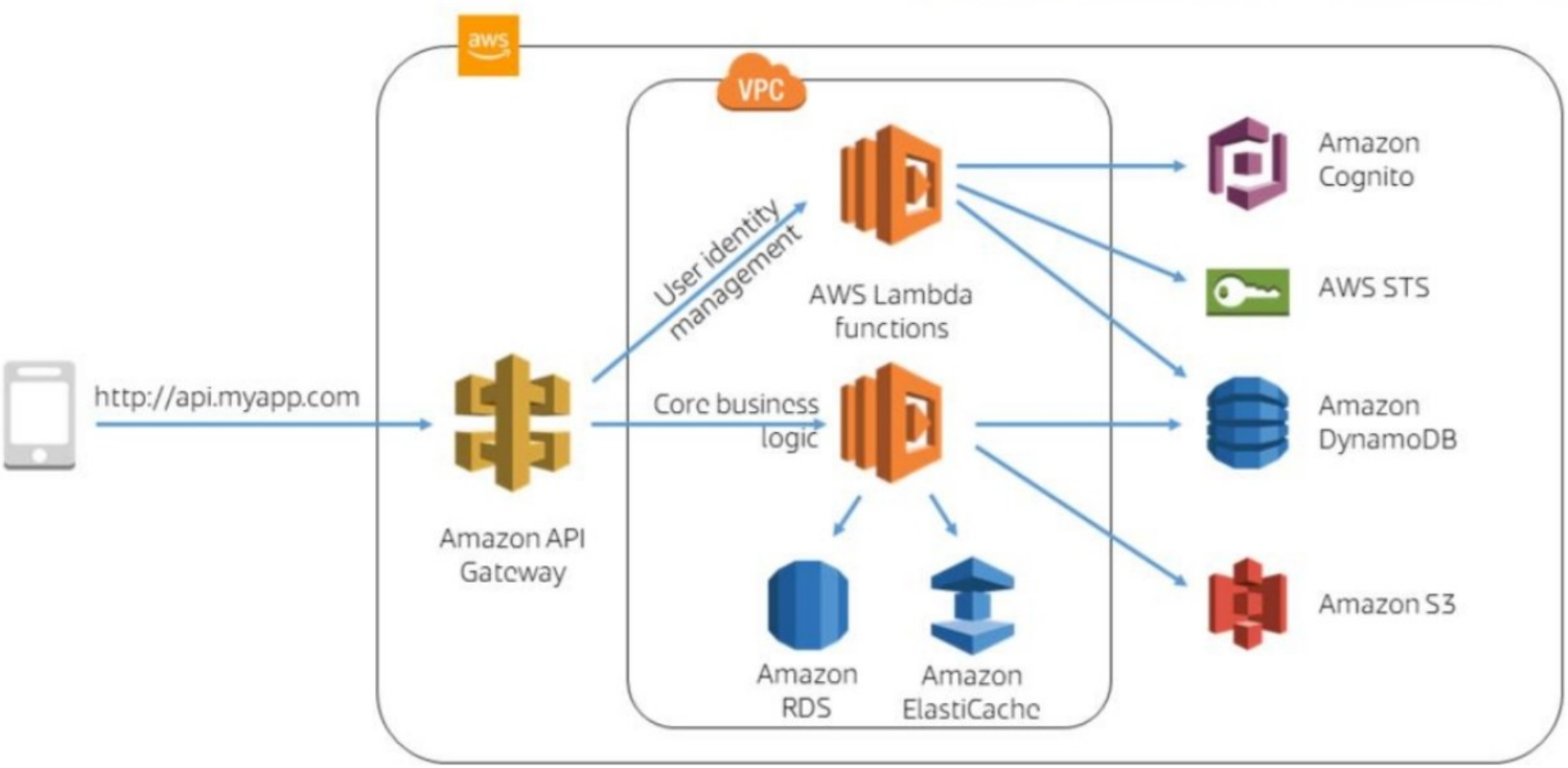
API Gateway

- Host and use multiple versions and stages of your APIs
- Create and distribute API keys to developers
- Leverage signature version 4 to authorize access to APIs
- Deeply integrated with AWS Lambda
- Endpoint integration with private VPCs

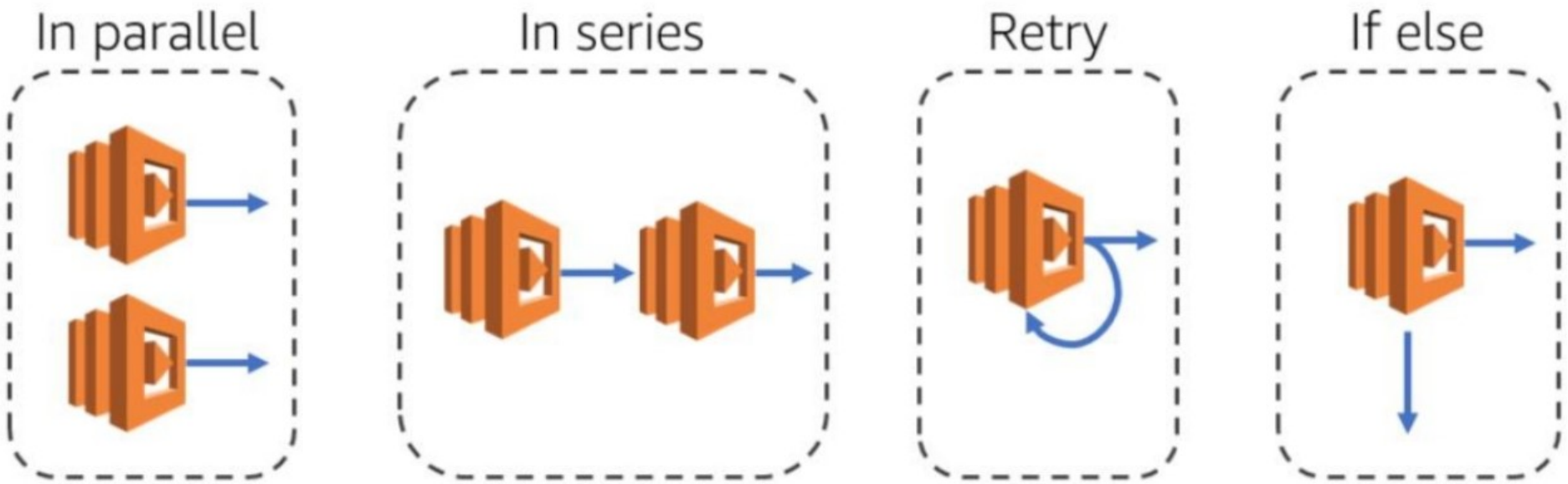
General Serverless Architecture Using API Gateway



Serverless Mobile Backend



What If I Need Lambda or API Gateway To Act...

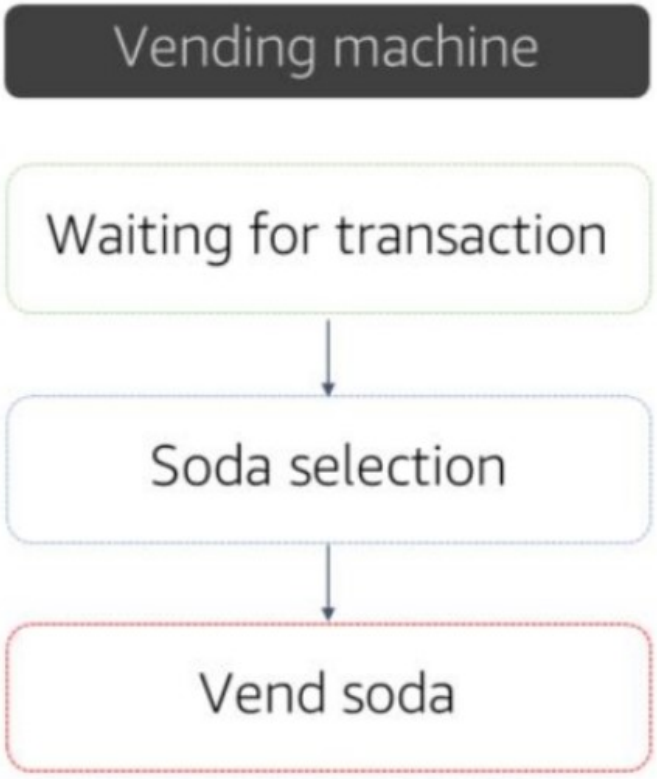


AWS Step Functions

- Coordinates microservices using visual workflows
- Allows you to step through the functions of your application
- Automatically triggers and tracks each step
- Provides simple error catching and logging if step fails

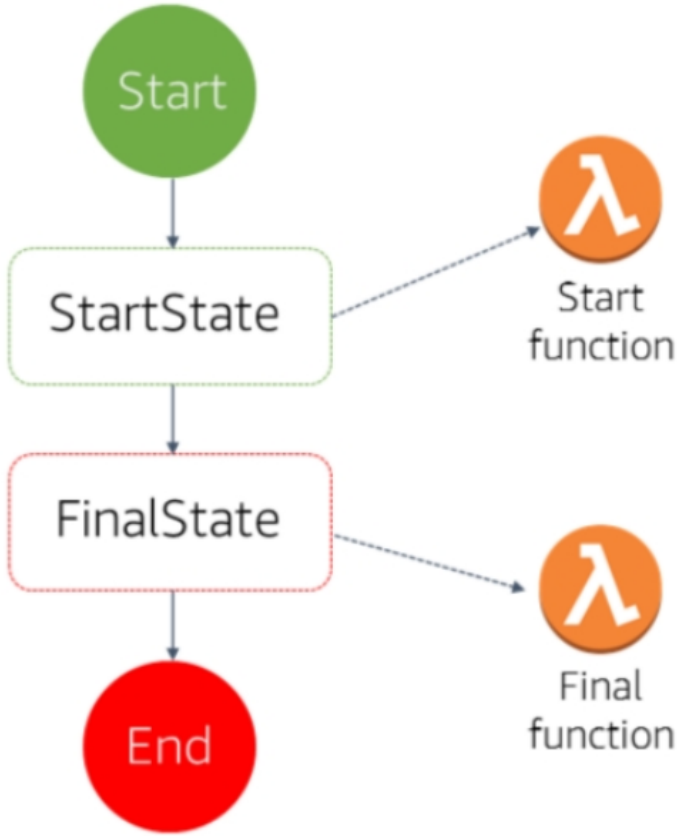
Step Function is State Machine

A state machine is an object that has a set number of operating conditions that depend on its previous condition to determine output.

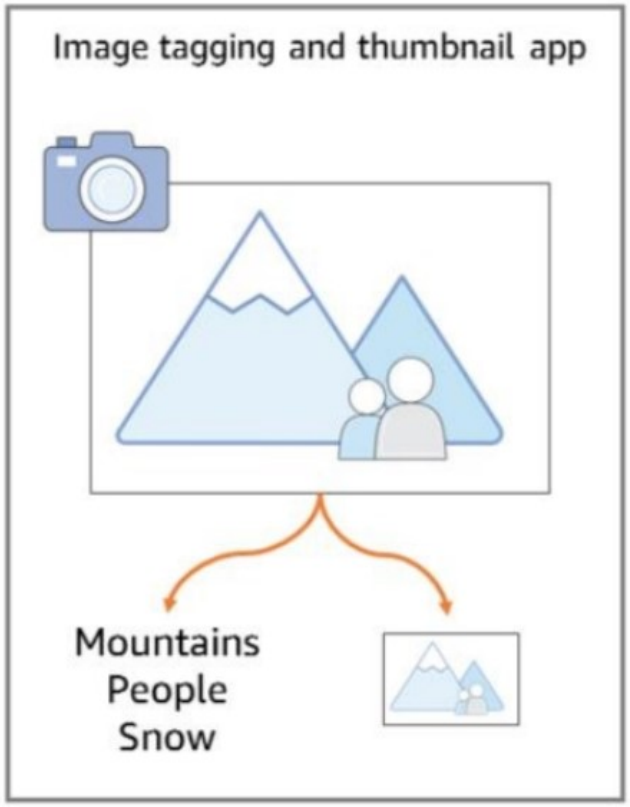


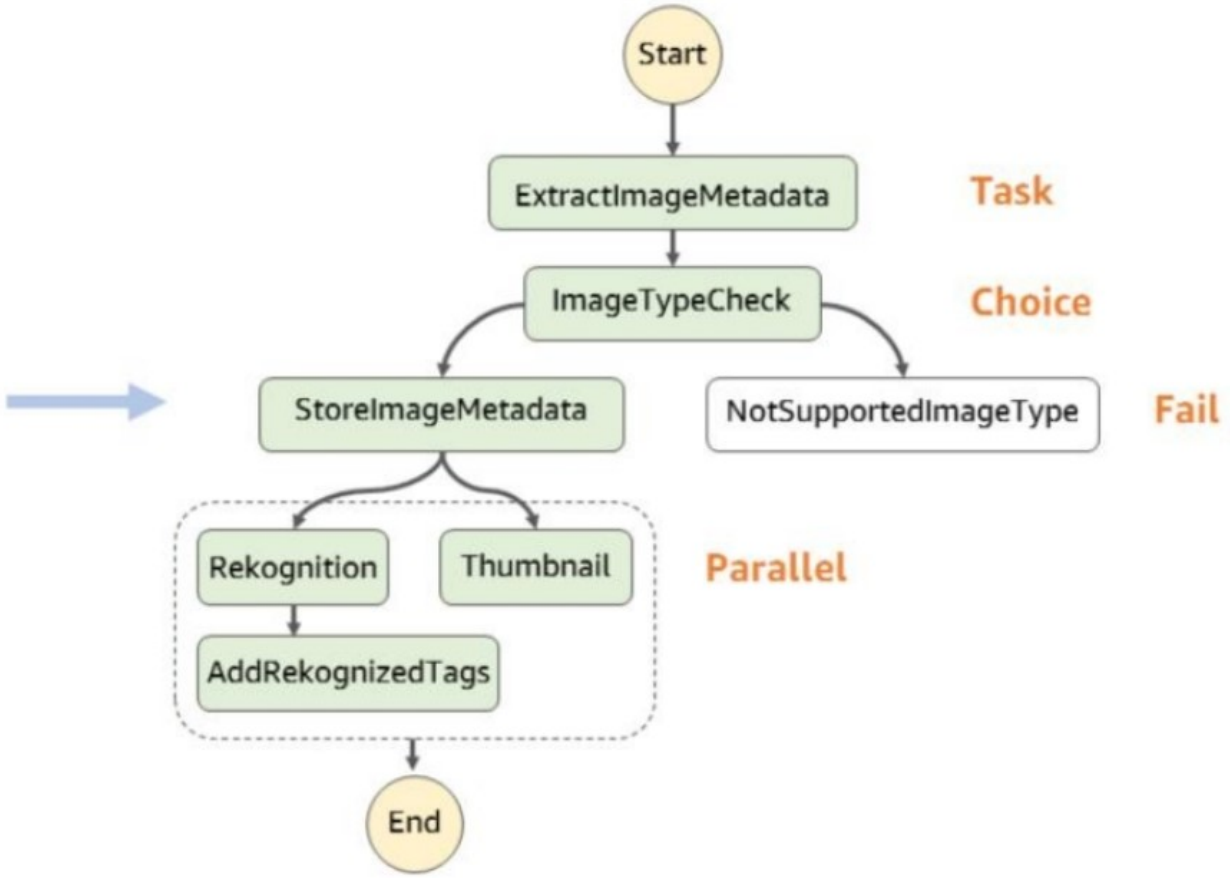
Amazon States Language

```
{
 "Comment": "An example of the ASL.",
 "StartAt": "StartState",
 "States": {
 "StartState": {
 "Type": "Task",
 "Resource": "arn:aws:lambda:us-east…,
 "Next": "FinalState"
 }
 "FinalState": {
 "Type": "Task",
 "Resource": "arn:aws:lambda:us-east…,
 "End": true
 }
 }
}
```



Build Visual Work Flows Using State Types





Video On Demand (VOD) Architecture

Lab: Implementing Serverless Architecture with AWS Managed Services

Lab: Implementing Serverless Architecture

"I want reliable, scalable, low-cost application built for the cloud"

Technologies used:

- AWS Lambda
- Amazon SNS
- Amazon DynamoDB
- Amazon S3
- Amazon Cognito

Lab: Implementing Serverless Architecture

Scenario

- Stores upload inventory files
- Monitor inventory levels via a dashboard
- Notify inventory managers when an item is out of stock

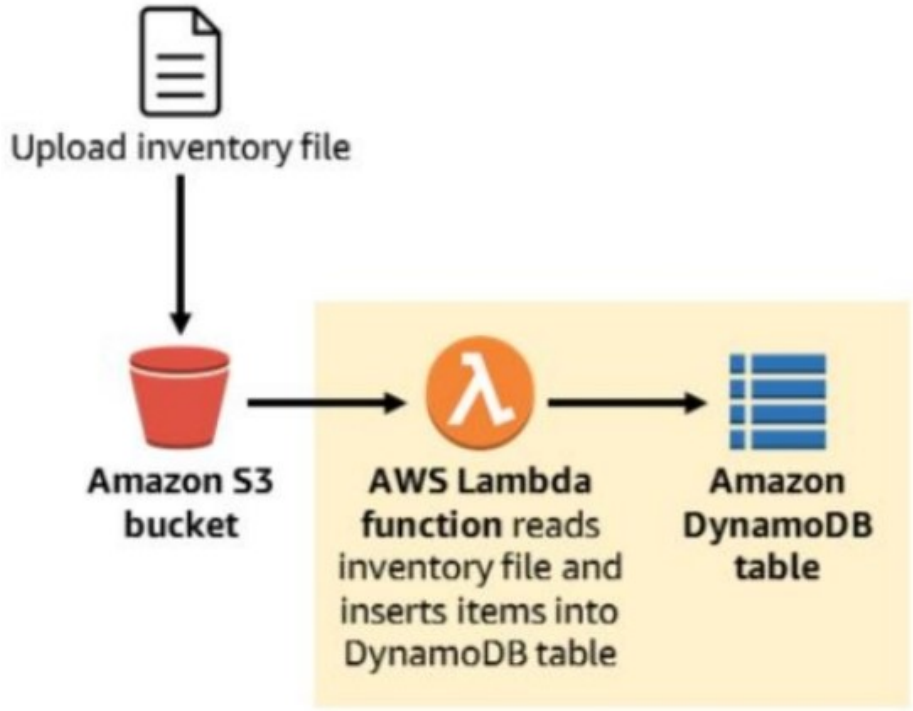
Lab: Implementing Serverless Architecture

A CSV inventory file is uploaded to Amazon S3


```
store,item,count
Berlin,Echo Dot,12
Berlin,Echo (2nd Gen),19
Berlin,Echo Show,18
Berlin,Echo Plus,0
Berlin,Echo Look,10
Berlin,Amazon Tap,15
```

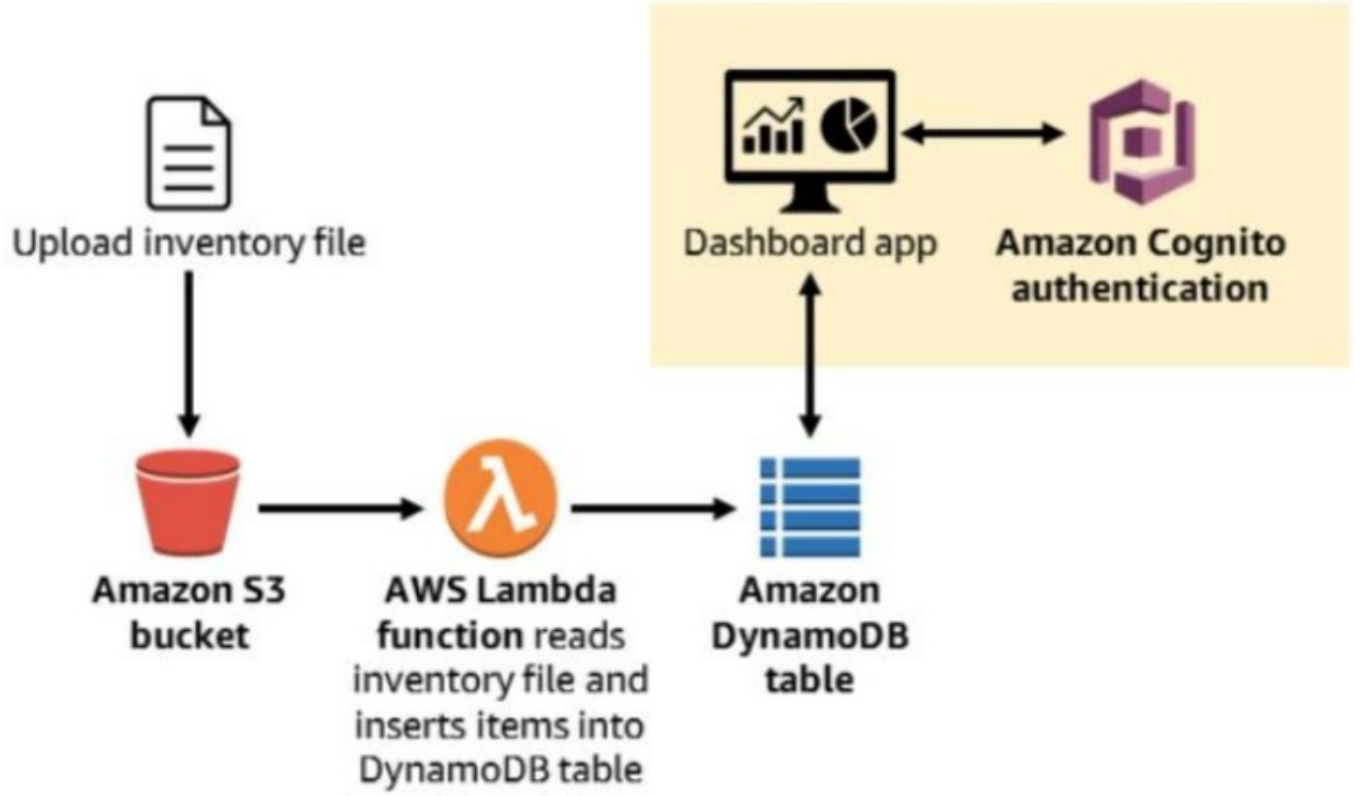
Lab: Implementing Serverless Architecture

An AWS Lambda function loads file contents into a DynamoDB table



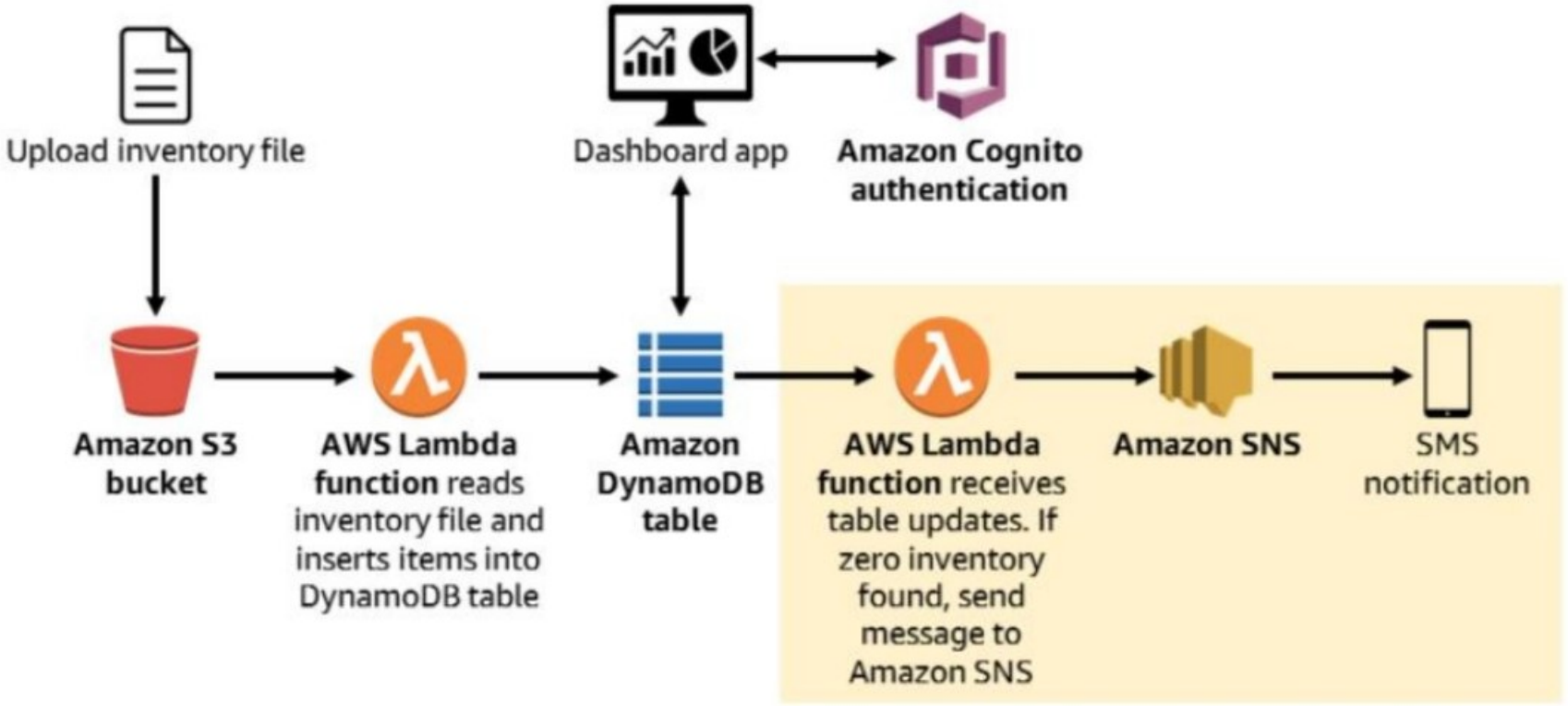
Lab: Implementing Serverless Architecture

Inventory can be monitored via Serverless Dashboard app



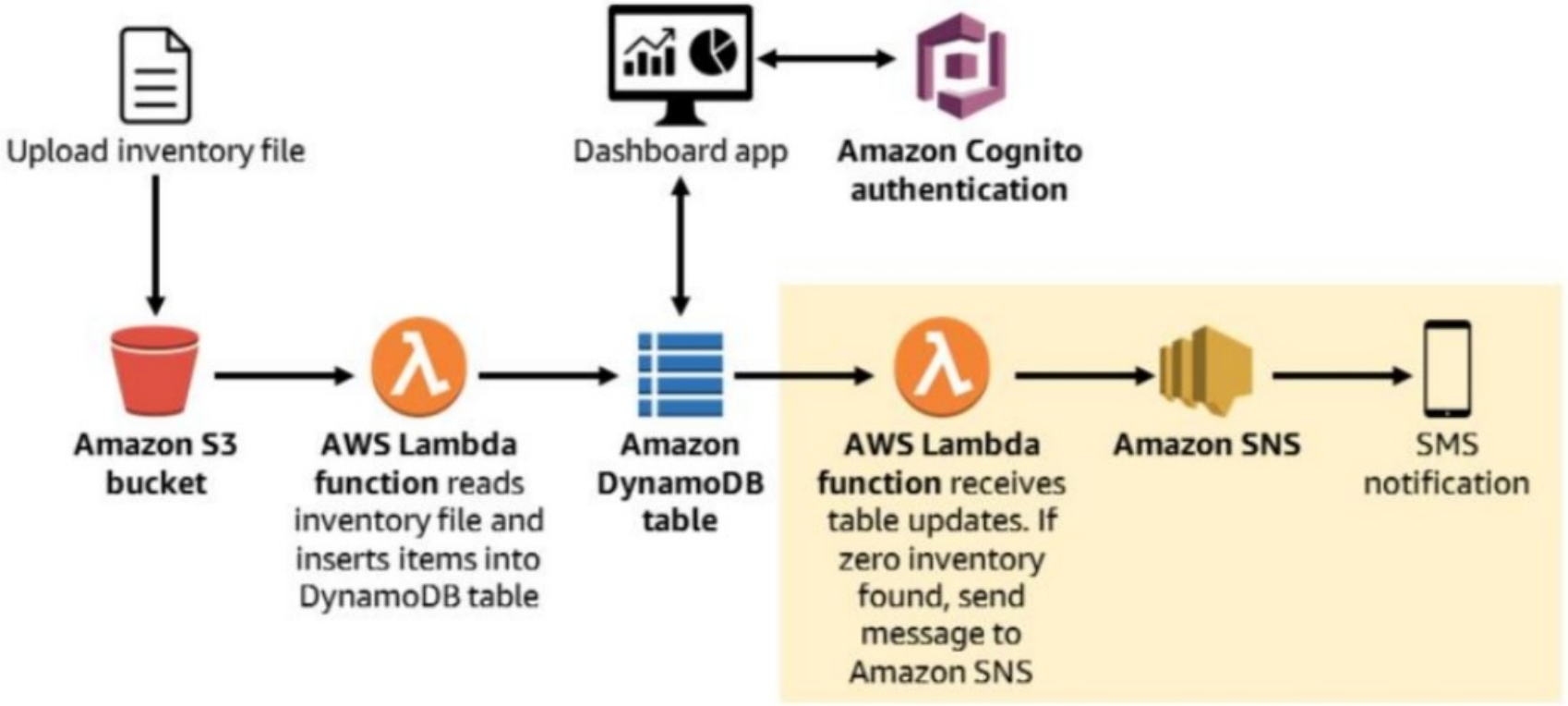
Lab: Implementing Serverless Architecture

A Second Lambda function sends notifications when an item is out of stock



Lab: Implementing Serverless Architecture

The Solution is loosely coupled, high scalable and totally serverless.



Capgemini

CONSULTING.TECHNOLOGY.OUTSOURCING

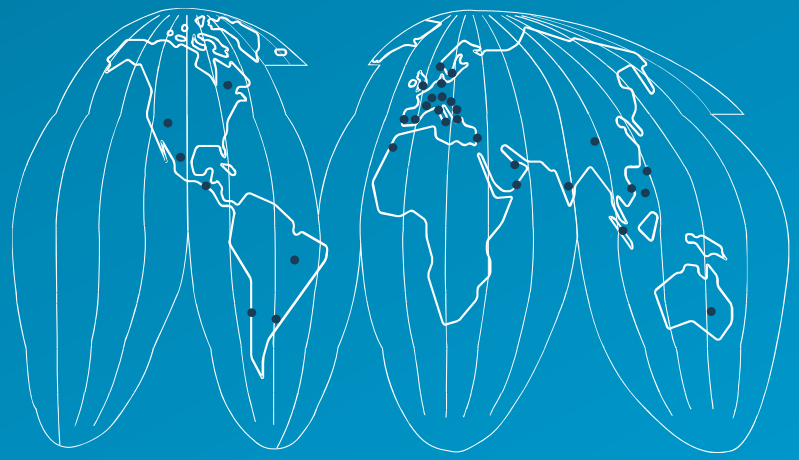
People matter, results count.

About Capgemini

With more than 145,000 people in 40 countries, Capgemini is one of the world's foremost providers of consulting, technology and outsourcing services. The Group reported 2014 global revenues of EUR 10.5 billion.

Together with its clients, Capgemini creates and delivers business and technology solutions that fit their needs and drive the results they want. A deeply multicultural organization, Capgemini has developed its own way of working, the Collaborative Business Experience™, and draws on Rightshore®, its worldwide delivery model.

Rightshore® is a trademark belonging to Capgemini



www.capgemini.com