AWS Containers

Introduction to ECS, EKS, ECR, Fargate

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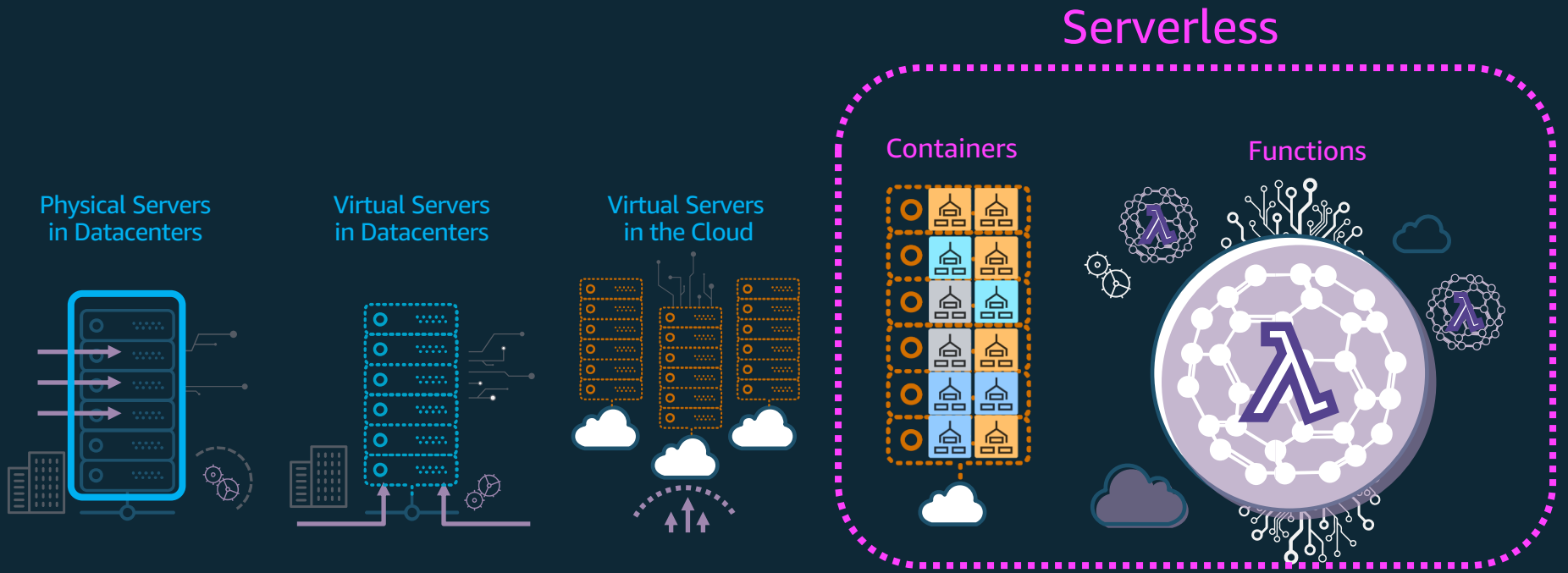
Evolution of computing



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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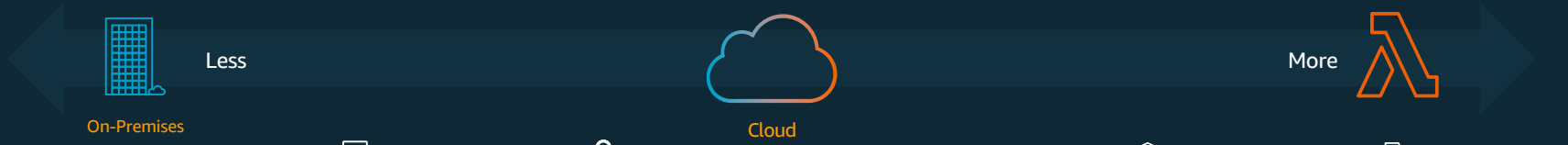
AWS operational responsibility models



Compute	Virtual Machine	EC2	Elastic Beanstalk	EKS	ECS	Fargate	AWS Lambda
Databases	MySQL/ PostgreSQL	MySQL/PostgreSQL on EC2	RDS MySQL	RDS Aurora		Aurora Serverless	DynamoDB
Storage	NAS/SAN		EBS Block	EFS/FSx for Lustre Files		Objects	S3
Messaging	ESBs		Amazon MQ	Kinesis			SQS / SNS
Analytics	Hadoop	Hadoop on EC2	EMR	Elasticsearch Service			Athena

Container-driven Changes

Architectural patterns

Operational model

Software delivery

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

Monolith
Does everything

Microservices
Do one thing

Architectural Pattern: Cloud-native architectures have small pieces, loosely joined

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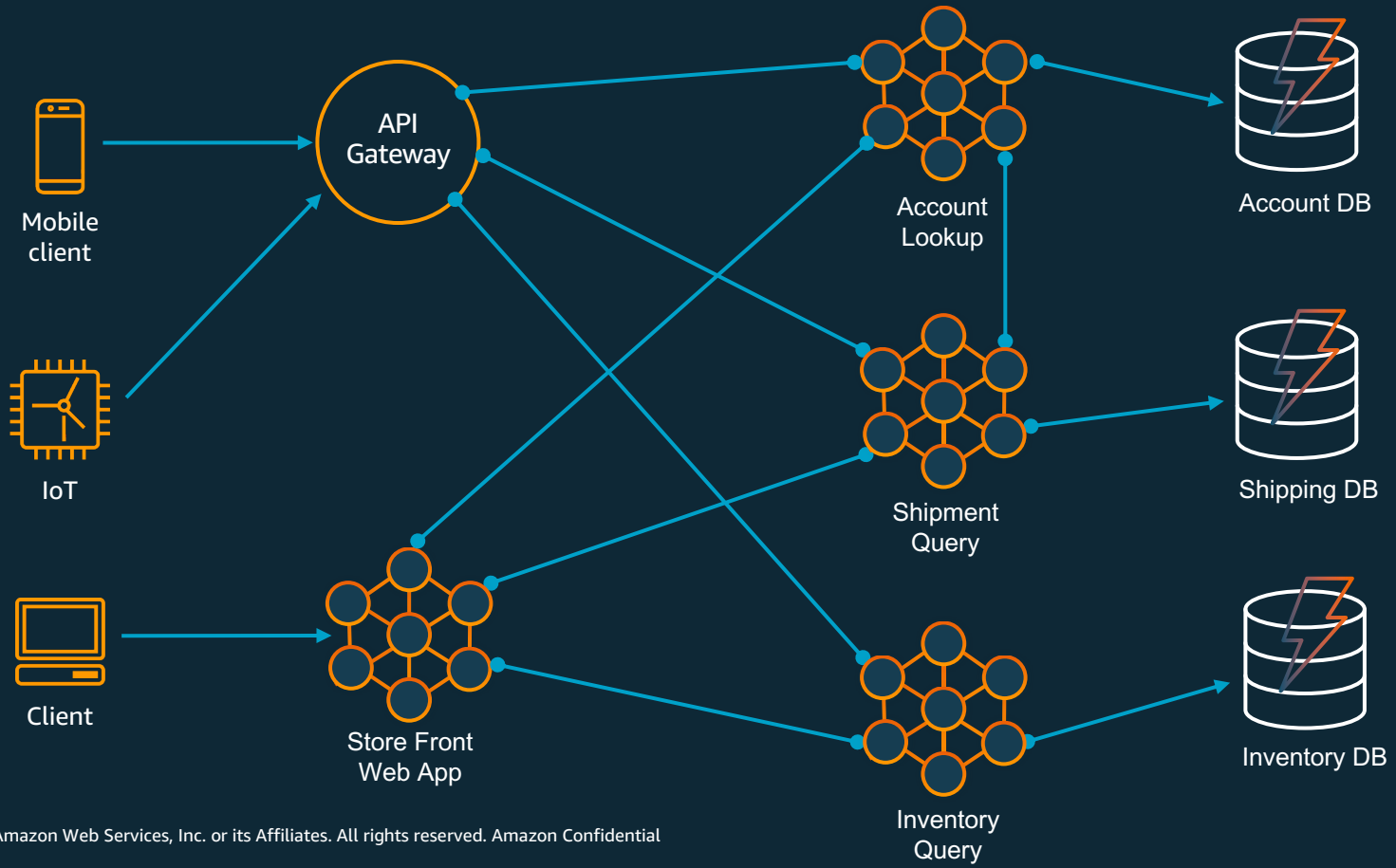
Typical Microservices Architecture



Typical use cases

- Microservices: Java, Node.js, Go, Web Apps, etc.
- Continuous Integration and Continuous Deployment (CI/CD)
- Batch Processing and ETL jobs
- Common PaaS Stack for Application Deployment
- Legacy Application Migration to the Cloud
- Hybrid Workloads
- AI/ML
- Scale Testing
- Backend for IoT use cases

Managing one container is easy

Managing multiple containers is much harder

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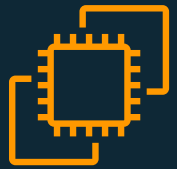
AWS container services landscape

Management
Deployment, Scheduling, Scaling & Management of containerized applications

Amazon Elastic Container Service

Amazon Elastic Container Service for Kubernetes

Hosting
Where the containers run



Amazon EC2

AWS Fargate

Image Registry
Container Image Repository

Amazon Elastic Container Registry

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Amazon Elastic Container Service

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Amazon ECS

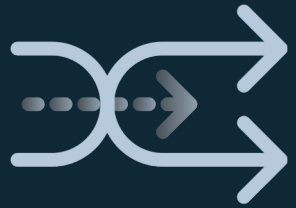
ECS

Highly scalable, high-performance container management system

A managed platform

Cluster management

Container orchestration



Deep AWS integration

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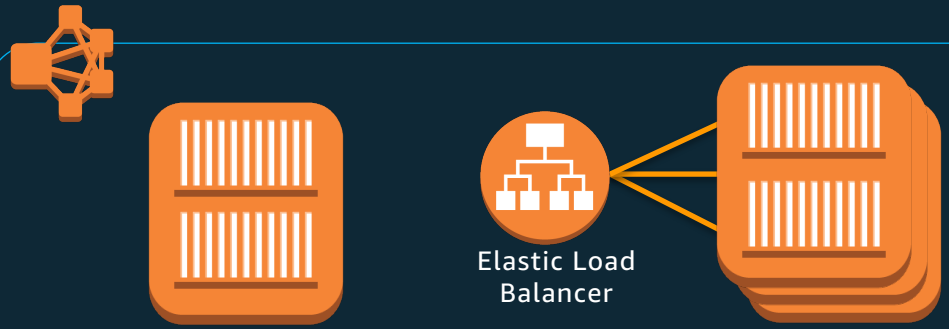
Terminology

register

Task Definition

Define application containers: Image URL, CPU & Memory requirements, etc.



run

Task

- A running instantiation of a task definition

create

Service

- Maintain n running copies
- Integrated with ELB
- Unhealthy tasks automatically replaced

create

Cluster

- Infrastructure Isolation boundary
- IAM Permissions boundary

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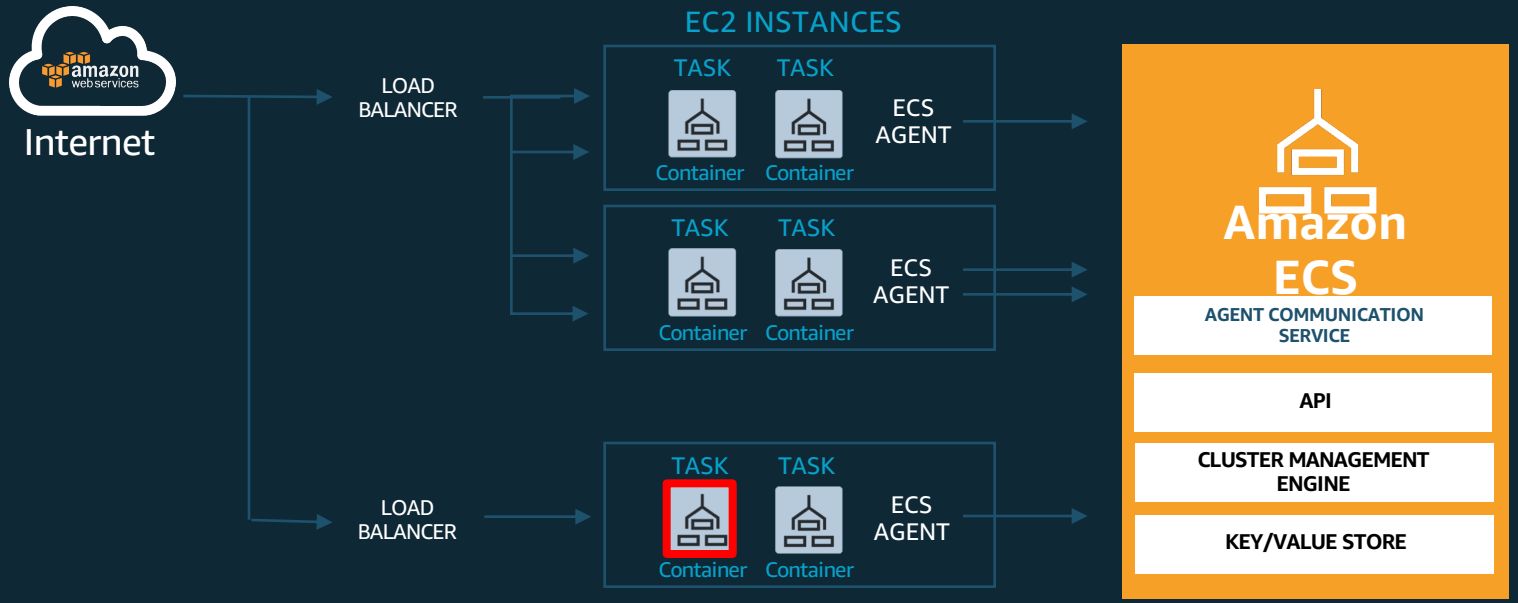
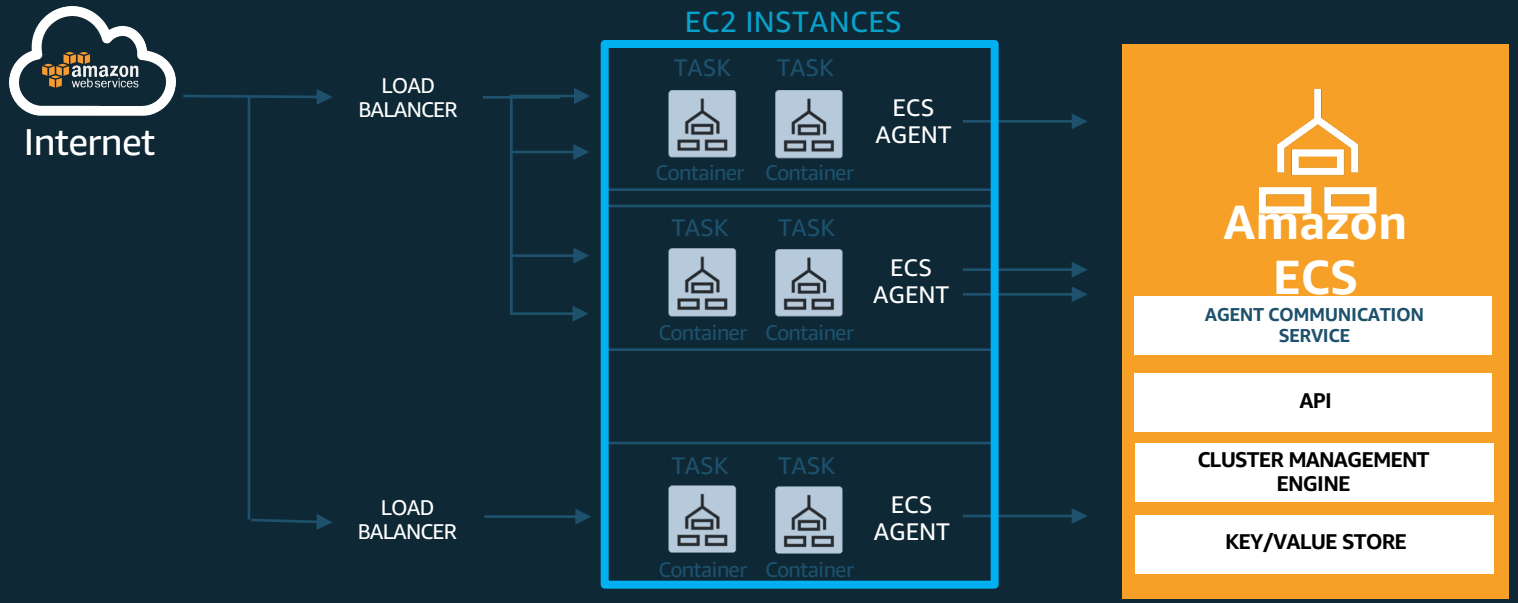
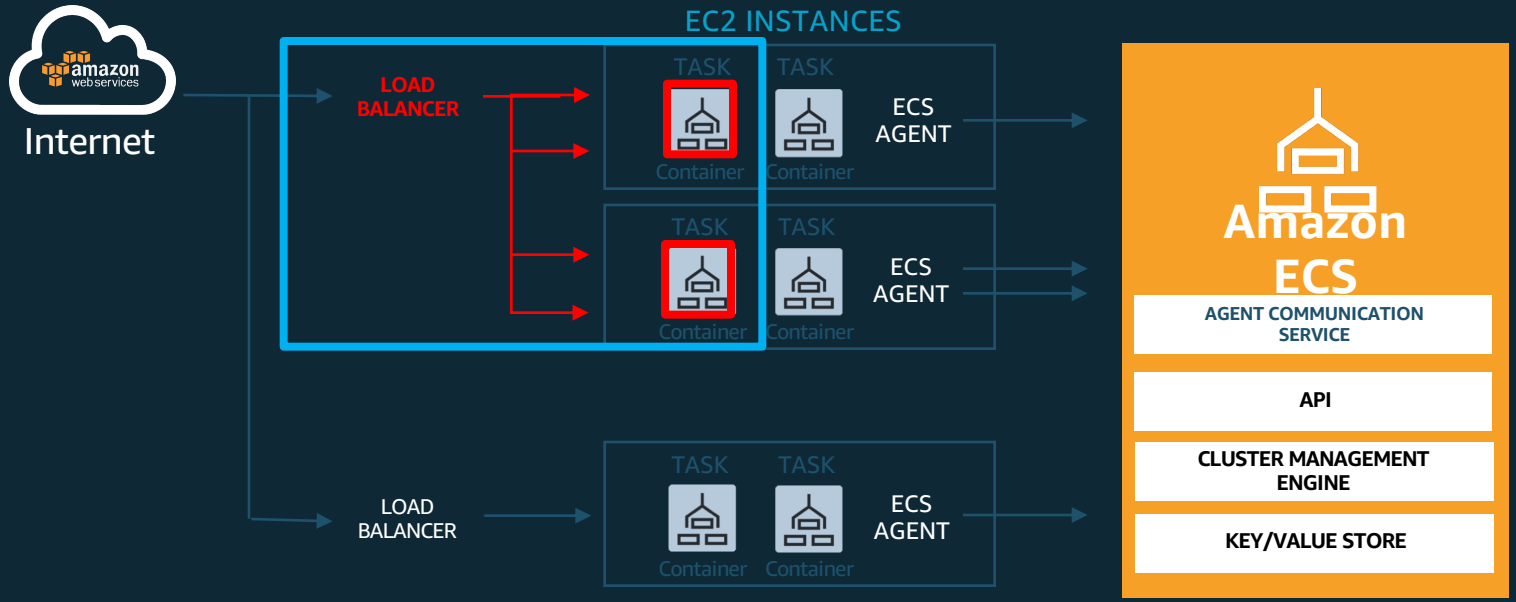
Amazon ECS - Task

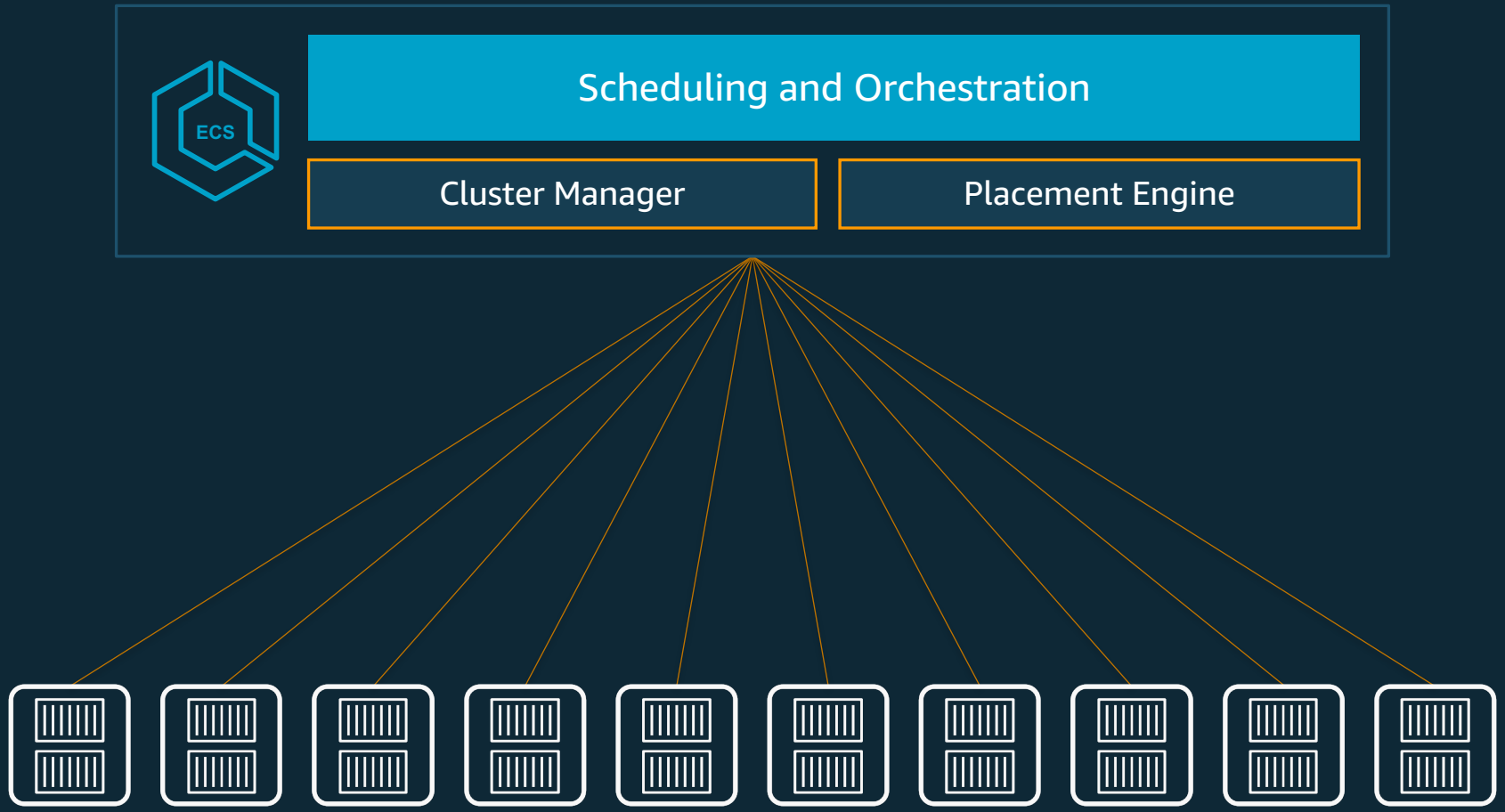


Amazon ECS - Cluster



Amazon ECS - Service





Task definition

Task definition snippet

```
{
  "family": “mytask",
  "containerDefinitions": [
    {
     "name":“container1",
     "image":"..."
    },
    {
     "name":“container2",
     "image":"..."
    }
  ]
}
```

- Immutable, versioned document
- Identified by family:version
- Contains a list of up to 10 container definitions
- All containers will be collocated on the same host
- Each container definition has
  - A name
  - Image URL (Amazon ECR or public images)
  - And more

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CPU & memory specification

Units

- CPU: vCPU (string) or CPU units (integer)
  (1 vCPU = 256 CPU units)
- Memory: MB (integer) or string (1 GB)

Task-level resources

Total CPU/memory across all containers

Container-level resources

Defines sharing of task resources among containers

Task definition snippet

```
{
  "family": "mytask",
  "cpu": "1 vCPU",
  "memory": "2 GB",
  "containerDefinitions": [
    {
     "name":“container1",
     "image":"...“,
     "cpu": 256,
     "memoryReservation": 512
    },
    {
     "name":“container2",
     "image":"...",
     "cpu": 768,
     "memoryReservation": 512
    }
  ]
}
```

Task-level resources

Container-level resources

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Amazon Elastic Container Service for Kubernetes

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Community, contribution, choice

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51%

of Kubernetes workloads run on AWS today

—CNCF survey

Customers adopting Kubernetes on AWS

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Control vs Data Plane

Kubernetes master 3X

API server	Controller manager	Cloud controller
Scheduler	KubeDNS	Add-ons

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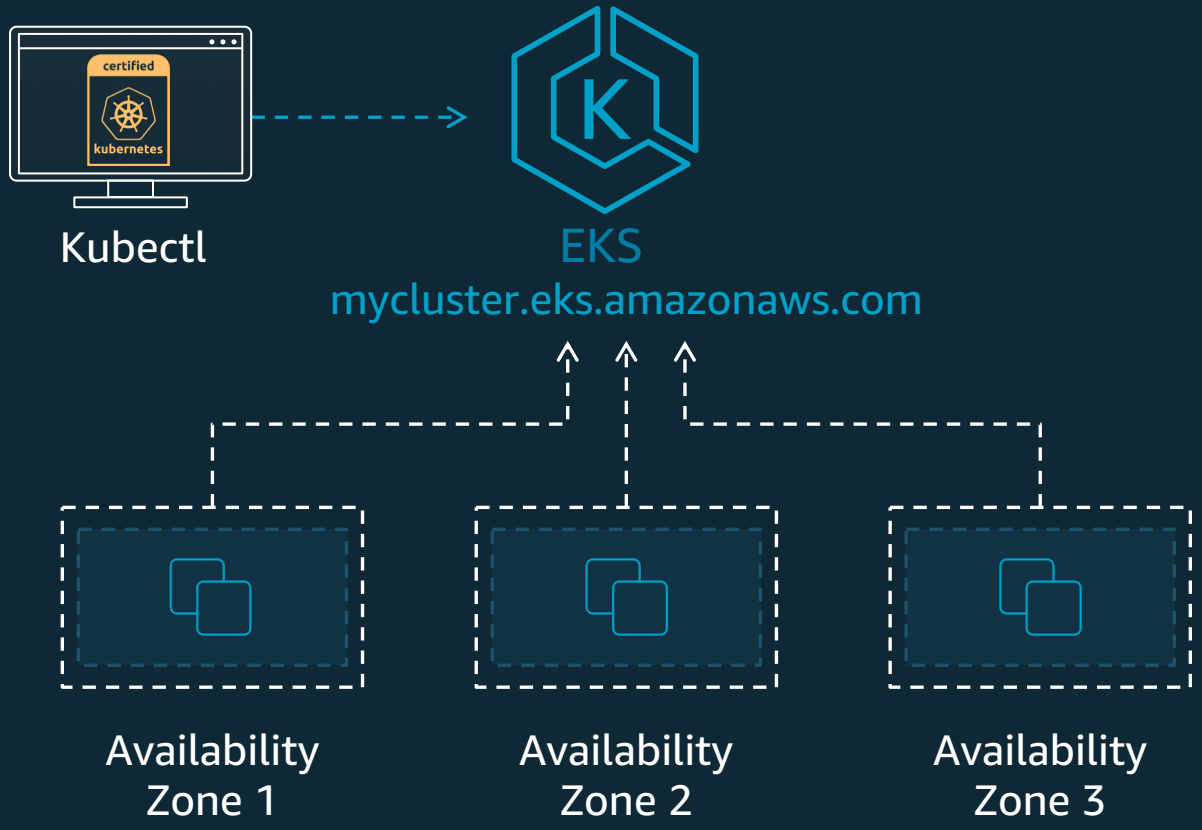

How are customer using Amazon EKS?

Microservices

Platform-as-a-Service

Enterprise App Migration

Machine Learning

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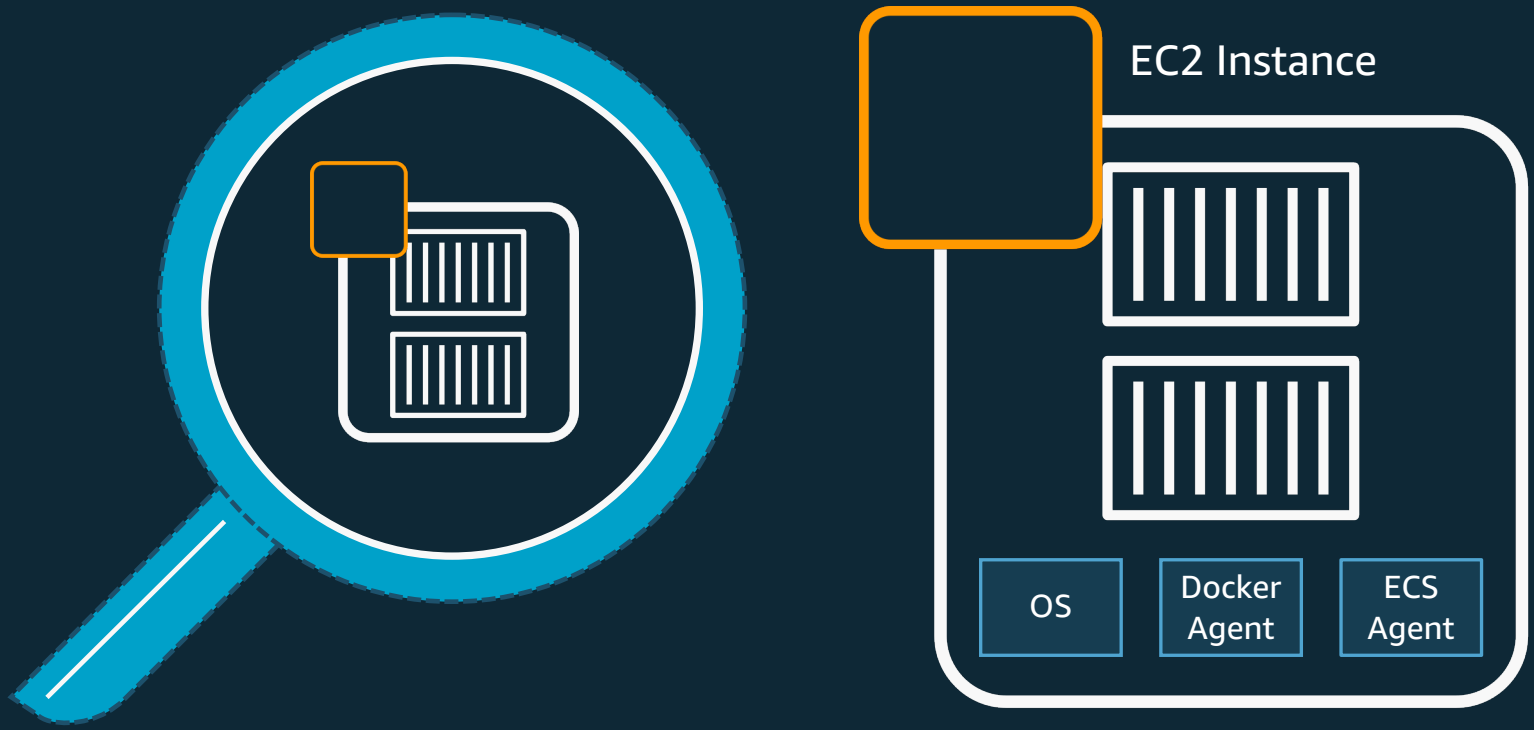
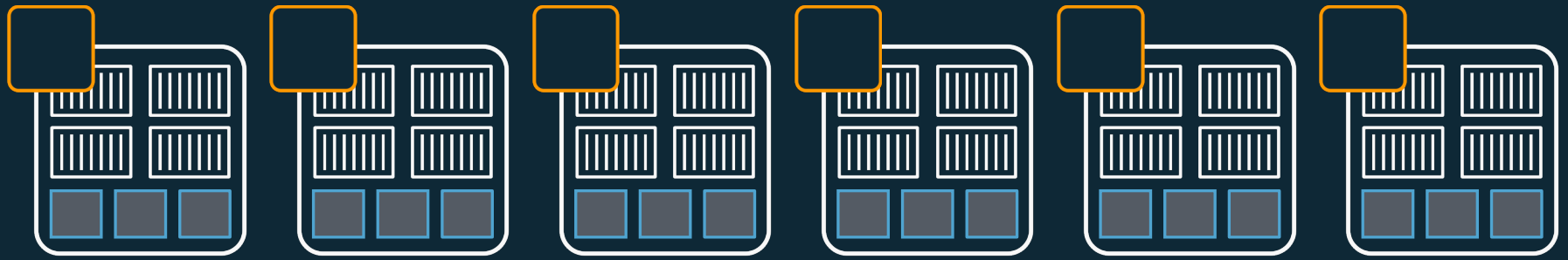
AWS Fargate

Without Fargate, you end up managing more than just containers

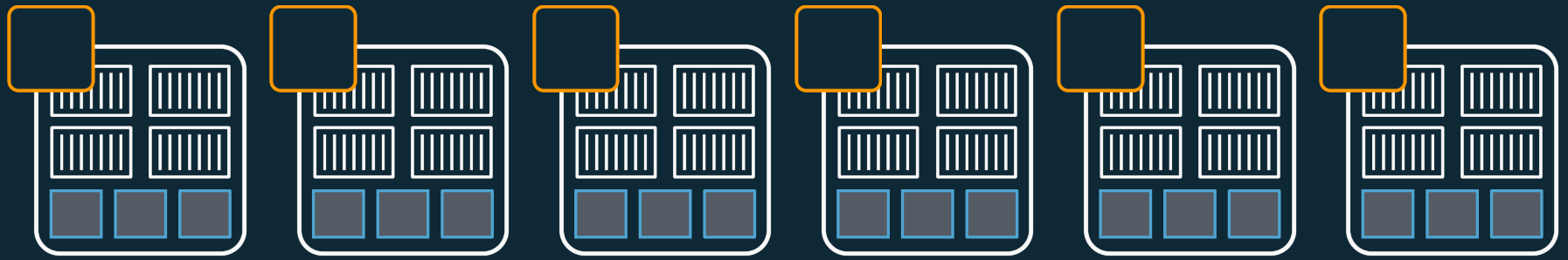


- Patching and Upgrading OS, agents, etc.

- Scaling the instance fleet for optimal utilization



Amazon Elastic Container Service



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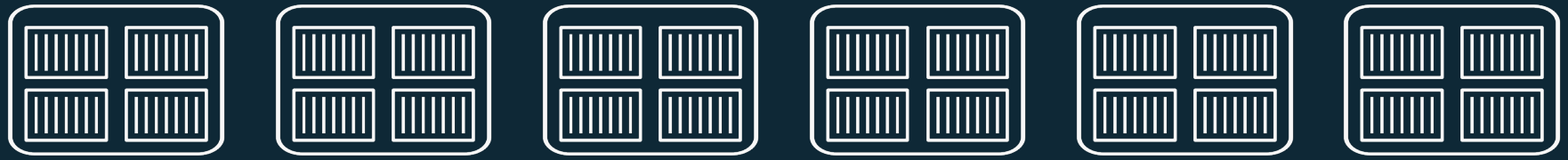
Amazon Elastic Container Service



AWS Fargate

run serverless containers

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AWS Fargate

Your containerized applications

Managed by AWS
No EC2 Instances to provision, scale or manage

Elastic
Scale up & down seamlessly. Pay only for what you use

Integrated
with the AWS ecosystem: VPC Networking, Elastic Load Balancing, IAM Permissions, CloudWatch and more

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Fully managed container environment with AWS ECS + Fargate

Bring existing code

No changes required of existing code, works with existing workflows and microservices built on Amazon ECS

Production ready

ISO, PCI, HIPAA, SOC compliant. Launch ten or tens of thousands of containers in seconds in 9 global regions (+7 in 2018)

Powerful integrations

Native AWS integrations for networking, security, CICD, monitoring, and tracing

Fargate runs tens of millions of containers for AWS customers every week

AWS Fargate customers

CATALYTIC · Product Hunt · Turner · accenture

"We moved to **Fargate** because we need the ability to scale quickly up from baseline and get fine-grained network control, without having to manage our own infrastructure"

Product Hunt

datree.io · ONICA · youi · LEVEL access · BEACHBODY

Smartronix · CBS Interactive · CBS SPORTS DIGITAL · GE · PHYN

"We don't want to babysit any clusters. That has nothing to do with us"

Shimon Tolts
CTO, DATREE

ZIFF DAVIS · SKYWATCH · ironSource · Yum! Brands · SGK · Yummly

FireEye · UOL DIVEO · APTIV · HARRY'S

Talroo · CORTEVA agriscience · AppZen · ancestry · VERITONE

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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

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

operational model

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New: AWS Cloud Map

AWS **Cloud Map**

Service discovery for all your cloud resources

Constantly monitor the health of every resource

Dynamically update the location of each microservice

Increase developer productivity

Single registry for all app resources

Define resources with user-friendly names

Integration with Amazon container services

AWS Fargate

Amazon ECS

Amazon EKS

New: AWS App Mesh

Observability & traffic control

Easily export logs, metrics, and traces

Client side traffic policies—circuit breaking, retries

Routes for deployments

Works across clusters and container services

Amazon ECS

Amazon EKS

Kubernetes on EC2

AWS Fargate (coming soon!)

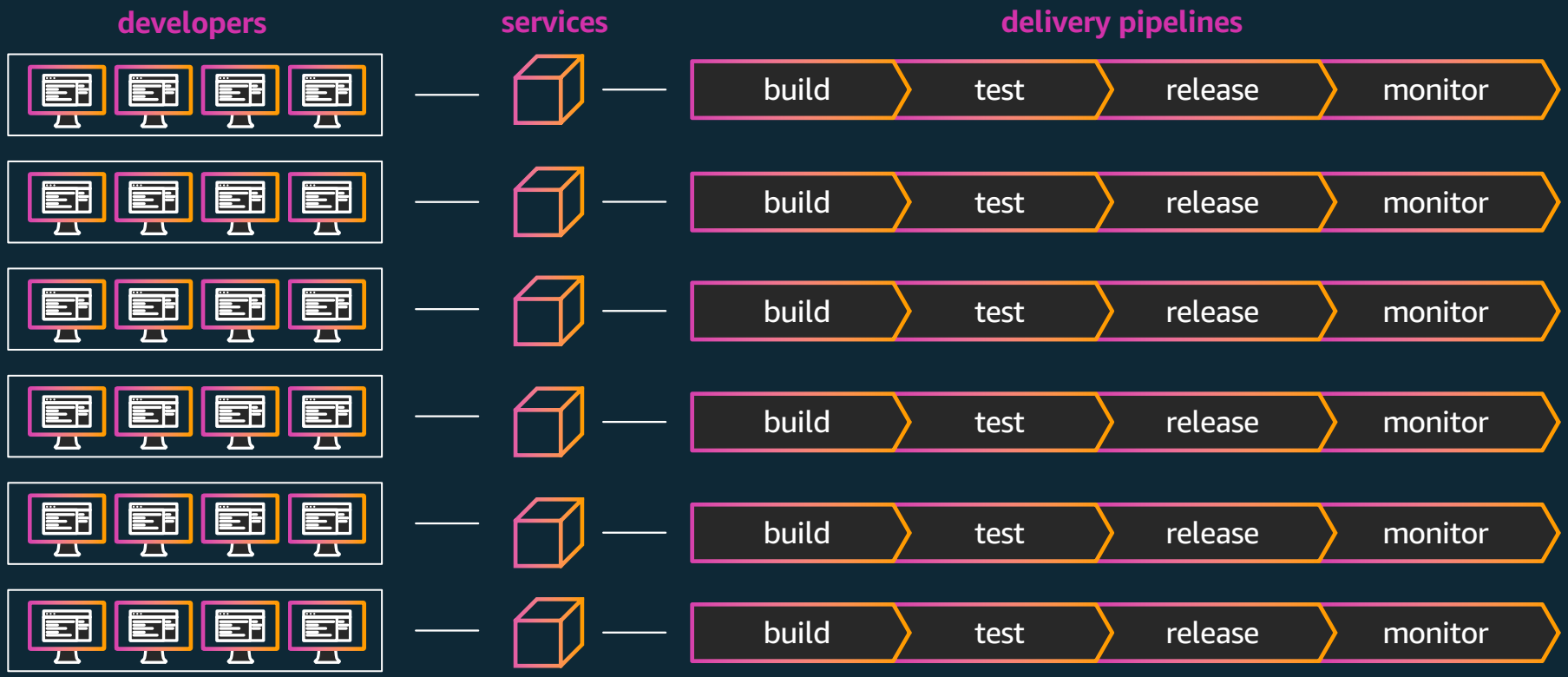
AWS built and run

No control plane to manage

Ease of operations

High scale

Microservice development lifecycle



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Amazon Elastic Container Registry

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What is Amazon EC2 Container Registry (ECR)?

Fully Managed

Compatible with Docker Registry v2 API

Secure

Fine grained access control

Highly Available

Simplified Workflow

Integrates with Amazon ECS

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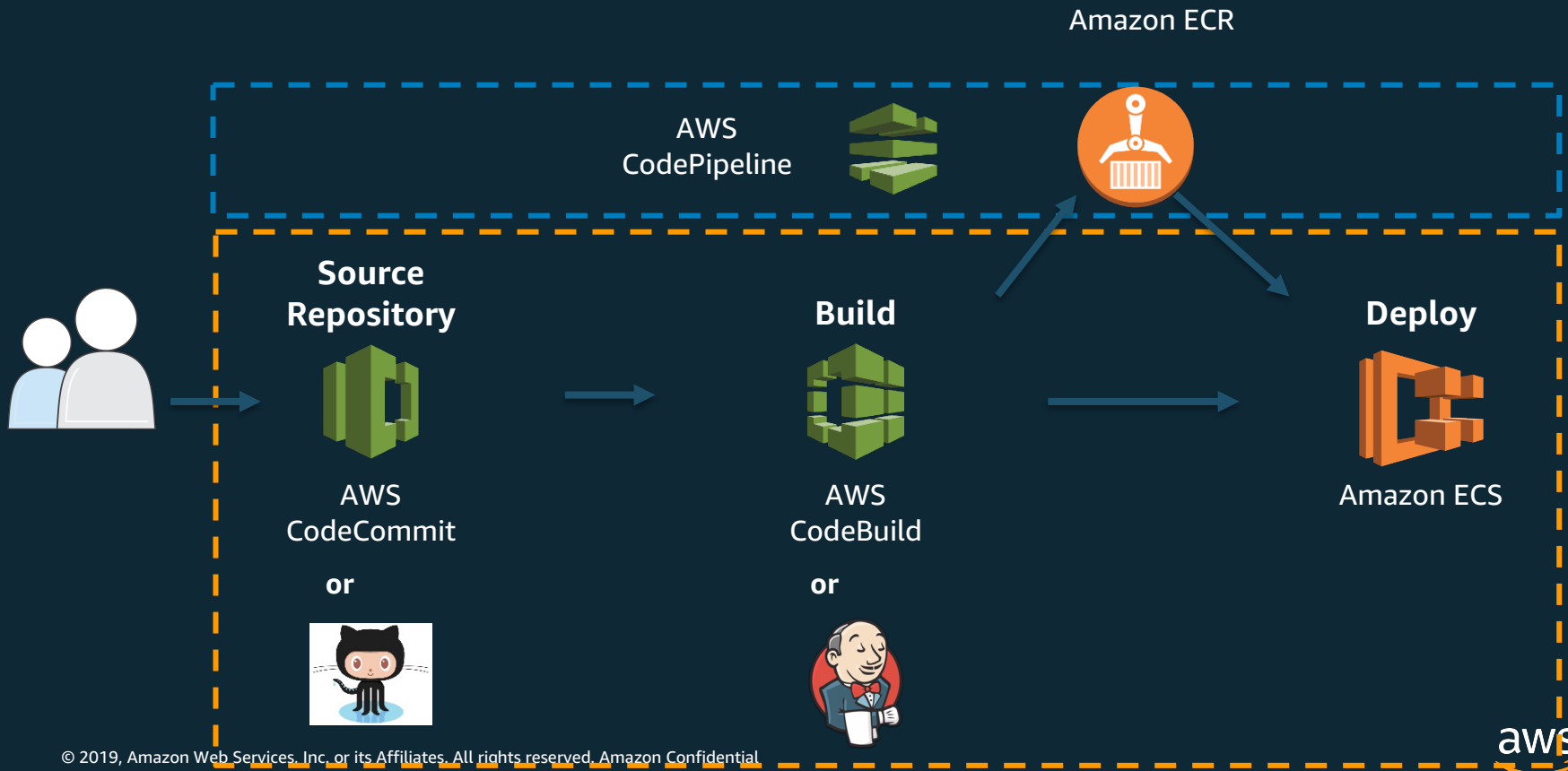
Using AWS CodePipeline with ECS and ECR



Why customers love AWS container services

Deeply integrated with AWS

Broad selection of compute instances and IAM security, VPC networking, load balancing, and autoscaling

DevOps Workflow

Best place to build and operate a complete DevOps workflow for containers—AWS DevTools and Cloud9

Security and Compliance

ISO, HIPPA, PCI, SOC1, SOC2, SOC3 Infocomm Media Development Auth.

Containers are a first-class citizen of the AWS Cloud

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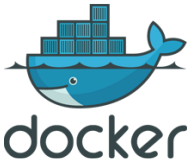
Rich partner ecosystem

Foundation



DevOps

Monitoring & Logging

Security

Networking

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THANK YOU

https://aws.amazon.com/containers