Containers on AWS

A Journey to Modern Applications

Johannes Langer, Senior Solutions Architect, AWS

June 2019

The new normal: companies are increasingly global and products are increasingly digital

47%

of CEOs said they are being challenged by the board of directors to make progress in digital business

79%

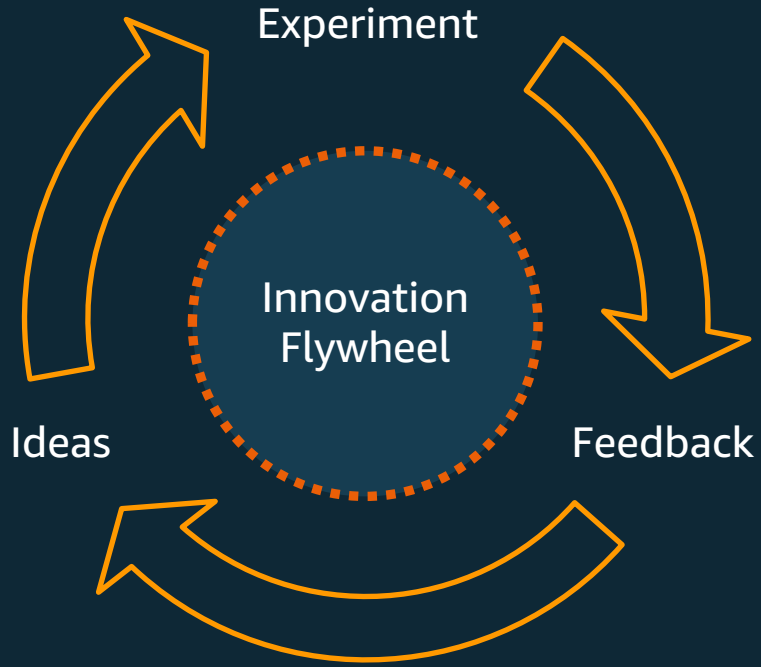
of CIOs believe that digital business is making their IT organizations better prepared to change

67%

of all business leaders believe that they must pick up the pace of digitalization to remain competitive

Source: Gartner

To maintain competitive advantage, digital businesses must innovate as rapidly as possible



What changes have to be made in this new world?

Architectural patterns

Operational model

Software delivery

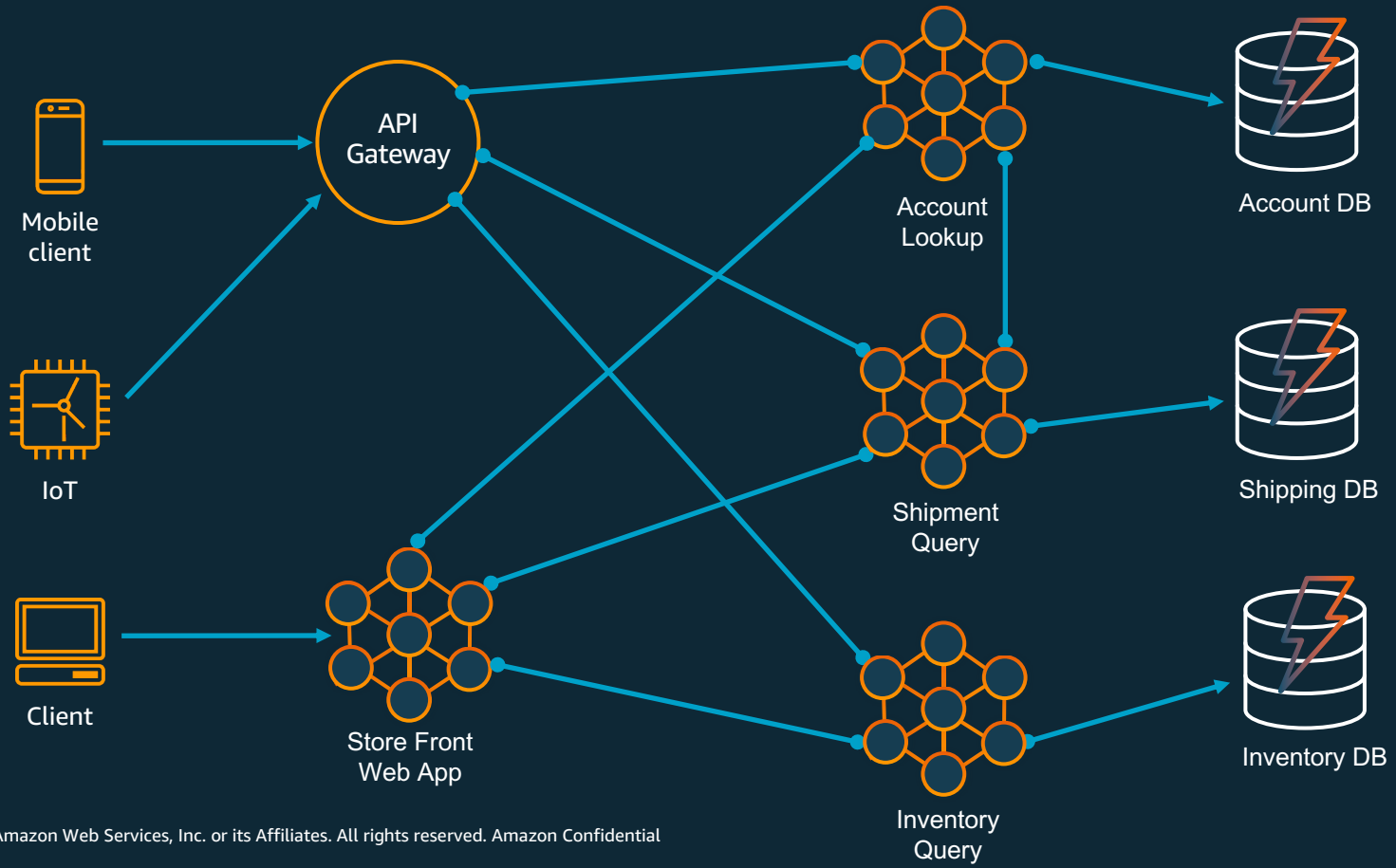
Changes to the architectural patterns

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

Monolith
Does everything

Microservices
Do one thing

Microservices architectures



Cloud-native architectures are small pieces, loosely joined

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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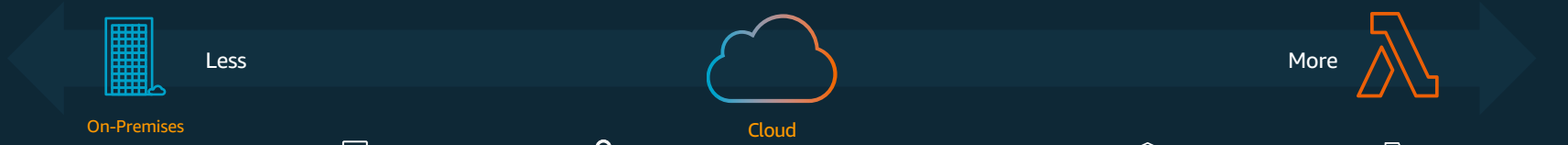
AWS operational responsibility models



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

aws

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

aws

Changes to the delivery of software

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

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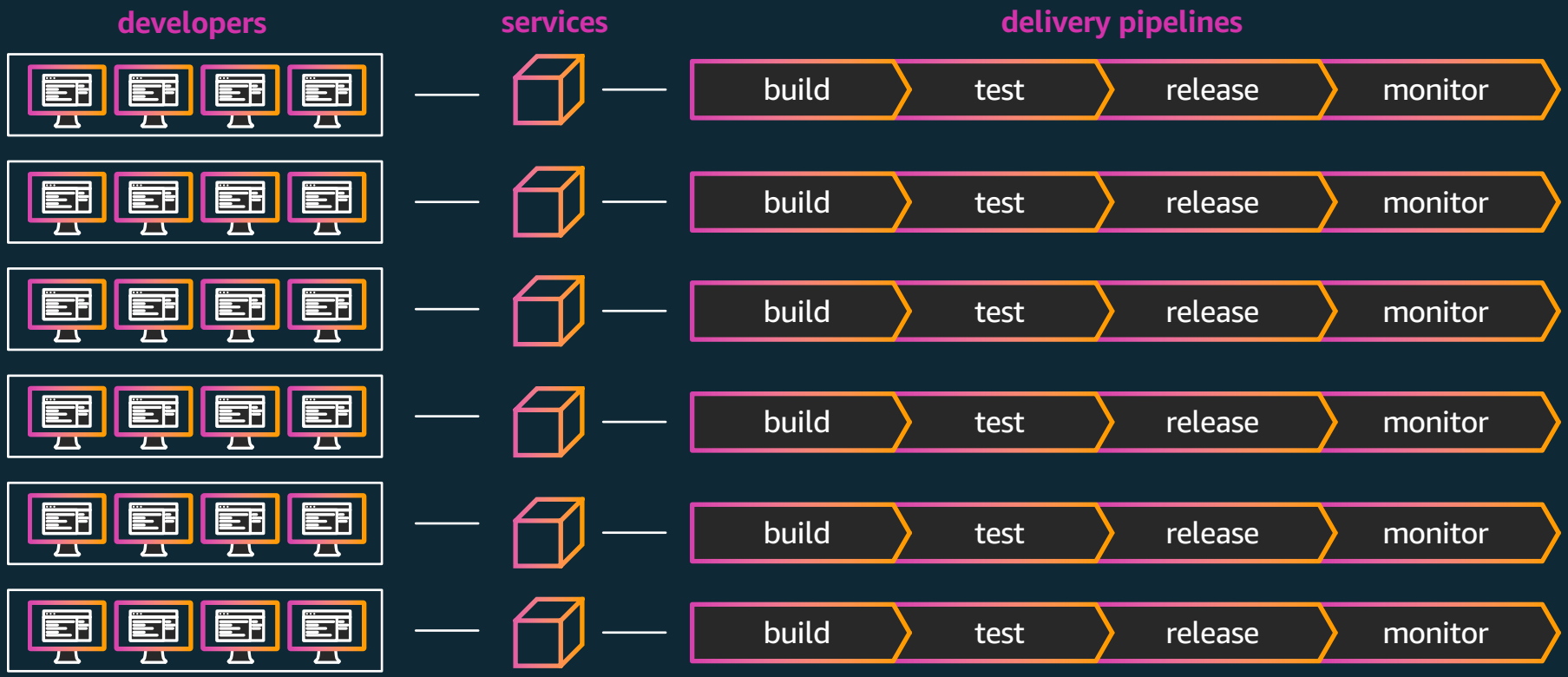
Microservice development lifecycle



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Best practices

Decompose for agility
(microservices, 2 pizza teams)

Automate everything

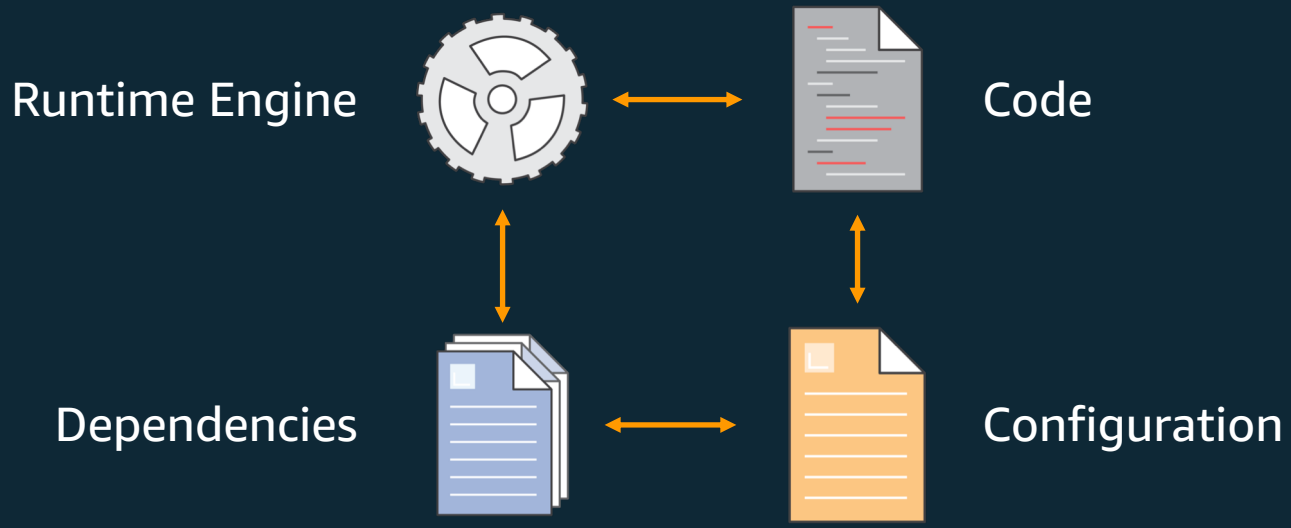
Standardized tools

Belts and suspenders
(governance, templates)

Infrastructure as code

Containers are the best on ramp towards modern applications

Application environment components



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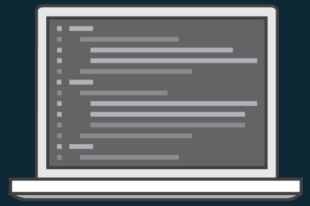
Different environments



Local Laptop

Staging / QA

Production

On-Prem

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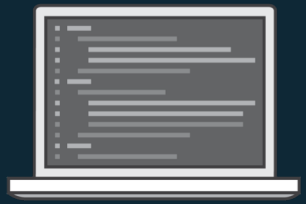
It worked on my machine, why not in prod?

v6.0.0



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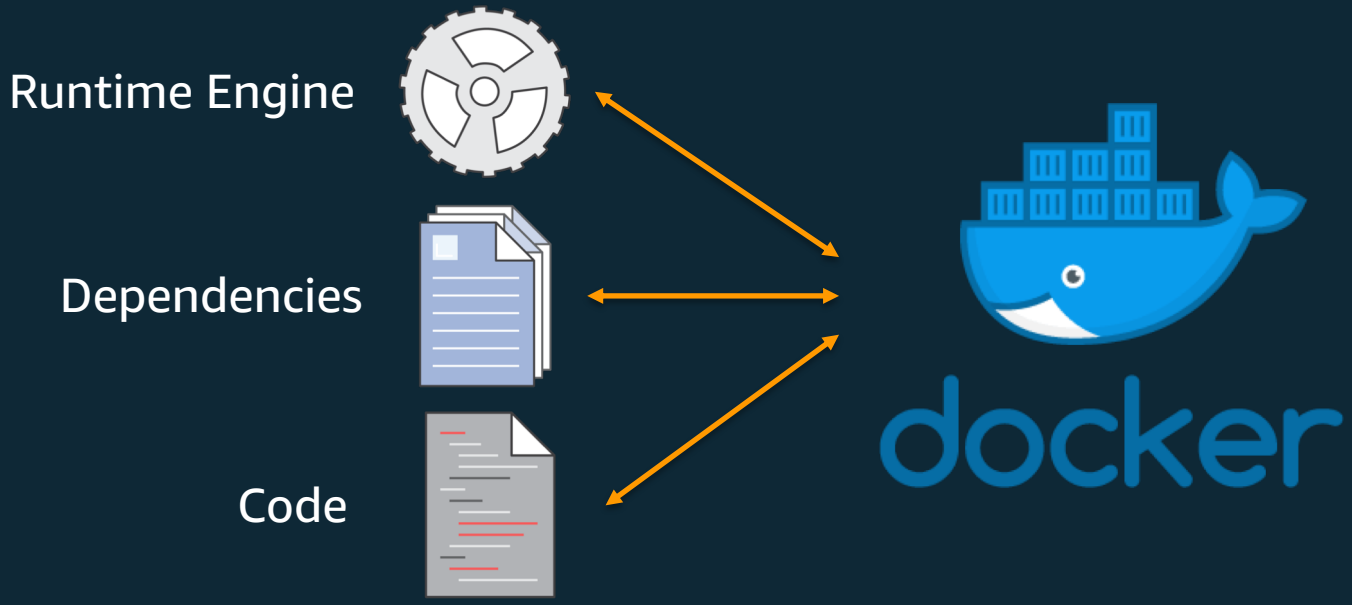
Docker to the rescue



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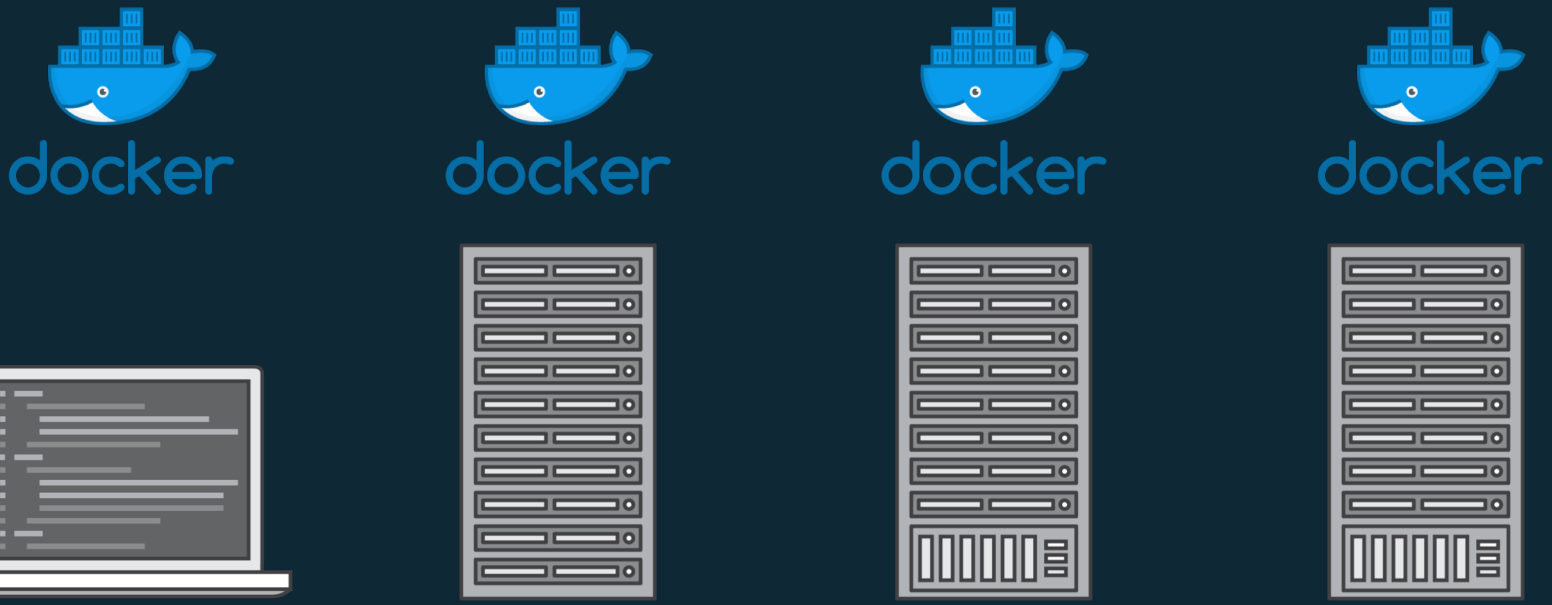
Four environments, same container



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Why are enterprises adopting containers?

- Accelerate software development
- Build modern applications
- Automate operations at web scale

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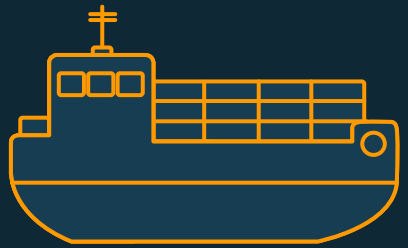
Helping customers scale containers

450+%
growth



Hundreds of millions
of containers started each week

of **millions**
of container instances

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Typical use cases

- Microservices: Java, Node.js, Go, Web Apps, etc.
- Continuous Integration and Continuous Deployment (CICD)
- 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

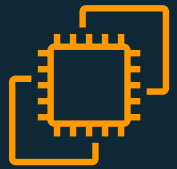
AWS container services landscape

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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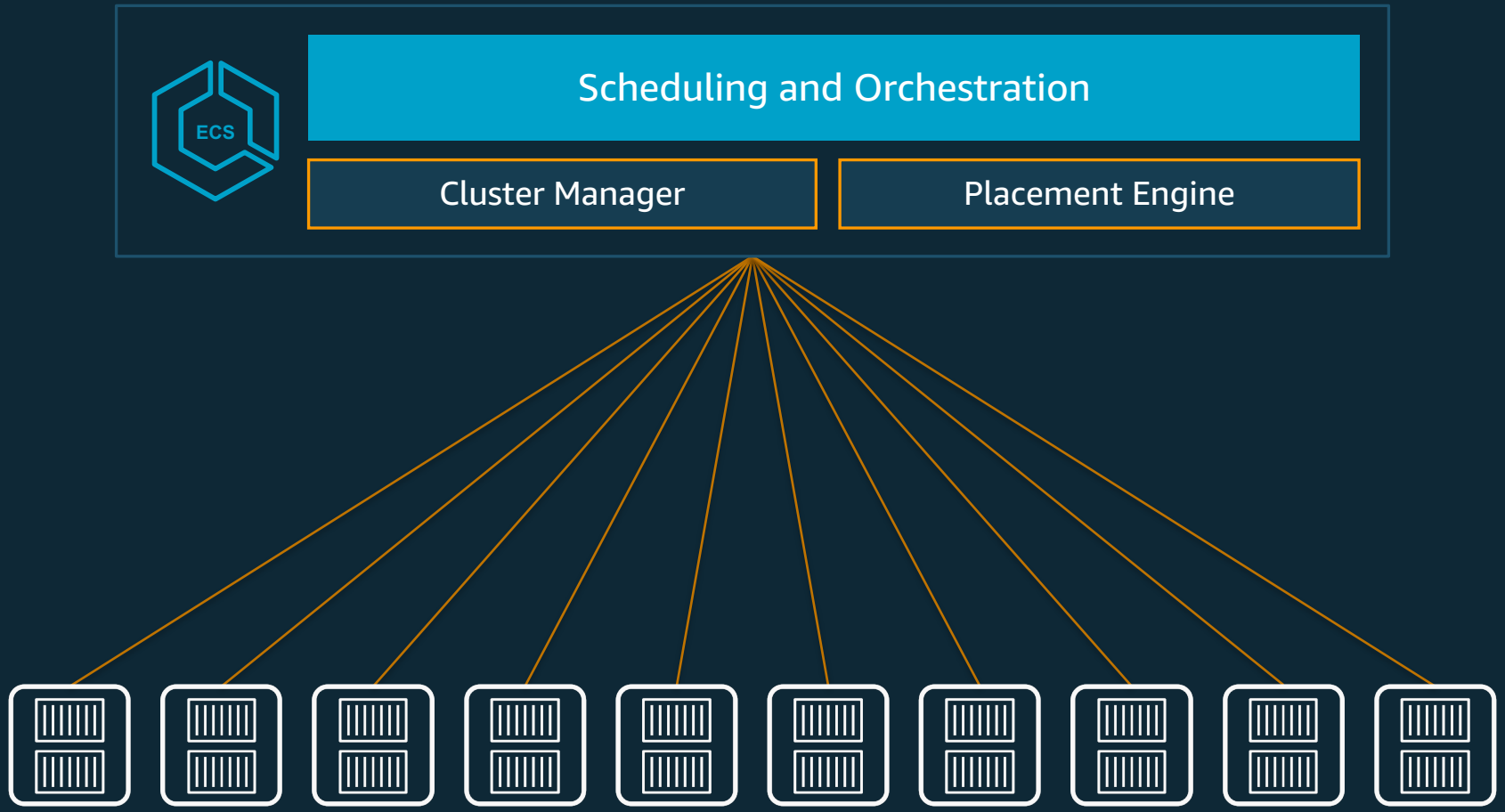

McDonald's Home Delivery: Why Amazon ECS?

- Speed to market
- Scalability and reliability
- Security
- DevOps—CI / CD
- Monitoring

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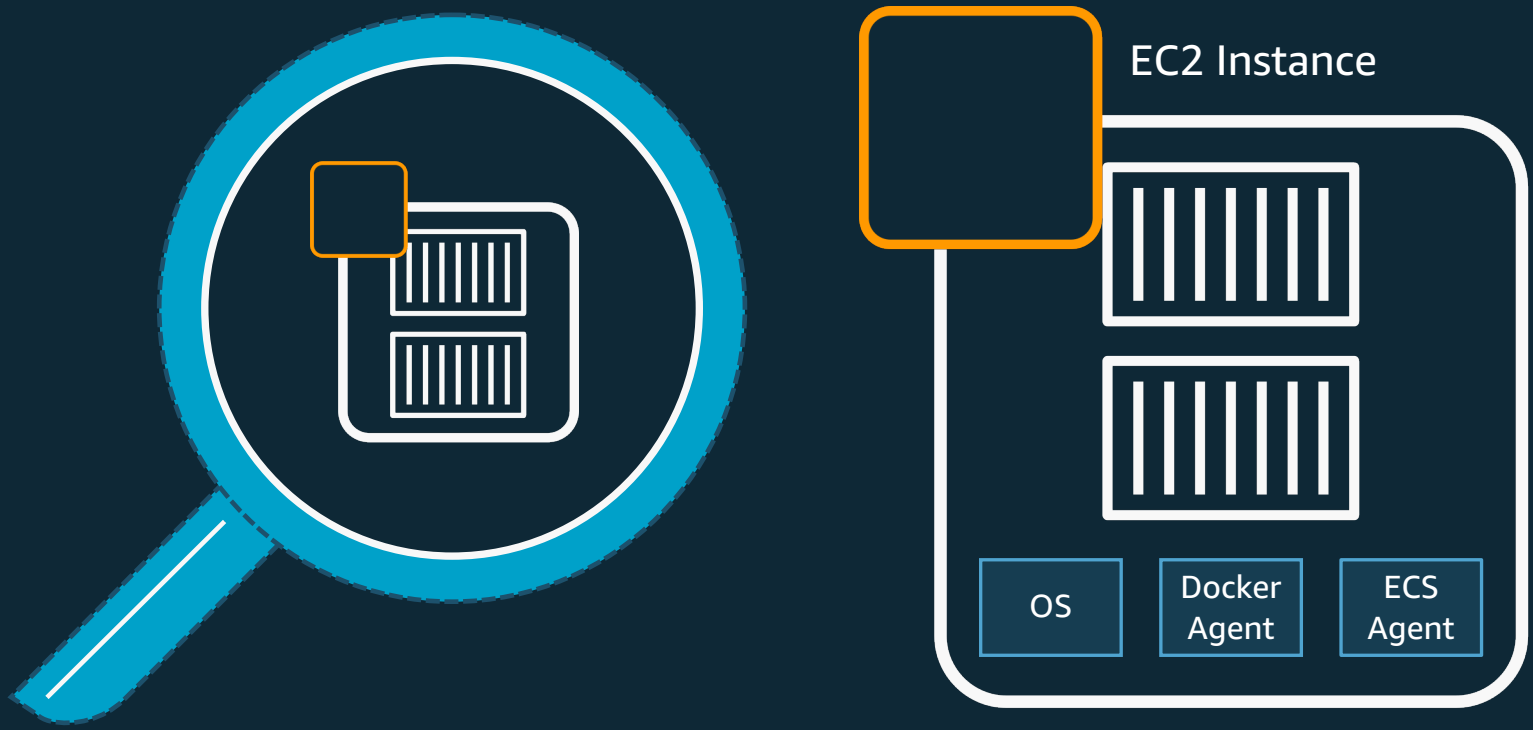
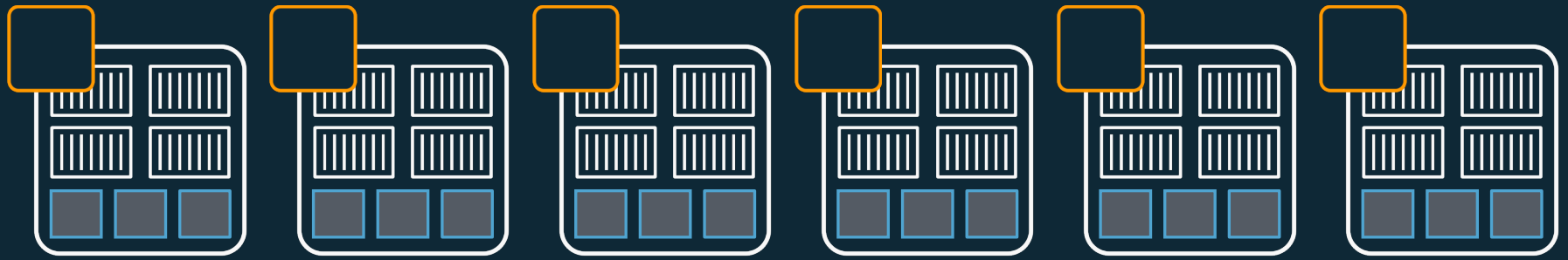
AWS Fargate

Without Fargate, you end up managing more than just containers

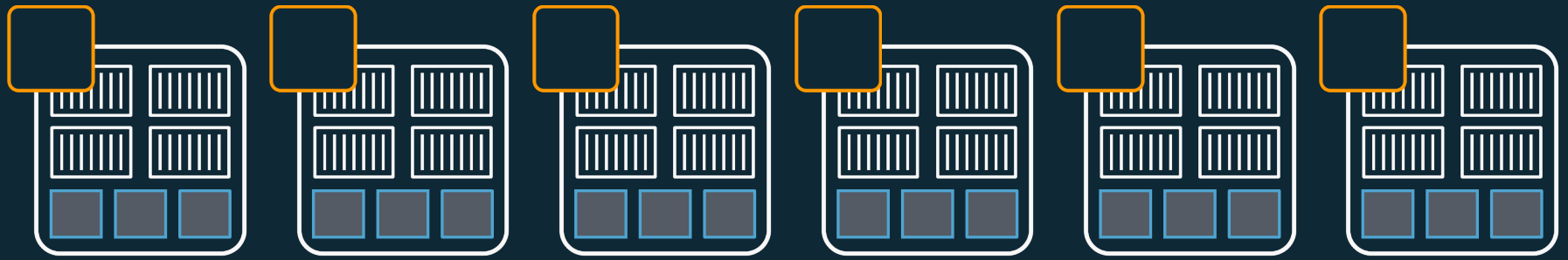


- Patching and Upgrading OS, agents, etc.

- 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

migrated ~850 applications running in ~5000 containers to Fargate to reduce the undifferentiated heavy lifting that came with managing Kubernetes

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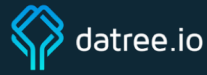
AWS Fargate customers

"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




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

Shimon Tolts
CTO, DATREE

Amazon Elastic Container Service for Kubernetes

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What is Kubernetes?

Open source container management platform

Helps you run containers at scale

Gives you primitives for building modern applications

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Community, contribution, choice

kubernetes

aws

But where you run Kubernetes matters

Quality of the cloud platform

Quality of the applications

Your users

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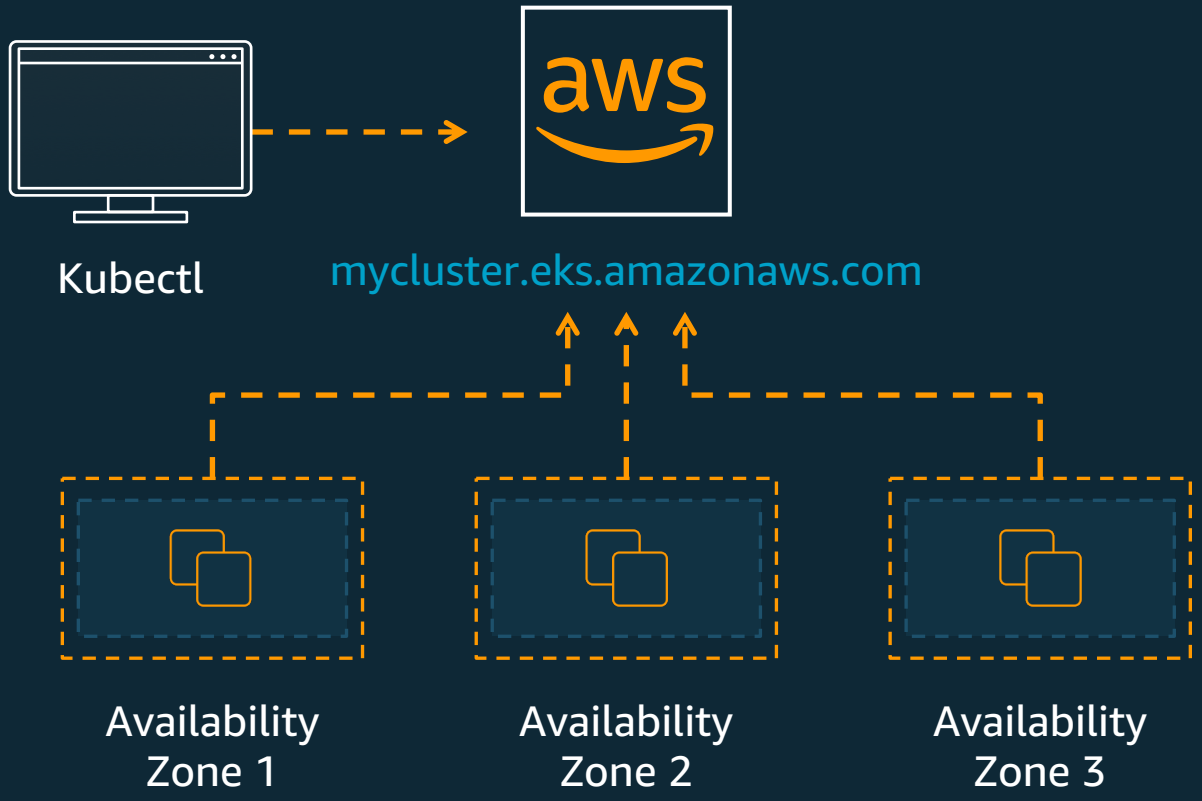
51%

of Kubernetes workloads run on AWS today

—CNCF survey



EKS is Kubernetes certified

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How are customer using Amazon EKS?

Microservices

Platform-as-a-Service

Enterprise App Migration

Machine Learning

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Customers adopting Kubernetes on AWS

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Customer example: Snap

100% on Kubernetes in the cloud

Moving core messaging architecture to AWS and EKS

Currently monolithic, breaking this into SOA and microservices

"Undifferentiated Heavy Lifting is work that we have to do that doesn't directly benefit our customers. It's just work. EKS frees us up to worry about delivering customer value and allows developers without operational experience to innovate without having to know where their code runs."

More detailed talk: AWS New York Summit 2018 - Run Kubernetes with Amazon EKS (SRV318)

Amazon container services

Amazon ECS

Amazon EKS

AWS Fargate

Amazon ECR

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THANK YOU! Questions?

https://aws.amazon.com/containers


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@johlanger

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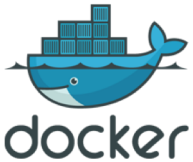
Rich partner ecosystem

Foundation



DevOps

Monitoring & Logging

Security

Networking

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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

Container Customers

EKS Reference Customers:

Fidelity Investments
SNAP Inc
Appcard

EKS Reference Customer: Fidelity Investments

"We built the next generation of our PaaS using EKS for large enterprise workloads. We manage thousands of applications and have hundreds of DevOps teams."

Amr Abdelhalem, Head of Cloud Architecture

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EKS Reference Customer: SNAP

"Snapchat serves millions of people around the world every day, and we're thrilled to now leverage Amazon EKS as a core compute service that can meet our needs now, as well as upcoming plans to host several critical workloads in the coming months."

Alex Strand, Senior Director of Engineering, Snap Inc

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EKS Reference Customer: Appcard

"Kubernetes is fast becoming the preferred solution for container orchestration. Its biggest downside is that it is not simple to set up and operate. EKS gives us all the benefits of Kubernetes, but takes care of managing the hard stuff. We can dedicate less resources to deployment and operations as result."

Amichay Oren, Co-founder & CTO, AppCard Inc

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Fargate Reference Customers:

Turner Broadcasting
99Designs
Harry's Razors

Fargate Reference Customer: Turner Broadcasting

"The Cloud Architecture team begin building tooling around Fargate to accelerate the adoption and the move to this new DevOps world. The result ended up with reduce cost and time."

Joseph Bulger, Principal Architect
Turner Broadcasting System

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Fargate Reference Customer: 99Designs

"We moved to Fargate to reduce operational burden and operational costs. Fargate made running Docker containers easy, removing need to maintain instances."

Robert McNeil, Sr. Engineer, 99designs

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Fargate Reference Customer: Harry's Razors

HARRY'S

"With Fargate we eliminated EC2 instances, sizing concerns, instance profiles and policies. Directly leveraging service auto scaling and target tracking policies, migrating without any downtime and simplifying our overall system."

Bryce Lohr, Technical Lead, Core Services, Harry's

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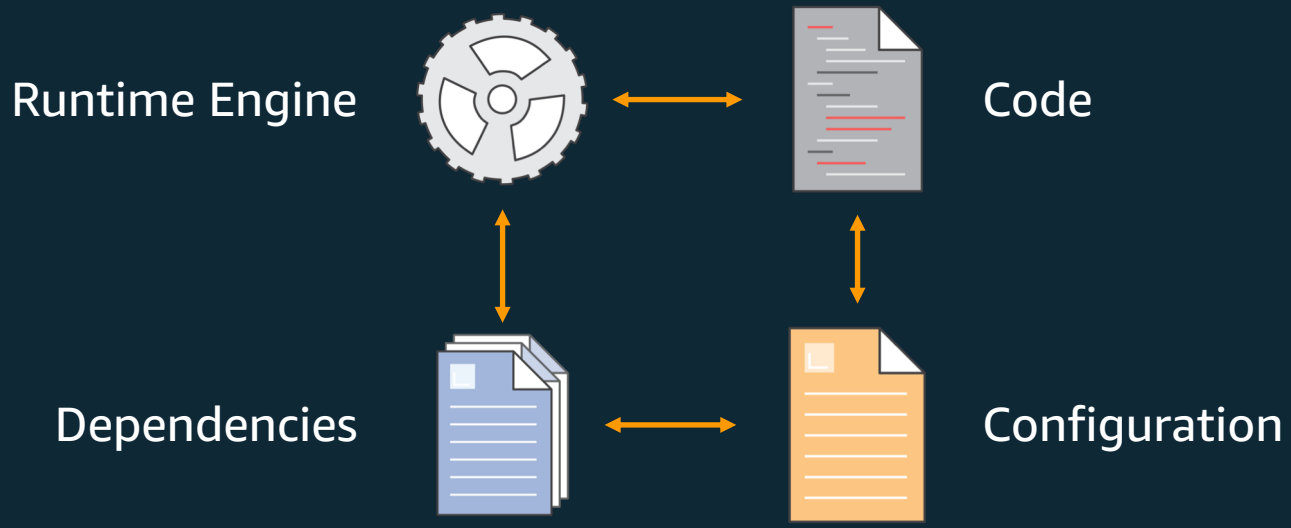
Introduction to Containers and Docker

Application environment components



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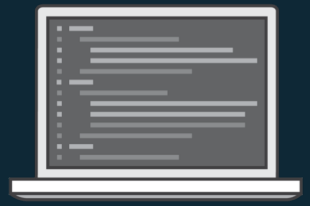
Different environments



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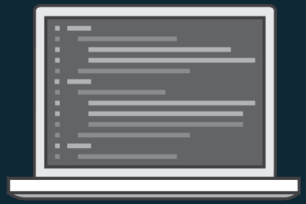

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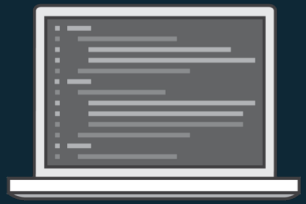

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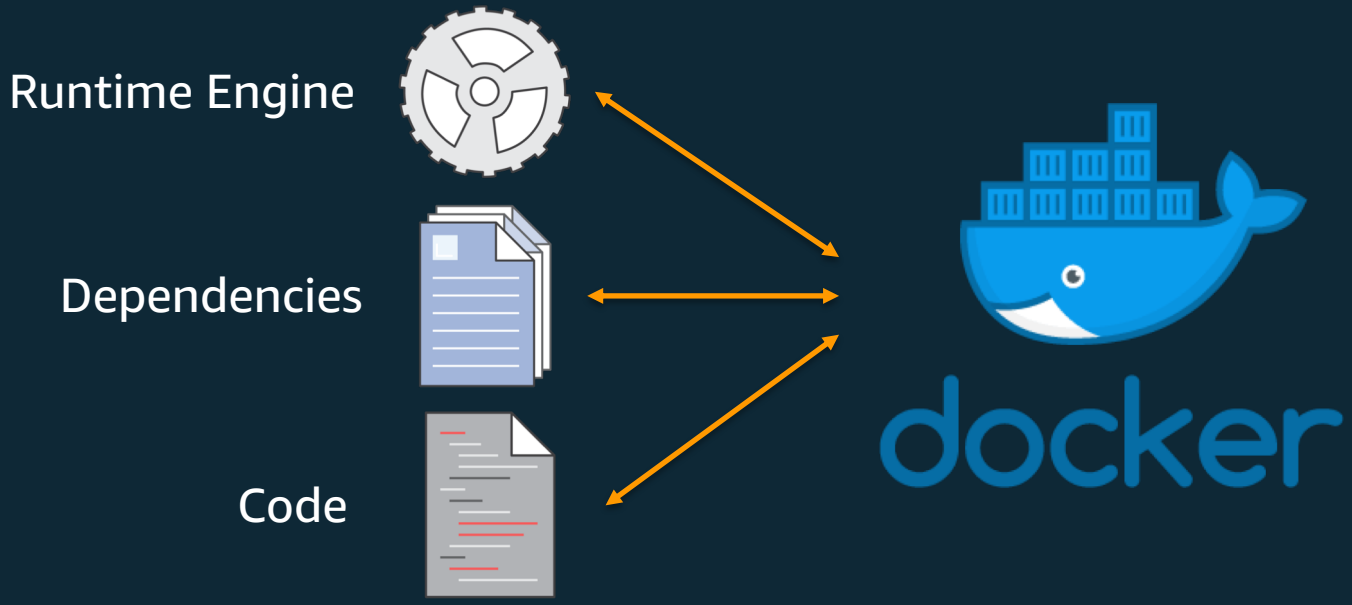
Docker to the rescue



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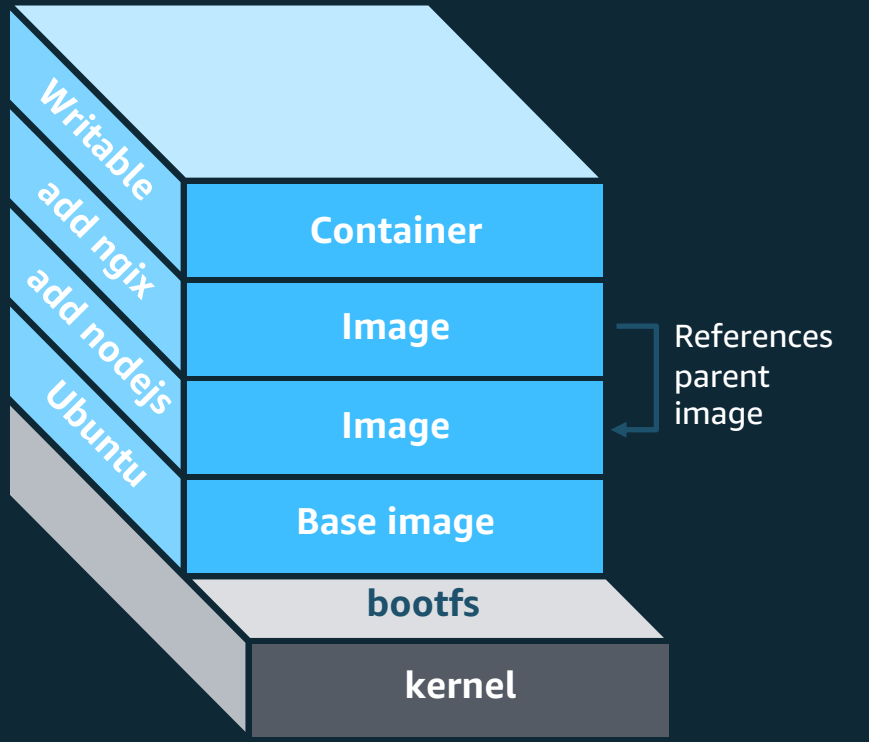
Docker container image

Read only image that is used as a template to launch a container.

Start from base images that have your dependencies, add your custom code.

Docker file for easy, reproducible builds.



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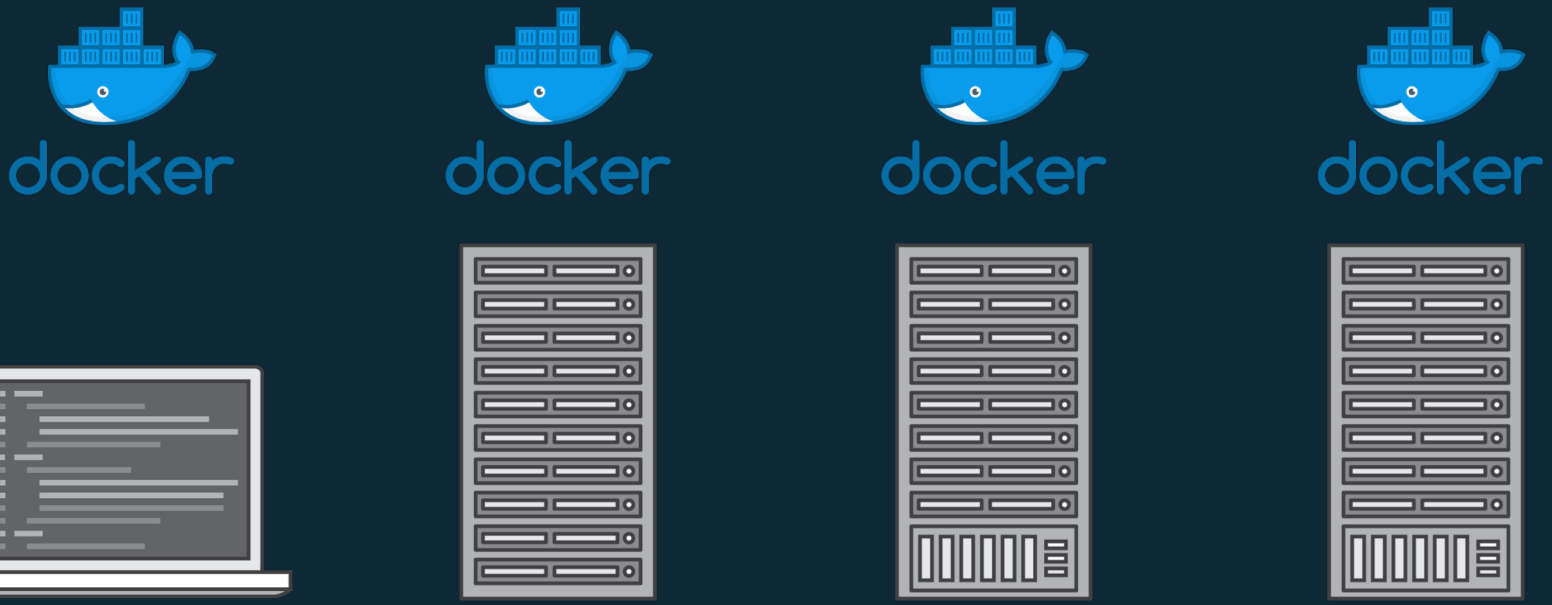
Four environments, same container



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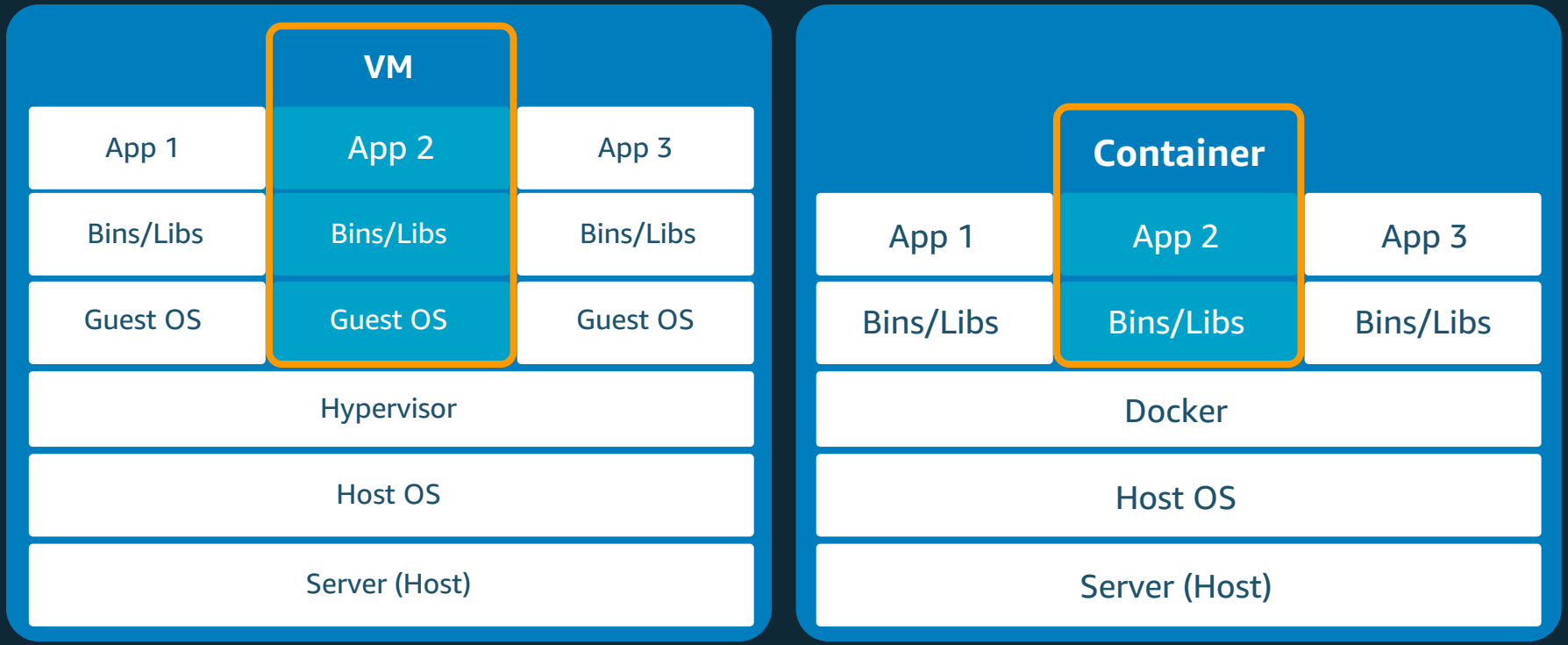
Virtual machine versus Docker



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Container & Docker Benefits

Portable application artifact that runs reliably everywhere

Run different applications or application versions with different dependencies simultaneously

Better resource utilization by running multiple lightweight containers per host

Reference Architectures (Informational)

Amazon ECS:
Rebalancing Amazon ECS Tasks using AWS Lambda
NGINX Reverse Proxy on Amazon EC2 Container Service
Java Microservices Deployed on EC2 Container Service
Amazon ECS Reference Architecture: Batch Processing
Node.js Microservices Deployed on EC2 Container Service
Amazon EC2 Container Service - Reference Architecture: Service Discovery to containers using CloudWatch Events, Lambda and Route 53 private hosted zones
Service Discovery for AWS EC2 Container Service via DNS
Canary Blue/Green deployments on ECS
Blue/Green deployments on ECS
ECS Reference Architecture: Continuous Deployment
Amazon ECS Scheduler Driver to integrate Apache Mesos with ECS

AWS Fargate
Blue/Green deployments using Fargate
How to host an ASP.NET core application in AWS Fargate using Linux containers

Amazon EKS
CodeSuite - Continuous Deployment Reference Architecture for Kubernetes