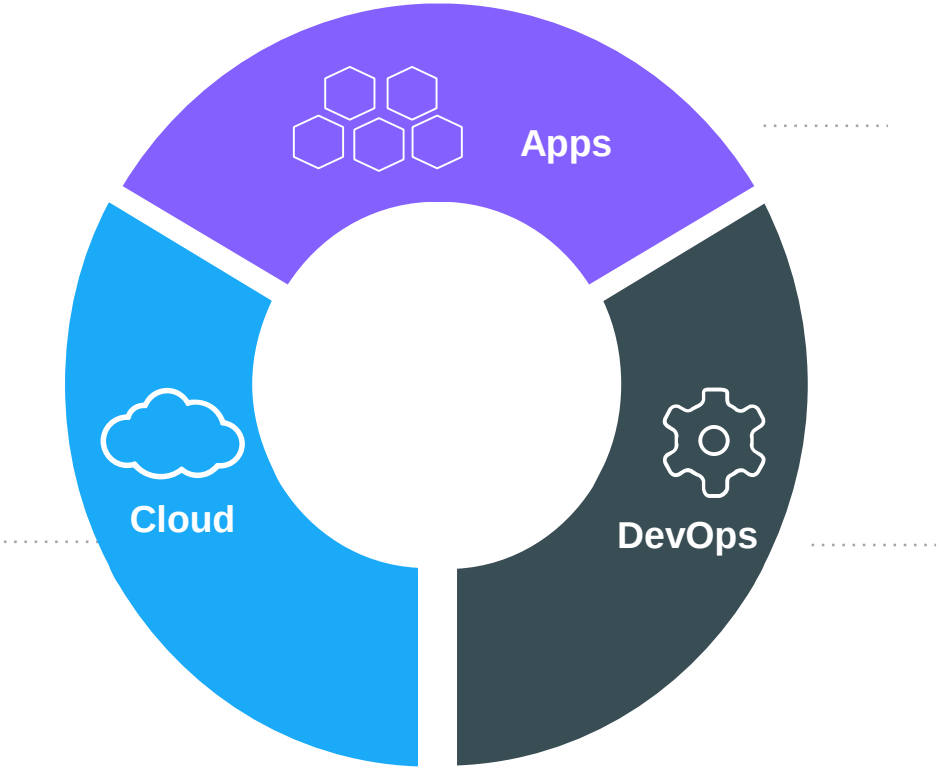
Introduction to Docker

The IT Landscape is Changing

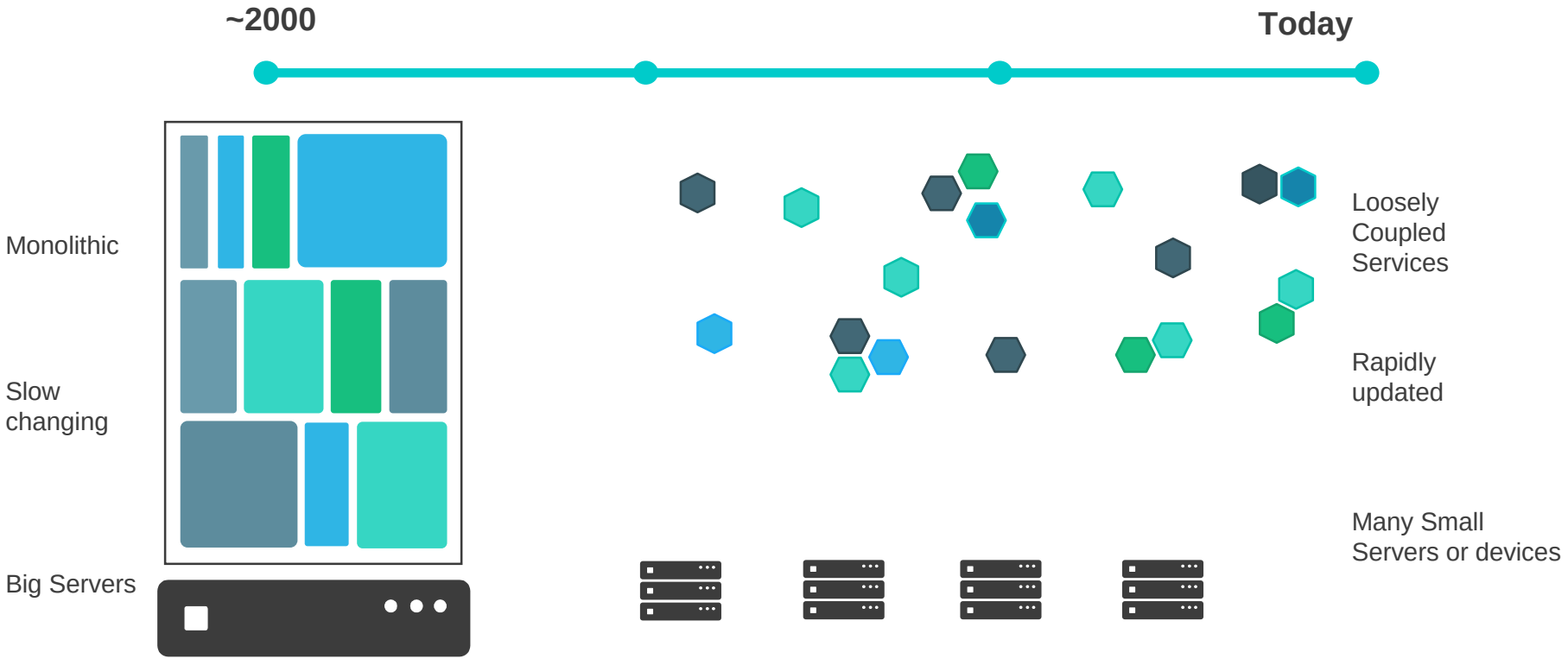


Movement in the cloud

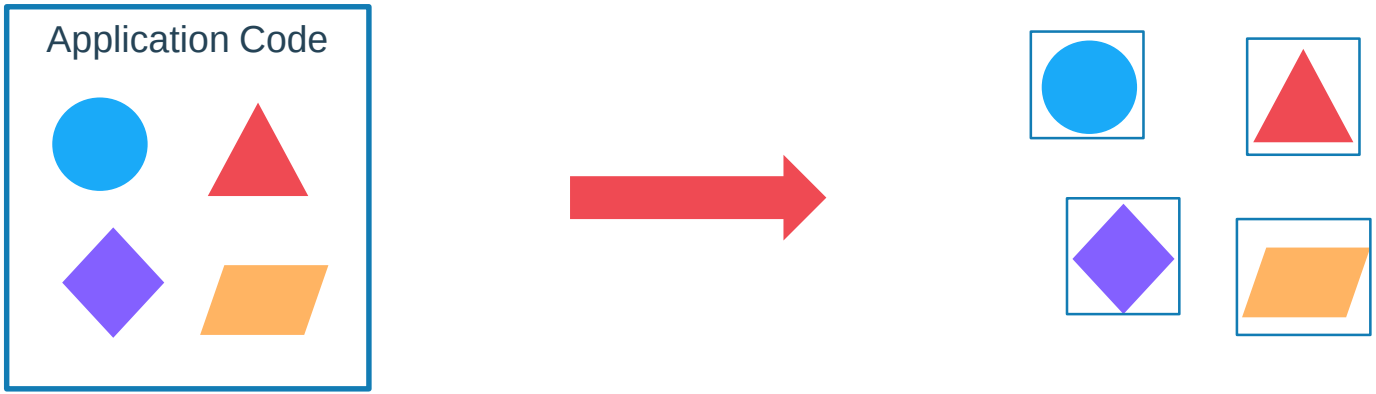
- Migrate workloads to cloud
- Portability across environments
- Want to avoid cloud vendor lock-in

State of App development Survey: Q1 - 2016

Applications are transforming



Application Modernization



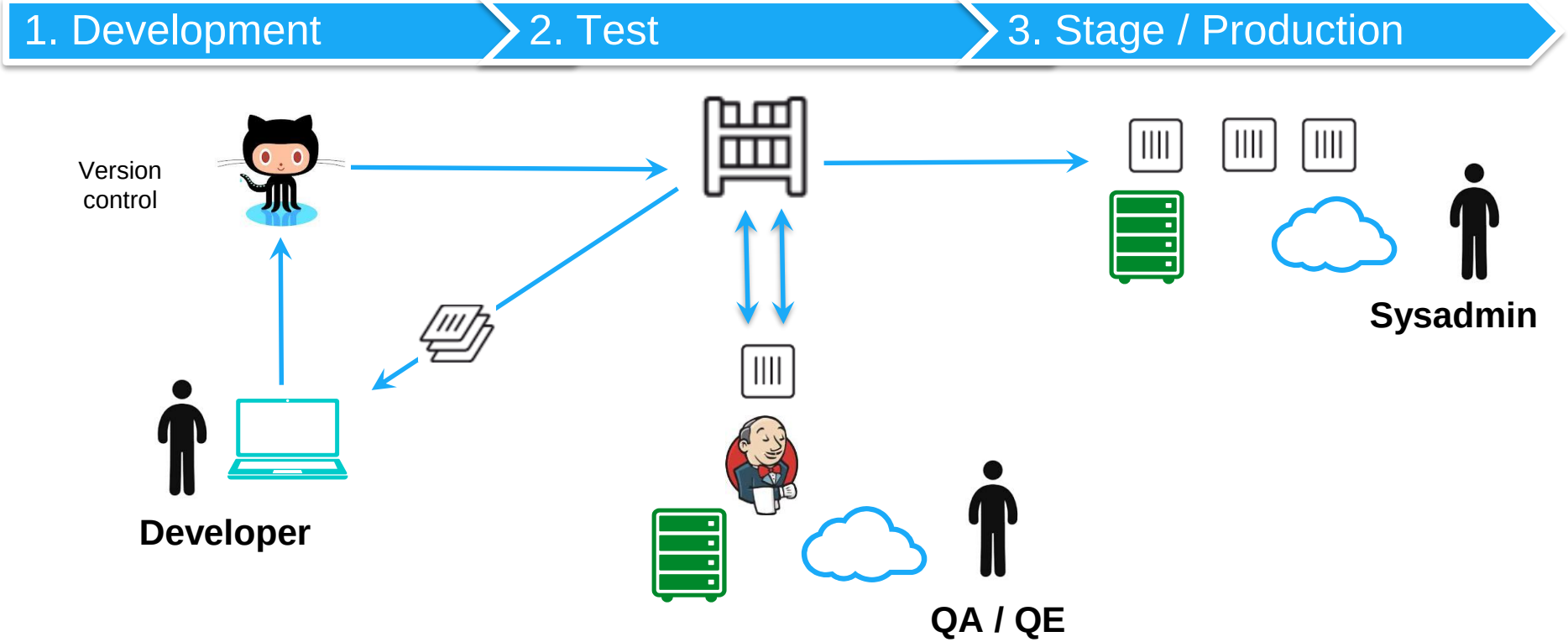
Developer Issues:

- Minor code changes require full re-compile and re-test
- Application becomes single point of failure
- Application is difficult to scale

Microservices: Break application into separate operations

12-Factor Apps: Make the app independently scalable, stateless, highly available by design

Continuous Integration and Delivery



Tug of War Between Developers and Ops

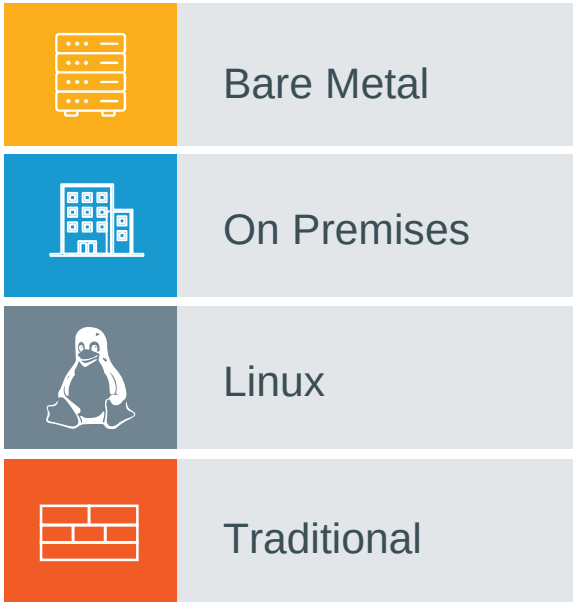
Developers

- Freedom to create and deploy apps fast
- Define and package application needs

IT Operations

- Quickly and flexibly respond to changing needs
- Standardize, secure, and manage

Organizations Must Deal with Diverse Technology



…and Diverse Organizations

Developers

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The Myth of Bi-Modal IT

	MICROSERVICES	TRADITIONAL APPS
Cloud or New Infrastructure	You are either here..	
Old Infrastructure		…or here

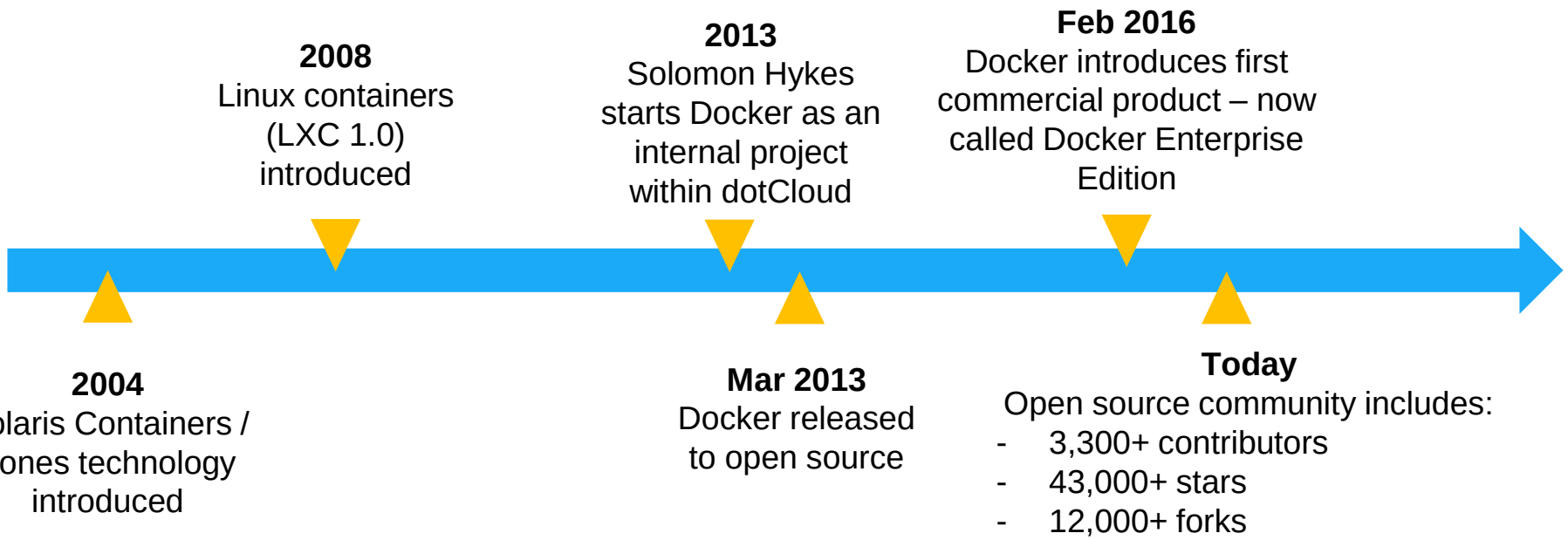
Enabling a Journey

	MICROSERVICES	AGILE TRADITIONAL APPS	TRADITIONAL APPS
Cloud or New Infrastructure			
Old Infrastructure			

…that is past AND future proof

Docker and Container Overview

History of Docker



Incredible adoption in just 4 years

14M
Docker Hosts

900K
Docker apps

77K%
Growth in Docker job listings

12B
Image pulls Over 390K% Growth

3300
Project Contributors

The Docker Family Tree

Open source **framework** for assembling core components that make a container platform

Intended for:
Open source contributors + ecosystem developers

Enterprise Edition

Subscription-based, commercially supported **products** for delivering a secure software supply chain

Intended for:
Production deployments + Enterprise customers

Community Edition

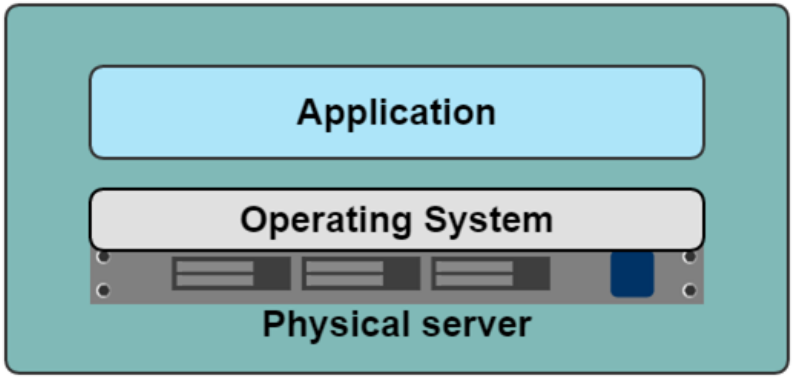
Free, community-supported **product** for delivering a container solution

Intended for:
Software dev & test

A History Lesson

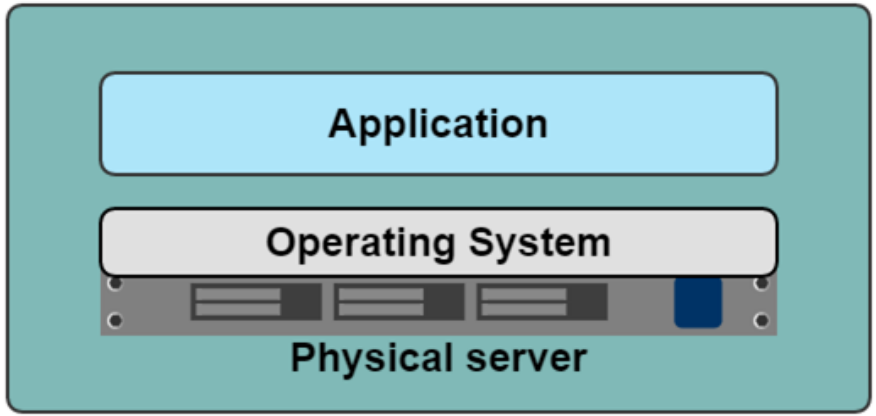
In the Dark Ages

One application on one physical server



Historical limitations of application deployment

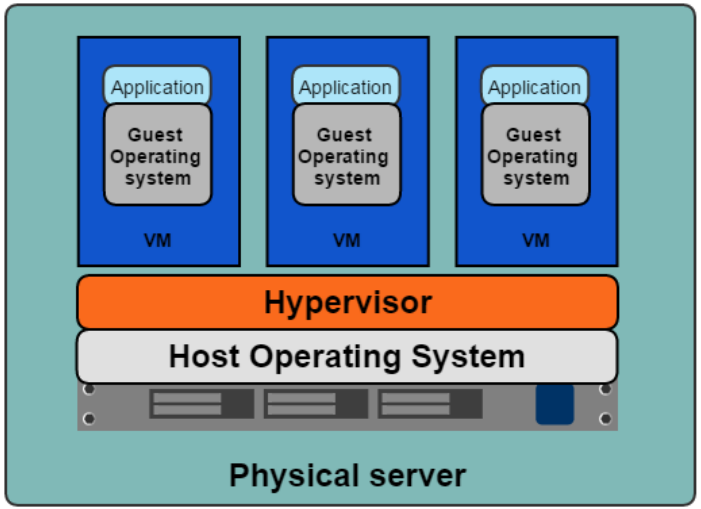
- Slow deployment times
- Huge costs
- Wasted resources
- Difficult to scale
- Difficult to migrate
- Vendor lock in



A History Lesson

Hypervisor-based Virtualization

- One physical server can contain multiple applications
- Each application runs in a virtual machine (VM)



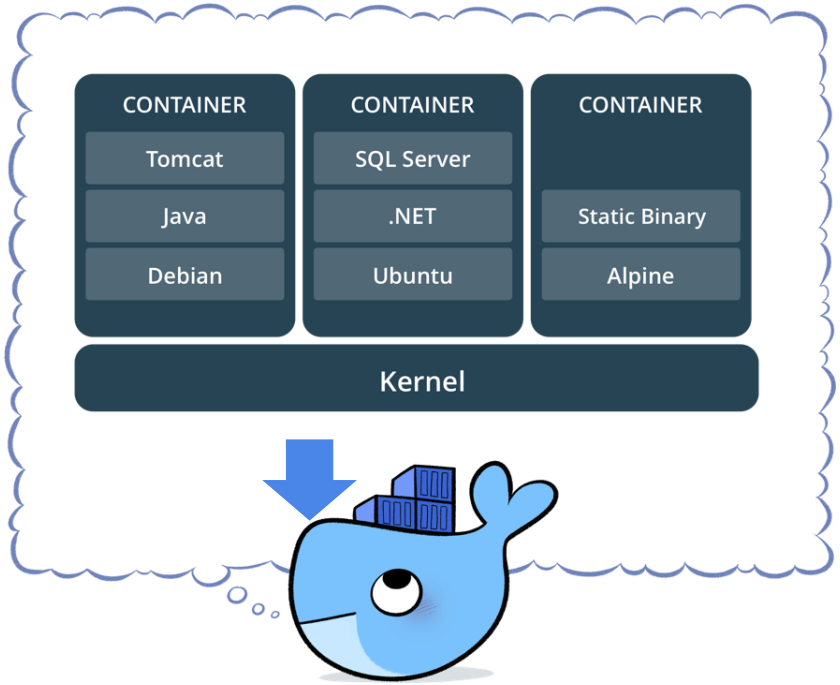
Benefits of VMs

- Better resource pooling
  - One physical machine divided into multiple virtual machines
- Easier to scale
- VMs in the cloud
  - Rapid elasticity
  - Pay as you go model

Limitations of VMs

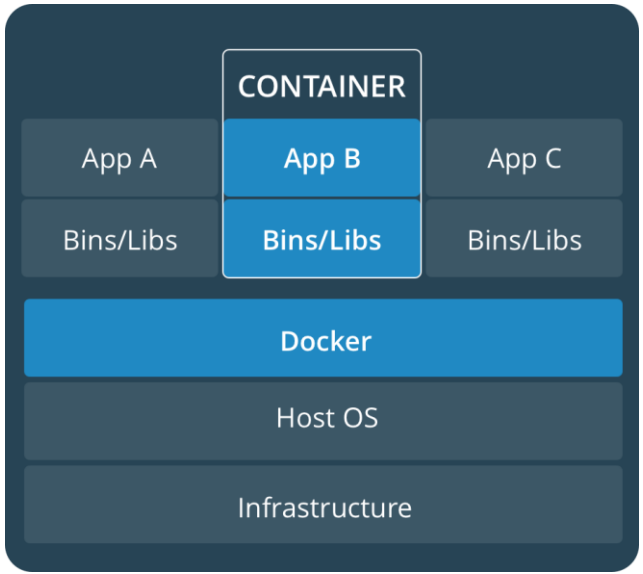
- Each VM stills requires
  - CPU allocation
  - Storage
  - RAM
  - An entire guest operating system
- The more VMs you run, the more resources you need
- Guest OS means wasted resources
- Application portability not guaranteed

What is a container?

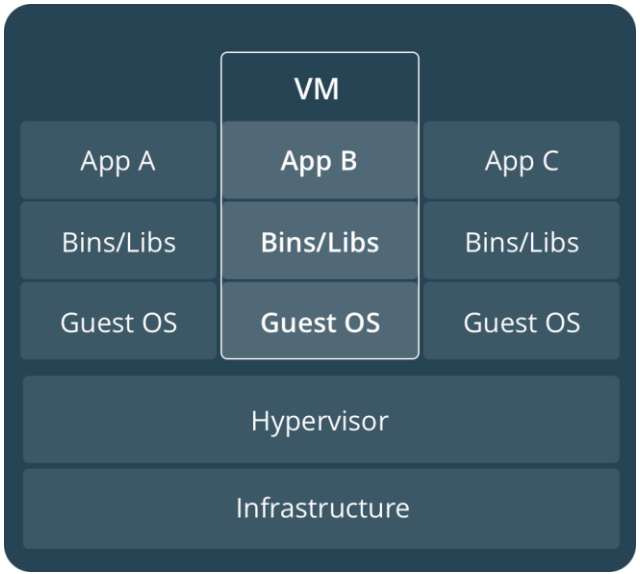


- Standardized packaging for software and dependencies
- Isolate apps from each other
- Share the same OS kernel
- Works with all major Linux and Windows Server

Comparing Containers and VMs

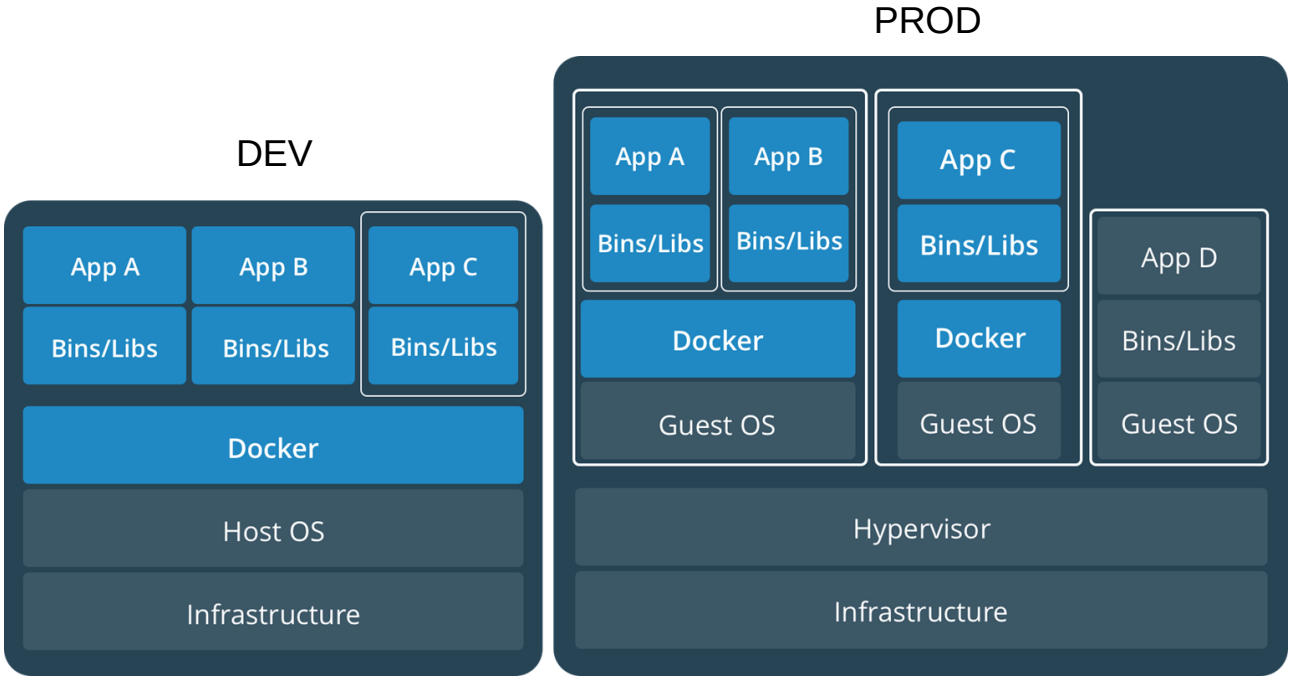


Containers are an app level construct



VMs are an infrastructure level construct to turn one machine into many servers

Containers and VMs together



Containers and VMs together provide a tremendous amount of flexibility for IT to optimally deploy and manage apps.

Key Benefits of Docker Containers

Speed

- No OS to boot = applications online in seconds

Portability

- Less dependencies between process layers = ability to move between infrastructure

Efficiency

- Less OS overhead
- Improved VM density

Container Solutions & Landscape

Docker Basics

Image

The basis of a Docker container. The content at rest.

Container

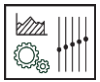
The image when it is ‘running.’ The standard unit for app service

Engine

The software that executes commands for containers. Networking and volumes are part of Engine. Can be clustered together.

Registry

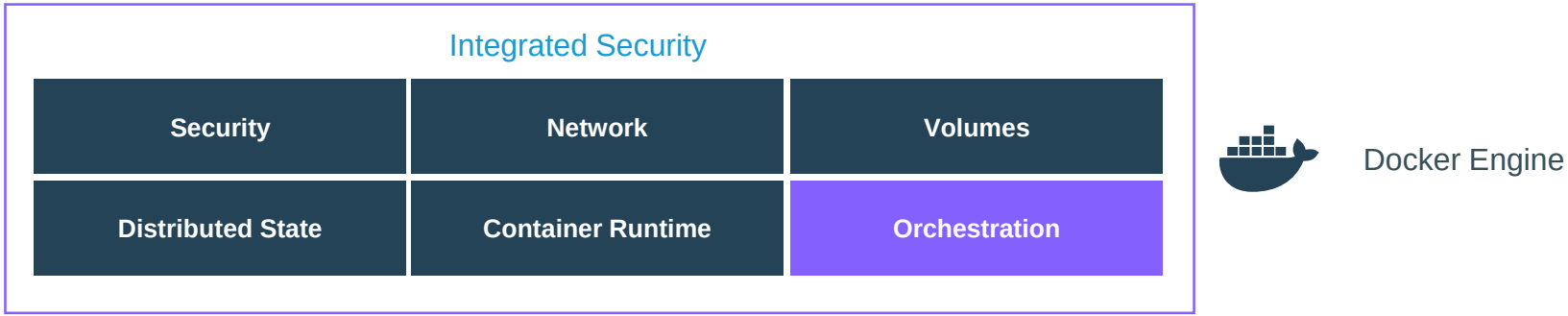
Stores, distributes and manages Docker images



Control Plane

Management plane for container and cluster orchestration

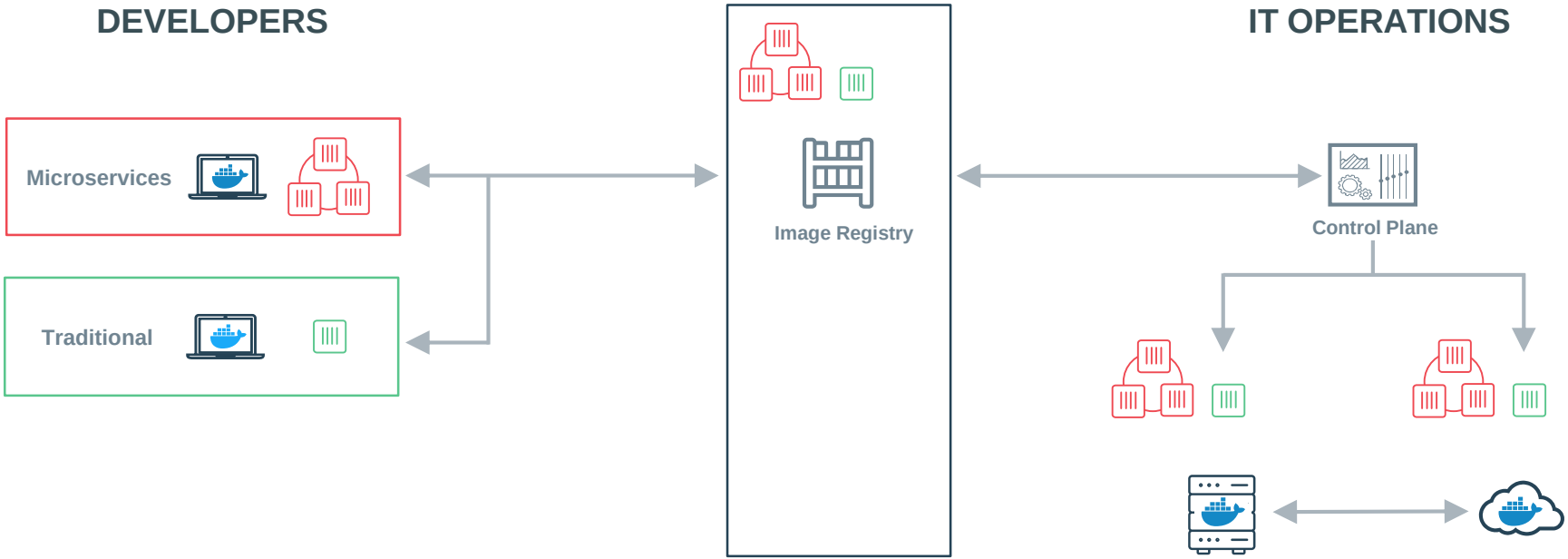
Foundation: Docker Engine



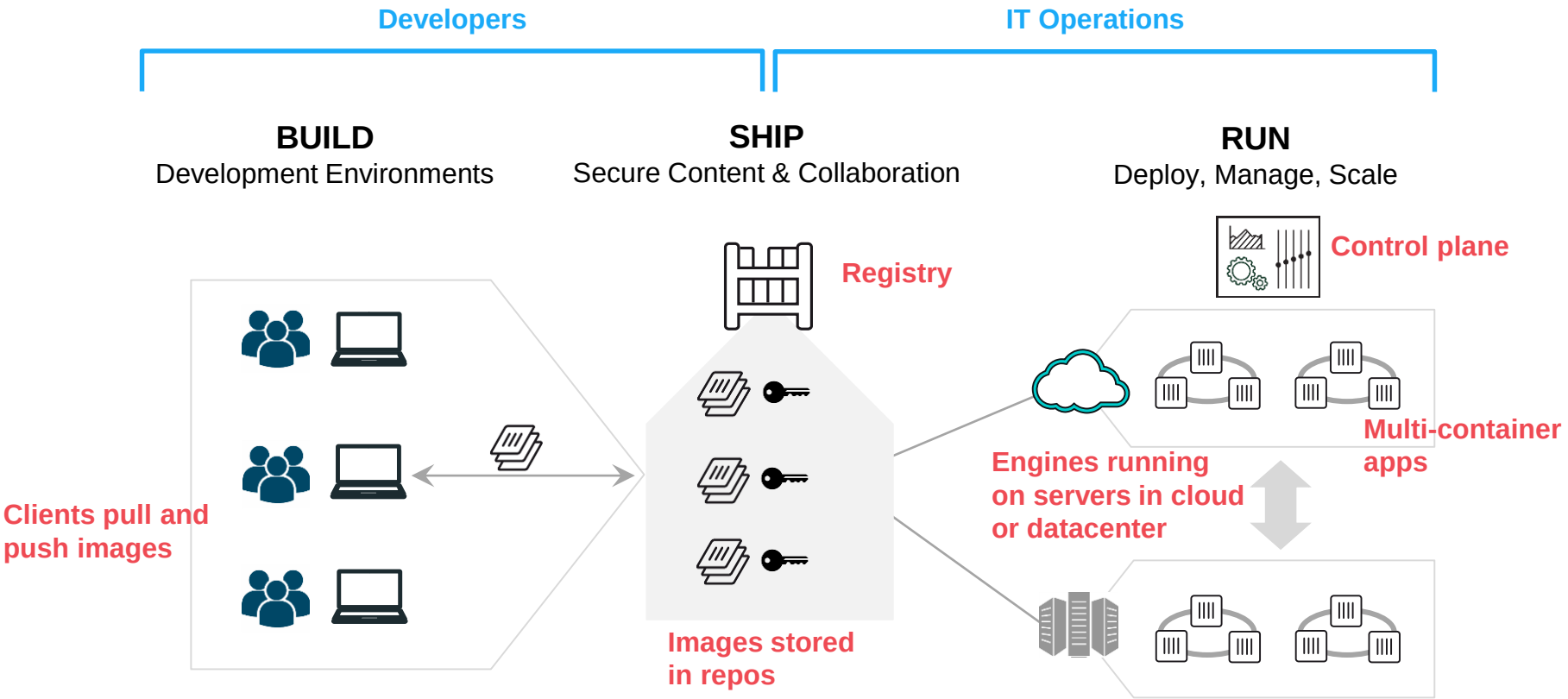
DEVELOPERS

IT OPERATIONS

Building a Software Supply Chain



Containers as a Service



Building a Secure Supply Chain

Container App Lifecycle Workflow

Private Image Registry	Secure Access and User Management	Application and Cluster Management
Image Scanning and Monitoring	Content Trust and Verification	Policy Management
Security	Network	Volumes
Distributed State	Container Runtime	Orchestration

Enterprise Edition

Docker Engine

Usable Security

Trusted Delivery

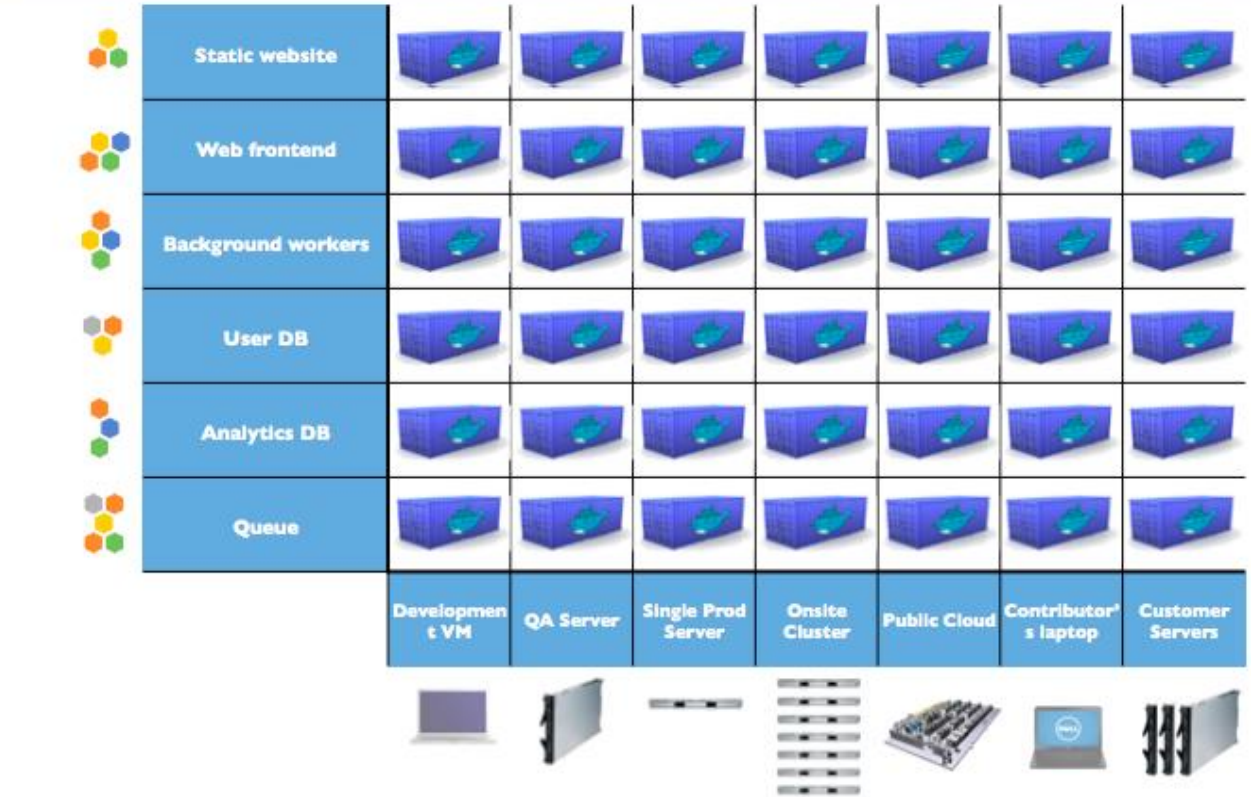
Portable

Multiple Stacks, Multiple Stages = Complexity

	Development VM	QA Server	Single Prod Server	Onsite Cluster	Public Cloud	Contributor's laptop	Customer Servers
Static website	?	?	?	?	?	?	?
Web frontend	?	?	?	?	?	?	?
Background workers	?	?	?	?	?	?	?
User DB	?	?	?	?	?	?	?
Analytics DB	?	?	?	?	?	?	?
Queue	?	?	?	?	?	?	?

docker

Solving the deployment matrix



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