

Introduction to Kubernetes and OpenShift

—

David Nugent

Developer Advocate, Cognitive,
Data & Analytics

Slides at: github.com/drnugent

Previously
known as

The Intersection of Quantum Computing, Artificial Intelligence and Cryptography

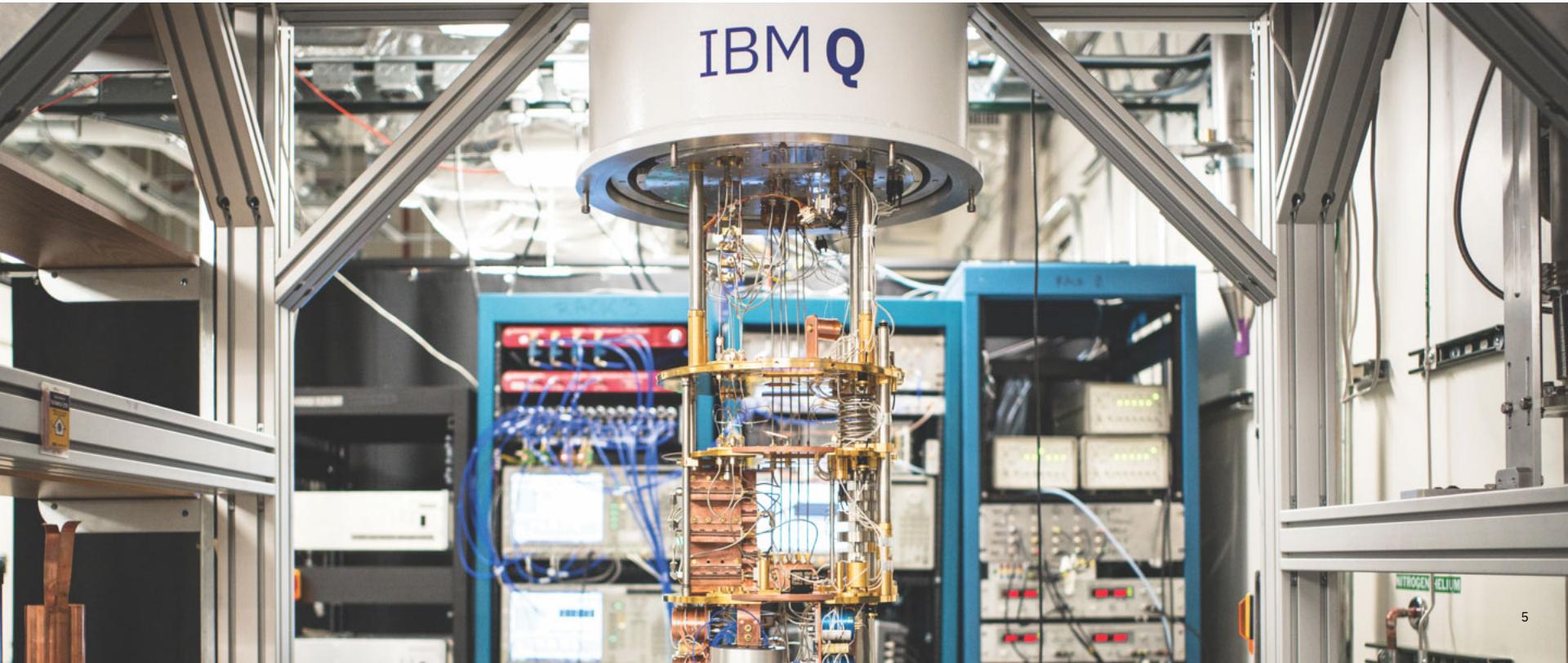
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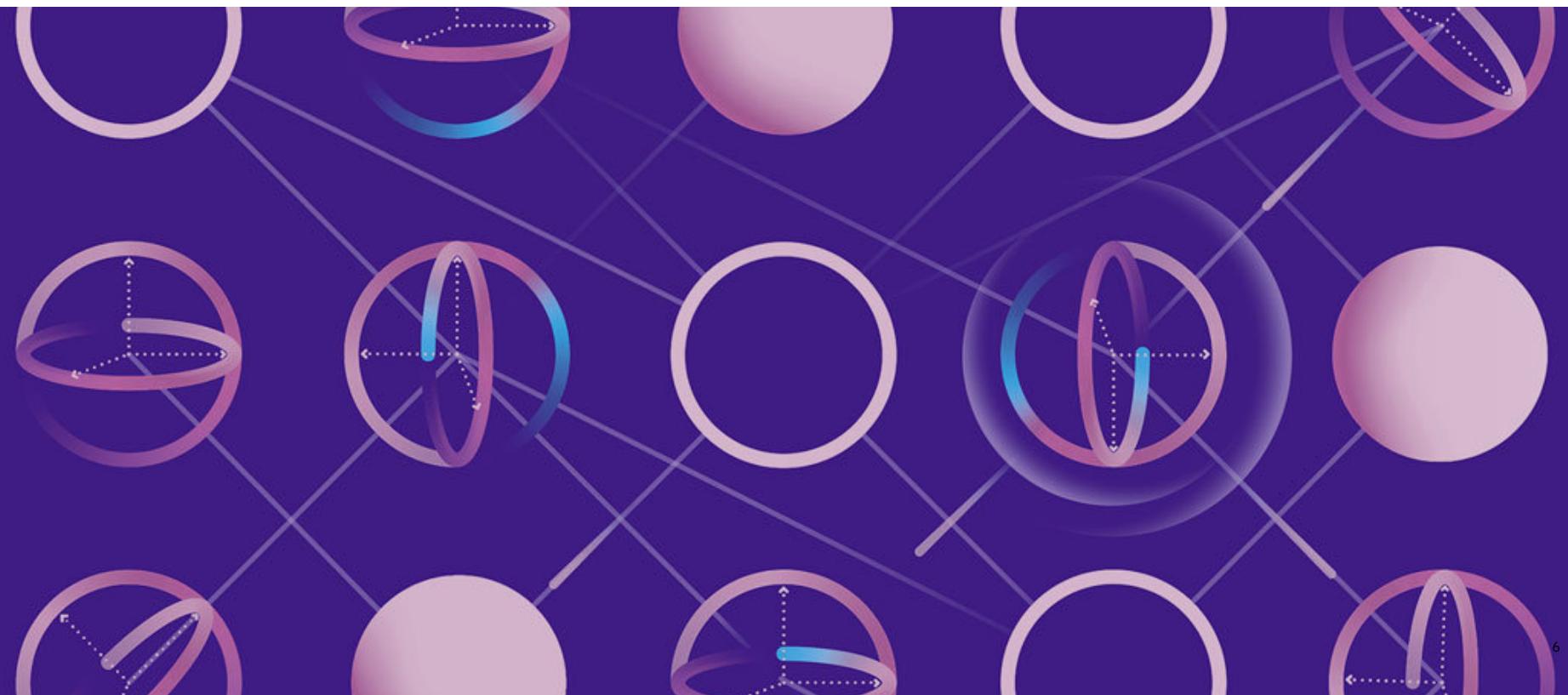
redhat.[®]



↳ Introduction to Quantum Computing



Quantum Theory



Quantum Processors: Superposition

- Classical computers: zeroes and ones
- Quantum computers: zero AND one
- Relationship between qubits and states

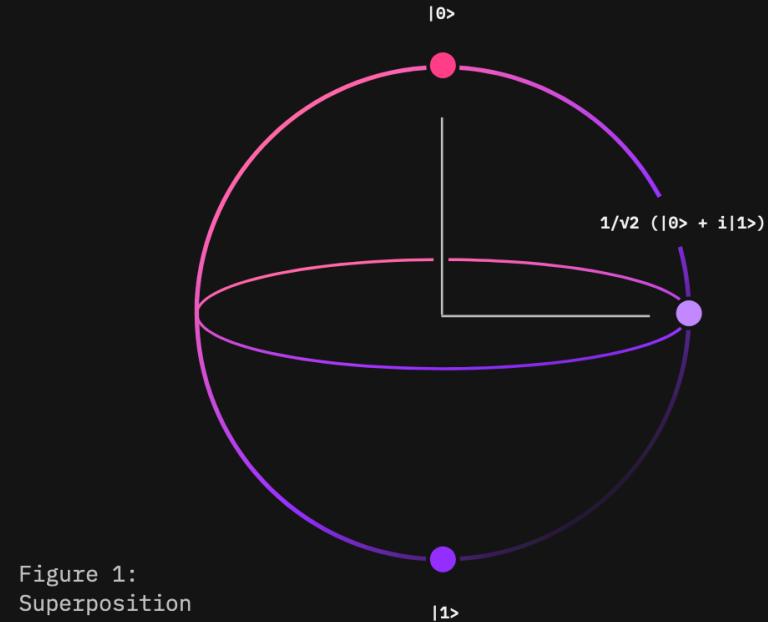


Figure 1:
Superposition

Quantum Processors: Entanglement

Entanglement is a famously counter-intuitive quantum phenomenon describing behavior we never see in the classical world. Entangled particles behave together as a system in ways that cannot be explained using classical logic.

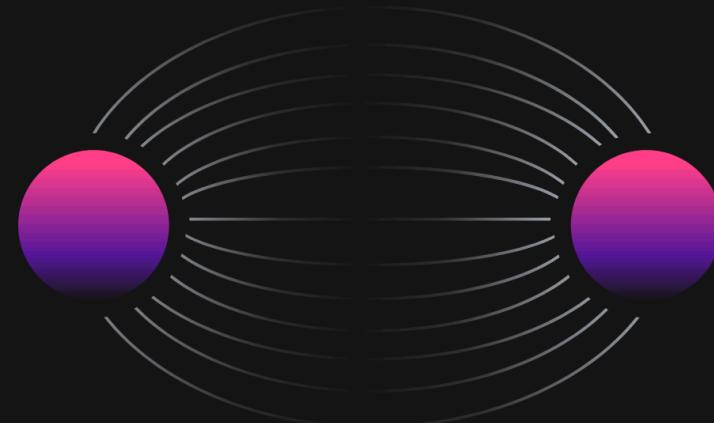


Figure 2:
Entanglement

Quantum Processors: Interference

Quantum interference can be understood similarly to wave interference; when two waves are in phase, their amplitudes add, and when they are out of phase, their amplitudes cancel.

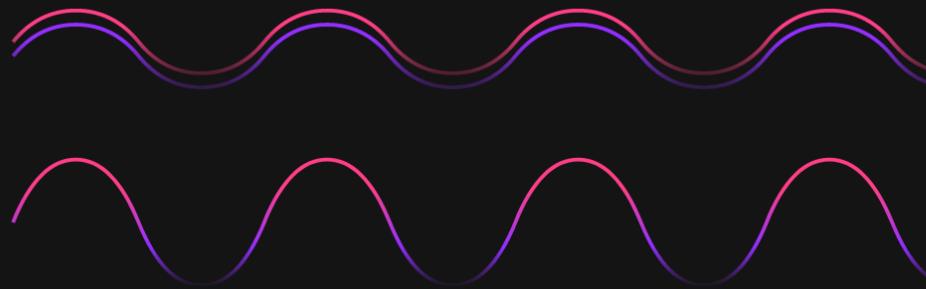
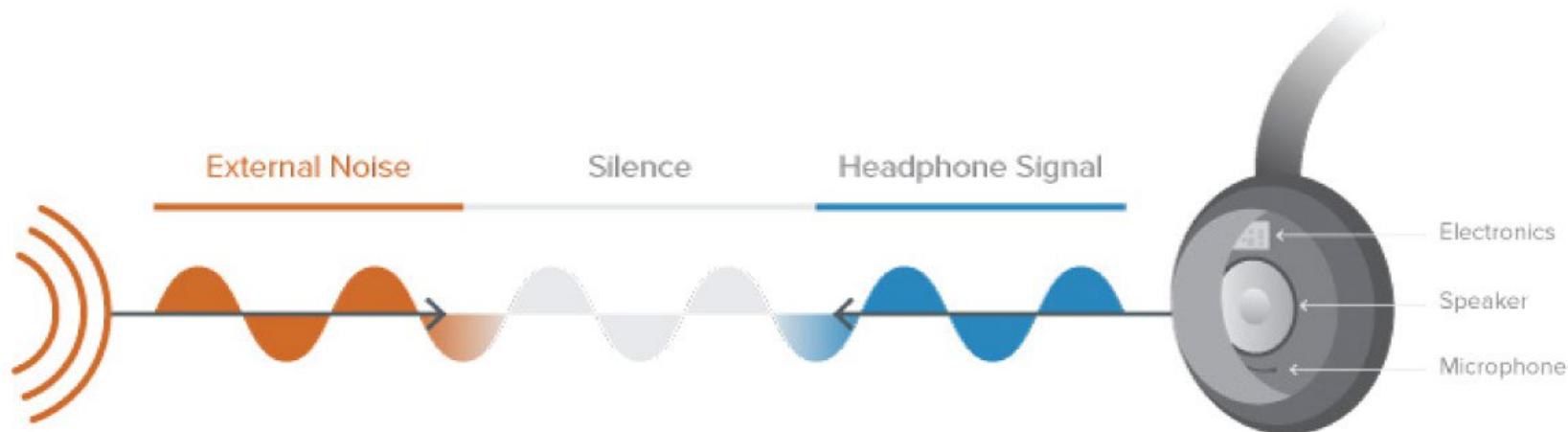
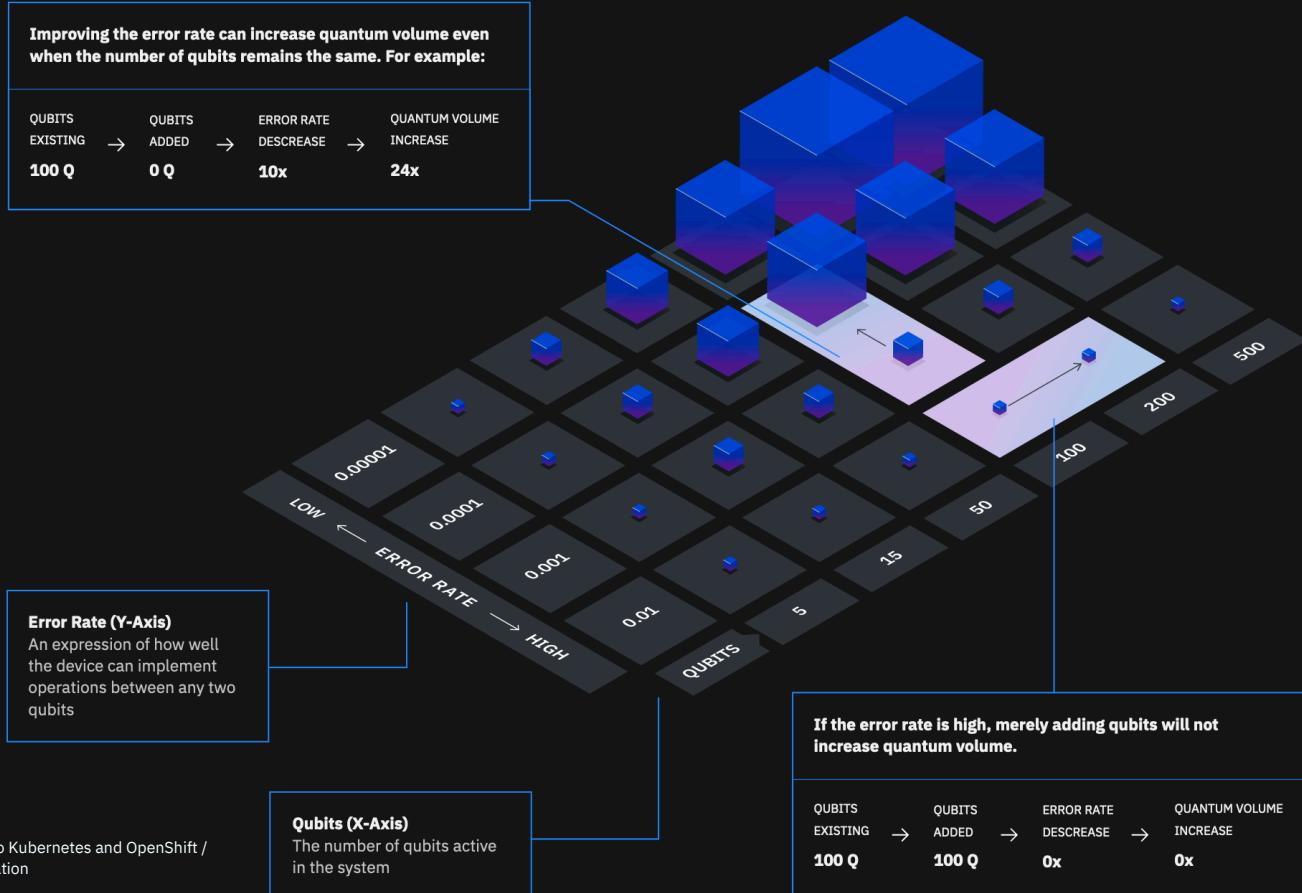


Figure 3:
Positive Interference

Noise Cancelling Headphones

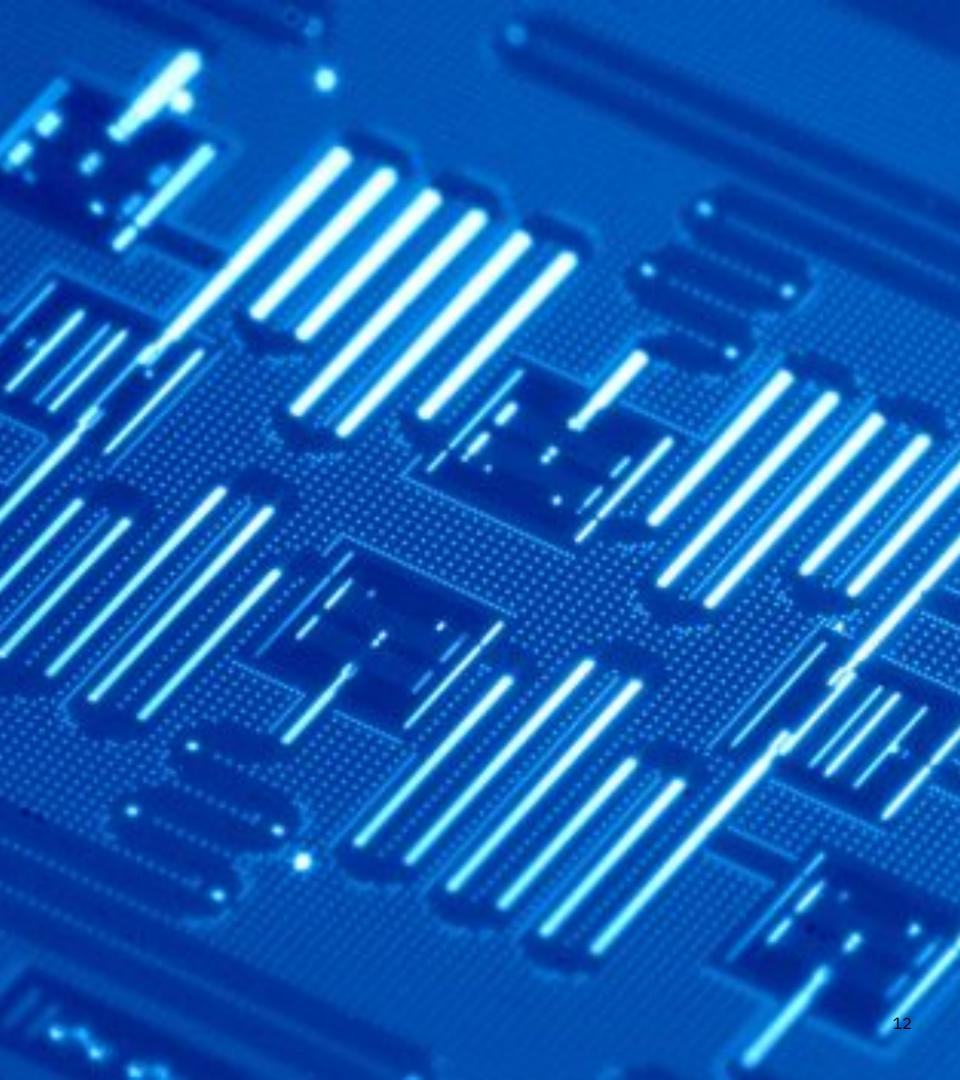


Scaling Quantum Systems



Quantum Computers Inside Out

- Superconducting Josephson Junctions
- Macroscopic Quantum Phenomena
- Microwave resonators to address and couple qubits
- Very low temperature



Quantum Computers: Inside Out

IBM Q system inside a dilution refrigerator



Quantum Computers: Inside Out



↳ Quantum Computing, Artificial Intelligence & Cryptography



Hi, I'm Dave

I'm a developer advocate for IBM in San Francisco. I also help organize:

- The SF JavaScript Meetup
- IBM Developer SF Meetup
- ForwardJS San Francisco && Ottawa

I participate in meetups, hackathons, webinars and write articles about technology for IBM and other organizations.

Warning: I am a lowly developer



Agenda

Red Hat + IBM	04	Kubernetes	41
		What Kubernetes Can't Do	45
Intro & Agenda	16		
Why Containers?	26	Red Hat OpenShift	46
Architectural Overview	27	OpenShift Developer Services	49
		OpenShift 4.2 Release	50
Microservice Architectures	32	Conclusion & Upcoming Events	53
What Is Docker?	35	Q&A	58
Docker Components	37		
Orchestration	39		

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Projected market for application container technologies, 2022

Source: [2019 Container Adoption Survey](#)

\$4 . 3B

IT Admins who are running container technologies

Source: [2019 Container Adoption Survey](#)

87%

IT Admins using Two or More Orchestration Tools

Source: [2019 Container Adoption Survey](#)

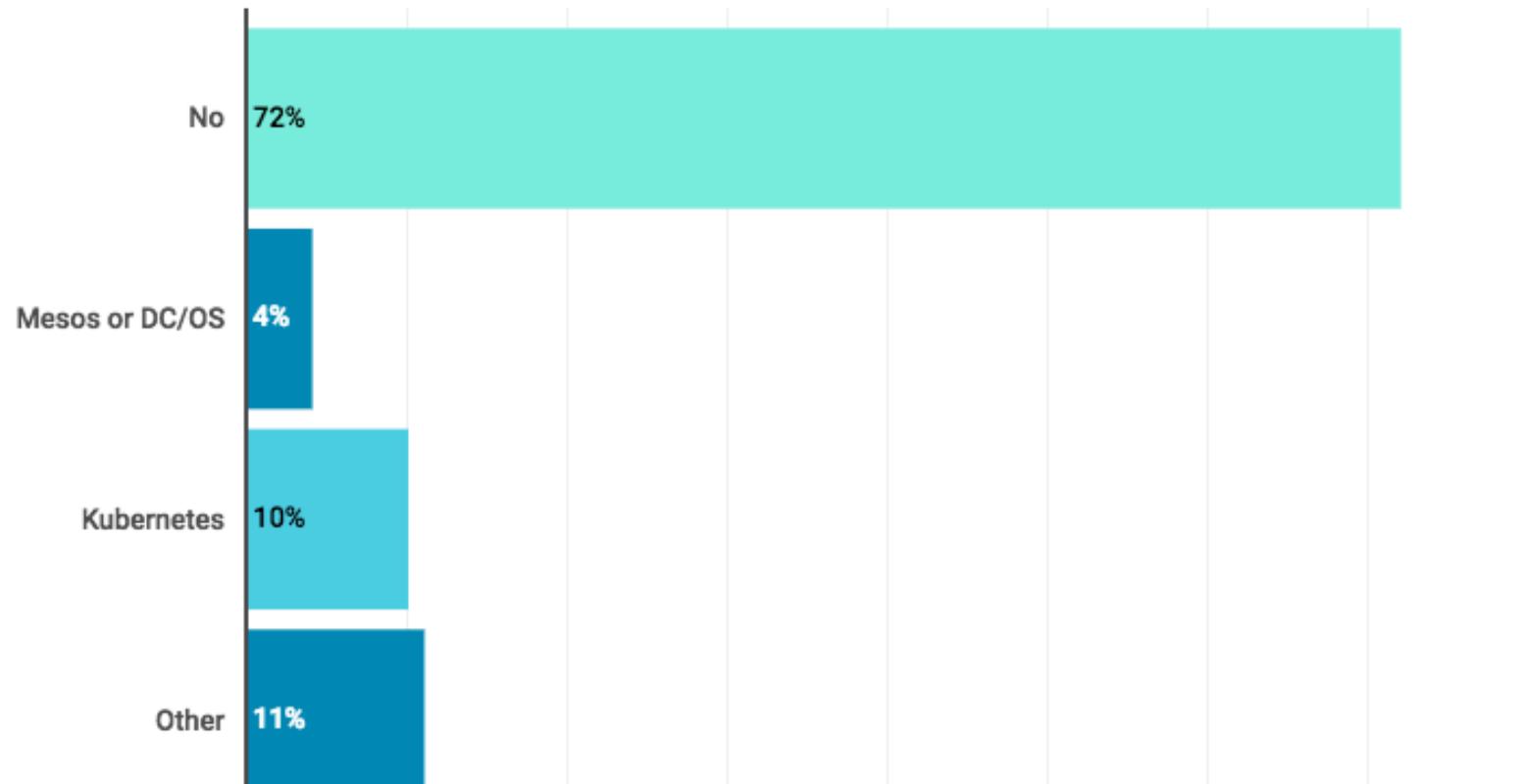
65%

Commits made to the [Kubernetes repository](#) on GitHub

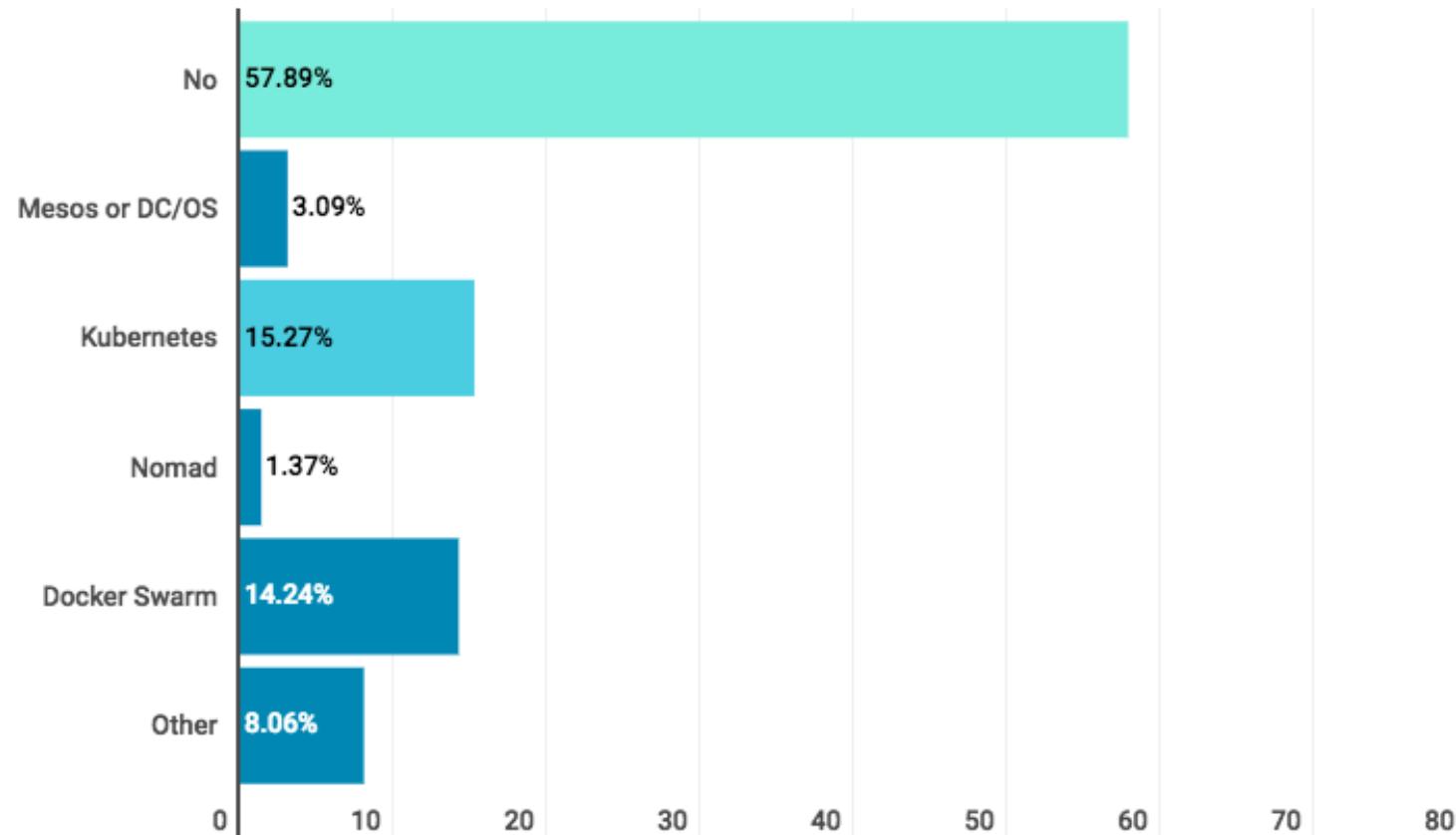
Source: [2019 Container Adoption Survey](#)

84,413

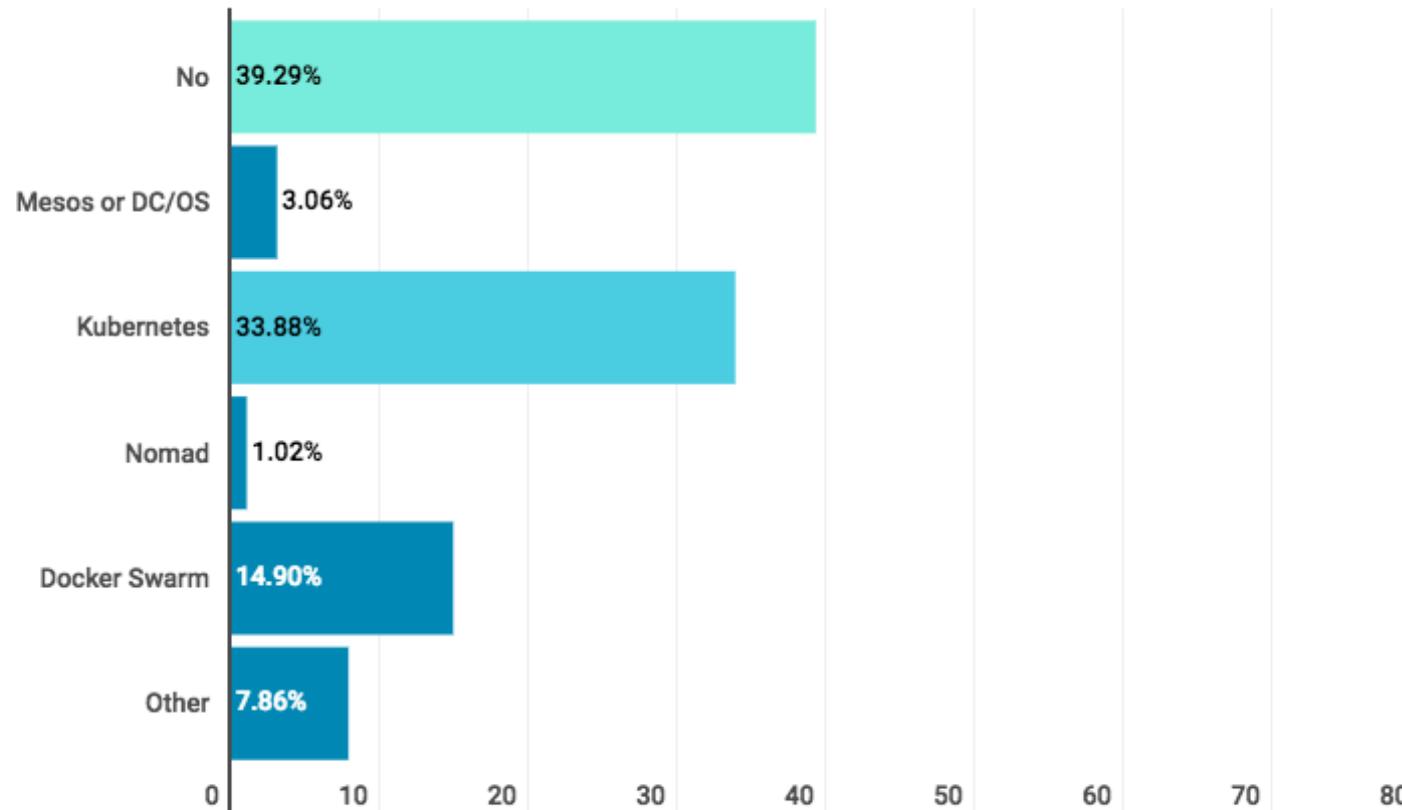
Do you use orchestration services, and if so which? (2016)



Do you use orchestration services, and if so which? (2017)



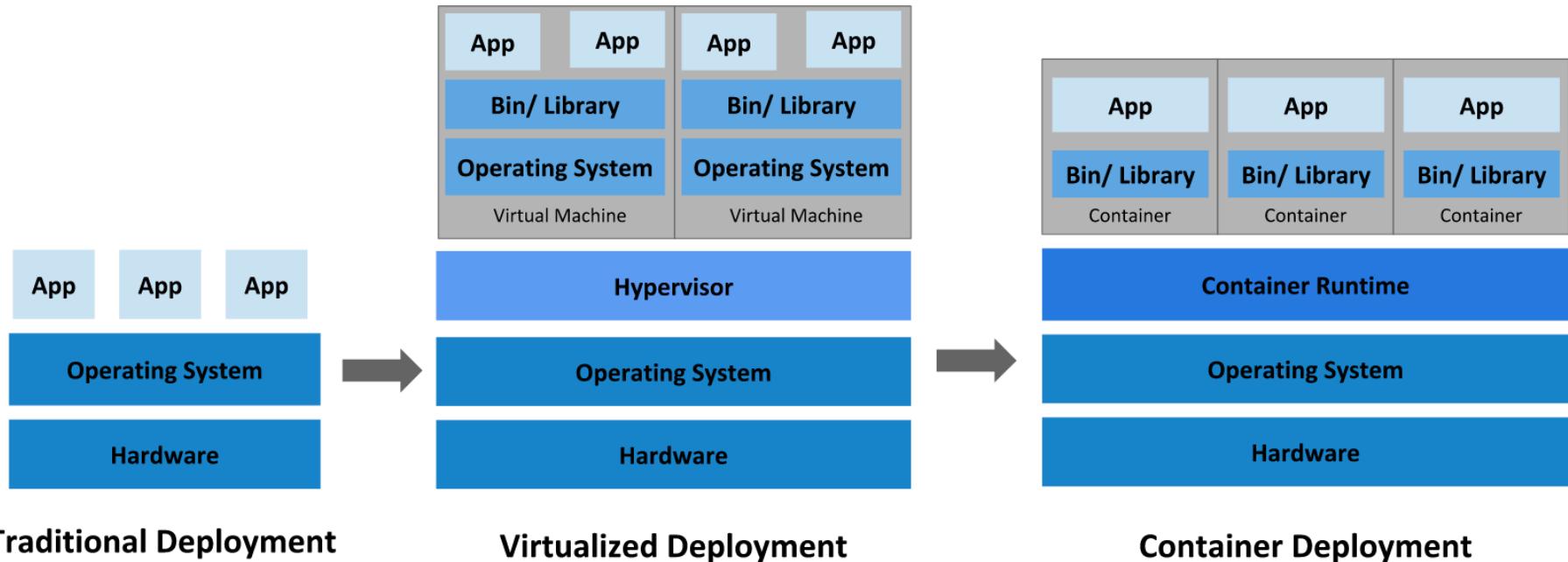
Do you use orchestration services, and if so which? (2018)



↳ Why Containers?



Why Containers?



Containers overview

- Environment isolation
- Demand growth
- New Cloud-Native Apps
- Modernize existing apps
- Dev vs Ops

A standard way to package an application and all its dependencies so that it can be moved between environments and run without changes.

Containers work by isolating the differences between applications inside the container so that everything outside the container can be standardized.

Containers: Dev vs Ops

Code	Logging
Libraries	Remote Access
Config	Network Config
Runtime	Monitoring
OS	



Why Containers?

- Agile
- Continuous Deployment
- Separation of Concerns
- Observability
- Consistency
- Management
- Microservices
- Resource Isolation
- Resource Utilization



Other High-Level Benefits

- Portable
- Easy to manage
- Containers provide “just enough” isolation
- Immutable



↳ Microservice Architectures



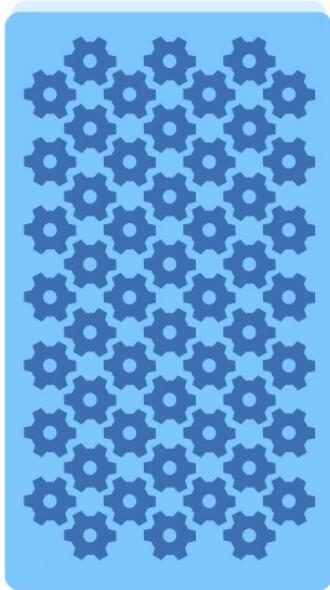
Microservices Defined

Martin Fowler: Microservices

“In short, the microservice architectural style is an approach to developing a single application as a suite of small services, each running in its own process and communicating with lightweight mechanisms, often an HTTP resource API. These services are built around business capabilities and independently deployable by fully automated deployment machinery. There is a bare minimum of centralized management of these services, which may be written in different programming languages and use different data storage technologies. “



Microservices



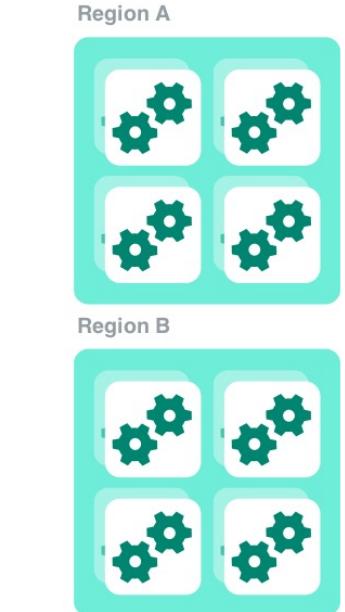
Monolithic Application



Break-down into microservices

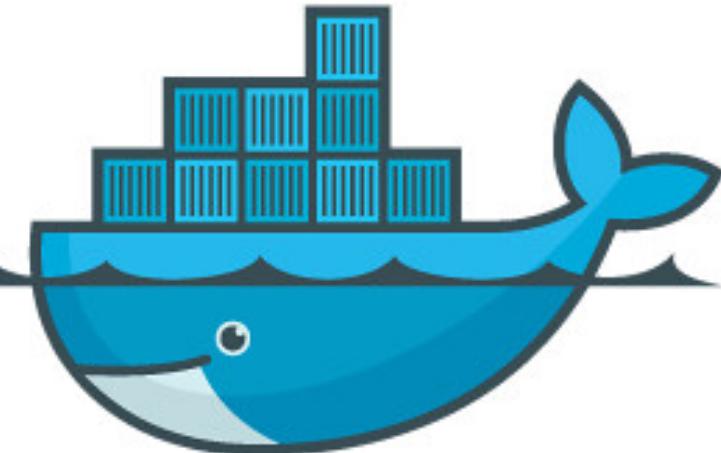


Make each microservice HA



Protect against regional outage

↳ Docker Containers



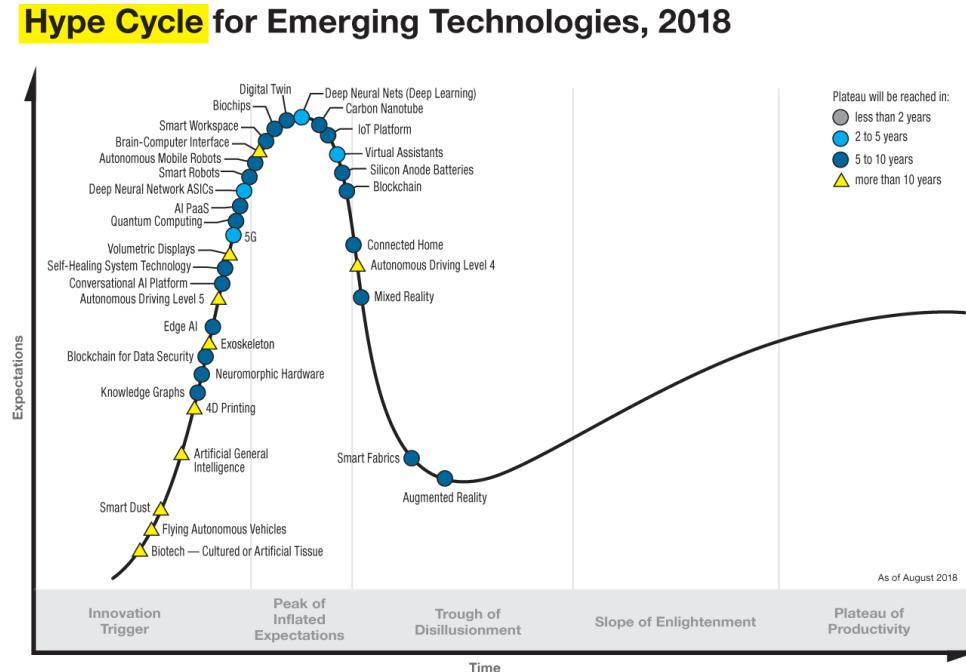
docker

The Gartner Hype Cycle

Docker generated a lot of buzz and \$272M+ in venture capital funding.

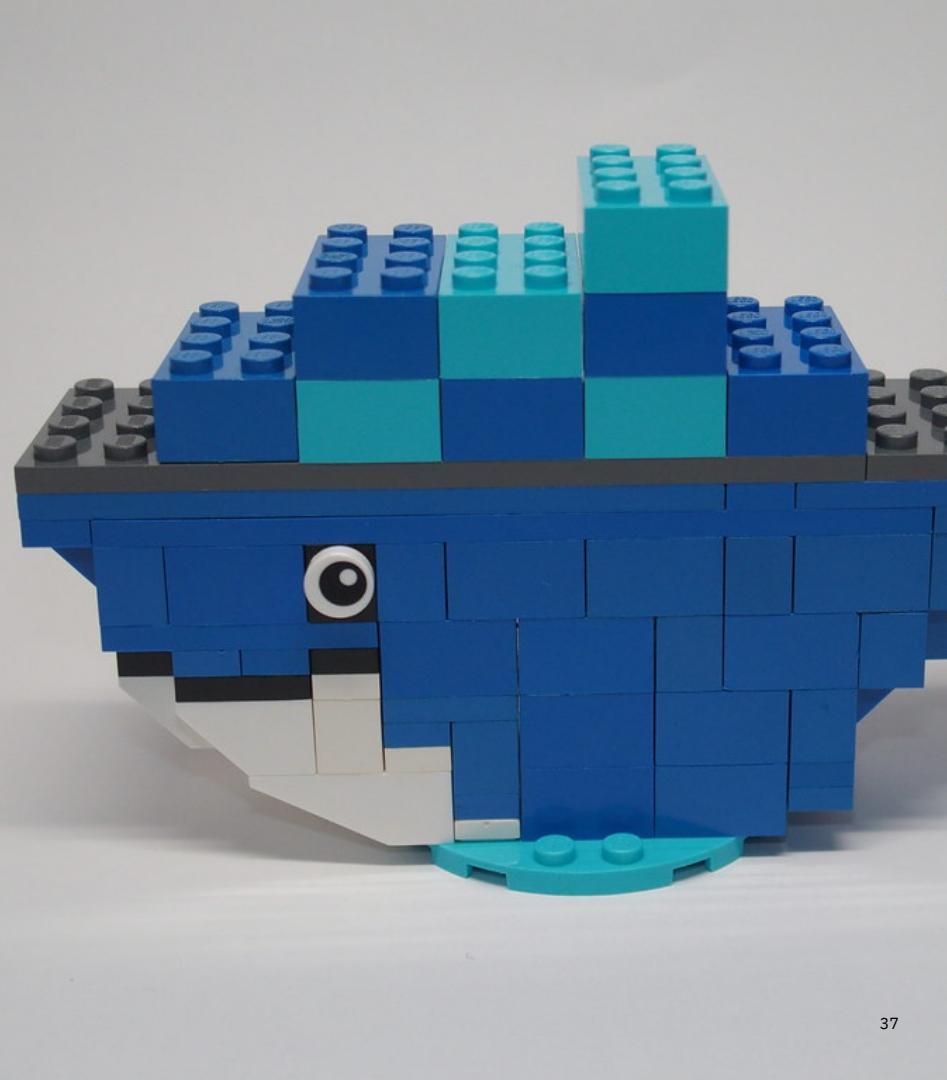
As a technology, containers are still gaining in popularity, especially with enterprises.

With a focus on Kubernetes, what is the future for Docker and Docker, Inc?



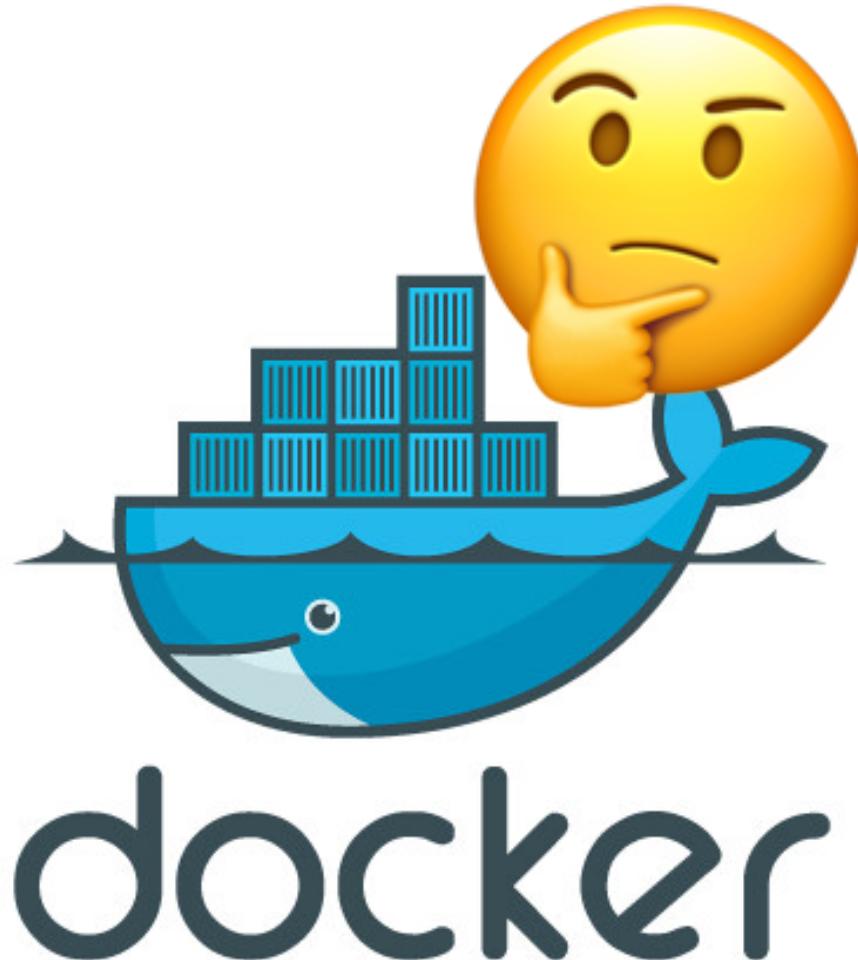
Docker Components

- Docker Engine
 - Manages containers on a host
 - Accepts requests from clients
 - Maps container ports to host ports
- Images
- Docker Client
 - Drives engine
 - Drives “builder” of images
- Docker Registry



What is Docker?

- Docker Engine
 - Manages containers on a host
 - Accepts requests from clients
 - Maps container ports to host ports
- Images
- Docker Client
 - Drives engine
 - Drives “builder” of images
- Docker Registry



↳ Orchestration



Orchestration

- Scheduling
- Cluster management
- Service discovery
- Provisioning
- Monitoring
- Configuration management



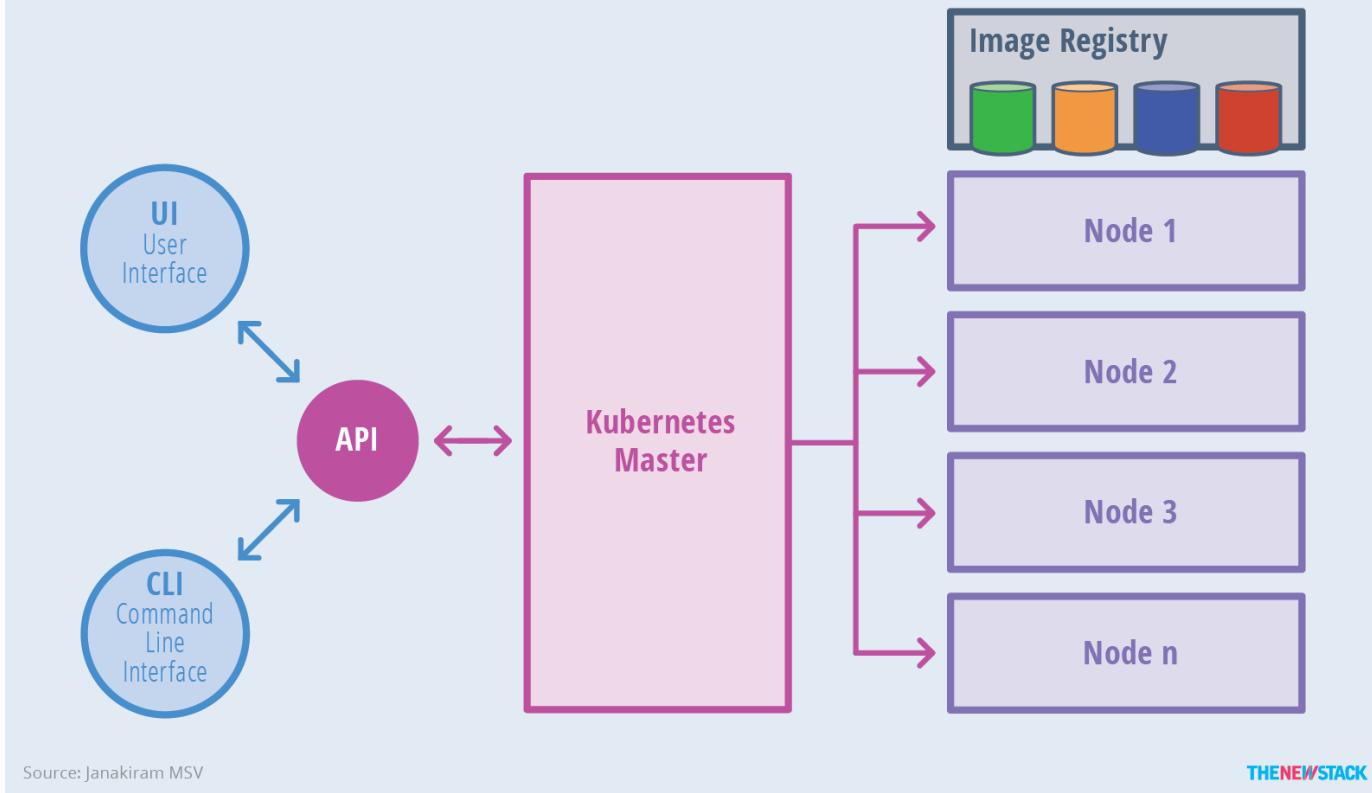
↳ Kubernetes





kubernetes

Kubernetes Architecture



Source: Janakiram MSV

THE NEW STACK

Why Kubernetes?

- Service Discovery
- Storage Orchestration
- Rollouts/Rollbacks
- Automatic Bin Packing
- Self-Healing
- Secret/Config Management



What Doesn't Kubernetes Do?

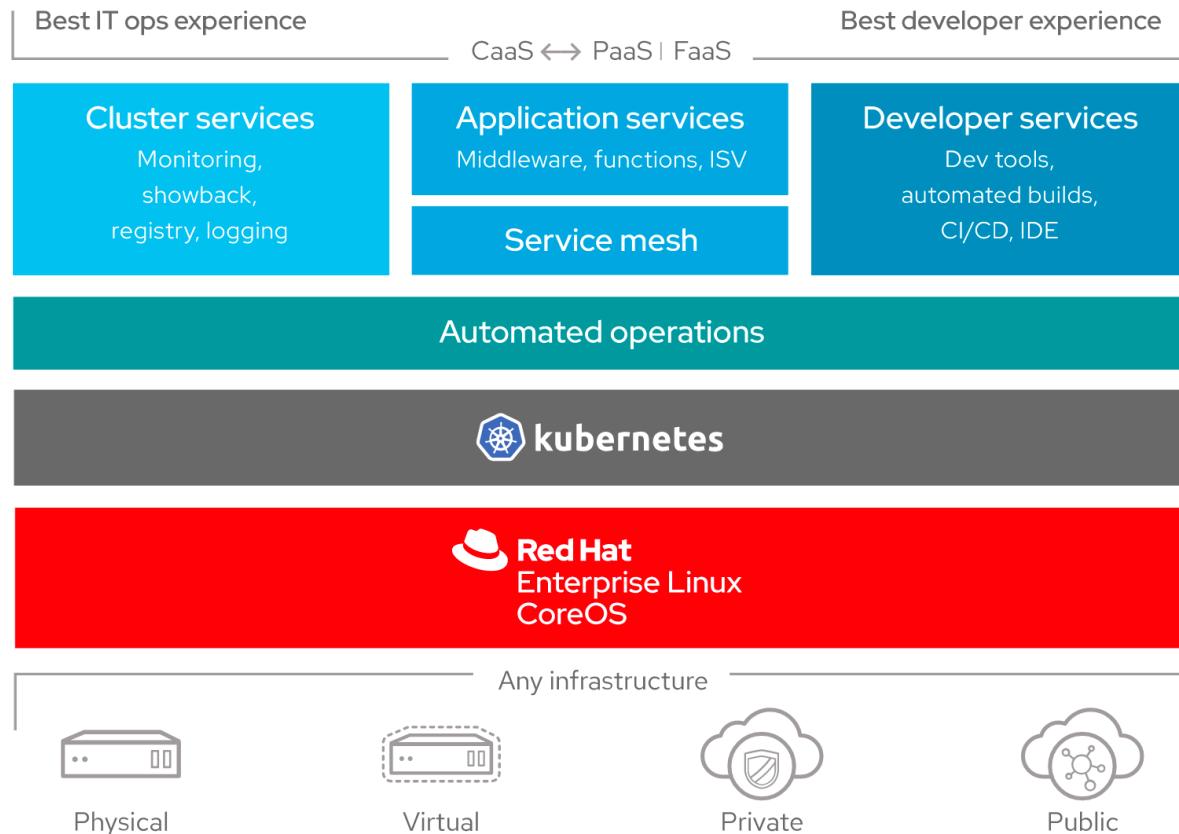
- Define Application Types
- Deploy Code
- Application-Level Services
- Logging/Monitoring/Alerting
- Config
- Machine Management



↳ OpenShift



↳ OpenShift Architectural Overview



OpenShift Overview

- Container Host & Runtime
- Enterprise Kubernetes
- Validated Integrations
- Integrated Container Registry
- Developer Workflows
- Access to Services



OpenShift Developer Services

- OpenShift Service Mesh
- OpenShift Serverless
- OpenShift Pipelines



Red Hat OpenShift 4.2

released October 16, 2019

<https://blog.openshift.com/introducing-red-hat-openshift-4-2-developers-get-an-expanded-and-improved-toolbox/>

Today Red Hat announces Red Hat OpenShift 4.2 extending its commitment to simplifying and automating the cloud and empowering developers to innovate.

Red Hat OpenShift 4, introduced in May, is the next generation of Red Hat's trusted enterprise Kubernetes platform, reengineered to address the complexity of managing container-based applications in production systems. It is designed as a self-managing platform with automatic software updates and lifecycle management across hybrid cloud environments, built on the trusted foundation of Red Hat Enterprise Linux and Red Hat Enterprise Linux CoreOS.

OpenShift vs Kubernetes

- What is the difference?
- When should you use one over the other?
- What are the pros and cons of each?

Sunday, 2:15pm Fireside A

Let's Get Ready to Rumble - Kubernetes Vs. Red Hat OpenShift



Level : Beginner

Your Status : Attending



Date : 2:15 PM Sunday

(NaN) - (1) Registered : (-)



Room : Fireside A



Track : IBM



Tag(s) : Cloud, Kubernetes, Orchestration, Red Hat,

Share this session :

PRESENTATION

In this fun, debate-style session you will learn what are the differences and pros and cons using Kubernetes vs Red Hat OpenShift. Join Marek Sadowski and Dave Nugent as they debate each other on Kubernetes vs Red Hat OpenShift and share in which situations one technology is more appropriate than the other. We will debate and you will learn about:

- 1) deploying your apps;
- 2) managing your apps;
- 3) day to day operations;
- 4) security

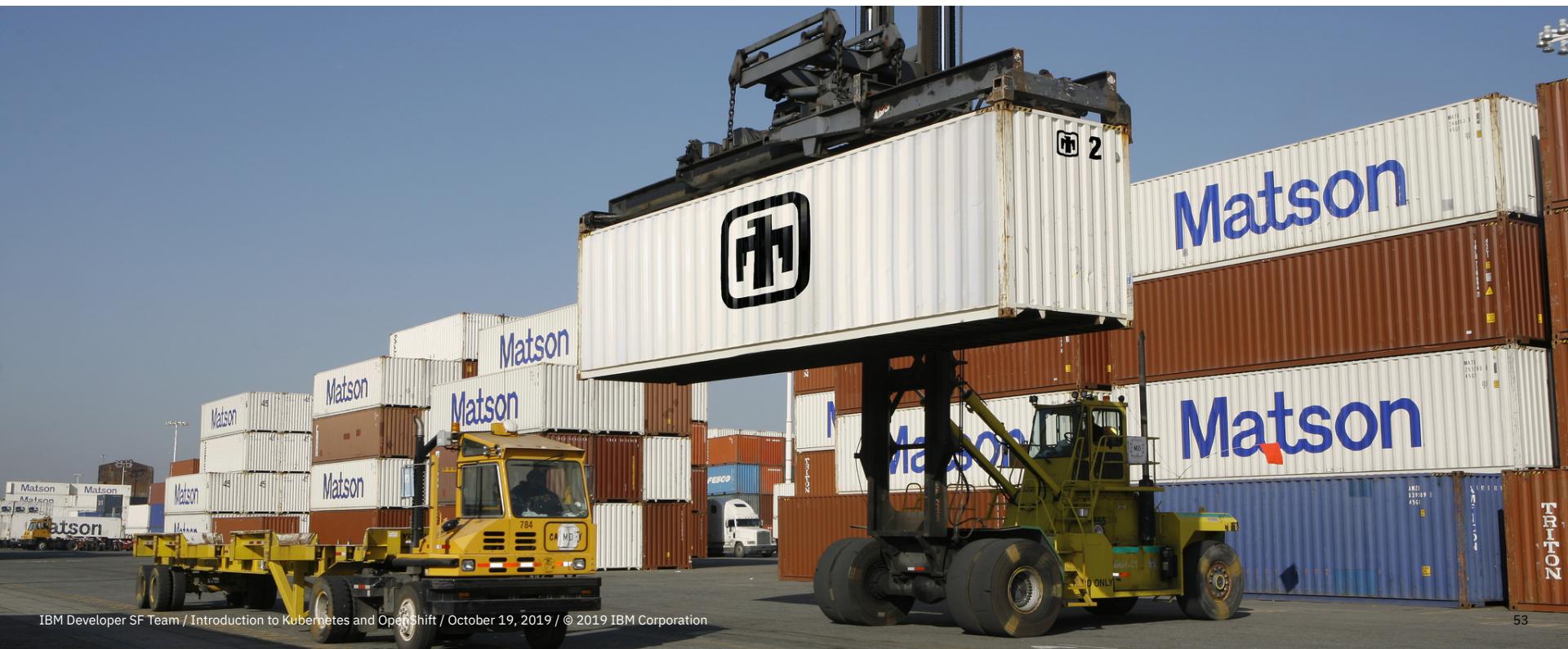
The main take away for the participant would be good knowledge on the most popular Containers technology, as well as when to use default Kubernetes or RedHat OpenShift for containers orchestration management.

OpenShift vs OKD

- OKD (Origin Community Distribution)
- github.com/openshift/origin
- 30,872 commits, 364 contributors



↳ Conclusion



Resources:

[https://en.wikipedia.org/
wiki/Microservices](https://en.wikipedia.org/wiki/Microservices)

[https://www.zdnet.com/
article/red-hat-
openshift-4-2-kubernetes-
for-the-hybrid-cloud-
developer/](https://www.zdnet.com/article/red-hat-openshift-4-2-kubernetes-for-the-hybrid-cloud-developer/)

[https://
www.openshift.com/learn/
what-is-openshift](https://www.openshift.com/learn/what-is-openshift)

[https://www.crowdcast.io/
e/introduction-to-3](https://www.crowdcast.io/e/introduction-to-3)

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Build Smart



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IBM Developer SF Bay Area



San Francisco, CA



7,619 members · Public group [?](#)



Organized by Angie K and 6 others

Wednesday, October 23, 2019

Online Meetup: Istio for Devops and Fast Release Management

<https://www.meetup.com/IBM-Developer-SF-Bay-Area-Meetup/events/265290383/>

Wednesday, October 23, 2019

Meetup: OpenShift on IBM Cloud Workshop @ Hacker Dojo

<https://www.meetup.com/IBM-Developer-SF-Bay-Area-Meetup/events/265028935/>

Wednesday, October 30, 2019

Online Meetup: RedHat OpenShift on IBM Cloud workshop

<https://www.meetup.com/IBM-Developer-SF-Bay-Area-Meetup/events/265479575/>

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Questions?

And, if we play our cards
right and we are very lucky:
also answers!

