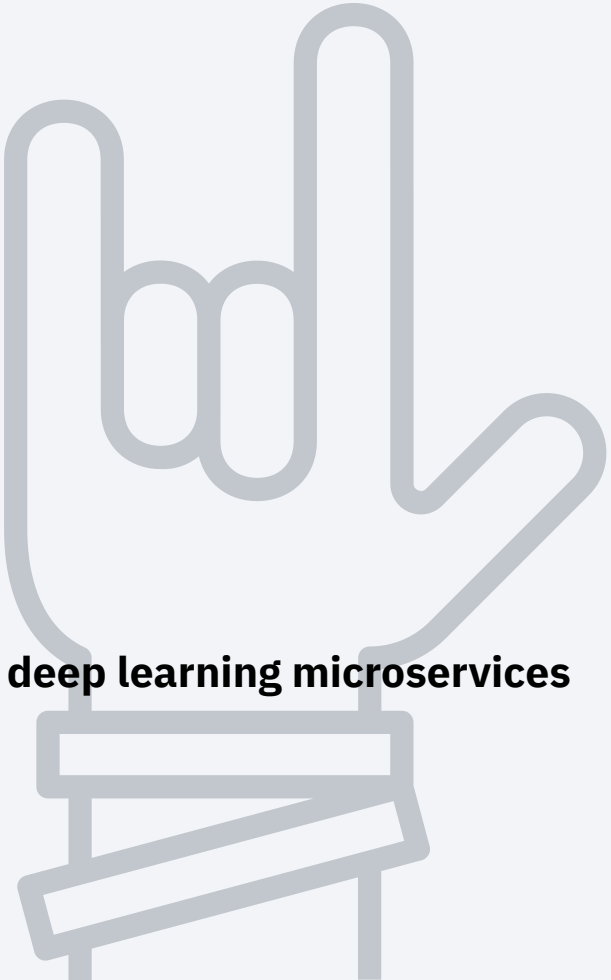
IBM | Red Hat

Kubernetes with Red Hat OpenShift

World Tour



AI integration with OpenShift: Deploy and consume deep learning microservices on OpenShift

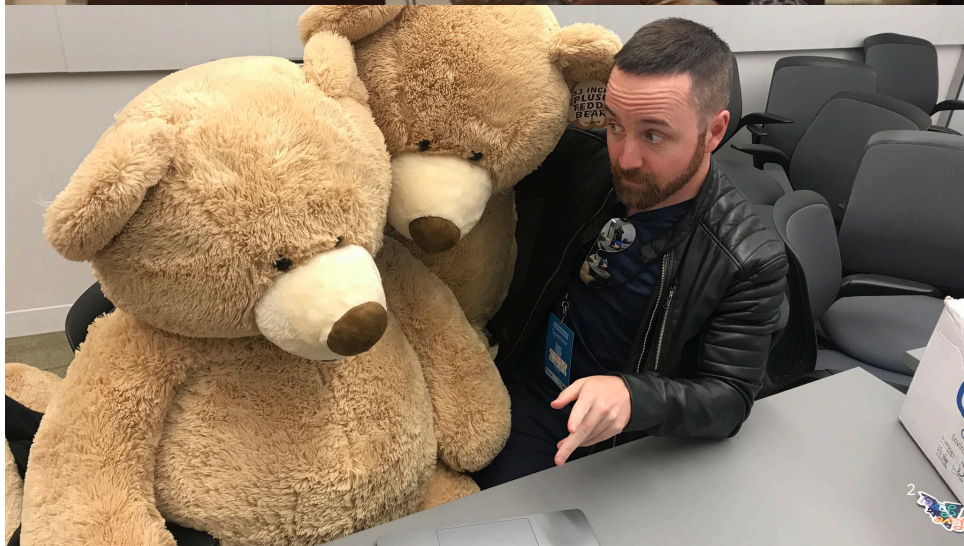
David Nugent, Developer Advocate, IBM
Nigel Brown, Developer Advocate, IBM

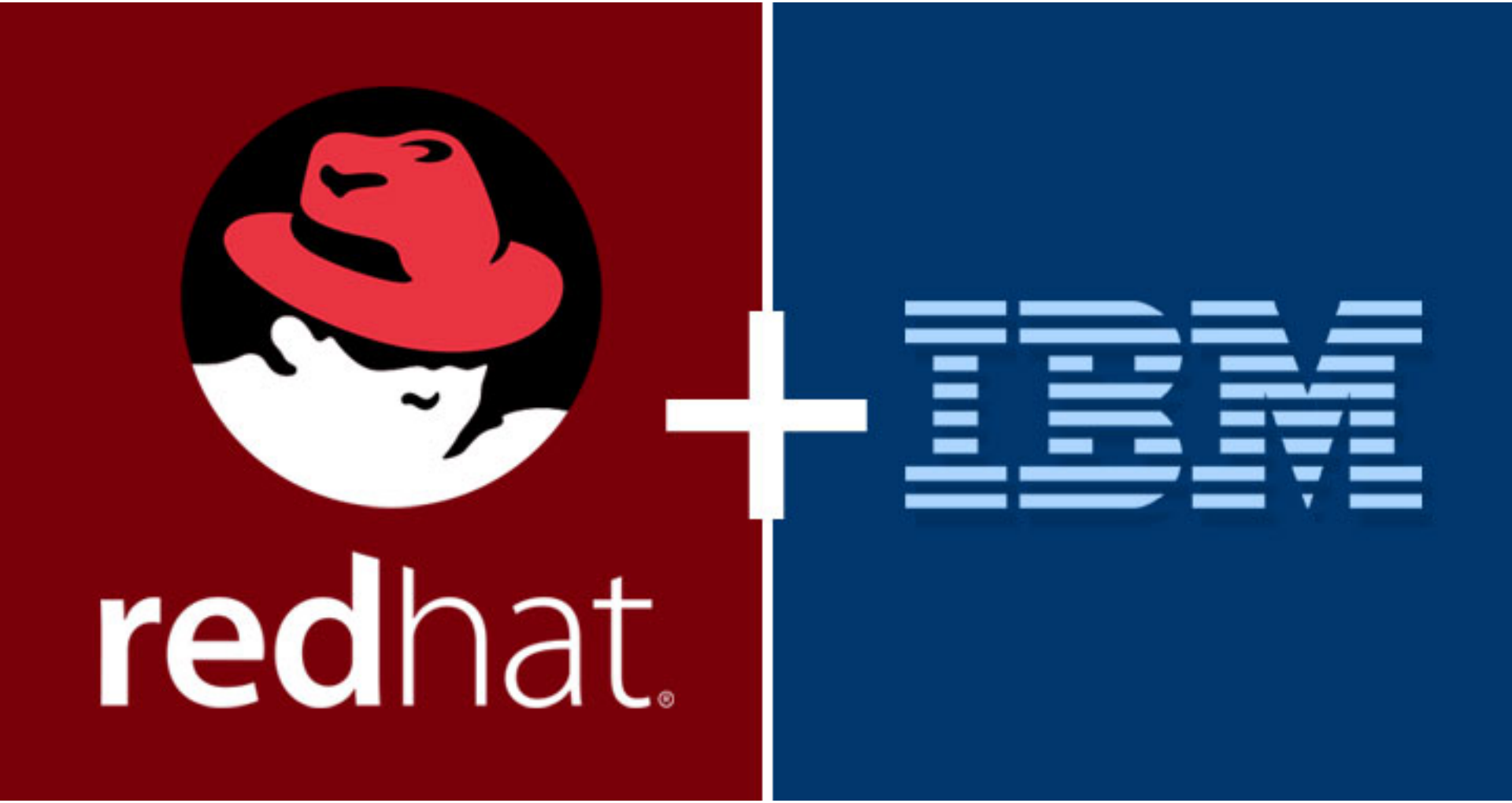
Hi, I’m Dave

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.

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+
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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

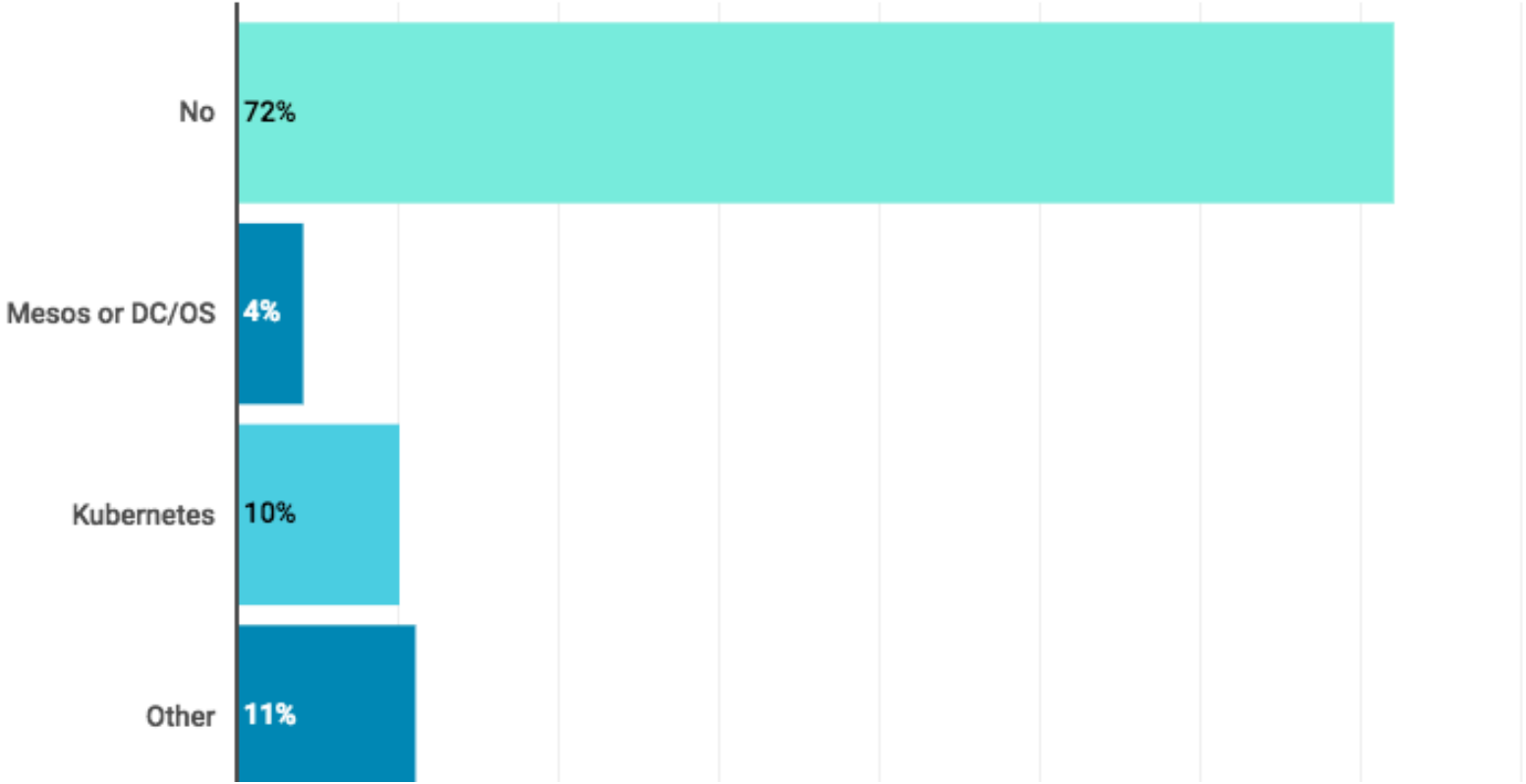
65%

Commits made to the Kubernetes repository on GitHub

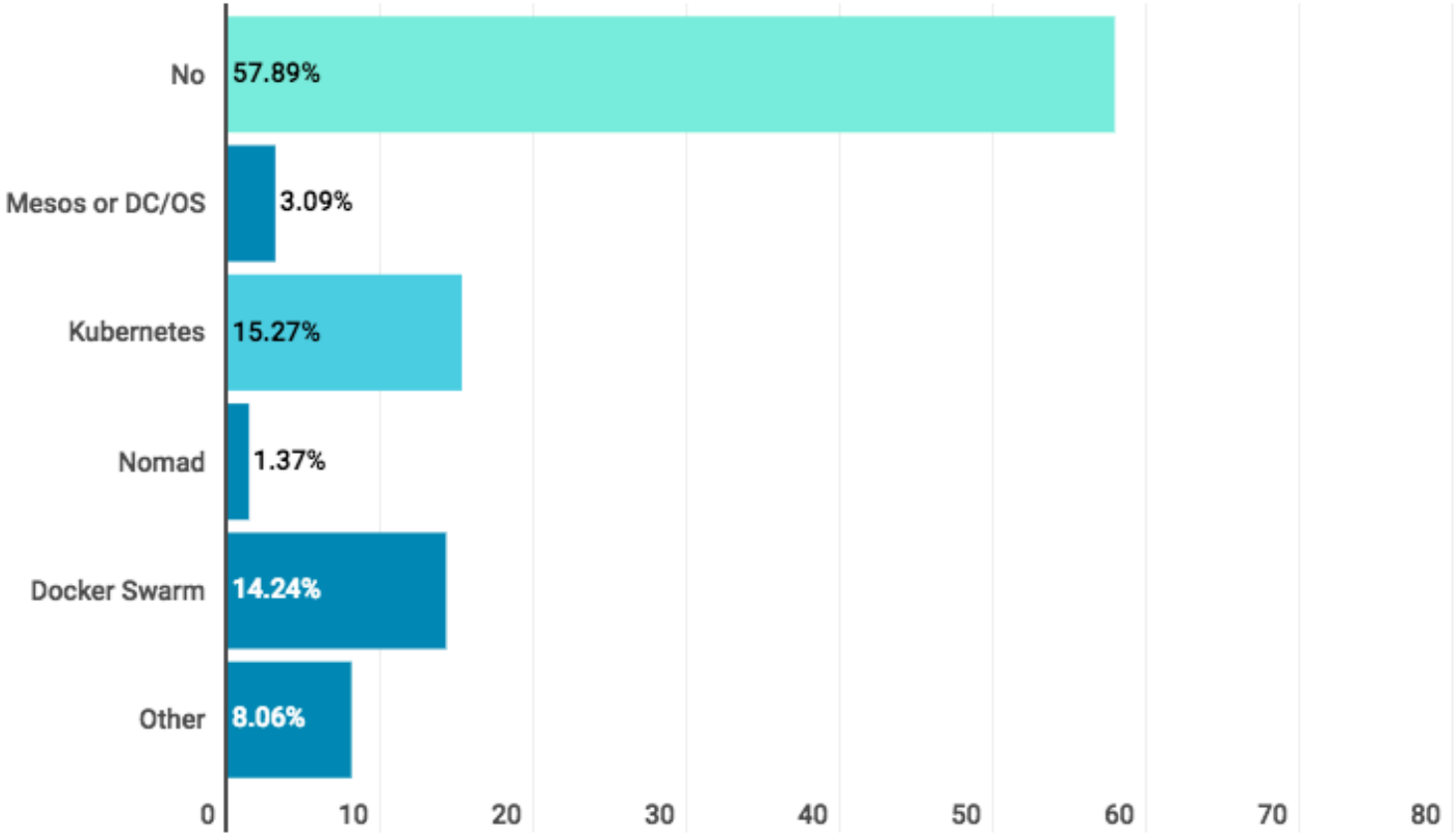
Source: 2019 Container Adoption Survey

88,483

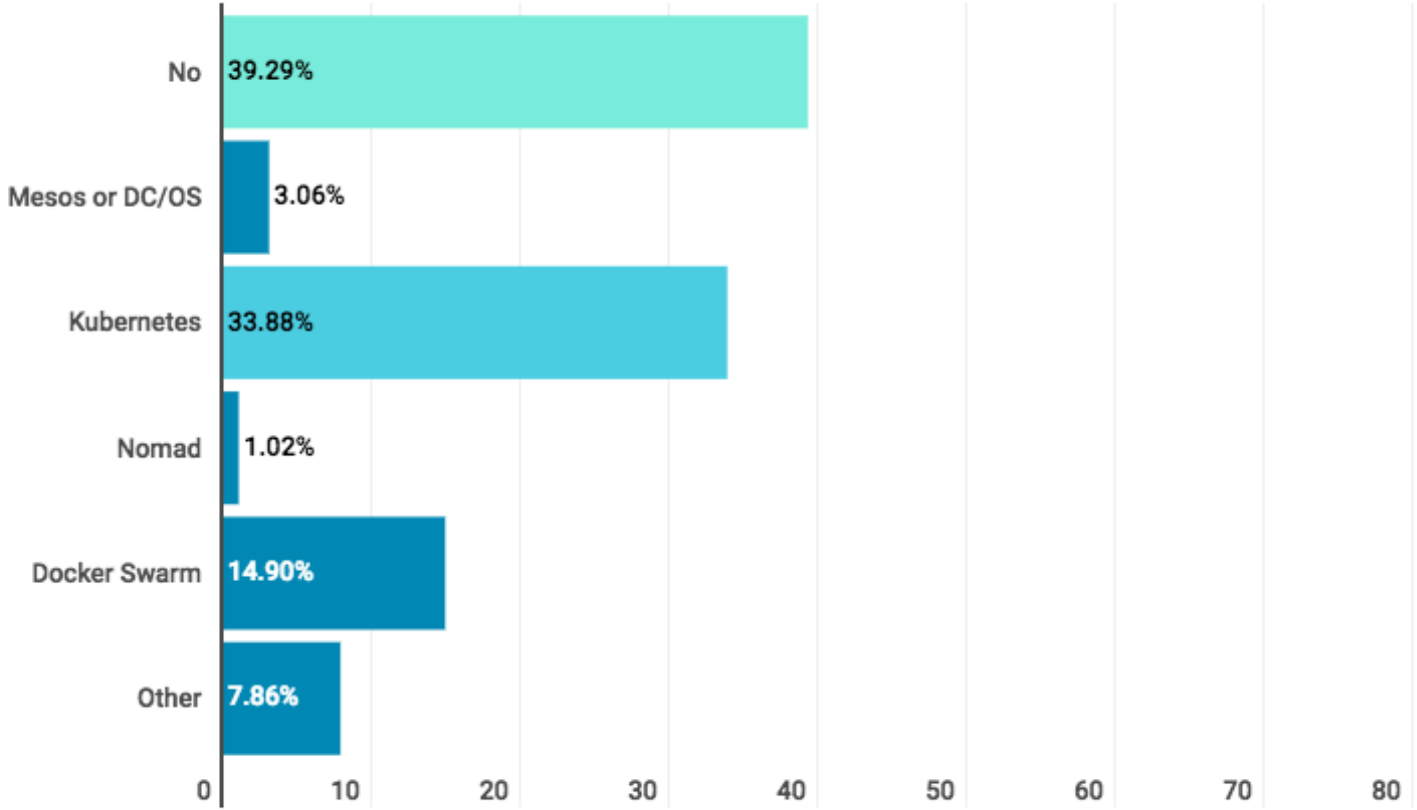
Do you use orchestration services, and if so which? (2016)



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

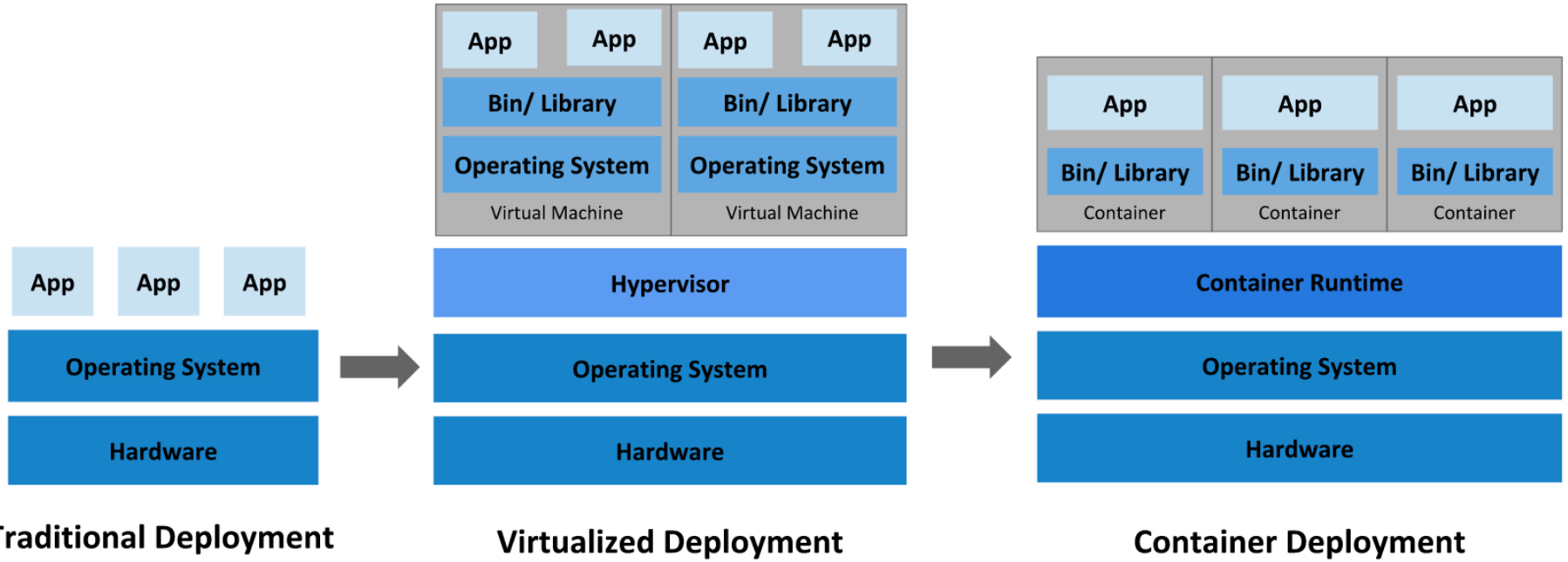


Do you use orchestration services, and if so which? (2018)



↳ 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

Libraries

Config

Runtime

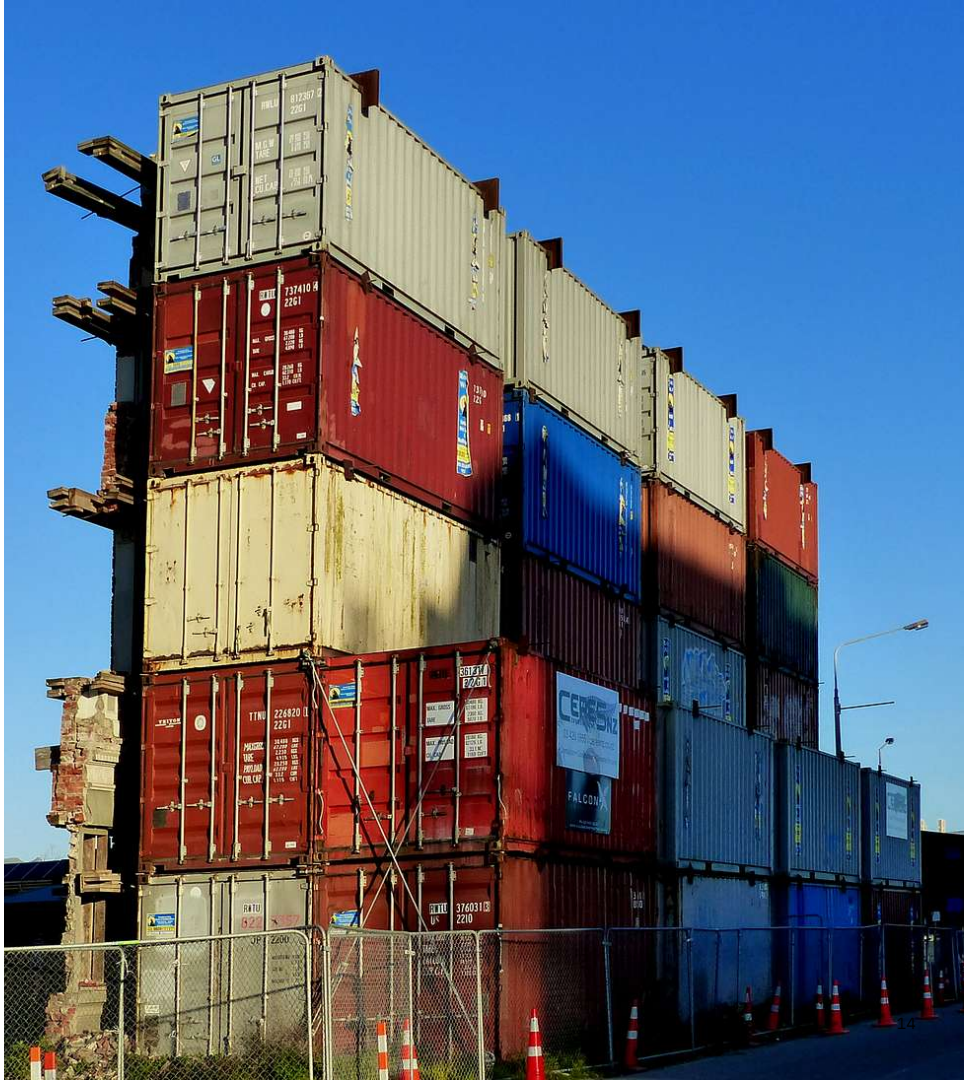
OS

Logging

Remote Access

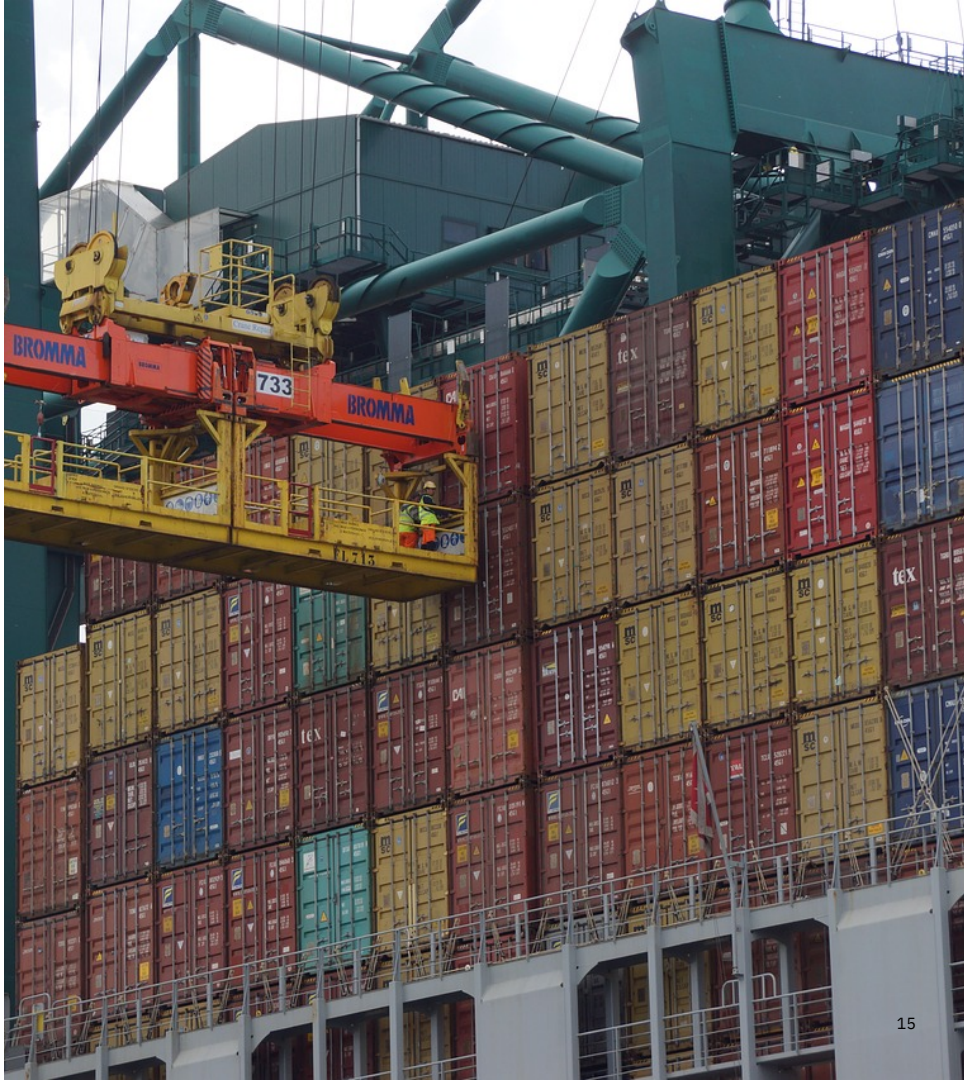
Network Config

Monitoring



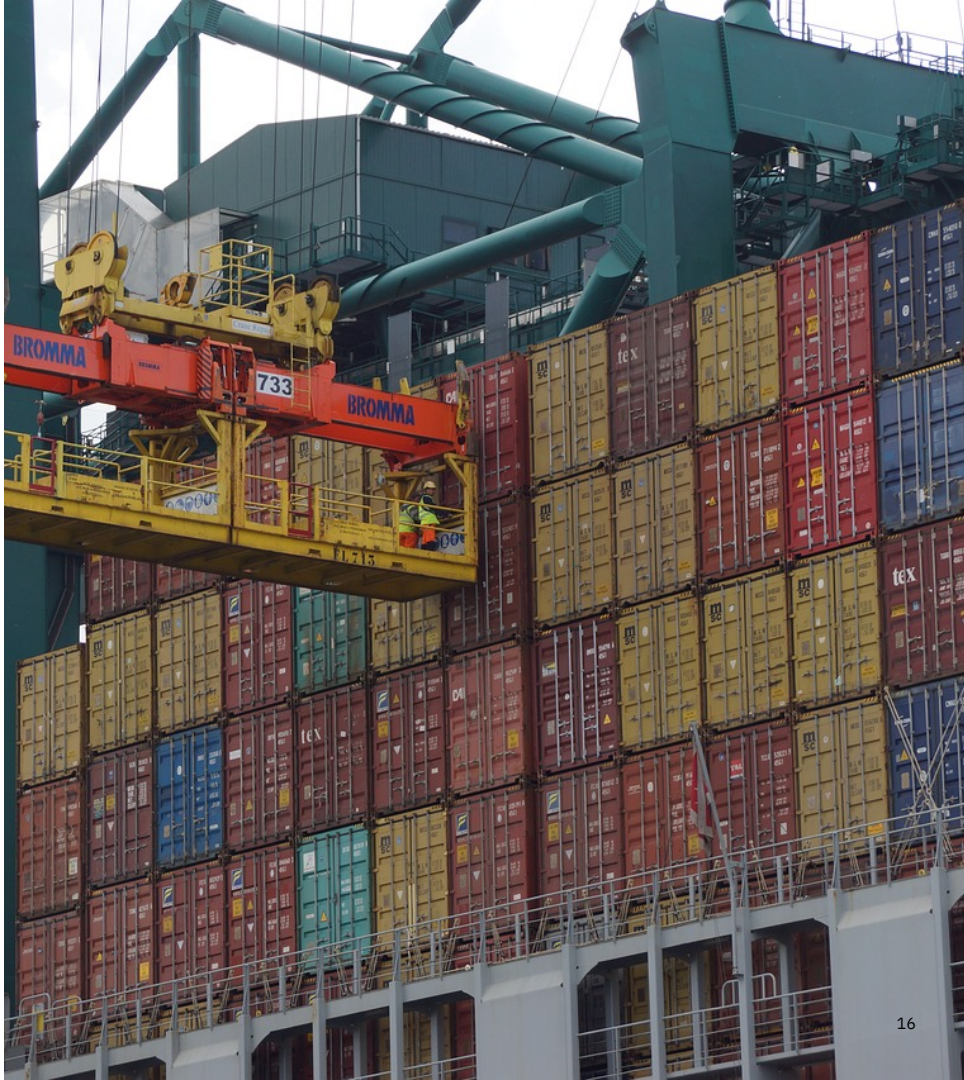
Why Containers?

- 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



↳ Orchestration

Orchestration

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

↳ Kubernetes


TTNU 991764 2
4561
TRIU 969001 8
4561
WHLU 594080 0
TW 4510
MGW
TARE
NET
CU CAP
AKLU 2903030
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TEXU 520100 2
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TRIU 984191 6
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XTRA
MLCU 930980 0
4561
TTNU 950566 6
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WHLU 594551 0
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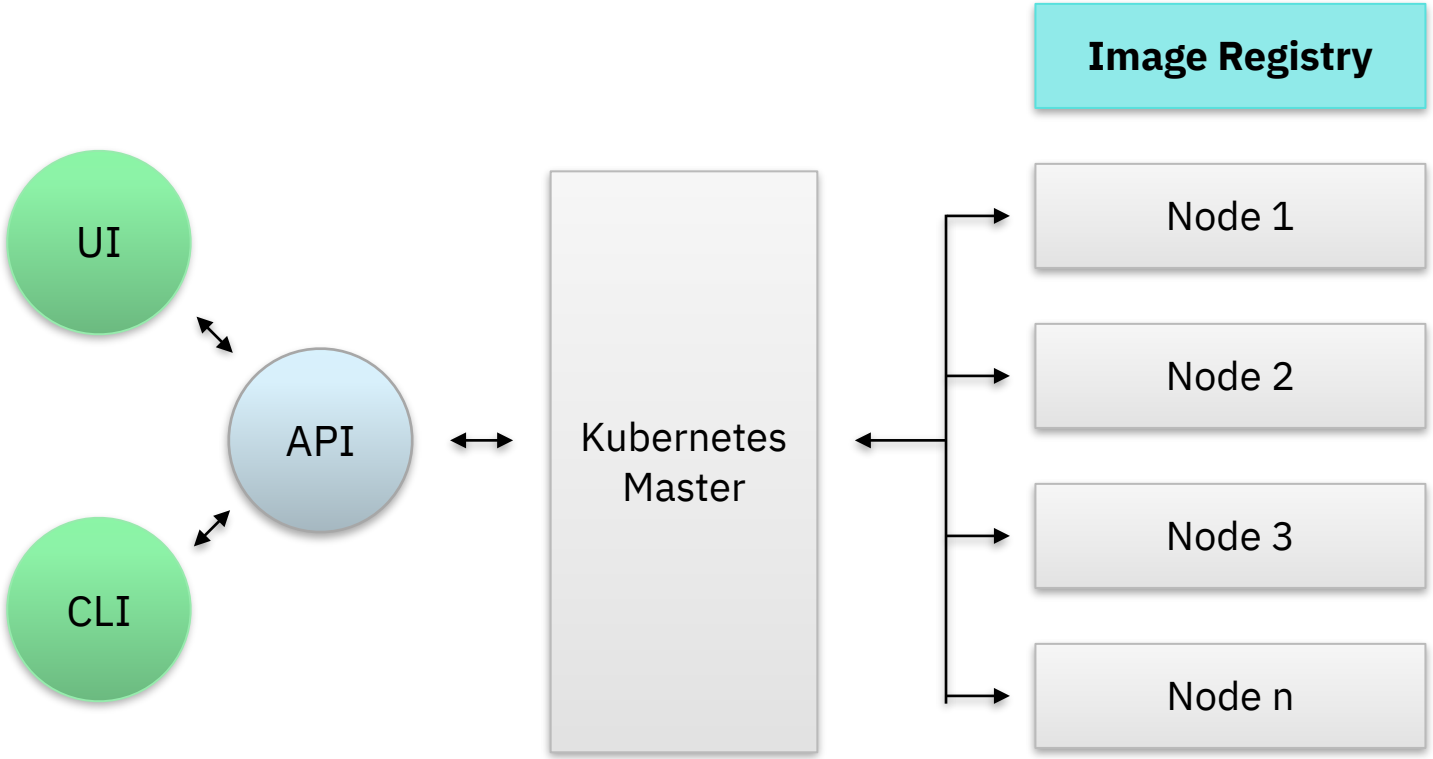
TEXU 520336 0
GB 4510
TRIU 9689315

kubernetes

Kubernetes Architecture



Why Kubernetes?

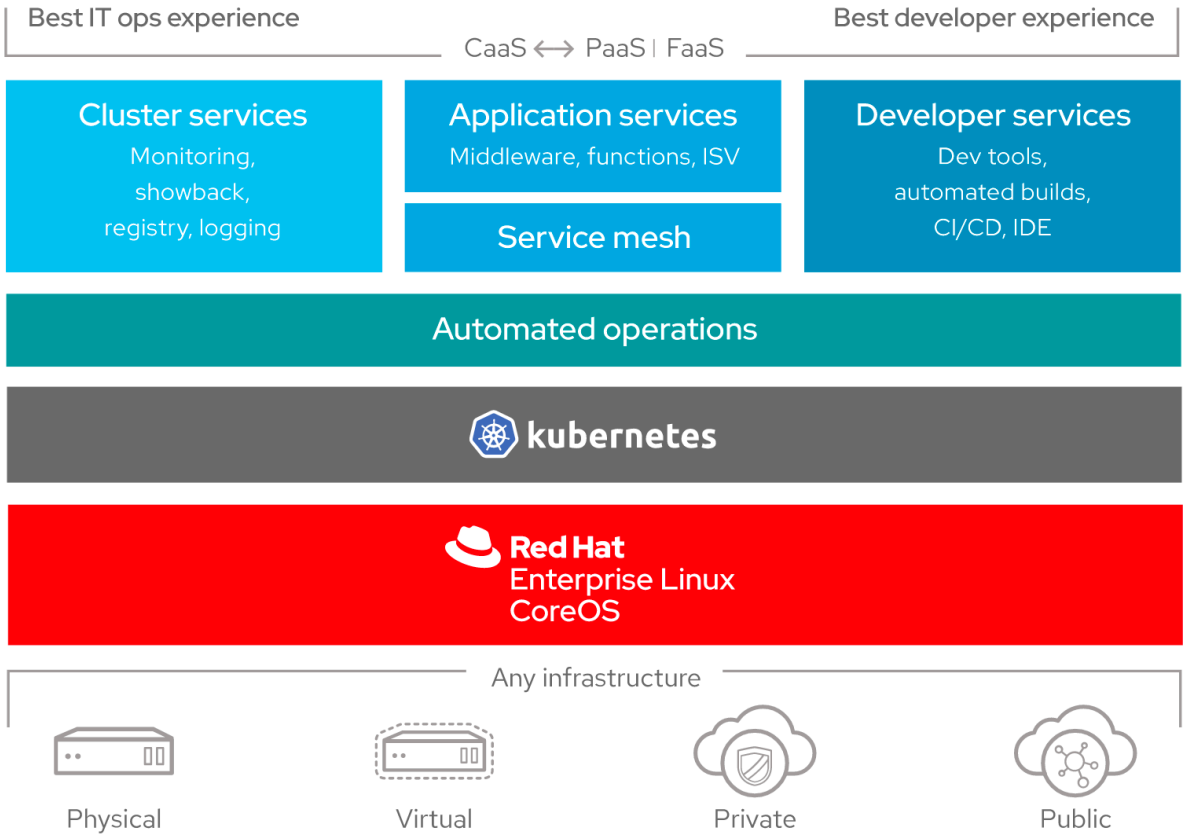
- Service Discovery
- Storage Orchestration
- Rollouts/Rollbacks
- Automatic Bin Packing
- Self-Healing
- Secret/Config Management

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

Why OpenShift 4 instead of 3?

- Not Just an Upgrade
- Immutable RHEL CoreOS
- OpenShift Services Mesh
- Operator Framework
- Knative Framework
- CodeReady Containers
- Simplified Update Process

Red Hat OpenShift 4.3 released January 15, 2020

https://blog.openshift.com/introducing-red-hat-openshift-4-3-to-enhance-kubernetes-security/

Today, Red Hat announces the general availability of Red Hat OpenShift 4.3, the newest version of the industry's most comprehensive enterprise Kubernetes platform.

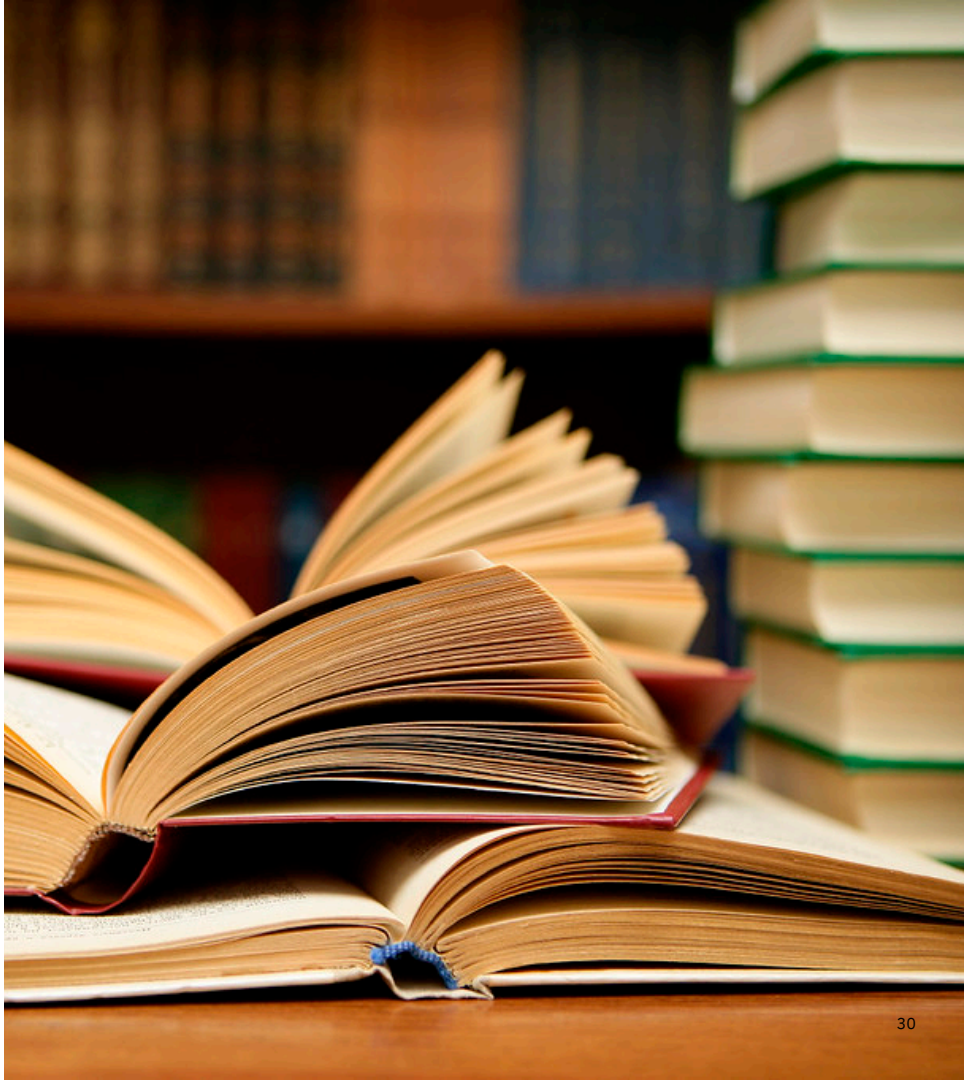
- **Encryption to strengthen the security of containerized applications on OpenShift**
- **Better access controls to comply with company security practices**
- **OpenShift Container Storage 4 across the cloud**
- **Automation to enhance day two operations with OpenShift**

OpenShift vs OKD

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

Machine Learning Defined

“Machine learning (ML) is the scientific study of algorithms and statistical models that computer systems use to perform a specific task without using explicit instructions, relying on patterns and inference instead. It is seen as a subset of artificial intelligence. Machine learning algorithms build a mathematical model based on sample data, known as "training data", in order to make predictions or decisions without being explicitly programmed to perform the task.”



Examples of Machine Learning

- Virtual Personal Assistants
- Email/Spam Filtering
- Chatbots/Online Support
- Video Surveillance
- Maps/Traffic/Time to Arrival
- Speech Recognition
- Recommendation Engines

"Machine learning (ML) is the scientific study of algorithms and statistical models that computer systems use to perform a specific task without using explicit instructions, relying on patterns and inference instead."

Deep Learning Defined

“Deep learning architectures such as deep neural networks, deep belief networks, recurrent neural networks and convolutional neural networks have been applied to fields including computer vision, speech recognition, natural language processing, audio recognition, social network filtering, machine translation, bioinformatics, drug design, medical image analysis, material inspection and board game programs, where they have produced results comparable to and in some cases surpassing human expert performance.”

Artificial Intelligence Defined

“A system’s ability to correctly interpret external data, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation.”

Let’s Recap: Definitions

Artificial Intelligence (AI) - The broad discipline of creating intelligent machines

Machine Learning (ML) - Systems that can learn from experience

Deep Learning (DL) - Systems that learn from experience on large data sets

Artificial Neural Networks (ANN) - Models of human neural networks that are designed to help computers learn

Source: Sonix

↳ Let’s Dive in: Artificial Neural Networks

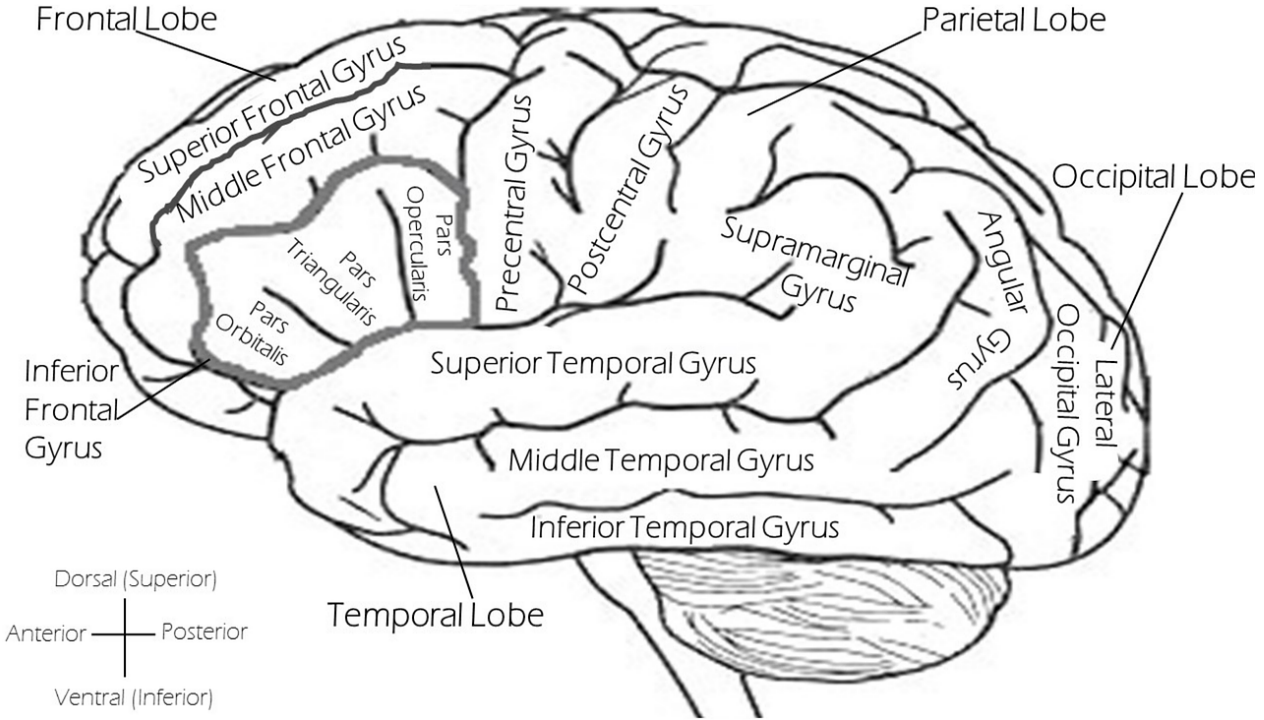
Types of Neural Networks

Convolutional neural networks

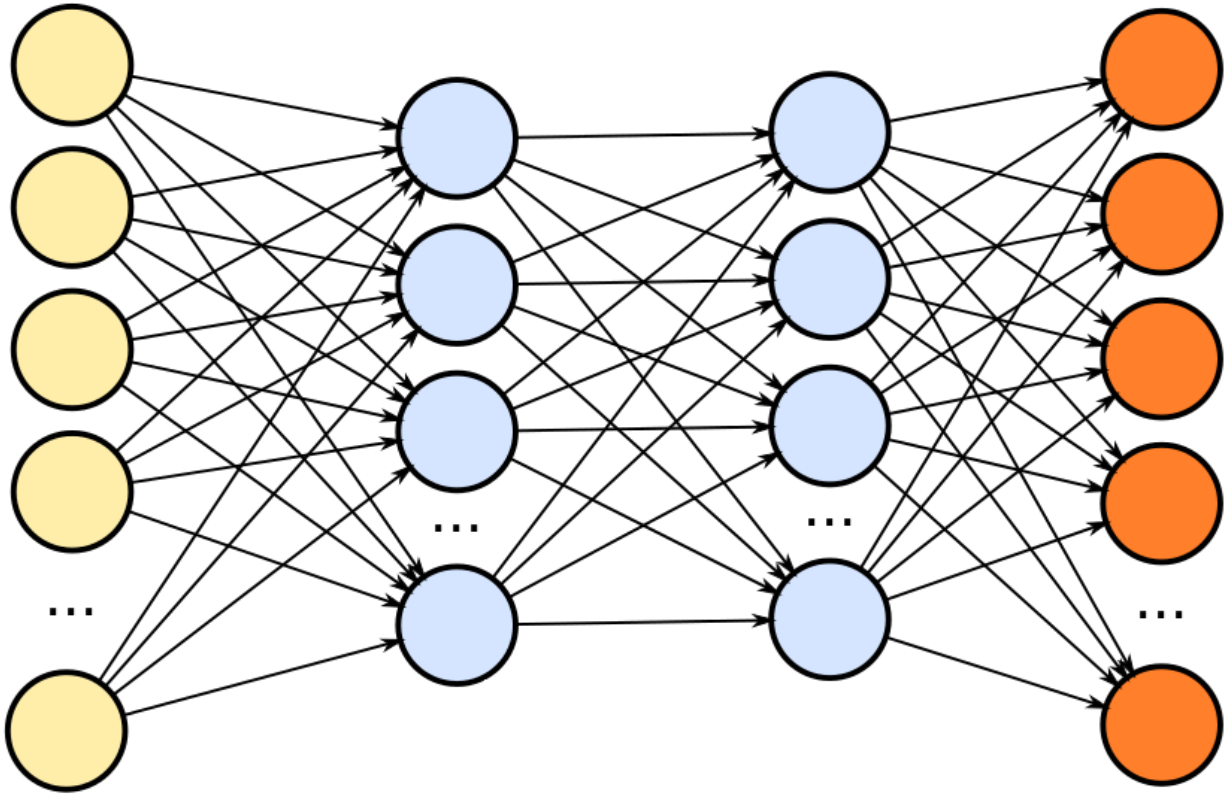
Long short-term memory network

Simple/multilayer

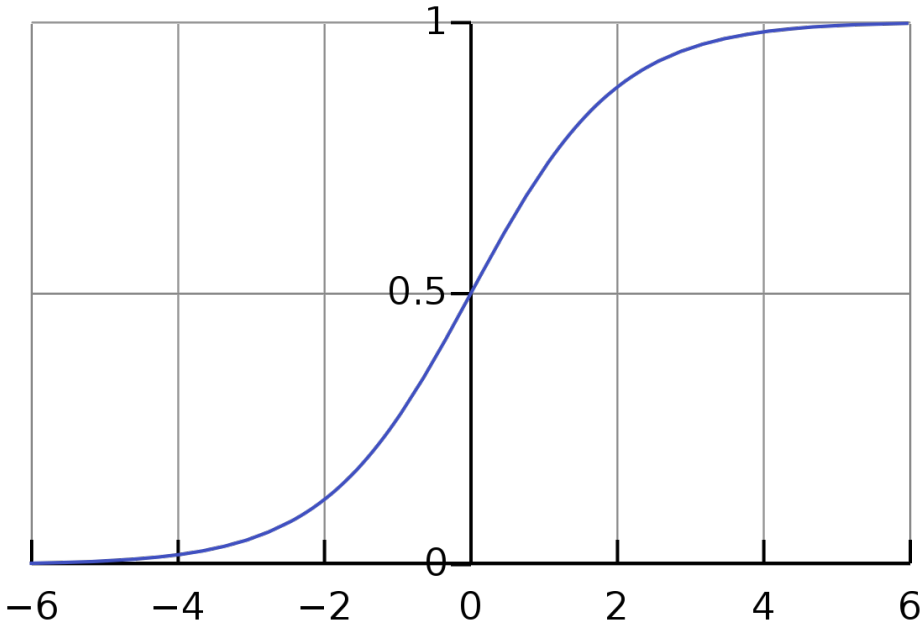
Artificial Neural Network Inspiration



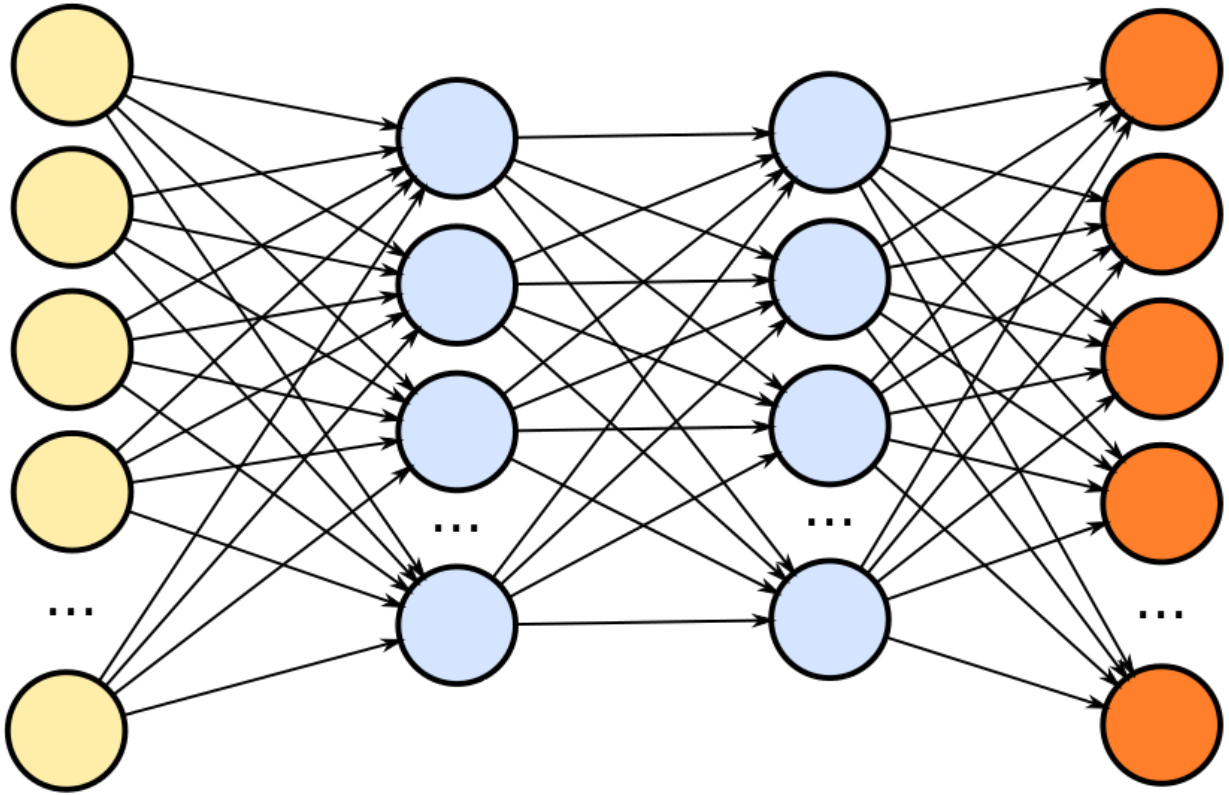
Artificial Neural Networks: Layers



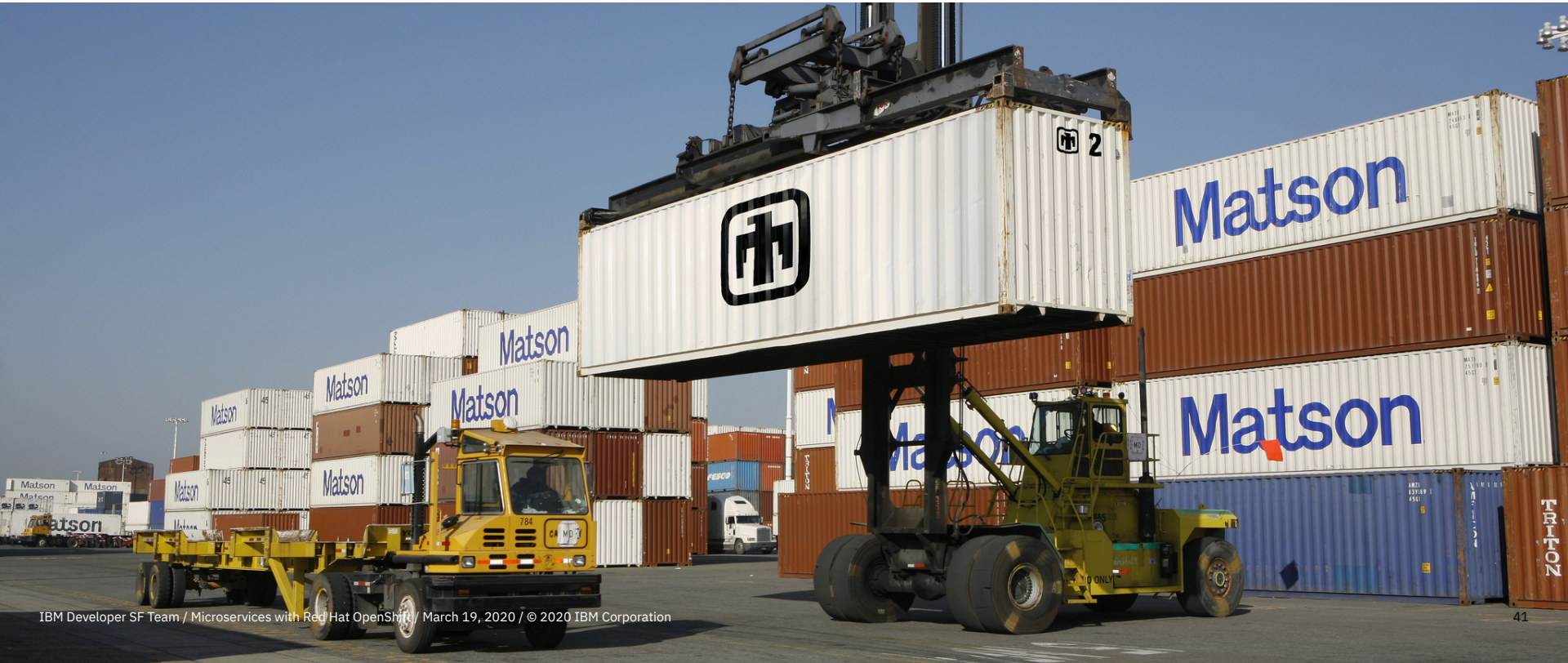
Sigmoid Function



Artificial Neural Networks: Weights & Costs



↳ Conclusion & Lab



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- Startups who aspire to build and sell their own solutions

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Questions?