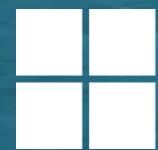




an IBM Company



Microsoft

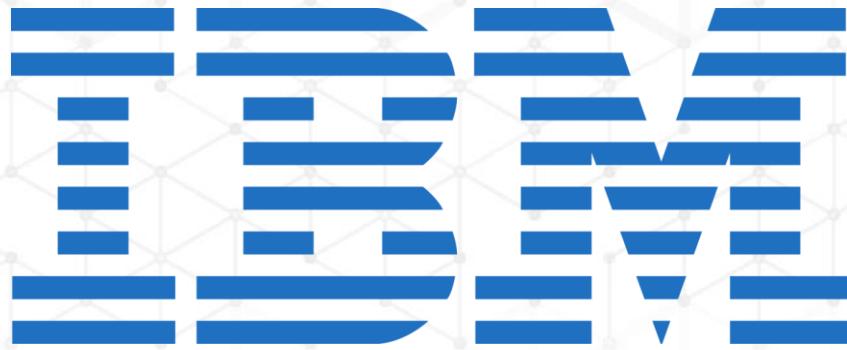
# Options for Kubernetes on Azure

Workshop

# About BoxBoat

Boutique consulting company focused on helping organizations achieve a DevOps transformation. We are engineers at heart and enjoy solving challenging problems by utilizing cutting-edge solutions through **Kubernetes** and **Automation**.





**boxboat**



**boxboat**  
an IBM Company

# Who am I?

Chris Wiederspan

[chwieder@microsoft.com](mailto:chwieder@microsoft.com)

App Innovation Specialist @ Microsoft

[linkedin.com/in/cwiederspan](https://linkedin.com/in/cwiederspan)

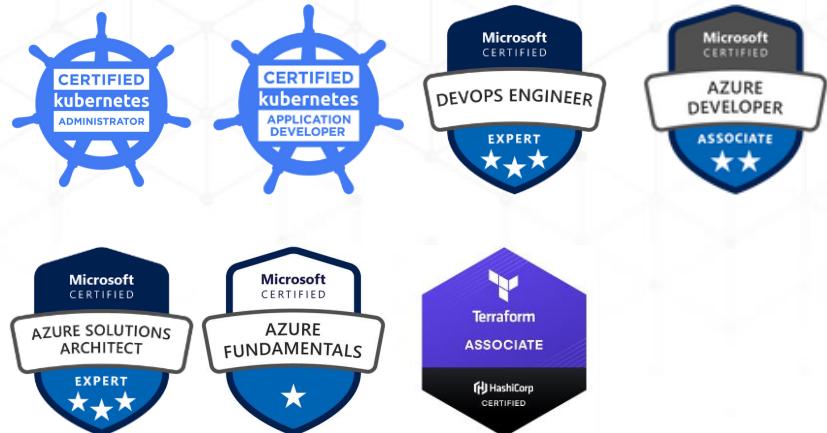


# Who am I?

Facundo Gauna

[facundo@boxboat.com](mailto:facundo@boxboat.com)

Senior Solutions Architect / Azure Practice Lead  
@ BoxBoat Technologies



# Who am I?

Justin VanWinkle

[justin@boxboat.com](mailto:justin@boxboat.com)

Solutions Architect @  
BoxBoat Technologies



# Agenda

**Intro**

**Do you need Kubernetes?**

**Intro to Azure Kubernetes Service (AKS)**

**Demo**

**Intro to Red Hat OpenShift (ARO)**

**Demo**

**Do it yourself**

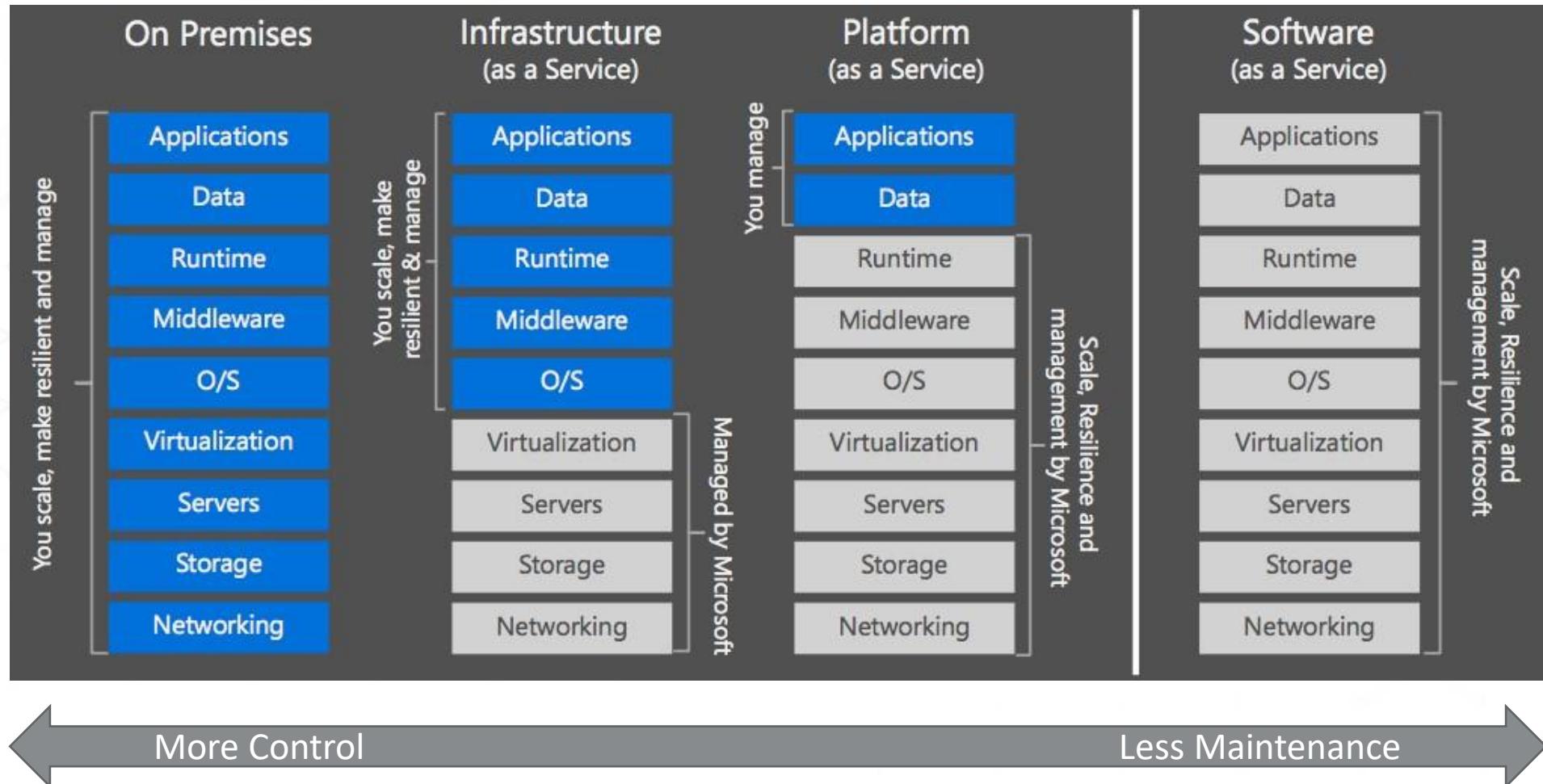
**Q&A / Closeout**



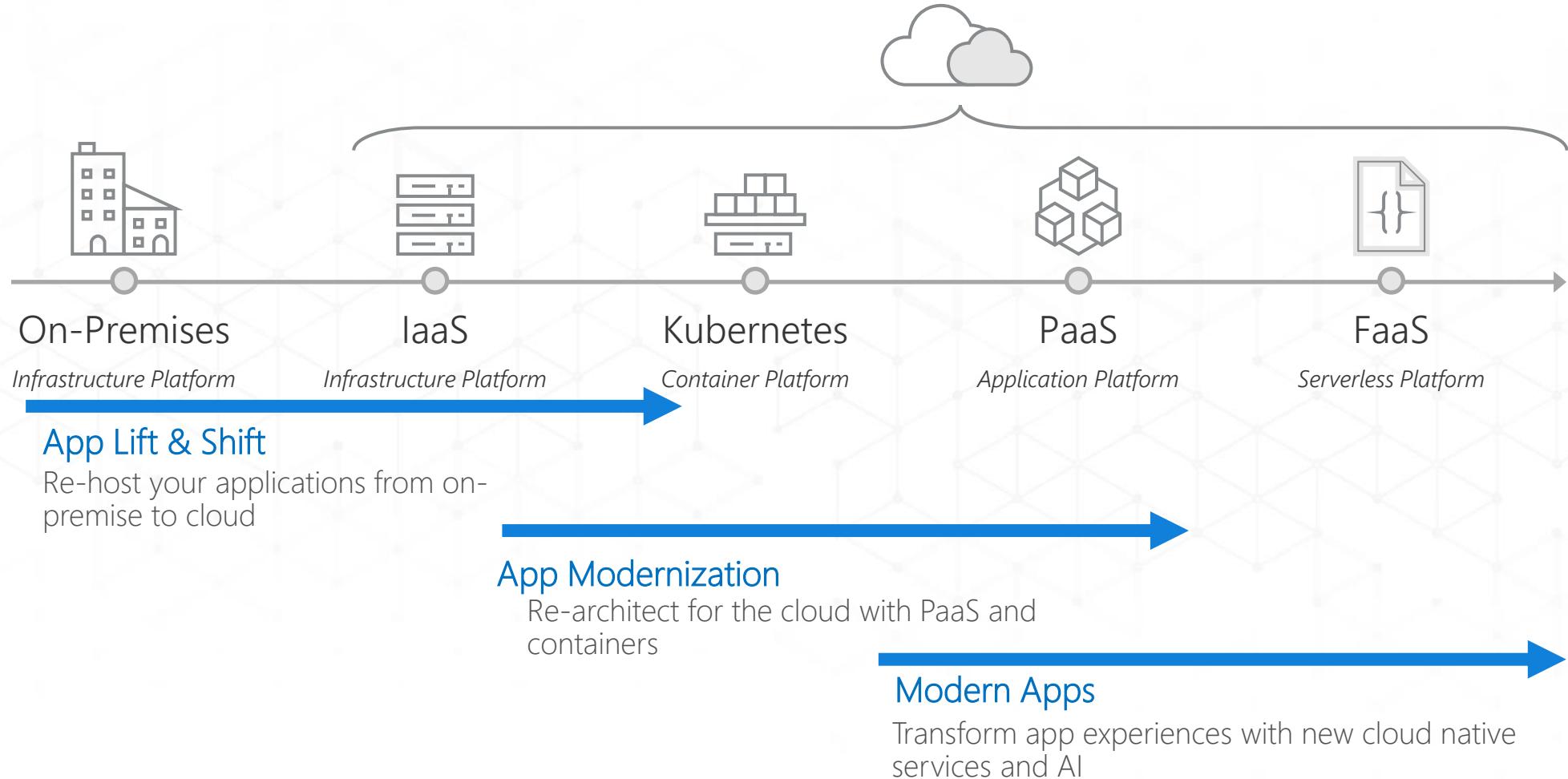
# Do you need Kubernetes?

By Chris Wiederspan (Microsoft)

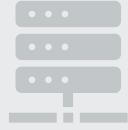
# Hosting Models



# Cloud Maturity Scale



# Kubernetes Pros



More control like Infrastructure as Service (IaaS)



High agility like Platform as a Service (PaaS)



Portable

# Kubernetes Cons



LEARNING CURVE



COMPLEX



MORE WORK

# Azure Alternatives

## Platform as a Service

- App Services
- ASEv3
- Spring Cloud

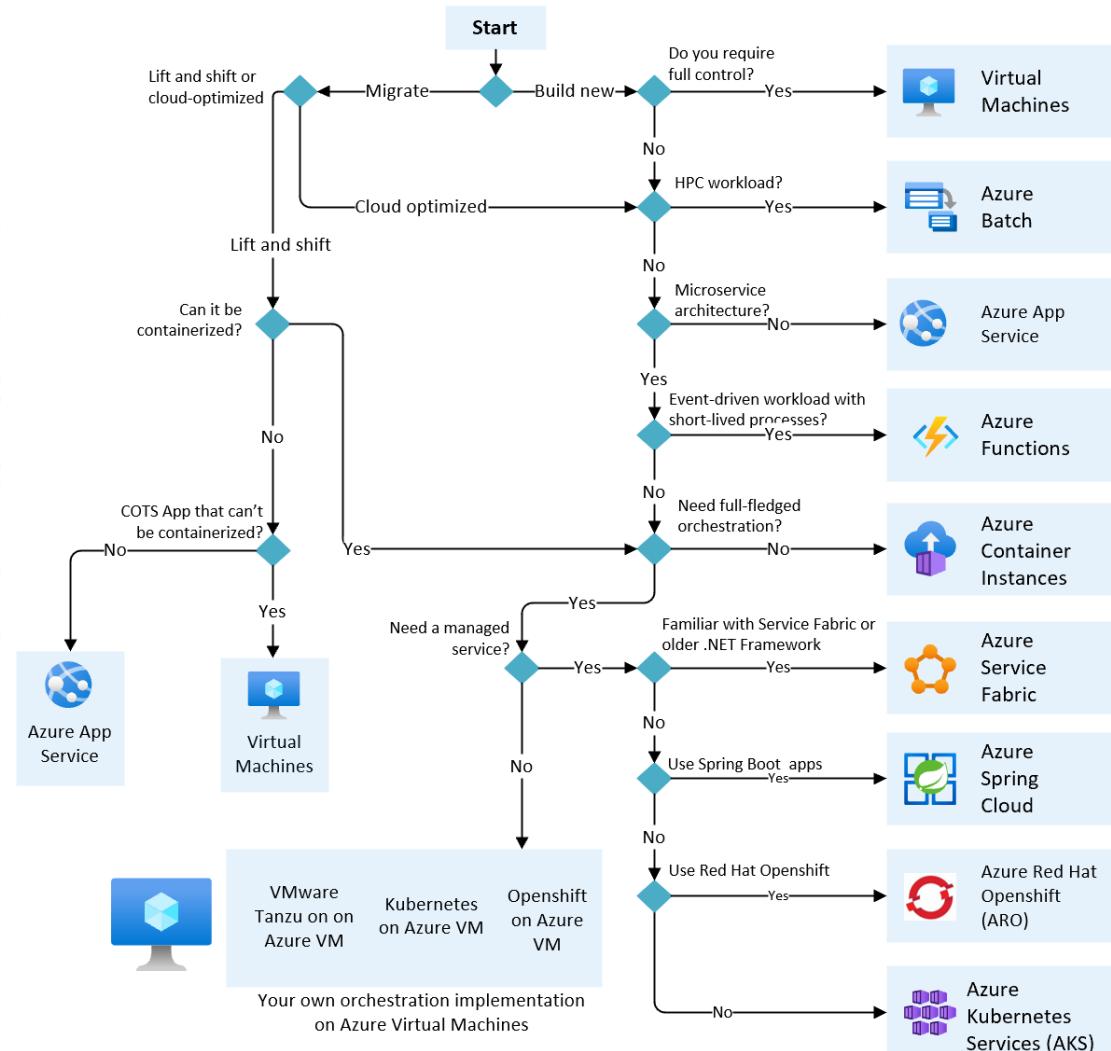


## Serverless

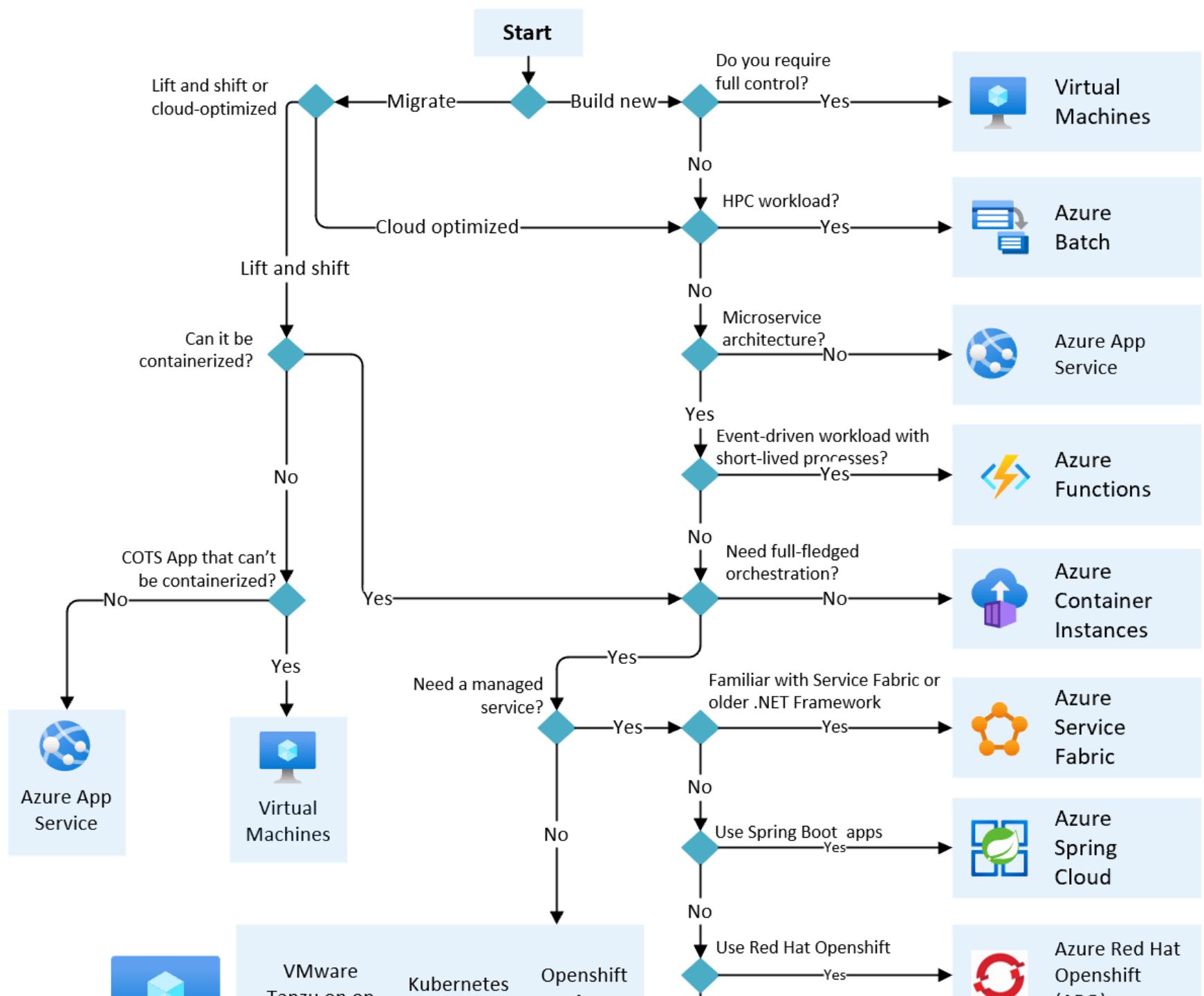
- Azure Functions
- Logic Apps

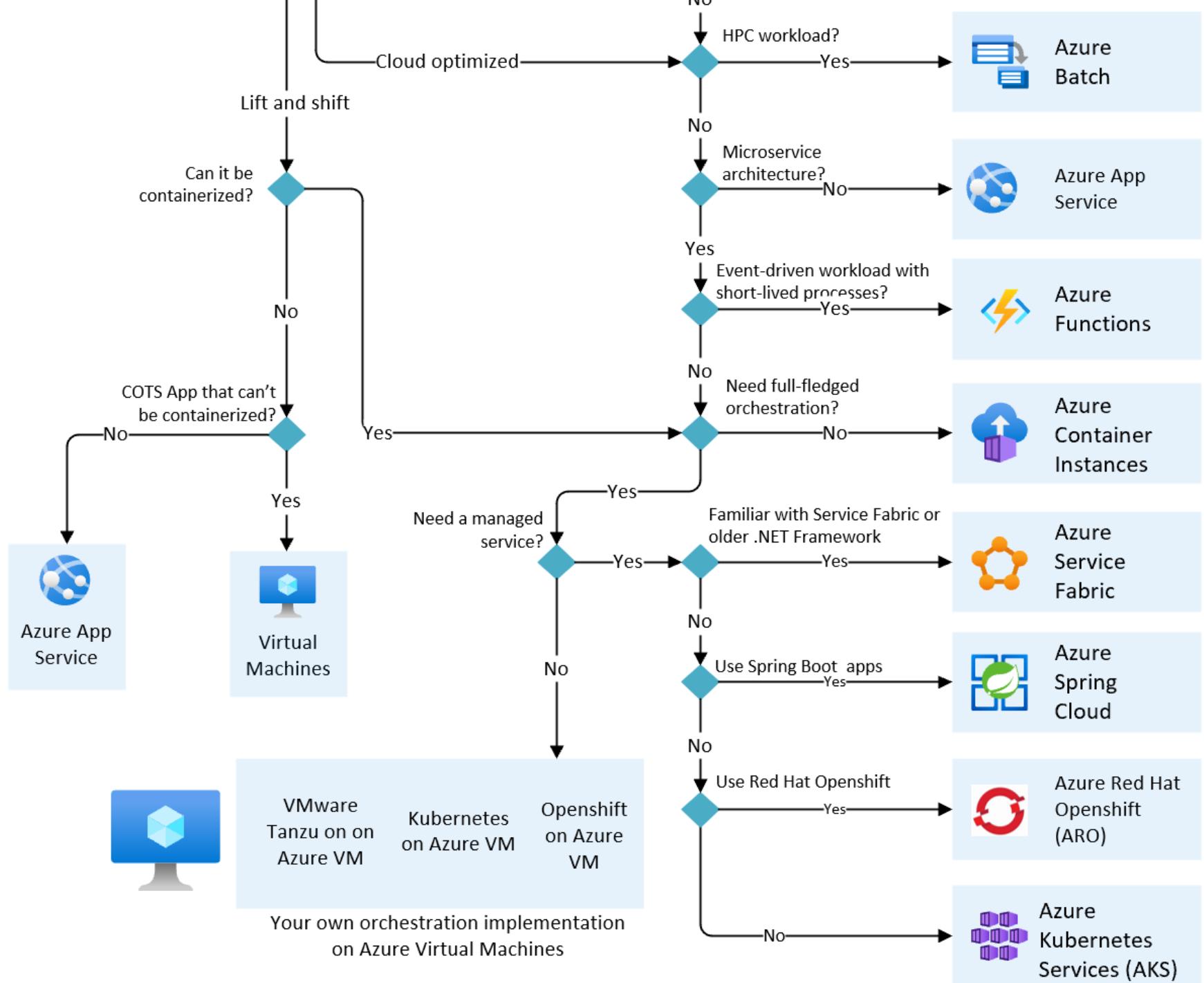


# Hosting Models



<https://aka.ms/azure-decision-tree>







# Azure Kubernetes Service (AKS)

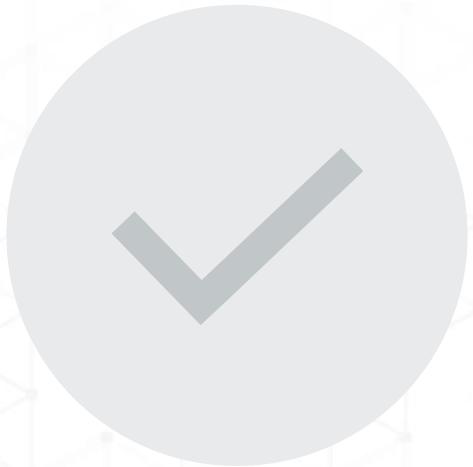
By Facundo Gauna

# Introduction

- An open-source container-orchestration system for automating application deployment, scaling, and management.
- De-facto industry container orchestrator
- Kubernetes is Greek for **helmsman** or **captain**
- Often referred to as “k8s”
- Initial release June 7, 2014
- Heavily influenced by Google’s Borg



# Why?

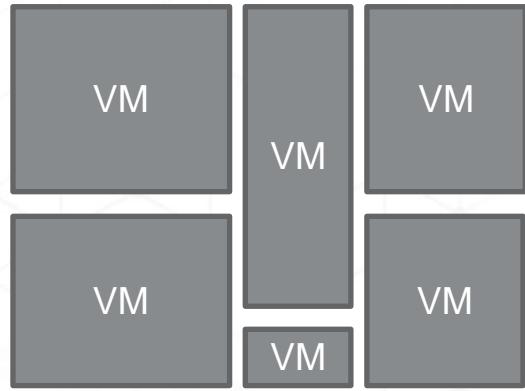


CONTAINERS CREATE  
SCALABILITY CHALLENGES

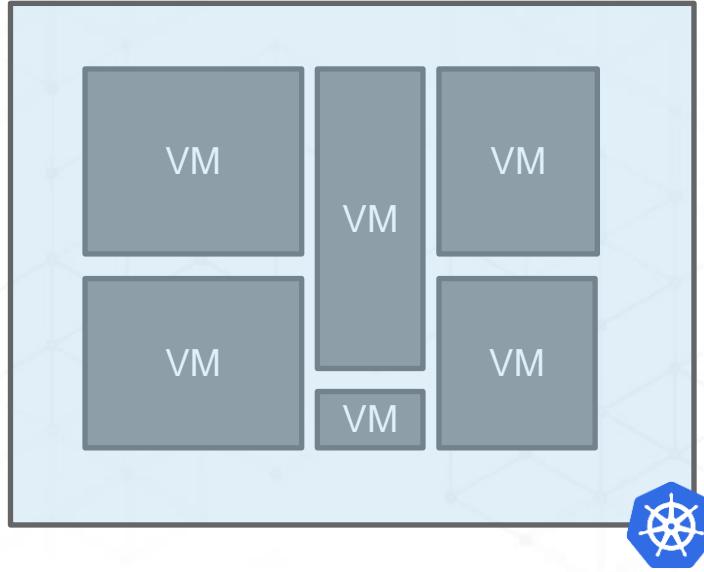


ALLOWS YOU TO VIEW THE  
DATA CENTER AS A COMPUTER

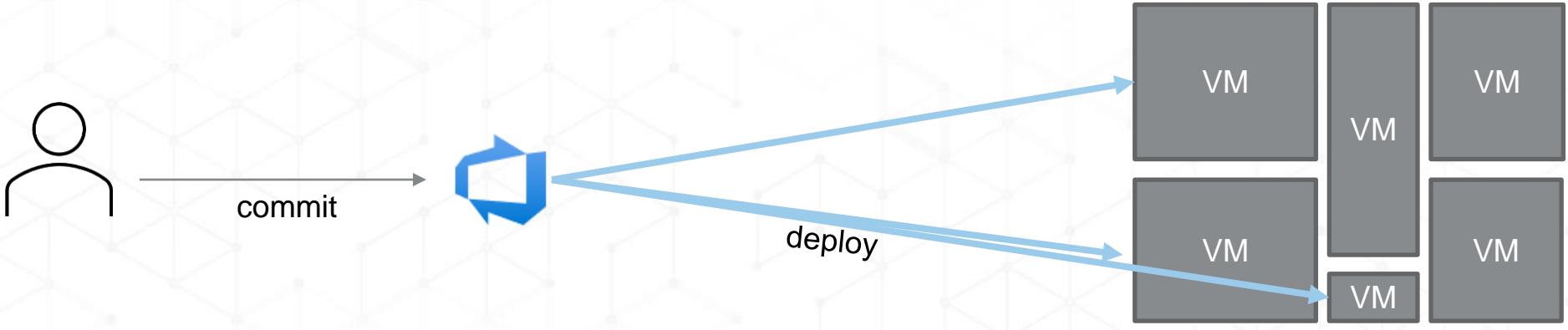
# Traditional data center



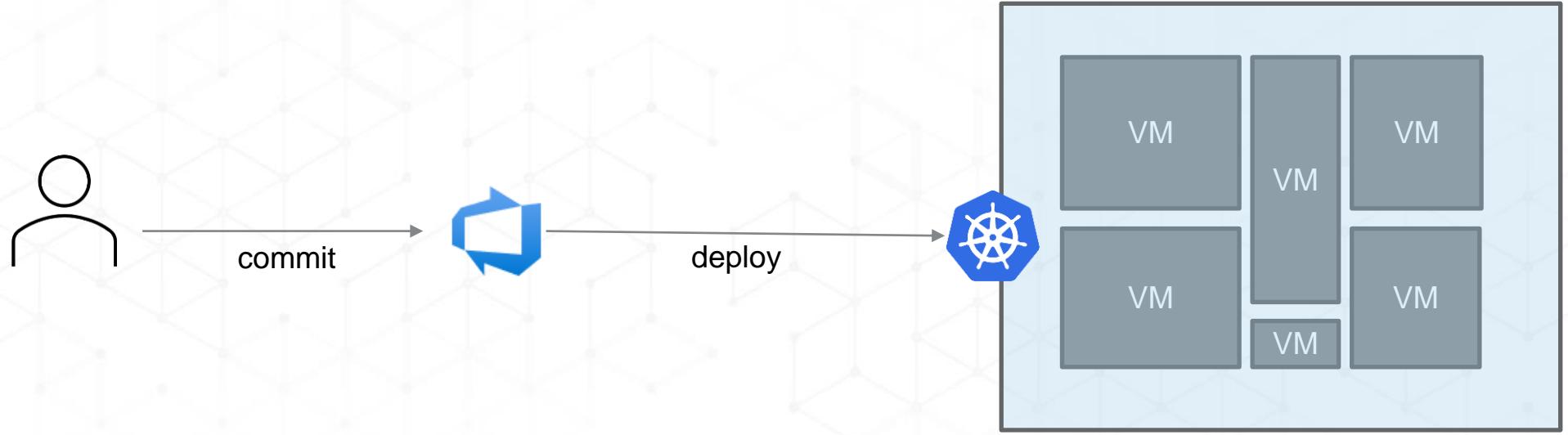
# View the data center as a computer



# Traditional deployments



# View the data center as a computer



# What does Kubernetes do?

## Self-Healing

Provides self-healing capabilities for both hardware and application issues

## Multi-tenancy

Becomes a platform to host multiple applications across the same hardware

## Declarative configuration

Let's you define and configure everything through code (YAML)

# Key Benefits

## Operational

- Simplifies hardware deployment to cloud and on-premises datacenters
- Resilient architecture – tolerate total management plane failure
- Fine-grained access controls
- Native integration to public cloud
- Fully-featured REST API for custom monitoring
- Control over internal networking
- Customizable application scheduling

## Technical

- Automatic application healing
- Deploy applications in high availability
- Zero downtime deployments
- Multiple networking paradigms
- Flexible reverse proxy options
- Extend its capability through Custom Resource Definitions (CRDs)

# Kubernetes Adoption Impact

## CI/CD Key Performance Indicators

- Deployment frequency **increased** 47%
- Speed of deployments **increased** 52%
- Deployment failure rate **decreased** from 25% to 6%
- Time to recovery **decreased** from 92 to 12 minutes

\*Based on a report by DataDog

# Who uses Kubernetes?

BlackRock®



COMCAST

ebay



Goldman  
Sachs

# What are common use-cases?

Microservices

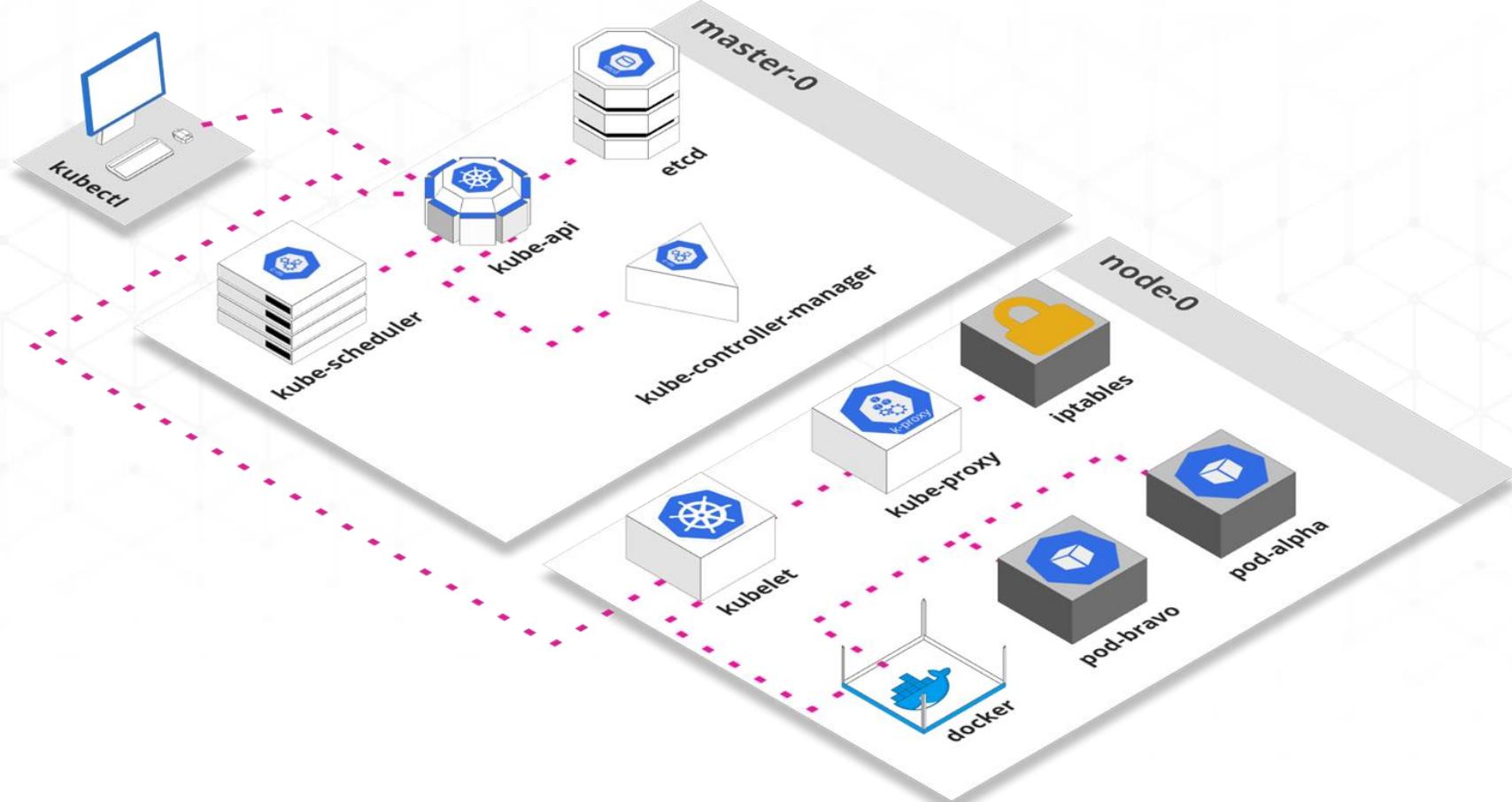
Batch Jobs

Workflows

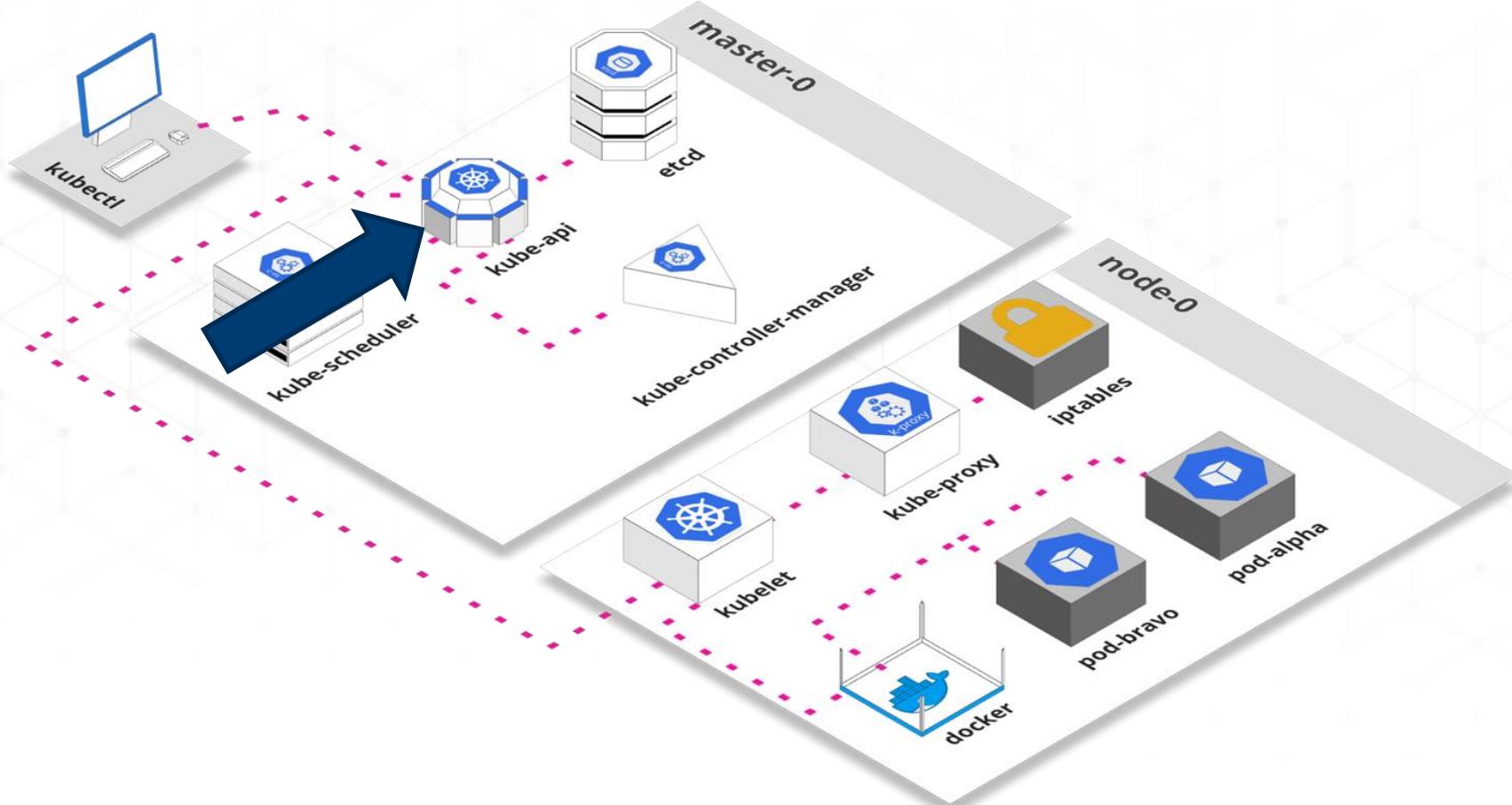
Machine Learning

Enterprise  
Platforms

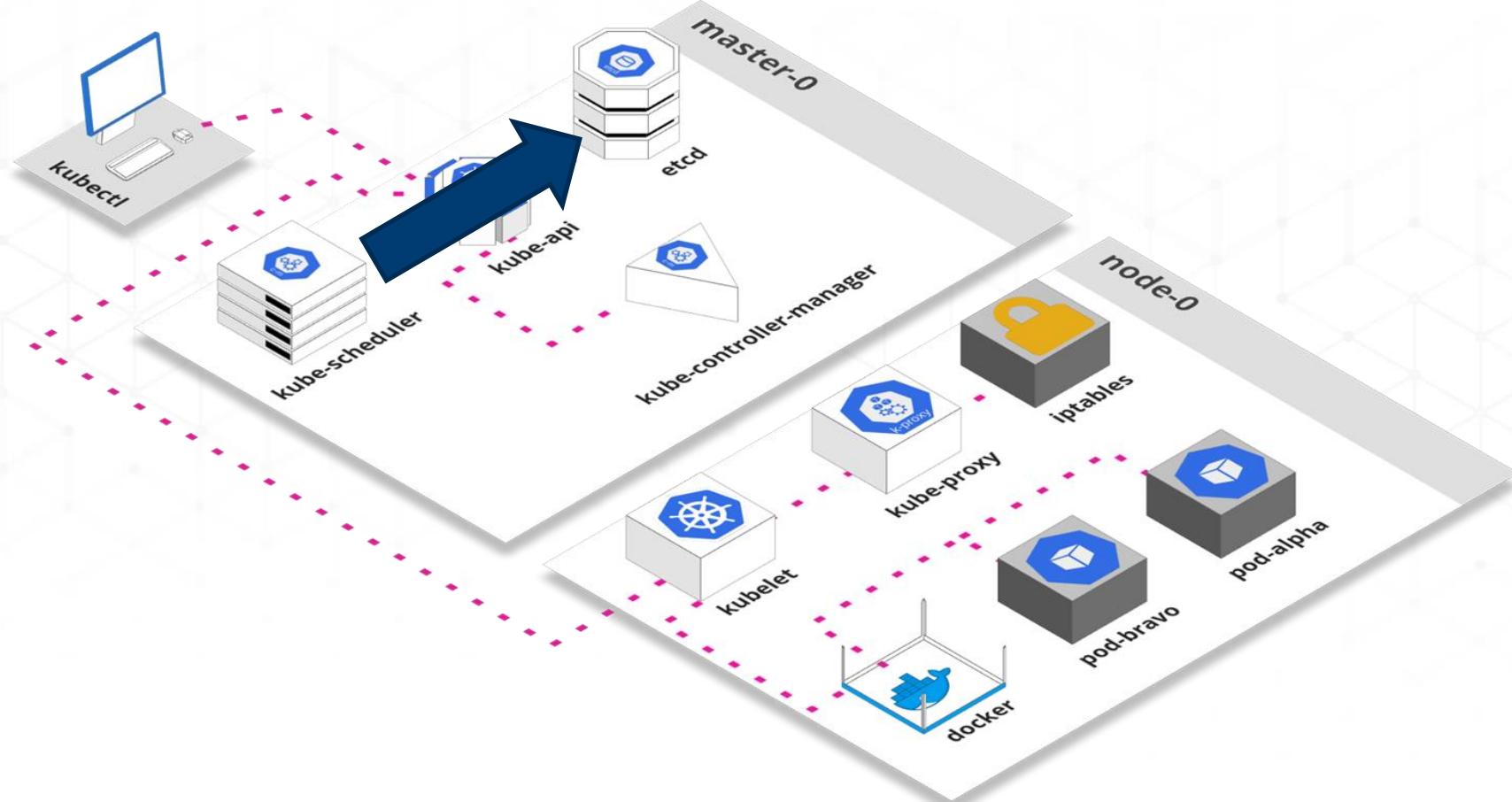
# Kubernetes Architecture



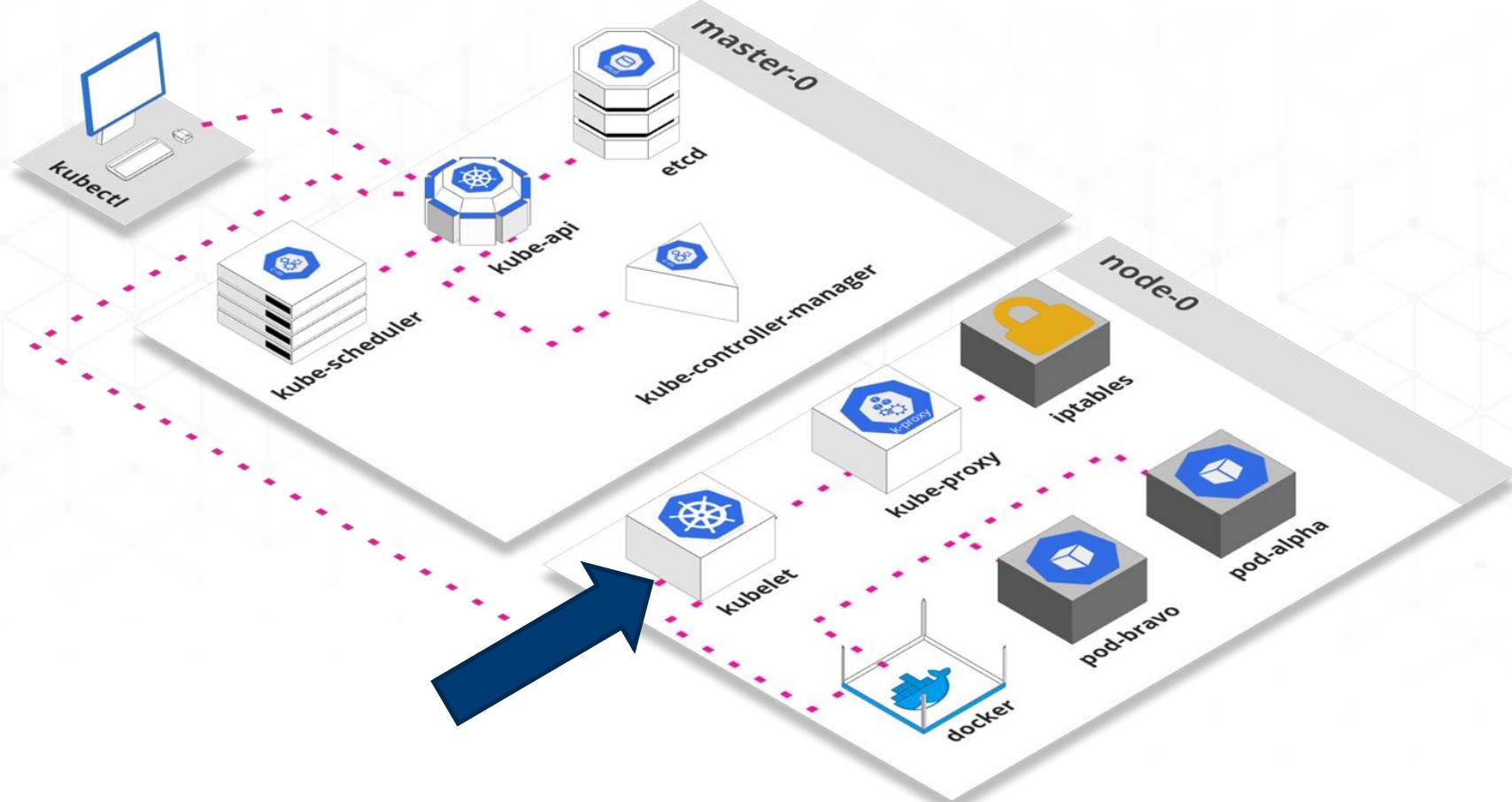
# Kubernetes Architecture



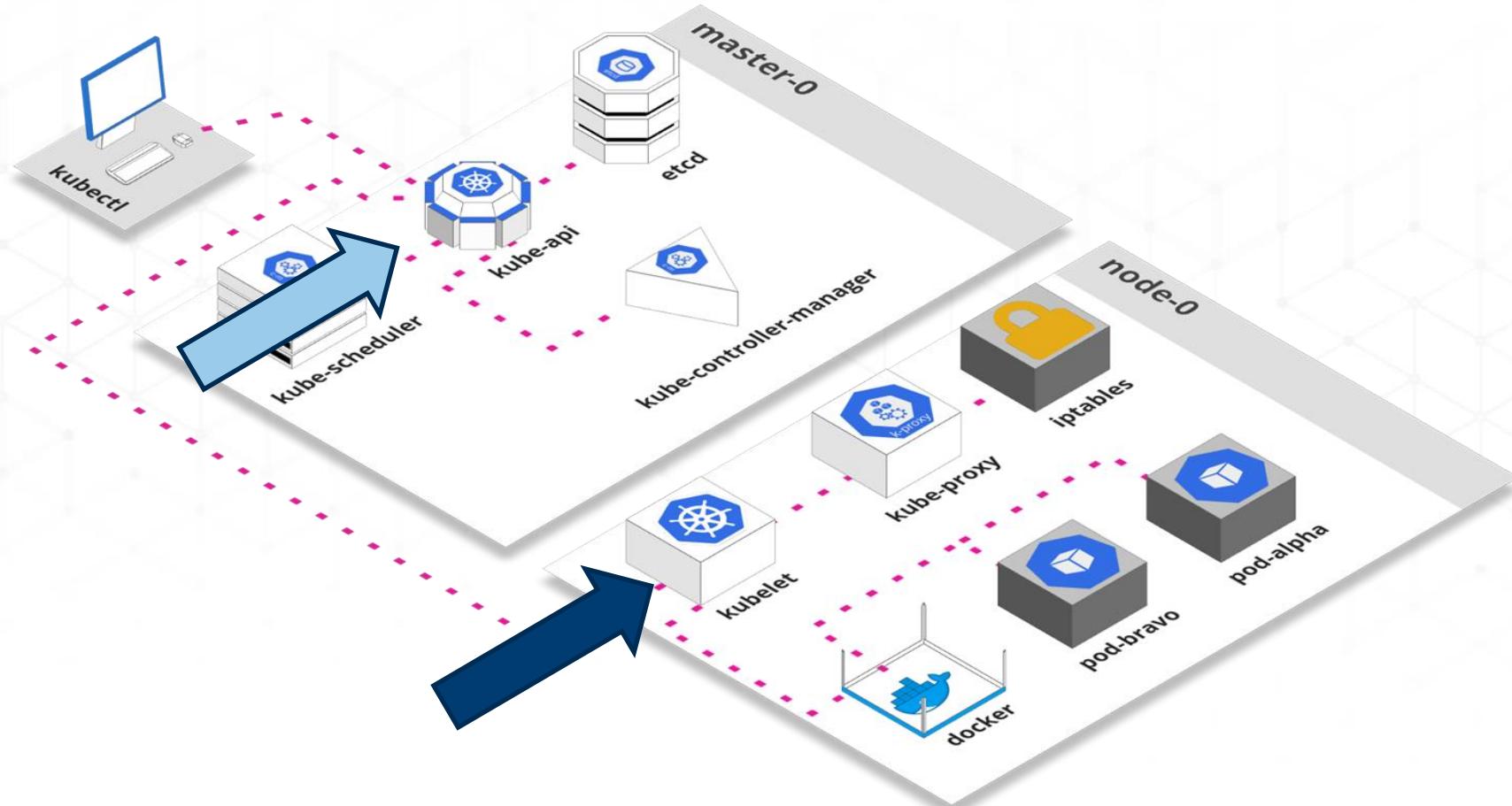
# Kubernetes Architecture



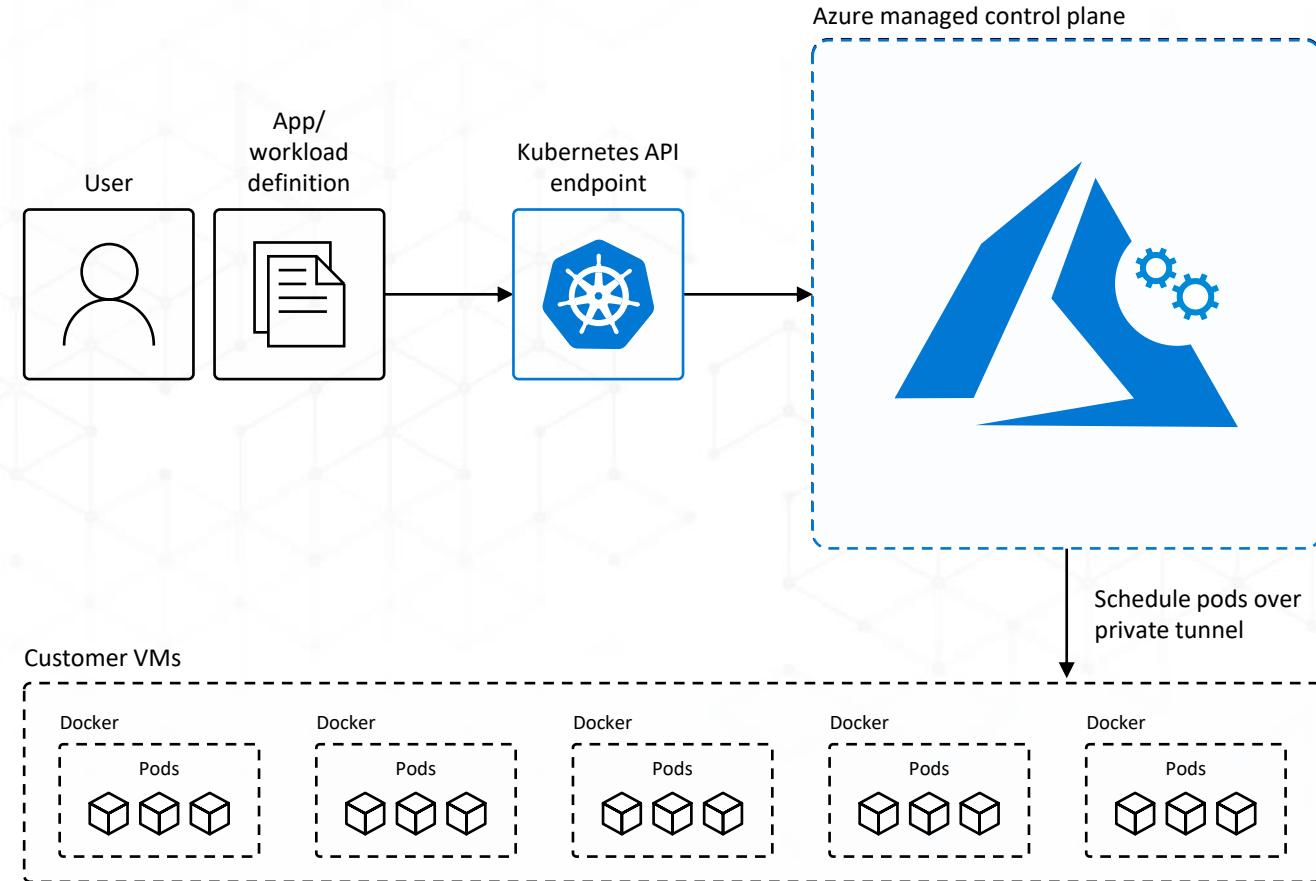
# Kubernetes Architecture



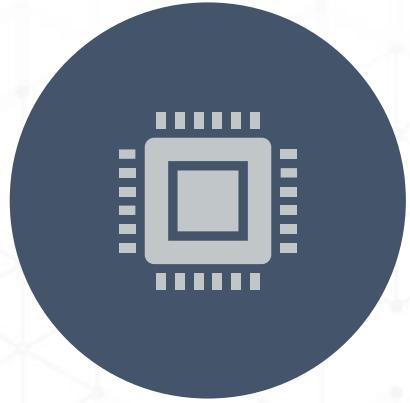
# Kubernetes Architecture



# Azure Kubernetes Service



# Azure Kubernetes Service



AUTOMATED PROVISIONING,  
UPGRADES, PATCHES



HIGH RELIABILITY,  
AVAILABILITY



EASY, SECURE, CLUSTER  
SCALING

# Azure Kubernetes Service



Rich integration with Azure services



Support for Windows containers

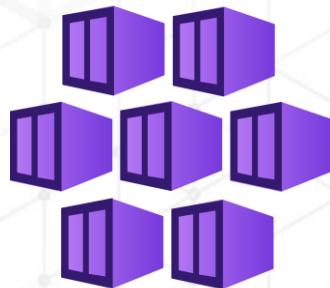


Master control plane at no charge

# Self-Hosted vs AKS

Responsibilities	DIY with Kubernetes	Managed Kubernetes on Azure
Containerization		
Application iteration, debugging		
CI/CD		
Cluster hosting		
Cluster upgrade		
Patching		
Scaling	 *	
Monitoring and logging		

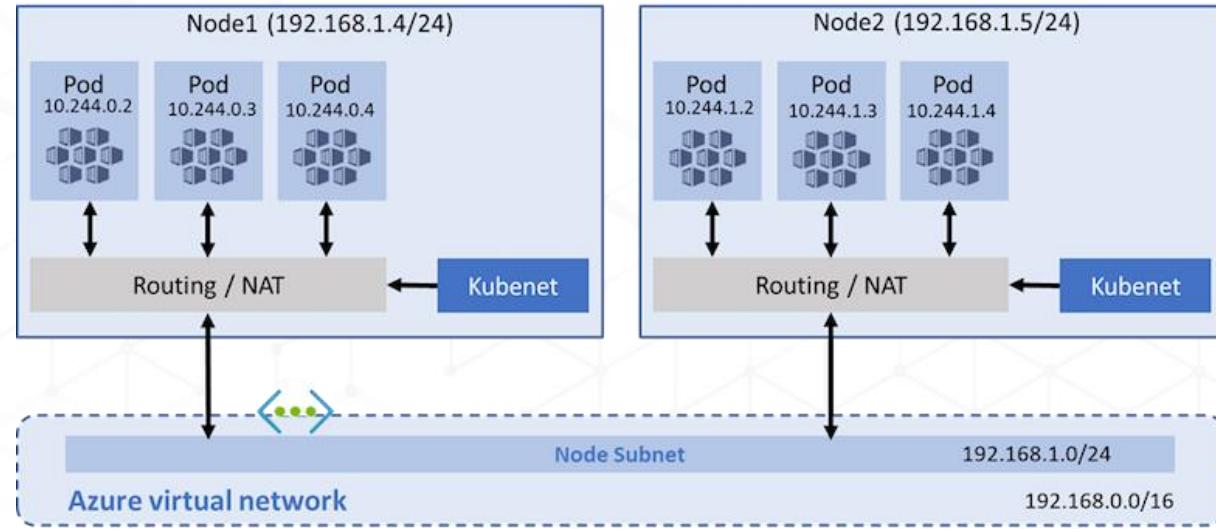
 Your Team    Microsoft



Demo

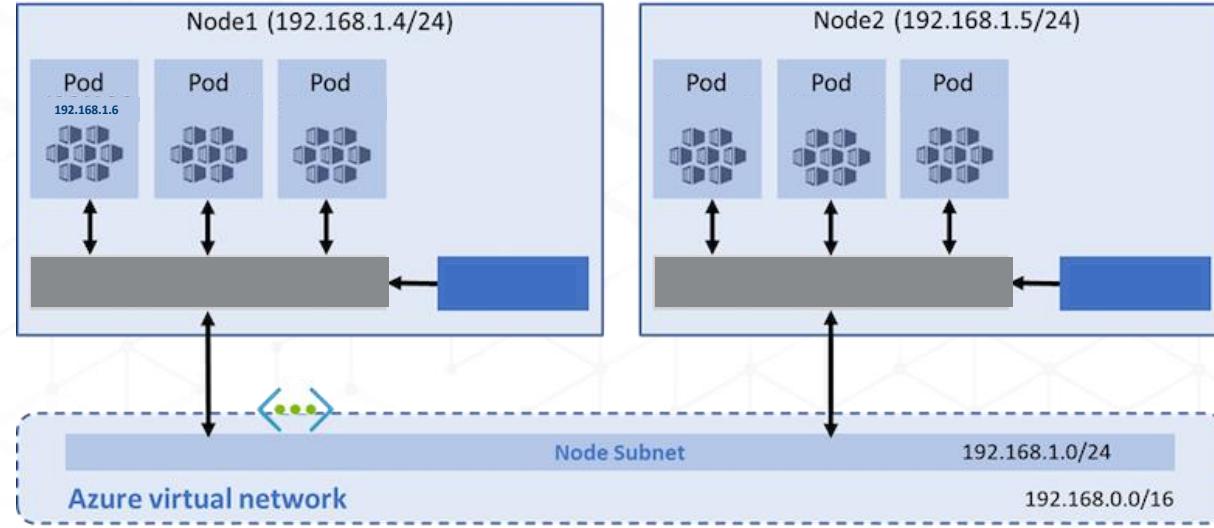
# The Big Decisions - Networking

**Kubenet**  
(each node gets an IP)



# The Big Decisions - Networking

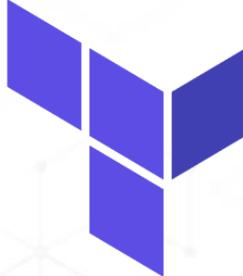
**Azure CNI**  
(each pod gets an IP)



# The Big Decisions – How to deploy?



Azure Portal



Terraform



Azure Blueprints



Pulumi

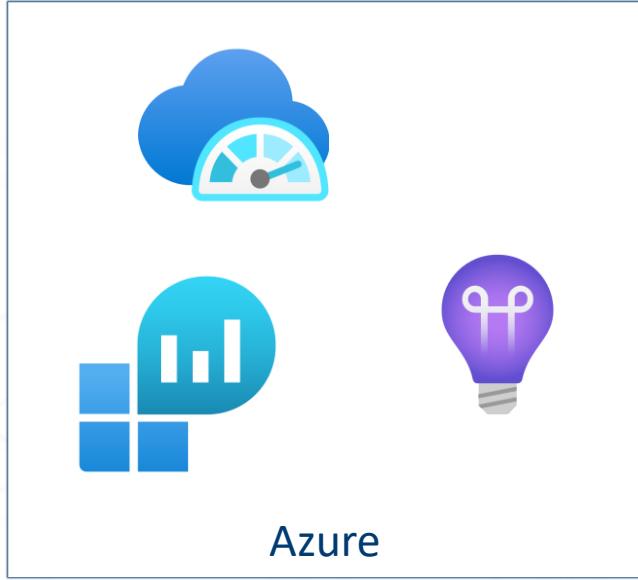


Bicep

`az aks create`

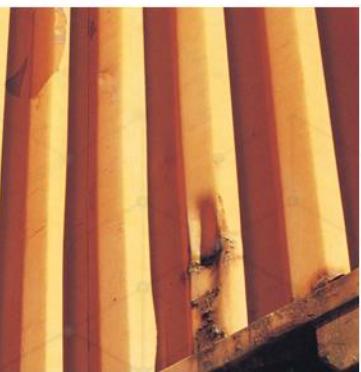
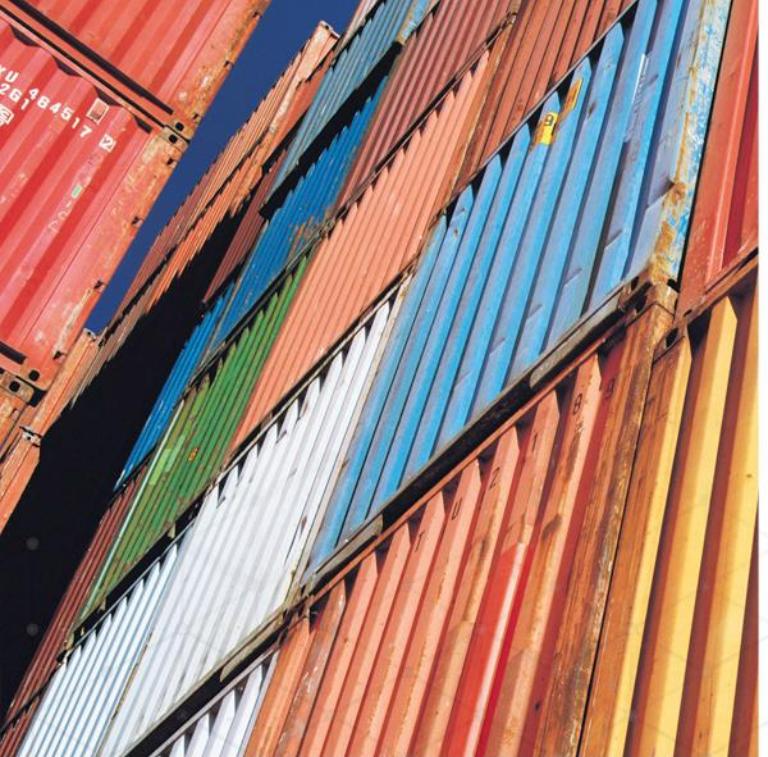
Azure CLI

# The Big Decisions - Secrets



# The Big Decisions - People

- Which team will support it?
- What does support mean?
- Do each application team get their own cluster?
- Do we share DevOps people?
- What about Site Reliability Engineers (SREs)?
- Do we create a Kubernetes platform?
- Who's going to own the Kubernetes platform?



# Azure RedHat OpenShift (ARO)

By Justin VanWinkle

# What is OpenShift?

**RedHat OpenShift** is an enterprise-ready container orchestration platform.

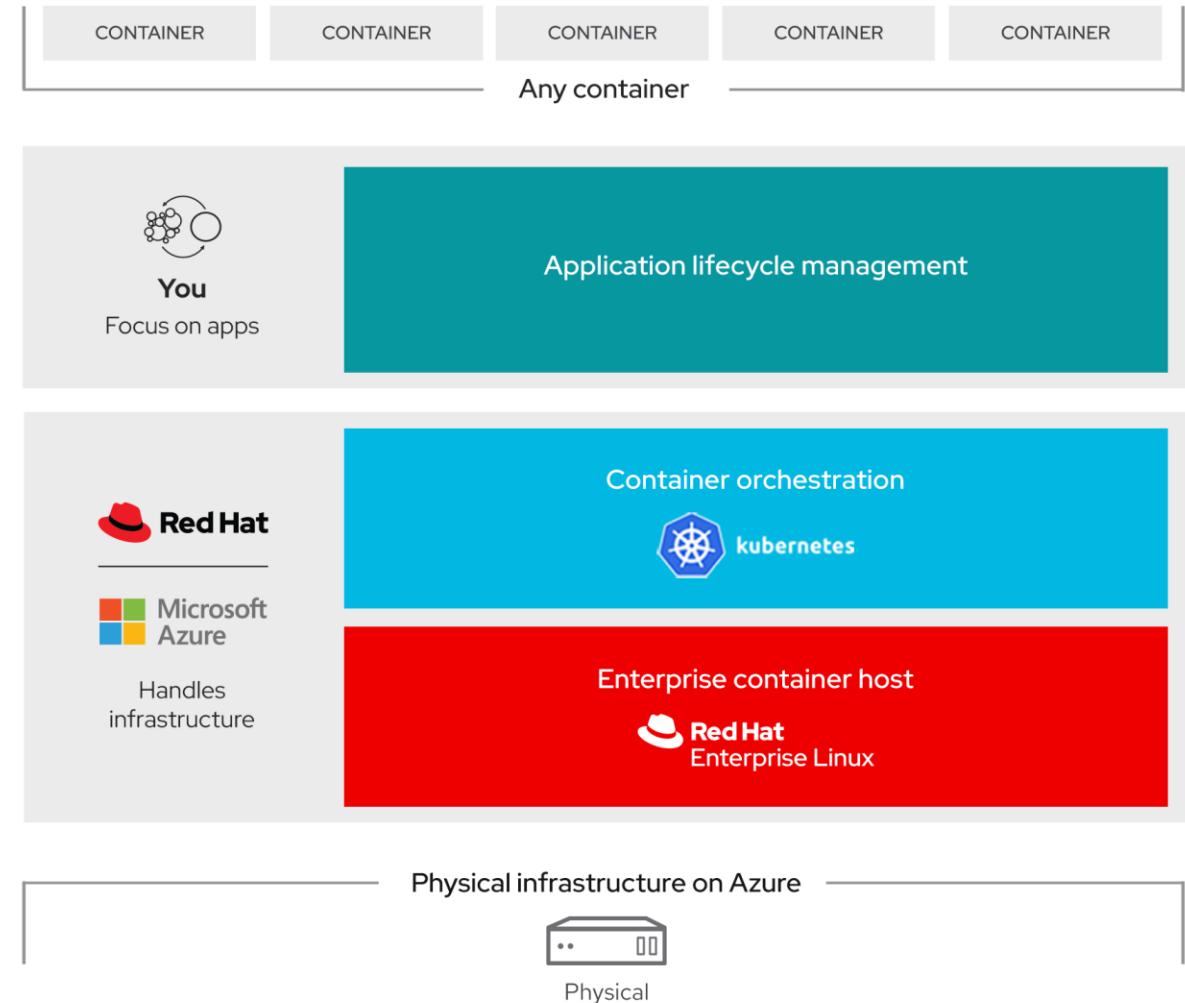
- Kubernetes++
- Enterprise Support
- Sane Defaults



# OPENSIFT

# What is Azure Red Hat OpenShift (ARO)?

- Enterprise Kubernetes
- Supported by Microsoft & Red Hat
- Fully-managed OpenShift
  - No virtual machines to operate
  - No patching required



# ARO Features and Benefits

## Cluster-admin role

Full cluster administrator capabilities enabling running privileged containers and installing Custom Resource Definitions (CRDs).

## Operator Framework

Available community and certified operators with developer self-service as well as Custom Resource Definitions (CRDs).

## Multi-Availability Zones clusters

To ensure the highest resiliency, cluster components are deployed across 3 Azure Availability Zones in supported Azure regions.

## Integrated support experience

Jointly engineered, operated, and supported by Red Hat and Microsoft with an integrated support experience and 99.95% uptime SLA.

## Regulatory compliance

Address comprehensive security and compliance needs with industry-specific standards and regulations such as PCI DSS, HITRUST, FedRAMP High, SOC 2, and more.

## Global availability

Available in 30+ regions supported by Microsoft Azure. Click [here](#) for the latest list of regions.

# Managed vs Self-Managed

SELF-MANAGED	INFRASTRUCTURE	BILLED BY	MANAGED BY 	SUPPORTED BY 
 Red Hat OpenShift	Any Private cloud Public cloud Bare metal Virtual machines Edge	1. Red Hat for OpenShift  2. Any cloud or compute resources used from cloud provider(s)	Customer	Red Hat for OpenShift support  Another party for infrastructure support
MANAGED	INFRASTRUCTURE	BILLED BY	MANAGED BY 	SUPPORTED BY 
    Red Hat   Microsoft Azure  Microsoft Azure Red Hat OpenShift	Cloud hosted Azure	Microsoft	Red Hat and Microsoft	Red Hat and Microsoft

# DYI vs AKS vs ARO

Responsibilities	DIY with Kubernetes	Managed Kubernetes on Azure	Azure RedHat OpenShift
Containerization			
Application iteration, debugging			
CI/CD			
Cluster hosting			
Cluster upgrade			
Patching			
Scaling			
Monitoring and logging			

Your Team   Microsoft   Microsoft & Red Hat

# Benefits of ARO over AKS

Support  
beyond  
infrastructure

Operator Hub

Cluster  
monitoring by  
default

# Sneak Peek: Manage Your Clusters

The screenshot shows the Red Hat Hybrid Cloud Console interface. On the left is a sidebar for "OpenShift" with options like Clusters, Overview, Releases, Downloads, Insights, Subscriptions, Cost Management, Support Cases, Cluster Manager Feedback, Red Hat Marketplace, and Documentation. The main content area is titled "Clusters > ARO Demo Cluster" and shows the "ARO Demo Cluster" details. The "Overview" tab is selected, showing the following information:

Details	Status
Cluster ID d757fc95-b710-49b2-adab-7b31fe637642	Ready
Type ARO	Total vCPU 36 vCPU
Region N/A	Total memory 141.15 GiB
Provider Azure	Nodes Control plane: 3 Worker: 3
Version OpenShift: 4.7.21	
Created at 9/9/2021 9:50:25 AM	
Owner Justin VanWinkle	

On the right, there are two cards: "Resource usage" showing vCPU (15.86% of 36 Cores used) and Memory (28.05% of 141.15 GiB used), and "Cost breakdown" with a callout to track spending and add clusters to cost management.

# Sneak Peek: Interact with the Cluster

- Kubectl
- OpenShift CLI
- Cluster Console

The screenshot shows the Red Hat OpenShift Cluster Console interface. The top navigation bar includes the Red Hat OpenShift logo, a user dropdown for 'kube:admin', and a notification bell icon. The left sidebar has a dark theme with a navigation menu:

- Administrator
- Home
- Operators
- Workloads
  - Pods
  - Deployments
  - DeploymentConfigs
  - StatefulSets
  - Secrets
  - ConfigMaps
- CronJobs
- Jobs
- DaemonSets
- ReplicaSets
- ReplicationControllers
- HorizontalPodAutoscalers

- Networking
- Storage
- Builds

The main content area is titled 'Overview' under the 'Cluster' section. It displays cluster details, status, utilization metrics, and activity logs.

**Cluster Details:**

- Cluster API address: https://api.okos2zc.eastus.aroapp.io:6443
- Cluster ID: d757fc95-b710-49b2-adab-7b31fe637642
- Provider: Azure
- OpenShift version: 4.7.21
- Update channel: Not available

**Status:** Cluster, Control Plane, Operators, Insights (2 issues found)

**Cluster utilization:** CPU usage (5.36), Memory usage (39.68 GiB), Filesystem usage (100.9 GiB), Network transfer (3.12 MBps in, 5.67 MBps out), Pod count (173).

**Activity:** Shows recent events such as stopping container registries, pulling images, and creating storage classes.

**Quick Starts:** Links to get started with Spring, Quarkus, and Helm Chart.

# Sneak Peek: Deploy an Application

- oc apply -f nginx.yaml
- kubectl apply -f nginx.yaml
- Cluster Console

The screenshot shows the Red Hat OpenShift Cluster Console. The left sidebar navigation bar includes links for Administrator, Home, Operators, Workloads (Pods, Deployments, DeploymentConfigs, StatefulSets, Secrets, ConfigMaps), CronJobs, Jobs, DaemonSets, ReplicaSets, ReplicationControllers, HorizontalPodAutoscalers, Networking, Storage, and Builds. The 'Deployments' link is currently selected. The main content area is titled 'Create Deployment' and contains a code editor with the following YAML configuration:

```
1 apiVersion: apps/v1
2 kind: Deployment
3 metadata:
4   name: example
5   annotations:
6     image.openshift.io/triggers: |-
7       [
8         {
9           "from": {
10             "kind": "ImageStreamTag",
11             "name": "openshift/hello-openshift:latest"
12           },
13           "fieldPath": "spec.template.spec.containers[0].image"
14         }
15       ]
16   namespace: default
17 spec:
18   selector:
19     matchLabels:
20       app: hello-openshift
21   replicas: 3
22   template:
23     metadata:
24       labels:
25         app: hello-openshift
26     spec:
27       containers:
28         - name: hello-openshift
29           image: openshift/hello-openshift
30           ports:
31             - containerPort: 8080
32
```

Below the code editor are 'Create' and 'Cancel' buttons, and a 'Download' button at the bottom right. To the right of the main content area is a sidebar titled 'Deployment' with tabs for 'Schema' and 'Details'. The 'Schema' tab contains a detailed description of the Deployment API object, listing fields like 'apiVersion', 'kind', 'metadata', and 'spec'. The 'Details' tab is partially visible.

# Bonus: Deploy Tools with Ease

The screenshot shows the Red Hat OpenShift web interface. On the left, the navigation sidebar includes sections for Administrator, Home, Operators (selected), OperatorHub (highlighted), Installed Operators, Workloads, Pods, Deployments, DeploymentConfigs, StatefulSets, Secrets, ConfigMaps, CronJobs, Jobs, DaemonSets, ReplicaSets, ReplicationControllers, and HorizontalPodAutoscalers. Below these are Networking and a 'More' section.

The main content area displays the OperatorHub. A modal window for the "Grafana Operator" is open. The modal header says "Grafana Operator 3.10.3 provided by Red Hat". It features an "Install" button. The "Latest version" is listed as 3.10.3. The "Capability level" is set to "Basic Install". The "Provider type" is "Community" and the "Provider" is "Red Hat". The "Repository" URL is <https://github.com/integr8ly/grafana-operator>. The "Container image" is `quay.io/grafana-operator/grafana-operator:v3.10.3`. The "Created at" date is Jul 31, 2020, 12:00 AM. The "Support" section indicates "Red Hat".

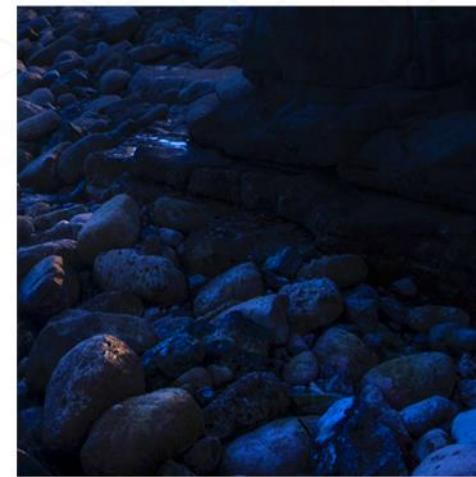
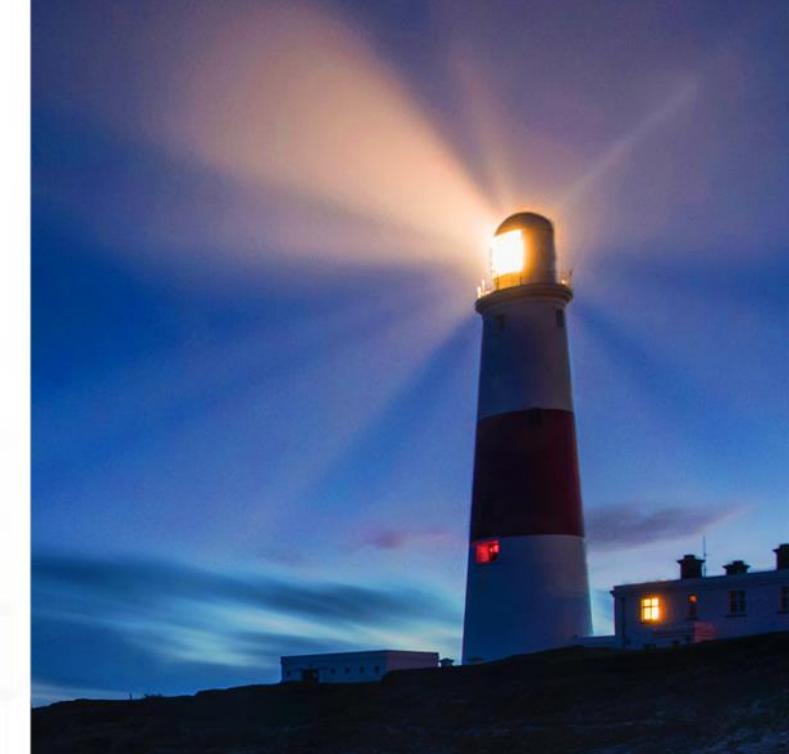
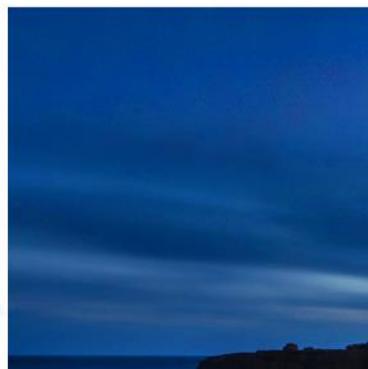
The "Community Operator" section notes that this is a community provided Operator, with Red Hat providing no support. It links to "Learn more about Red Hat's third party software support policy".

The background shows a list of other operators available in the Marketplace, such as Dynatrace OneAgent, File Integrity Operator, and Instana Agent Operator.



Demo

# Do it yourself



# Companion Website

## Cloud-Native Workshop: Know your options for Kubernetes on Azure

by BoxBoat, an IBM Company

Slides

GitHub

<https://boxboat.github.io/k8s-on-azure-wkshp/>

### 0. Pre-Requisites

Let's get you set-up

READ MORE →

### 1. Lab - Intro to Azure Kubernetes Service (AKS)

Let's get started with AKS!

READ MORE →

### 2. Lab - Intro to Azure RedHat OpenShift (ARO)

Let's get started with ARO!

READ MORE →

# Wrapping Up



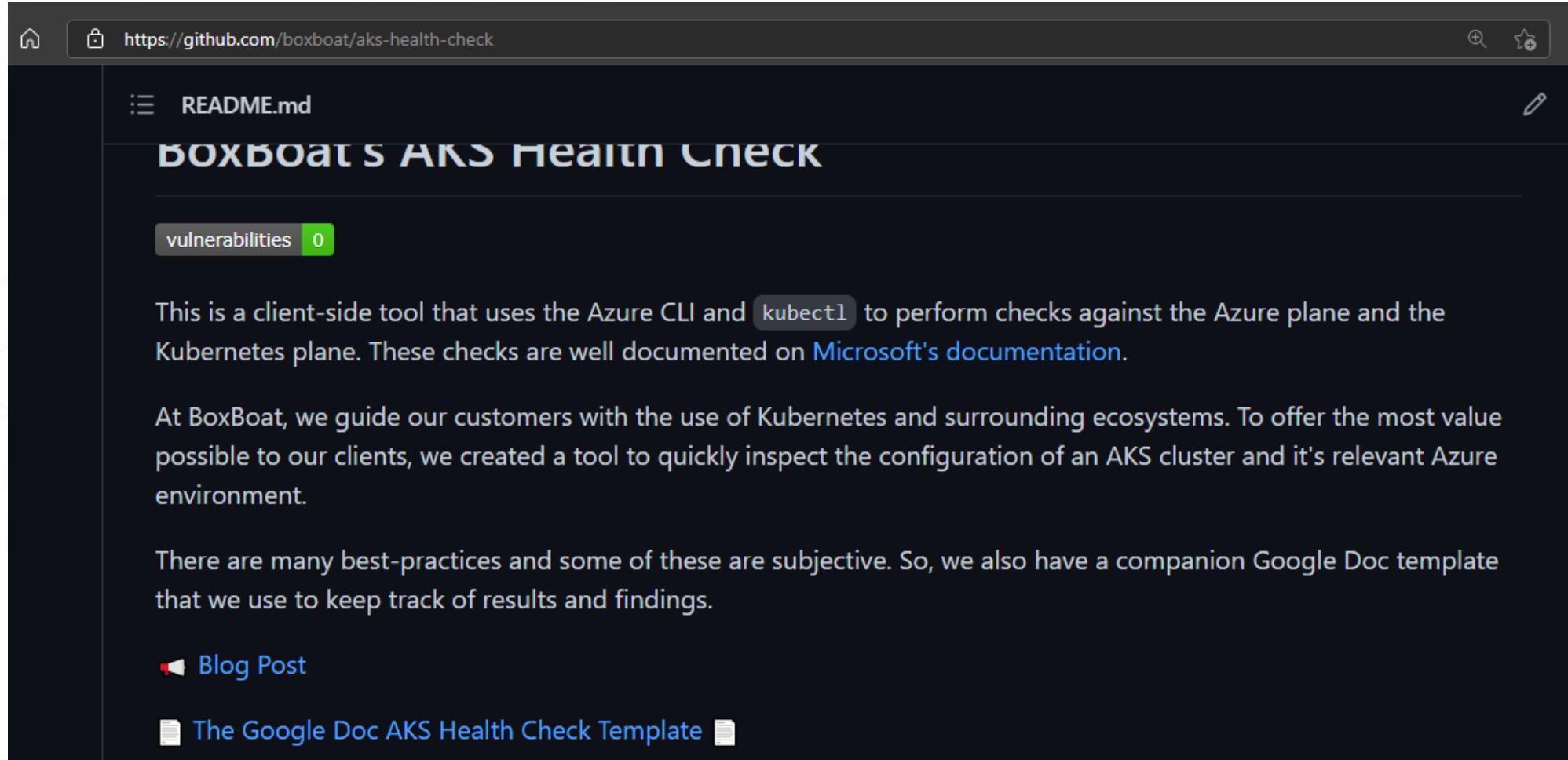
# Summary

- Kubernetes is here to **stay**
- A lot of **control over your infrastructure** and a lot of **agility**
- You might not need Kubernetes; you might be able to use Platform as a Service
- **Azure Kubernetes Service** is a managed Kubernetes offering
  - You still must:
    - Learn containerization & Kubernetes
    - Make choices on more tooling (Azure vs Open-Source vs Third Party)
    - Figure out how to support it
    - Figure out how to support issues on Kubernetes

# Summary

- **Azure RedHat OpenShift** is an opinionated and managed Kubernetes offering jointly supported with RedHat.
  - **Less pressure** to:
    - Learn containerization & Kubernetes
    - Make choices on more tooling
    - Figure out how to support it
  - You can leverage RedHat support for issues with Kubernetes

# AKS Health Check ❤



The screenshot shows a GitHub repository page for 'boxboat/aks-health-check'. The page title is 'README.md' and the main heading is 'BOXBOAT'S AKS Health Check'. A 'vulnerabilities' button shows '0'. The content describes the tool as a client-side tool using Azure CLI and kubectl to check the Azure and Kubernetes planes, with documentation linked to Microsoft's site. It also mentions BoxBoat's role in guiding customers and creating a companion Google Doc template. Below the text are links to a 'Blog Post' and the 'The Google Doc AKS Health Check Template'.

This is a client-side tool that uses the Azure CLI and `kubectl` to perform checks against the Azure plane and the Kubernetes plane. These checks are well documented on [Microsoft's documentation](#).

At BoxBoat, we guide our customers with the use of Kubernetes and surrounding ecosystems. To offer the most value possible to our clients, we created a tool to quickly inspect the configuration of an AKS cluster and it's relevant Azure environment.

There are many best-practices and some of these are subjective. So, we also have a companion Google Doc template that we use to keep track of results and findings.

 [Blog Post](#)

 [The Google Doc AKS Health Check Template](#) 

# AKS Health Check ❤

- If you're tried AKS...
- Value-packed assessment where we assess your environment and ensure its following Microsoft's best practices
  - **Time Commitment:** Up to 2 hrs.
  - **We don't need access**

# Schedule an intro call

31

- A. Reach out of your Microsoft account rep and ask for BoxBoat
- B. Reach out to me at **facundo@boxboat.com**



**Questions?**