Microsoft

TLV WORKSHOPS

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Hilton Tel Aviv

Microservices – Development to Production with Azure

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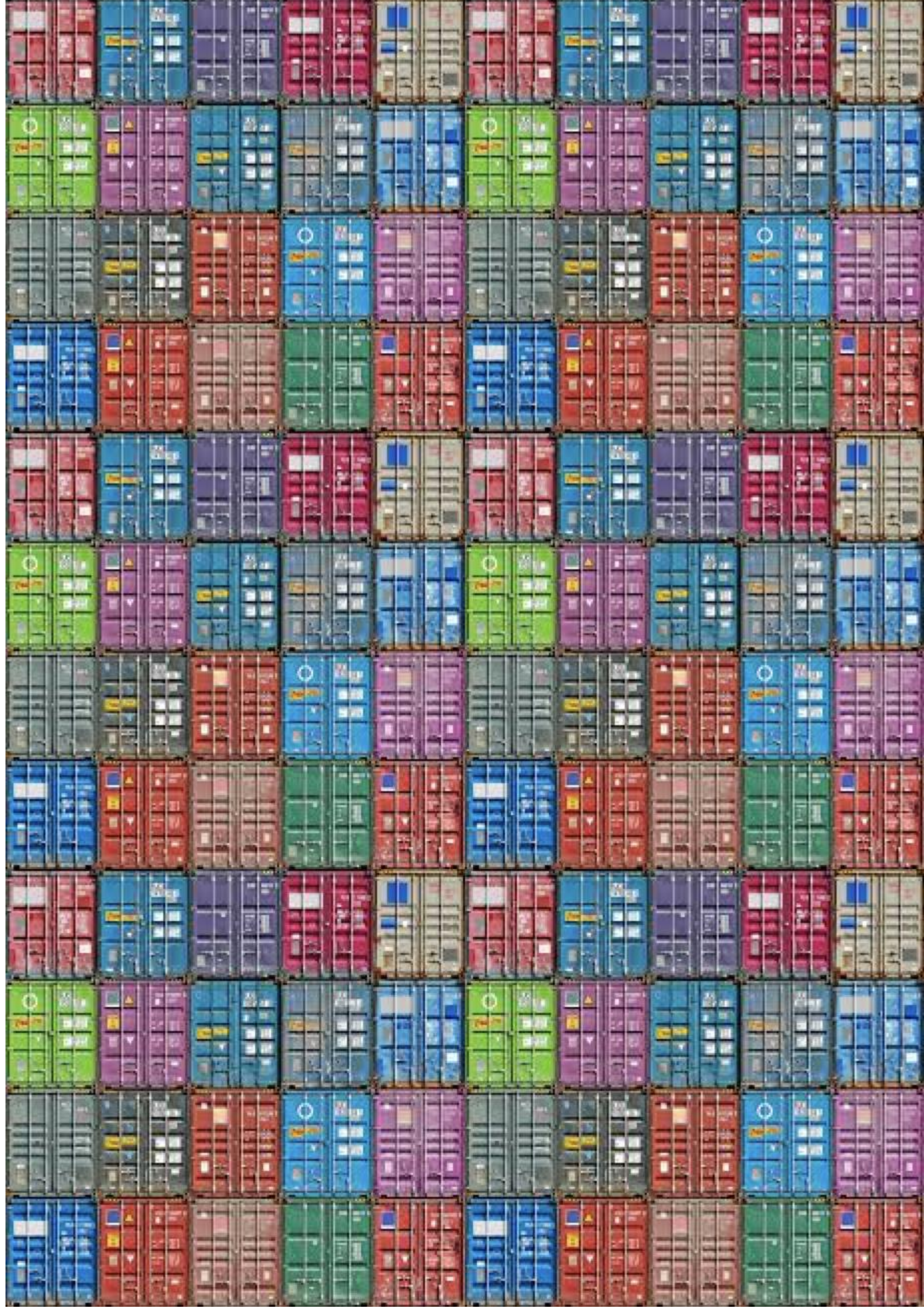
Agenda

- Introduction to microservices
- Traditional application vs microservices
- Container and Microservice Orchestration
- **DEMO**: Developing Microservices
- **DEMO**: DevOps-ing Microservices
- **DEMO**: Production and Scale of Microservices

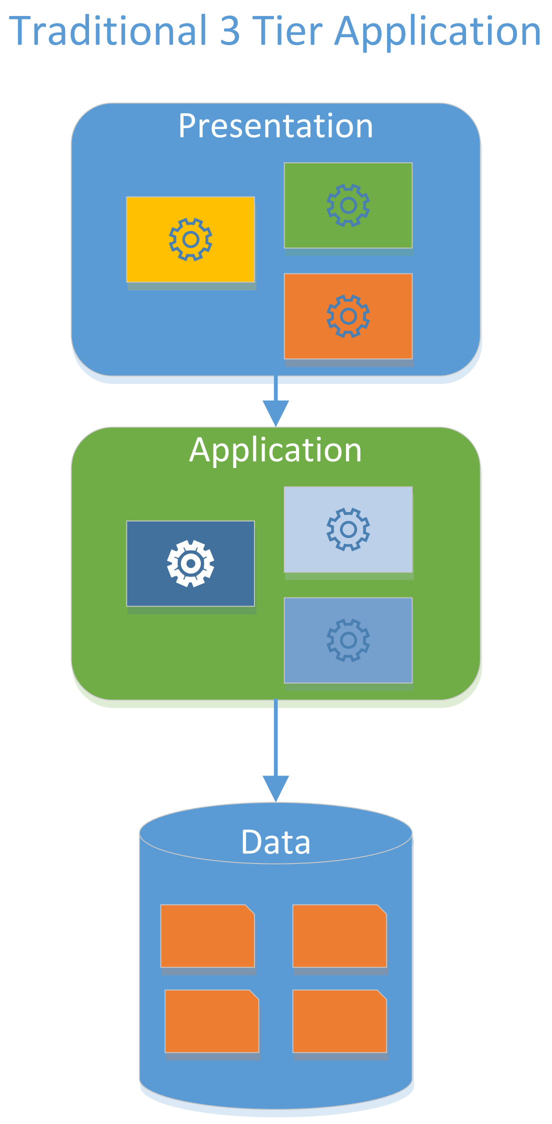


Where did it come from?

The cloud had changed expectations

- Agility
- Availability
- Hyper-scale
- Elasticity
- Density
- Immutability
- Portability

Most common problems in Apps today



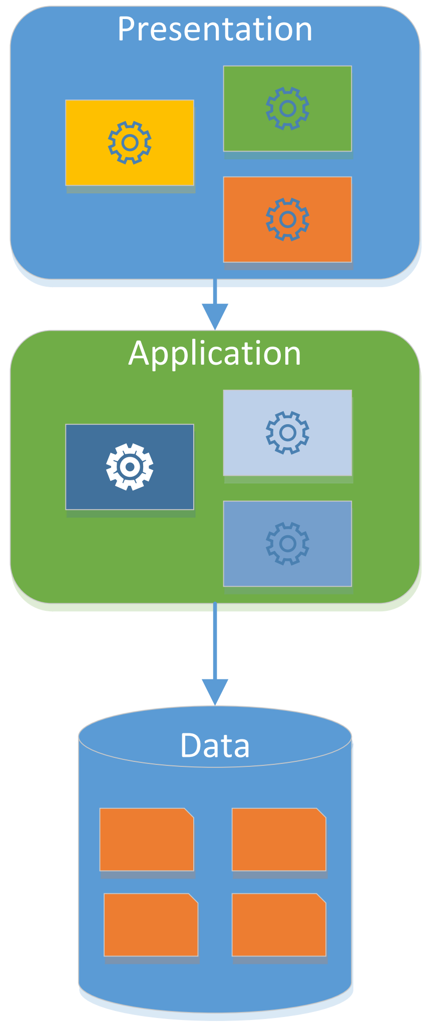
Most common problems in Apps today

- Code Complexity
- Hard to maintain/upgrade
- Reliability
- Hard to scale
- Difficult to use new/multiple development frameworks

Most common requirements today

- Continually evolving applications
- Faster delivery of features and capabilities
- Scalability
- Availability

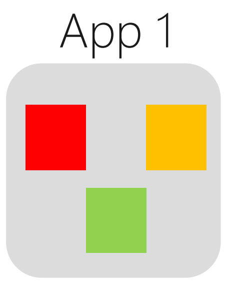
Traditional 3 Tier Application

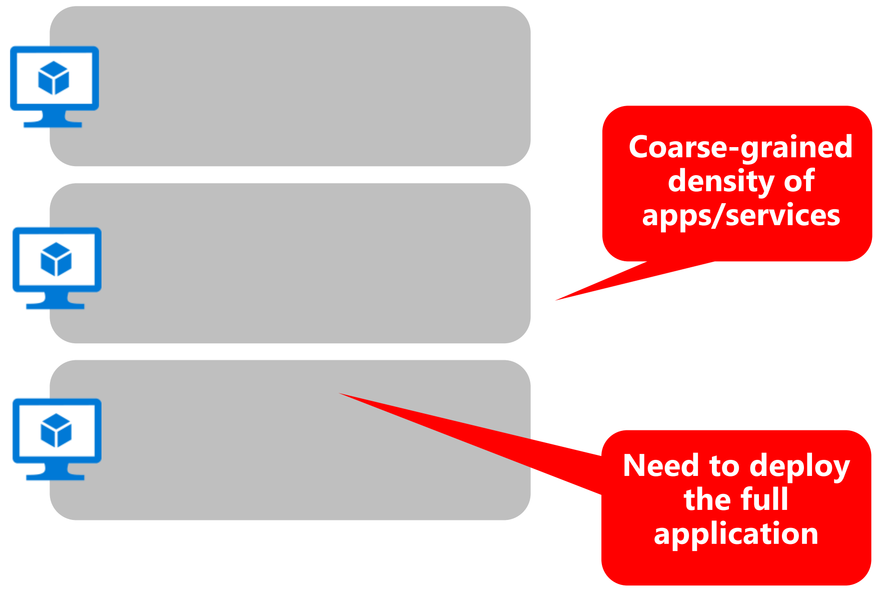


What are Microservices?

Traditional application approach

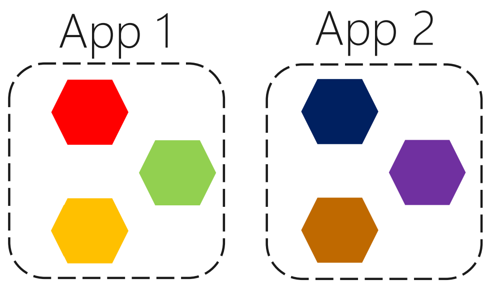
- Componentized with layers
- Scales by cloning servers/VMs
- Updated together

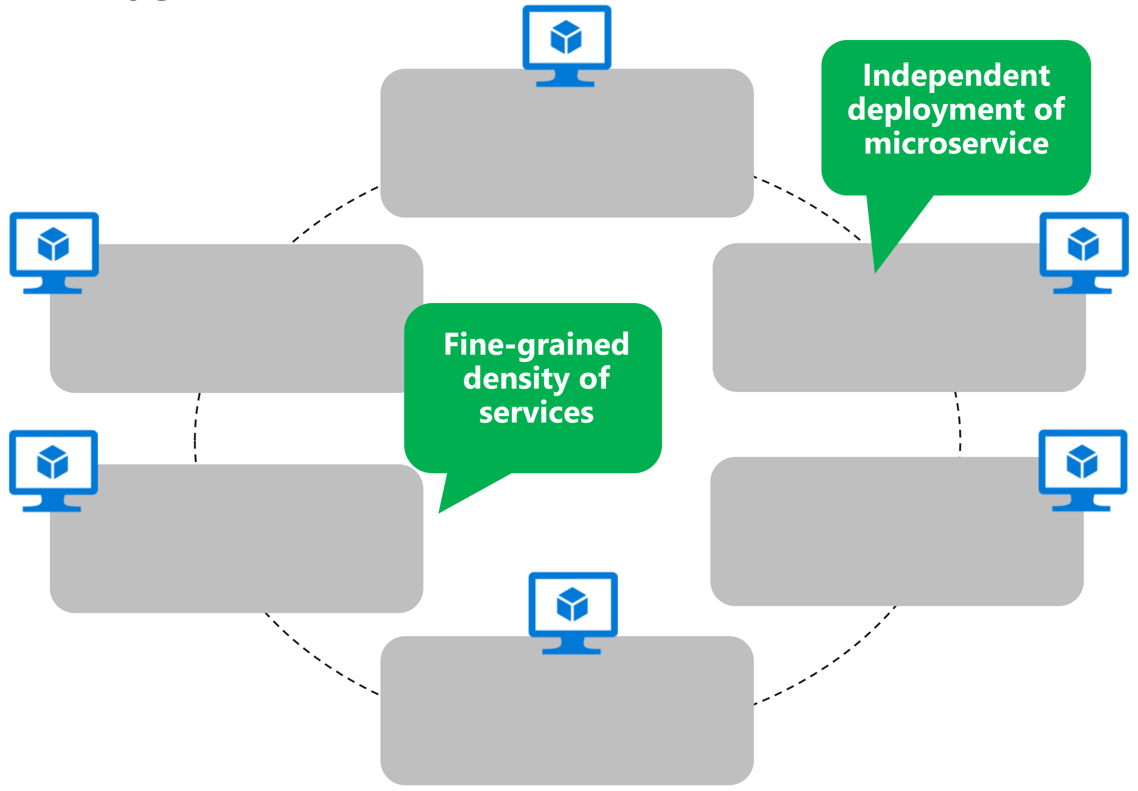



Coarse-grained density of apps/services
Need to deploy the full application

Microservices application approach

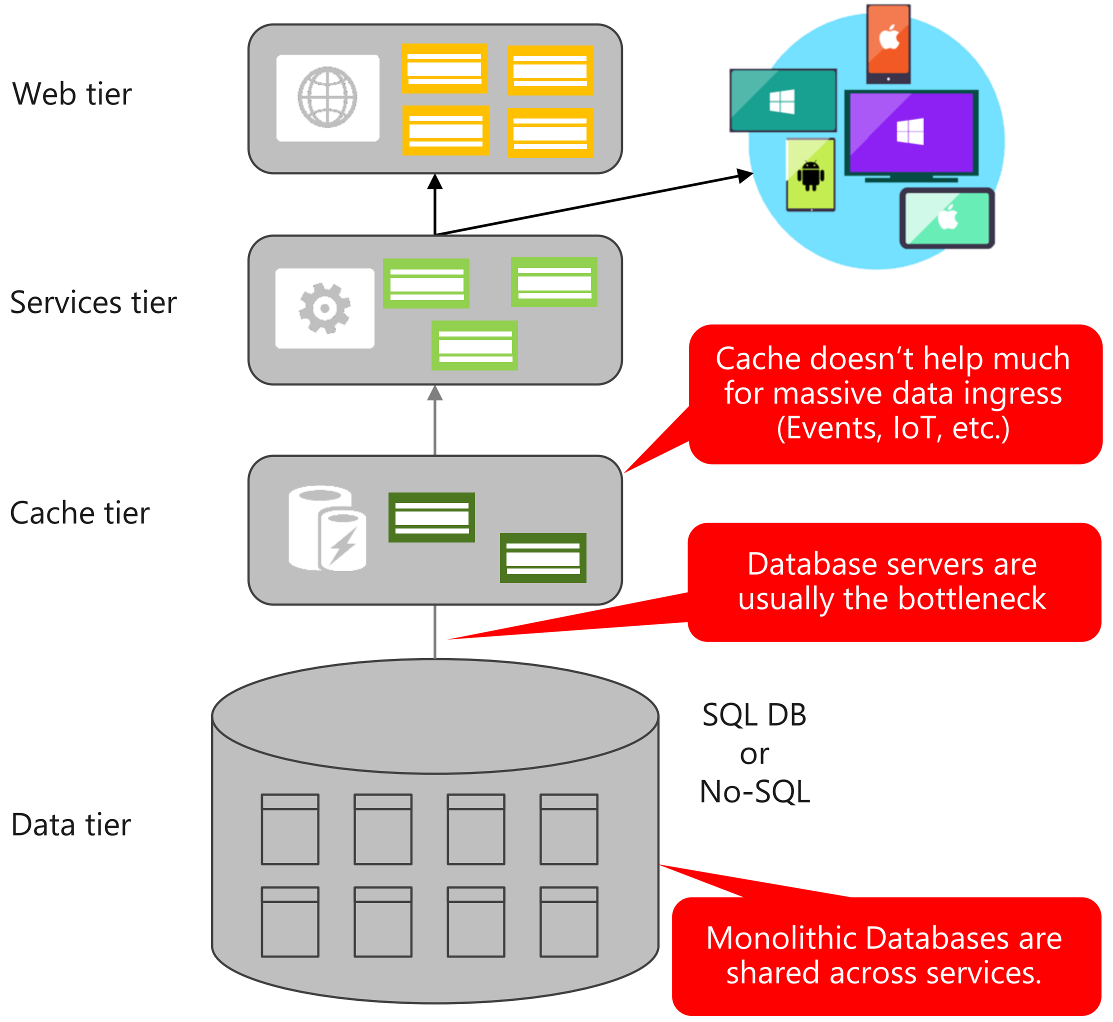
- Smaller services of functionality
- **Developed, deployed and updated independently**
- Scales out by **deploying each service independently**
- **Polyglot**




Independent deployment of microservice
Fine-grained density of services

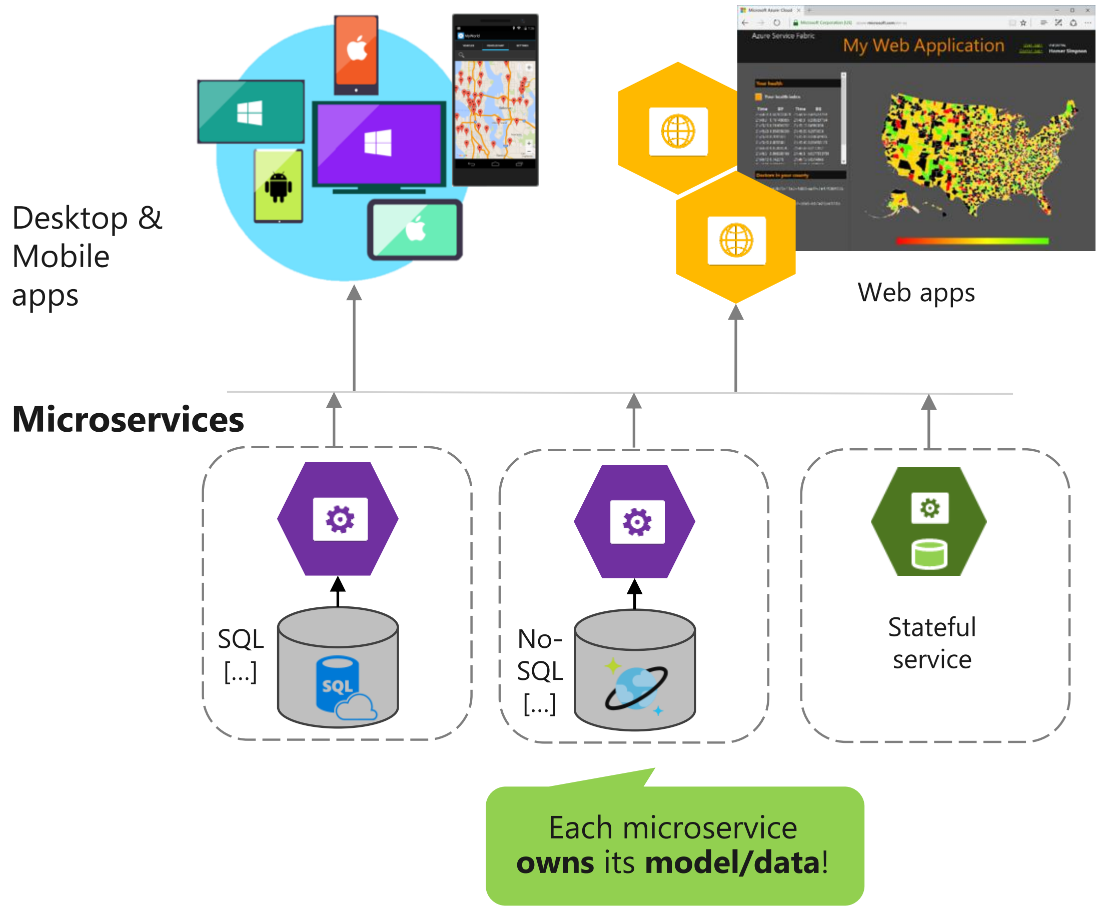
Traditional application approach

- Single monolithic database
- Tiers of specific technologies


Web tier
Services tier
Cache tier
Data tier
SQL DB or No-SQL
Cache doesn't help much for massive data ingress (Events, IoT, etc.)
Database servers are usually the bottleneck
Monolithic Databases are shared across services.

Data in Microservices approach

- Graph of interconnected microservices
- State/data typically scoped to the microservice
- Remote Storage for cold data



12 Factor App – SOLID principles for cloud native

Codebase - One codebase tracked in revision

Dependencies - Explicitly declare and isolate dependencies

Configuration - Store config in the environment

Backing Service - Treat backing services as attached resource

Build, Release and Run - Strictly separate build and run stages

Process - Execute the app as one or more stateless processes

Port Binding - Export services via port binding

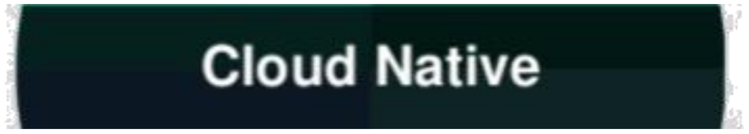
Concurrency - Scale out via the process model

Disposability– Maximize robustness with fast startup and graceful shutdown

Dev/prod Parity - Keep development, staging, and production as similar as possible

Logs - Treat logs as event streams

Admin Process - Run admin/management tasks as one-off processes



https://12factor.net/

By Adam Wiggins (Heroku)

Microservices != Containers

But they are a great fit… ☺

Containers are NOT microservices

Well, you can still put a large monolithic application inside a container….

Microservices are an application design pattern:

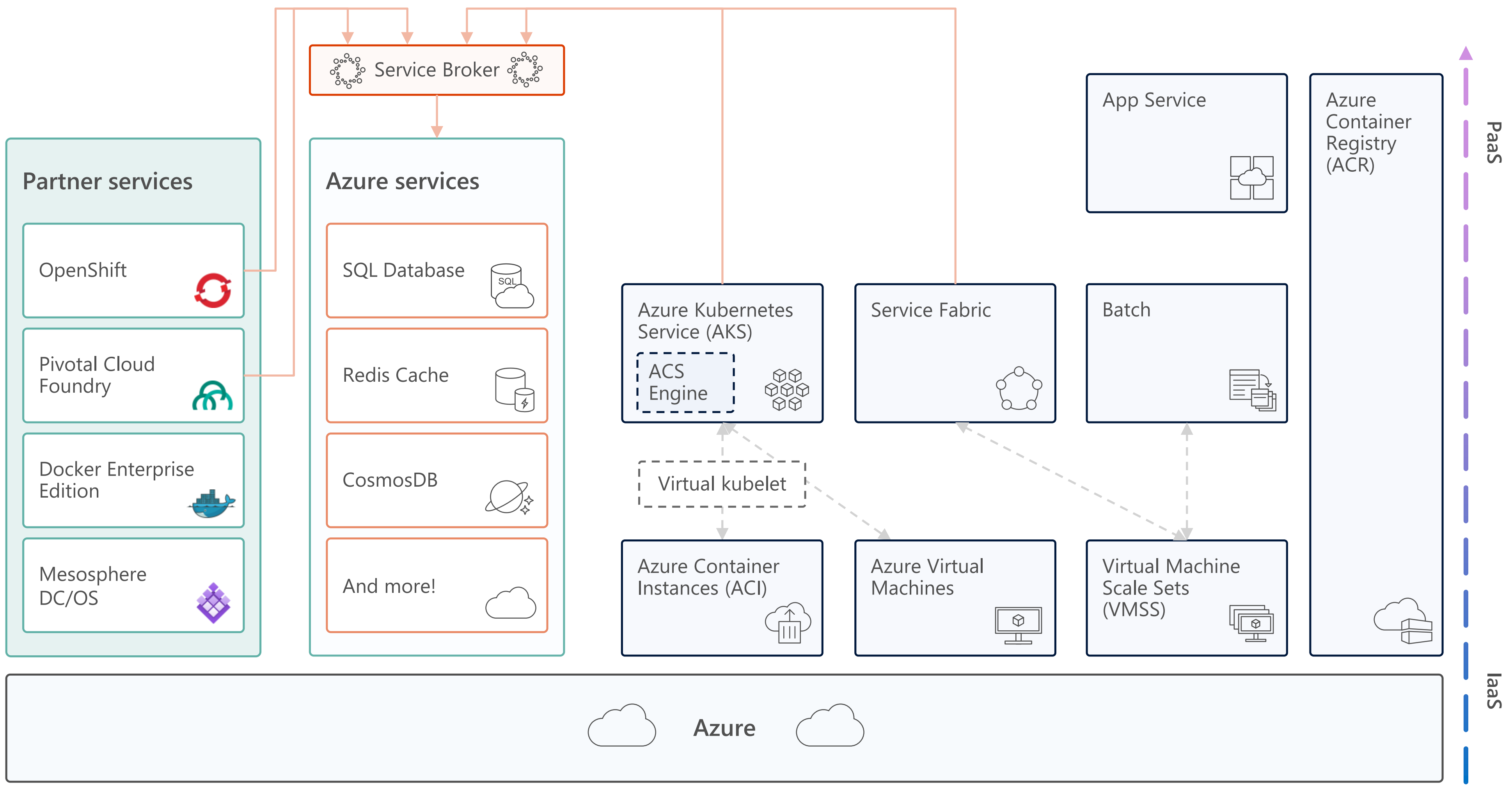
- Small units of responsibility
- Structured interfaces and communication
- Potentially different technology choices
- Generally horizontally scalable

Containers are OS Isolation\Encapsulation

The elements of **orchestration**

- Scheduling
- Affinity/anti-affinity
- Health monitoring
- Failover
- Scaling
- Networking
- Service discovery
- Coordinated app upgrades

Azure container ecosystem



Kubernetes: the industry leading orchestrator

Portable

Public, private, hybrid, multi-cloud

Extensible

Modular, pluggable, hookable, composable

Self-healing

Auto-placement, auto-restart, auto-replication, auto-scaling

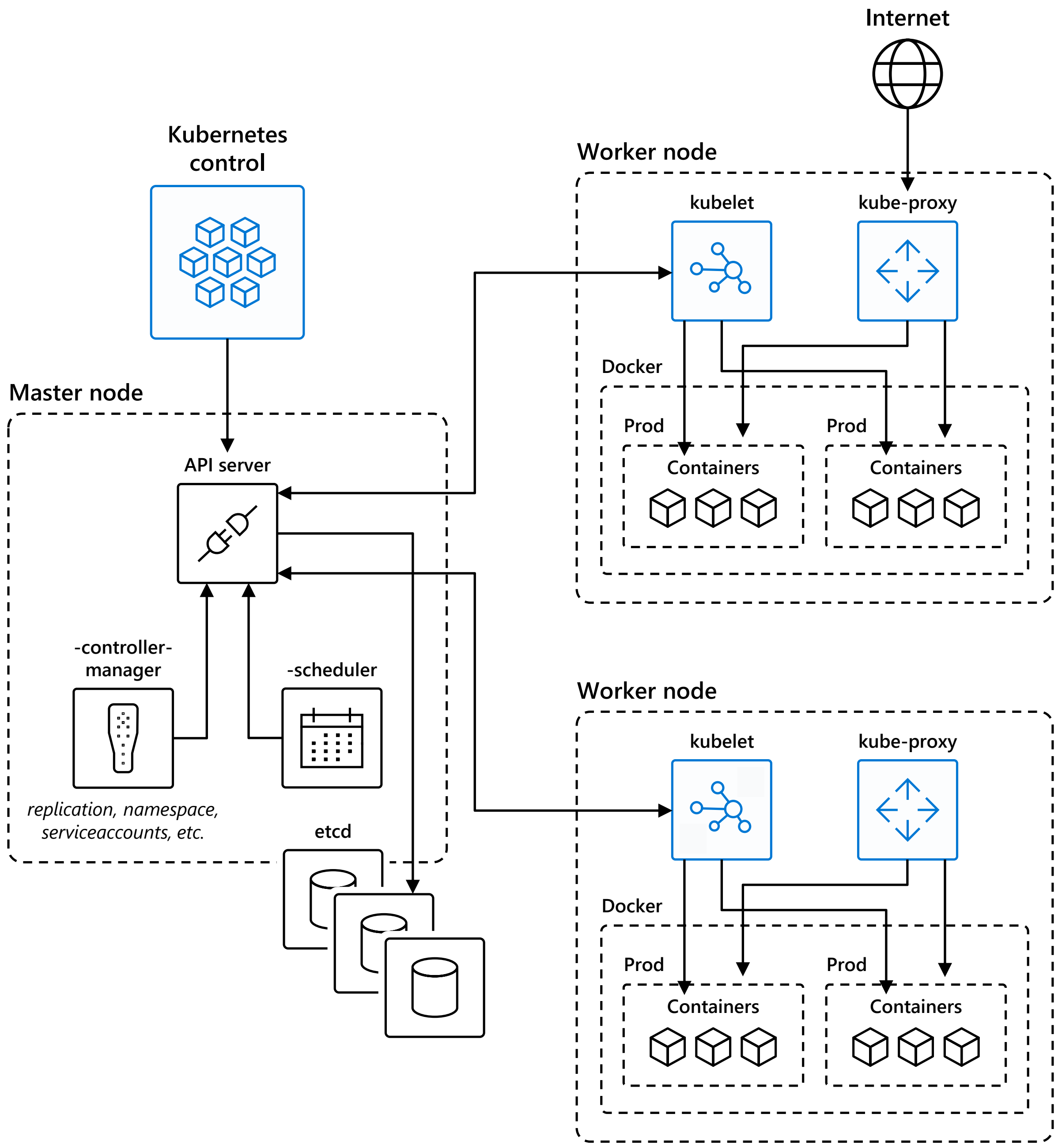
Kubernetes 101

1. Kubernetes users communicate with API server and apply desired state

2. Master nodes actively enforce desired state on worker nodes

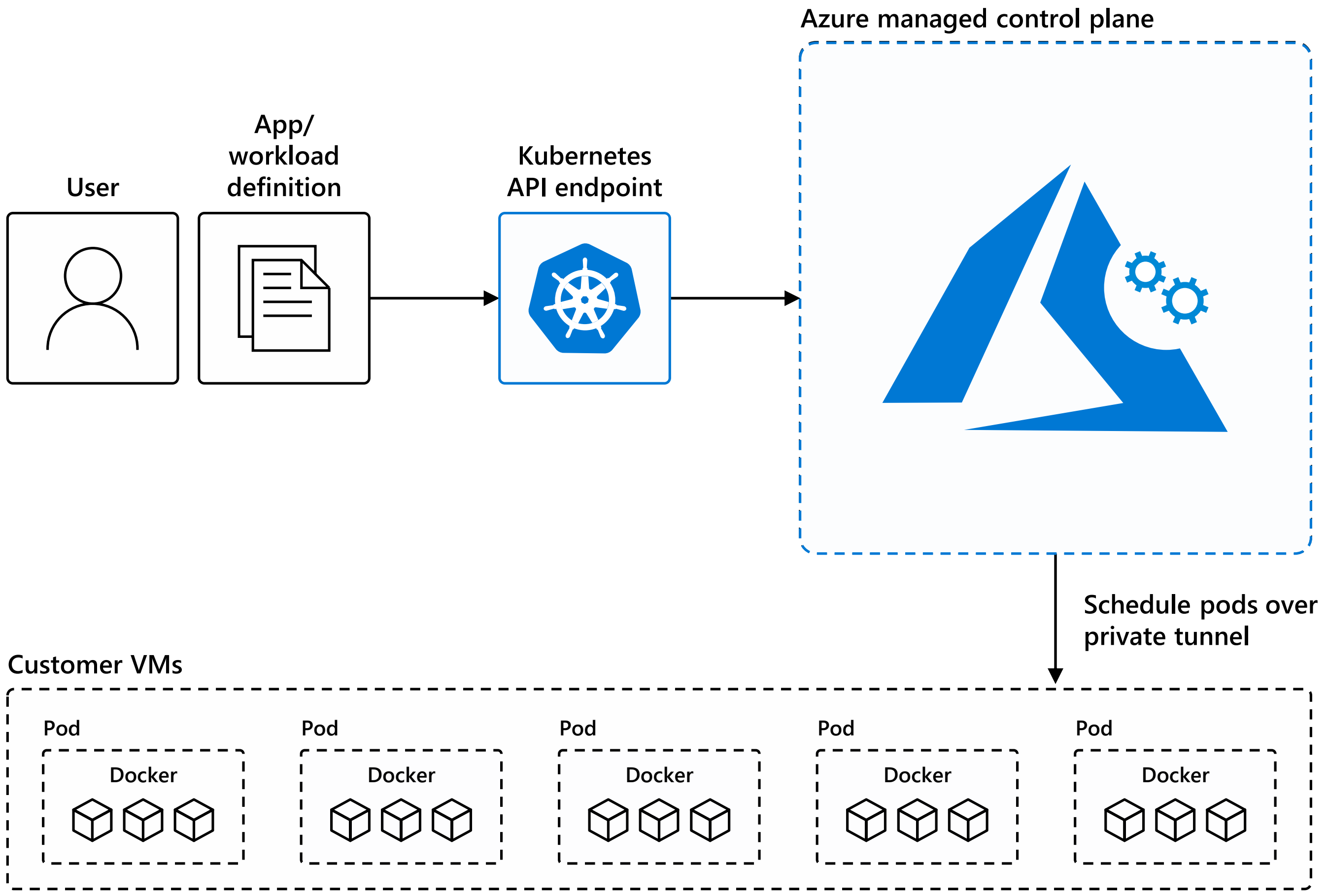
3. Worker nodes support communication between containers

4. Worker nodes support communication from the Internet



How managed Kubernetes on Azure works

- Automated upgrades, patches
- High reliability, availability
- Easy, secure cluster scaling
- Self-healing
- API server monitoring
- At no charge



Azure makes Kubernetes easy

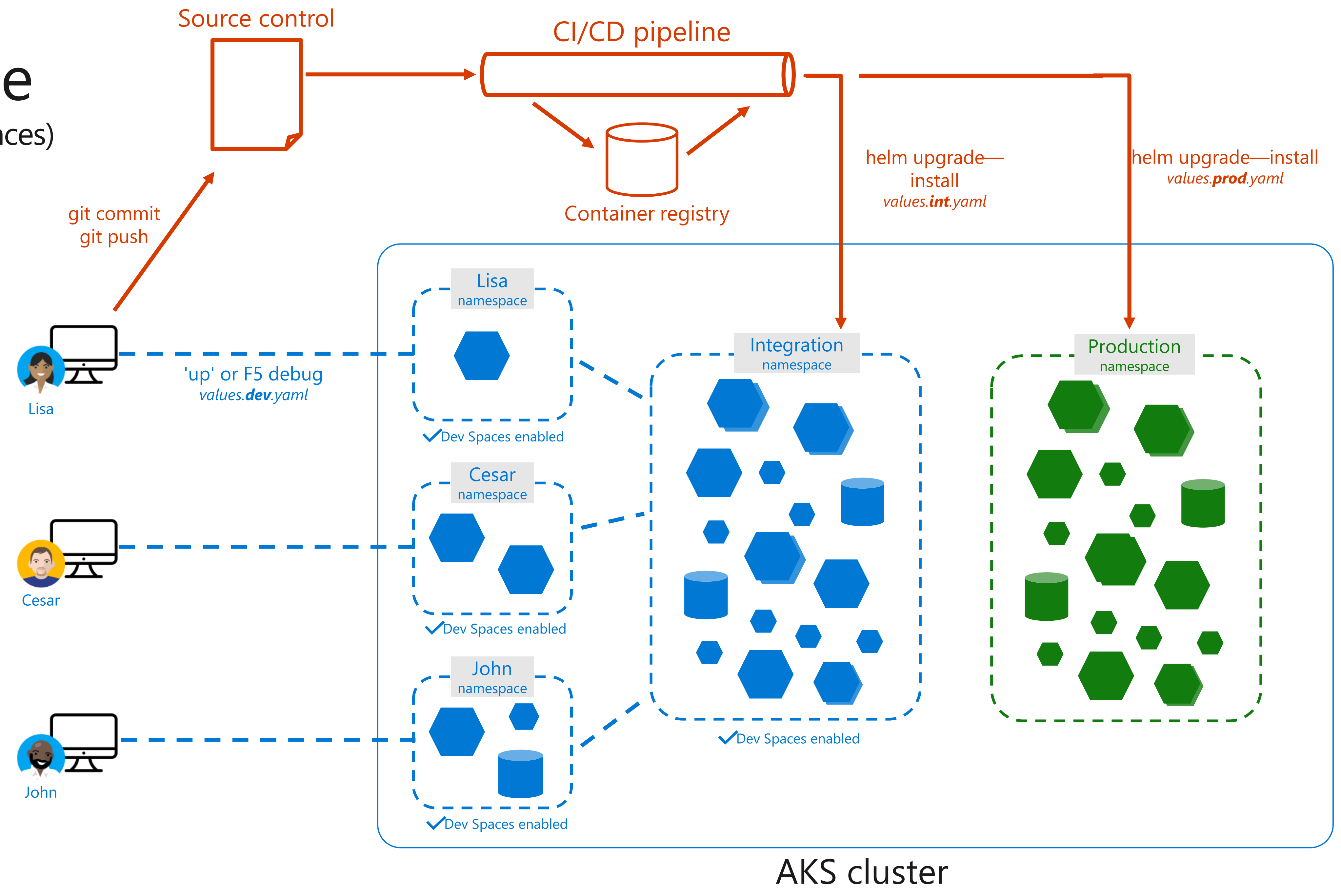
Deploy and manage Kubernetes with ease

Task	The old way	With Azure
Create a cluster	Provision network and VMs Install dozens of system components including etcd Create and install certificates Register agent nodes with control plane	az aks create
Upgrade a cluster	Upgrade your master nodes Cordon/drain and upgrade worker nodes individually	az aks upgrade
Scale a cluster	Provision new VMs Install system components Register nodes with API server	az aks scale

Demo 1

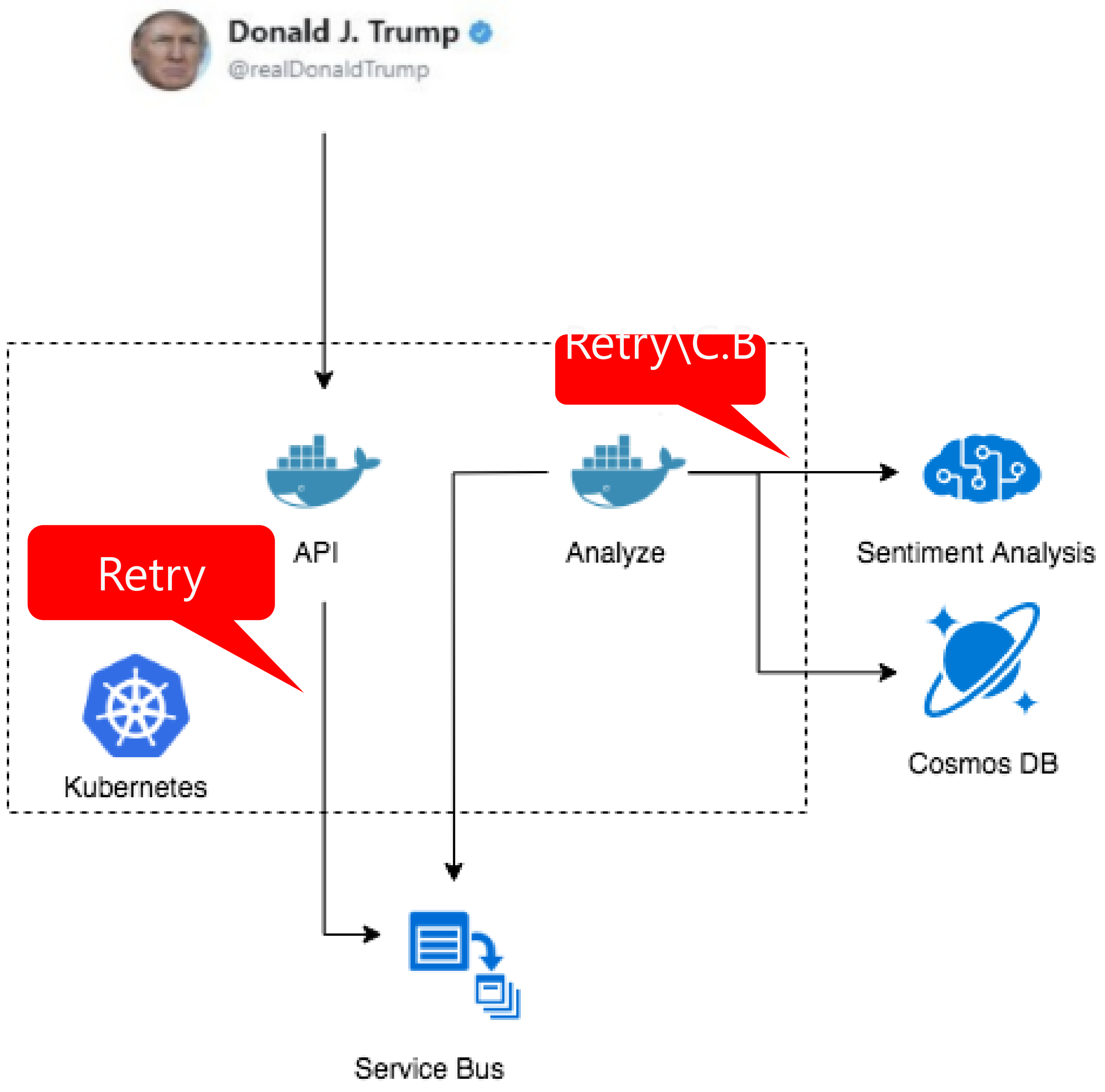
Collaborative development environments for microservices

Lifecycle
(Azure Dev Spaces)

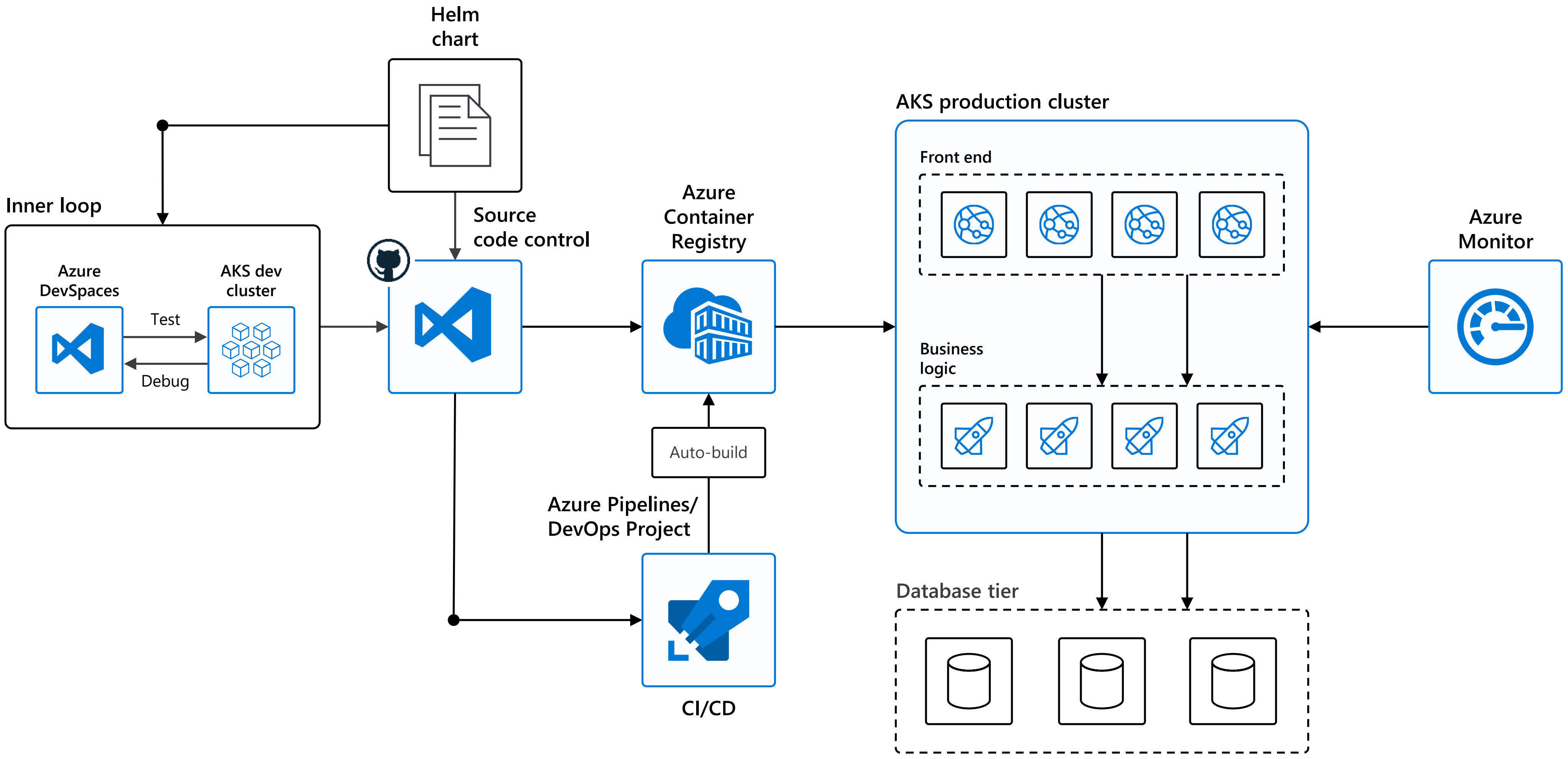


Demo 2

Microservices DevOps


Donald J. Trump
@realDonaldTrump
Retry\C.B
API
Analyze
Sentiment Analysis
Retry
Kubernetes
Cosmos DB
Service Bus

End to end experience



Kubernetes and Helm

Container Images → Deploy with → Orchestrator's cluster

Microsoft Google codefresh bitnami ticketmaster codecentric

Helm is THE package manager for Kubernetes:

...Kubernetes deployments with just Kubectl.exe and .yml files are not standard but custom & complex...

Helm improves:

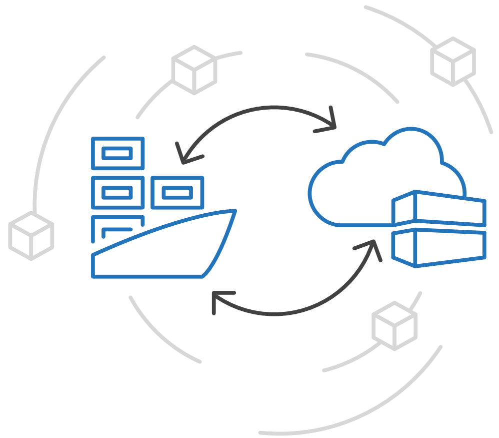
- Makes application deployment easy, standar and reusable
- Easy application *install, update, rollback & removal*. Packages are declaratively defined in *Helm Charts*
- Charts can be *shared* and publicly published (https://github.com/helm/charts/tree/master/stable)
- Designed with *versioning* of packages in mind
- You need Helm if you want to use *Azure DevSpaces*! :)

Demo 2

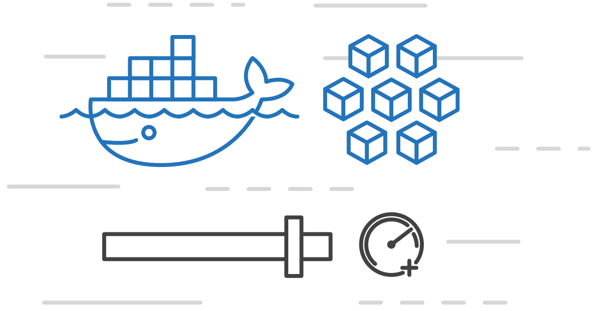
Microservices Scale out and Monitoring

Azure Container Instances (ACI)

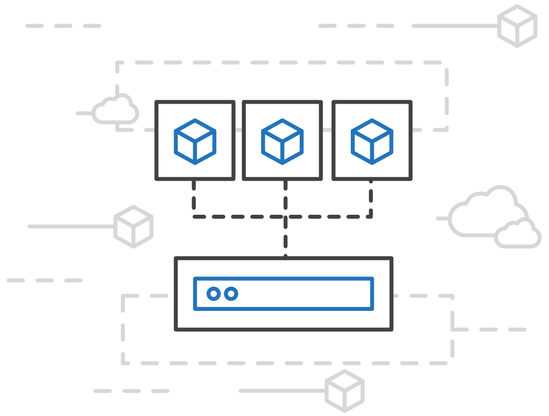
Easily run containers on Azure with a single command



Start using containers right away



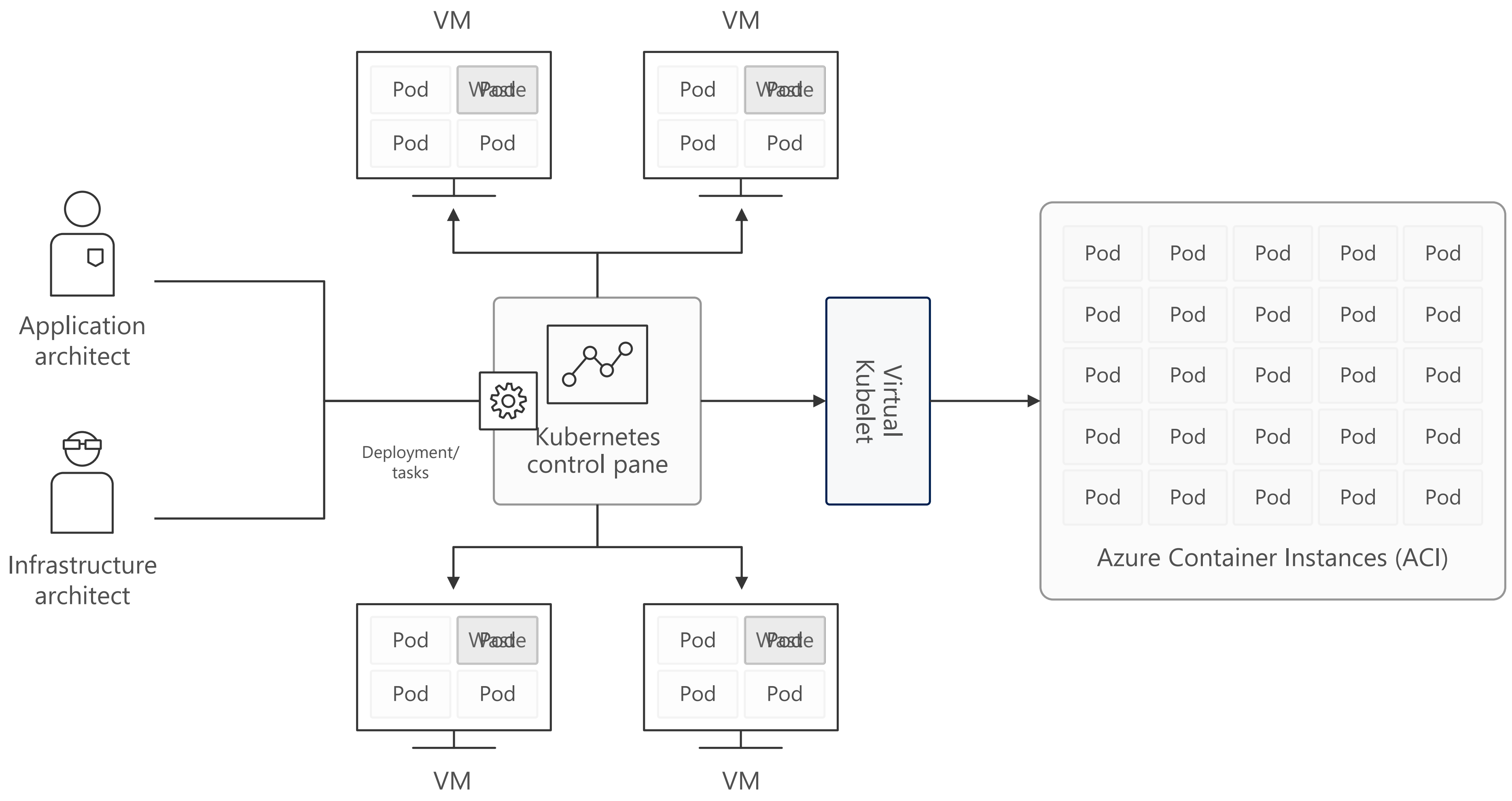
Cloud-scale container capacity



Hyper-visor isolation

Bursting with the Virtual Kubelet

Azure Container Instances (ACI)



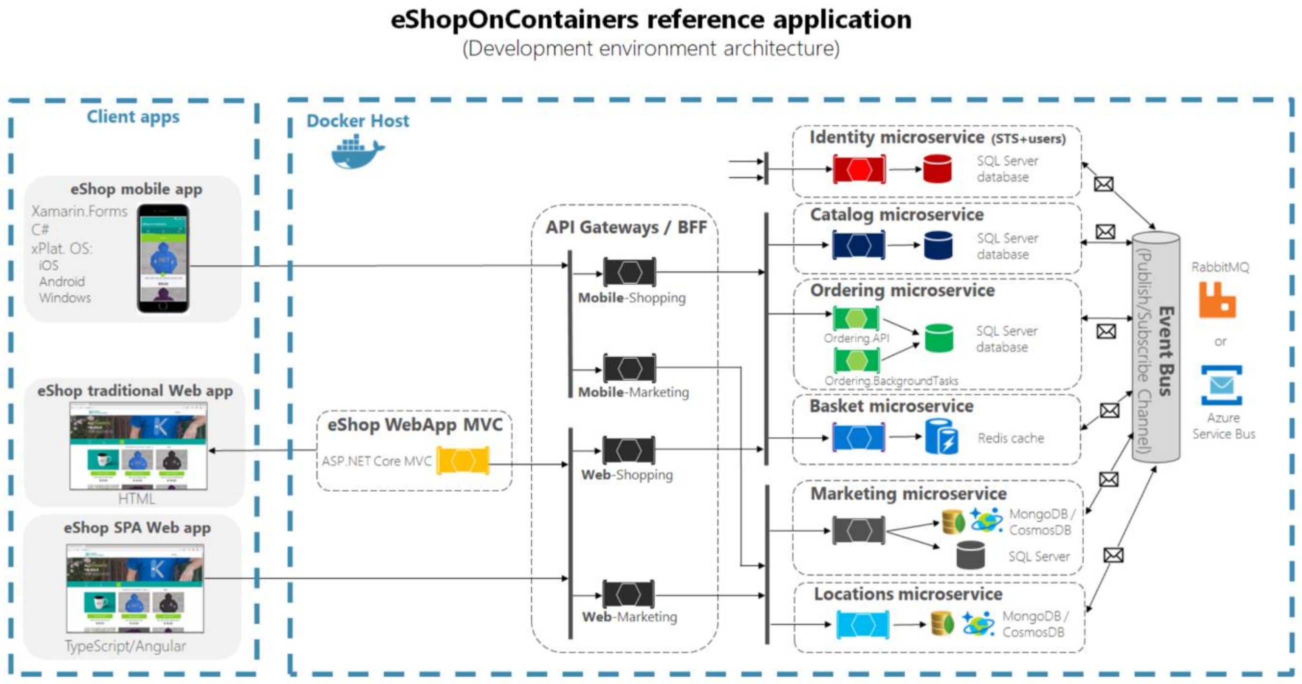
Guide/eBook and sample apps on microservices architecture

eBook/Guide

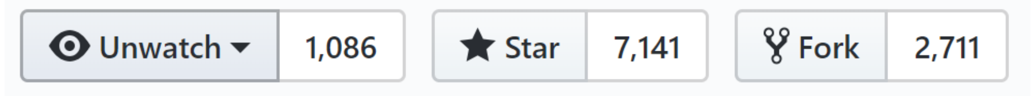
https://aka.ms/microservicesebook

eShopOnContainers: Reference microservices application

- Intended for .NET developers and solution architects
- Prescriptive guidance on Microservices implementation with .NET Core and Docker



https://github.com/dotnet-architecture/eShopOnContainers


Unwatch 1,086 | Star 7,141 | Fork 2,711

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