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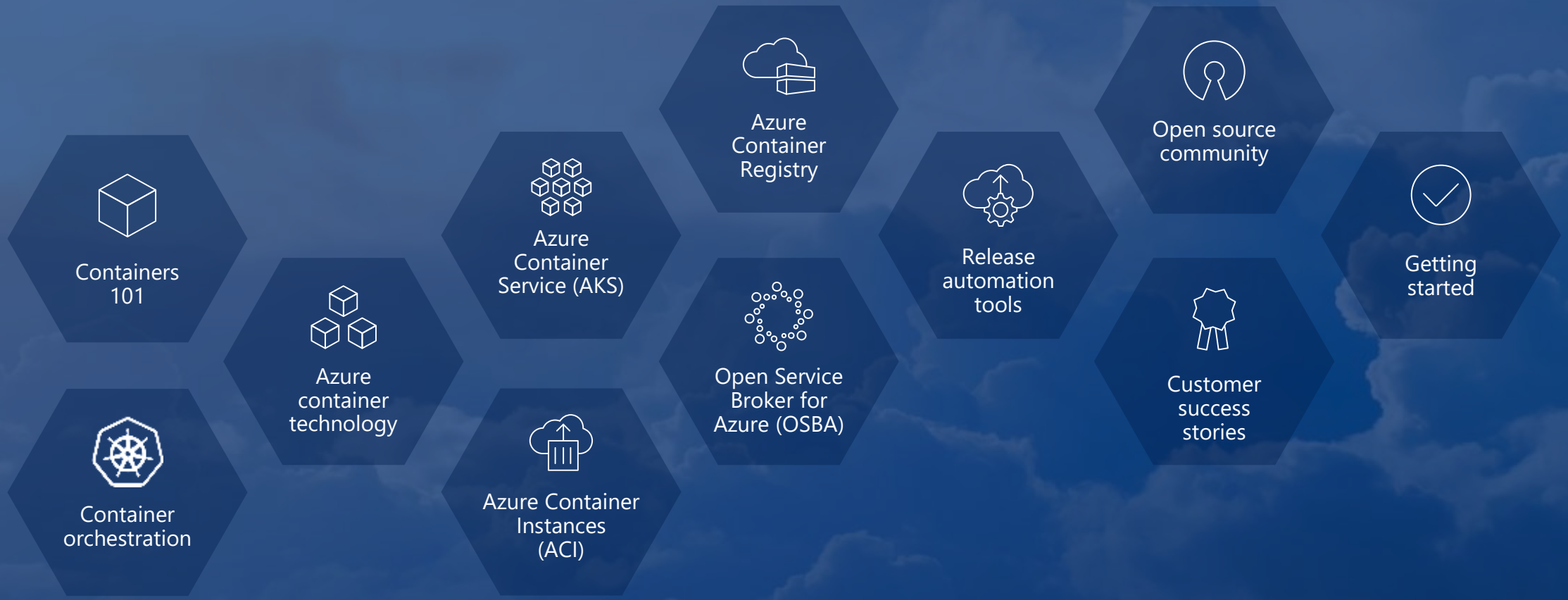
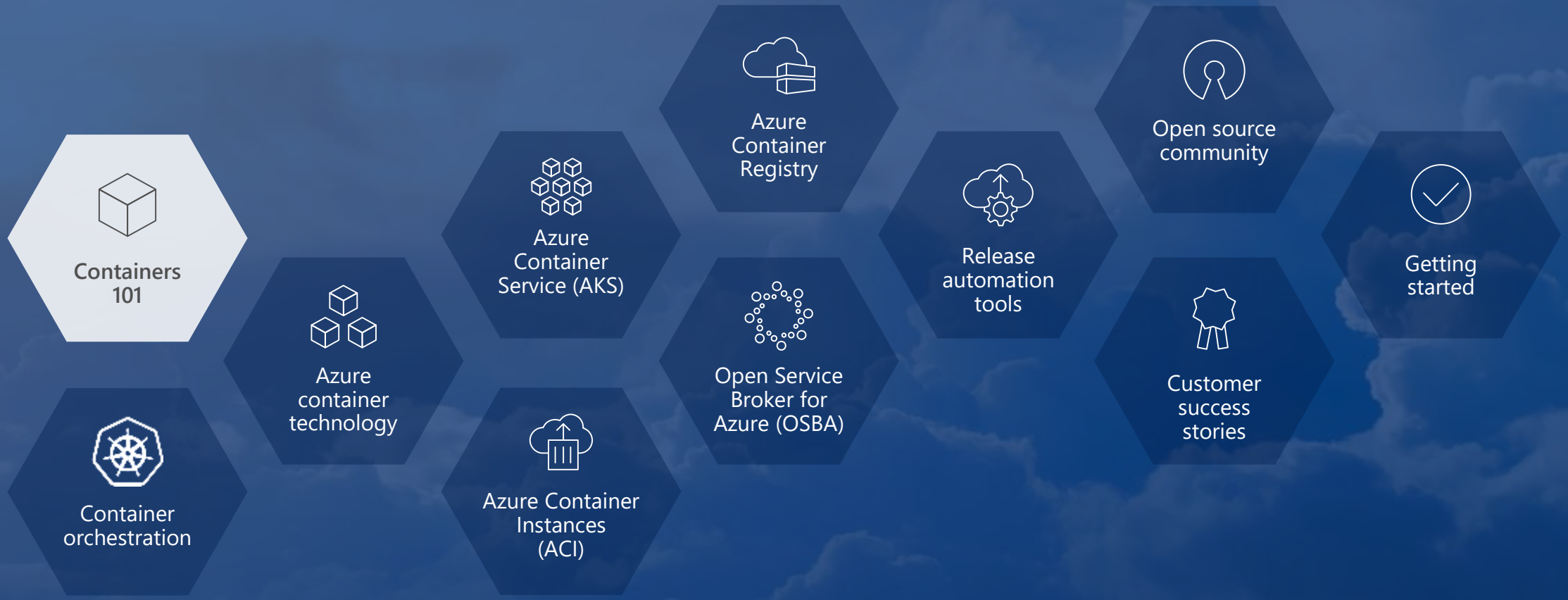
Containers 101

Jessica Deen

Table of contents

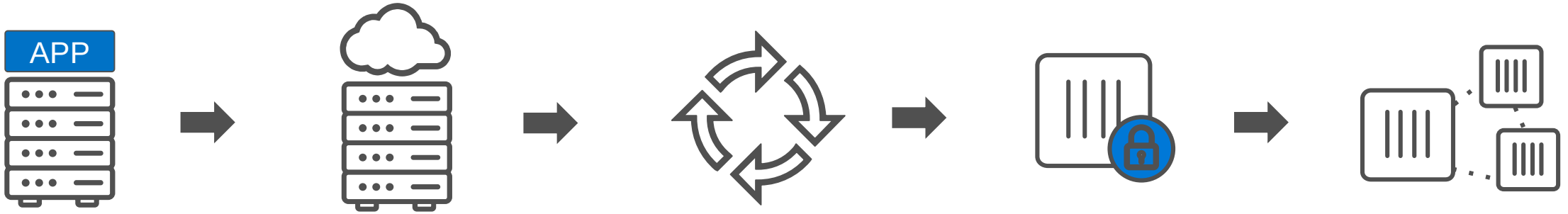


Containers 101



Digital Transformation and your customers

From traditional app to modern app



Existing Application

Modern Infrastructure

Move to the cloud as VMs or Containers or refresh HW.

Modern Methodologies

Implement DevOps practices and automation.

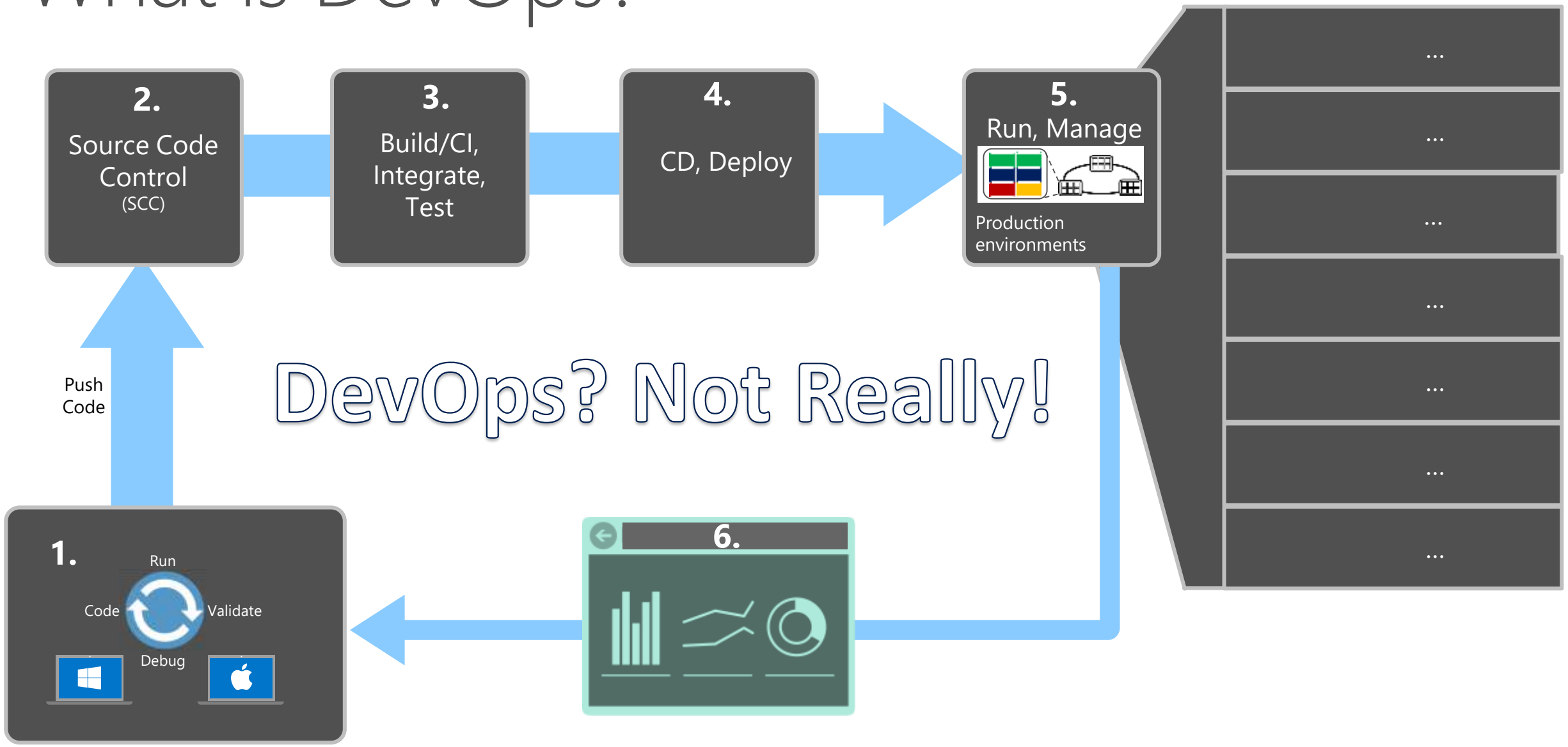
Containerize Applications

Re-architect apps for scale with containers.

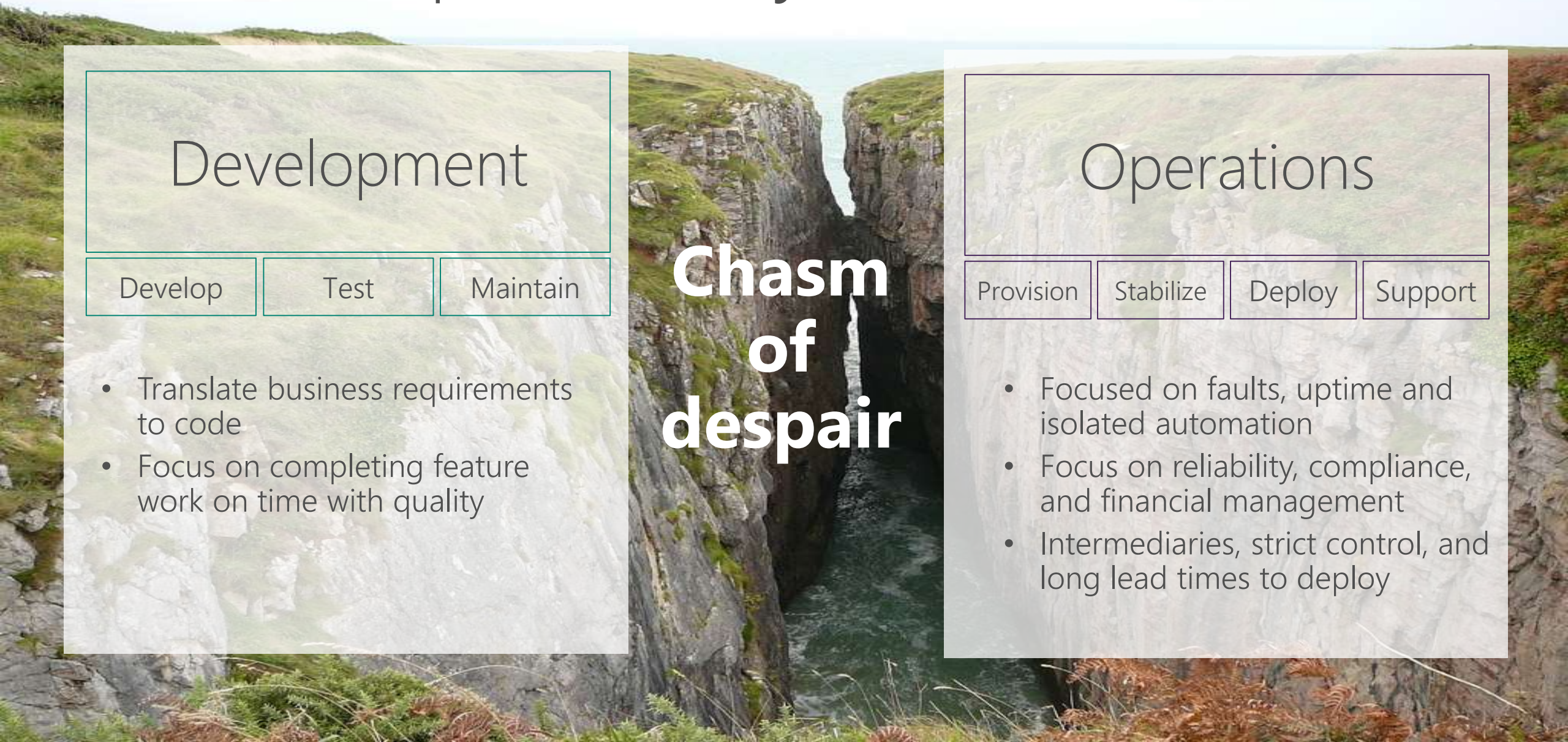
Modern Microservices

Add new services or start peeling off services from monolithic code.

What is DevOps?



Most enterprise today…



Development

Develop | Test | Maintain

- Translate business requirements to code
- Focus on completing feature work on time with quality

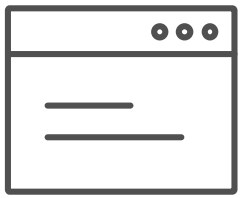
Chasm of despair

Operations

Provision | Stabilize | Deploy | Support

- Focused on faults, uptime and isolated automation
- Focus on reliability, compliance, and financial management
- Intermediaries, strict control, and long lead times to deploy

What we hear from **developers**



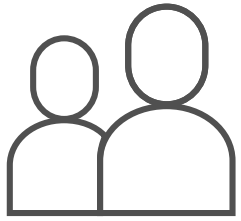
I need to create applications at a competitive rate without worrying about IT

New applications run smoothly on my machine but malfunction on traditional IT servers

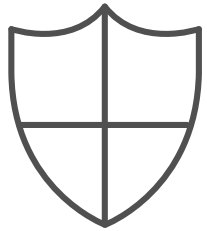
My productivity and application innovation become suspended when I have to wait on IT

What we hear from **IT**

I need to manage servers and maintain compliance with little disruption



I'm unsure of how to integrate unfamiliar applications, and I require help from developers

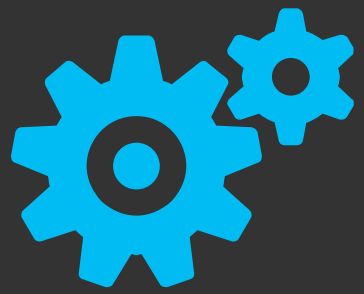


I'm unable to focus on both server protection and application compliance

IT stress points

Security threats

Datacenter efficiency



Supporting innovation

Cloud is a new way to think about a datacenter

Traditional model

Dedicated infrastructure for each application

Purpose-built hardware

Distinct infrastructure and operations teams

Customized processes and configurations

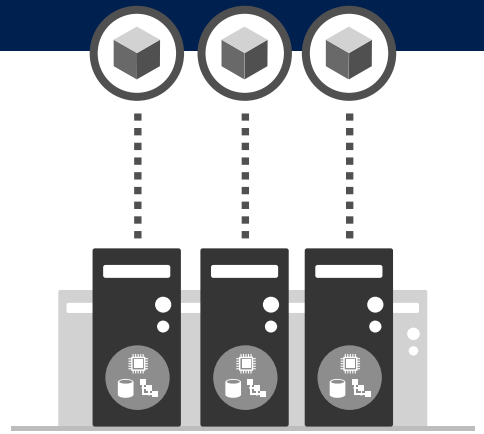
Cloud model

Loosely coupled apps and micro-services

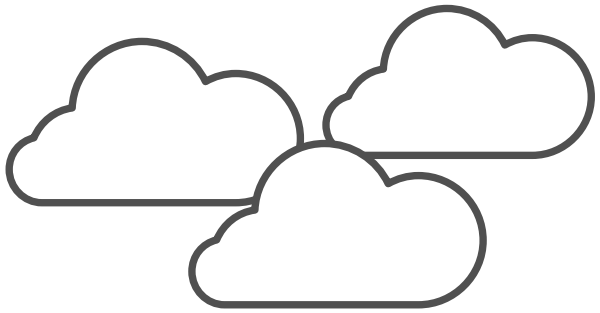
Industry-standard hardware

Service-focused DevOps teams

Standardized processes and configurations



Servers

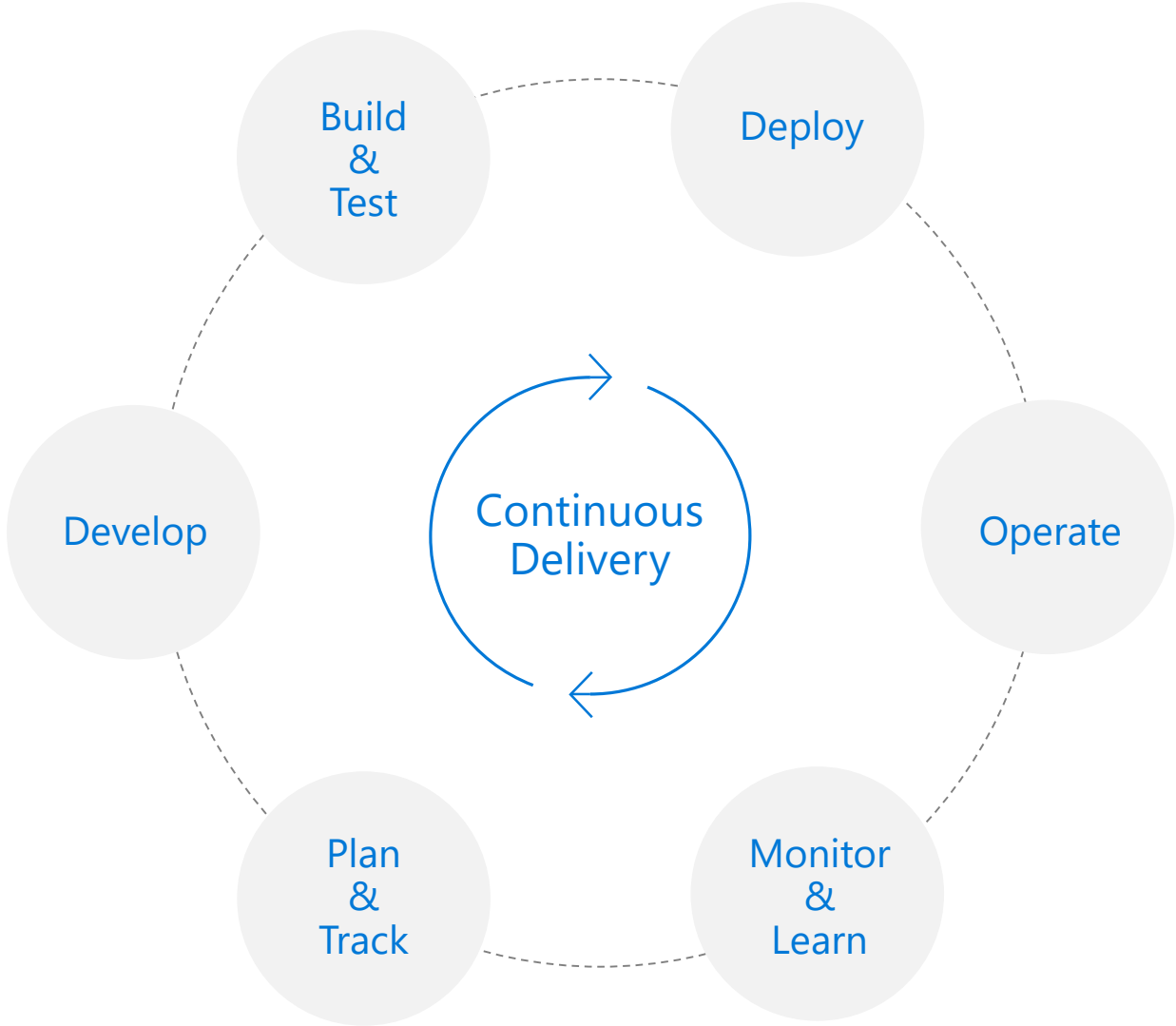


Services

Microsoft

What is DevOps?

“DevOps is the union of **people**, **process**, and **products** to enable continuous delivery of value to your end users.”



People. Process. Products.

Key DevOps Practices

Infrastructure as Code	**Continuous Integration**	**Continuous Deployment**
Automated Testing	**Release Management**	**Performance Monitoring**
Availability Monitoring	**Load Testing & Auto Scale**	**Automated Recovery (Rollback & Roll Forward)**

Why Containers?

Developers

- Enable ‘write-once, run-anywhere’ apps
- Enables microservice architectures
- Great for dev/test of apps and services
- Production realism
- Growing Developer Community

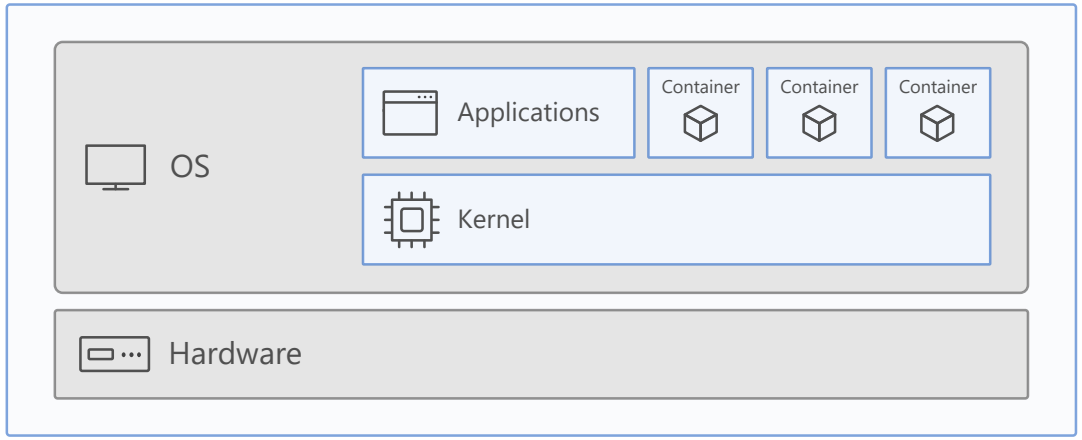
Operations

- Portability, Portability, Portability
- Standardized development, QA, and prod environments
- Abstract differences in OS distributions and underlying infrastructure
- Higher compute density
- Easily scale-up and scale-down in response to changing business needs

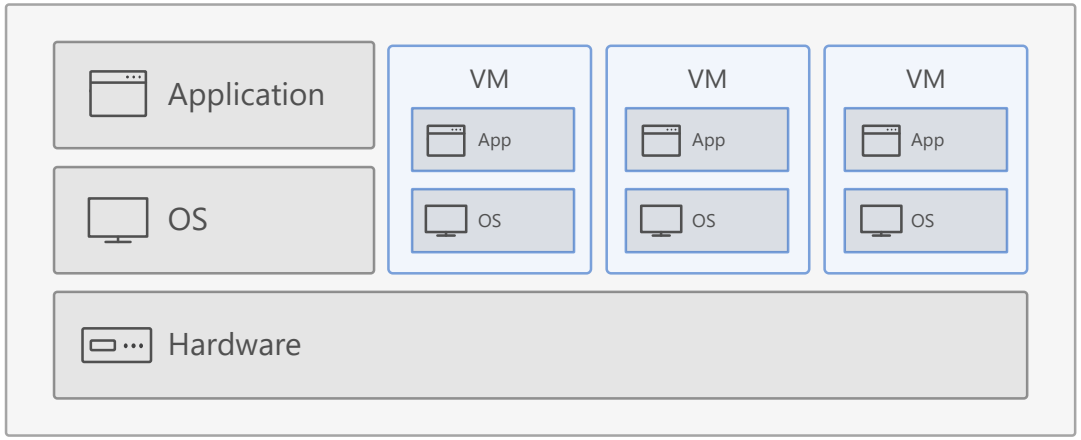
DevOps

What is a **container**?

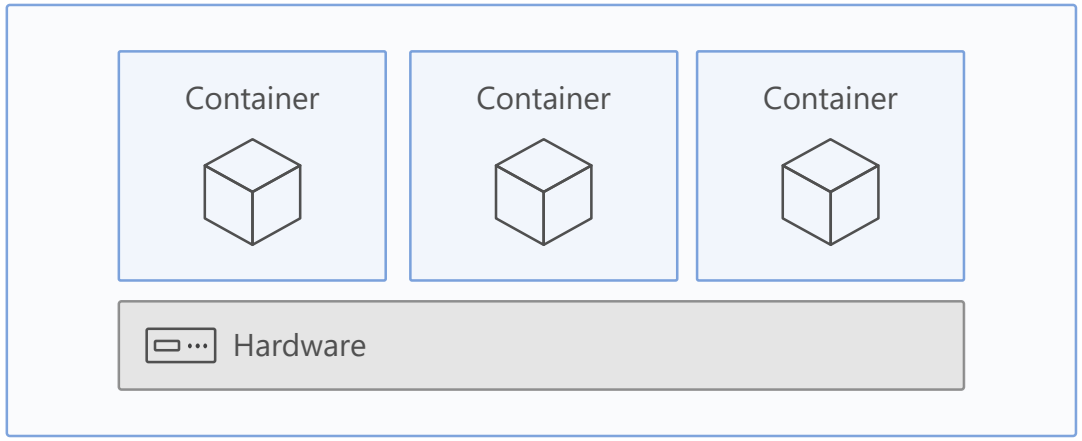
Containers = operating system virtualization



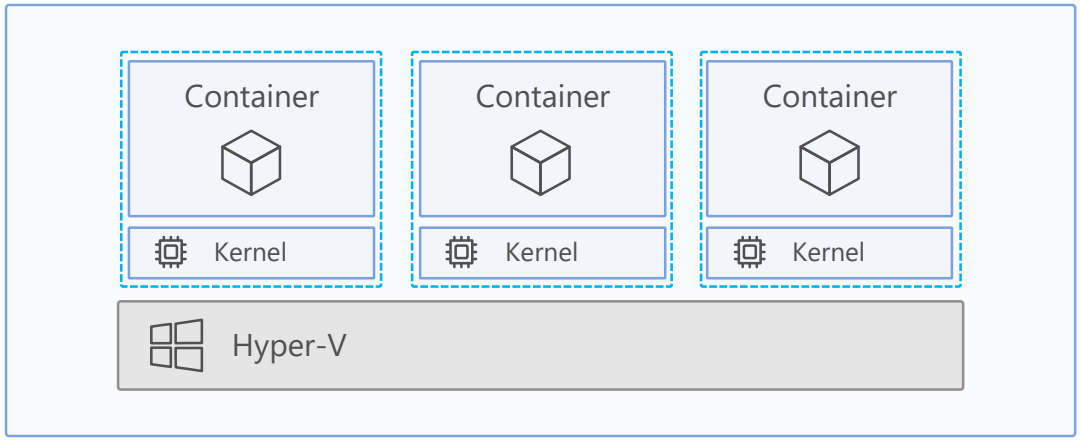
Traditional virtual machines = hardware virtualization



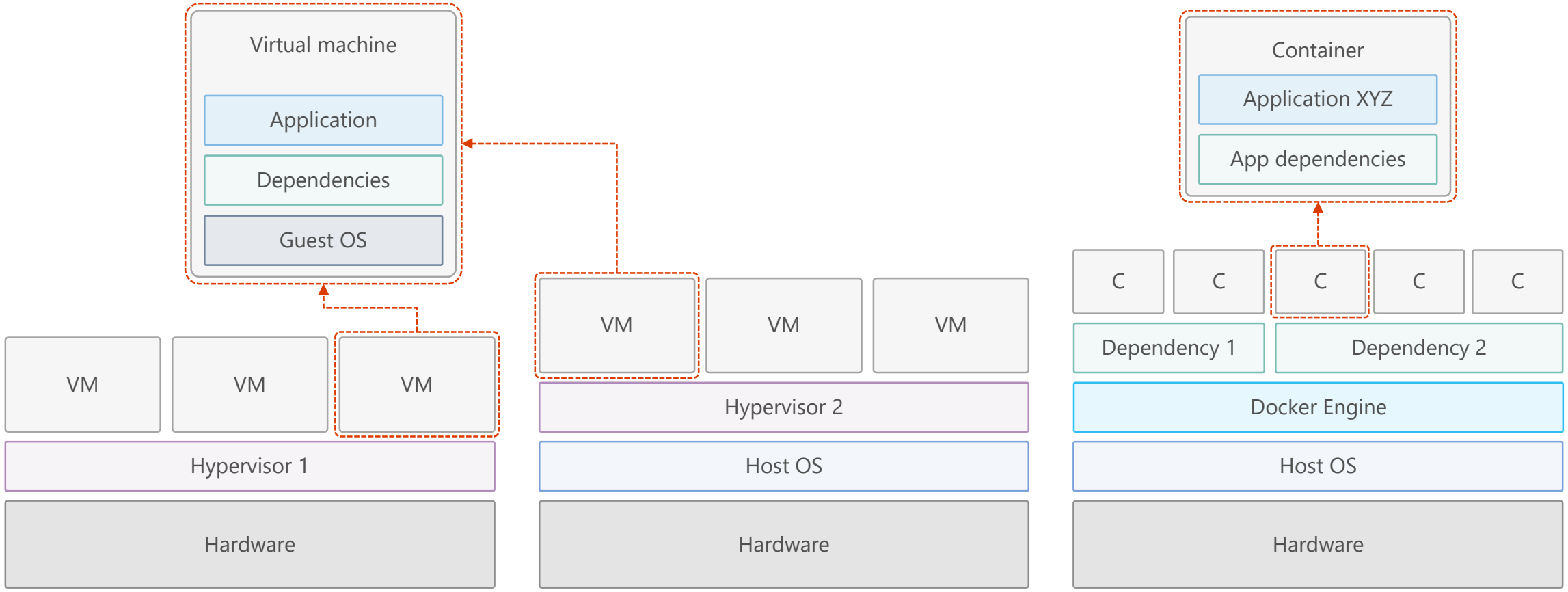
Windows Server containers: maximum speed and density



Hyper-V containers: isolation plus performance



Virtualization versus **containerization**

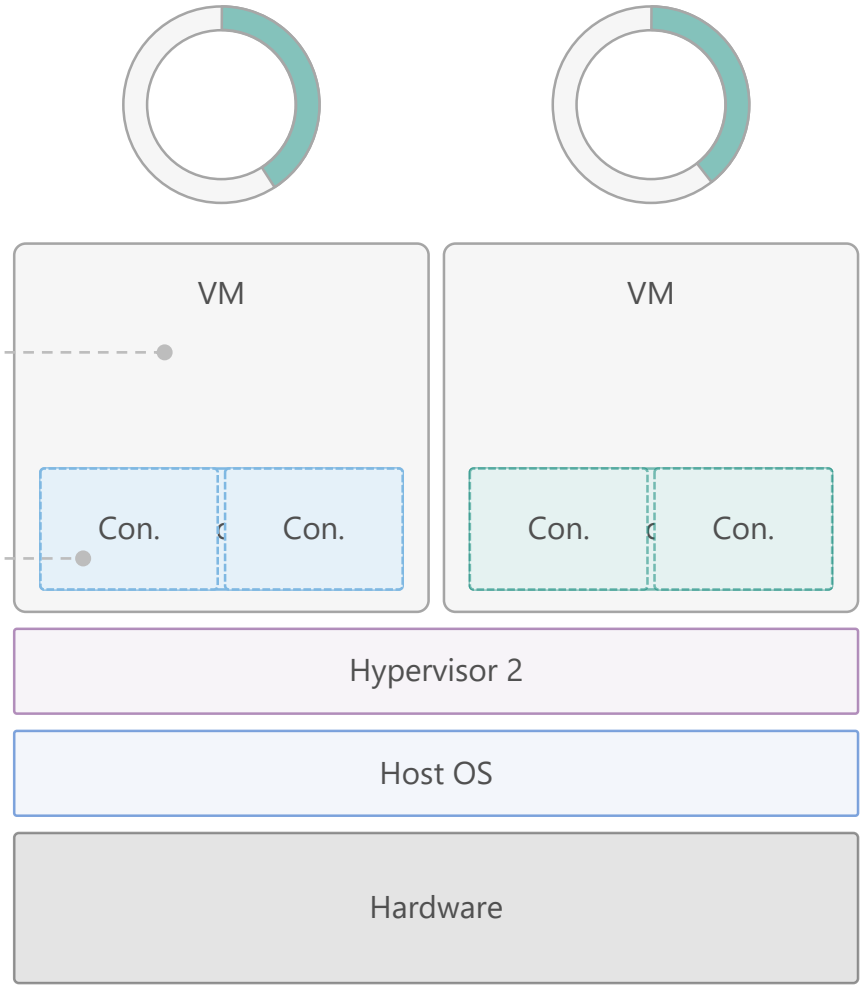


The container **advantage**

Traditional virtualized environment

Low utilization of container resources

Containerization of applications and their dependencies

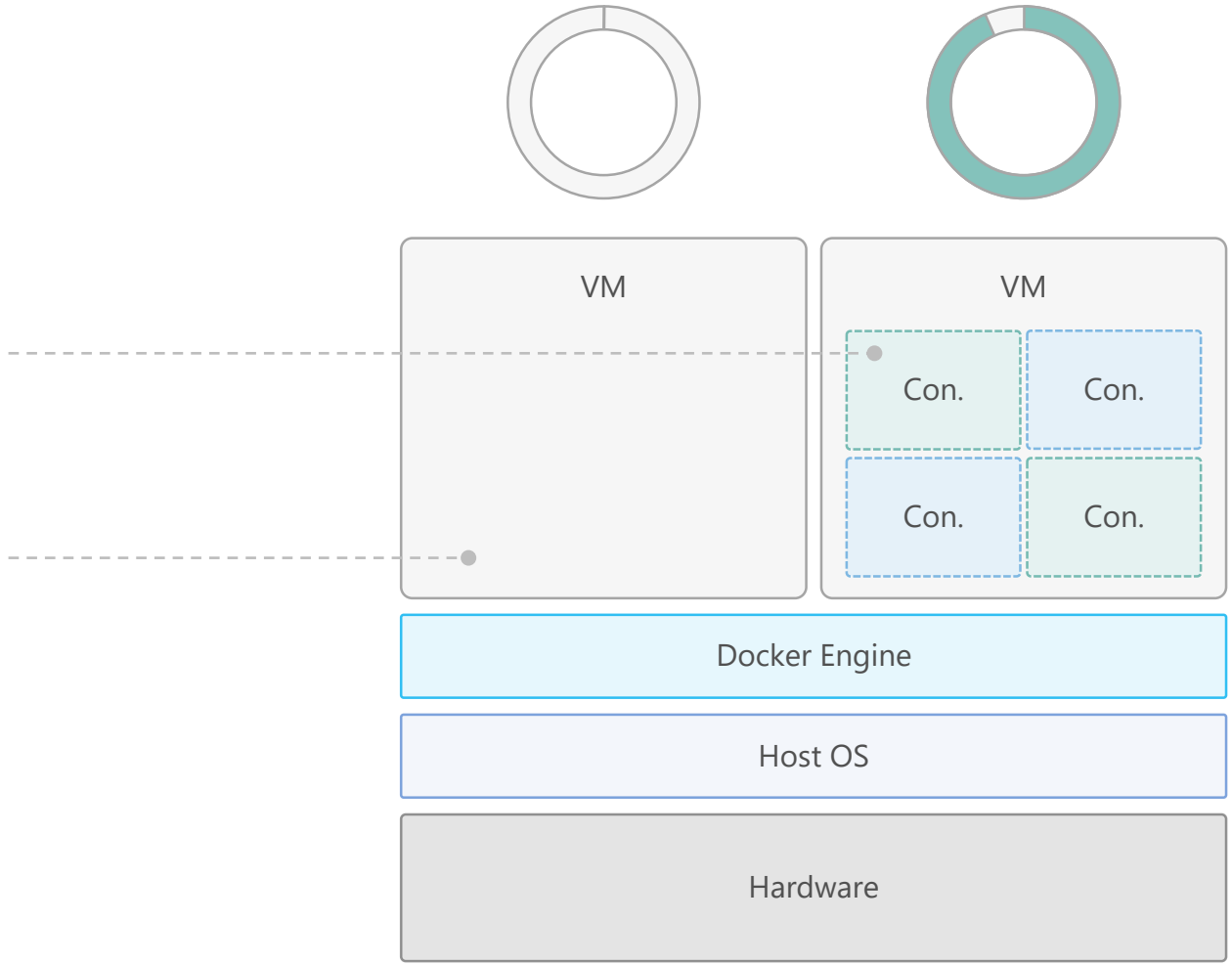


The container **advantage**

Containerized environment

Migrate containers and their dependencies to underutilized VMs for improved density and isolation

Decommission unused resources for efficiency gains and cost savings



The benefits of using containers

Agility

Ship apps faster

Portability

Easily move workloads

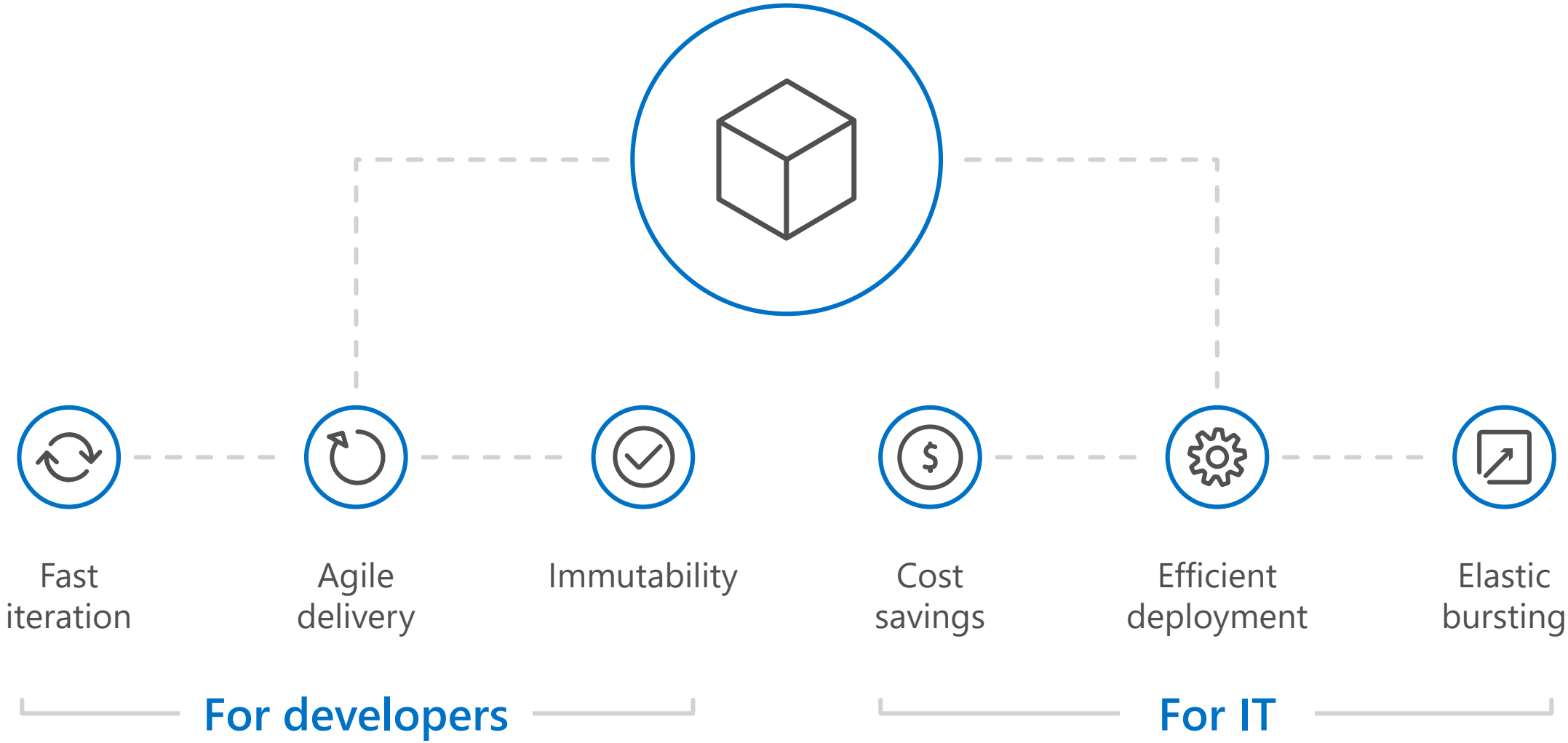
Density

Achieve resource efficiency

Rapid scale

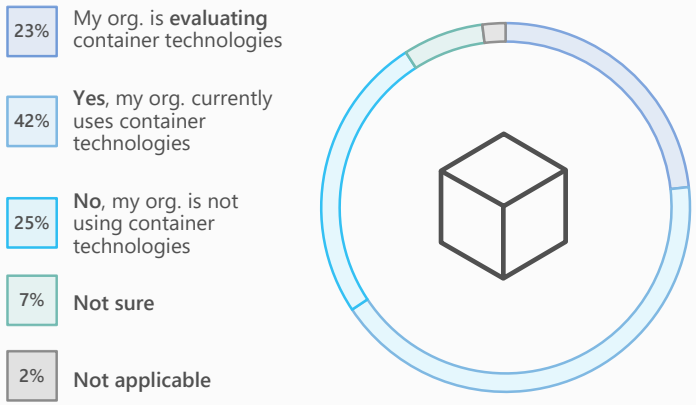
Scale easily to meet demand

The container **advantage**



Containers are gaining **momentum**

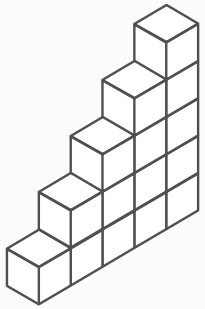
Does your organization currently use container technologies?[1]



Larger companies are leading adoption.[2]

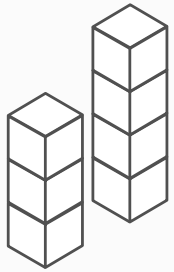
Nearly **60% percent** of organizations running 500 or more hosts are classified as **container dabblers** or adopters.

The average company QUINTUPLES its container usage within 9 months.[1]



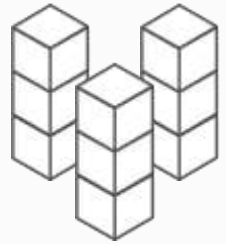
5X

Container hosts often run SEVEN containers at a time.[1]



7X

Containers churn 9 times FASTER than VMs.[1]

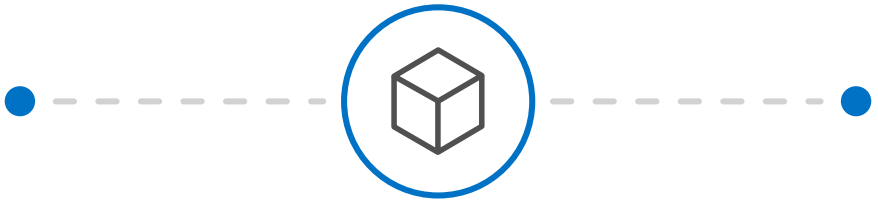


9X

Source:

1: Datadog: 8 Surprising Facts About Real Docker Adoption; 2: DZone: The DZone Guide to Deploying and Orchestrating Containers

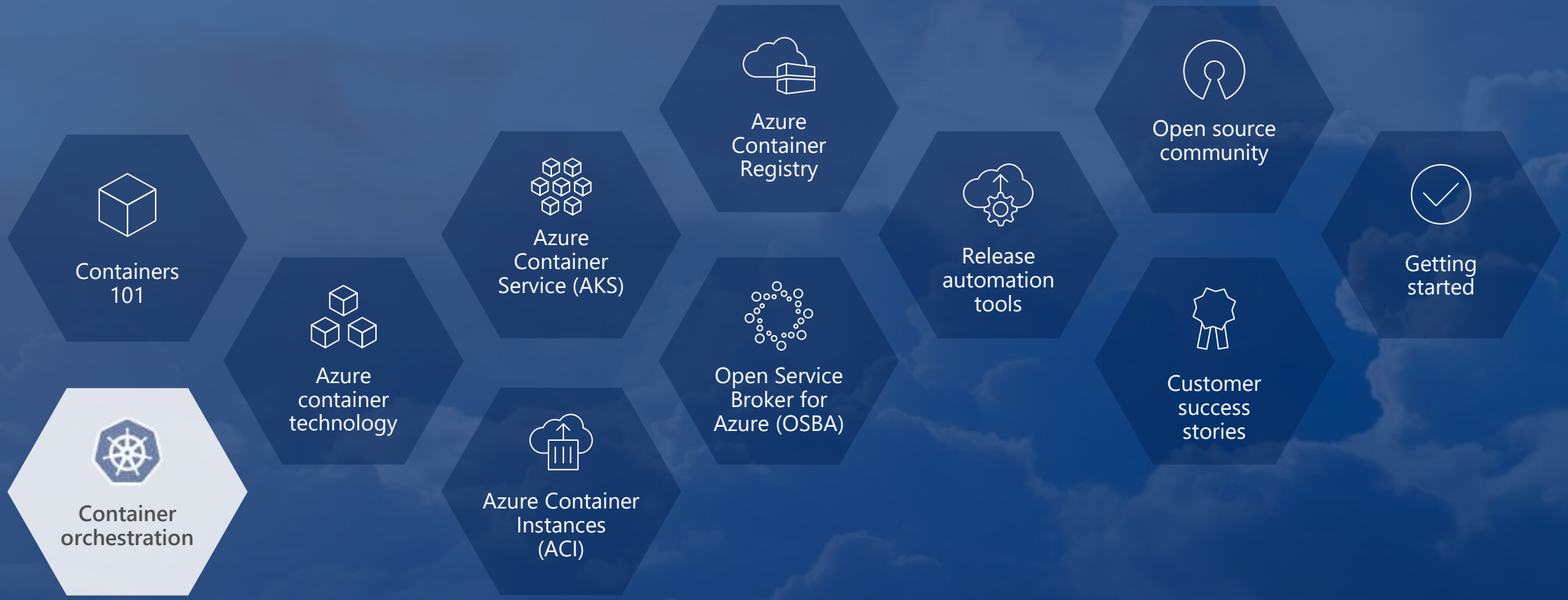
Industry analysts **agree**



"By 2020, more than 50% of enterprises will run mission-critical, containerized cloud-native applications in production, up from less than 5% today."

Gartner

Container orchestration



The elements of **orchestration**

Scheduling

Affinity/anti-affinity

Health monitoring

Failover

Scaling

Networking

Service discovery

Coordinated app upgrades

Kubernetes: the de-facto orchestrator

Portable

Public, private, hybrid, multi-cloud

Extensible

Modular, pluggable, hookable, composable

Self-healing

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

Kubernetes: empowering you to do more

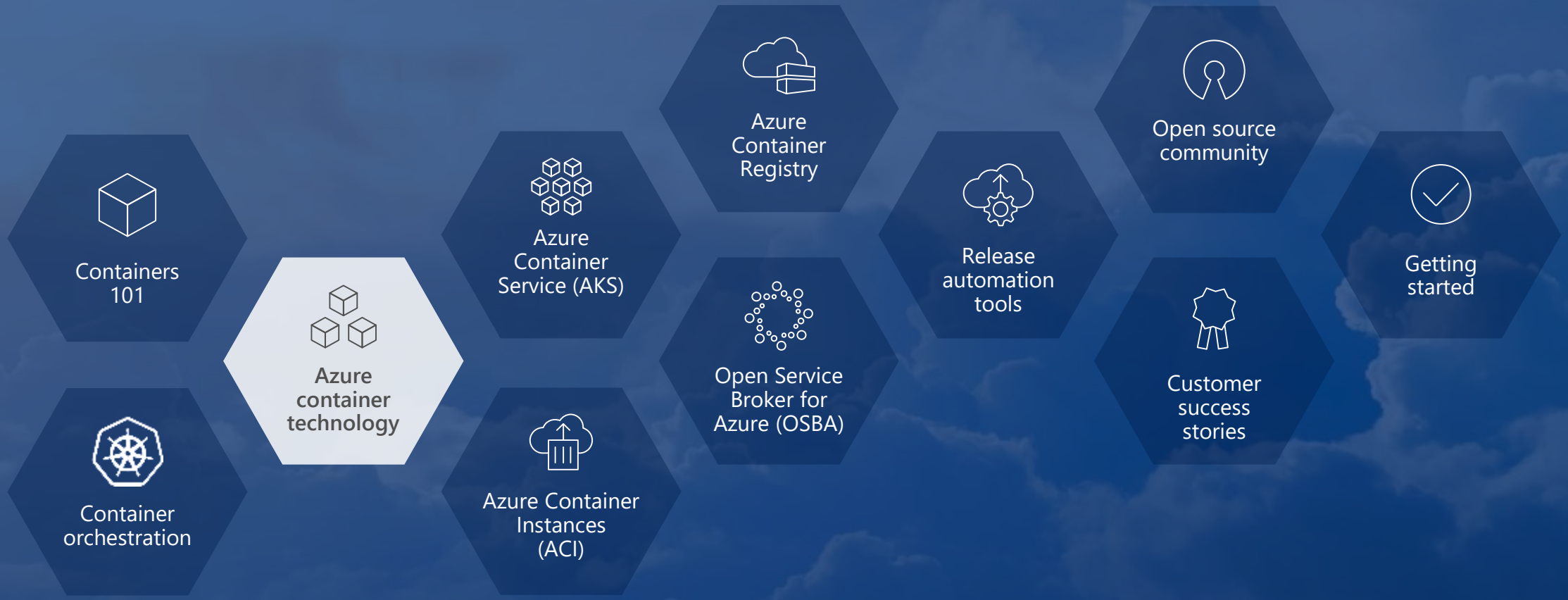
Deploy your applications quickly and predictably

Scale your applications on the fly

Roll out new features seamlessly

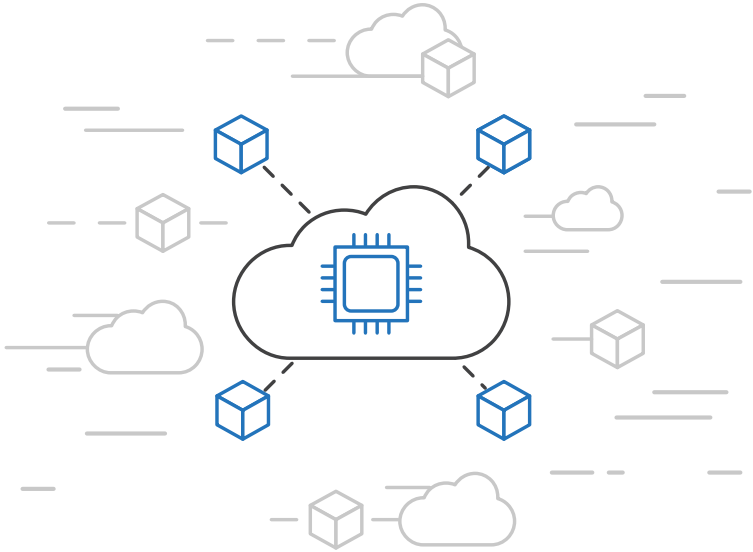
Limit hardware usage to required resources only

Azure container technology

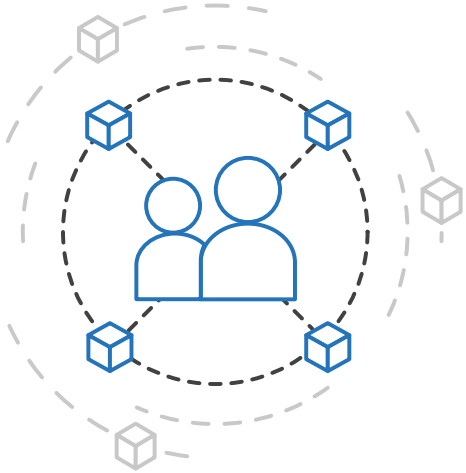


Azure container **strategy**

Embrace containers as ubiquitous

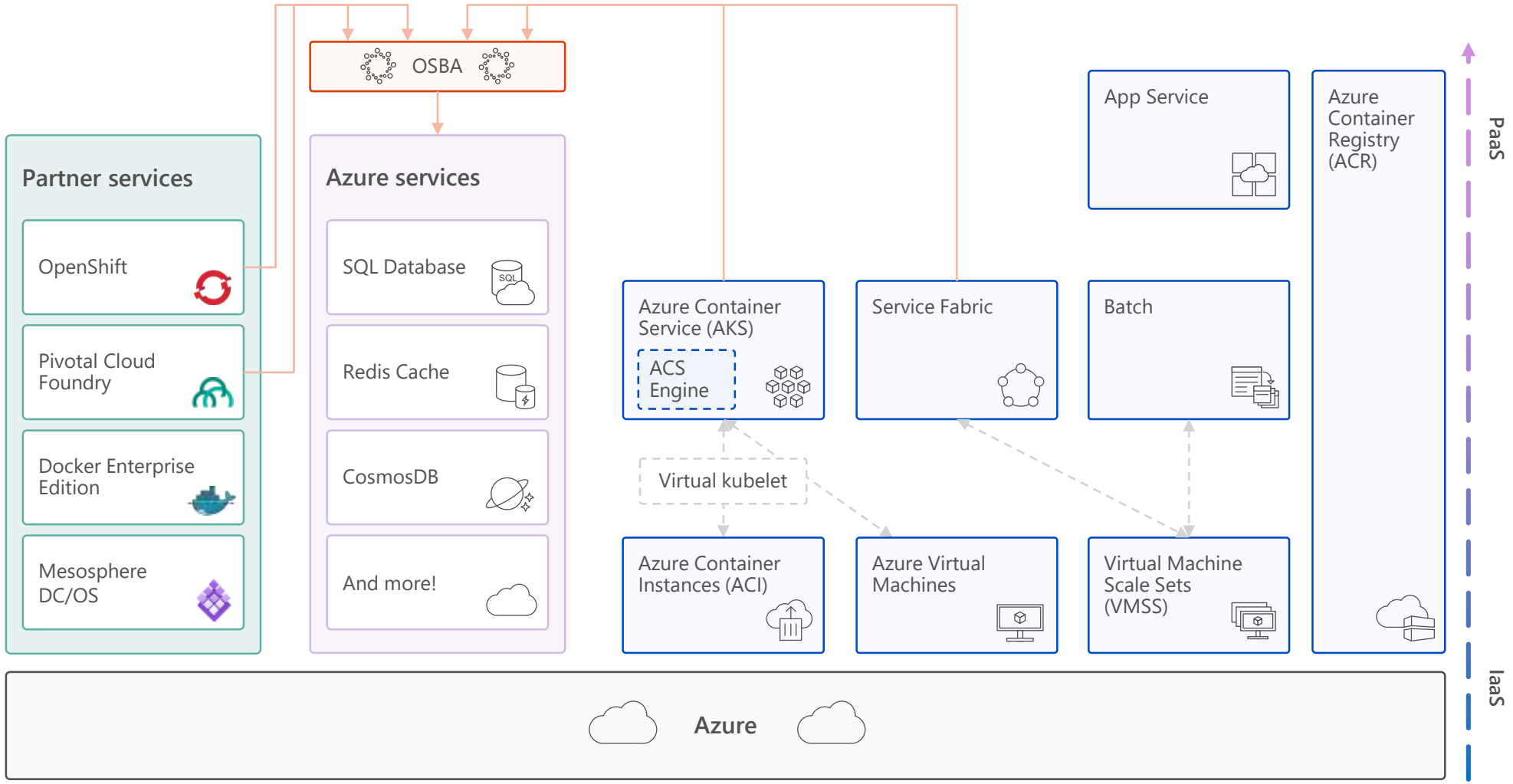


Support containers across the compute portfolio



Democratize container technology

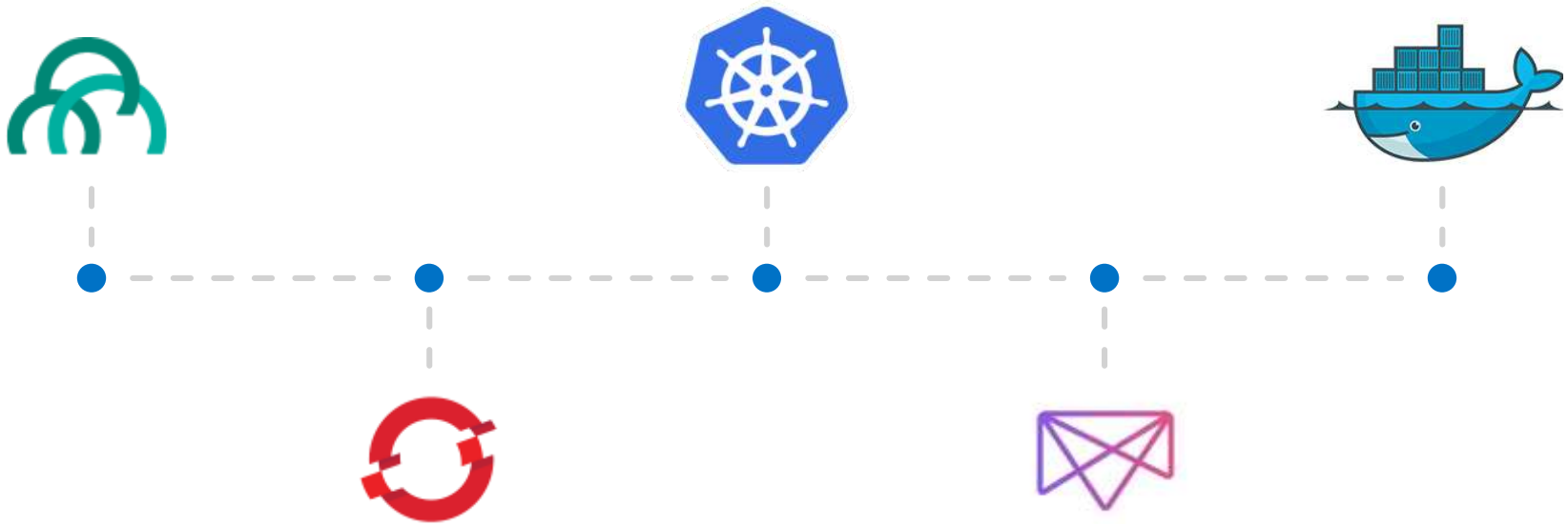
Azure container **ecosystem**



If you have a preferred container platform

Pivotal Cloud Foundry · Kubernetes · Docker Enterprise Edition

Red Hat OpenShift · Mesosphere DC/OS

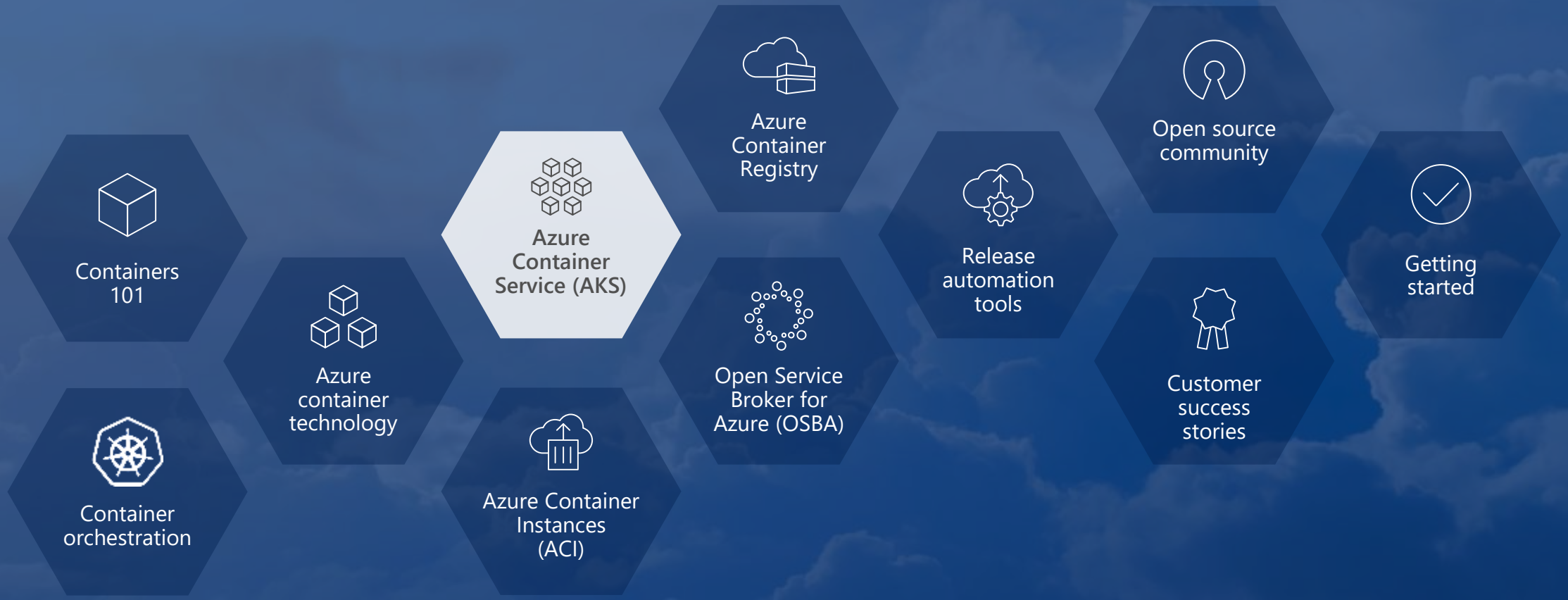


Lets help you bring that platform to Azure

If you are without a preferred container platform…

Lets profile your needs and help you select the right option

Azure Container Service (AKS)



Azure Container Service (AKS)

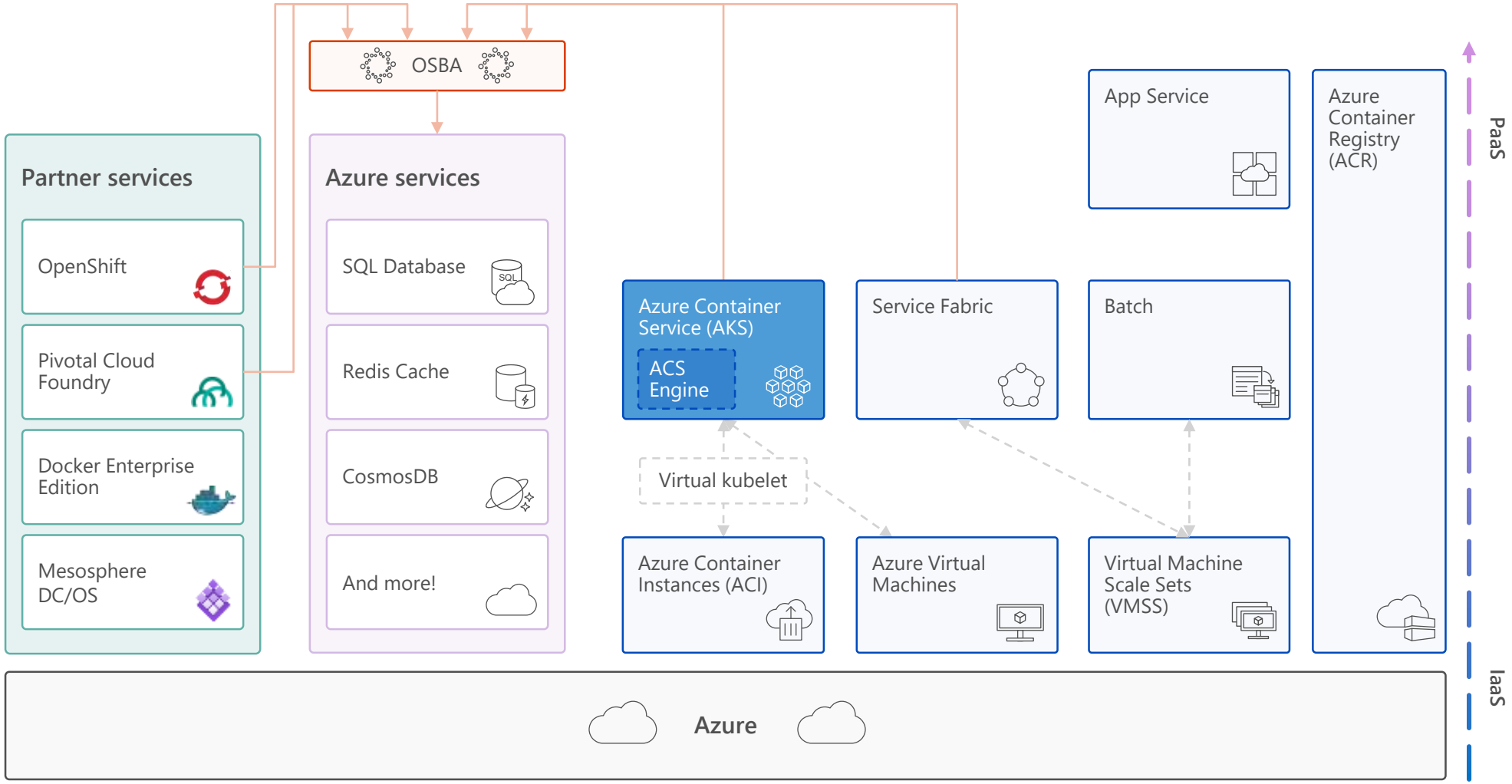
Azure Container Service (AKS)

Azure Container Instances (ACI)

Azure Container Registry

Open Service Broker API (OSBA)

Release Automation Tools



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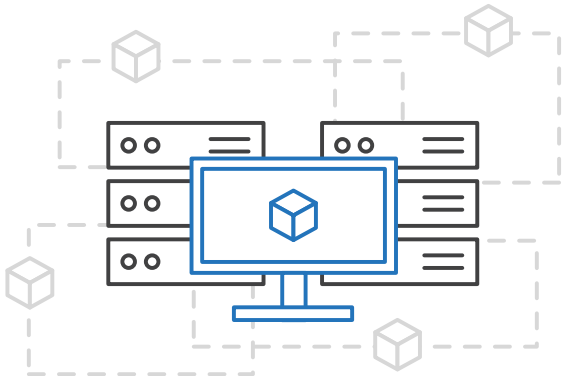
Release Automation Tools

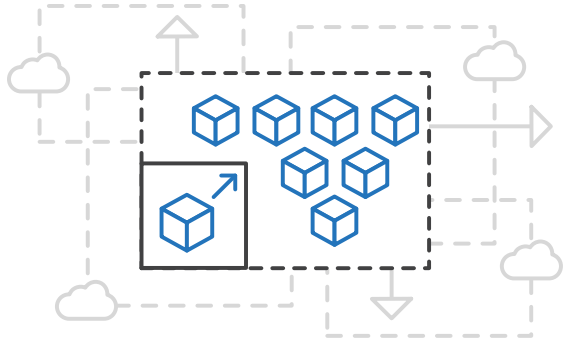
Azure Container Service (AKS)

Simplify the deployment, management, and operations of Kubernetes



Focus on your containers not the infrastructure

Work how you want with open-source APIs



Scale and run applications with confidence

Azure Container Service (AKS)

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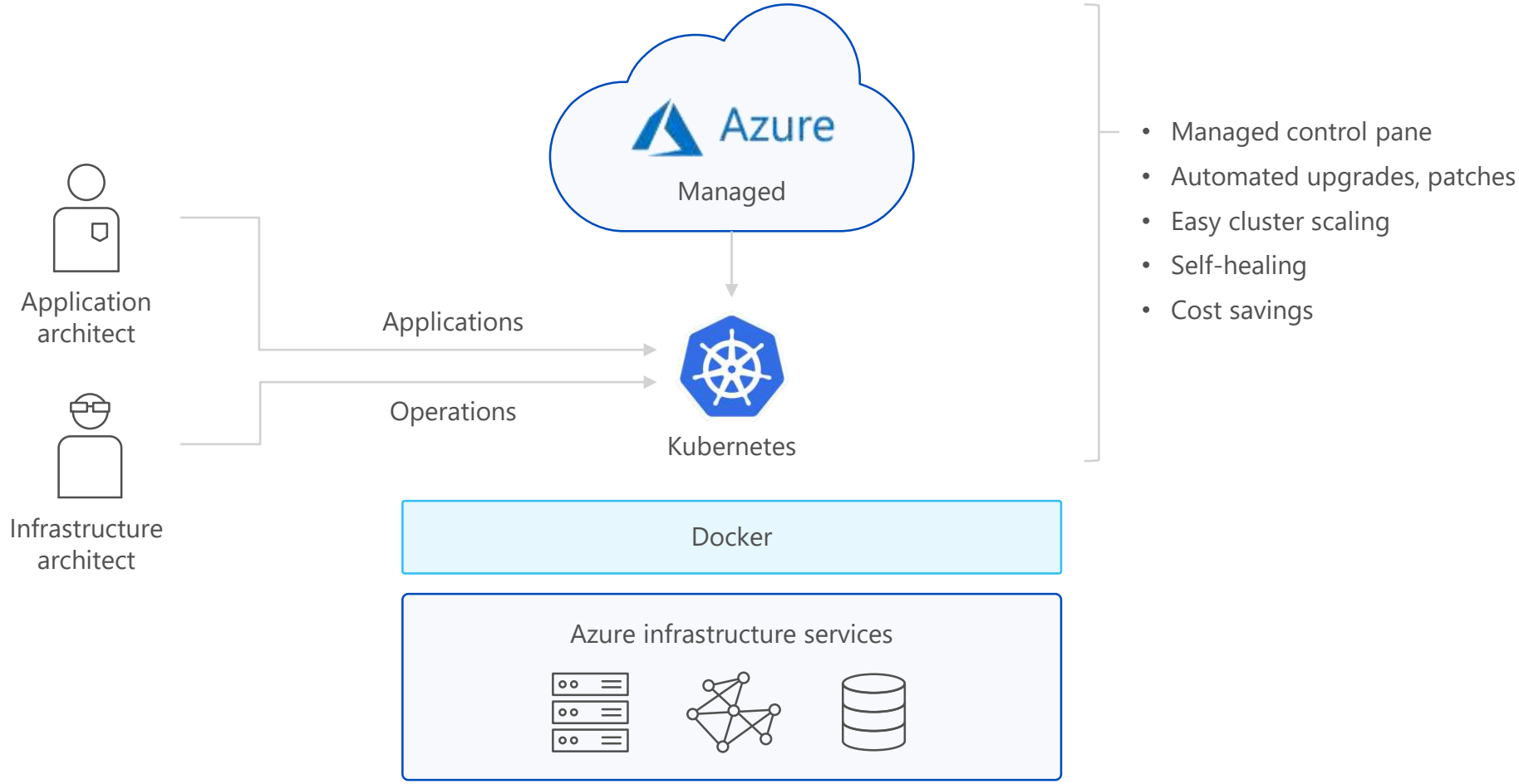
Release Automation Tools

Azure Container Service (AKS)

A fully managed Kubernetes cluster



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Azure Container Registry

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Release Automation Tools

Azure Container Service (AKS)

Get started easily

```
$ az aks create -g myResourceGroup -n myCluster --generate-ssh-keys
\ Running ..

$ az aks install-cli
Downloading client to /usr/local/bin/kubectl ..

$ az aks get-credentials -g myResourceGroup -n myCluster
Merged "myCluster" as current context ..

$ kubectl get nodes
NAME                          STATUS    AGE       VERSION
aks-mycluster-36851231-0      Ready     4m        v1.8.1
aks-mycluster-36851231-1      Ready     4m        v1.8.1
aks-mycluster-36851231-2      Ready     4m        v1.8.1
```

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Azure Container Registry

Open Service Broker API (OSBA)

Release Automation Tools

Azure Container Service (AKS)

Manage an AKS cluster

```
$ az aks list –o table
Name                Location    ResourceGroup     KubernetesRelease  ProvisioningState
------------------  ----------  --------------  -------------------  -------------------
myCluster           westus2     myResourceGroup               1.7.7  Succeeded
```

```
$ az aks upgrade -g myResourceGroup -n myCluster –-kubernetes-version 1.8.1
\ Running ..
```

```
$ kubectl get nodes
NAME                          STATUS    AGE       VERSION
aks-mycluster-36851231-0      Ready     12m       v1.8.1
aks-mycluster-36851231-1      Ready     8m        v1.8.1
aks-mycluster-36851231-2      Ready     3m        v1.8.1
```

```
$ az aks scale -g myResourceGroup -n myCluster --agent-count 10
\ Running ..
```

Azure Container Service (AKS)

Azure Container Instances (ACI)

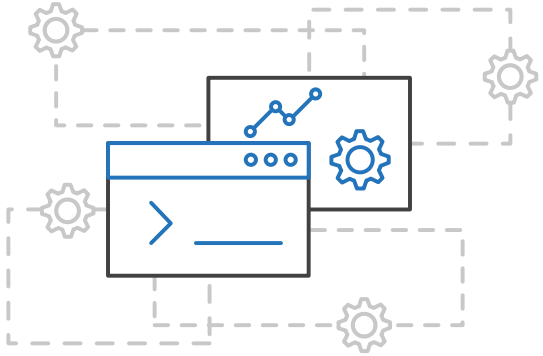
Azure Container Registry

Open Service Broker API (OSBA)

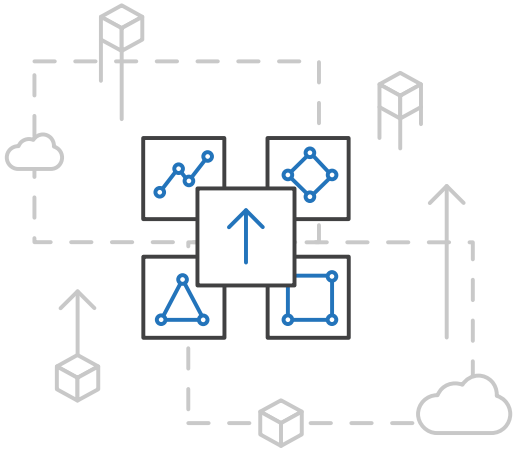
Release Automation Tools

Azure Kubernetes Service (AKS)

Azure Container Service Engine



A proving ground for new features



Enables custom deployments

Available on GitHub

Azure Container Service (AKS)

Azure Container Instances (ACI)

Azure Container Registry

Open Service Broker API (OSBA)

Release Automation Tools

Azure Container Service (AKS)

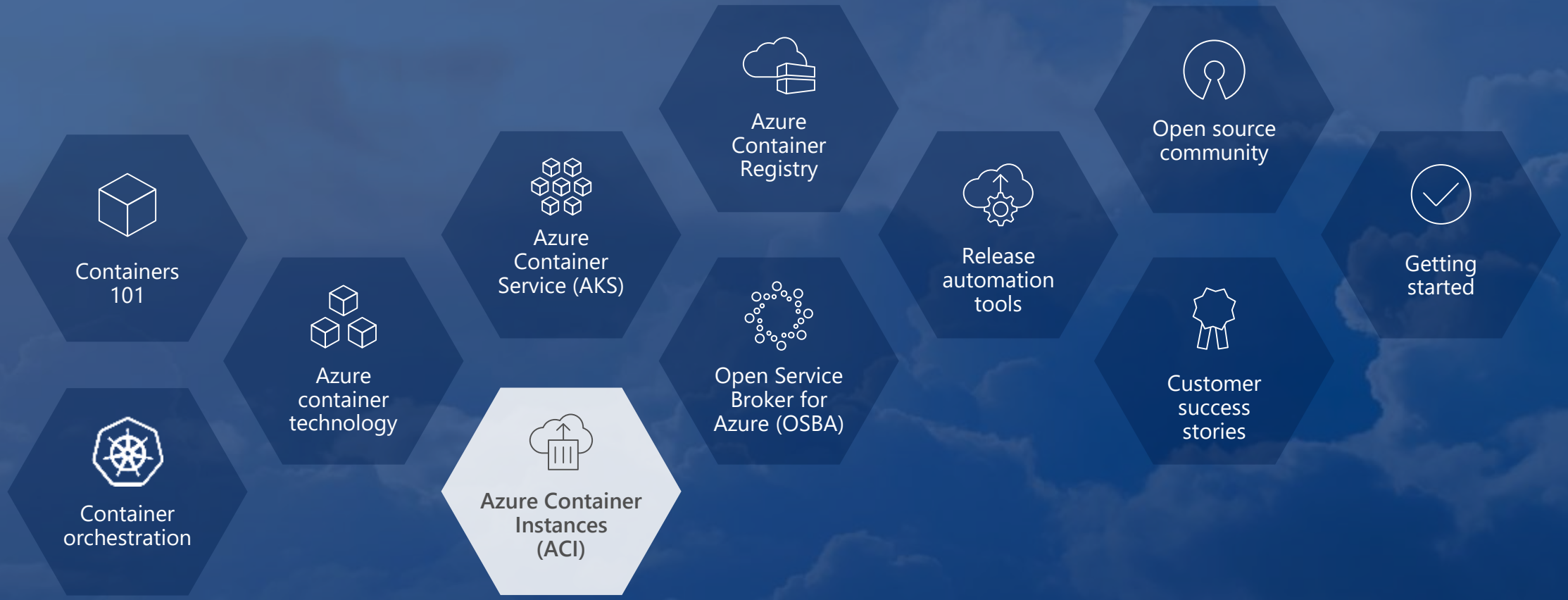
Resources

- Azure Kubernetes Service (AKS) webpage
- AKS videos
- AKS technical documentation
- AKS pricing details
- AKS roadmap
- Azure Container Service Engine: Github

Container Orchestration Simplified with AKS

Kubernetes Support in Azure Container Services

Azure Container Instances (ACI)



Azure Container Service (AKS)

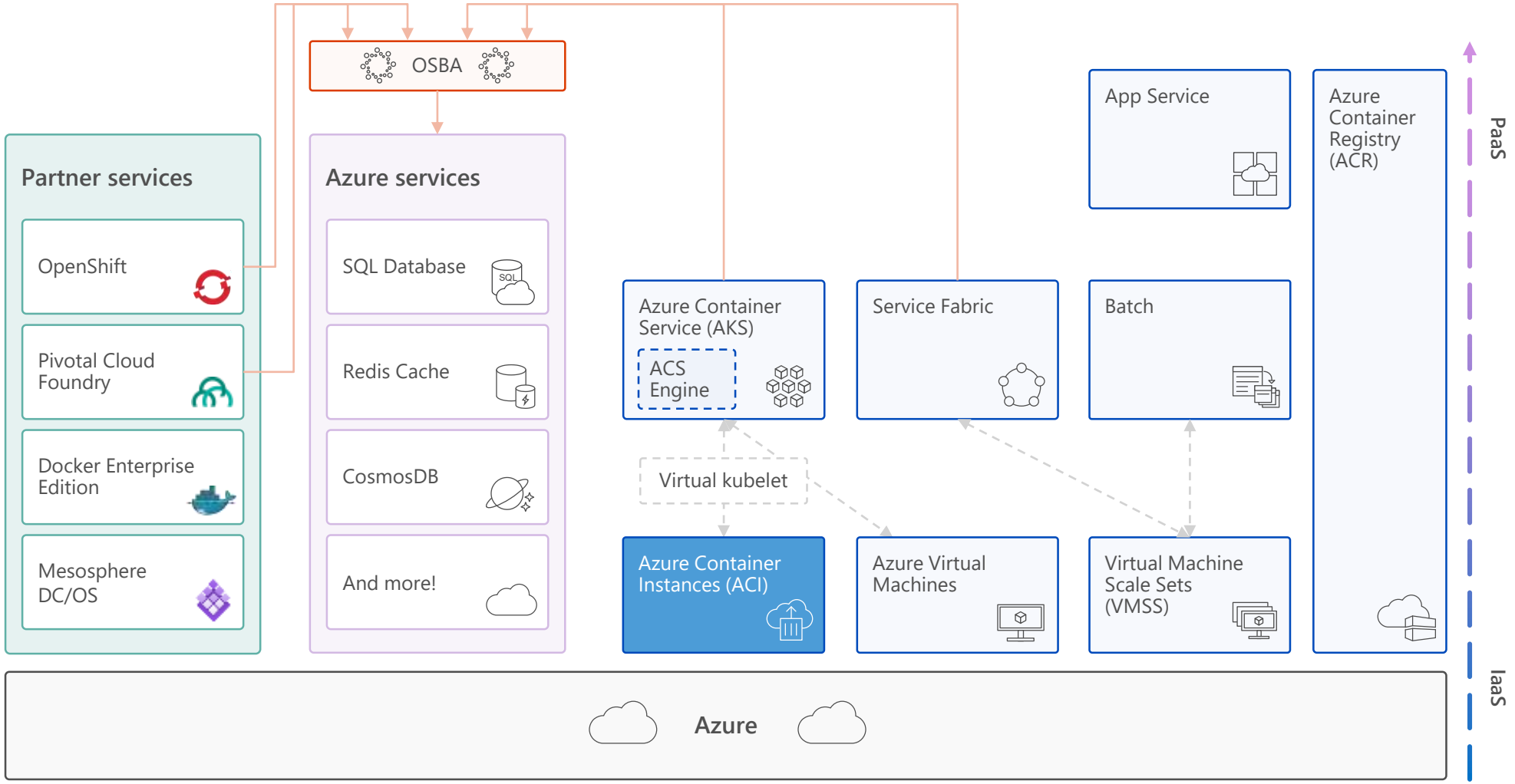
Azure Container Instances (ACI)

Azure Container Registry

Open Service Broker API (OSBA)

Release Automation Tools

Azure Container Instances (ACI)



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Azure Container Instances (ACI)

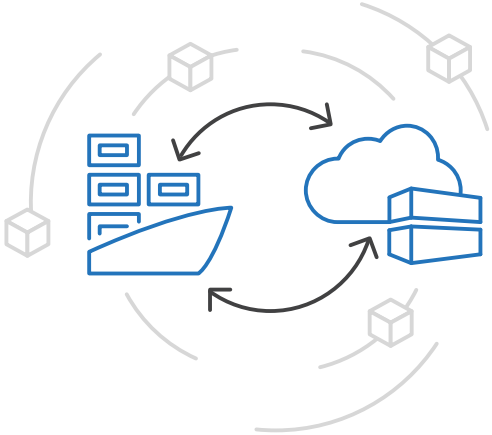
Azure Container Registry

Open Service Broker API (OSBA)

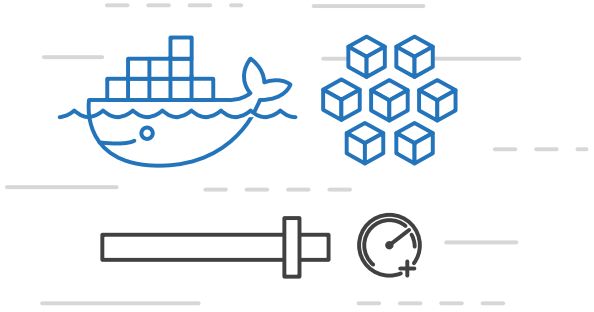
Release Automation Tools

Azure Container Instances (ACI)

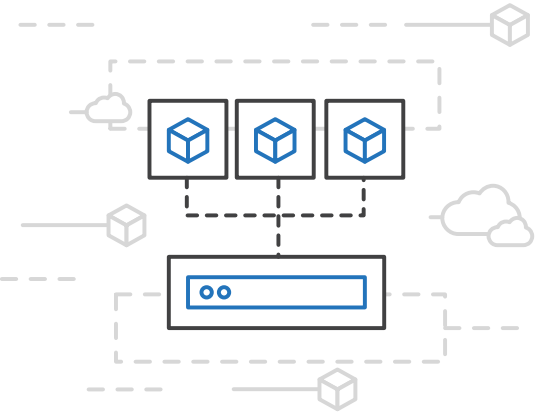
Easily run containers on Azure with a single command



Start using containers right away



Cloud-scale container capacity



Hyper-visor isolation

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Azure Container Instances (ACI)

Azure Container Registry

Open Service Broker API (OSBA)

Release Automation Tools

Azure Container Instances (ACI)

Get started easily

```
$ az container create --name mycontainer --image microsoft/aci-helloworld --
resource-group myResourceGroup --ip-address public
  "ipAddress": {
    "ip": "52.168.86.133",
    "ports": [...]
  },
  "location": "eastus",
  "name": "mycontainer",
  "osType": "Linux",
  "provisioningState": "Succeeded",
```

```
$ curl 52.168.86.133
<html>
<head>
  <title>Welcome to Azure Container Instances!</title>
</head>
```

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Azure Container Instances (ACI)

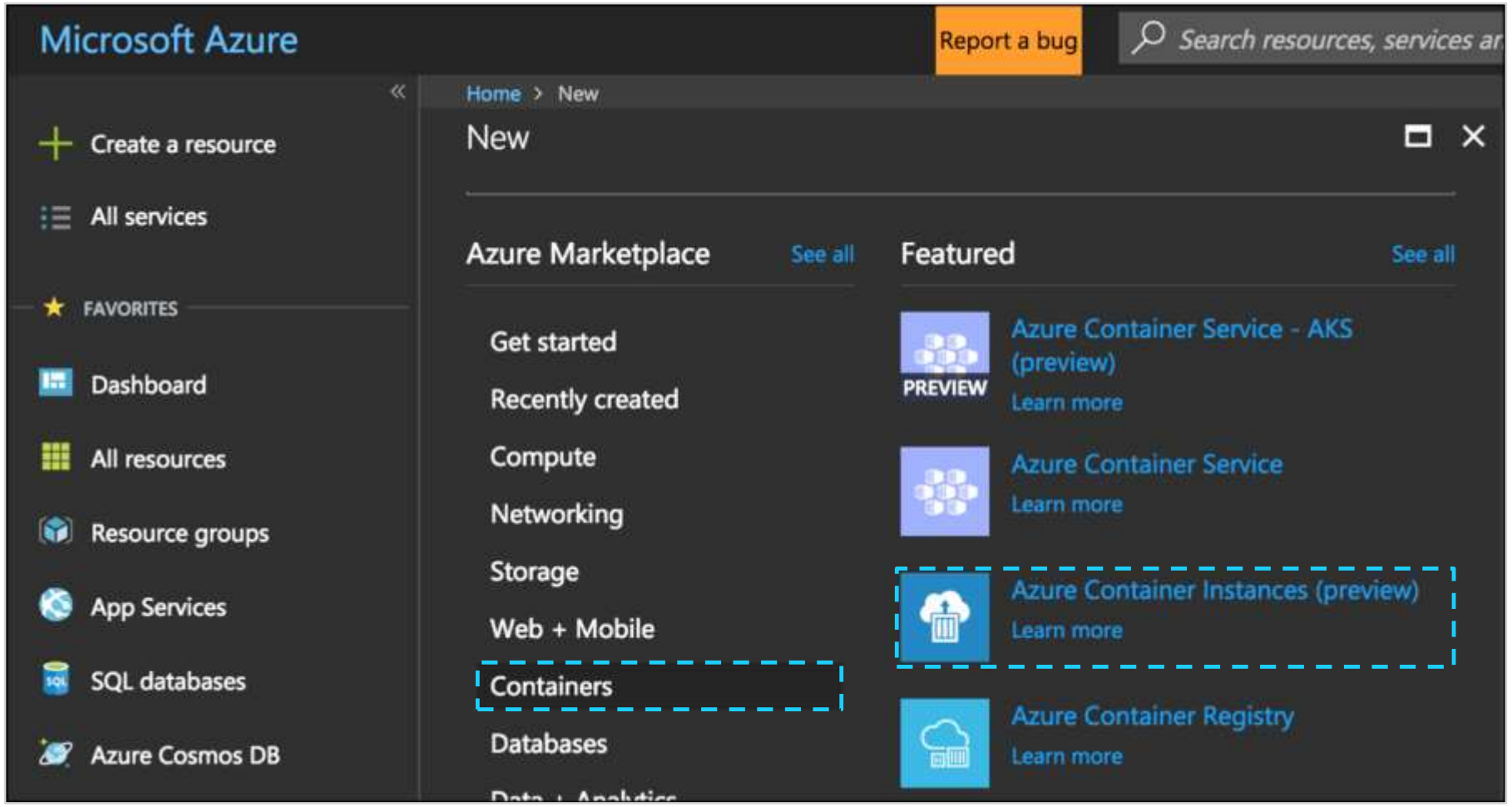
Azure Container Registry

Open Service Broker API (OSBA)

Release Automation Tools

Azure Container Instances (ACI)

Create an Azure Container Instance quickly



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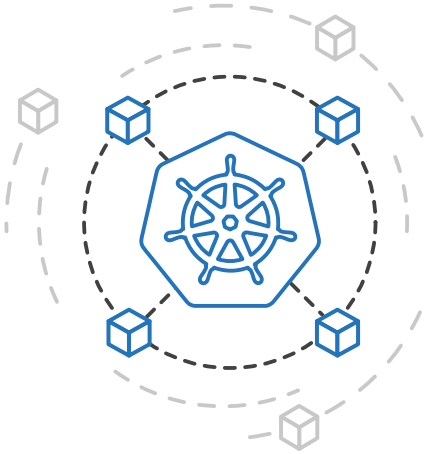
Azure Container Registry

Open Service Broker API (OSBA)

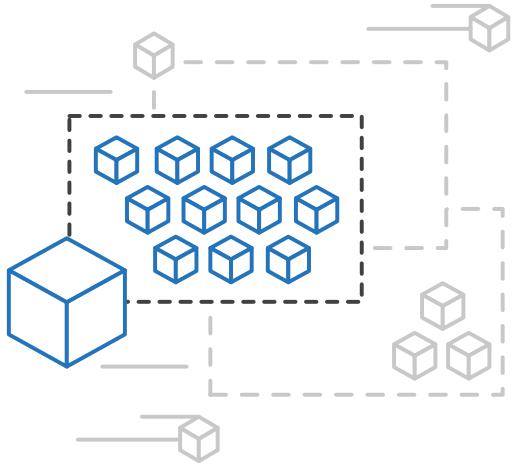
Release Automation Tools

Azure Container Instances (ACI)

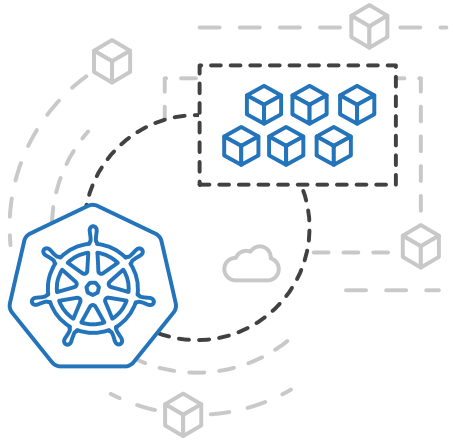
ACI Connector for Kubernetes



Kubernetes provides rich orchestration capabilities



ACI provides infinite container-based scale



The ACI Connector for K8s brings them together

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Azure Container Instances (ACI)

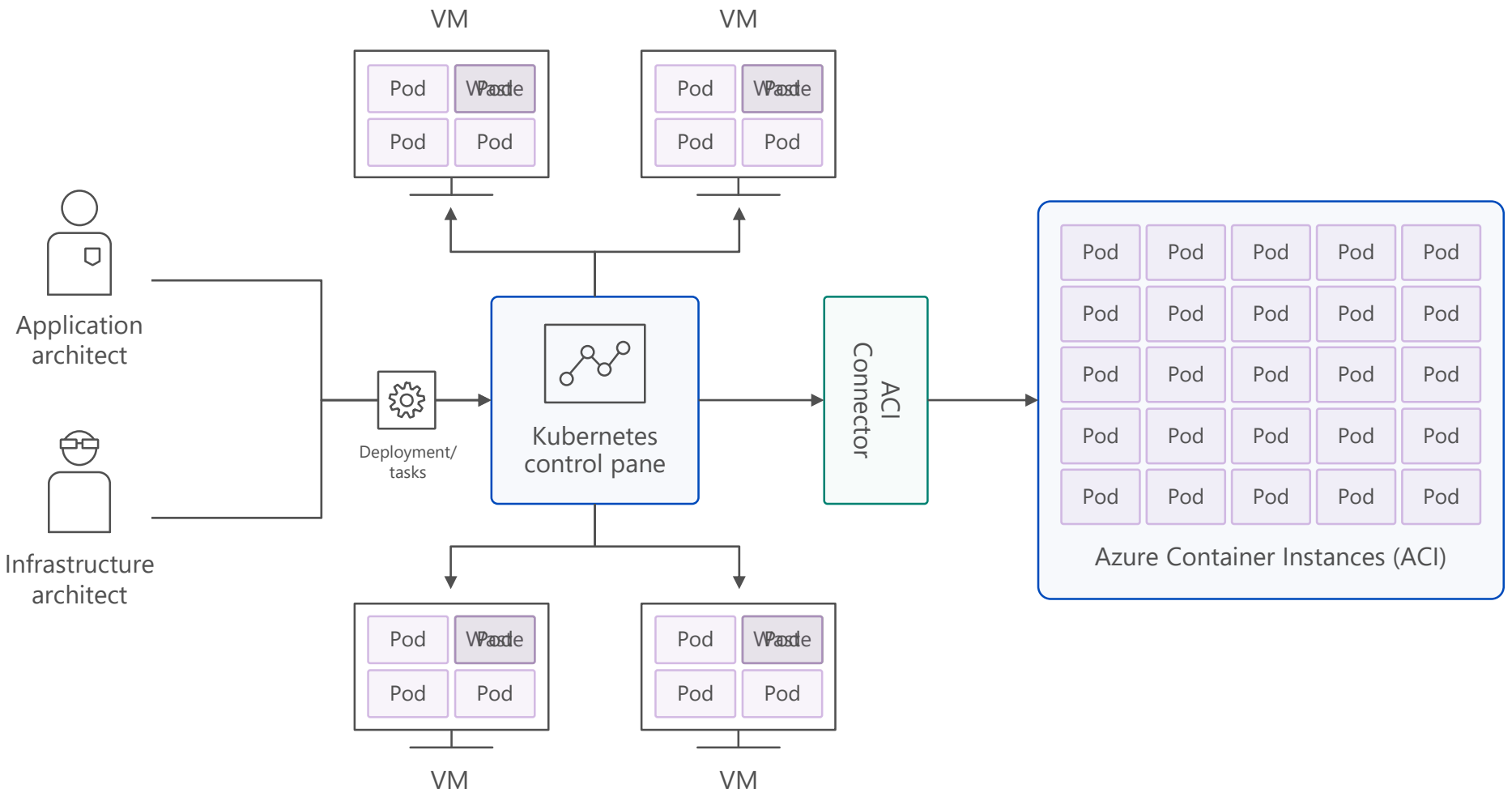
Azure Container Registry

Open Service Broker API (OSBA)

Release Automation Tools

Azure Container Instances (ACI)

Bursting with the ACI Connector



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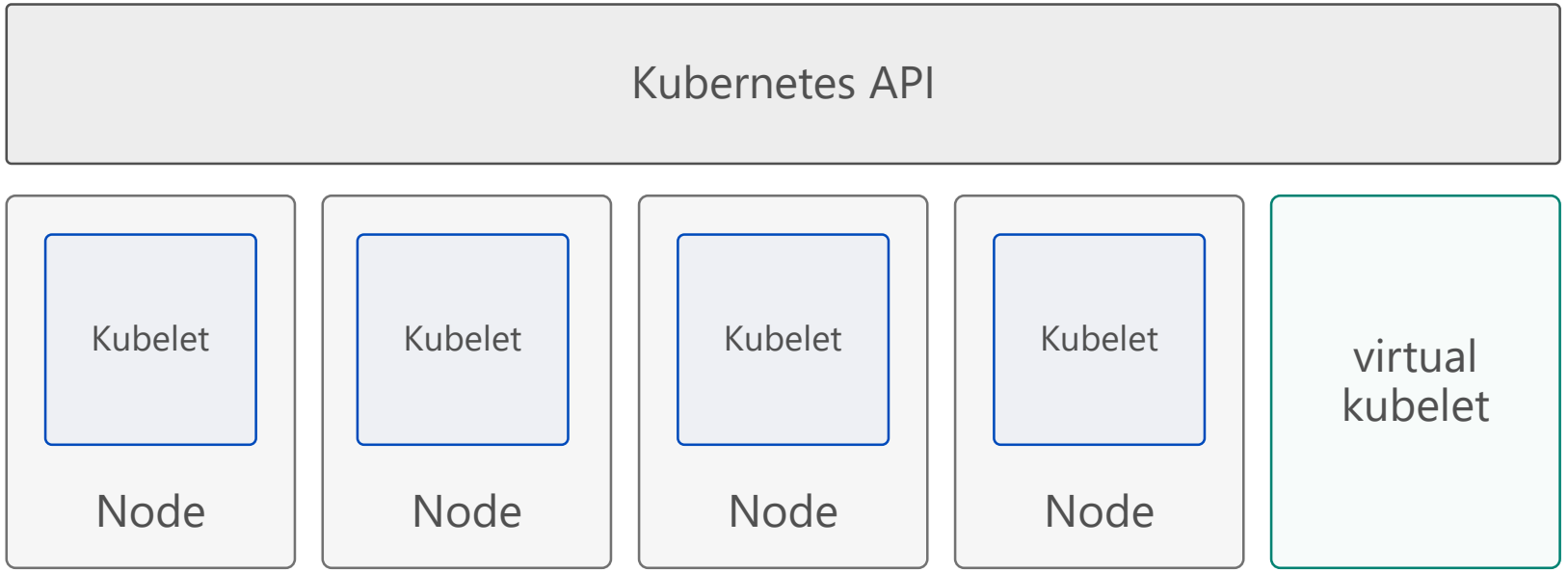
Azure Container Registry

Open Service Broker API (OSBA)

Release Automation Tools

Azure Container Instances (ACI)

Virtual Kubelet



Typical kubelets implement the pod and container operations for each node as usual.

Virtual kubelet registers itself as a “node” and allows developers to program their own behaviors for operations on pods and containers.

Azure Container Service (AKS)

Azure Container Instances (ACI)

Azure Container Registry

Open Service Broker API (OSBA)

Release Automation Tools

Azure Container Instances (ACI)

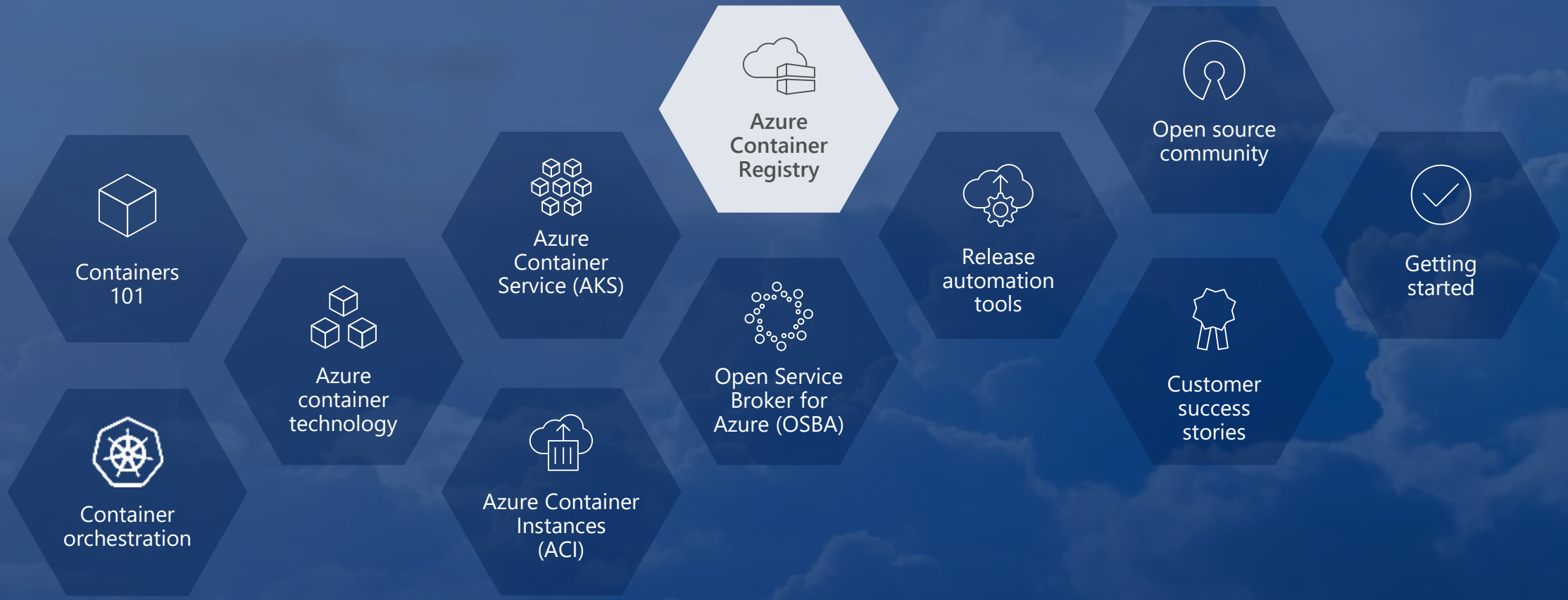
Resources

- Azure Container Instances (ACI) webpage
- ACI videos
- ACI technical documentation
- ACI pricing details
- ACI roadmap

Azure Container Instances

Using Kubernetes with Azure Container Instances

Azure Container Registry



Azure Container Registry

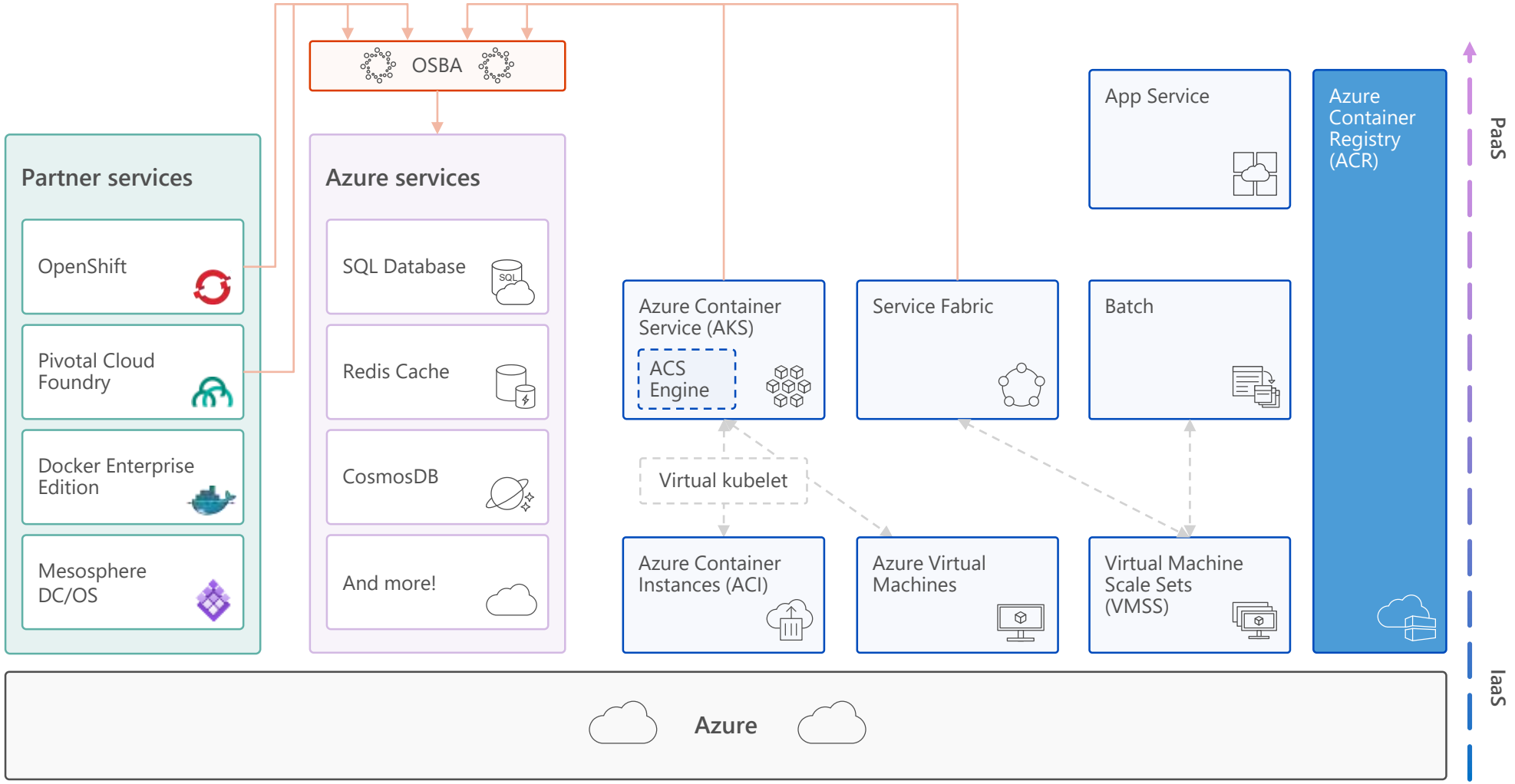
Azure Container Service (AKS)

Azure Container Instances (ACI)

Azure Container Registry

Open Service Broker API (OSBA)

Release Automation Tools



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Azure Container Registry

Open Service Broker API (OSBA)

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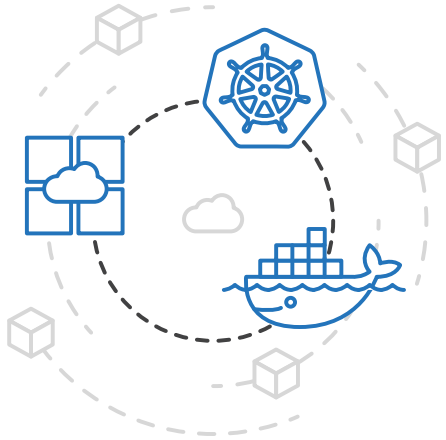
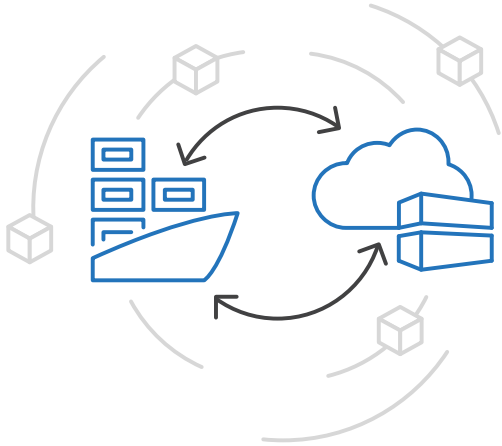
Azure Container Registry

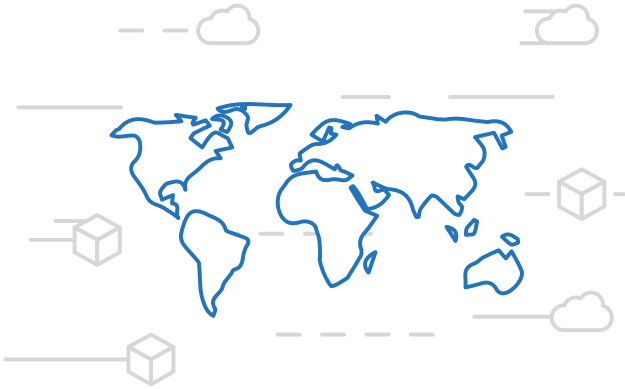
Manage a Docker private registry as a first-class Azure resource



Manage images for all types of containers



Use familiar, open-source Docker CLI tools



Azure Container Registry geo-replication

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Azure Container Registry

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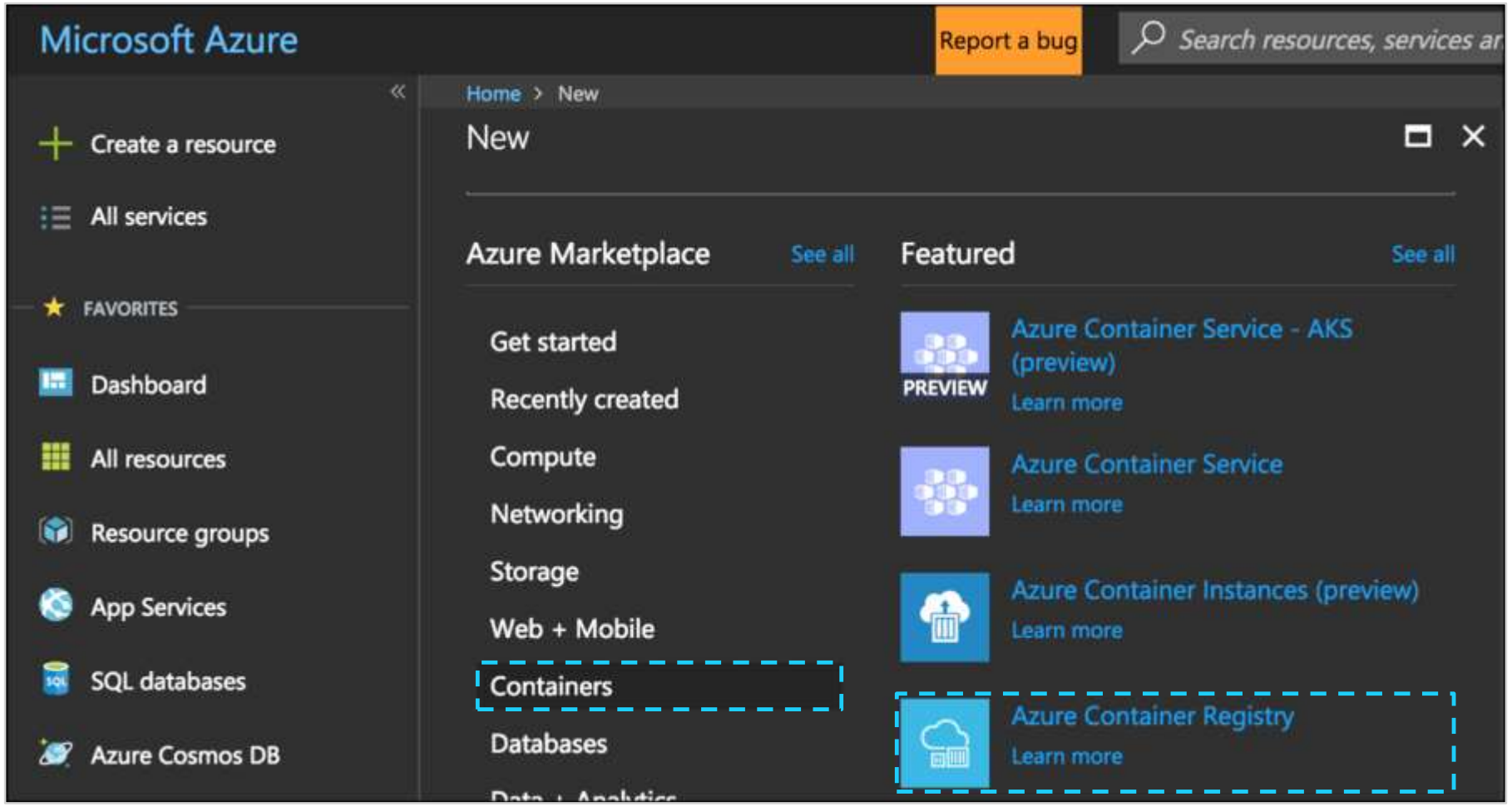
Release Automation Tools

Azure Container Registry

Create a container in the Registry quickly



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Azure Container Instances (ACI)

Azure Container Registry

Open Service Broker API (OSBA)

Release Automation Tools

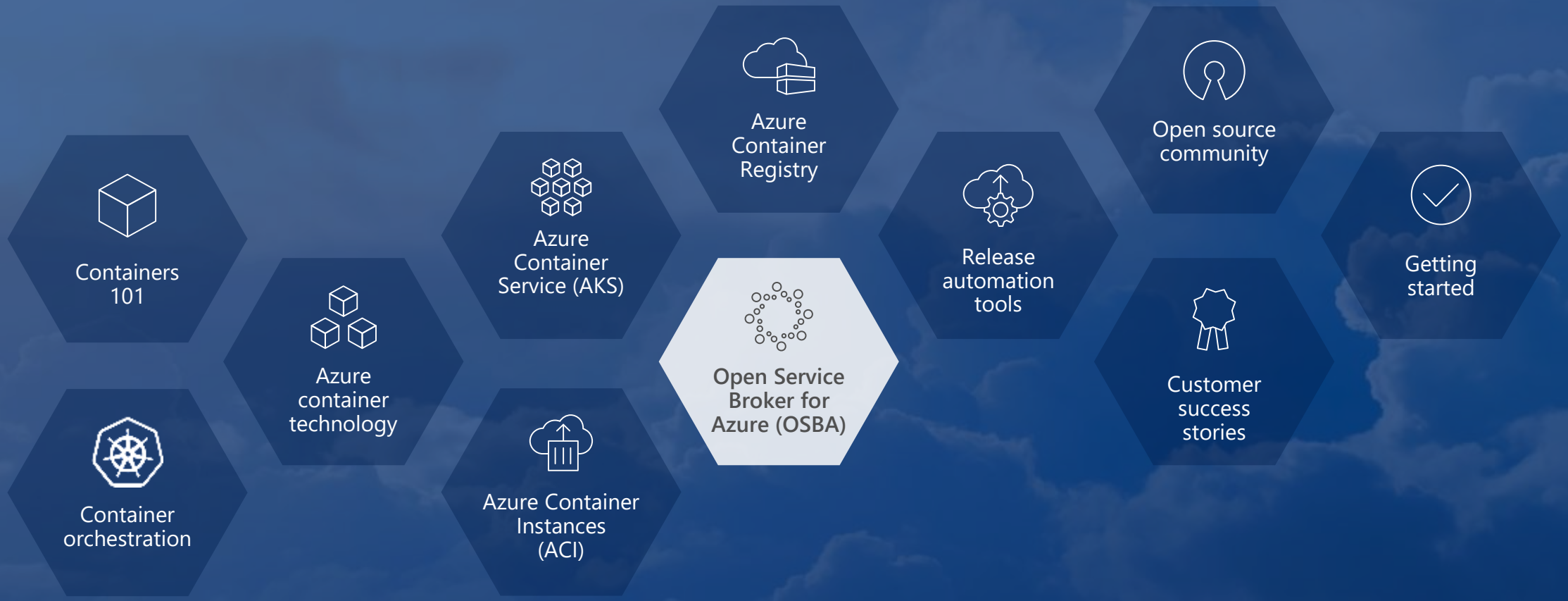
Azure Container Registry

Resources

- Azure Container Registry webpage
- Registry technical documentation
- Registry pricing details
- Registry roadmap

Creating, configuring the Azure Container Registry

Open Service Broker for Azure



Azure Container Service (AKS)

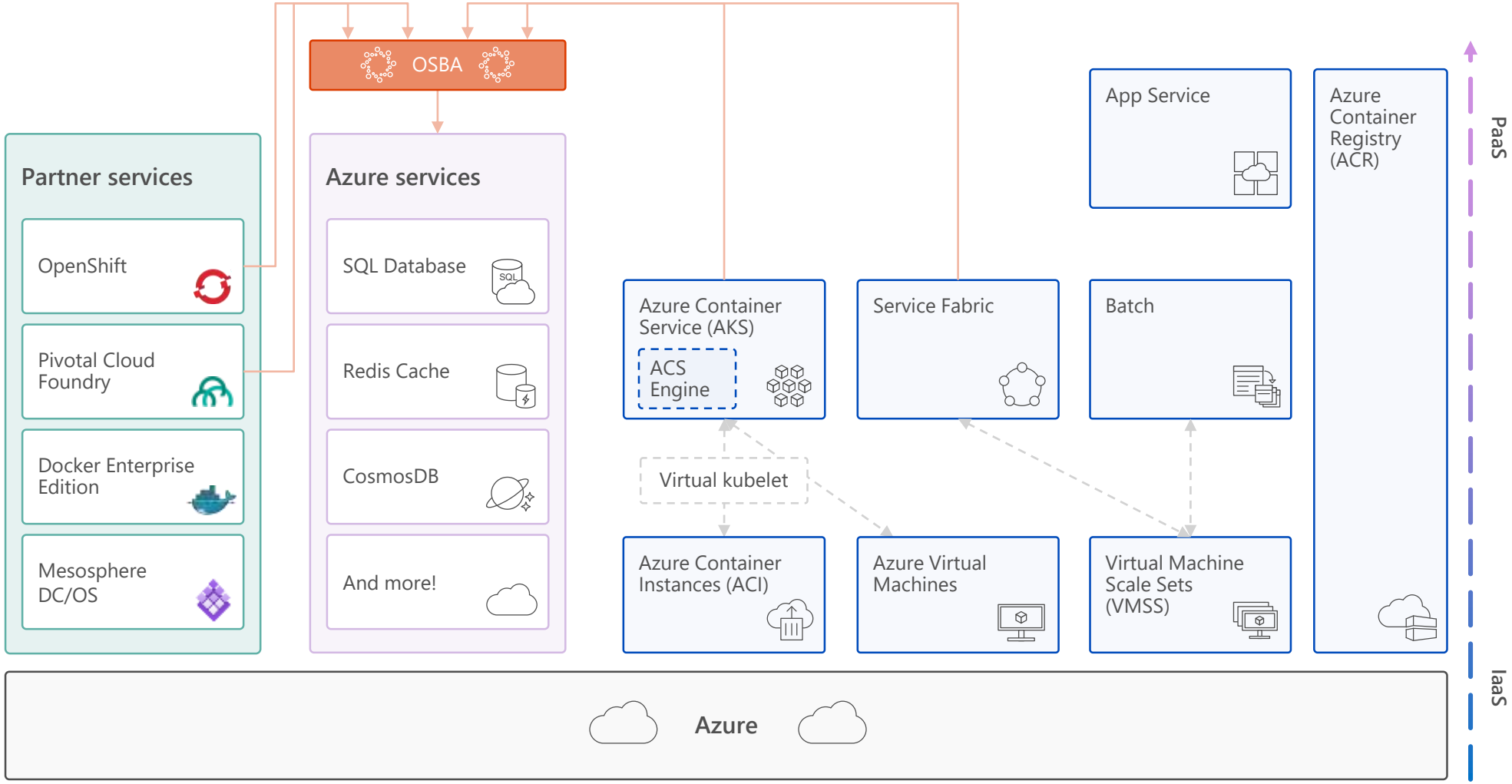
Azure Container Instances (ACI)

Azure Container Registry

Open Service Broker API (OSBA)

Release Automation Tools

Open Service Broker for Azure (OSBA)



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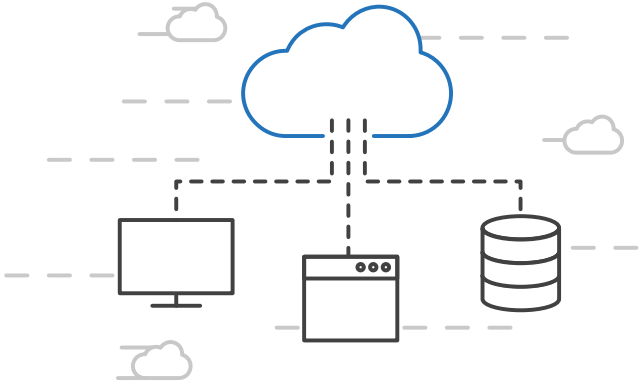
Azure Container Registry

Open Service Broker API (OSBA)

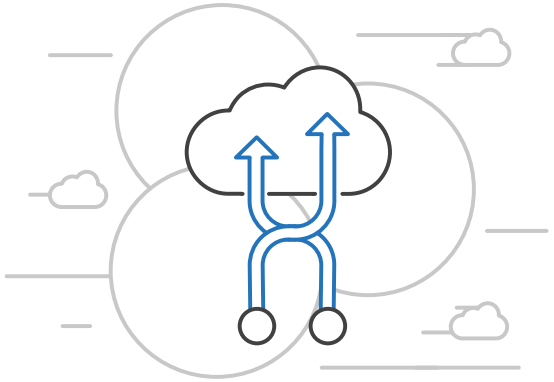
Release Automation Tools

Open Service Broker for Azure (OSBA)

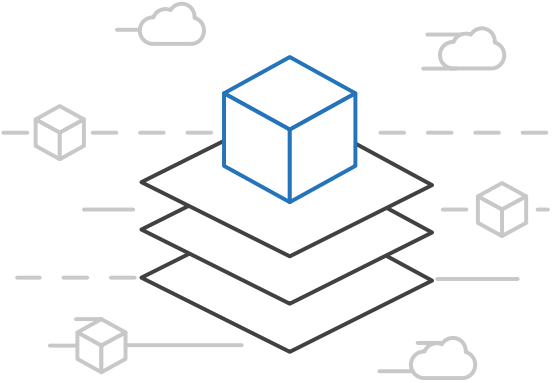
Connecting containers to Azure services and platforms



A standardized way to connect with Azure services



Simple and flexible service integration



Compatible across numerous platforms

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Azure Container Instances (ACI)

Azure Container Registry

Open Service Broker API (OSBA)

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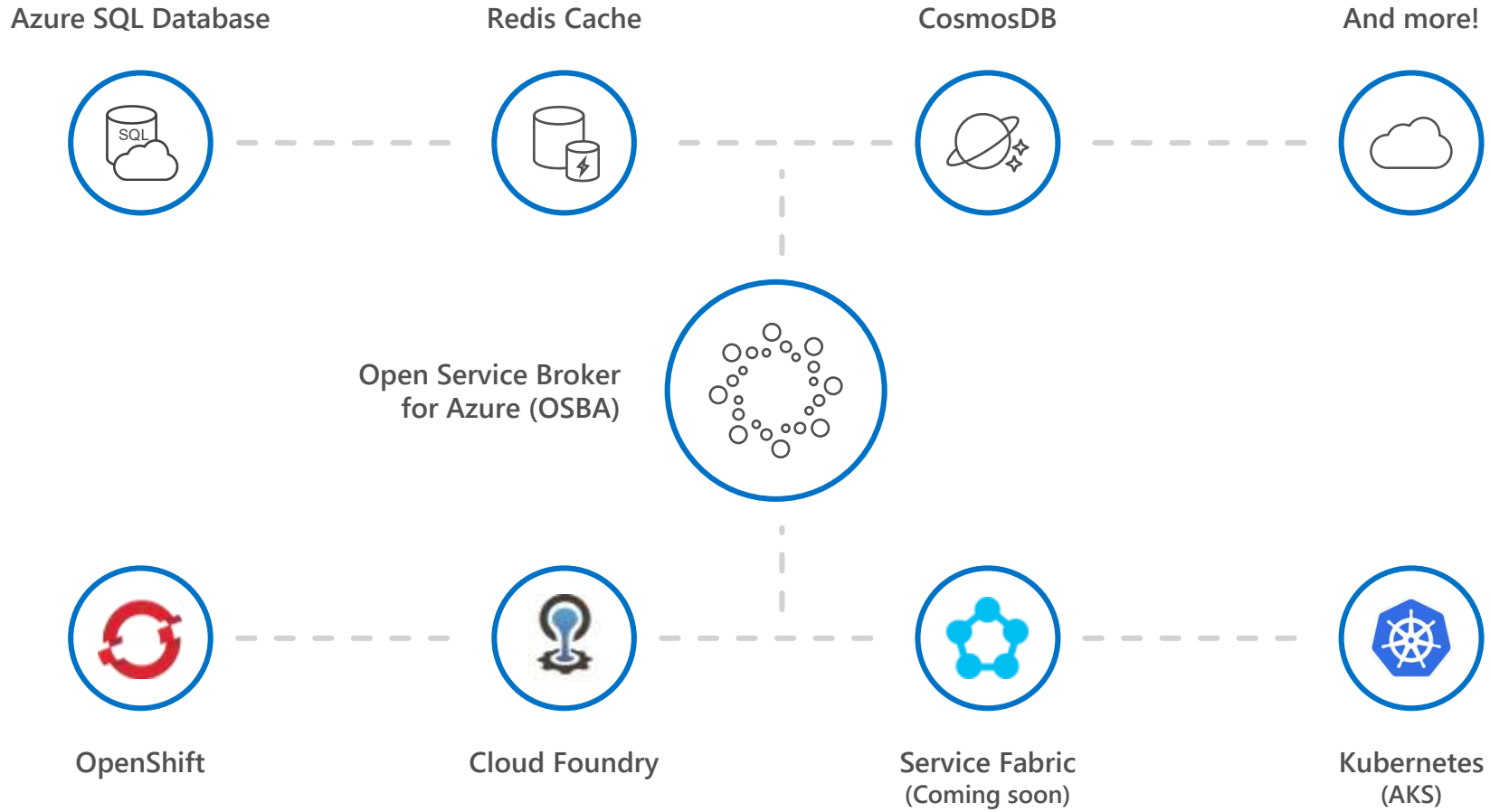
Open Service Broker for Azure (OSBA)

An implementation of the Open Service Broker API



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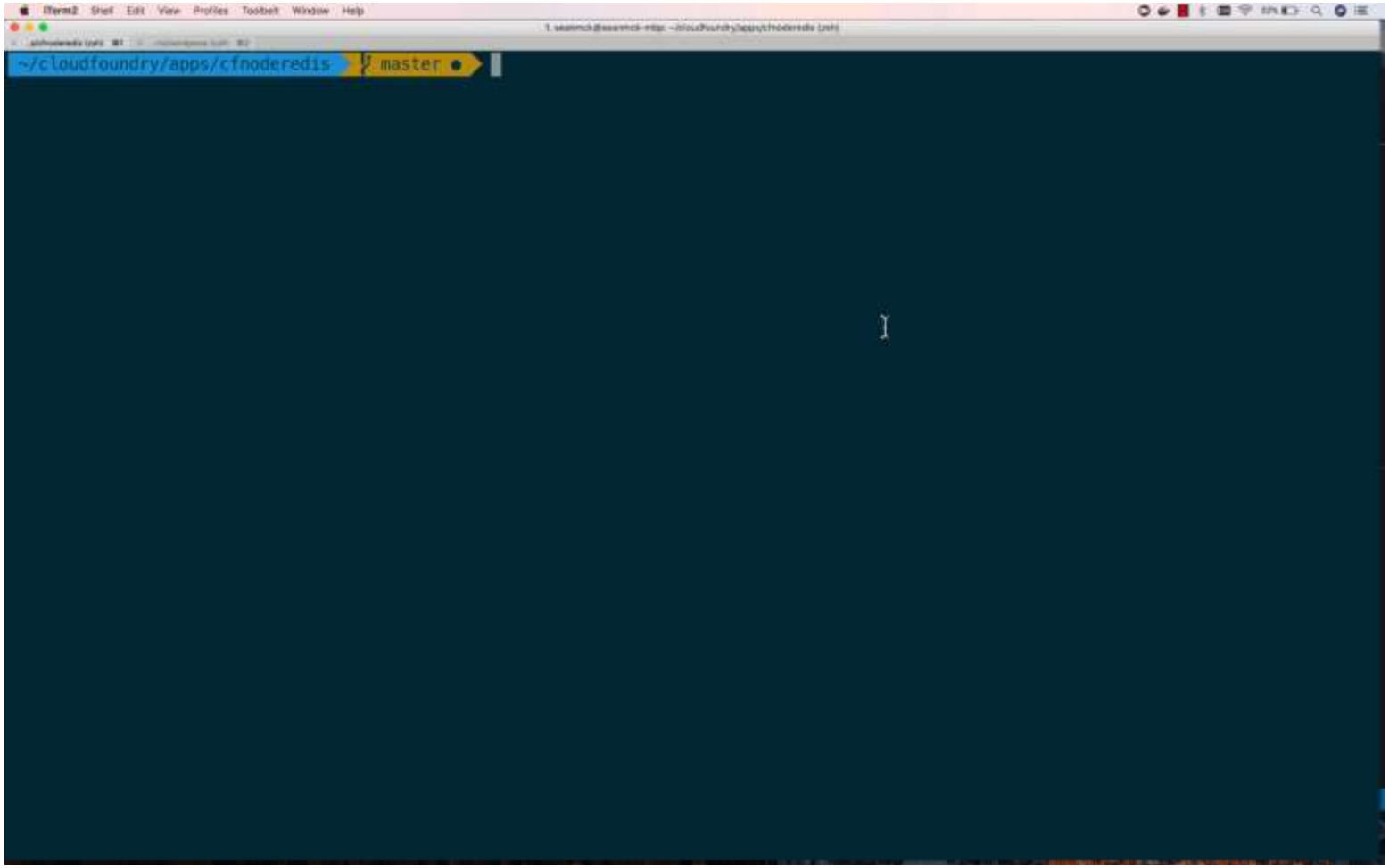
Azure Container Registry

Open Service Broker API (OSBA)

Release Automation Tools

Open Service Broker for Azure (OSBA)

OSBA in action



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Azure Container Instances (ACI)

Azure Container Registry

Open Service Broker API (OSBA)

Release Automation Tools

Open Service Broker for Azure (OSBA)

Getting started with ease

```
$ helm repo add azure Azure/helm-charts

$ helm install azure/service-broker

$ helm install azure/wordpress
```

Azure Container Service (AKS)

Azure Container Instances (ACI)

Azure Container Registry

Open Service Broker API (OSBA)

Release Automation Tools

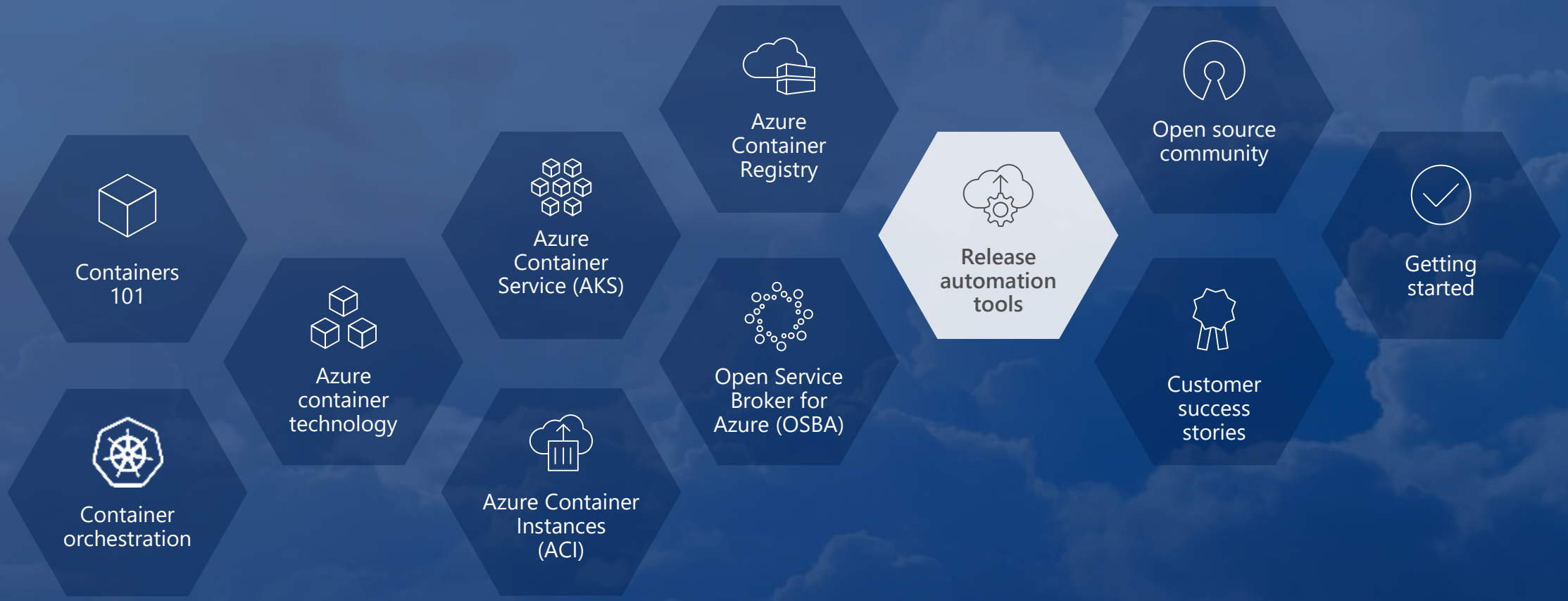
Open Service Broker for Azure (OSBA)

Resources

- OSBA announcement blog
- OSBA on GitHub
- Integrating with Azure-managed services using OSBA

Open Service Broker for Azure

Release automation tools



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Azure Container Instances (ACI)

Azure Container Registry

Open Service Broker API (OSBA)

Release Automation Tools

Release automation tools

Simplifying the Kubernetes experience

DRAFT

Streamlined Kubernetes development

HELM

The package manager for Kubernetes

BRIGADE

Event-driven scripting for Kubernetes

KASHTI

Visualization dashboard for Brigade

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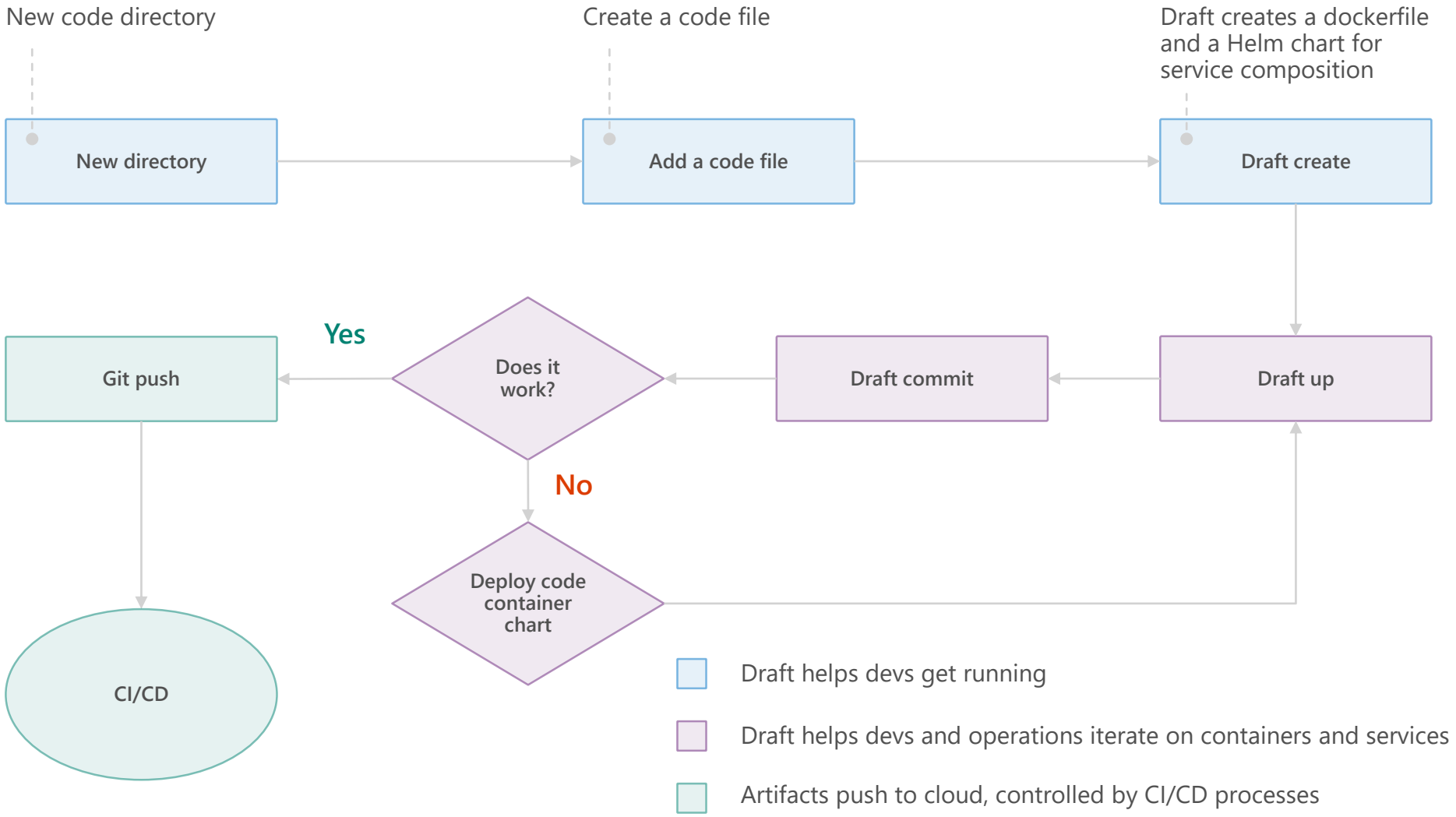
Azure Container Instances (ACI)

Azure Container Registry

Open Service Broker API (OSBA)

Release Automation Tools

Release automation workflow



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Azure Container Registry

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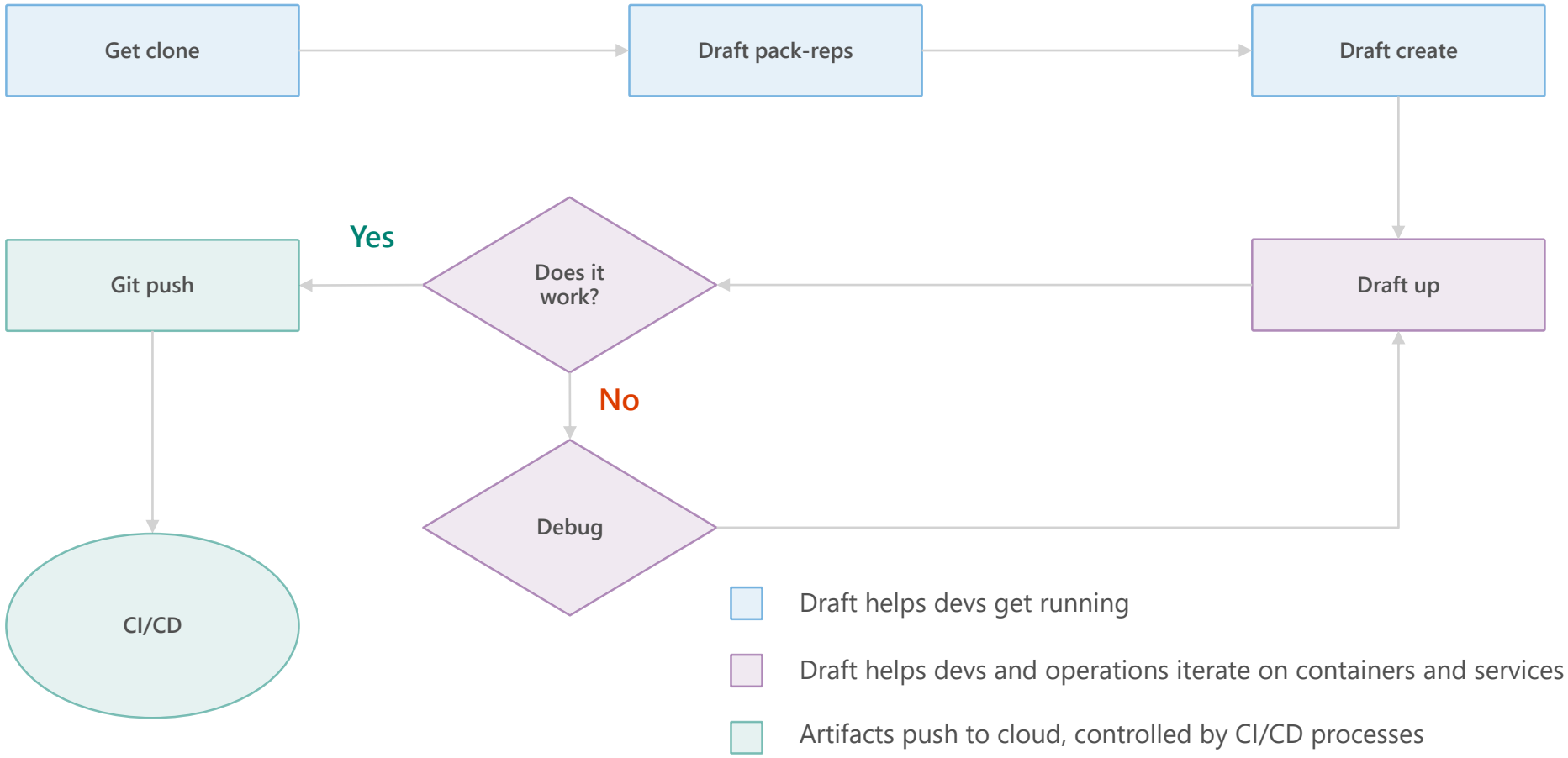
Release Automation Tools

Release automation workflow

Once developers are up and running—or working on a service that is in a complex system—Draft **ALSO** helps devs ignore artifacts and focus on code



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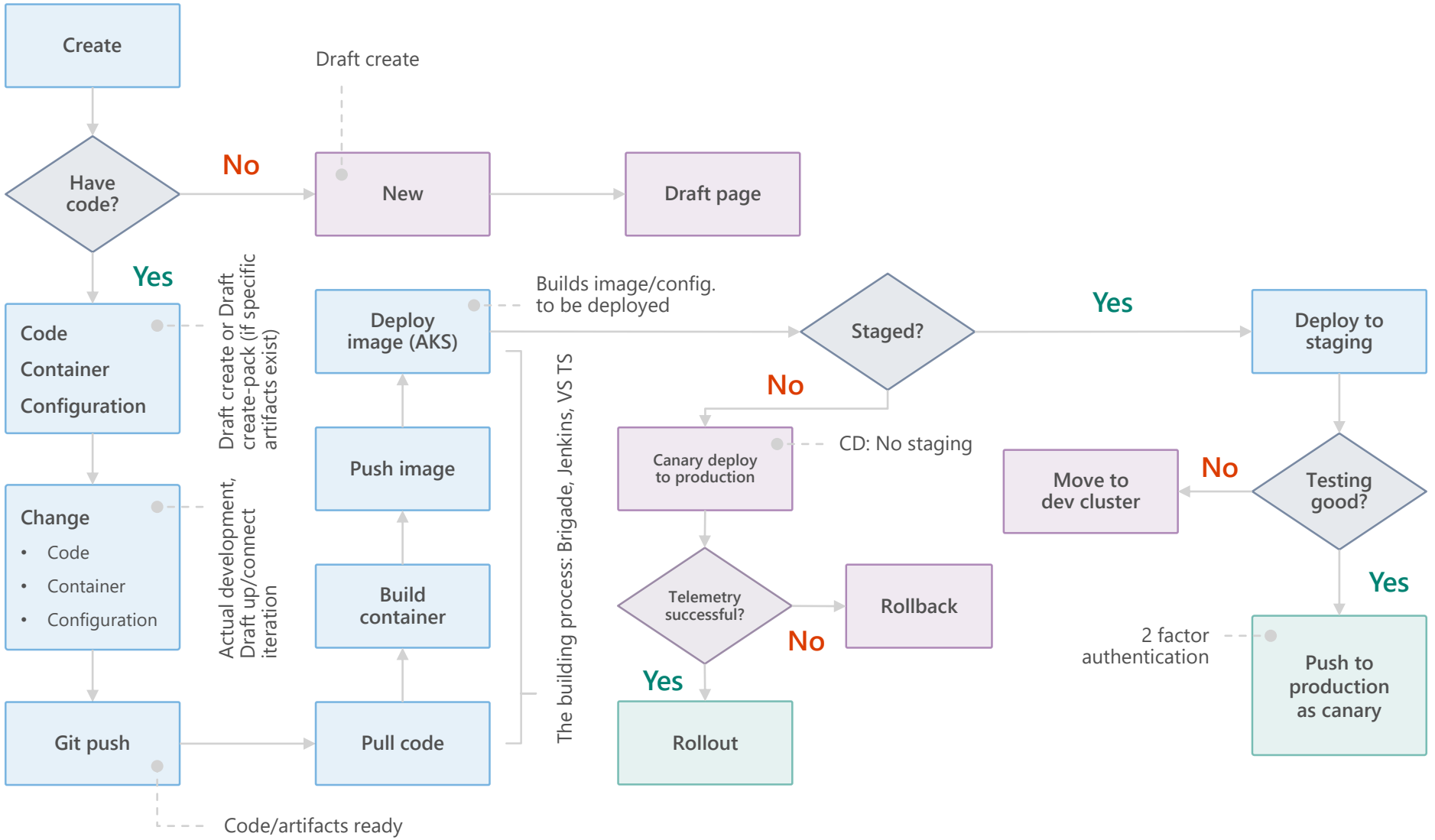
Release automation workflow



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Azure Container Instances (ACI)

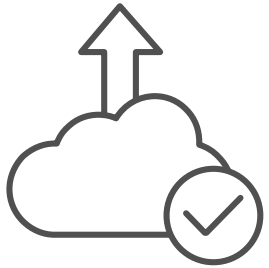
Azure Container Registry

Open Service Broker API (OSBA)

Release Automation Tools

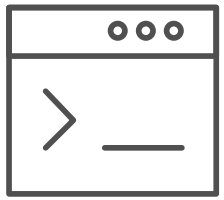
Draft

Simple app development and deployment – into any Kubernetes cluster



Simplified development

Using two simple commands, developers can now begin hacking on container-based applications without requiring Docker or even installing Kubernetes themselves



Language support

Draft detects which language your app is written in, and then uses packs to generate a Dockerfile and Helm Chart with the best practices for that language

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Azure Container Instances (ACI)

Azure Container Registry

Open Service Broker API (OSBA)

Release Automation Tools

Draft

Draft in action

Azure Container Service (AKS)

Azure Container Instances (ACI)

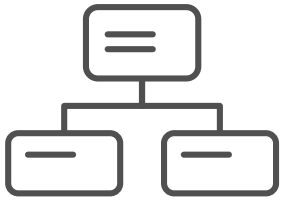
Azure Container Registry

Open Service Broker API (OSBA)

Release Automation Tools

Helm

The best way to find, share, and use software built for Kubernetes



Manage complexity

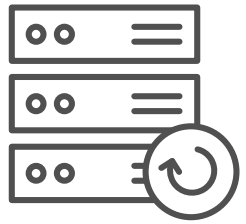
Charts can describe complex apps; provide repeatable app installs, and serve as a single point of authority

Easy updates

Take the pain out of updates with in-place upgrades and custom hooks

Simple sharing

Charts are easy to version, share, and host on public or private servers



Rollbacks

Use `helm rollout` to roll back to an older version of a release with ease

Azure Container Service (AKS)

Azure Container Instances (ACI)

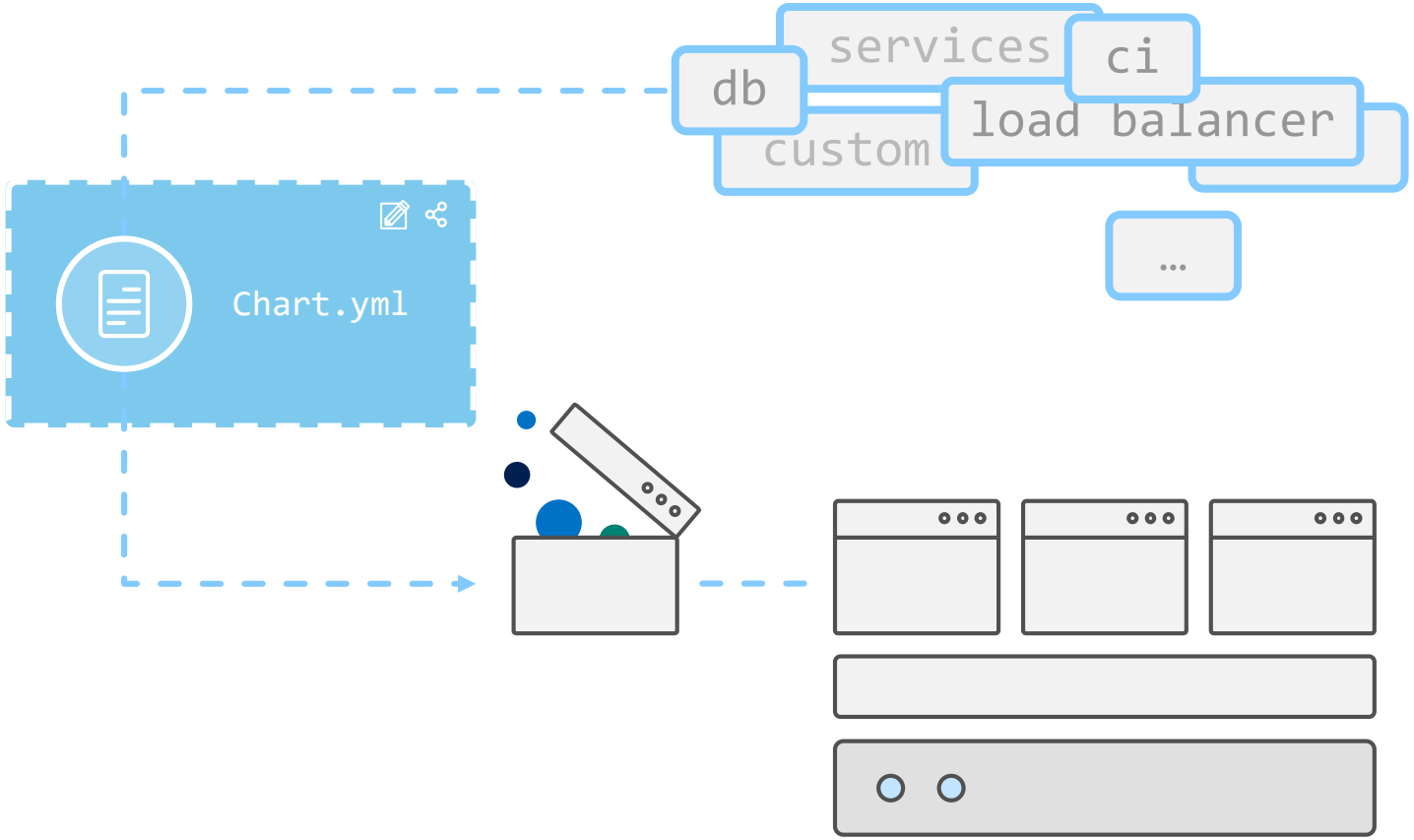
Azure Container Registry

Open Service Broker API (OSBA)

Release Automation Tools

Helm

Helm Charts helps you define, install, and upgrade even the most complex Kubernetes application



Azure Container Service (AKS)

Azure Container Instances (ACI)

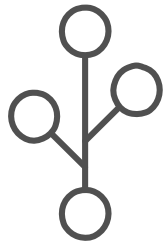
Azure Container Registry

Open Service Broker API (OSBA)

Release Automation Tools

Brigade

Run scriptable, automated tasks in the cloud — as part of your Kubernetes cluster



Simple, powerful pipes

Each project gets a `brigade.js` config file, which is where you can write dynamic, interwoven pipelines and tasks for your Kubernetes cluster

Runs inside your cluster

By running Brigade as a service inside your Kubernetes cluster, you can harness the power of millions of available Docker images

Azure Container Service (AKS)

Azure Container Instances (ACI)

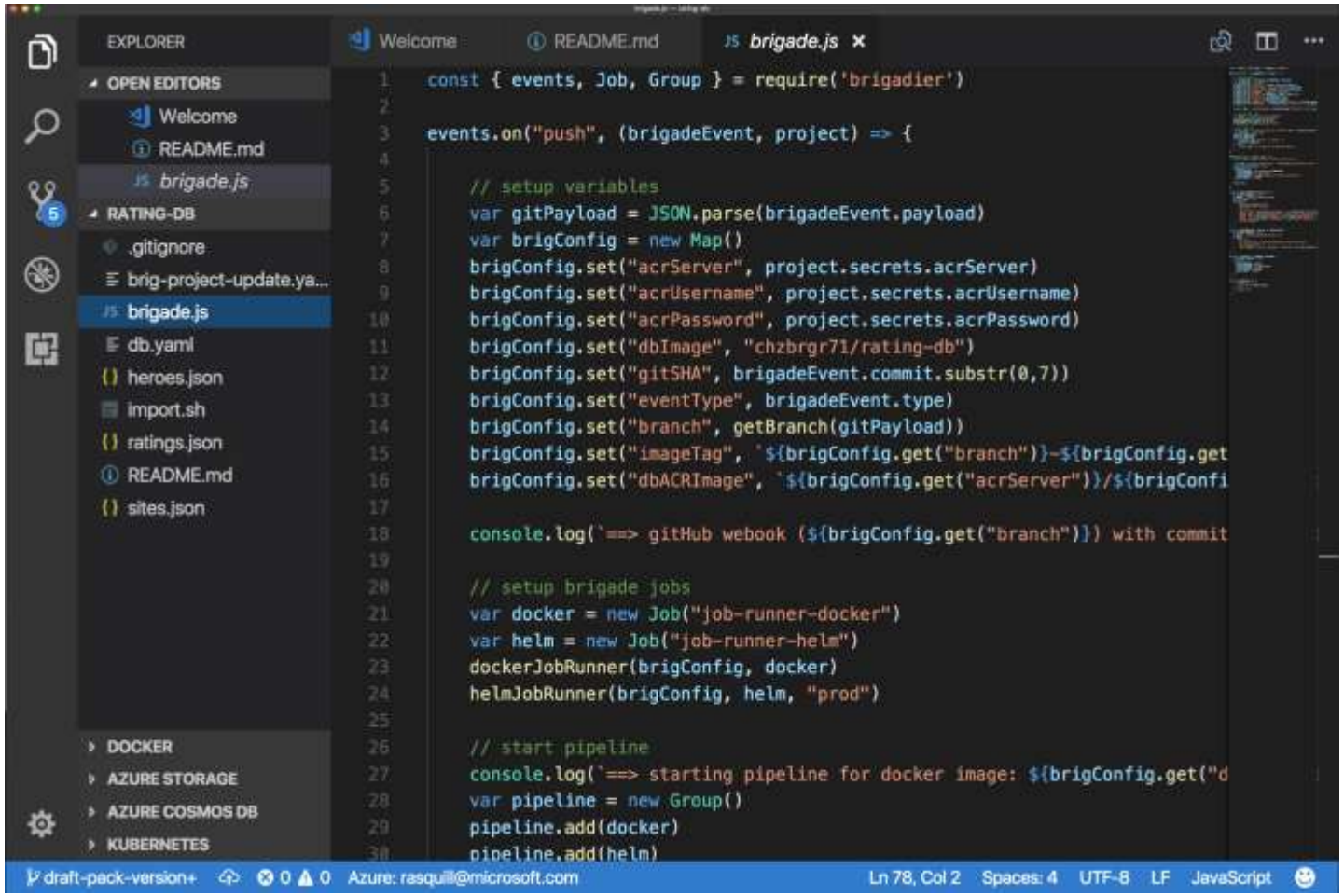
Azure Container Registry

Open Service Broker API (OSBA)

Release Automation Tools

Brigade

Brigade in action



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Azure Container Instances (ACI)

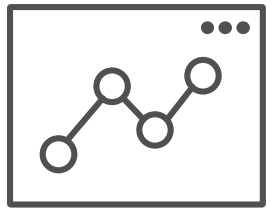
Azure Container Registry

Open Service Broker API (OSBA)

Release Automation Tools

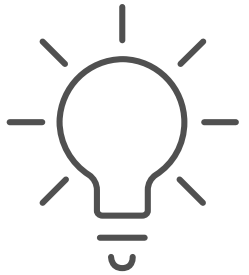
Kashti

A simple UI to display build results and logs



Simple visualizations

A web dashboard for Brigade, helping to easily visualize and inspect your Brigade builds



Driving deep insights

Make Brigade DevOps workflows—projects, scripts, and jobs—and their events visible instantly

Azure Container Service (AKS)

Azure Container Instances (ACI)

Azure Container Registry

Open Service Broker API (OSBA)

Release Automation Tools

Kashti

Dashboards for Brigade pipelines

Builds dashboard

Events log

Azure Container Service (AKS)

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Open Service Broker API (OSBA)

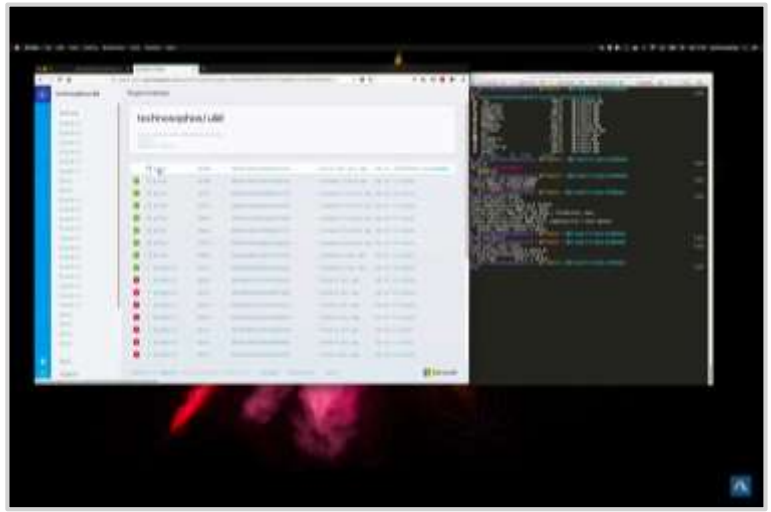
Release Automation Tools

Release automation tools

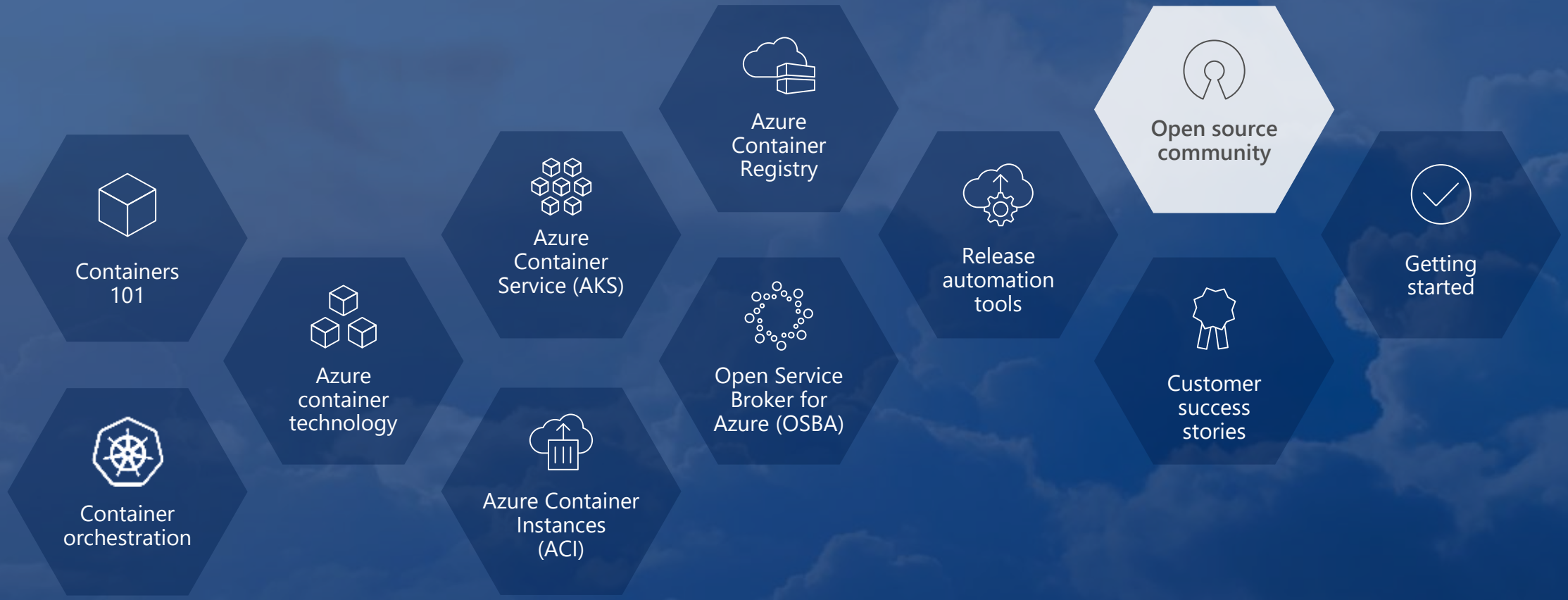
Resources

- Draft webpage
- Helm webpage
- Brigade webpage
- Kashti announcement blog

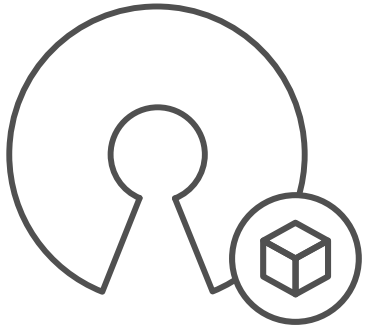
Brigade Demo with Kashti dashboard



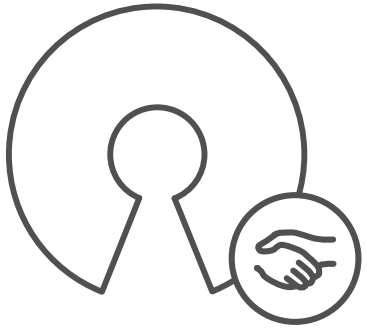
Open source community



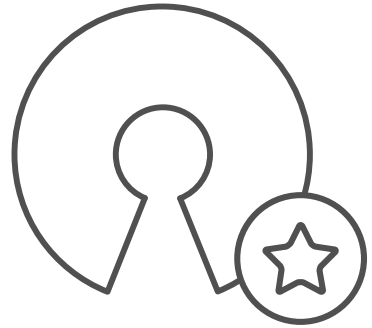
Community culture



Open source container code contributions

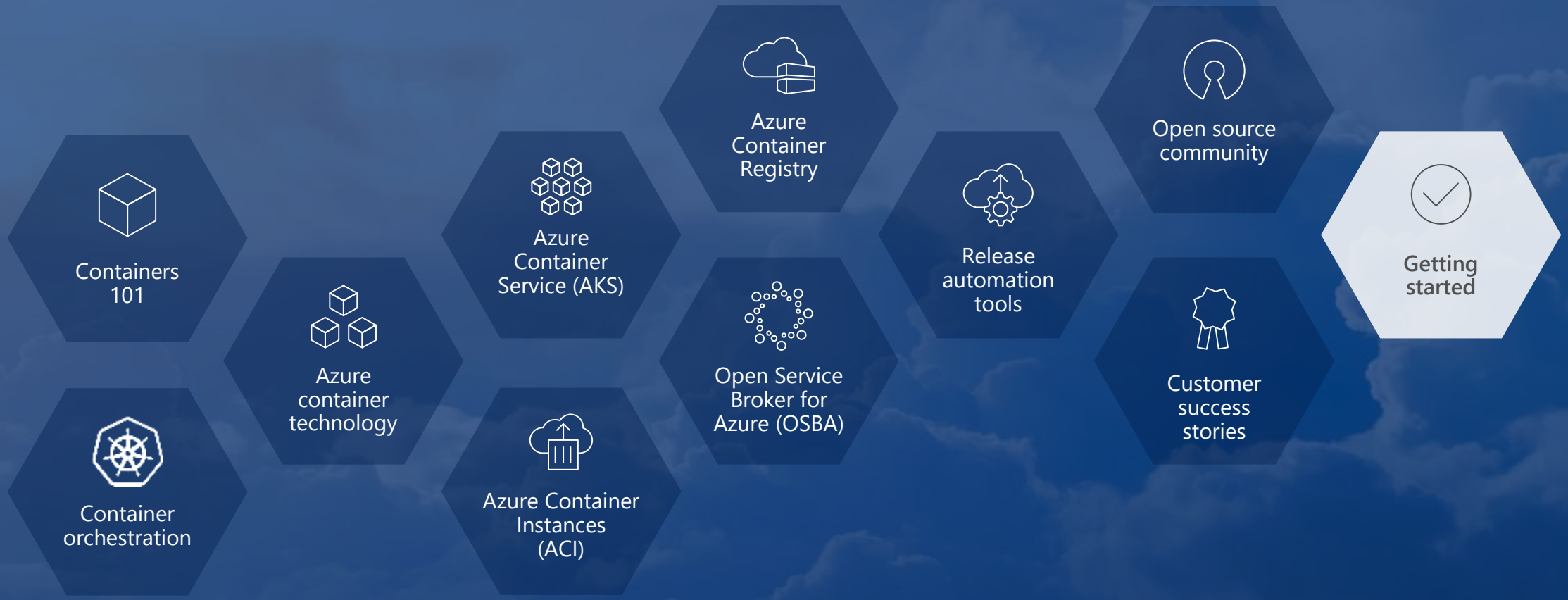


Numerous open source project builds



Open source community leadership

Getting started



Get started **today**!

Sign up
for Azure

Check out
resources

Spin up an
AKS cluster

Check out **resources**

- Azure Kubernetes Service (AKS)
- Azure Container Instances (ACI)
- Azure Container Registry
- OSBA announcement blog
- Draft webpage
- Helm webpage
- Brigade webpage
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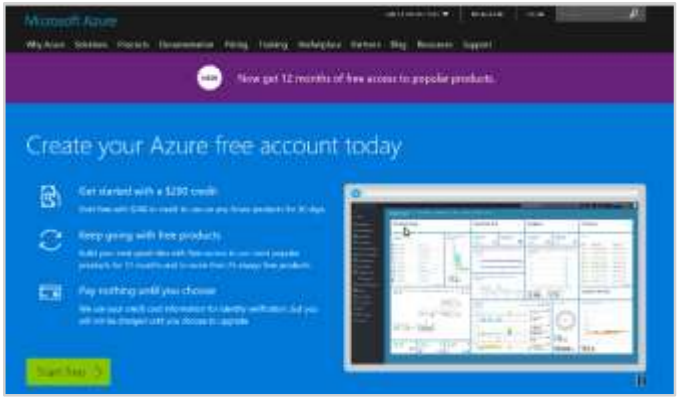
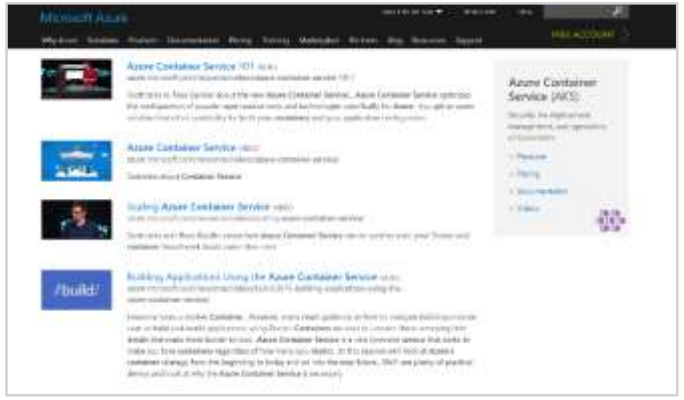
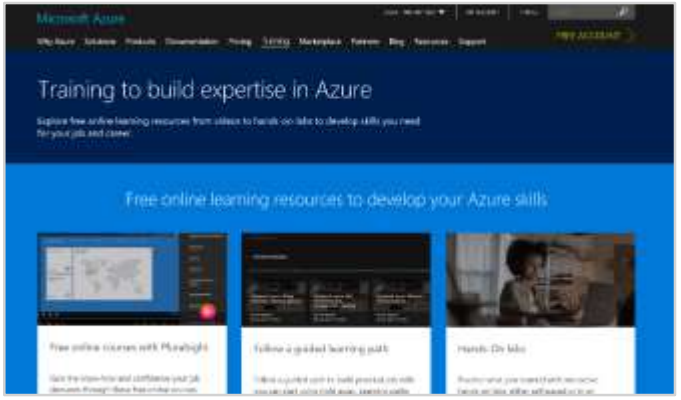
Sign up for a free Azure account



Check out the Azure container videos page

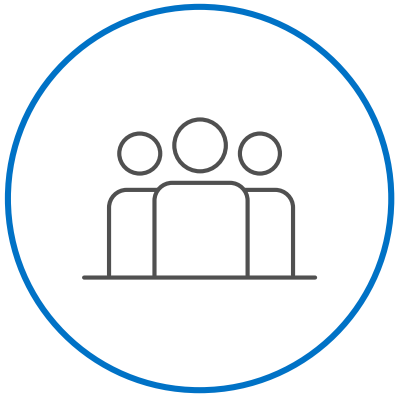


Hone your skills with Azure training



Get the code from GitHub

Connect with us



Core team

PM: Gabe Monroy, @gabrtv

PM: Sean McKenna

OSS: David Dennis

PMM: Anand Chandramohan

DX: Jim Zimmerman

CDA: Bryan Liston

Community

Brendan Burns, @brendandburns

Michelle Noorali

Partner team

Morgan Pettis

Leon Jones

Dan Sandlin

Thank you!