Microsoft

Bring your own container (BYOC) - Running your containers on Microsoft Azure

Marcus Robinson
Technical Program Manager
Commercial Software Engineering
marcus.robinson@microsoft.com
@techdiction

Slides and demo scripts available at:
https://github.com/marrobi/Microsoft-and-Containers

Containers deliver speed, flexibility, and savings

Availability

62%

Report reduction in MTTR

10X

Cost reduction in maintaining existing applications

Hyper-scale

41%

Move workloads across private/public clouds

Eliminate

"works on my machine" issues

Agility

13X

More software releases

65%

Reduction in developer onboarding time

State of App development Survey: Q1 2016, Cornell University case study

One platform delivers one journey for all applications

1

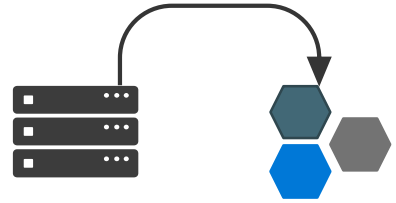
Containerize Legacy Applications

Lift and shift for portability and efficiency

2

Transform Legacy to Microservices

Look for shared services to transform

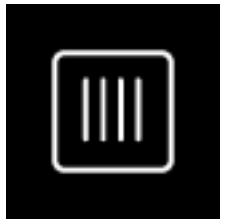


3

Accelerate New Applications

Greenfield innovation

Some Container vocabulary

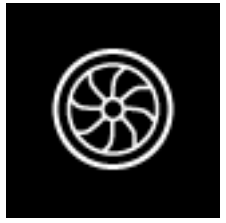


Container

The standard unit in which the processes reside and execute

Image

A packaged application. A container is created from an image.



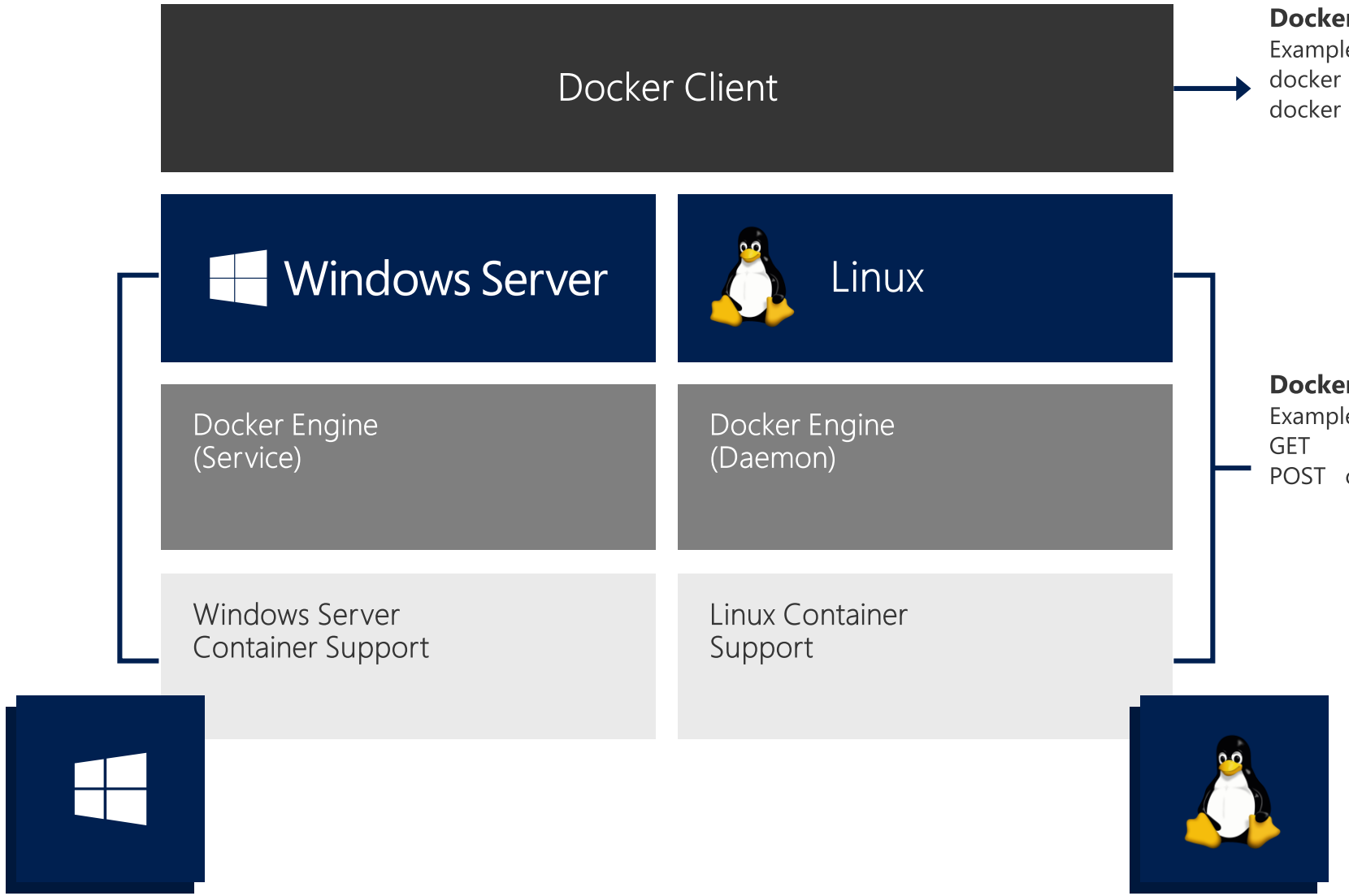
Container Runtime

Creates, ships and runs containers deployable on a physical or virtual, host locally, in a datacenter or cloud service provider

Container Registry

Cloud or server based storage and distribution service for your images

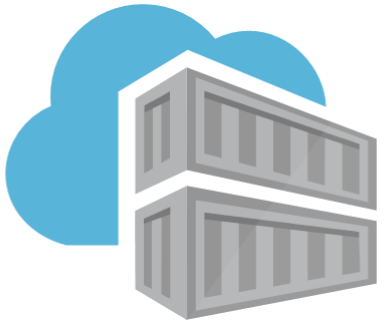
Windows & Linux



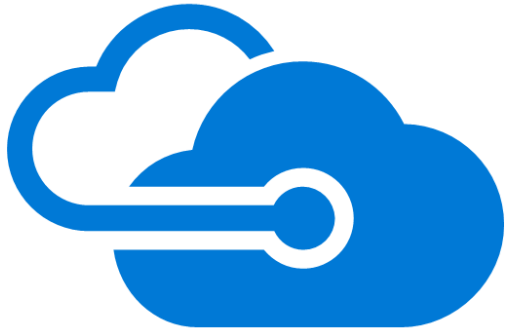
build → ship → run

Developer's Machine

CI/CD



Azure Container Registry



- IaaS
- Container Instances
- Kubernetes Service
- Service Fabric
- Partner Solutions
- Batch
- Web App for Containers

Azure Container Registry

- Private Docker Registry on Azure
- Authentication with Azure Active Directory
- Webhook integration
  - Trigger events on image push (update) or delete
- Geo-replication
- Preview: Build container images – build + ship! Can build from git commit.

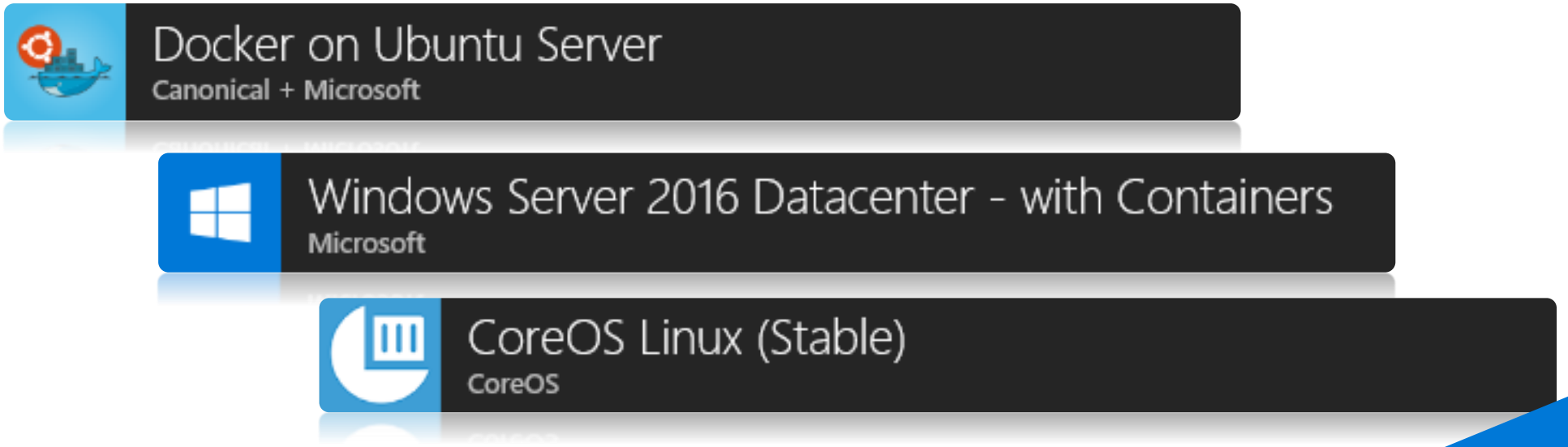

DEMO
Build & Ship to
Azure Container Registry

Infrastructure As A Service

Virtual Machines

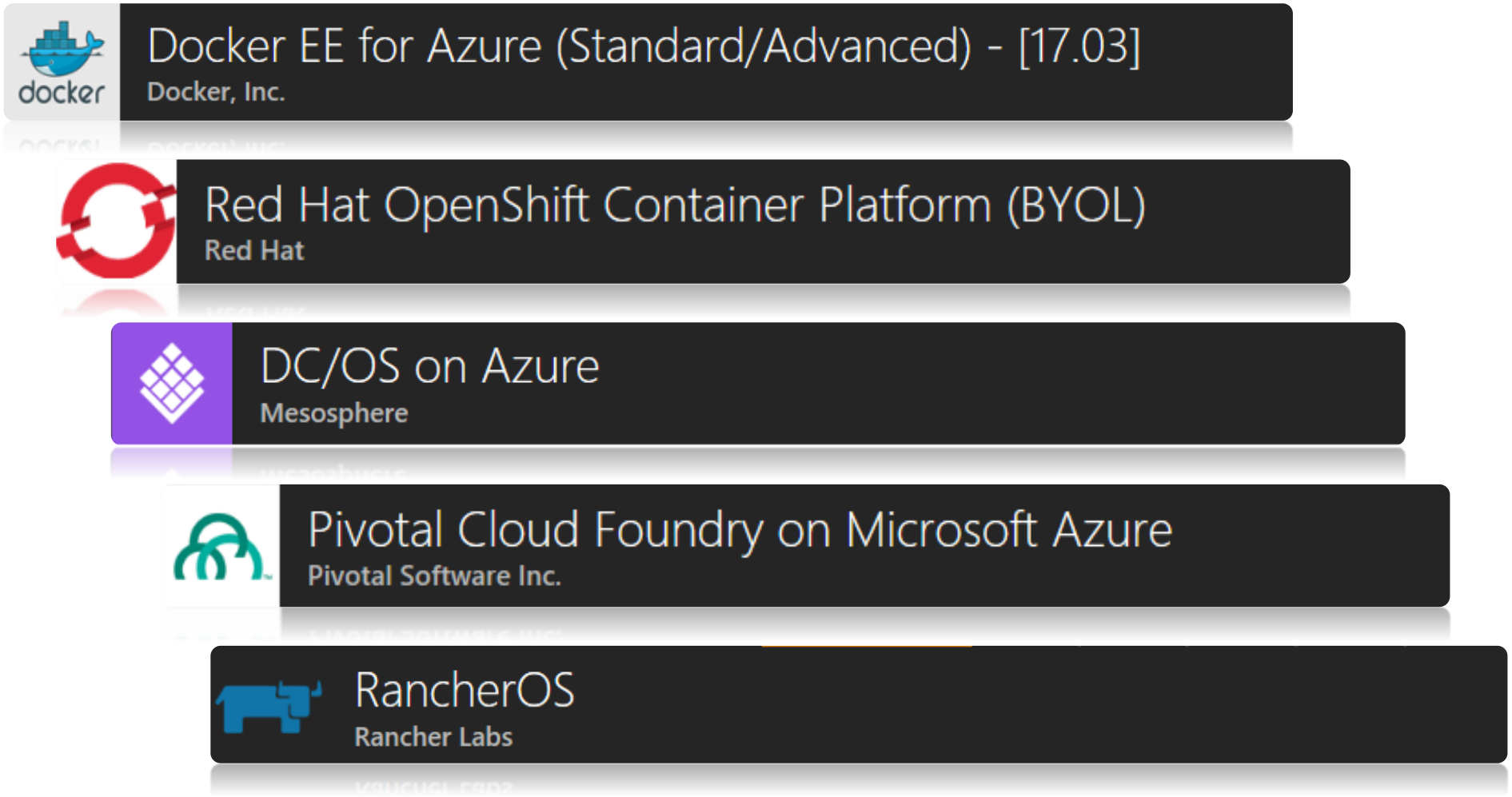
Virtual Machines on Azure

- Windows and Linux images available in the Azure Marketplace with Docker preinstalled
- Great for Dev & Test scenarios
- Need to support OS and manage the infrastructure
- Billed for the compute resource used by the minute



Windows: GA
Linux: GA

Partner solutions using IaaS



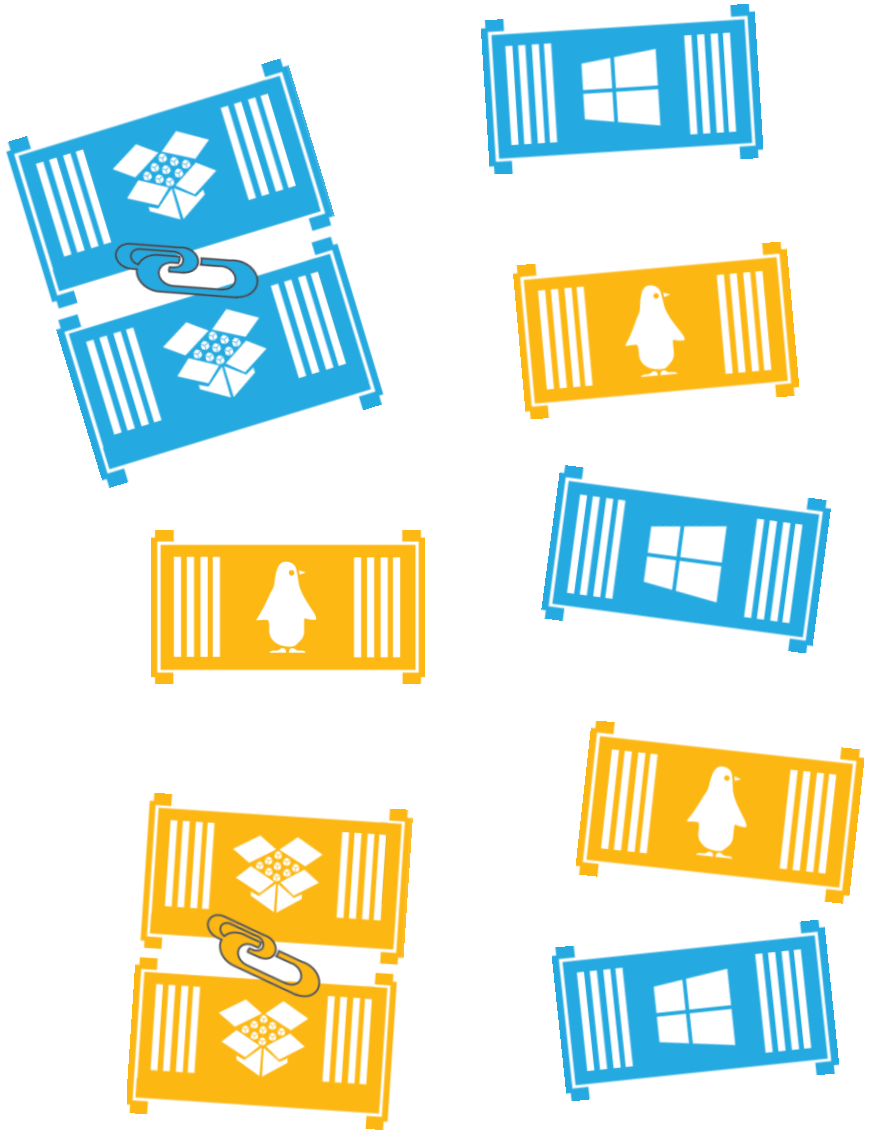
and more at https://azuremarketplace.microsoft.com/en-us/marketplace/

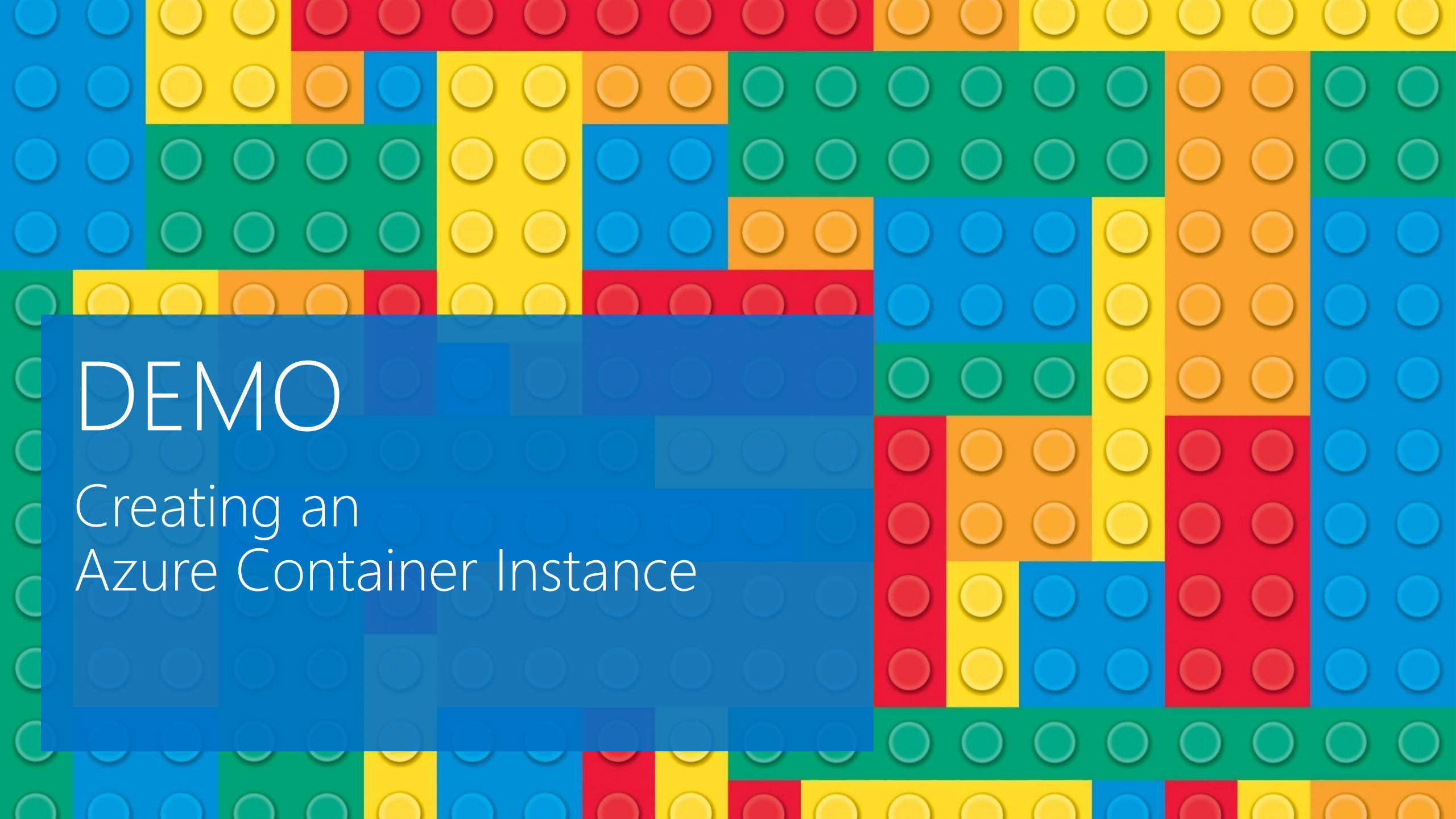
Azure Container Instances

Containers without Servers

Azure Container Instances

- Just containers – **no host VM**
- Can deploy containers that are always deployed together into Container Groups
- Can be used stand alone, but more likely be utilised by other services
- Billed by the second for CPU and memory usage




DEMO
Creating an
Azure Container Instance

Azure Kubernetes Service

Orchestration & Microservices

Kubernetes: the de-facto orchestrator

Portable

Public, private, hybrid, multi-cloud

Extensible

Modular, pluggable, hookable, composable

Self-healing

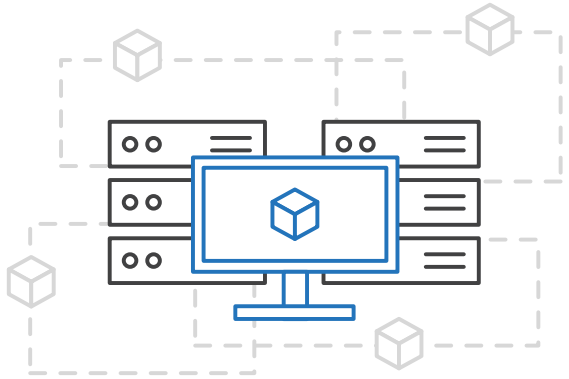
Auto-placement, auto-restart, auto-replication, auto-scaling

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

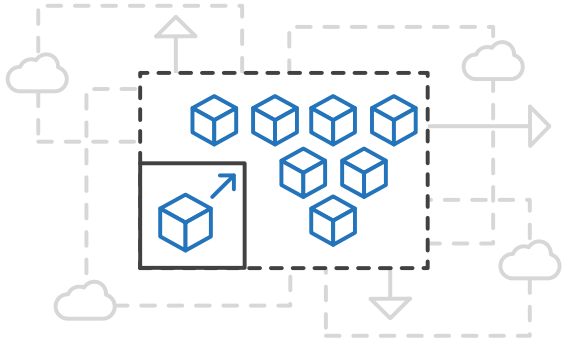
Azure Container Service (AKS)

Simplify the deployment, management, and operations of Kubernetes



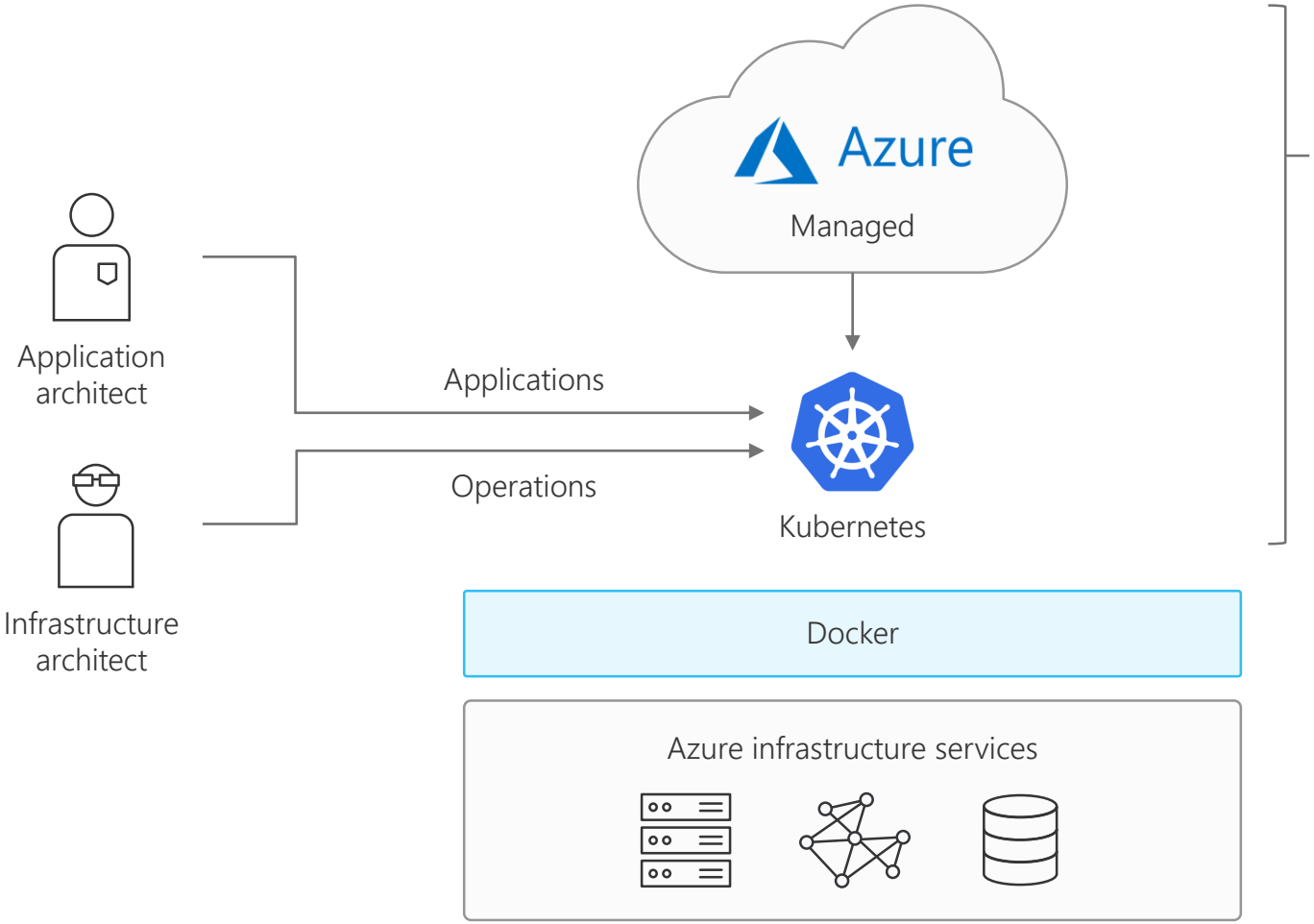
Focus on your containers not the infrastructure

Work how you want with open-source APIs



Scale and run applications with confidence

A fully managed Kubernetes cluster



- Managed control pane
- Automated upgrades, patches
- Easy cluster scaling
- Self-healing
- Cost savings

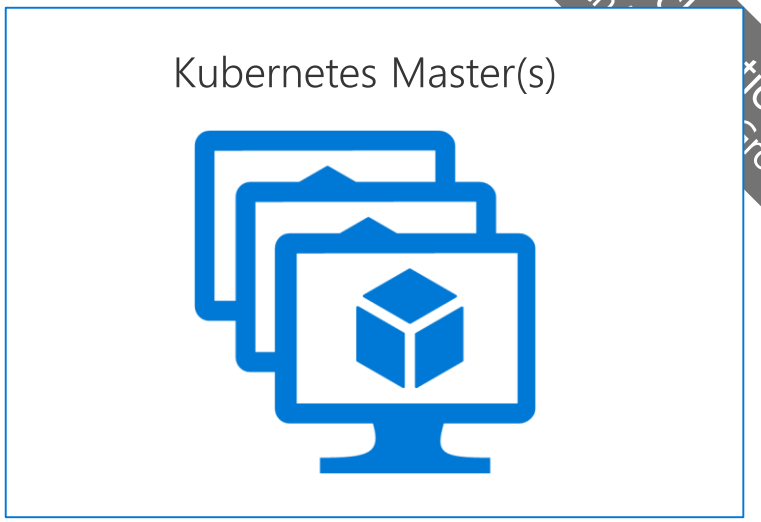

DEMO
Deploying to Kubernetes on AKS

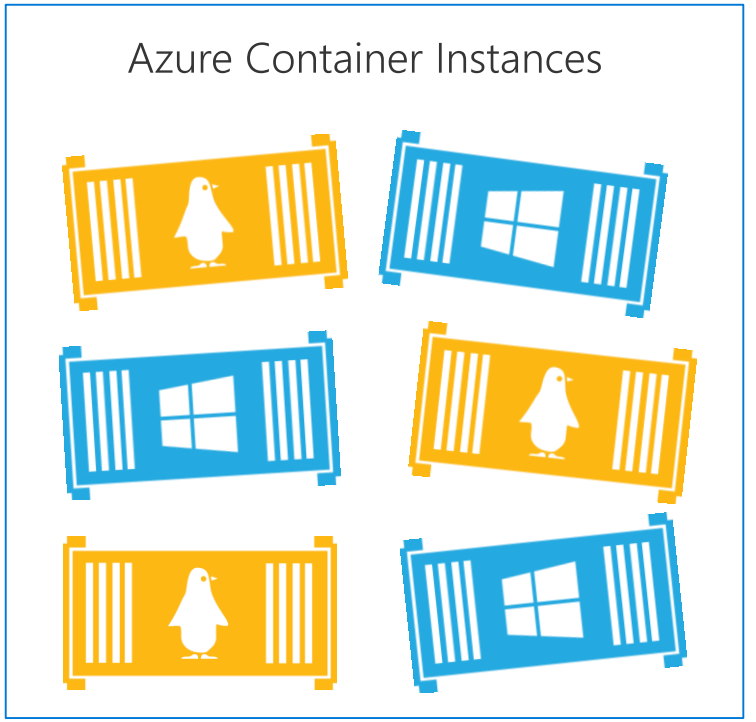
Kubernetes and ACI

Bringing ACS/AKS + ACI together

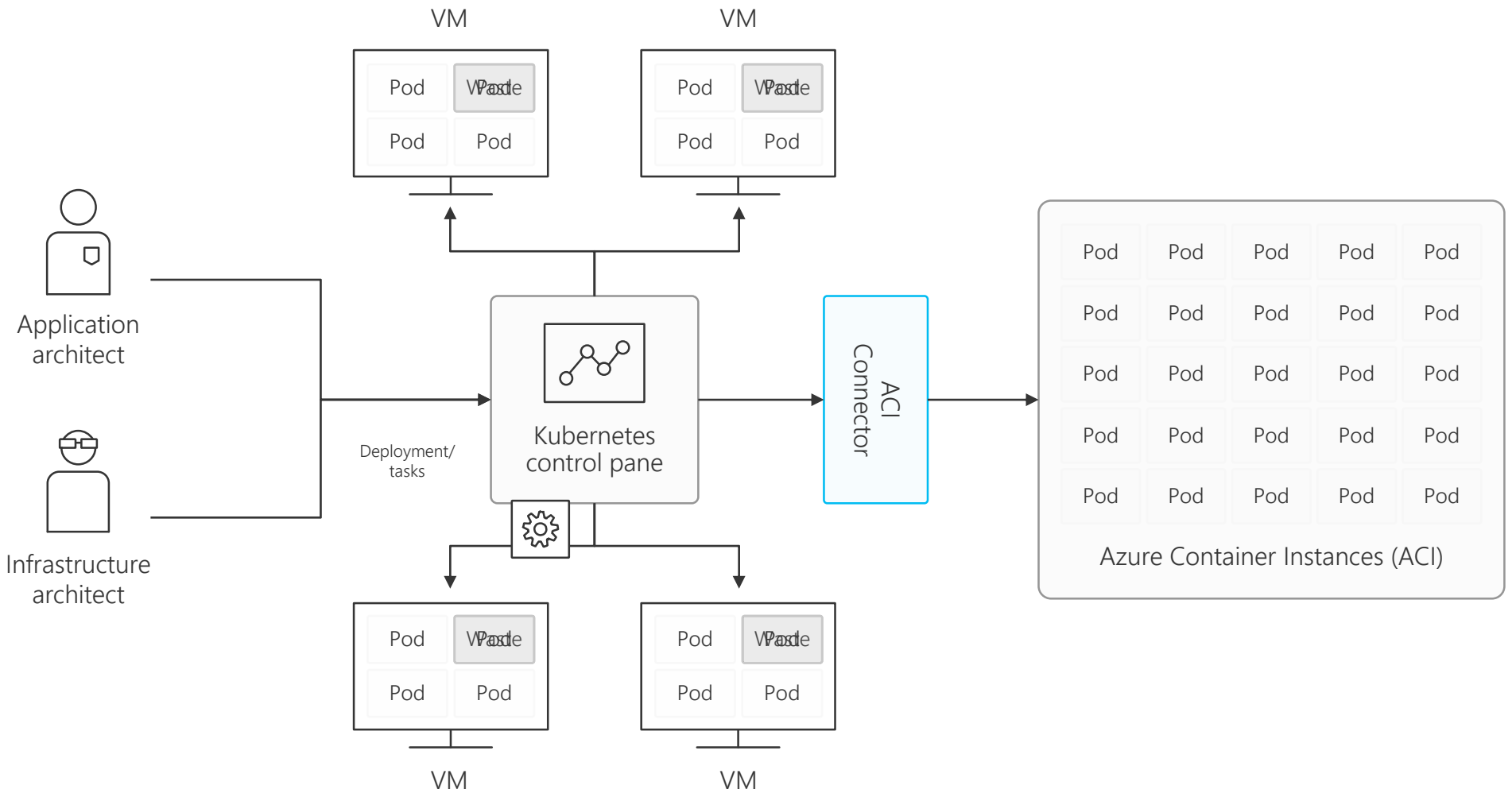
ACI Connector PREVIEW

- Allows Kubernetes clusters to deploy Azure Container Instances.
- Registers into the Kubernetes as a Node with unlimited capacity
- On-demand and near instantaneous container compute
- Unlimited capacity with zero infrastructure to manage
- Utilize both VMs and container instances simultaneously in the same cluster





Bursting with the ACI Connector




DEMO
Azure Container Instances
with Kubernetes on
Azure Container Services

Service Fabric

Orchestration, microservices, programming models

Service Fabric: Microservices platform

Build and deploy applications and microservices on Windows and Linux, at any scale, on any cloud

ASP.NET Core

Reliable Actors (.NET, Java)

Reliable Services (.NET, Java)

Containers

Executables

Programming Models

Dev & Ops Tooling

Orchestration

Lifecycle Management

Health & Monitoring

Always On Availability

Auto Scaling

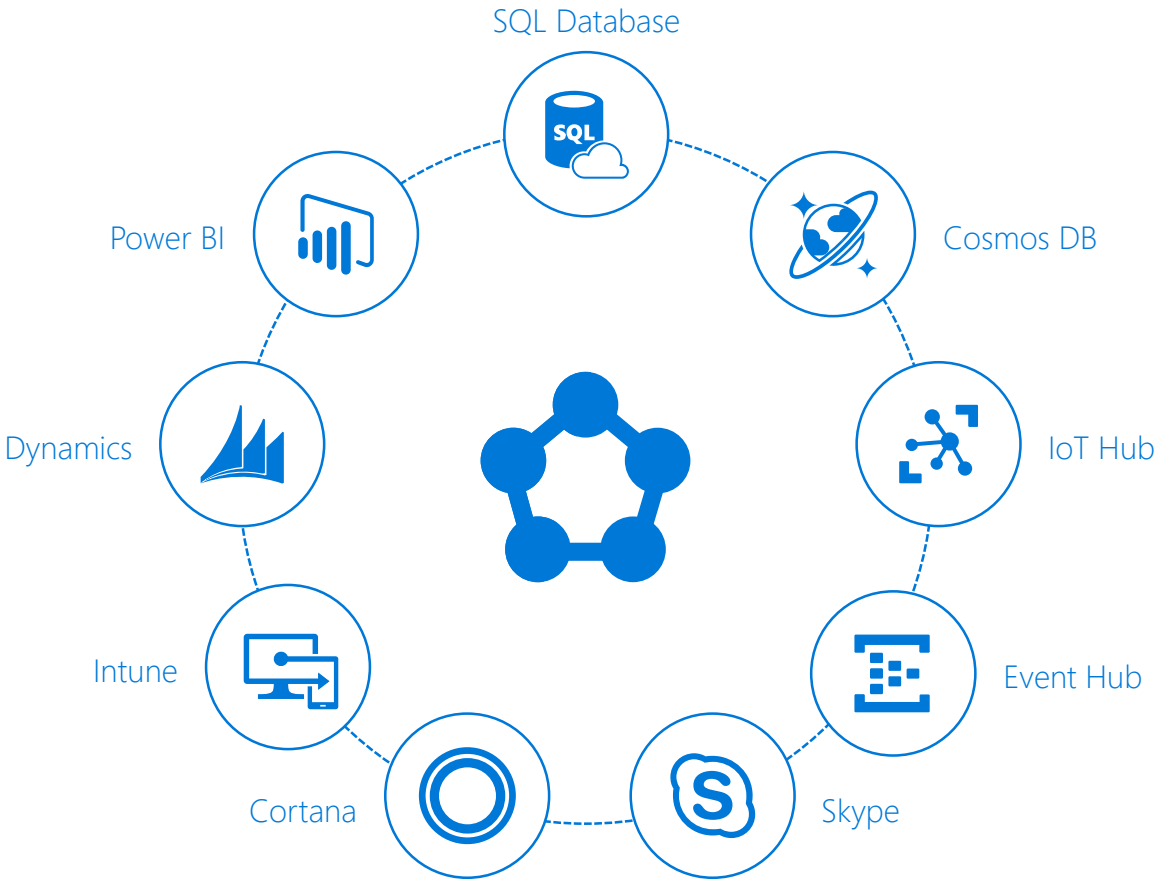
Dev machine

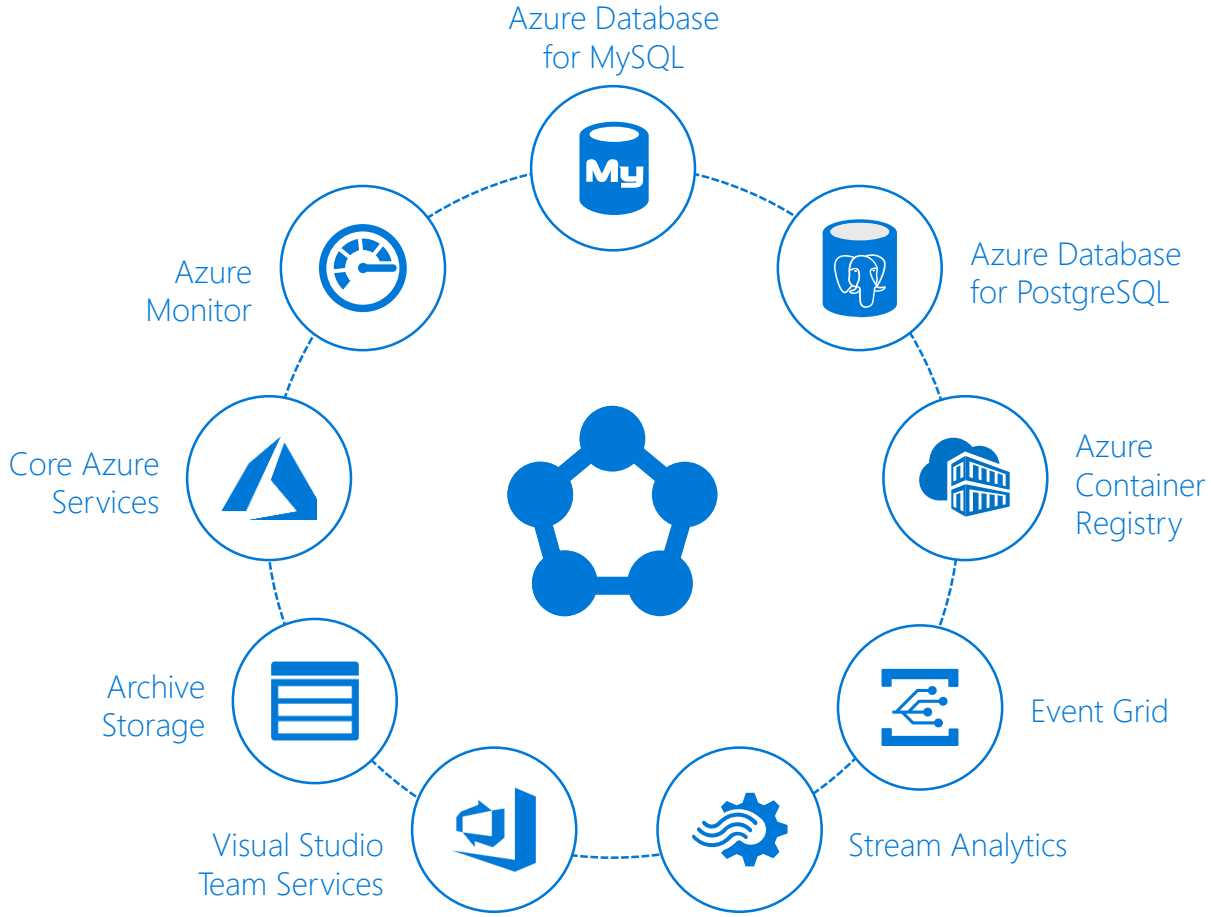
Any cloud

On-premises infrastructure

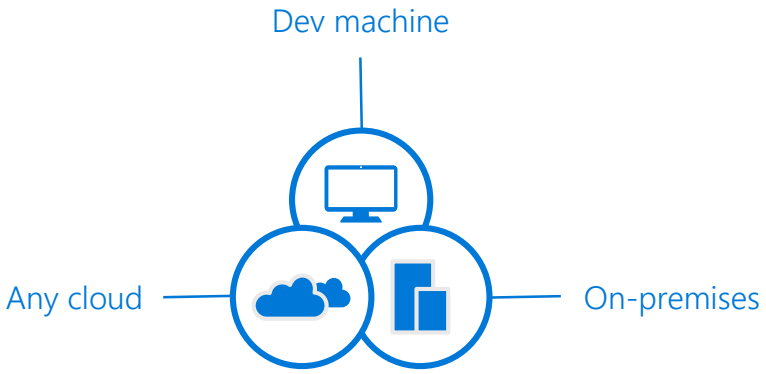
Azure

Powering Azure and Microsoft services





Azure Service Fabric Mesh



Service Fabric Standalone

Bring your own infrastructure

Azure Service Fabric

Dedicated Azure clusters

Azure Service Fabric Mesh

Fully managed microservices platform

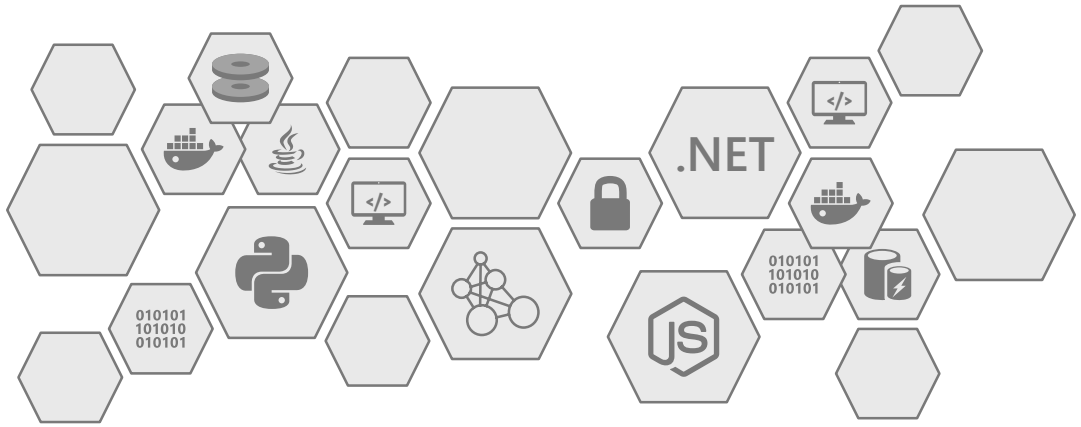
Azure Service Fabric Mesh

A fully-managed microservices platform for business critical applications

Microservices development

Serverless infrastructure

Scale on demand



Lifecycle management

Pay only for what you use

Intelligent traffic routing

Microservice and container orchestration

Security & compliance

Health & monitoring

Request access to Service Fabric Mesh private preview:
http://aka.ms/sfmeshpreview

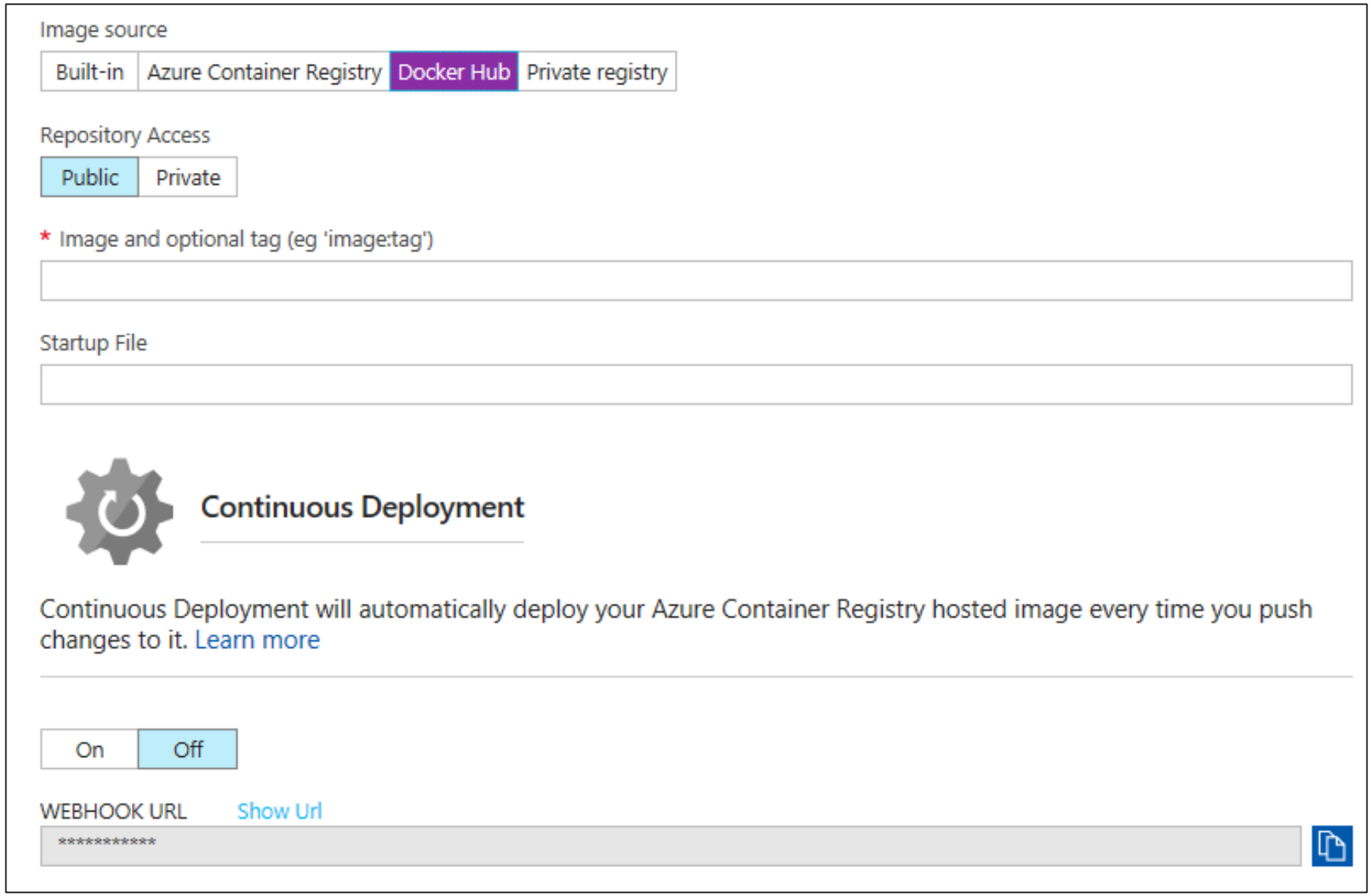
Azure Web App for Containers

Web sites, web applications – no servers

Azure Web App for Containers

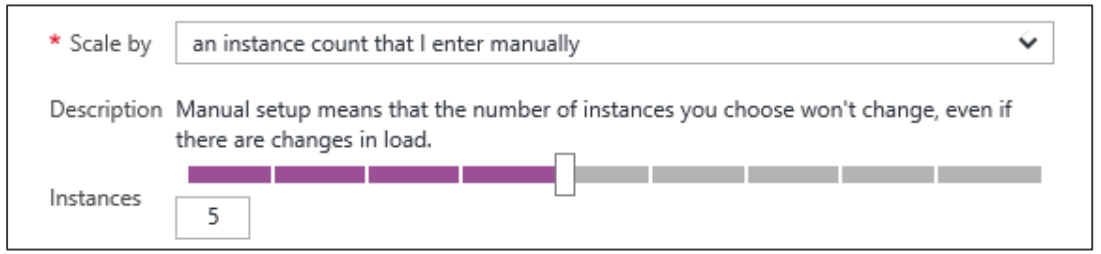
- Deploy Linux container-based **web apps** in seconds
- **Fully managed infrastructure** with auto scaling and load balancing
- **Built-in features to enable DevOps practices** including staging slots; rollback; testing-in-production; monitoring; and performance testing
- Integrated CI/CD capabilities with Docker Hub, Azure Container Registry, and VSTS
- Billed by the minute based on App Service Plan tier and number of instances

Choose your container

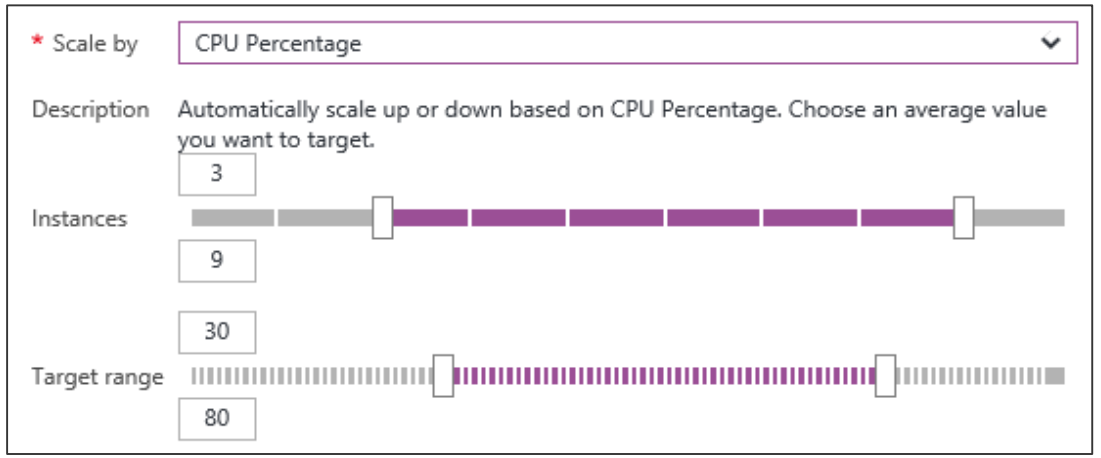


Manual Scaling & Auto-Scaling

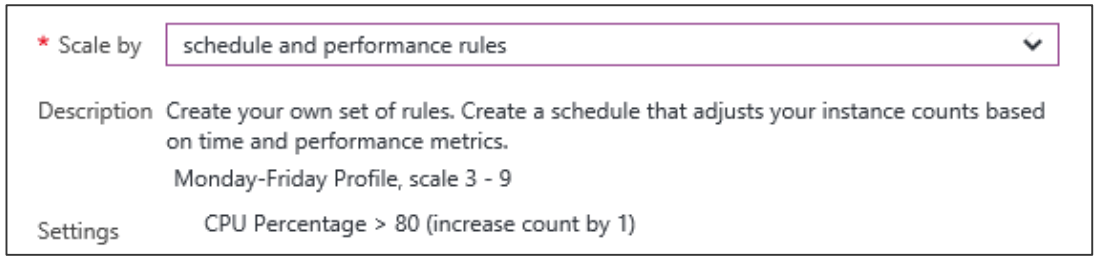
Manual – Scale via portal or scripts



Auto – CPU Percentage

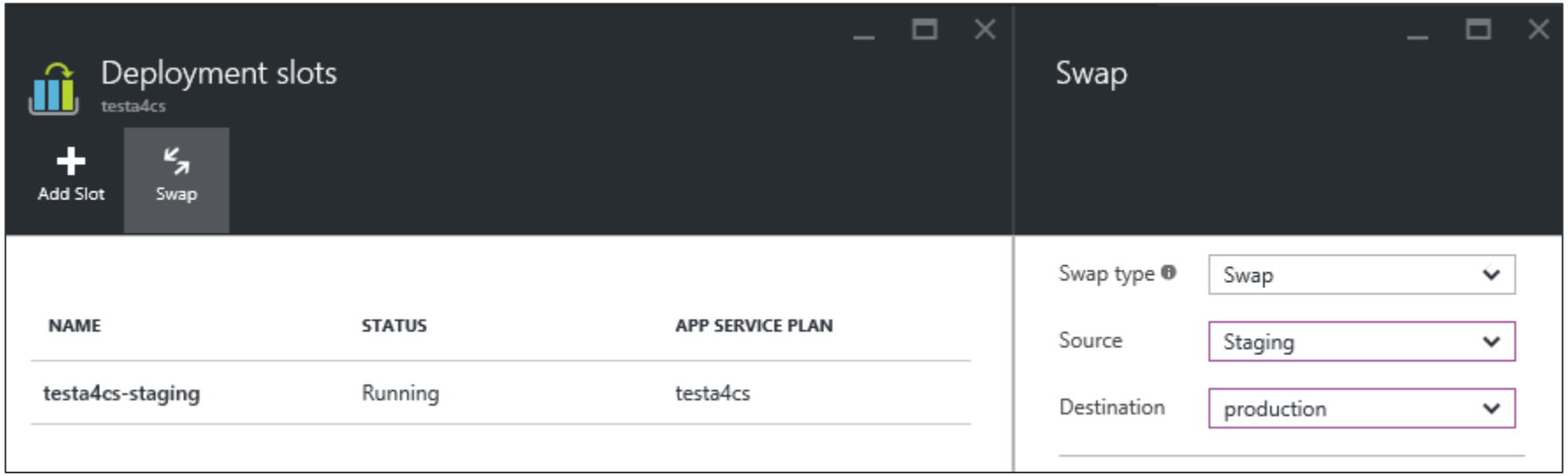


Auto – Schedule & Performance Rules



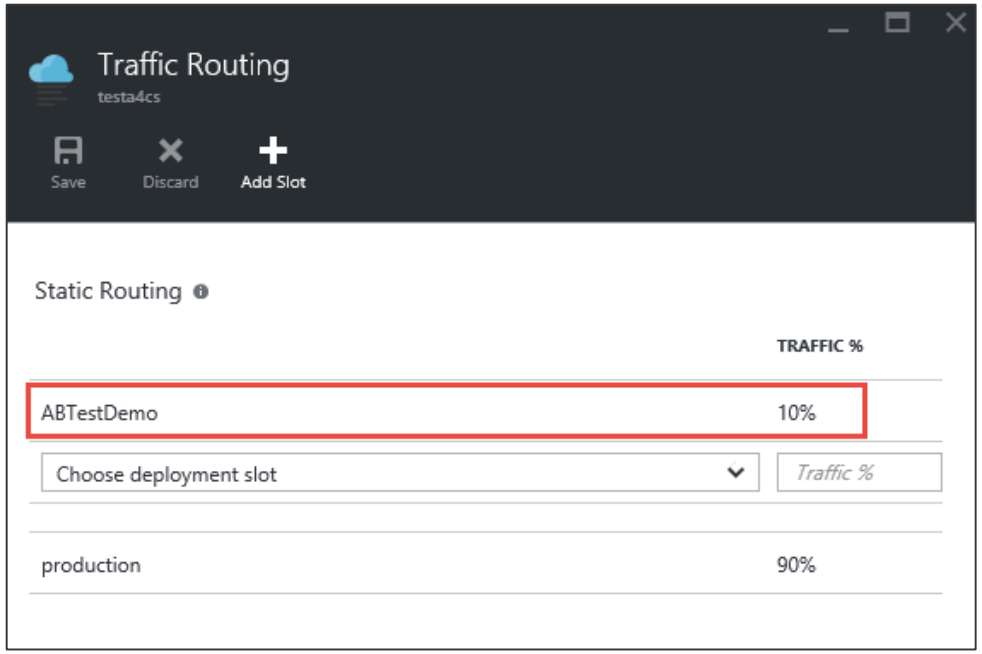
Deployment Slots

- Use a Deploy-Confirm-Promote workflow
  - Promote via "swap" through Azure portal
- http://sitename-slotname.azurewebsites.net



Traffic Routing

- Test changes or scenarios by routing requests to different deployment slots
- Use Traffic Routing to direct % of traffic to alternate slots

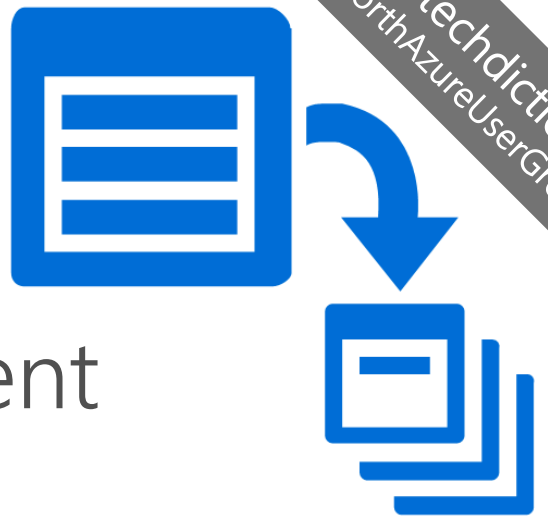



DEMO
Azure Web App for Containers

Azure Batch

Parallel processing

Azure Batch



Job scheduling and cluster management service, allowing applications or algorithms to run in **parallel** at scale

- Capacity on demand; run jobs on demand
- Scale - 1 to 10,000's VMs for a cluster according to load; 1 to millions of tasks
- Choice of hardware and OS – Any VM size; Windows or Linux
- No charge for Batch, pay for used resources by the minute; no head-node

Some real-world Batch workloads

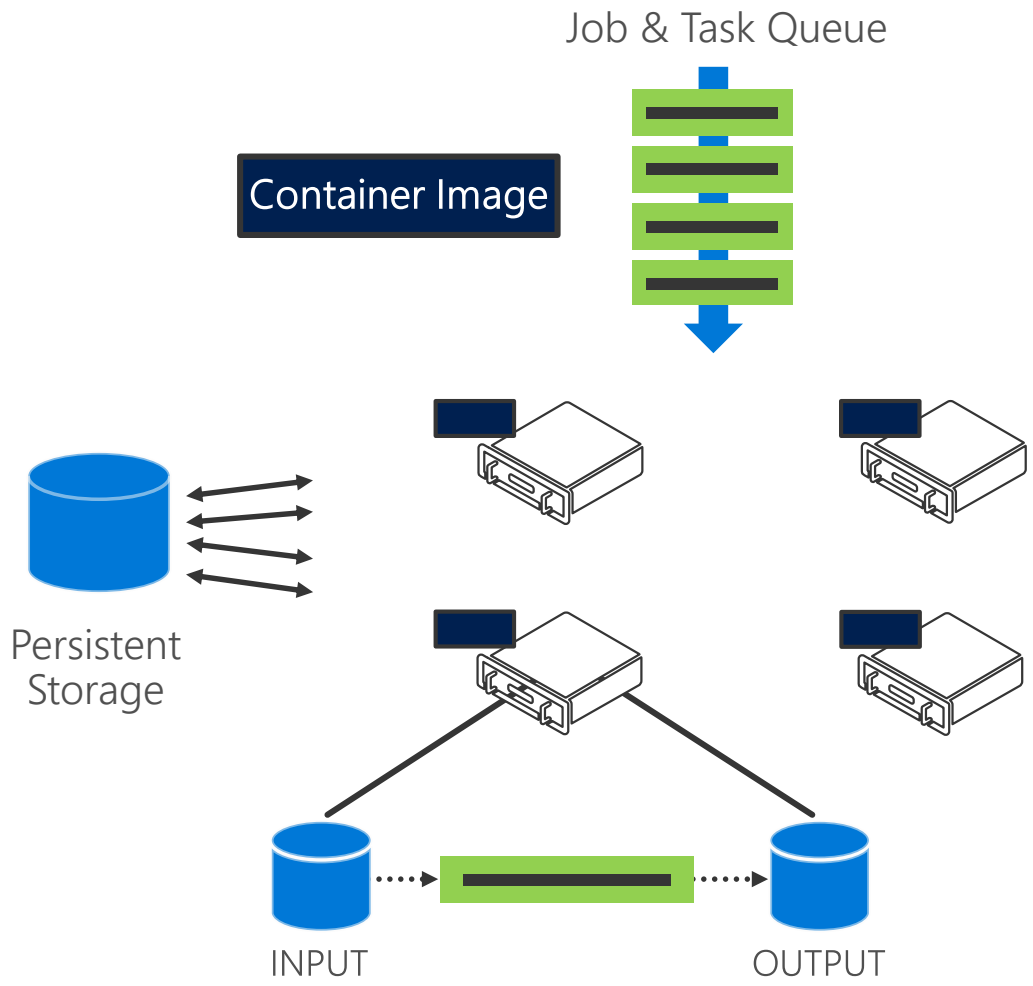
- Media transcoding & pre-/post-processing
- Rendering
- Test execution
- Monte Carlo simulations
- Genomics
- Deep Learning
- OCR
- Data ingestion, processing, ETL
- R at scale
- Compiled MATLAB
- Engineering simulations
- Image analysis & processing

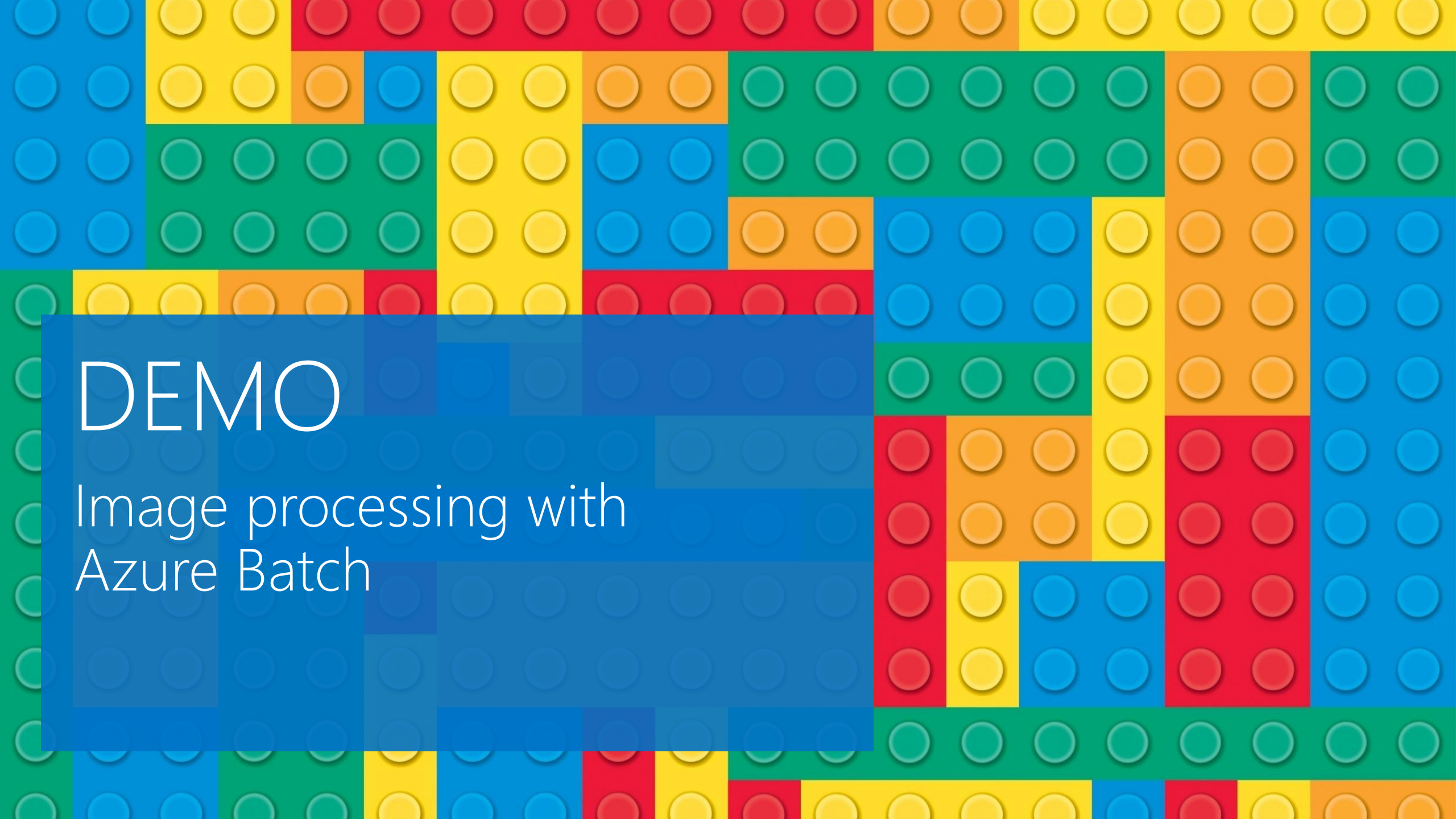
Batch + Containers = Batch Shipyard

- Make it easier to run Docker apps using Python tooling
- Deploys Docker engine to nodes and deploys required container images to nodes
- Can deploy GlusterFS for use by pool nodes and install required GPU and RDMA drivers
- Create a Recipe – Number of JSON configuration files
- Large number of pre-supplied recipes in GitHub; e.g. CNTK, TensorFlow, Caffe

https://github.com/Azure/batch-shipyard

Batch Shipyard




DEMO
Image processing with
Azure Batch

Summary

- IaaS and Partner Solutions
- Azure Container Instances
- Azure Container Service + AKS
- Azure Service Fabric
- Azure Web App for Containers
- Azure Batch

Additional resources:

- Azure.com service overviews
  https://aka.ms/containersonazure
- Microsoft Docs - Documentation for container related services
  https://aka.ms/containerdocs
- MSDN Channel 9 – Videos covering Azure and Containers
  https://channel9.msdn.com/
- Microsoft Virtual academy – online training courses
  https://mva.microsoft.com/

Slides and demo scripts available at:
https://github.com/marrobi/Microsoft-and-Containers