

# Containers and Docker on Microsoft Azure

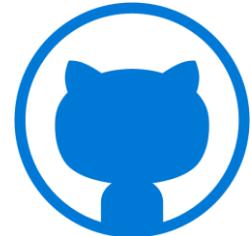
Mathieu Benoit & Sani Chabi Yo  
Docker Meetup – Quebec city – 3/1/2017



# Speaker as Code

```
{
```

```
  "firstName": "Mathieu",
  "lastName": "Benoit",
  "city": "Quebec",
  "country": "Canada",
  "company": "Microsoft",
  "role": "Cloud Solution Architect",
  "gitHub": "mathieu-benoit",
  "blog": "aka.ms/mabenoit",
  "misc": [
    "software development",
    "cloud + web + mobile",
    "agile & devops enthusiast",
    "continuous learning"
  ]
}
```



[GitHub account](#)



[Personal blog](#)

# Sani Chabi Yo

Cloud Solutions Architect

[@chabiyo](https://twitter.com/chabiyo)

sachabiy@microsoft.com

# Agenda

Introduction (5min)

Microsoft Azure Overview (10min)

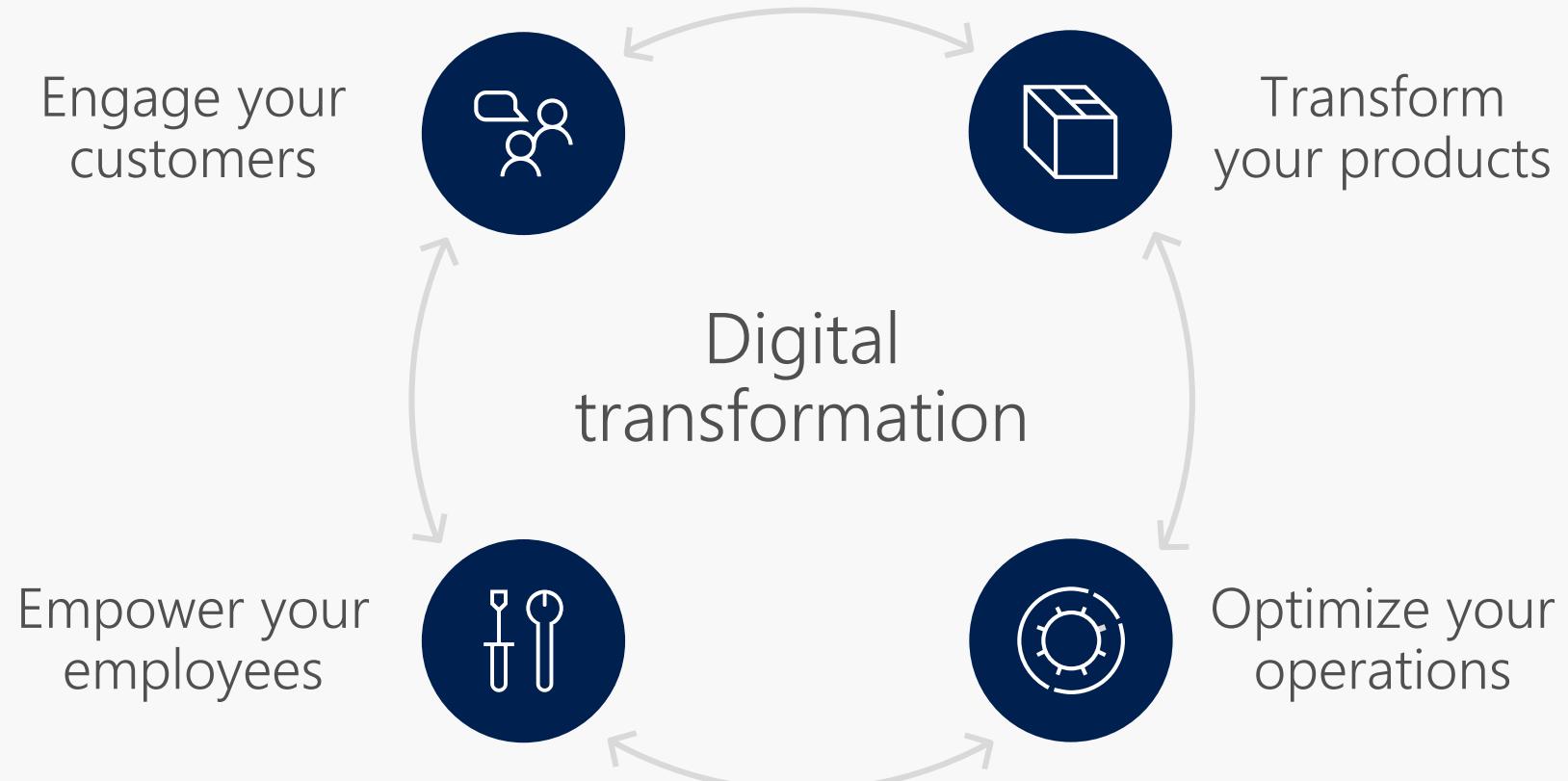
Container and Docker Ecosystem on Microsoft Azure (15min)

Other Microsoft Azure initiatives with Docker (10min)

Conclusion & Resources (5min)

Q&A (5min)

# Microsoft Azure Overview



# Microsoft Azure



## Application innovation

Accelerate innovation with the cloud



## Data and intelligence

Power decisions & apps with insights



## Openness and flexibility

Build freely, deploy anywhere



## Trust

Protect your business

# Microsoft Azure



**Application innovation**  
Accelerate innovation with the cloud

# Application innovation

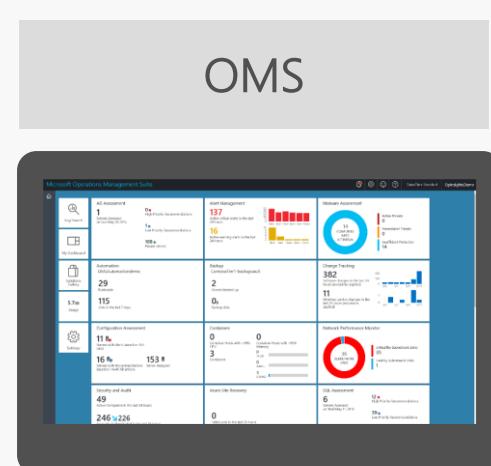
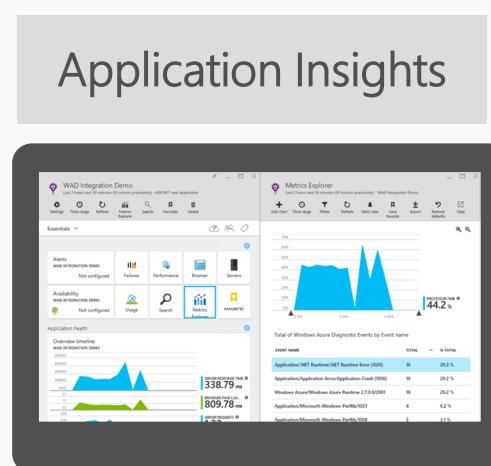
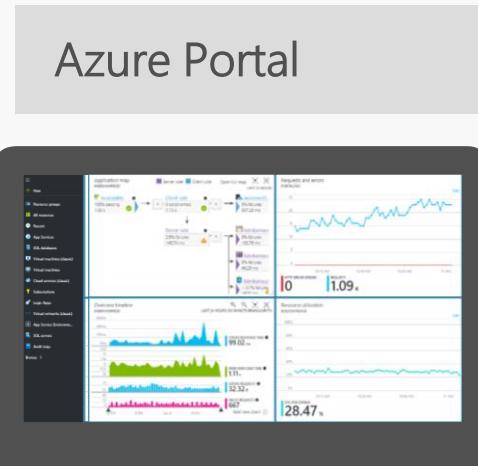
## Accelerate innovation with the cloud



Build apps faster and easier

Deliver native mobile apps seamlessly

Manage applications proactively



## Build on PaaS

Existing frameworks

Web and mobile

Microservices

Serverless Compute

## Build on IaaS

Storage

Virtual machines

Networking

# Microsoft Azure



**Data and intelligence**  
Power decisions & apps with insights

# Data and intelligence

## Power decisions & apps with insights



Support business strategy with any data

Predict and respond proactively

Learn and engage with AI

Cognitive services



Bot framework



Azure Machine Learning Services

- Models
- API
- Clients diversity

Azure Machine Learning templates

Demand forecasting

Predictive maintenance

Vehicle telemetry

# Microsoft Azure



**Openness and flexibility**  
Build freely, deploy anywhere

# Openness and flexibility

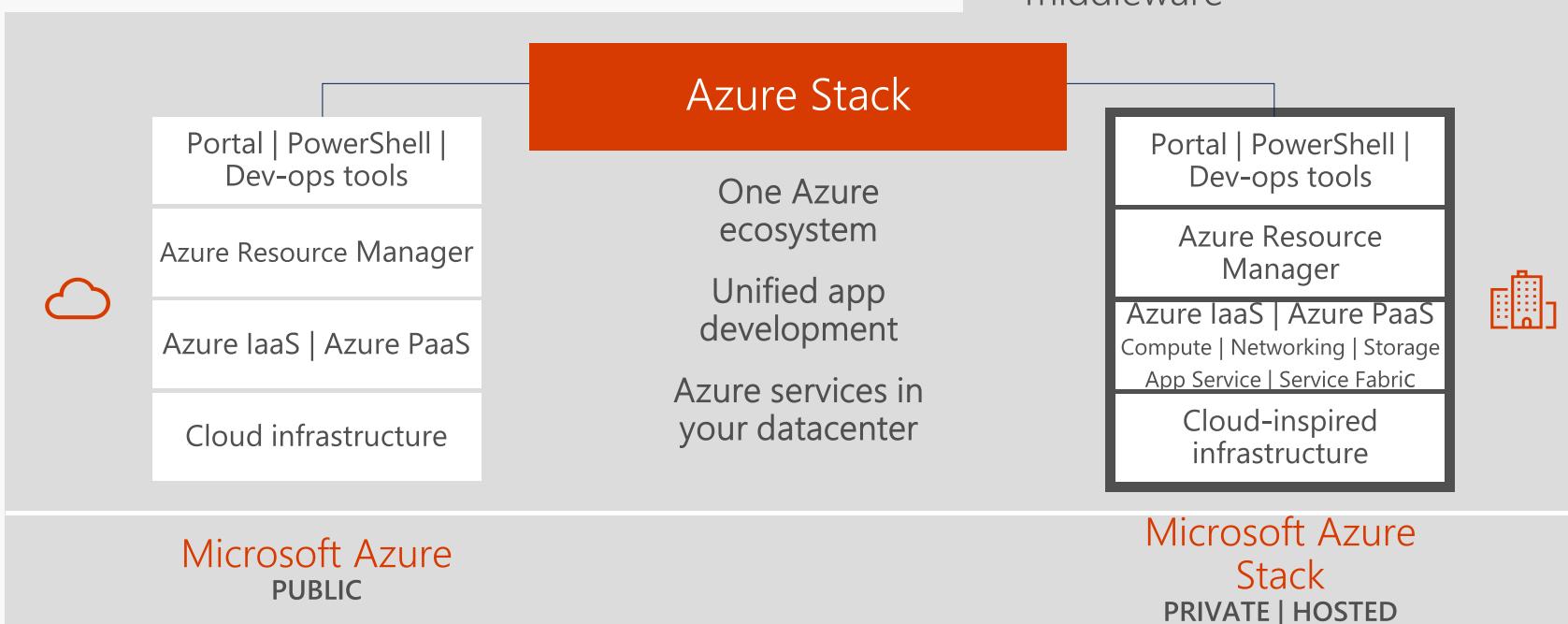
## Build freely, deploy anywhere



Build and run OSS solutions

Extend on-premises data/apps

Deploy the cloud on-premises



Any tool, application, framework

Applications



DevOps



Frameworks



Databases & middleware



# Microsoft Azure



**Trust**  
Protect your business

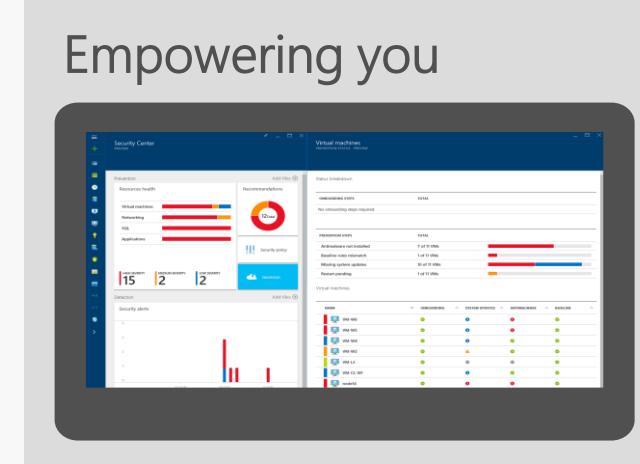
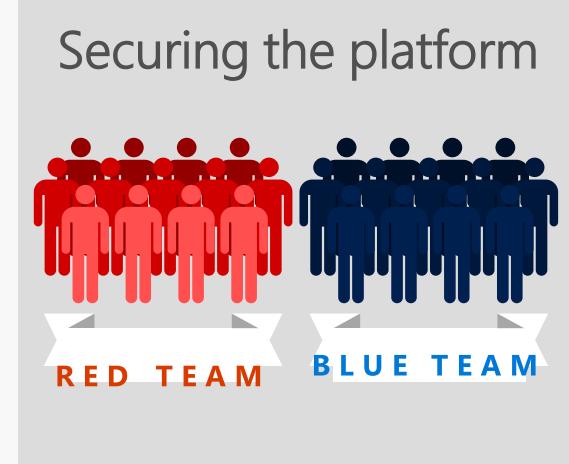


# Trust Protect your business

Detect and mitigate threats

Achieve global scale, in local regions

Benefit from relentless business commitment



## Security & Management

- Security Center
- Portal
- Azure Active Directory
- Azure AD B2C
- Multi-Factor Authentication
- Automation
- Scheduler
- Key Vault
- Store/ Marketplace
- VM Image Gallery & VM Depot

## Platform Services

### Media & CDN



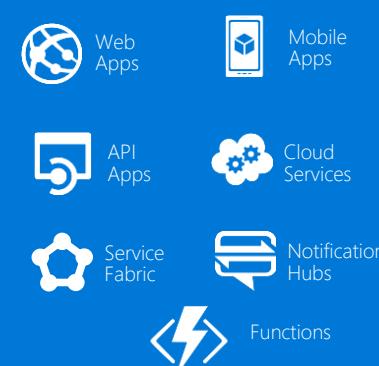
### Integration



### Compute Services



### Application Platform



### Developer Services



### Data



### Intelligence



### Analytics & IoT



## Hybrid Cloud

- Azure AD Health Monitoring
- AD Privileged Identity Management
- Domain Services
- Backup
- Operational Analytics
- Import/Export
- Azure Site Recovery
- StorSimple

## Compute



## Storage



## Networking



## Datacenter Infrastructure (38 Regions, 30 Online)



# Microsoft Azure



## Application innovation

Accelerate innovation with the cloud



## Data and intelligence

Power decisions & apps with insights



## Openness and flexibility

Build freely, deploy anywhere



## Trust

Protect your business

# Container and Docker Ecosystem on Microsoft Azure

# Docker, Docker, Docker

Containers have been around for many years

Docker Inc. did not invent them

They created open source software to build and manage containers

Docker makes containers easy

Even I can create and run them

Docker is a container format and a set of tools

Docker CLI, Docker Engine, Docker Swarm, Docker Compose, Docker Machine and more...

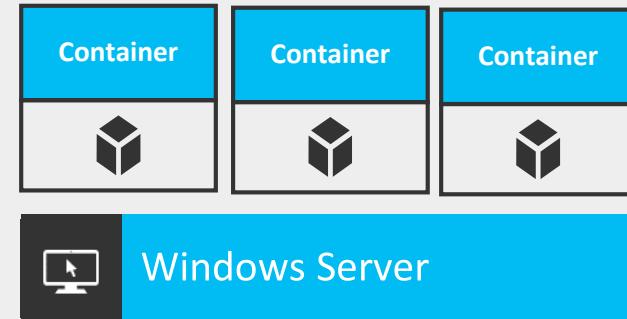
# How Containers Work

**Containers** = Operating system virtualization

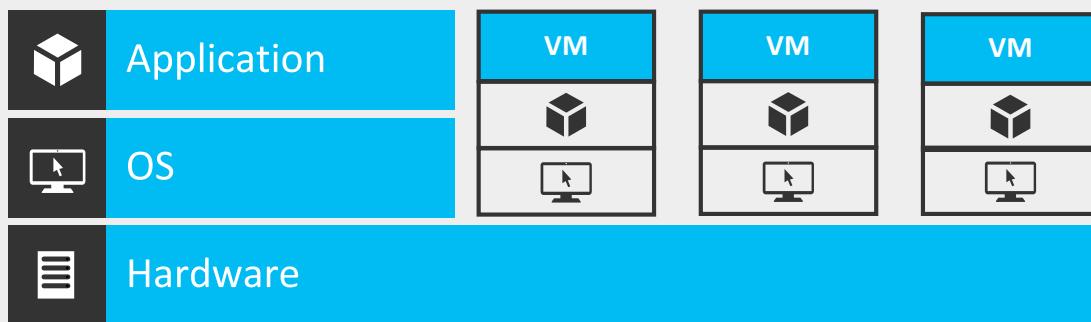


**Windows Server containers**

No different from Linux containers

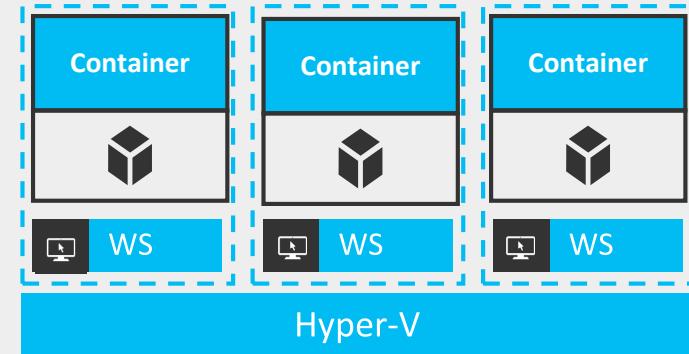


**Traditional virtual machines** = hardware virtualization

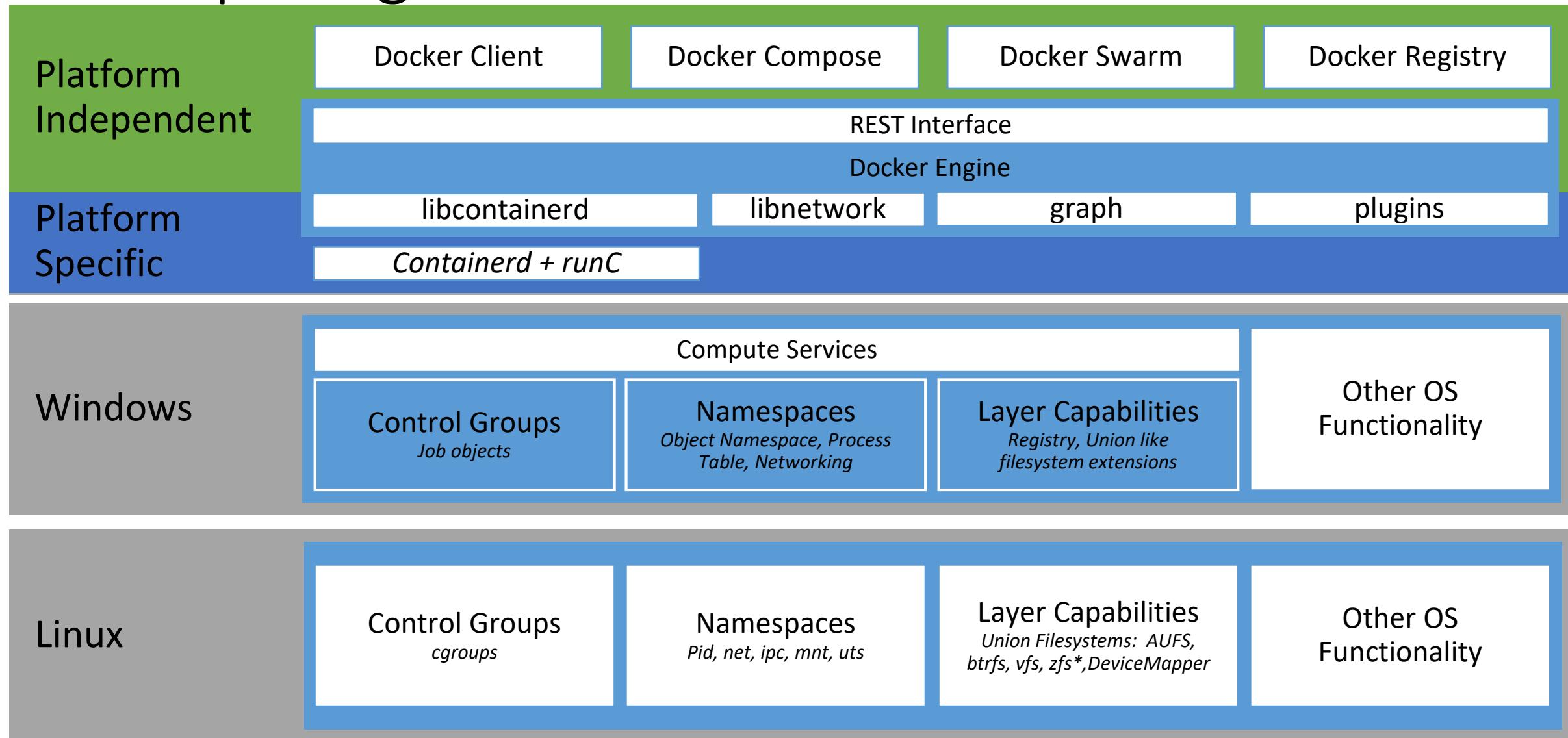


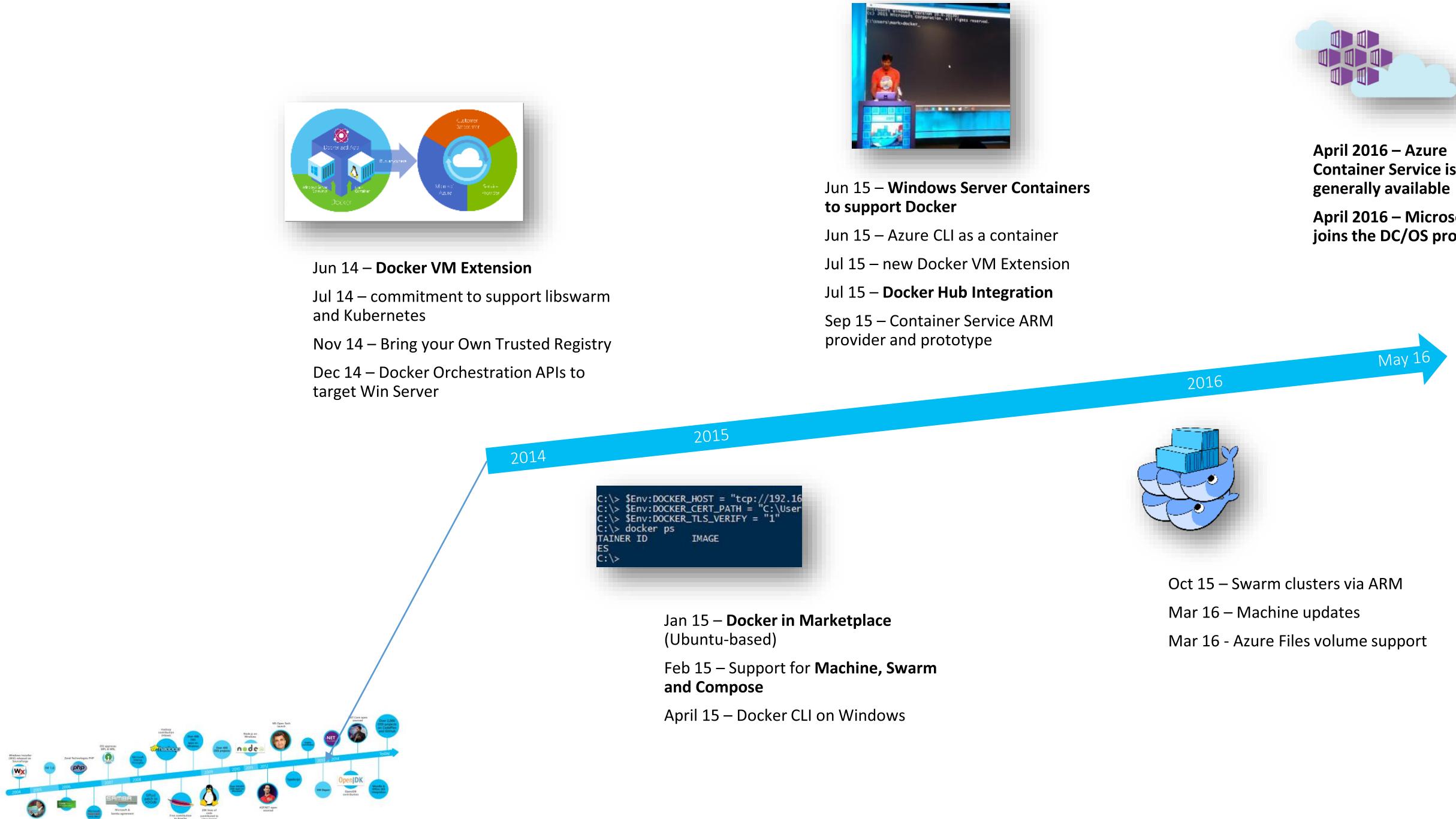
**Hyper-V containers**

Isolation plus performance

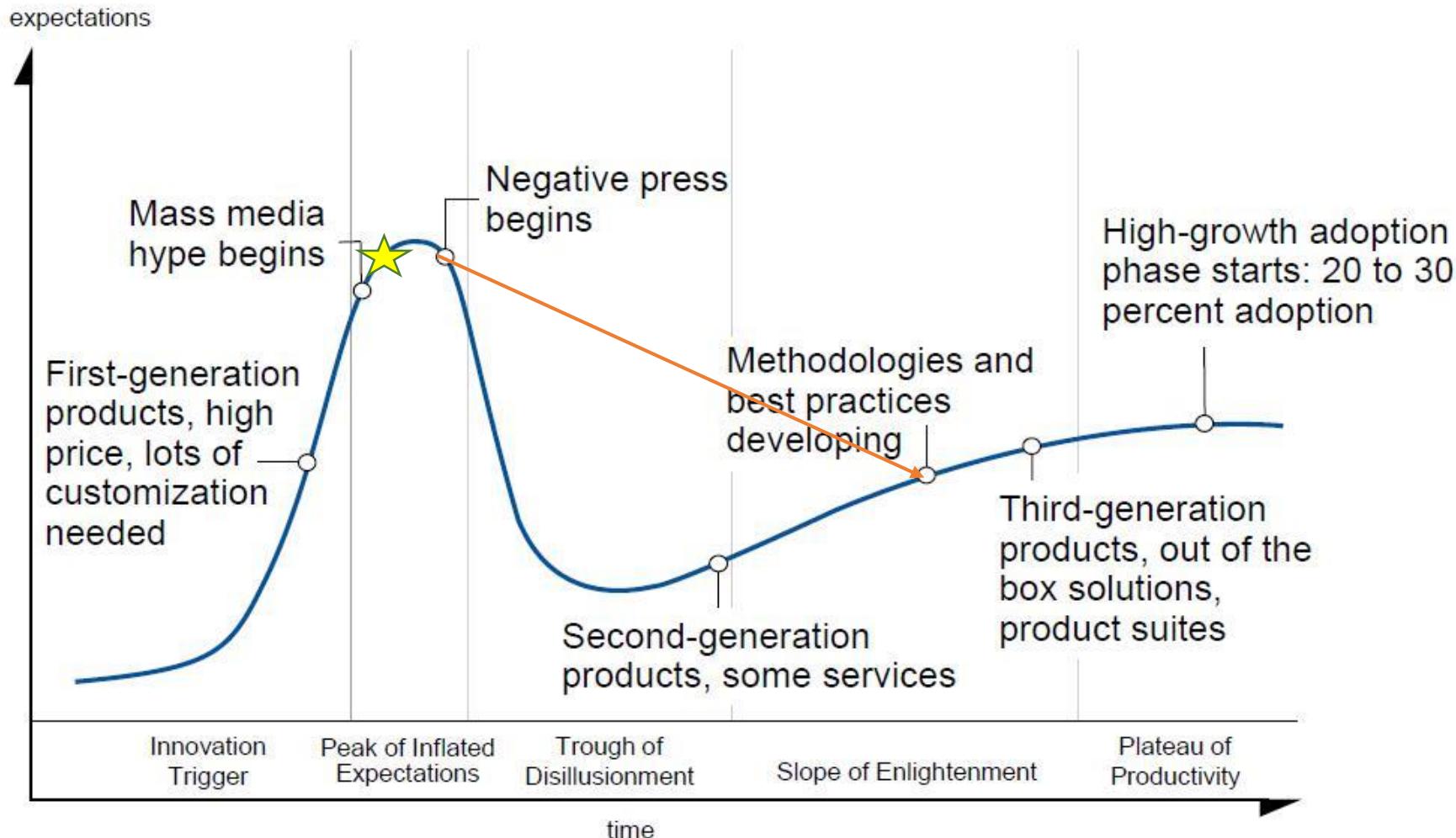


# Comparing OS Architectures

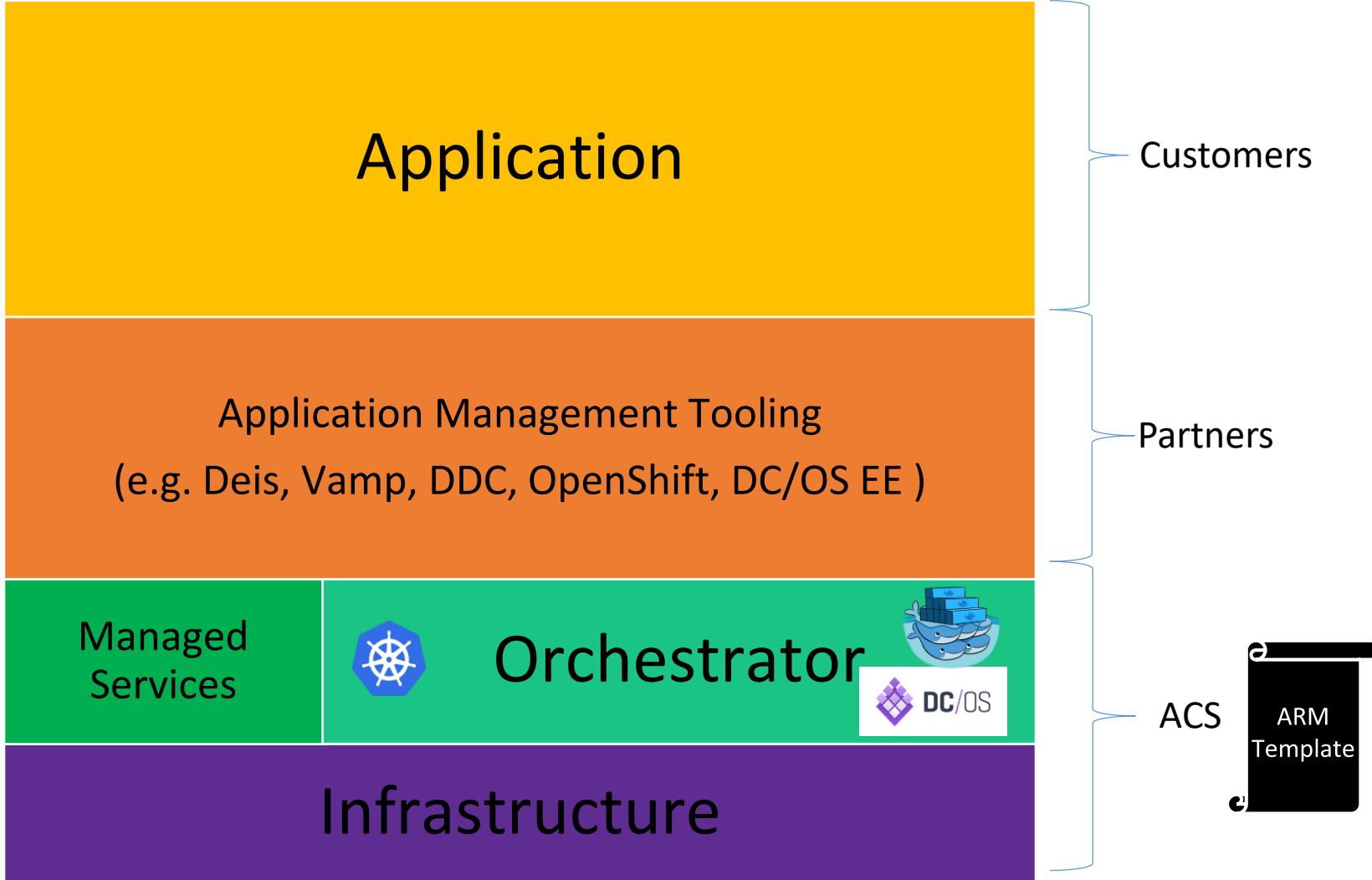




# The Hype Cycle of Innovation



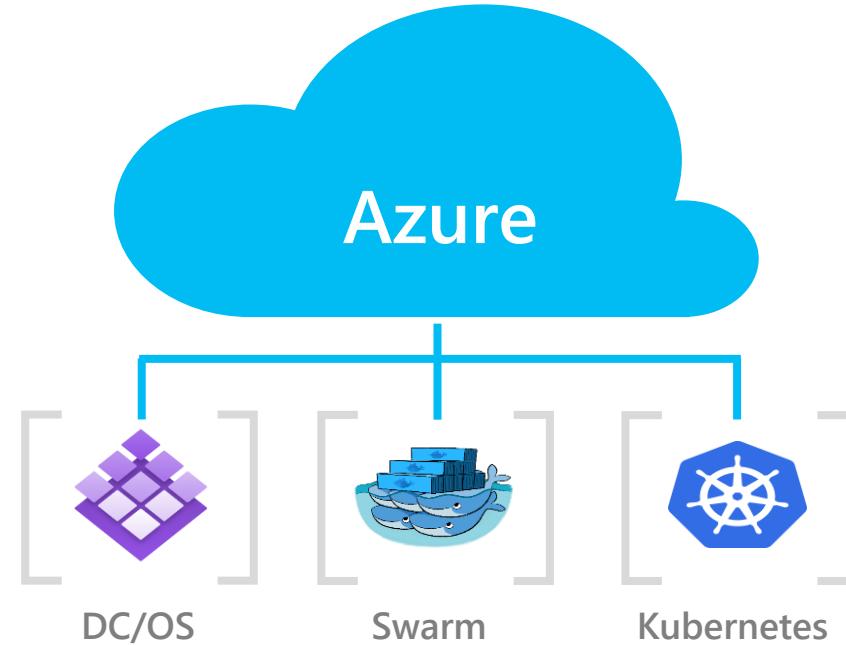
# ACS: The best place to make your choices



# Azure Container Service

*The most open container orchestration service yet*

- ✓ Kubernetes support in Azure Container Service
- ✓ DC/OS Upgrade to 1.8.4
- ✓ Open Source Azure Container Service Engine
- ✓ Azure Container Registry (in preview)
- ✓ Continuous integration and deployment to Azure Container Service (in preview)

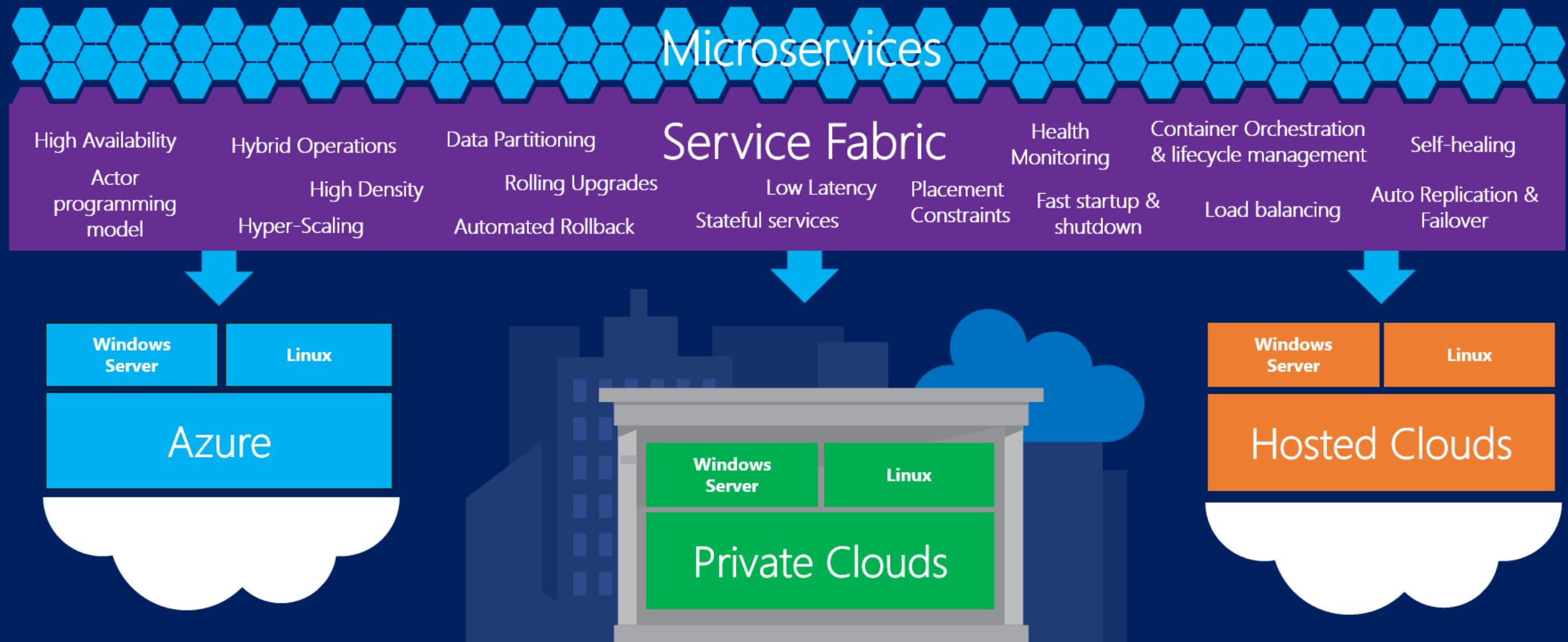


A screenshot of a GitHub repository page for "Azure / acs-engine". The repository has 160 commits, 6 branches, 0 releases, and 15 contributors. It has 29 issues, 8 pull requests, and 0 projects. The repository is described as a place for community collaboration and building the best open Docker container infrastructure for Azure. The last commit was 6 days ago. The repository includes documentation, examples, parts, pkg, scripts, and test files.

Branch: master	New pull request	Create new file	Upload files	Find file	Clone or download
docs	Merge pull request #104 from timfpark/master	6 days ago			
examples	Updating api model in acs-generator to not have apiversion on the typ...	21 days ago			
parts	unflatten files (#88)	18 days ago			
pkg	unflatten files (#88)	18 days ago			
scripts	Add devenv for building/testing/validating under Docker	a month ago			
test	basic e2e testing for k8s	a month ago			

# Microsoft Azure Service Fabric

A platform for reliable, hyperscale, microservice-based applications



# Other Microsoft Azure initiatives with Docker

# Image Registries

## Docker Hub and Docker Store

Public, Official and Private image repositories

Granular access controls with organization support

Automated image build support

## Docker Trusted Registry

Enterprise Grade Private Registries

Runs on your infrastructure (on-prem or cloud)

Active Directory and Role Based Access Controls

## Azure Container Registry

Store and manage container images across Azure deployments

Maintain Windows and Linux container images

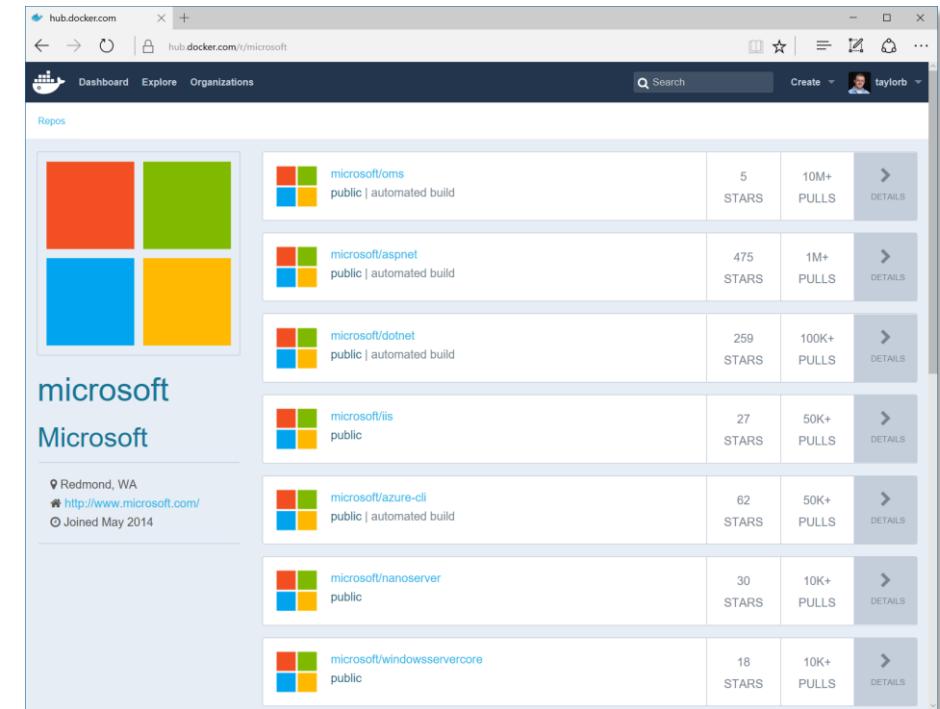
Same API and Tools as Docker Hub/Store/Registry

## Docker Registry

Open source foundation of Hub and DTR

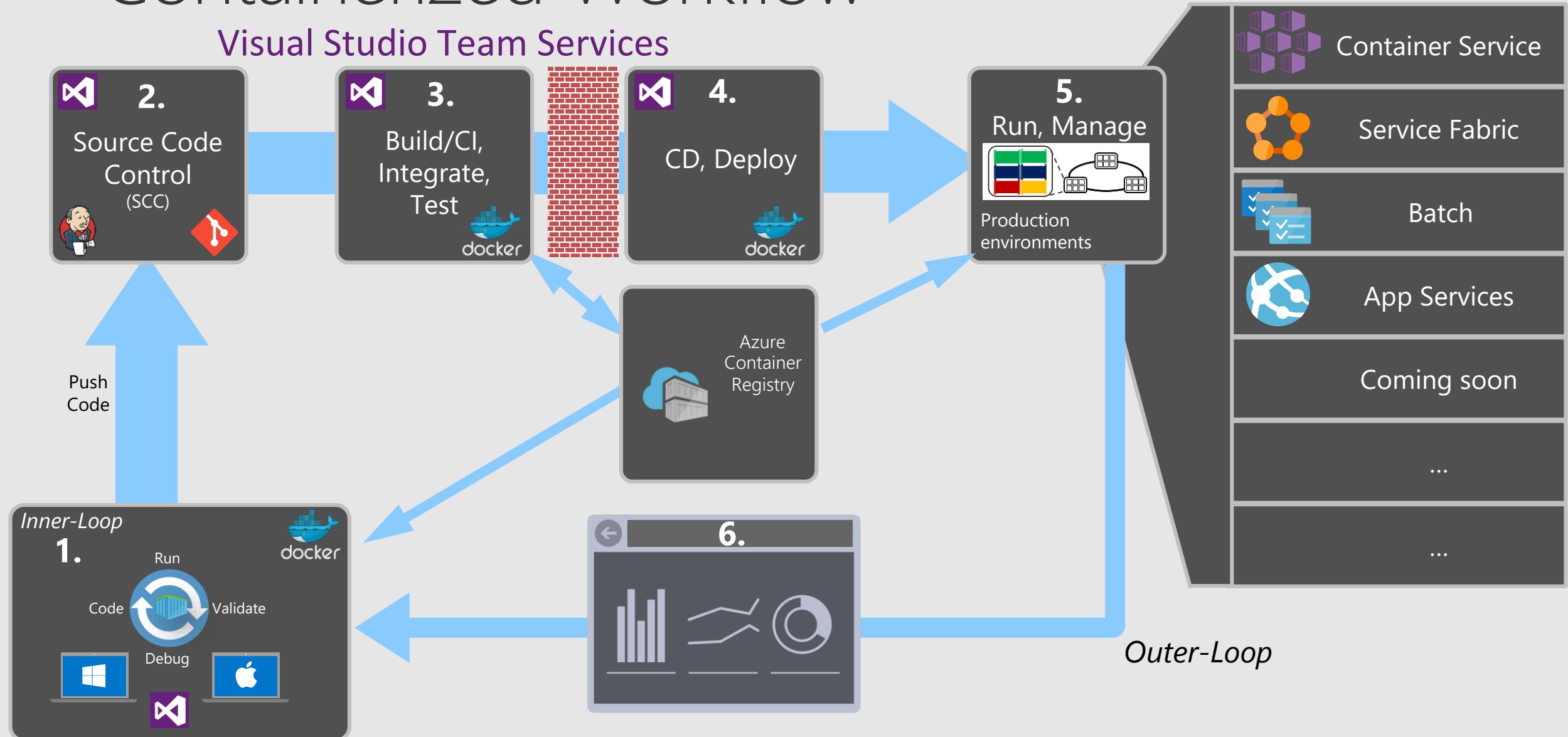
Runs on your infrastructure (on-prem or cloud) as a container

<https://docs.docker.com/registry> and or <https://github.com/docker/distribution>



# Containerized Workflow

## Visual Studio Team Services



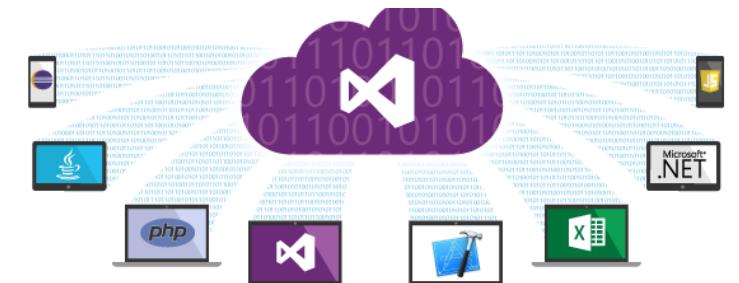
# VSTS – Hosted Linux pool preview

We're offering a preview of our new hosted Linux pool to enable you to build and release on Linux machines without having to configure a private agent.

The agents in the hosted Linux pool run on an Ubuntu Linux host inside the [vsts-agent-docker](#) container. This container includes all the standard Java, Node, Docker and .NET Core tooling. When we start the container we map in the Docker socket from the host VM and the working folder from /opt/vsts/work. This enables you to create or spawn other Docker containers as part of your build or release process using either a script or the [Docker extension](#) in the Visual Studio Marketplace.

To use the Hosted Linux pool:

- In your build definition, go to the **General** tab, open the **Default agent queue** menu, and then select **Hosted Linux**.
- In your release definition, go to the **Environments** tab, select your **Run on agent** task, open the **Deployment queue** menu, and then select **Hosted Linux**.



# VSTS – Docker Extension

Secure | <https://marketplace.visualstudio.com/items?itemName=ms-vscs-rm.docker>

Visual Studio | Marketplace

Visual Studio Team Services > Build and release > Docker Integration



## Docker Integration

**Microsoft** |  2,583 installs |  (26)

Build, push, run or deploy Docker images and multi-container Docker applications.

**Install** **Download**

Click **Install** for Team Services and **Download** for Team Foundation Server.

The world's largest enterprises rely on Docker to develop the world's best applications. With the Docker extension, you can integrate Docker images and containers into your existing agile and DevOps workflows.

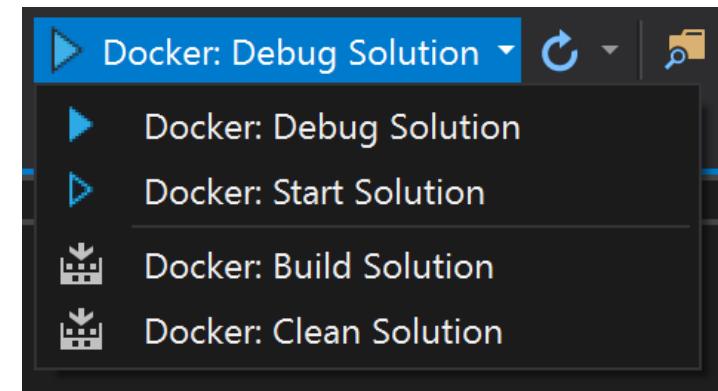
# Steps to Dockerize a .NET Framework app

1. (Have Docker for Windows installed. Requires Windows 10 or Windows Server 2016)
2. Create a Dockerfile in project folder next to source code

```
1 FROM microsoft/aspnet  
2 COPY . /inetpub/wwwroot
```

3. Build and run app in a Docker container from the command-line or using Visual Studio 2017 RC Docker Tools

```
docker build -t aspnetapp .  
docker run -d -p 80:80 aspnetapp
```





# Visual Studio Docker Tools

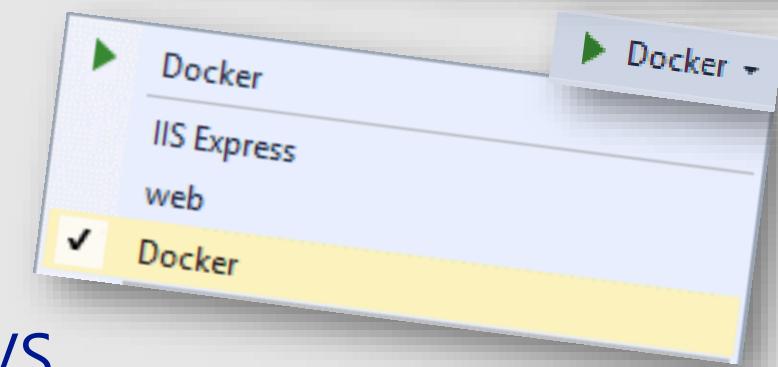
- Run, Debug, Test Web & Console apps in docker containers
  - Linux today, Windows Server & Nano Server coming soon
- F5 Debugging
- Edit & Refresh of code
- Scaffolds docker assets
  - Dockerfile, docker-compose.yml

```
Dockerfile + X
FROM microsoft/aspnetcore:1.0.1
ARG source=.
WORKDIR /app
EXPOSE 80
COPY $source .
ENTRYPOINT ["dotnet", "Web.dll"]
```

```
Dockerfile + X
FROM microsoft/dotnet:1.0.1-core
ARG source=.
WORKDIR /app
COPY $source .
ENTRYPOINT ["dotnet", "BatchJob.dll"]
```

The screenshot shows the Visual Studio Marketplace page for the 'Visual Studio Tools for Docker - Preview' extension. The page includes the following details:

- Extension Name:** Visual Studio Tools for Docker - Preview
- Creator:** Microsoft Cloud Explorer
- Reviews:** ★★★★☆ (14) Review
- Supports:** Visual Studio 2015
- Downloads:** Download (34,795)
- Tags:** Azure, linux, virtual machines, Docker, Containers, ASP.NET Core
- Updated:** 9/22/2016
- Version:** 0.40.0
- Share:** Share icon
- Favorites:** Favorites icon
- Add to favorites:** Add to favorites button



[aka.ms/DockerToolsForVS](http://aka.ms/DockerToolsForVS)

# Azure App Services (Linux)

- Can deploy a single custom image that can be scaled in the same way as all App Services
- Great for gaining production realism in your dev flow or gaining control of your environment

The screenshot shows the Azure portal interface for creating a new web application. The left pane is titled 'Web App On Linux (preview)' and contains fields for 'App name' (with placeholder 'Enter a name for your App'), 'Subscription' (set to 'Visual Studio Enterprise'), 'Resource Group' (radio buttons for 'Create new' and 'Use existing'), and 'App Service plan/Location' (selected 'ServicePlan1872eb14-ae44(West...)'). A highlighted section shows 'Configure container' set to 'node 4.5.0'. The right pane is titled 'Docker Container' and includes a 'docker' logo, a description of Docker Container support, and sections for 'Image source' (with 'Built-in' selected), 'Runtime Stack' (listing Node.js versions from 4.4.7 to 4.5.0, PHP 5.6.23 and 7.0.6, .Net Core v1.0, and Ruby 2.3), and a 'Pin to dashboard' button.

# Azure Cloud Console on Container

The screenshot shows the Microsoft Azure Cloud Console interface running within a container. The top navigation bar includes 'Preview' (orange), 'Microsoft Azure' (blue), a search bar ('Search resources'), and user information ('yangl@microsoft.com', 'MICROSOFT'). The left sidebar lists various Azure services: 'Resource groups', 'All resources', 'Recent', 'App Services', 'Virtual machines (classic)', 'Virtual machines', 'SQL databases', and 'Cloud services (classic)'. The main area is titled 'My Dashboard' with options to '+ New dashboard', 'Edit dashboard', 'Share', 'Fullscreen', 'Clone', and 'Delete'. Below the dashboard is a terminal window with the following content:

```
Azure CLI | Azure PowerShell (coming soon) | Learn more about Azure CLI
Microsoft Azure: Microsoft's Cloud Platform
Tool version 0.10.6
Hint: type 'az account list' to start.

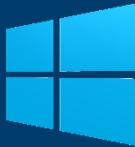
anders@MyDockerVM:~$ az account set -n b644c38b-9481-4465-89f8-1597b5edfeac
anders@MyDockerVM:~$ az resource g
```

The bottom of the screen shows a media player-style control bar with icons for volume, play/pause, and progress (0:00:09 to 0:00:29).

# Conclusion & Resources

# Containers in Azure

Docker support  
for Azure VMs



Container-based  
PaaS



Service  
Fabric



CLOUD  
FOUNDRY™

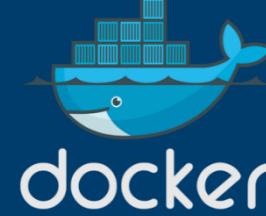


OPENSIFT

Azure  
Container Service



DC/OS



docker

Container  
Management



docker



DC/OS



kubernetes



CoreOS



RANCHER

Microsoft Azure

# Getting Started

## Containers at Microsoft

Microsoft and the container ecosystem

[microsoft.com/containers](https://microsoft.com/containers)

## Windows Container Docs

Getting Started Guides and Documentation

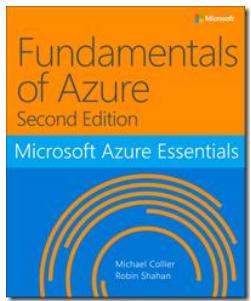
[aka.ms/windowscontainers](https://aka.ms/windowscontainers)

## Community Links

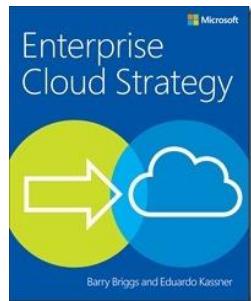
Links to blogs, videos and other valuable resources.

[aka.ms/windowscontainers/community](https://aka.ms/windowscontainers/community)

# Free e-books



Fundamentals



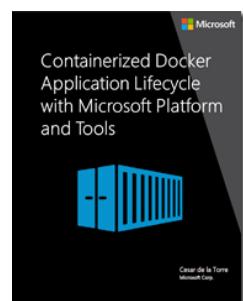
Enterprise Cloud  
Strategy



Cloud Design  
Patterns



Architecting &  
Developing  
Containerized and  
Microservice based .NET  
Applications



Containerized Docker  
Application Lifecycle

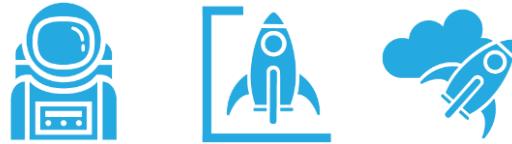


Azure Developer  
Guide

# Microsoft Azure - Architecture guidance

- Know the limits of each service
- Know the SLA of each service
- Know the price of each service
- Know the regions where you could host each service
- Know the compliances of the Azure platform
- Automate early and always with ARM Templates
- Get inspired from the Microsoft Technical Case Studies and make amazing architecture diagrams with these icons

# Azure Skills Initiative - MOOCs



Free and easily accessible

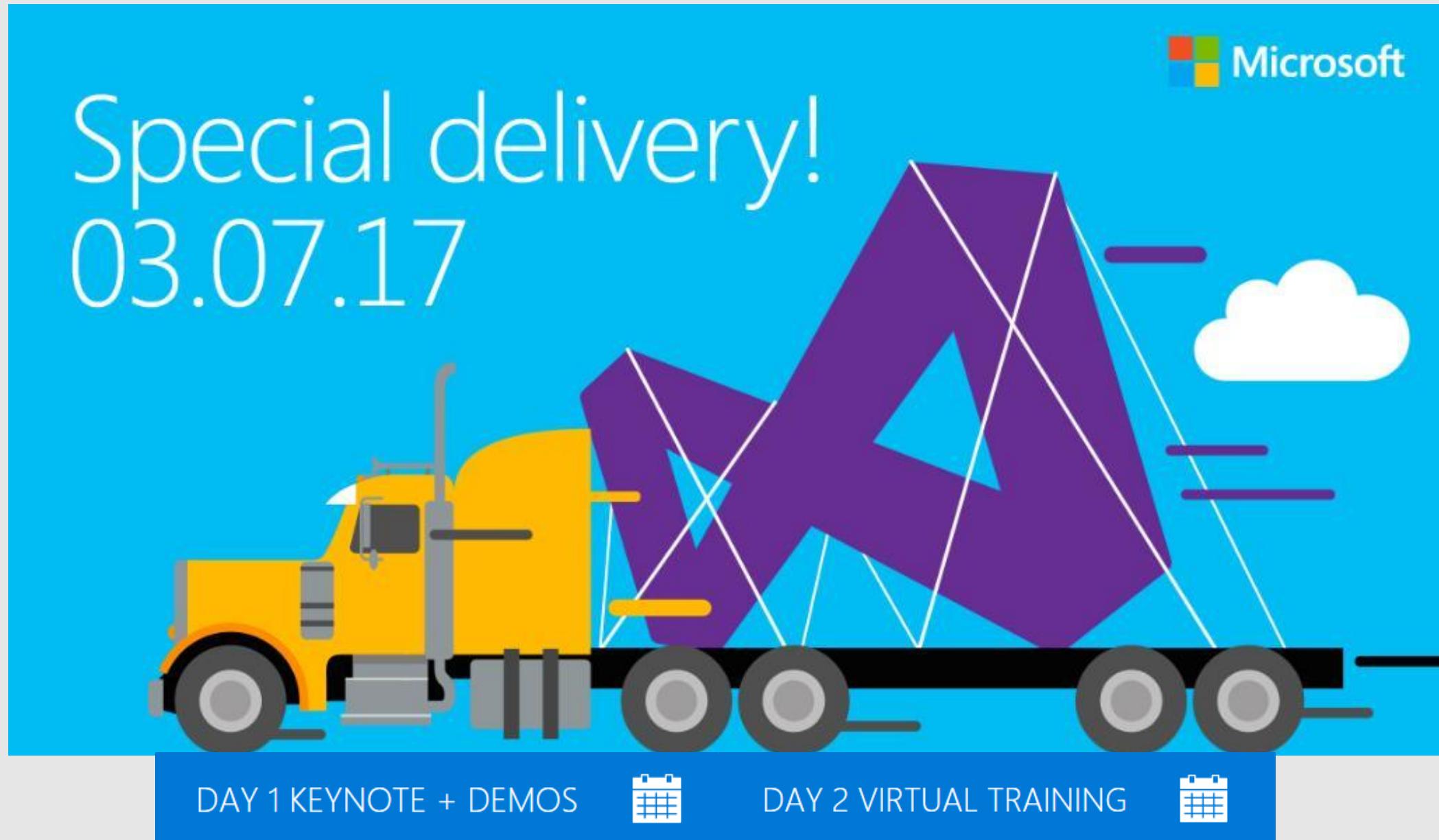
Build and demonstrate your capability

Learn on your own time

Apply and validate your skills

Fundamentals	Nov 29	<a href="#"><b>Microsoft Azure Fundamentals</b></a>	<a href="#"><b>Microsoft Azure for AWS Experts</b></a>		
Core IaaS	Nov 29	<a href="#"><b>Microsoft Azure Virtual Machines</b></a>	<a href="#"><b>Microsoft Azure Networks</b></a>	<a href="#"><b>Microsoft Azure Identity</b></a>	<a href="#"><b>Microsoft Azure Storage</b></a>
Deployment	Dec 31	<a href="#"><b>Microsoft Azure App Services</b></a>			
	Dec 31	<a href="#"><b>Databases in Microsoft Azure</b></a>			
	Jan 31	<a href="#"><b>Azure Application Deployment and Management</b></a>			
Securing & Managing	Dec 15	<a href="#"><b>Managing Microsoft Azure Workloads</b></a>			
	Dec 31	<a href="#"><b>Security and Compliance in Microsoft Azure</b></a>			
Scale and Agility	Dec 15	<a href="#"><b>Automating Azure Workloads</b></a>			
	Jan 01	<a href="#"><b>Continuous Integration and Continuous Deployment</b></a>			
Migration	Mar 31	<a href="#"><b>Microsoft Azure IaaS Migration</b></a>			
DevOps	Jan 01	<a href="#"><b>DevOps on Azure PaaS</b></a>			
	Jan 12	<a href="#"><b>DevOps Testing</b></a>			

# Visual Studio 2017 Launch Event



The illustration features a yellow semi-truck with a white cab and a black trailer. It is carrying two large, purple shipping containers. The Microsoft logo, consisting of four colored squares (red, green, blue, and yellow), is prominently displayed on the side of one of the containers. The background is a bright blue sky with a single white cloud.

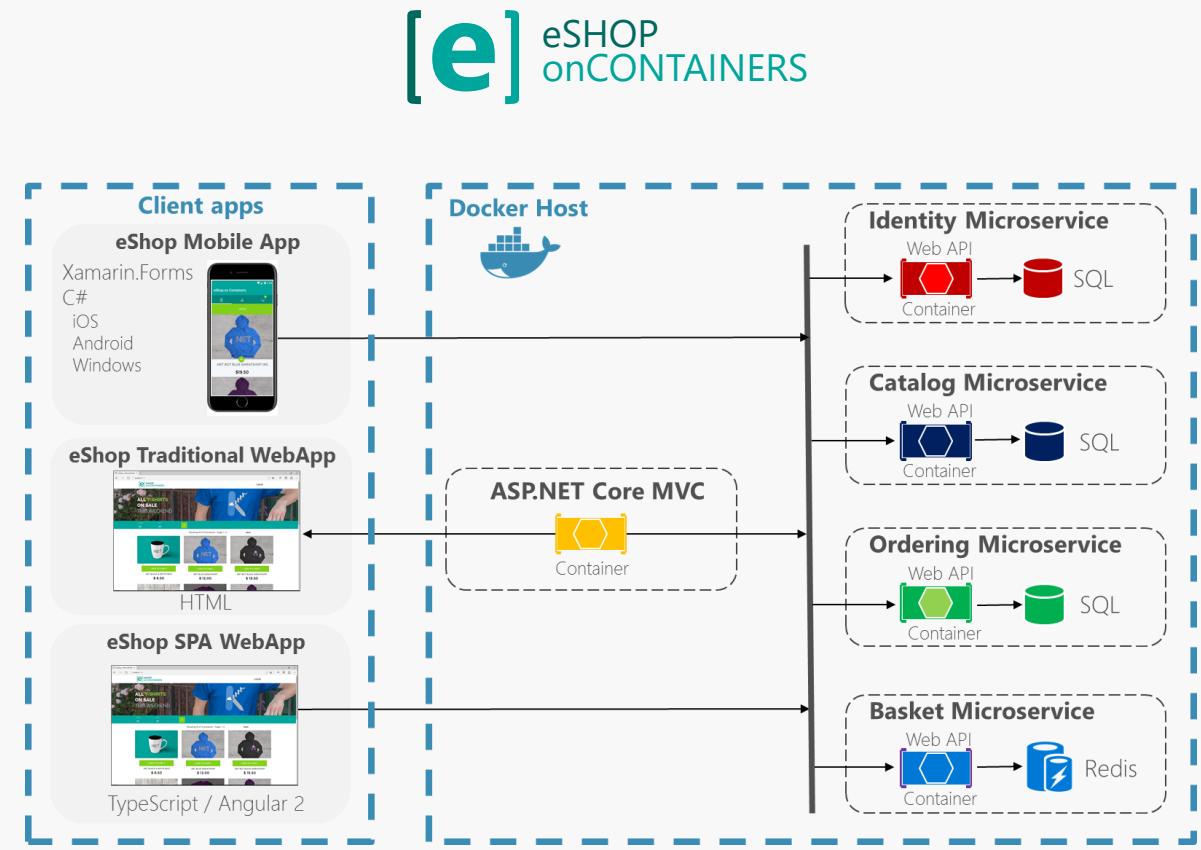
Special delivery!  
03.07.17

DAY 1 KEYNOTE + DEMOS

DAY 2 VIRTUAL TRAINING

# .NET Core microservices reference app

- Includes backend services architected with best practices
- Mobile and web client apps included
- Supported in Visual Studio 2017
- Supported on Docker and dotnet CLI on Mac, Linux or Windows

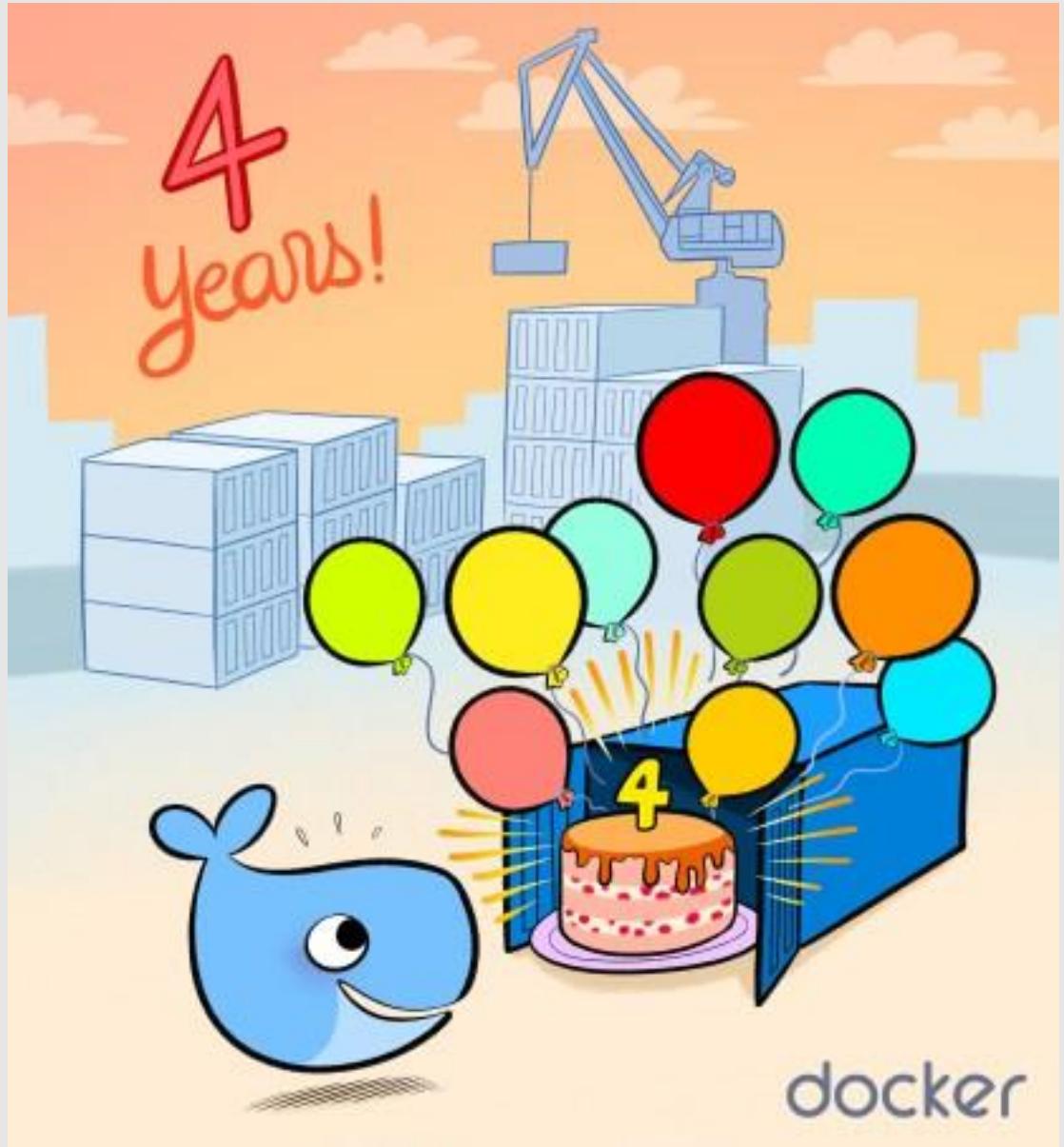


Explore our beta release  
and provide feedback:

<http://aka.ms/MicroservicesArchitecture>

# Docker Birthday #4

- Announcing Docker Birthday #4: Spreading The Docker Love!
- Docker Birthday #4 at #DockerQC



# Questions

# Answers

# Containers and Docker on Microsoft Azure

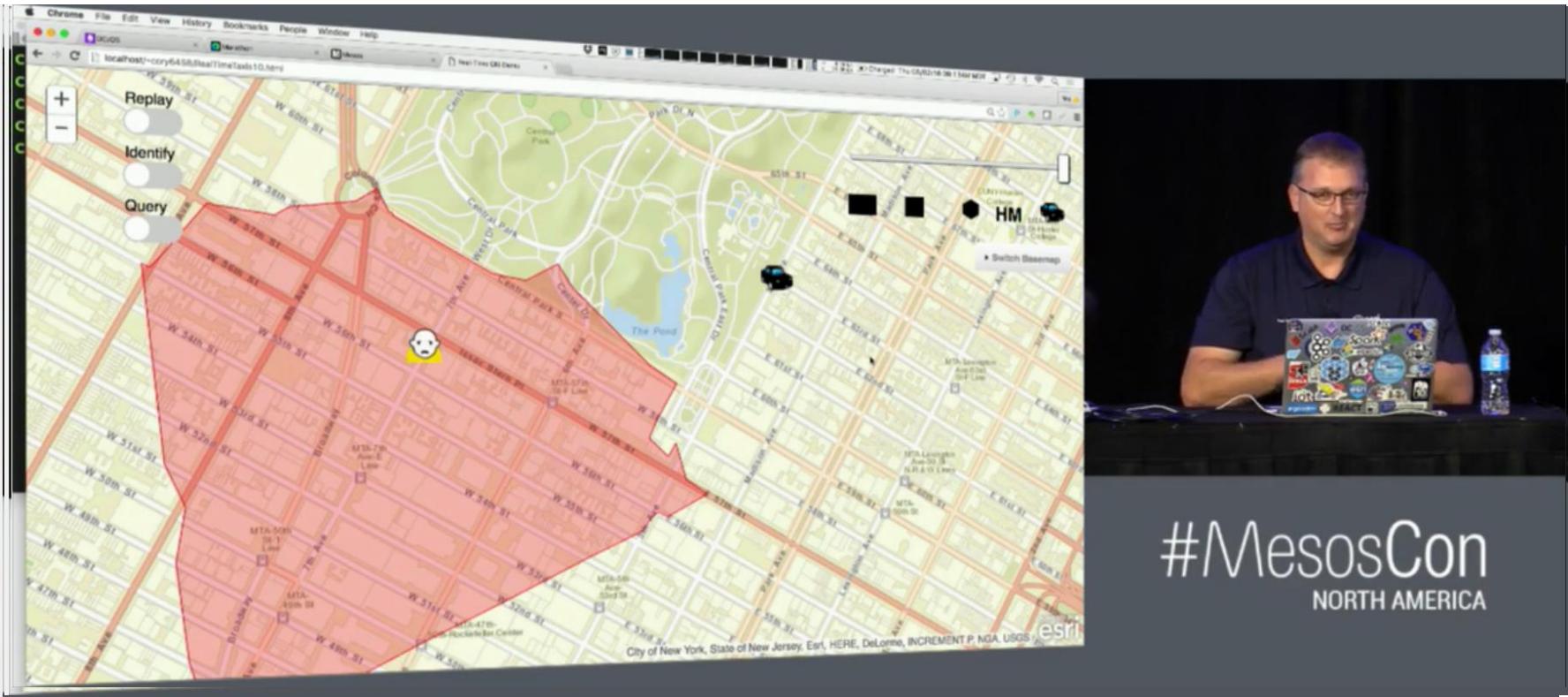
Mathieu Benoit & Sani Chabi Yo  
Docker Meetup – Quebec city – 3/1/2017



# Appendix

# ESRI – Real Time GIS Services

Built on Azure Container Service



- PoC in days not weeks
- Process in real time
  - 7.1 million GPS positions in 1 hour
- Visualizations
- DVR style playback
- Improve routing, customer satisfaction
- Machine Learning for predictions
- IoT Hub for data collection

# Licensing



Windows Server 2016 feature differentiation and core-based pricing		
Feature	Datacenter	Standard
Core functionality of Windows Server	•	•
OSEs / Hyper-V containers	Unlimited	2
Windows Server containers	Unlimited	Unlimited
Host Guardian Service	•	•
Nano Server*	•	•
Storage features including Storage Spaces Direct and Storage Replica	•	
Shielded Virtual Machines	•	
Networking stack	•	
Core-based pricing**	\$6,155	\$882

\*Software Assurance is required to deploy and operate Nano Server in production.

\*\*Pricing for Open (NL) ERP license for 16 core licenses. Actual customer prices may vary.

<https://www.microsoft.com/en-us/cloud-platform/windows-server-pricing>