

Azure Developer Series

Application Migration to Azure

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About Me...

Peter De Tender – MCT, Azure MVP

☁ CEO and Lead Technical Trainer of 007FFFlearning.com,
+20 years IT experience, mainly datacenters and
Microsoft Infrastructure background

☁ Full-time in Azure since 2013 (Readiness & Architect)

☁ Azure Advisor, Azure Certified Architect

☁ Technical Writer, Book author, Courseware Creator

☁ Living in Belgium, but traveling worldwide
90% of my time, helping larger Microsoft Partners,
customers and Microsoft FTEs in learning about and
using Azure, by providing workshops with passion



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Setting the scene



Overview of the workshop

About the workshop content...

About:

In this workshop, you will learn how to build a proof of concept (POC) that will transform an existing ASP.NET-based Web application to a container-based application. This POC will deliver a multi-tiered web app solution from a Virtual Machine architecture into Azure, leveraging Azure WebApps and different Azure container solutions available today. You will also migrate the underlying database from a SQL 2014 Virtual Machine architecture to SQL Azure. **Easter Bonus: Every now and then, we will showcase similar steps using a Node.JS and MongoDB, migrating to Azure Web Apps, Containers and CosmosDB.**

At the end of this workshop, you will have a good understanding of container concepts, Docker architecture and operations, Azure Container Services, Azure Kubernetes Services and SQL Azure PaaS solutioning.

Target Audience:

The workshop is targeted to Cloud Architects, Cloud Solution designers, developers and IT sysadmins, CIO's, CTO's and anybody else who is interested in learning about Azure, containers, application cloud migration and digital transformation.

Focus of the workshop (40%) is getting hands-on experience, complemented with presentations and whiteboard sessions (if in-person delivery).

Time Estimate:

16 hours (+/- 10 hours presentations, 6 hours of optional hands-on labs for attendees)

Workshop Agenda - Presentations

What we will talk about...

- Module 1: Digital App Transformation with Azure
- Module 2: Infrastructure as Code using ARM templates
- Module 3: Azure Database Solutions – SQL Azure
- Module 4: Azure App Services – Azure Web Apps (.NET + Node.JS)
- Module 5: Introduction to Docker
- Module 6: Deploying Azure Container Registry / Azure Container Instance
- Module 7: Migrating Apps to Azure Container Services / Kubernetes Services
- **Module 8: Azure Container Services Management and Monitoring**

Workshop Agenda – Hands-On-Labs

Learn by doing...

- **Module 2: Infrastructure as Code using ARM templates**
 - **Lab 1:** Setup your Azure subscription and deploy the source Virtual Machine environment with Visual Studio 2017
- **Module 3: Azure Database Solutions – SQL Azure**
 - **Lab 2:** Migrating a SQL VM database to SQL Azure using SQL Management Studio
- **Module 4: Azure App Services – Azure Web Apps**
 - **Lab 3:** Migrating your legacy ASP.NET application to Azure Web Apps with Visual Studio 2017
 - Easter Egg Bonus: Deploying a Node.JS app with MongoDB / CosmosDB
- **Module 5: Introduction to Docker**
 - **Lab 4:** Containerizing your legacy ASP.NET application with Docker CE for Windows

Workshop Agenda – Hands-On-Labs

Learn by doing...

- **Module 6: Deploying Azure Container Registry / Azure Container Instance**
 - **Lab 5:** Using Azure Container Registry, Azure Container Instance
- **Module 7: Migrating Apps to Azure Container Services / Kubernetes Services**
 - **Lab 6:** Deploying Azure Container Services with Kubernetes and running Pods
 - **Lab 7:** Deploying Azure Kubernetes Services
- **Module 8: AKS Monitoring and Operations**
 - **Lab 8: Integrating AKS monitoring with Azure Monitor and Deploying Kubernetes Dashboard**

Node.JS and Cosmos DB labs are available on request

Technical Requirements

What you need...

<Could vary based on the actual delivery-method>, but overall:

- Client workstation running recent Windows, Linux or Mac OS and latest internet browser
- Access to ports 80 (HTTP), 443 (HTTPS) and 3389 (Remote Desktop)
- Full Azure subscription (MSDN, AzurePass, Paid subscription, AE, CSP,...)
- Lab consumption estimate: \$15-35 (when shutdown all resources)

Questions and HOL support

msdevseriesupport@007FFFLearning.com

Subject: Azure Developer Series – Containers

Response Time: within 4-8 hours

Check GitHub for FAQ and Updates:

<http://www.github.com/007FFFLearning/MsDevSeriesSupport>

Application Migration

Managing and Monitoring Azure Kubernetes Services

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Key Objectives

What you will learn in this section

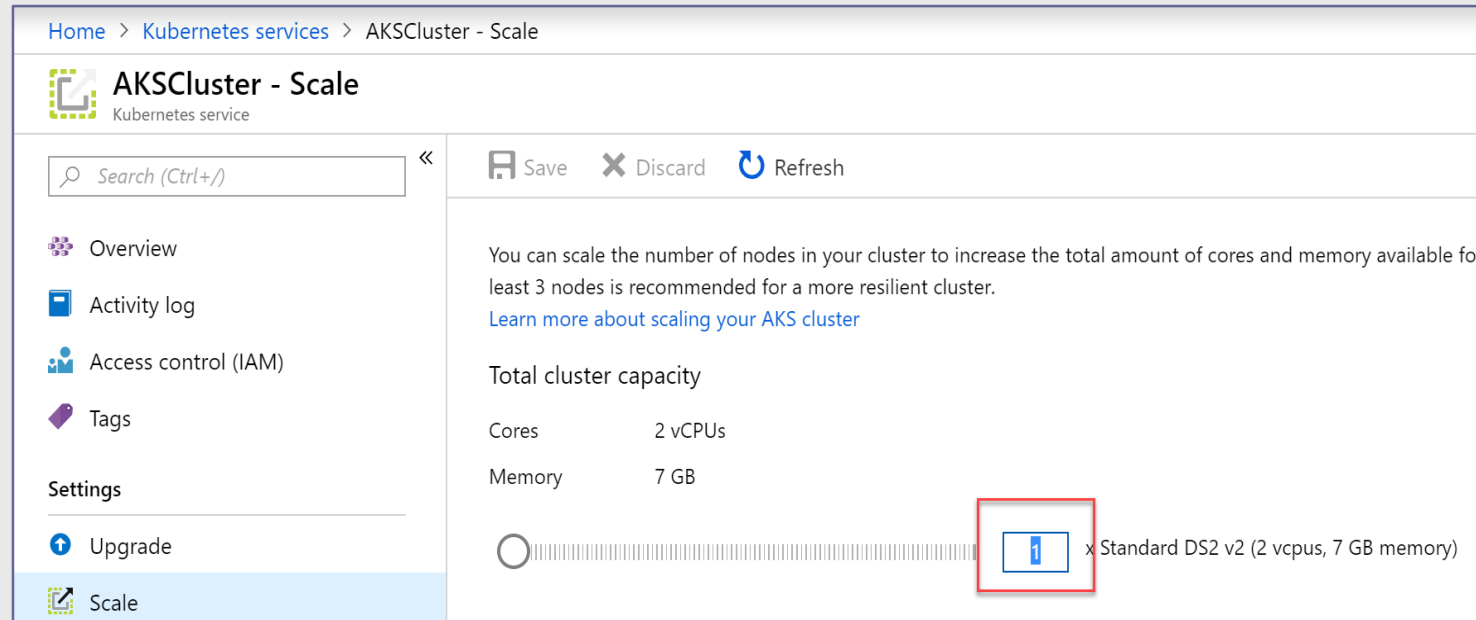
- Enabling Container Scalability in AKS
- Monitoring Azure Kubernetes Services
- Using Kubernetes dashboard with Azure Kubernetes Services

Enabling Container Scalability

AKS Scale

Option 1: Scaling the Nodes

```
Az aks scale --resource-group AKSRG --name AKSCluster --node-count 3
```



The screenshot shows the 'AKSCluster - Scale' page in the Azure portal. The breadcrumb navigation at the top reads 'Home > Kubernetes services > AKSCluster - Scale'. The page title is 'AKSCluster - Scale' with the subtitle 'Kubernetes service'. On the left, there is a sidebar with a search bar and a list of navigation items: Overview, Activity log, Access control (IAM), Tags, Settings, Upgrade, and Scale (which is highlighted). The main content area has a top bar with 'Save', 'Discard', and 'Refresh' buttons. Below this, a message states: 'You can scale the number of nodes in your cluster to increase the total amount of cores and memory available for your cluster. At least 3 nodes is recommended for a more resilient cluster. [Learn more about scaling your AKS cluster](#)'. The 'Total cluster capacity' section shows 'Cores 2 vCPUs' and 'Memory 7 GB'. A progress bar is displayed with a red box highlighting the number '1' in a blue box, followed by the text 'x Standard DS2 v2 (2 vcpus, 7 GB memory)'.

Home > Kubernetes services > AKSCluster - Scale

AKSCluster - Scale

Kubernetes service

Search (Ctrl+ /)

Save Discard Refresh

You can scale the number of nodes in your cluster to increase the total amount of cores and memory available for your cluster. At least 3 nodes is recommended for a more resilient cluster. [Learn more about scaling your AKS cluster](#)

Total cluster capacity

Cores	2 vCPUs
Memory	7 GB

1 x Standard DS2 v2 (2 vcpus, 7 GB memory)

AKS Scale

Option 2: Scaling the PODS

```
kubectl scale --replicas=3 -f .\kubernetes3.yml
```

```
Administrator: Windows PowerShell
PS C:\Users\labadmin> cd\
PS C:\> cd .\DockerImage1\
PS C:\DockerImage1> kubectl scale --replicas=3 -f .\kubernetes3.yml
deployment.apps "drupalcntr" scaled
error: Scaling the resource failed with: could not fetch the scale for services drupalcntr
e requested resource
PS C:\DockerImage1> kubectl get pods
```

NAME	READY	STATUS	RESTARTS	AGE
adsakssample-6d7c8cf5cd-9brgr	0/1	ImagePullBackoff	0	22h
akshellworld-64dbbb7cf8-vfqnc	1/1	Running	1	21h
dockerwebvmsample-79947845f6-jwr7p	0/1	ImagePullBackoff	0	22h
dockerwebvmsample2-77cd55c9bd-kkcfh	0/1	ImagePullBackoff	0	22h
drupalcntr-5fff4774bf-h8bx2	1/1	Running	0	20s
drupalcntr-5fff4774bf-hdm6g	1/1	Running	0	20s
drupalcntr-5fff4774bf-zm8lk	1/1	Running	0	50m
newadsakssample-6486f76985-p4r42	0/1	ImagePullBackoff	0	22h
newdockerwebvmsample-54dffc974d-qpv4	0/1	ImagePullBackoff	0	22h
ubuntucont-6f555d84d8-xs7vl	0/1	CrashLoopBackoff	15	54m

```
PS C:\DockerImage1> kubectl get services --watch
```

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	AGE
adsakssample	LoadBalancer	10.0.212.10	104.209.177.162	80:30156/TCP	22h
akshellworld	LoadBalancer	10.0.164.32	137.116.72.252	80:31558/TCP	21h
drupalcntr	LoadBalancer	10.0.74.211	104.46.117.95	80:30750/TCP	50m
kubernetes	ClusterIP	10.0.0.1	<none>	443/TCP	22h
newadsakssample	LoadBalancer	10.0.56.37	104.209.180.231	80:32692/TCP	22h
ubuntucont	LoadBalancer	10.0.254.169	104.210.11.189	80:31412/TCP	55m

Scaling PODS means you technically deploy multiple instances of your app container

AKS Container AutoScaler

Preview

```
kubectl create -f aks-cluster-autoscaler.yaml
```

```
kubectl autoscale deployment azure-vote-front --cpu-percent=50 --min=3 --max=10
```

AutoScaling checks pending PODS, based on values in the Yaml-file.

Define a min and max value

e.g. Run 3 nodes minimum, with a maximum of 10, when CPU +50%

```
memory: 300Mi
command:
- ./cluster-autoscaler
- --v=3
- --logtostderr=true
- --cloud-provider=azure
- --skip-nodes-with-local-storage=false
- --nodes=1:10:nodepool1
env:
- name: ARM_SUBSCRIPTION_ID
  valueFrom:
```

Demo

Scaling Azure Kubernetes Services

Monitoring AKS in Azure

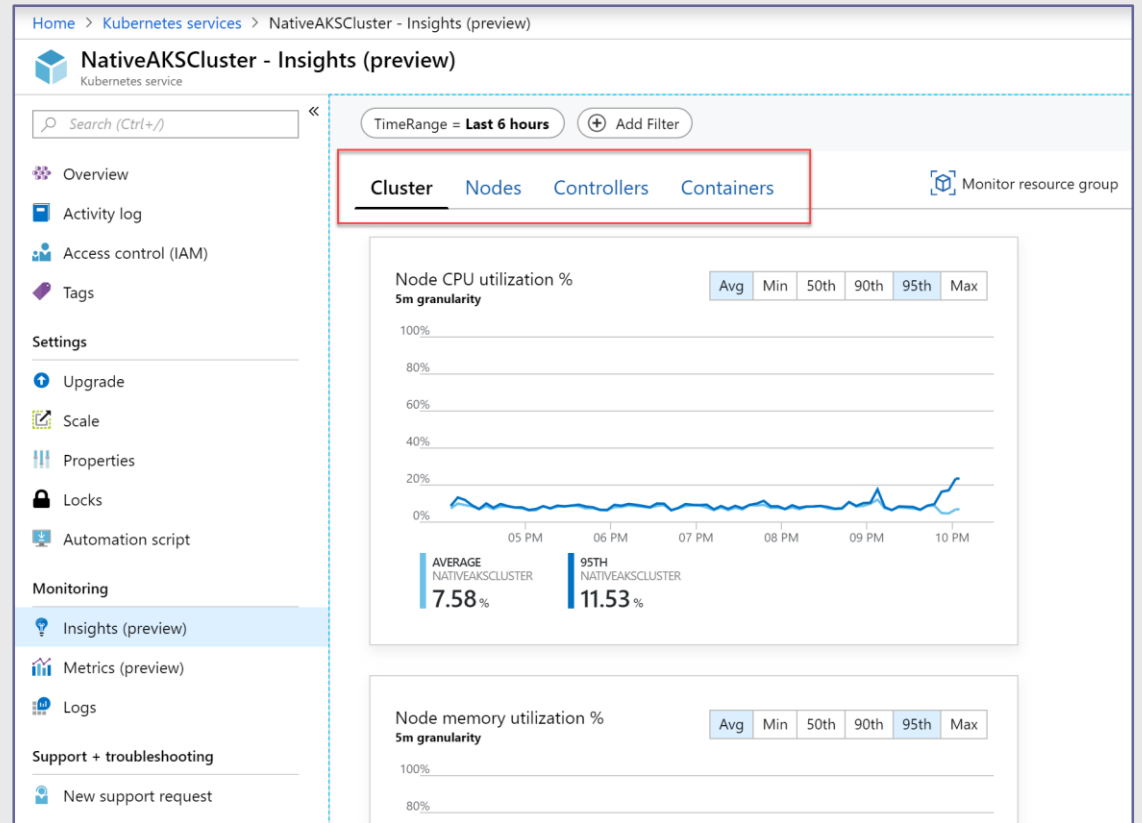
AKS Monitoring

You can't manage what you don't see...

- Identify AKS containers that are running on the node and their average processor and memory utilization.
- Identify where the container resides in a controller or a pod.
- Review the resource utilization of workloads running on the host that are unrelated to the standard processes that support the pod.
- Understand the behavior of the cluster under average and heaviest loads.

AKS Monitoring

Built-in monitoring capabilities of the AKS Cluster, within Azure Monitor



AKS Monitoring

Cluster | Nodes | Controllers | Containers

Cluster

Nodes

Controllers

Containers

Monitor resource group

[Learn more](#)

Feedback

Search by name...

Metric:

CPU Usage (millicores)

Min

Avg

50th

90th

95th

Max

All 3 item(s)

NAME	STATUS	95TH % <div></div>	95TH	CONTAINERS	UPTIME	CONTROLLER	TREND 95TH % (1 BAR = 5M)
<div><div></div></div> aks-nodepool1-200...	<div><div></div></div> Ok	18%	353 mc	29	13 hours	-	<div></div>
<div><div></div></div> aks-nodepool1-200...	<div><div></div></div> Ok	8%	166 mc	7	24 mins	-	<div></div>
<div><div></div></div> aks-nodepool1-200...	<div><div></div></div> Ok	6%	128 mc	5	24 mins	-	<div></div>

Cluster

Nodes

Controllers

Containers

Monitor resource group

[Learn more](#)

Search by name...

Metric: CPU Usage (millicores)

Min

Avg

50th

90th

95th

Max

NAME	STATUS	95TH %	95TH	CONTAIN...	RESTA...	UPTIME	NODE	TREND 95TH
<div><div></div>kubernetes-dashboard-...</div>	1 <div></div>	0.5%	0.5 mc	1	0	13 hours	-	
<div><div></div>kube-proxy (DaemonSet)</div>	7 <div></div>	0.4%	7 mc	7	0	10 mins	-	
<div><div></div>kube-svc-redirect (Dae...</div>	3 <div></div>	0.2%	3 mc	6	0	18 mins	-	
<div><div></div>kube-dns-v20-7d874cb...</div>	2 <div></div>	0.1%	2 mc	6	0	13 hours	-	
<div><div></div>akshelloworld-64dbbb7...</div>	1 <div></div>	0%	0.2 mc	1	0	13 hours	-	
<div><div></div>drupalcntr-5fff4774bf (R...</div>	3 <div></div>	0%	0.1 mc	3	0	20 mins	-	
<div><div></div>drupalcntr-5fff4774...</div>	<div></div> Ok	0%	0.1 mc	1	0	1 hour	aks-nodepo...	
<div><div></div>adsacr</div>	<div></div> Ok	0%	0.1 mc	1	0	1 hour	aks-nodepo...	
<div><div></div>drupalcntr-5fff4774...</div>	<div></div> Ok	0%	0.1 mc	1	0	20 mins	aks-nodepo...	
<div><div></div>adsacr</div>	<div></div> Ok	0%	0.1 mc	1	0	20 mins	aks-nodepo...	
<div><div></div>drupalcntr-5fff4774...</div>	<div></div> Ok	0%	0.1 mc	1	0	20 mins	aks-nodepo...	
<div><div></div>adsacr</div>	<div></div> Ok	0%	0.1 mc	1	0	20 mins	aks-nodepo...	

Demo

Monitoring AKS in Azure

Using the Kubernetes Dashboard

Kubernetes Dashboard

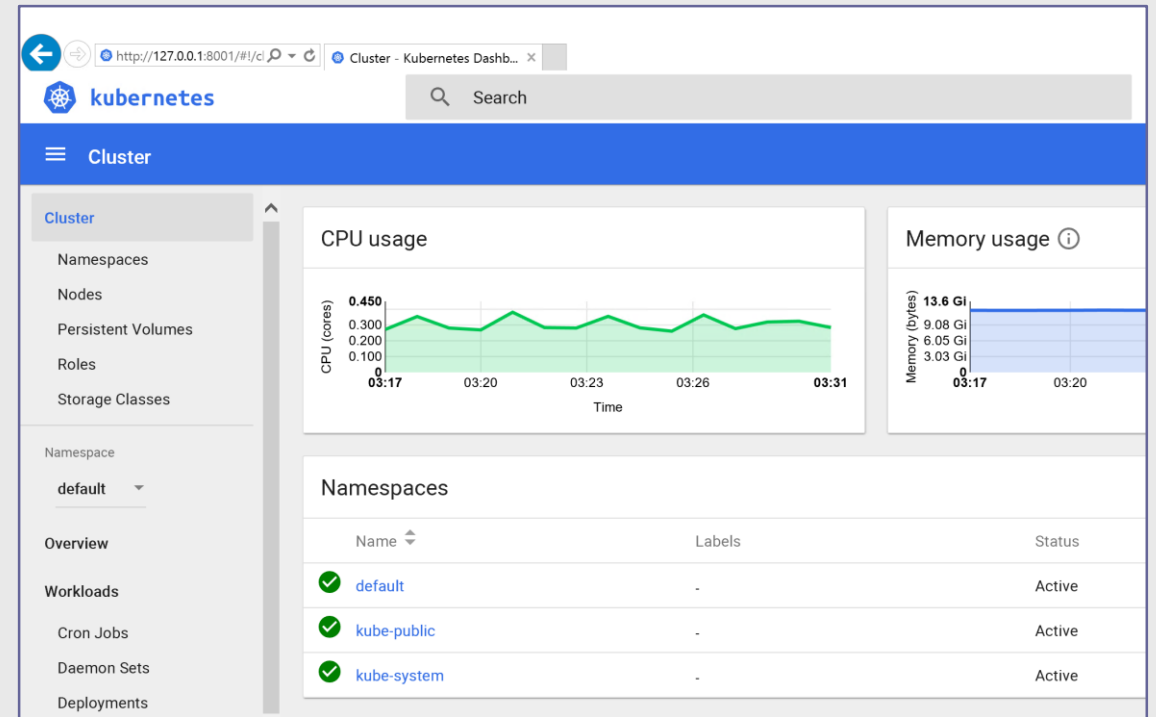
You can't manage what you don't see...

- Kubernetes includes a **web dashboard** that can be used for **basic management operations**. This dashboard lets you view basic health status and metrics for your applications, create and deploy services, and edit existing applications.

```
az aks browse --resource-group AKSResourceGroup --name AKSCluster
```

Kubernetes Dashboard

1. Install latest version of the kubectl CLI tool
2. Connect to the AKS Cluster with the correct credentials
3. az aks browse...



Kubernetes Dashboard

Shows detailed information on:

- Jobs
- Pods
- Nodes
- ...

Namespace

default

Overview

Workloads

Cron Jobs

Daemon Sets

Deployments

Jobs

Pods

Replica Sets

<div><div></div><div></div></div>	<div><div>drupalcntr-5fff4774bf-h8b:</div><div>aks-nodepool1-20062427-0</div></div>	Running	0	43 minutes	<div><div></div><div></div></div>	0
<div><div></div><div></div></div>	<div><div>drupalcntr-5fff4774bf-hdm</div><div>aks-nodepool1-20062427-0</div></div>	Running	0	43 minutes	<div><div></div><div></div></div>	0
<div><div></div><div></div></div>	<div><div>drupalcntr-5fff4774bf-zm8</div><div>aks-nodepool1-20062427-0</div></div>	Running	0	an hour	<div><div></div><div></div></div>	0
<div><div></div><div></div></div>	<div><div>ubuntucont-6f555d84d8-x:</div><div>aks-nodepool1-20062427-0</div></div> <div>Back-off restarting failed container</div>	Waiting: CrashLoop	24	an hour	<div><div></div><div></div></div>	-
<div><div></div><div></div></div>	<div><div>akshellworld-64dbbb7cf8</div><div>aks-nodepool1-20062427-0</div></div>	Running	1	22 hours	<div><div></div><div></div></div>	0
<div><div></div><div></div></div>	<div><div>newadsakssample-6486f7</div><div>aks-nodepool1-20062427-0</div></div> <div>Error: ImagePullBackOff</div>	Waiting: ImagePulle	0	23 hours	<div><div></div><div></div></div>	-
<div><div></div><div></div></div>	<div><div></div><div>aks-nodepool1-</div></div>					

If AKS cluster is using RBAC,
your dashboard will fail
because of missing
rolebinding:

```
kubectl create clusterrolebinding
kubernetes-dashboard --clusterrole=cluster-
admin --serviceaccount=kube-
system:kubernetes-dashboard
```

Demo

Using the Kubernetes Dashboard

Lab

Managing and Monitoring Azure Kubernetes Services

Lab 8 Instructions

1. (Assumption is you finished all prior labs to these)
2. Download the “Lab 8” Guide from GitHub (PDF)
3. Task 1: Enable AKS Scalability
4. Task 2: Monitoring AKS using the Azure Portal Dashboard
5. Task 3: Monitoring and Managing AKS using the Kubernetes Dashboard
6. When having questions: msdevseriesupport@007FFFlearning.com

Section Take-Aways

1. Azure Kubernetes Services has built-in scaling features
2. Azure Kubernetes Services provides Azure-integrated Monitoring
3. AKS provides deployment of a specific « Kubernetes Dashboard »

Workshop Take-Aways

1. Azure has all services available to assist in application migration and digital transformation
2. Azure integrates with Docker Containers, as an enabler for cloud migration and integration of your business-critical workloads
3. Azure provides several « Container Services », from low-level to enterprise-grade solutions, including end-to-end monitoring

Questions?

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Thank you for attending this workshop

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