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MCW TECHNOLOGIES

MVP Microsoft Most Valuable Professional

LEARNING

Other sessions

- TH02-Docker for ASP.NET Core Developers
  - Michele Leroux Bustamante
- TH05 Kubernetes and Containers for Developers
  - Aaron Schlesinger

Agenda

- What, Why, and How
- ASP.NET Core app → Docker container
- Kubernetes (K8s) in Azure
- CI / CD pipeline with Visual Studio Team Services

What does it look like?

What we use and why

.NET Core and ASP.NET Core

- Next generation managed runtime
- Cross-platform
- Container and micro-service optimized
- High performance

Containers

- A way of packaging software
- Predictable, Repeatable, Immutable
- Your application's
  - code
  - libraries
  - dependencies

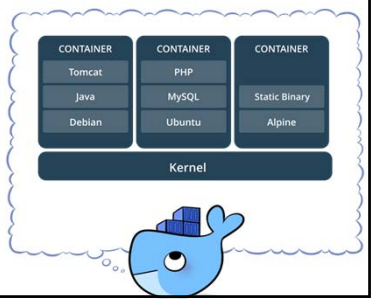
  packed together as an immutable artifact

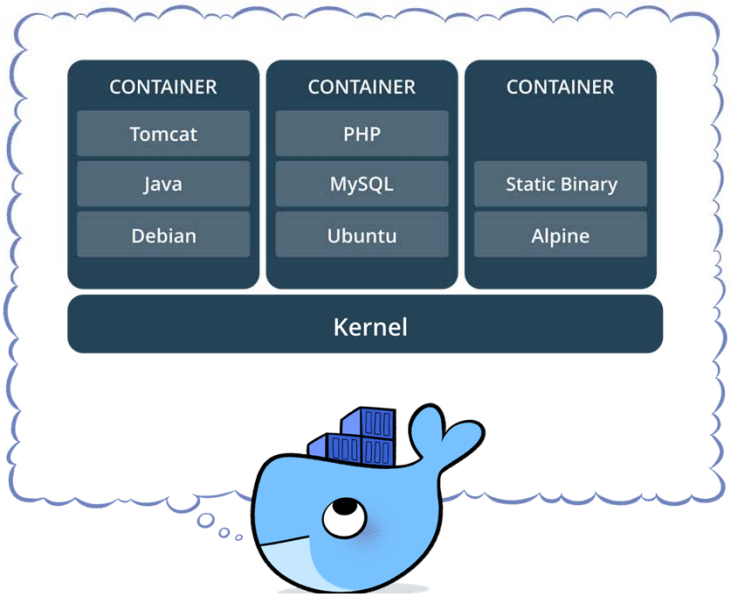
Docker

- Company
- Product
- Command-line tool

Docker

- Docker is software that helps you
  - create and deploy software within containers
- Docker's mantra
  - "Build, Ship, and Run any App, Anywhere"
- Docker helps you build and run containers





What's a Docker Container

- Linux and Windows runtime abstraction
- Containers isolate software from its surroundings
- Runs the same, regardless of the environment.
- Think development vs test vs prod
- Helps reduce conflicts when running different software on the same infrastructure

dockerfiles and images

- dockerfiles define a build process
- docker build + dockerfile == docker image
  - Docker images are immutable
  - Think snapshot in time of your code + dependencies
- docker push + docker → image repository
  - Docker has "Docker Hub"; like GitHub but for container images
  - Public "repos" like Docker Hub
  - Private "repos" like your own Azure Container Registry

docker run

- docker run + docker image == running app
- Run anywhere docker runs
  - Windows
  - Linux
- App runs the same everywhere
  - Raspberry Pi to 256 Core Monster Servers
- Regardless of where your image is running, it behaves the same way.

Kubernetes (aka K8s)

- Open source container orchestration platform
  - Specifically containerized apps
- Came out of Google
  - Google created the Borg who begat Omega
  - Omega knew the OSS community and begat Kubernetes
- Open-sourced in 2014
- Written in Go (Golang)
  - Lives at https://github.com/kubernetes/kubernetes

Kubernetes (aka K8s)

- Reduces operational burden
- Scaling up or down when demand changes
- Distributes load between the containers
- Launches new containers on different machines if something fails

- Kubernetes is a "data center OS"

K8s Concepts

- Masters
  - A master is a collection of services that make up the control plane for a cluster
  - API Server, cluster store, controller manager, scheduler
- Nodes (formally minions)
  - kubelet (node agent), container runtime, and network proxy
- Containers run inside Pods
  - Pods are the minimum scaling unit in K8s
  - Containers in a Pod share the same environment (host OS, network stack, namespaces, etc.)
- Pods live and die; they're cattle, not pets

K8s Concepts

- ReplicaSet is a higher-level object that wraps Pods
  - Takes a template and deploys a desired number of *replicas*
- Services provide a reliable networking endpoint for a set of Pods
- Deployments are used to deploy ReplicaSets and provide support for things like rolling updates
- … and on and on …
- kubectl == command-line control app

That's a lot of stuff …

How do I install all that?

Microsoft Azure

- Comprehensive set of cloud services
- Global network of datacenters
- Integrated tools, full support for "DevOps"
- Build anything

Azure AKS

- Azure Container Service
- Manages hosted Kubernetes environment
- Eliminates burden of ongoing operations and maintenance
- As a managed service, you don't have to managed the server, VMs, infrastructure, etc. – MSFT does!

Azure ACR

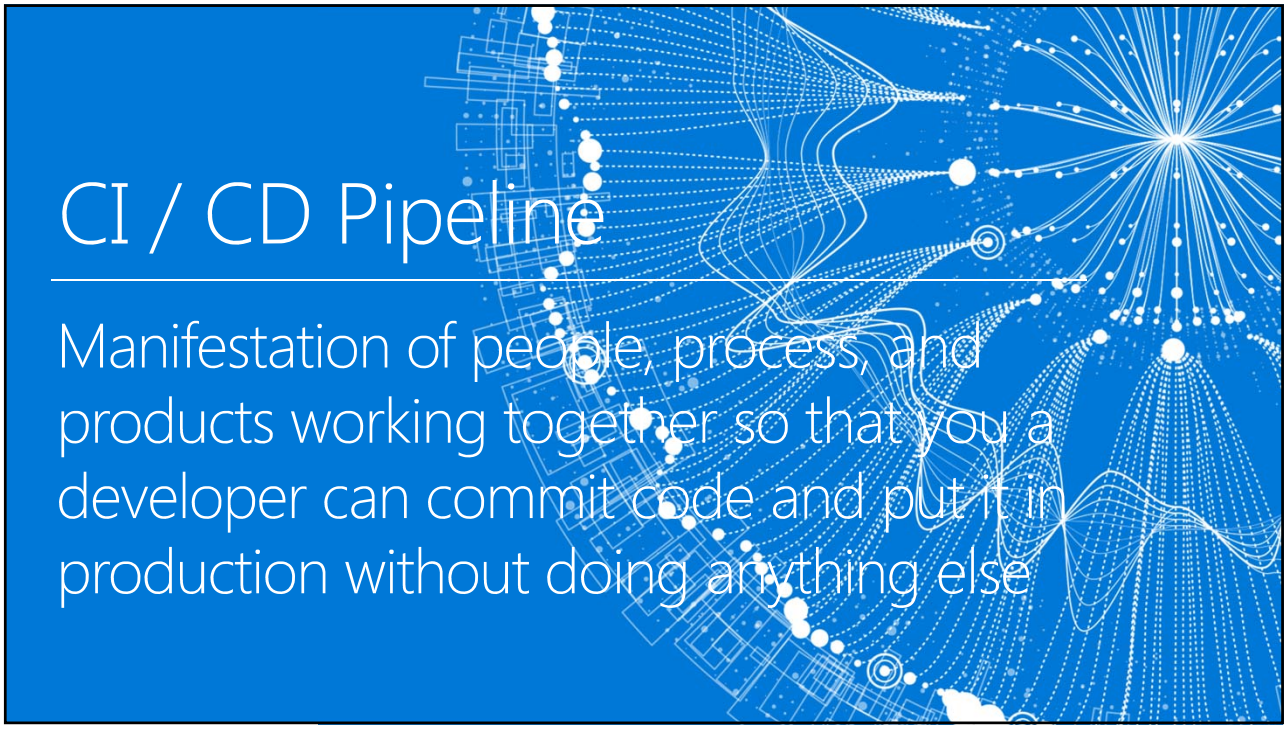
- Azure Container Registry
- Private registry hosted in Azure to store your containers
- Can pay for more performance and geo-replication of your images

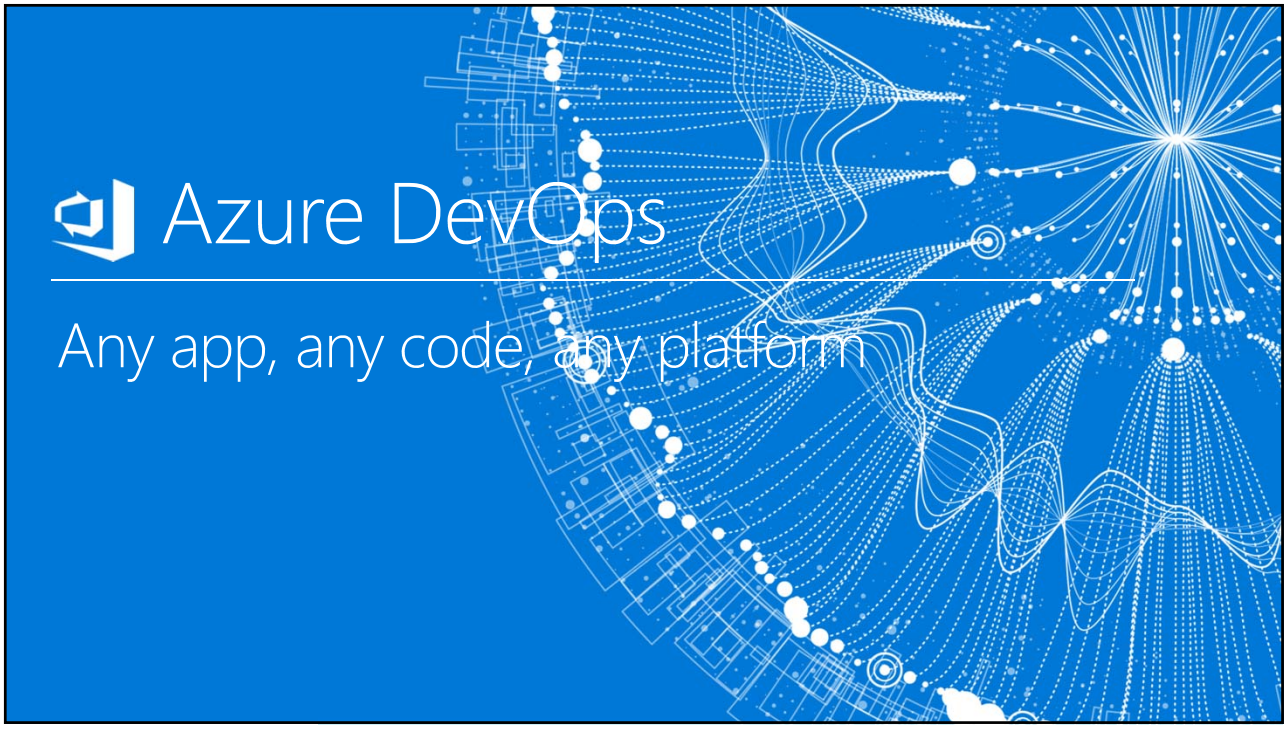
How?

Is there a process? What can tools help?

DevOps

DevOps is the union of people, process, and products to enable continuous delivery of value for our end users


CI / CD Pipeline
Manifestation of people, process, and products working together so that you a developer can commit code and put it in production without doing anything else


Azure DevOps
Any app, any code, any platform

End-to-end

How do you do it

Wrap up

A few more details

Tools I Used

- Windows 10 with WSL and Hyper-V
  - Latest Azure CLI 2.0 with Kubernetes tools (`az aks install-cli`)
- Visual Studio 2017 (15.8.4)
  - ASP.NET and Azure workloads
  - .NET Core 2.1 update
- Docker for Windows
- Azure subscription
- Azure DevOps organization (former VSTS account)

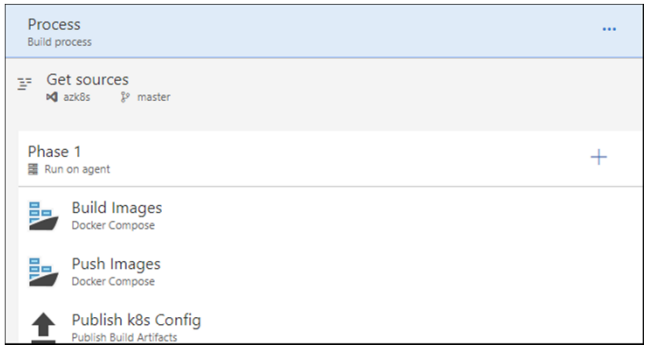
Build a cluster from bash in WSL (part 1)

```
azureSubscriptionId="sub GUID"
resourceGroup="<<add yours>>"
clusterName="<<add yours>>"

# Pick yours
location="centralus"

# Useful if you have more than one Azure subscription
az account set --subscription $azureSubscriptionId

# Resource group for cluster
# Only available in certain regions at time of writing
az group create --location $location --name $resourceGroup
```

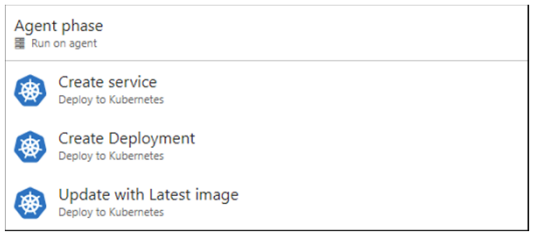
Build a cluster from bash in WSL (part 2)

```
# Create actual cluster
az aks create --resource-group $resourceGroup --name $clusterName --node-count 2
--generate-ssh-keys

# Creates a config file at ~/.kube on local machine
# Tells kubectl which cluster to manage
az aks get-credentials --resource-group $resourceGroup --name $clusterName

# Copies config file to a location easily accessible by an editor like VS Code
cp ~/.kube/config /mnt/c/Users/Public



# Graham Smith published original version on his blog
```

Team Build



Release Management



Interesting Commands

// Hit K8 Dashboard

```
az aks browse --resource-group $resourceGroup --name $cluster
```

// Get List of Info with FQDN for VSTS

```
az aks show --resource-group $resourceGroup --name $cluster
```

// List your public IP address

```
kubectl get services
```

Changes from AKS preview to release

- Dashboard now does **not** work "OOTB"
- Need to look at RBAC
  - Role Based Access Control
- Take a look at docs
  - https://bri.gd/aksk8sdashrbac

One more thing …

DevOps Projects

- From the Azure Portal run a new wizard
- DevOps Project
  - Pick ASP.NET Core (but no SQL Database)
  - Pick Kubernetes
  - Deploy
- Be carefull—you'll spend real money quickly

A final thought …

Don't let your **experience**
be an **impediment** to your ability
to **learn** and **grow**.

Thank you!

Notes and Thank you

- Thanks to Dr. Graham Smith for his blog series
  - https://pleasereleaseme.net/
- Nigel Poulton
  - http://blog.nigelpoulton.com/
  - Books and writings on Docker and K8s

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