INTRODUCTION TO DOCKER FOR .NET DEVELOPERS

BRENDON MATHESON

Your Presenter

- Brendon Matheson
- Australian
- 11yr Bangkok Resident

Currently Working On

- Healthcare (Architect at Orion Health)
- Cloud / Multi-Tenant / SaaS
- Functions-as-a-Service (FaaS)


DOCKER

Agenda

- What is Docker?
- Exercise 1 – hello-world
- Exercise 2 – Externalities
- Exercise 3 – Build a .NET Core app on Linux
- Exercise 4 – Dockerize a .NET Core app on Linux
- Exercise 5 – Customize the dotnetcore SDK container
- Exercise 6 – Dockerize nginx and CIFS on Linux
- Exercise 7 – Serve static content in IIS on Windows
- Exercise 8 – Serve web app in IIS on Windows

What is Docker?

Packaging, deployment and execution tool

Problems

- Environmental differences
- Complex deployment processes
- Conflicting dependencies

Solution

- Process isolation
- Bundle app and dependencies into containers
- Consistency and portability

Virtualization vs Containerization

Docker is a cool n virtualization techno y

What is Docker?

Virtualization

- Virtual hardware
  - CPU
  - Disk
  - Memory
  - Devices
- Guest OS and software installed into VM

VM's => System-Oriented

Containerization

- Native hardware – no hypervisor
  - Allocate resources with control groups (on Linux)
- Host kernel is used by containerized process

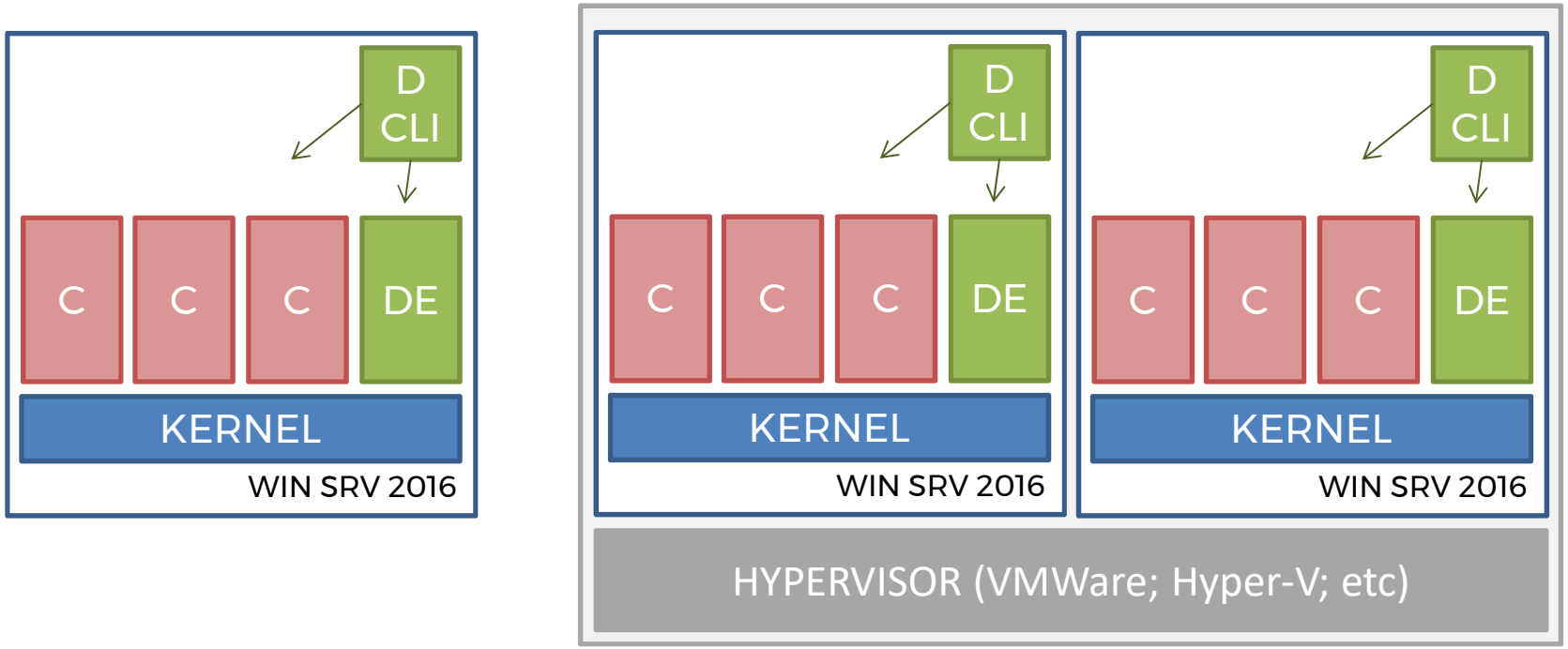
Containers => Service-Oriented

Docker on Windows

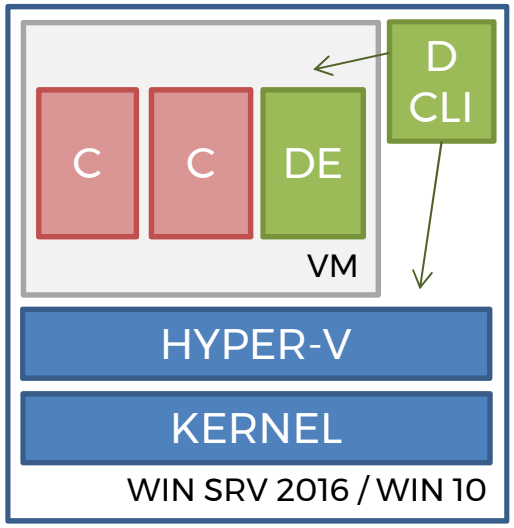
Docker on Windows – Two Models:

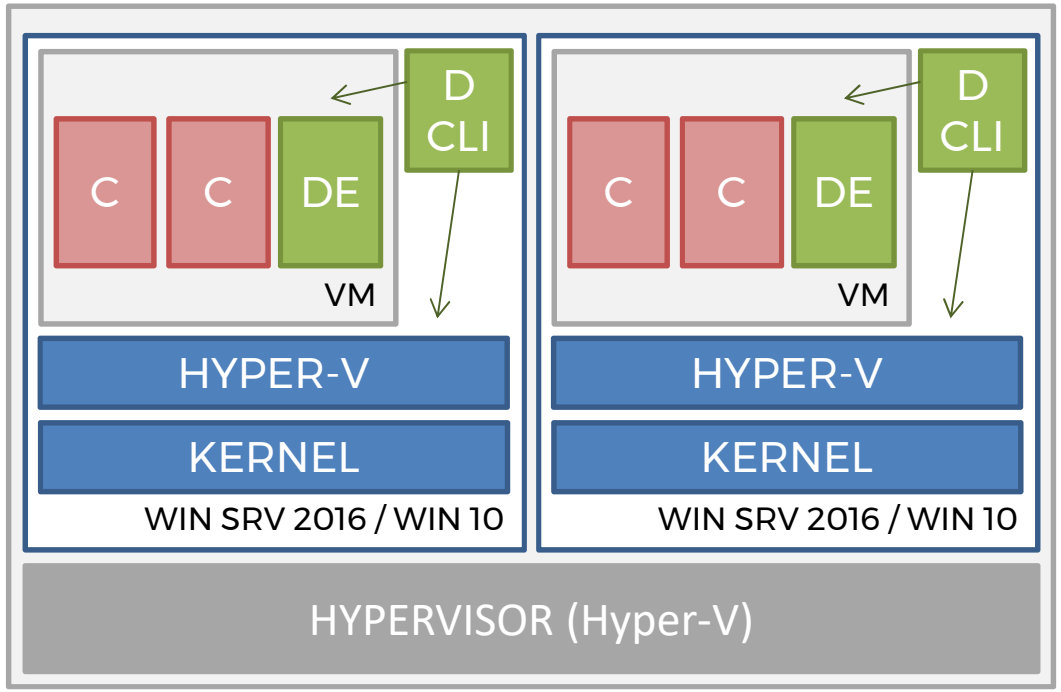
- **Windows Containers** – Kernel-level support like Linux
  - Windows Server 2016
- **Hyper-V Isolation** – Virtualization-based shim
  - Windows Server 2016
  - Windows 10
    - Version 1511 / November 2016 Update / Build 10586

Windows Containers



Hyper-V Isolation





References

Background Reading

- https://docs.docker.com/engine/docker-overview/#what-can-i-use-docker-for
- http://www.haifux.org/lectures/299/netLec7.pdf

Installation

- https://docs.docker.com/docker-for-windows/install/

Exercise 1 – hello-world

- Run it!

```
docker run hello-world
```

- Review https://hub.docker.com/_/hello-world/
- Pull

```
docker pull debian:9
```

- Check C:\Users\Public\Documents\Hyper-V\Virtual hard disks

Exercise 1 – hello-world

- Run an interactive session in Debian 9

```
docker run –i -t debian:9 /bin/bash
```

- Run a detached nginx instance

```
docker run –d nginx
```

- Launch a bash process in the detached nginx instance

```
docker exec -it <id> /bin/bash
```

Exercise 1 – hello-world

- Attach to the detached nginx instance

```
docker attach <id>
```

- Housekeeping commands

```
docker stop
docker rm
docker images
docker rmi
```

Exercise 2 – Externalities

- Mounting file system volumes

```
docker run –it –v W:\data:/data debian:9 /bin/bash
```

- Exposing ports

```
docker run -it -p 8080:80 nginx
```

- Environment variables

```
docker run -it -e "FOO=bar" debian:9 /bin/bash
root@8e035b9c48d9:/# echo $FOO
```

Exercise 3 – Build a dotnetcore app

- Launch a build environment

```
docker run –it –v W:\wrk\bjm_str_px_docker_dotnet\hello:/hello-world
microsoft/dotnet:2-sdk /bin/bash
```

- Navigate to the mounted project directory

```
cd /hello-world
```

Exercise 3 – Build a dotnetcore app

- Build as a FDD (Framework Dependent Deployment)

```
dotnet build -c Release hello.csproj
dotnet publish -c Release hello.csproj
```

- References:
  - https://docs.microsoft.com/en-us/dotnet/core/deploying/index
  - https://docs.microsoft.com/en-us/dotnet/core/tools/dotnet-build
  - https://docs.microsoft.com/en-us/dotnet/core/tools/dotnet-publish
  - https://docs.microsoft.com/en-us/dotnet/core/rid-catalog

Exercise 3 – Build a dotnetcore app

- Run the app

```
dotnet bin/Release/netcoreapp2.0/publish/hello.dll
```

- Quit the container

```
docker ps -a
```

- Clean up the container

```
docker rm <id>
```

Exercise 4 – Dockerize a dotnetcore app

- Create the Dockerfile

```
FROM microsoft/dotnet:2-runtime

RUN mkdir -p /hello-world/

COPY bin/Release/netcoreapp2.0/publish/* /hello-world/

CMD ["dotnet", "/hello-world/hello.dll"]
```

- Build the image

```
docker build –t bren/hello .
```

Exercise 4 – Dockerize a dotnetcore app

- Run it

```
docker run bren/hello
```

Exercise 7 – Serve static content in IIS on Windows

- Review the base IIS image at https://hub.docker.com/r/microsoft/iis/
  - Note: nanoserver vs windowsservercore

- Start with the tutorial Dockerfile:

```
FROM microsoft/iis:nanoserver-10.0.14393.1715
RUN mkdir C:\site
RUN powershell -NoProfile -Command \
    Import-module IISAdministration; \
    New-IISSite -Name "Site" -PhysicalPath C:\site -BindingInformation
"*:8000:"
EXPOSE 8000
ADD content/ /site
```

Exercise 7 – Serve static content in IIS on Windows

- Build

```
docker build -t my/iis .
```

- Run

```
docker run --rm -it --name iis my/iis
```

- Connect browse to <IP>:8000 – get IP from inspect:

```
docker inspect iis
docker inspect -f "{{ .NetworkSettings.Networks.nat.IPAddress }}" iis
```

Exercise 7 – Serve static content in IIS on Windows

- Create a volume for our static site:

```
docker volume create --name website
```

- Drop content into C:\ProgramData\Docker\volumes\website
- Remove ADD from Dockerfile and rebuild
- Run with external volume mounted

```
docker run --rm -it --name iis -v
C:\ProgramData\Docker\volumes\website:C:\site my/iis
```

Exercise 8 – Serve web app in IIS on Windows

- Review the base aspnet image at https://hub.docker.com/r/microsoft/aspnet/
- Test the sample webapp – mvcrandomanswers
- Create Dockerfile, publish app and build image

```
FROM microsoft/aspnet:windowsservercore-10.0.14393.1715

RUN mkdir C:\randomanswers
RUN powershell -NoProfile -Command \
    Import-module IISAdministration; \
    New-IISSite -Name "ASPNET" -PhysicalPath C:\randomanswers -
BindingInformation "*:8000:"

EXPOSE 8000

ADD MVCRandomAnswerGenerator/bin/Release/PublishOutput /randomanswers
```

Exercise 8 – Serve web app in IIS on Windows

- Build

```
docker build –t bren/webapp .
```

- Run

```
docker run --rm -it --name webapp bren/webapp
```

Exercise 8 – Serve web app in IIS on Windows

- References:
  - https://hub.docker.com/r/microsoft/aspnet/
  - https://github.com/dotnet/docs/tree/master/samples/framework/docker/MVCRandomAnswerGenerator

Homework!

Core skills and workflow

- Development environment – one of:
  - Install Docker for Windows 10
  - Windows Server 2016
- hello-world
- .NET Core build and Dockerize
- ASP.NET Core Dockerize

Continued study

- docker-compose
- docker-swarm

b@bren.cc

http://u.bren.cc/github

brendon.matheson

http://u.bren.cc/linkedin

http://u.bren.cc/youtube

http://u.bren.cc/twitter