

docker

# Introduction to Containers

SQL Server On Linux and Docker

# Chris Taylor

Worked with SQL Server since 2001

MCSE – Data Platform

Exceptional DBA Award finalist

*Damn that Jeff Moden and his RBAR and Tally tables 😊*

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Formerly one of those “dirty devs”

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# Agenda

- Session Aim
- What are containers?
- Containers vs Virtual Machines
- Images
- Getting Setup
- Volumes
- Dockerfile
- Docker Hub
- Multi-Container Applications

# Not on the Agenda

- Docker-Machine
- Orchestration
  - Docker-Swarm
  - Kubernetes
- Containers / Orchestration in the Cloud
  - AWS Elastic Container Service (ECS)
  - Azure Container / Kubernetes Service (AKS)
- Networking and Linking

# Session Aim

- High(ish) level insight into containers and what you can do with them
- Learn by example
  - Demo's
  - My mistakes 😊
- Enough of a taste to get the container bug and start experimenting!

*Well, it worked on my  
machine!*

# The Problem



Developers?

# The Real Problem

- Adapting to changing markets
- Environmental
  - Code
  - Tools
  - System libraries
  - Settings
  - Security



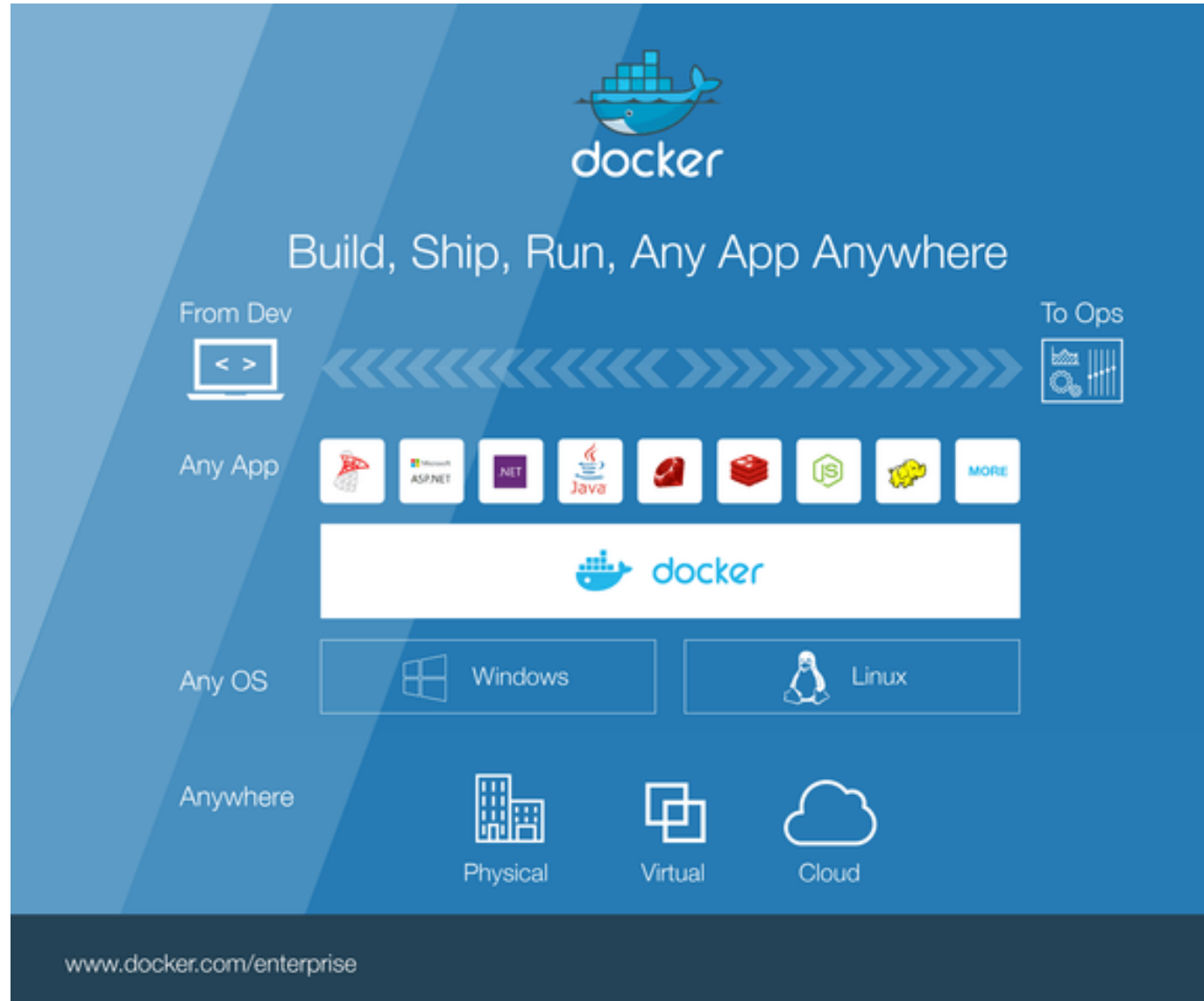
# What are Containers

- Next evolution in virtualisation
- Lightweight, stand alone, executable package of a piece of software
  - Separation of applications or services on the same container host
  - Isolated, resource controlled, and portable operating environment
  - Containerized software will always run the same, regardless of the environment
- Enables true independence between applications / infrastructure / developers / IT ops

*“Basically, a container is an isolated place where an application can run without affecting the rest of the system, and without the system affecting the application.”*

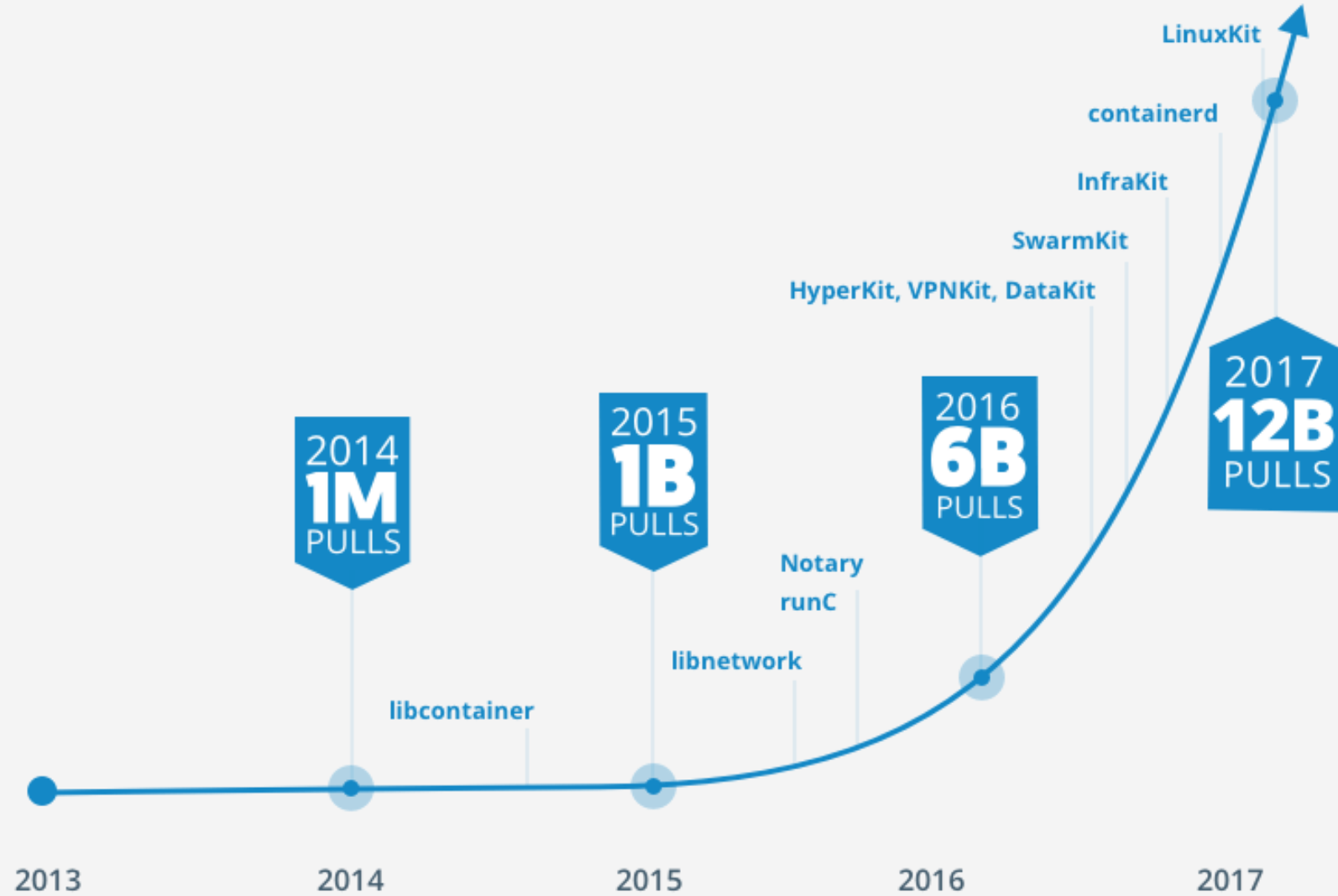
<https://docs.microsoft.com/en-us/virtualization/windowscontainers/quick-start/>

# What is Docker?



## Pulls

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# Container Terminology – The Basics

- **Container Host**

- Physical or Virtual computer system configured with the Windows Container feature.

- **Container OS Image**

- Containers are deployed from images.
- OS image is the first layer in potentially many that make up a container. This image provides the operating system environment.

- **Container Image**

- Union of layered filesystems, contains the base operating system, application, and all application dependencies needed to quickly deploy a container.

- **Container Registry**

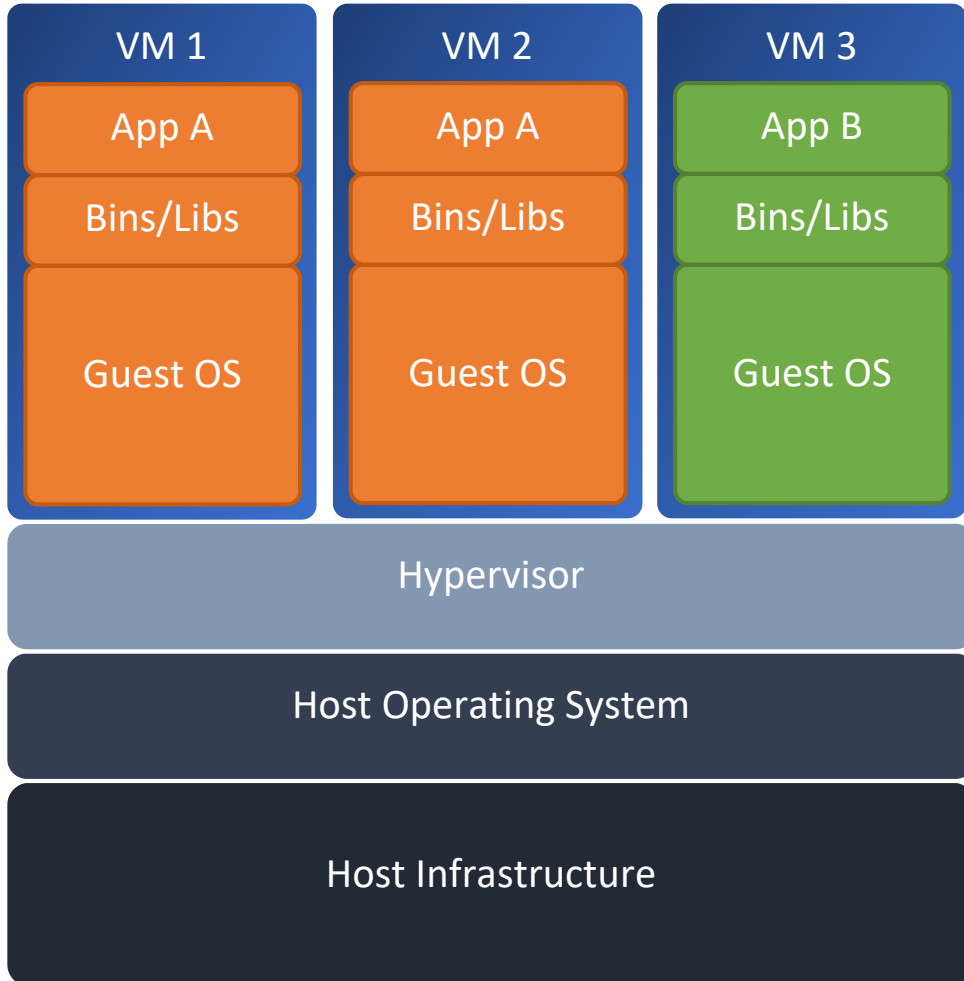
- A hosted service containing repositories (set) of images.

- **Dockerfile**

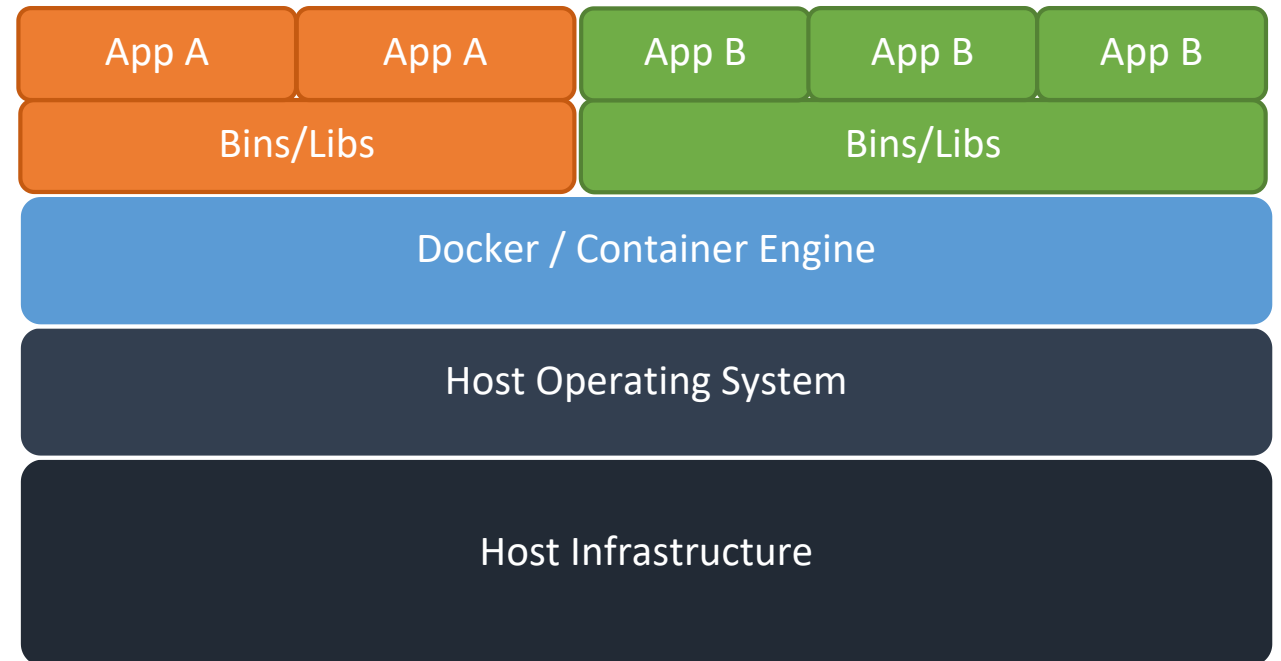
- Dockerfiles are used to automate the creation of container images.

# Virtual Machine vs Windows Container

## Virtual Machines

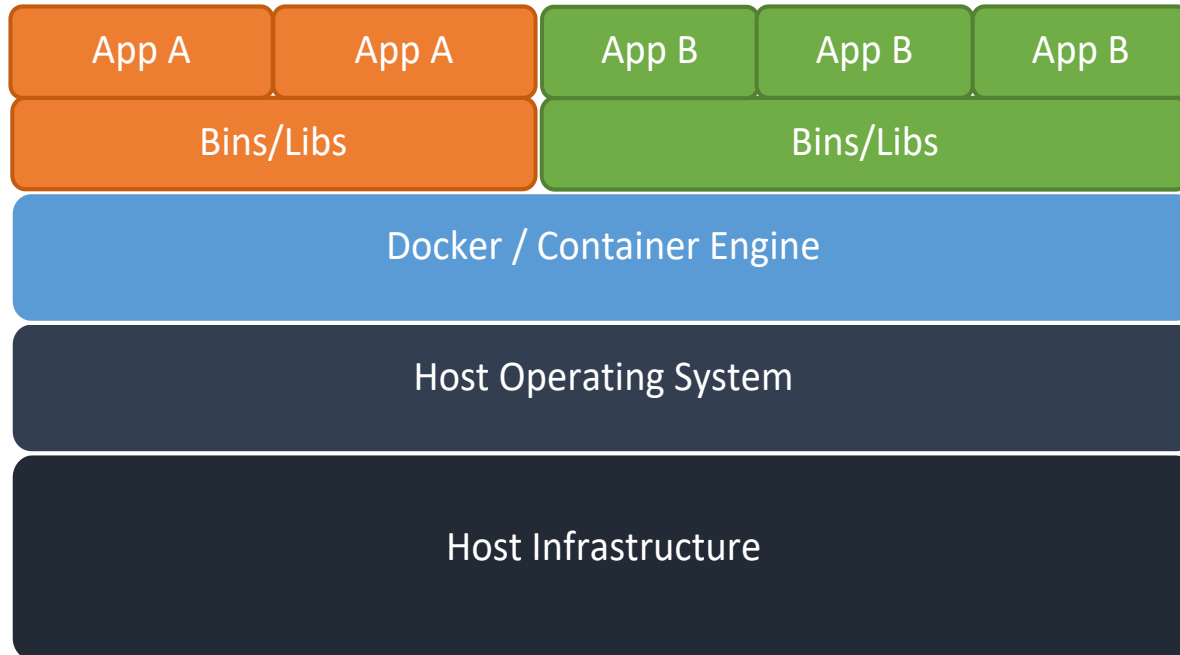


## Windows Container

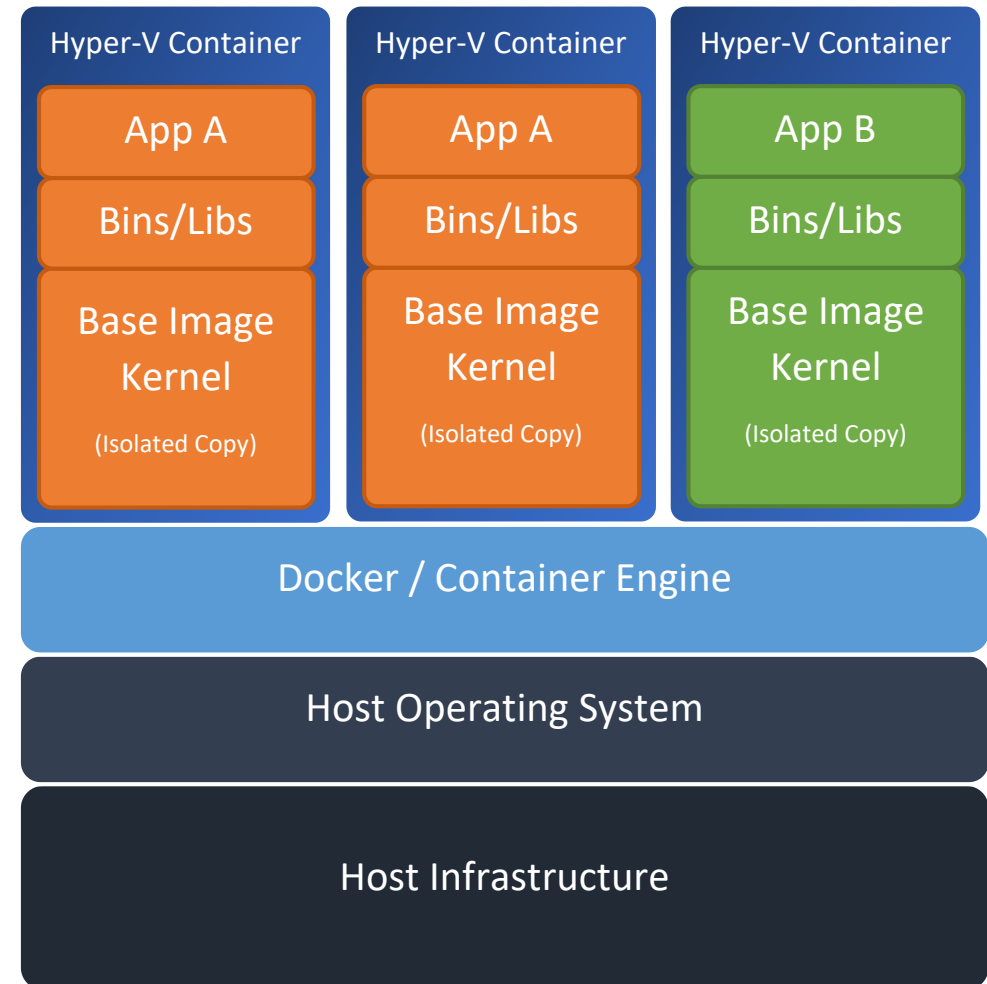


# Windows Containers vs Hyper-V Containers

## Windows Container



## Hyper-V Container



# SQL on Linux Container DEMO

# Conclusion

## Good

- Docker provides a facility to quickly provision environments
- Consolidation and Resource savings can be exceptional
- Docker Hub has 10000's of publicly available repositories / images

## Not so good

- Storage fiddly / not user friendly
- Lack of monitoring via Docker
  - TP tools available – cAdvisor
- Platform Independency still in its infancy
  - Windows Docker Service



# Summary

- Session Aim
- What are containers?
- Containers vs Virtual Machines
- Images
- Getting Setup
- Volumes
- Dockerfile
- Docker Hub
- Docker Compose

# Contact

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Questions?

# Links

- SQL Server on Linux:
- SQLPAL: <https://blogs.technet.microsoft.com/dataplatforminsider/2016/12/16/sql-server-on-linux-how-introduction/>
- 
- Getting Started:
- Docker 101: [https://www.slideshare.net/Docker/docker-101-nov-2016?next\\_slideshow=2Docker101-Nov2016](https://www.slideshare.net/Docker/docker-101-nov-2016?next_slideshow=2Docker101-Nov2016)
- <https://www.simple-talk.com/sysadmin/virtualization/working-windows-containers-docker-basics/>
- 
- Simple Hello World on nanoserver:
- <https://docs.microsoft.com/en-us/virtualization/windowscontainers/quick-start/quick-start-windows-10>
-


# Links

- Introduction:
  - [Docker introduction](#)
- General:
  - <https://blog.sixeyed.com/windows-containers-and-docker-5-things-you-need-to-know/>
- Licensing:
  - <https://blog.docker.com/2017/01/docker-windows-server-image2docker/>
- Installing:
  - <https://mathaywardhill.com/2017/04/12/installing-sql-server-vnext-on-linux-using-docker-on-windows-10/>
- SQL On Linux:
  - <https://docs.microsoft.com/en-us/sql/linux/sql-server-linux-setup-docker>
  - <https://roadtoalm.com/2017/01/06/running-a-linux-sql-server-in-a-docker-container/>
- Connecting to SQL via sqlcmd:
  - <http://searchsqlserver.techtarget.com/tip/Use-these-commands-to-deploy-SQL-Server-Docker-containers>

# Links

- Nested Virtualisation (for VMs):
  - <https://www.youtube.com/watch?v=ycCK1EyJG6Y> (nested virtualisation)
- Windocks:
  - <https://www.windocks.com/blog-2/Windows-Containers-at-Work>
- Performance:
  - <https://sabin.io/blog/sql-server-container-performance/>
  - <https://facility9.com/2017/01/how-do-i-update-my-sql-server-docker-container/>
- Error pushing image (add collaborators):
- <http://stackoverflow.com/questions/41984399/denied-requested-access-to-the-resource-is-denied-docker/42403423>
- Terminology:
  - <http://itproguru.com/expert/2016/10/docker-create-container-change-container-save-as-new-image-and-connect-to-container/>
- Volumes:
  - <http://paper.li/e-1483951345?read=http%3A%2F%2Fthedatafarm.com%2Fdata-access%2Fmashup-sql-server-on-linux-in-docker-on-a-mac-with-visual-studio-code%2F>
  - <http://www.tricksofthetrades.net/2016/03/14/docker-data-volumes/>
  - <https://www.richard-banks.org/2017/03/connecting-to-sql-on-docker.html>

# Links

- Hyper-V containers:
  - [https://www.simple-talk.com/sysadmin/virtualization/working-windows-containers-docker-stride/?utm\\_source=simpletalk&utm\\_medium=pubemail&utm\\_content=20170512-slota2&utm\\_term=simpletalkmain](https://www.simple-talk.com/sysadmin/virtualization/working-windows-containers-docker-stride/?utm_source=simpletalk&utm_medium=pubemail&utm_content=20170512-slota2&utm_term=simpletalkmain)
  - <https://hyper-v.nu/archives/hvredevoort/2015/05/nested-hypervisor-in-windows-server-vnext/>
  - <https://blogs.technet.microsoft.com/uktechnet/2016/01/11/windows-containers-what-they-are-and-how-they-work/>
  - [Windows Server and Docker - The Internals Behind Bringing Docker and Containers to Windows by Taylor Brown and John Starks](#)
- Tutorials:
  - [Docker Container Tutorial #1 Containers vs Images](#) - Focuses on Ubuntu
  - [Learn Docker in 12 Minutes](#) 
  - [Learn Docker in 20 Minutes](#)