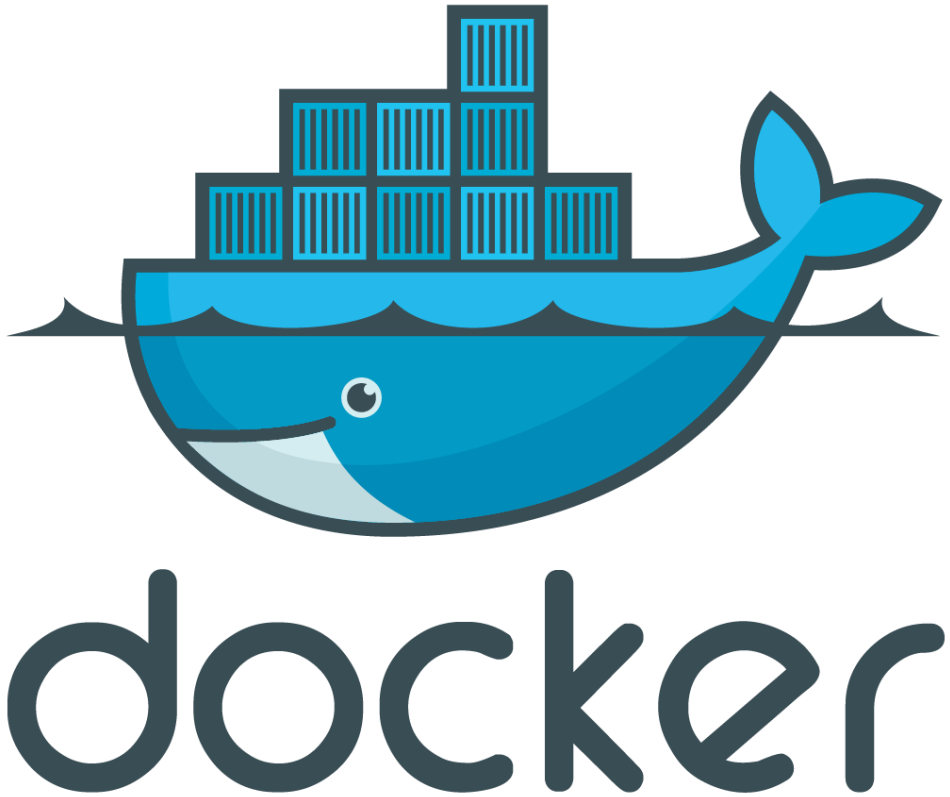


# Introduction to Containers

SQL Server On Linux and Docker

# Chris Taylor

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SQL Server Specialists

Worked with SQL Server since 2001

MCSE – Data Platform

Exceptional DBA Award finalist

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

SQLNE PASS ~~Chapter~~ Group Leader

SQLRelay Organiser (Newcastle)

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 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

Those pesky Dev's!!

https://cdn.geekwire.com/wp-content/uploads/2012/02/nerd-bigstock_Extreme_Computer_Nerd_1520708.jpg

# The Real Problem

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

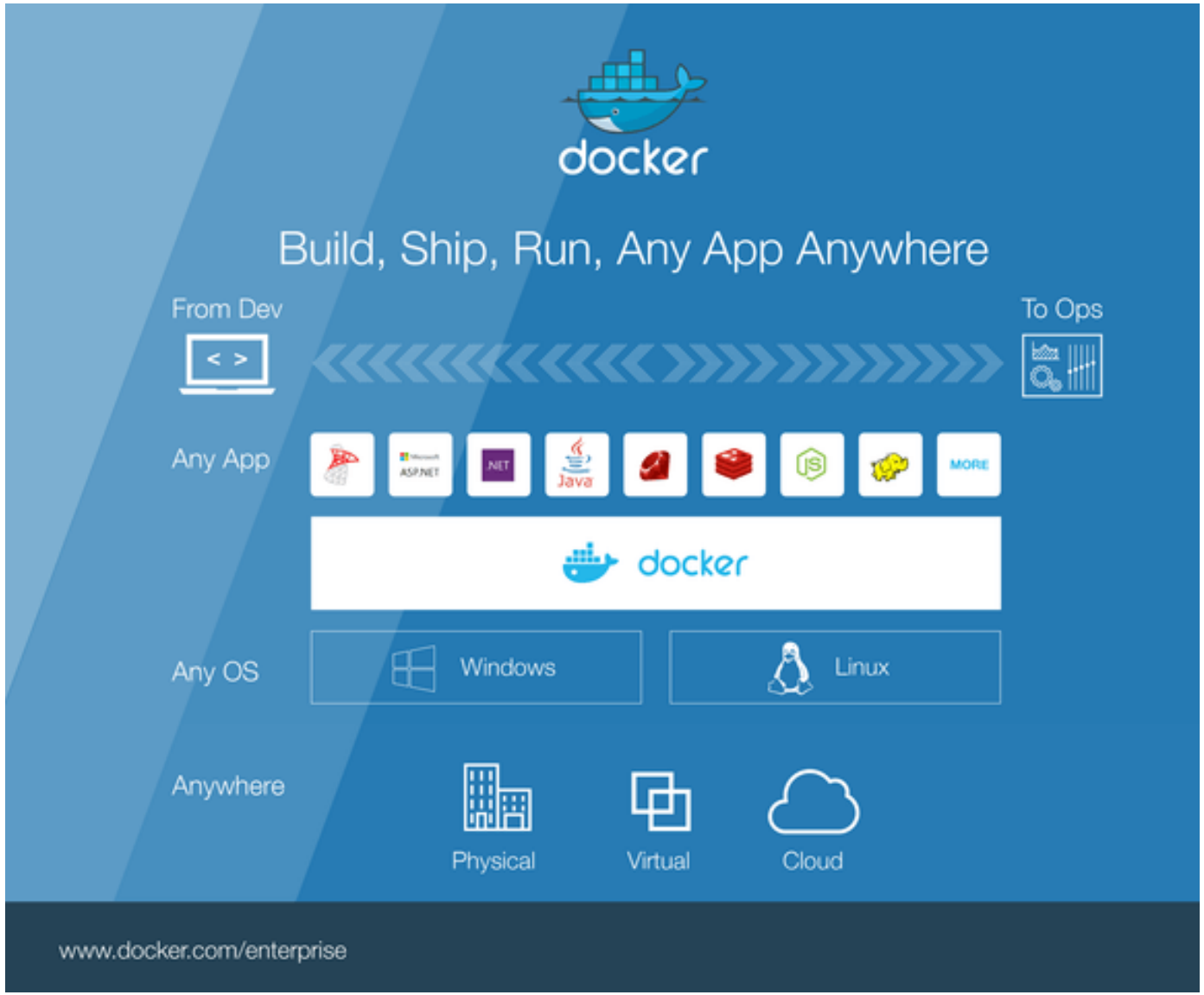
# What are Containers

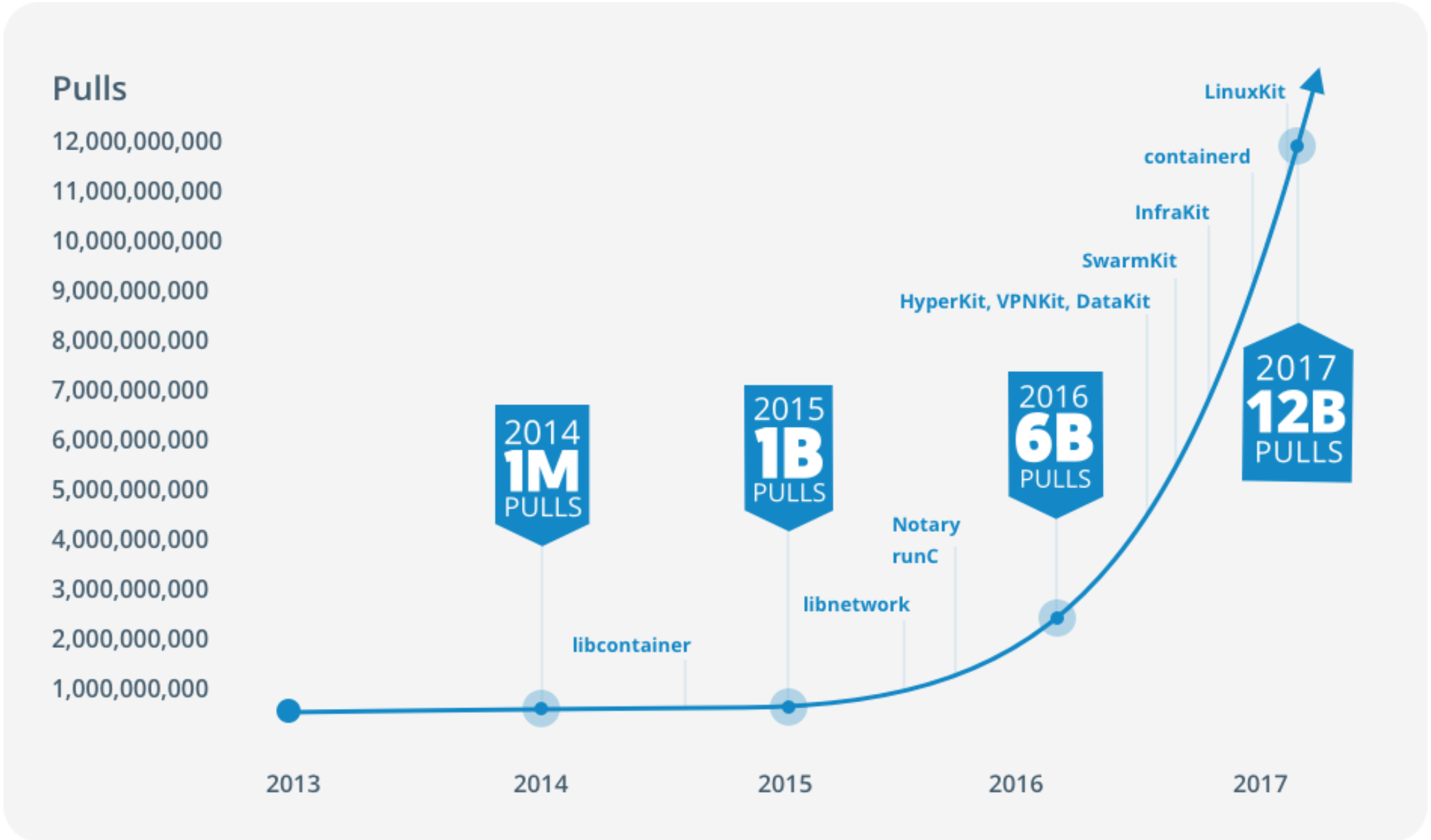
- Next evolution in virtualisation
- Lightweight, stand alone, executable package of a piece of software
  - Separation of applications or services on the same container host
  - Isolated, resource controlled, and portable operating environment
- Enables true independence between applications / infrastructure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



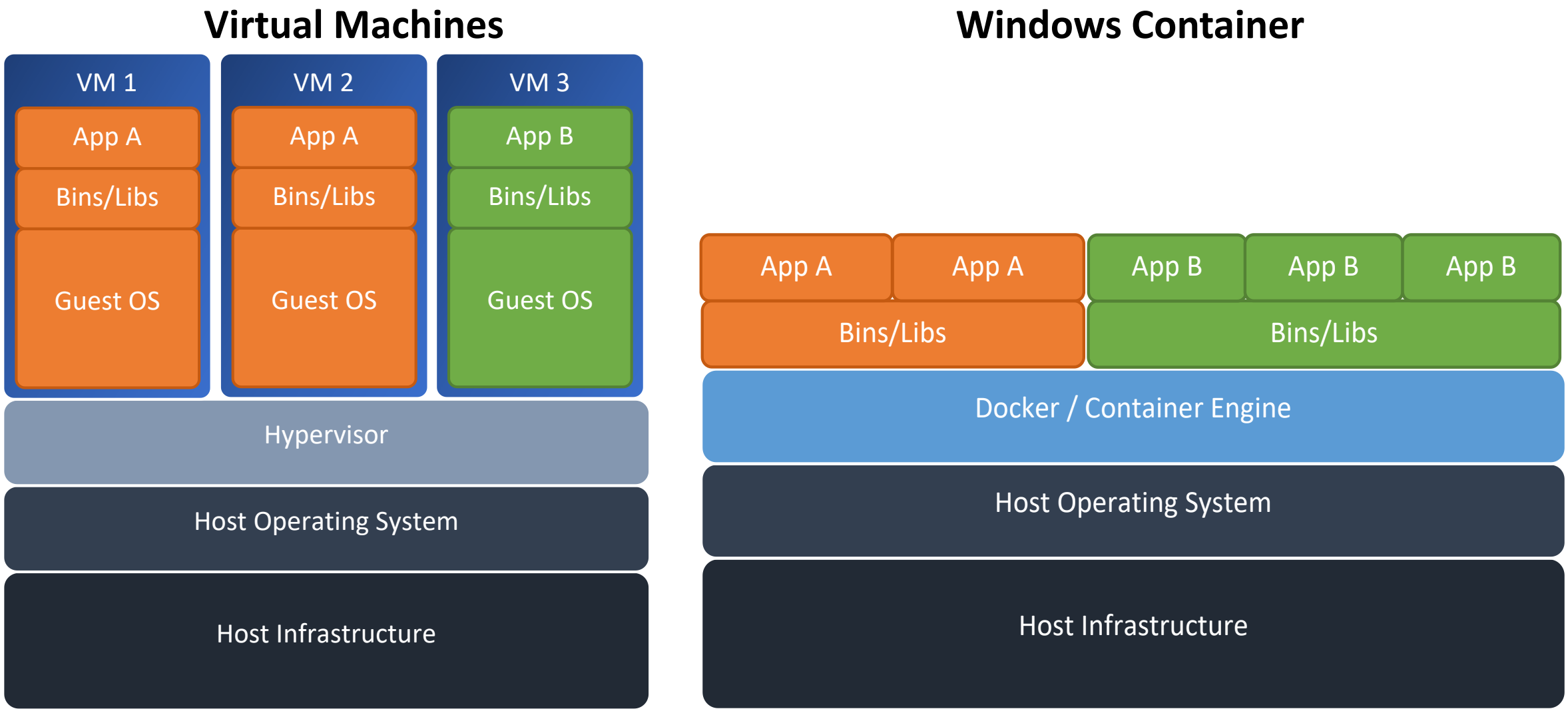



https://www.docker.com/what-container

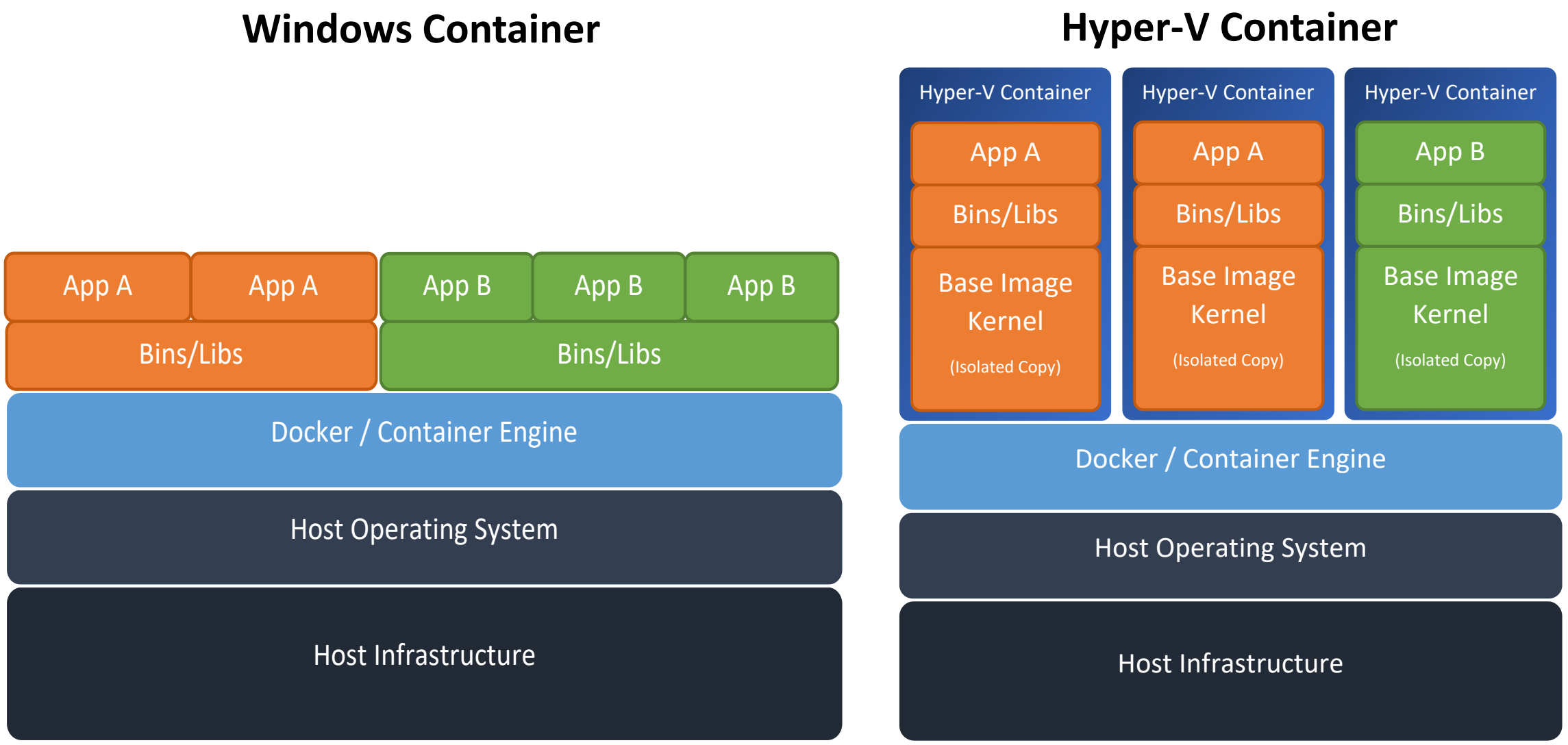
# Container Terminology – The Basics

- **Container Host**
  - Physical or Virtual computer system configured with the Windows Container feature.
- **Container OS Image**
  - Containers are deployed from images. The container OS image is the first layer in potentially many image layers that make up a container. This image provides the operating system environment.
- **Container Image**
  - A container image contains the base operating system, application, and all application dependencies needed to quickly deploy a container.
- **Container Registry**
  - Container images are stored in a container registry, and can be downloaded on demand.
- **Dockerfile**
  - Dockerfiles are used to automate the creation of container images.

# Virtual Machine vs Windows Container



# Windows Containers vs Hyper-V Containers



# 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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www.chrisjarrintaylor.co.uk

# 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=2Docker 101 - Nov 2016
- 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://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