



# Exploring SQL Server containers on Docker and Kubernetes

Carlos Robles, Principal Consultant, DBA Mastery

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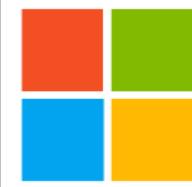
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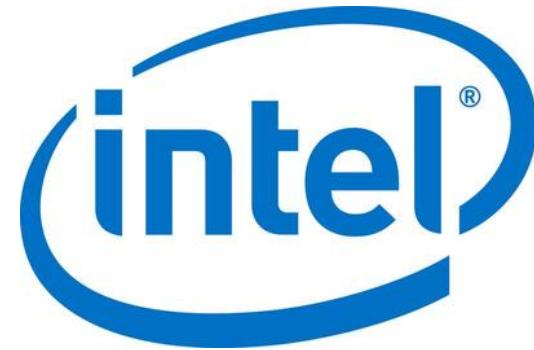
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# Carlos Robles

Principal Consultant, DBA Mastery



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## Experience

Over 10 years working with multiple DMBS  
Microsoft Data Platform MVP  
MCSE Data Management and Analytics

## Community

Guatemala SQL Server User Group leader  
International speaker, mentor, volunteer  
MSSQL Tips and SQL Server Central author

## DBA Mastery

SQL Server tips, best practices, scripts and more  
MAXDOP calculator



# Exploring SQL Server containers on Docker and Kubernetes

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# Agenda

In this session we will explore the options we have when working with SQL Server running on Docker containers and Kubernetes.

- Introduction to Docker
- The SQL Server Docker image
- The SQL Server Dockerfile
- How to start a SQL Server container
- Demo
- Introduction to Kubernetes
- Demo

# Docker



# Introduction to Docker



- From Docker docs:

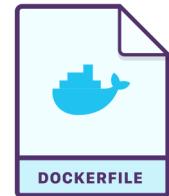
*Docker is an open platform for developing, shipping, and running applications.*

*Docker enables you to separate your applications from your infrastructure so you can deliver software quickly.*

*With Docker, you can manage your infrastructure in the same ways you manage your applications.*

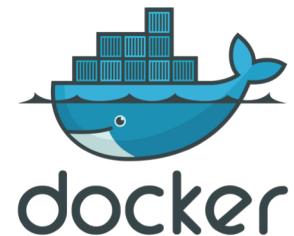
# Images

- Is a read-only template with instructions for creating a Docker container
- Images are created using a Dockerfile
- A snapshot of a set of files required to run an application
- Portable and consistent
- A new image can be created from an existing image (make your own)
  - SQL Server for example, based on Ubuntu or RedHat

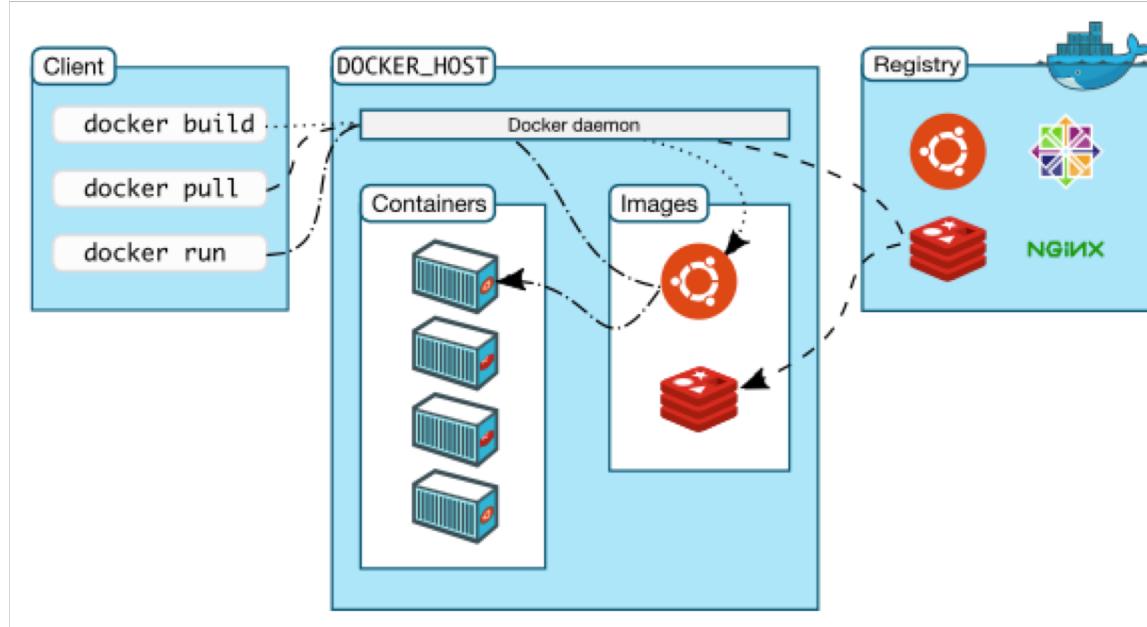


# Containers

- The runnable instance of a Docker image
- Container is nothing more than a program
- A standardized unit of software
- Writable layer and shared read-only layer
  - Small storage footprint
- Containers has full access to all resources
- Volumes = Persistent storage



# Docker architecture



# VM's vs Containers



Virtualization +15 years

Sometimes heavyweight

Hardware virtualization

Each VM has an entire OS

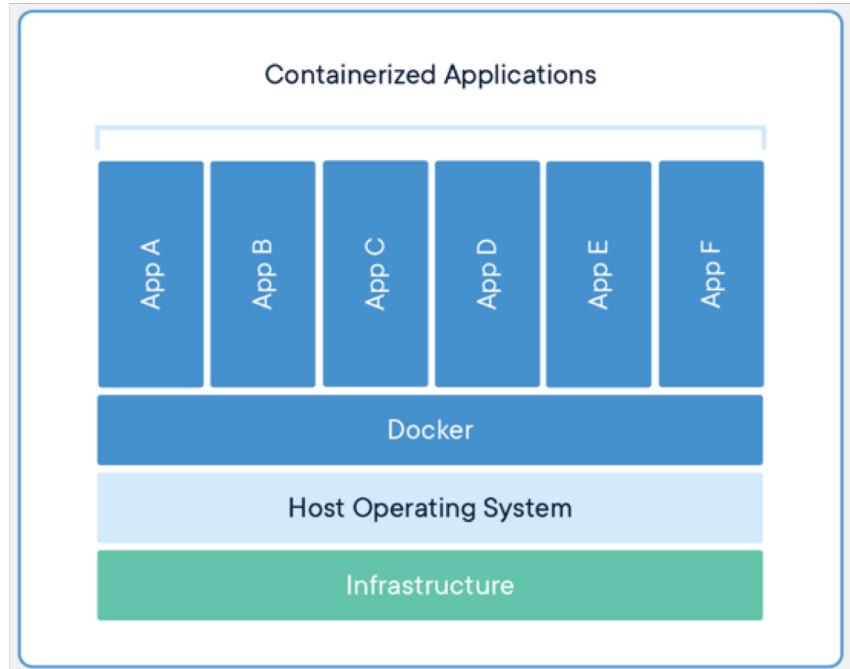
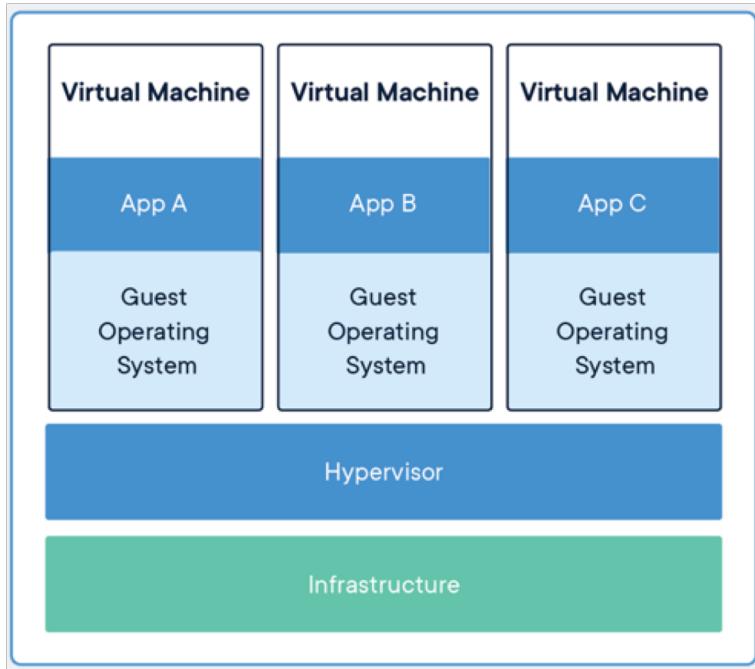


No installation

Lightweight

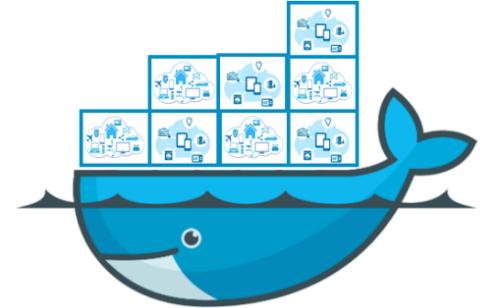
OS virtualization

All containers run in the same host OS



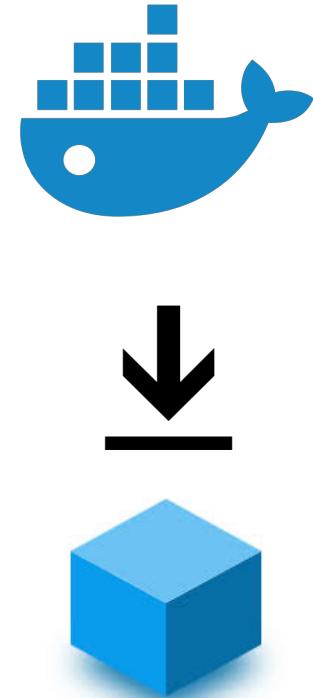
# Advantages

- Easy to use
- Agile application creation and deployment
- CI\CD - DevOps
- Resource isolation and better utilization
- Quick start \ stop time
- Cloud and OS portability
- Environmental consistency across all platforms



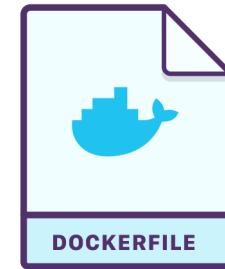
# The SQL Server docker image

- [Docker Hub](#) – [Microsoft container registry](#)
- SQL Server 2017
  - Just Ubuntu from RTM to latest CU
- SQL Server 2019 (CTP)
  - Ubuntu and RedHat
  - From RTM to latest CU
- SQL Server is pre-installed (standard)
- Backups are compatible between all platforms



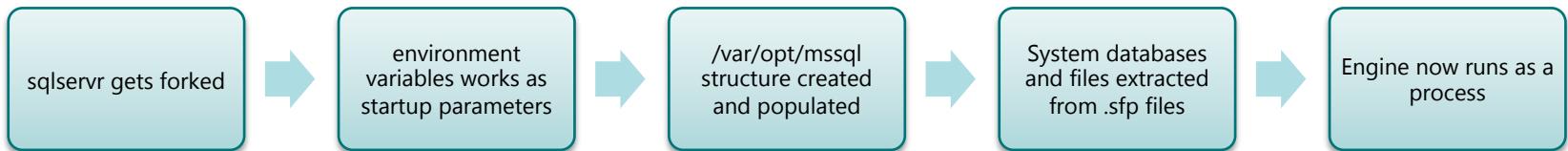
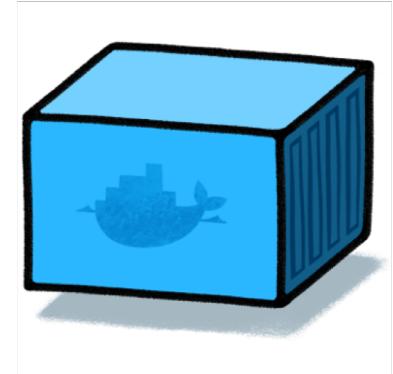
# The SQL Server Dockerfile

```
FROM ubuntu:16.04  
  
EXPOSE 1433  
  
COPY ./install /  
  
CMD ["/opt/mssql/bin/sqlservr"]
```



# How to start a SQL Server container

```
docker run \
--name 24HOP \
--env 'ACCEPT_EULA=Y' \
--env 'MSSQL_SA_PASSWORD=24hop#' \
--publish 1400:1433 \
--detach mcr.microsoft.com/mssql/server:2017-CU13-ubuntu
```

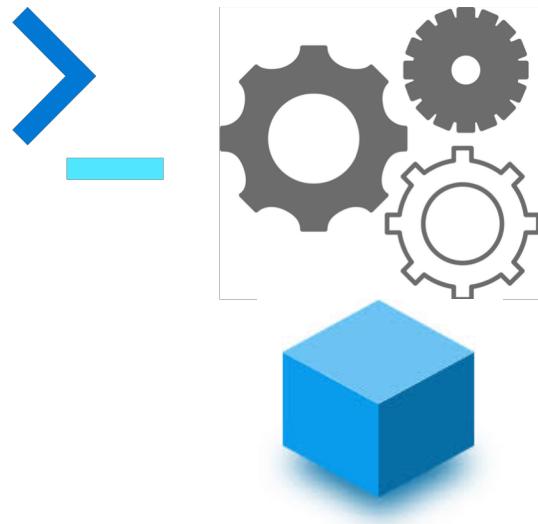


# Demo



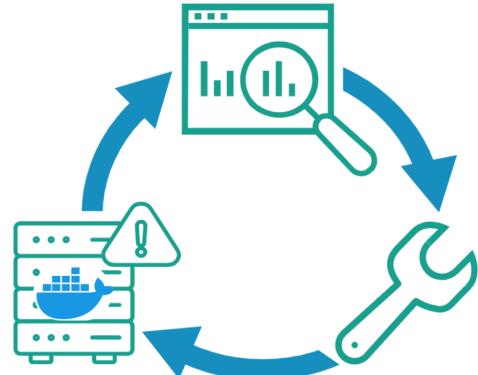
# Docker client commands

```
docker pull  
docker run  
docker start | stop  
docker image | container  
docker rm | rmi  
docker exec  
docker build  
docker logs  
docker inspect  
docker volume  
docker save
```



# Use cases

- Local development, testing
- CI\CD – DevOps workflows
- Troubleshooting
- Demonstrations
- Eliminates shared environments
- Resource contention
- No installation \ patching



# Kubernetes



# Introduction to Kubernetes



kubernetes

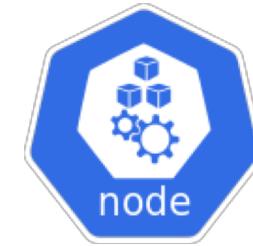
- From Kubernetes docs:

*Kubernetes is a portable, extensible open-source platform for managing containerized workloads and services, that facilitates both declarative configuration and automation.*

*It also make possible the container orchestration for automating application deployment, scaling, and management.*

# Kubernetes architecture

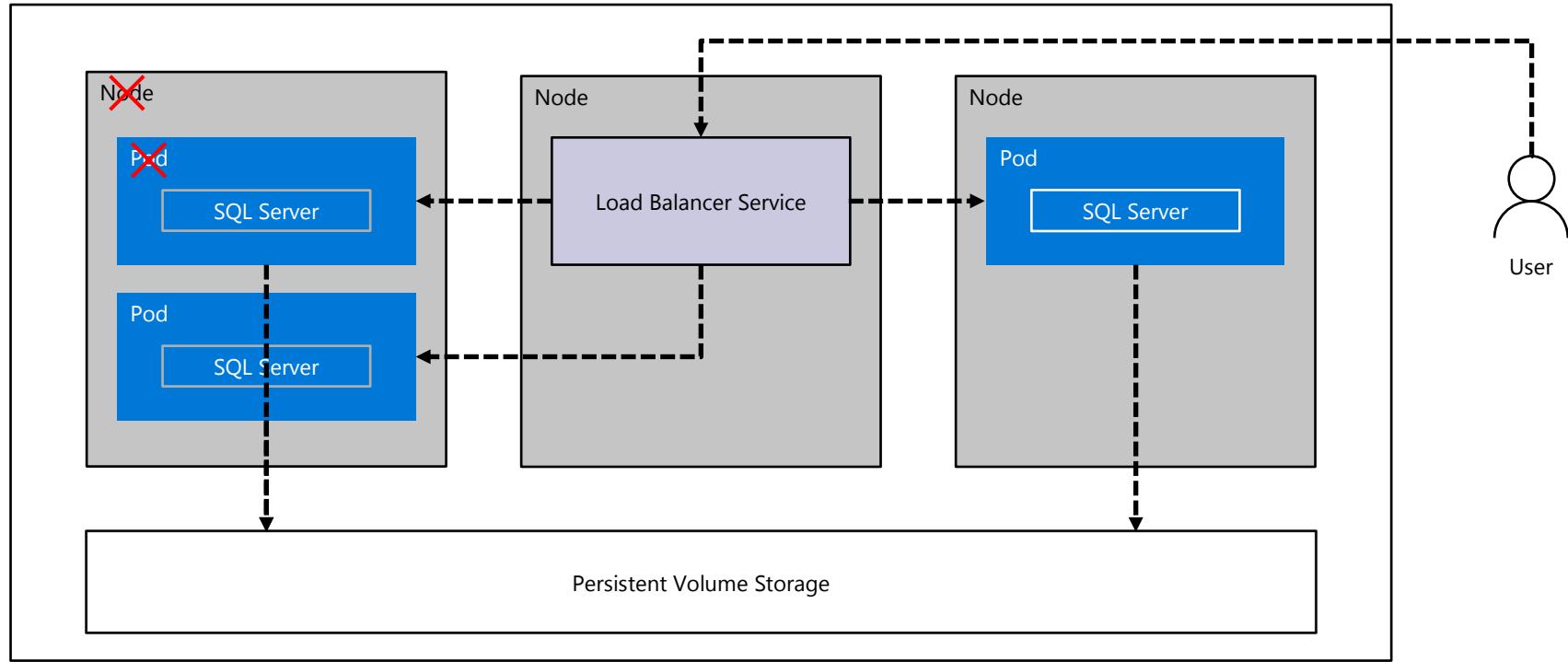
- Master
  - Multiple moving parts \ processes
  - Runs on a single node in the cluster
  - Tells what to do – desired state
- Nodes
  - Do the work, runs applications
  - Aka “minions”
  - Reports the state back up to the master



- Pods
  - Containers runs inside of POD's
  - Can have one or more containers
- Services
  - Hiding multiple POD's behind a service IP address
- Deployments
  - Declarative model
    - Desired state (number of POD's)
  - Manifest file (YAML, JSON)

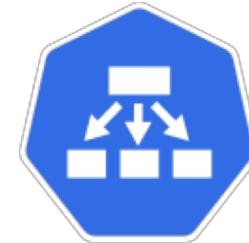


Master



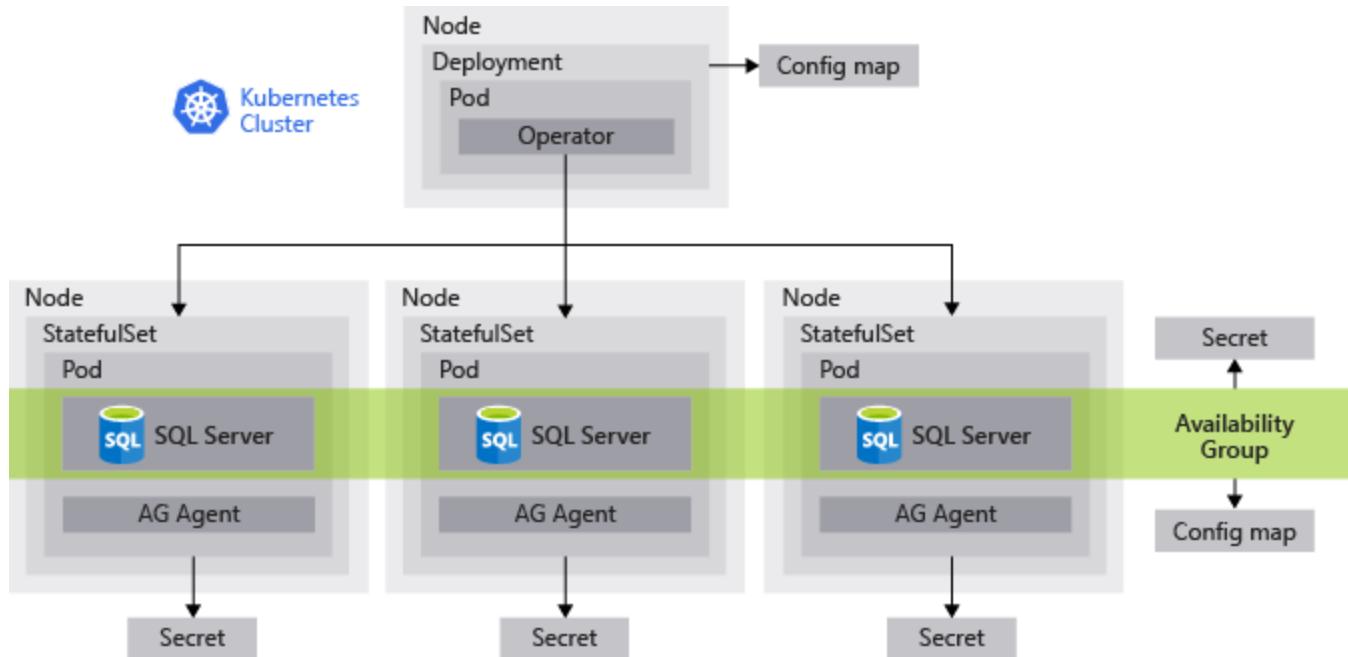
# Advantages

- Easy to use – Declarative configuration
- Self healing – Built in HA
- Autoscale
- Platform agnostic
- Compute and storage layer are separate
- Load balancing
- CI\CD – DevOps workflow



# Demo





# Questions?





# Coming up next...

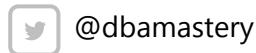
Transforming your Data Estate - Beating the End of Support for SQL Server 2008/R2

Raj Pochiraju and PedroLopes



# Thank you for attending

Learn more from Carlos Robles



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A photograph of a man and a woman sitting at a wooden table, looking down at a laptop and a tablet. The man is on the left, wearing a light blue denim shirt, and the woman is on the right, wearing a white long-sleeved shirt. They appear to be working together on a project.

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