

DBA MASTERY



SQL Server containers on
Docker and Kubernetes





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Experience

Over 10 years of experience

Multi platform DBA

Microsoft Data Platform MVP

MCSE Data management and analytics

Community

Speaker, blogger, mentor, volunteer

Guatemala SQL community leader

MSSQL tips and SQL Server Central author

DBA Mastery

SQL Server tips, scripts, best practices and more.



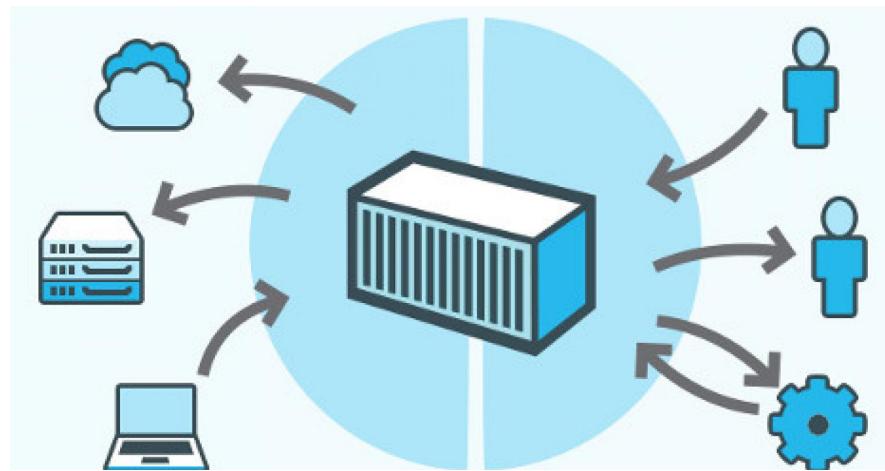
MAXDOP Calculator
PerfMon for DBA's
MSDB tuning

AGENDA

- Introduction to Containers
 - Images
 - Containers
- VM's vs Containers
- Docker
 - Docker architecture
 - Advantages
- SQL Server Image
- SQL Server Dockerfile
- Running a SQL container
 - Managing containers
 - Demo
- Kubernetes
 - Kubernetes architecture
 - Advantages
 - Demo



INTRODUCTION TO CONTAINERS

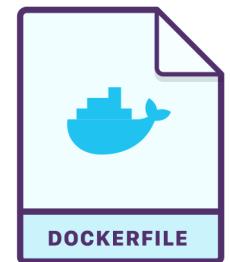


Containers are the future!



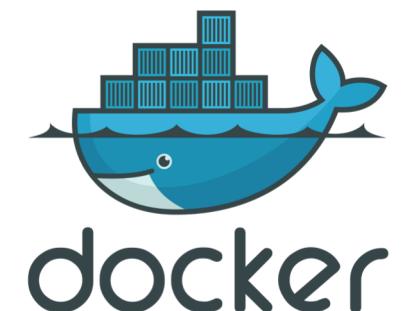
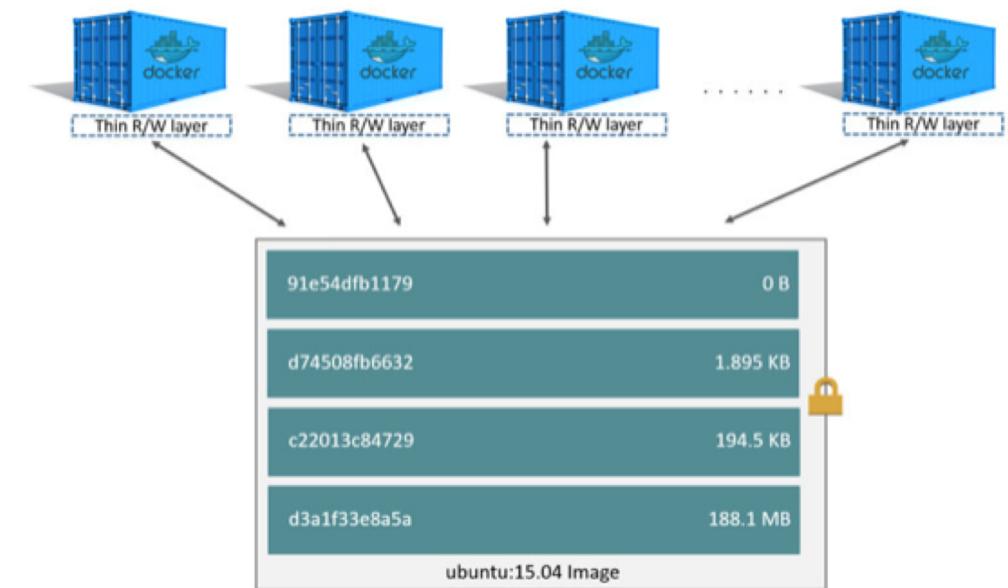
IMAGES

- 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
- A new image can be created from an existing image (make your own)
 - SQL Server for example, based on Ubuntu or RedHat
- Portable and consistent



CONTAINERS

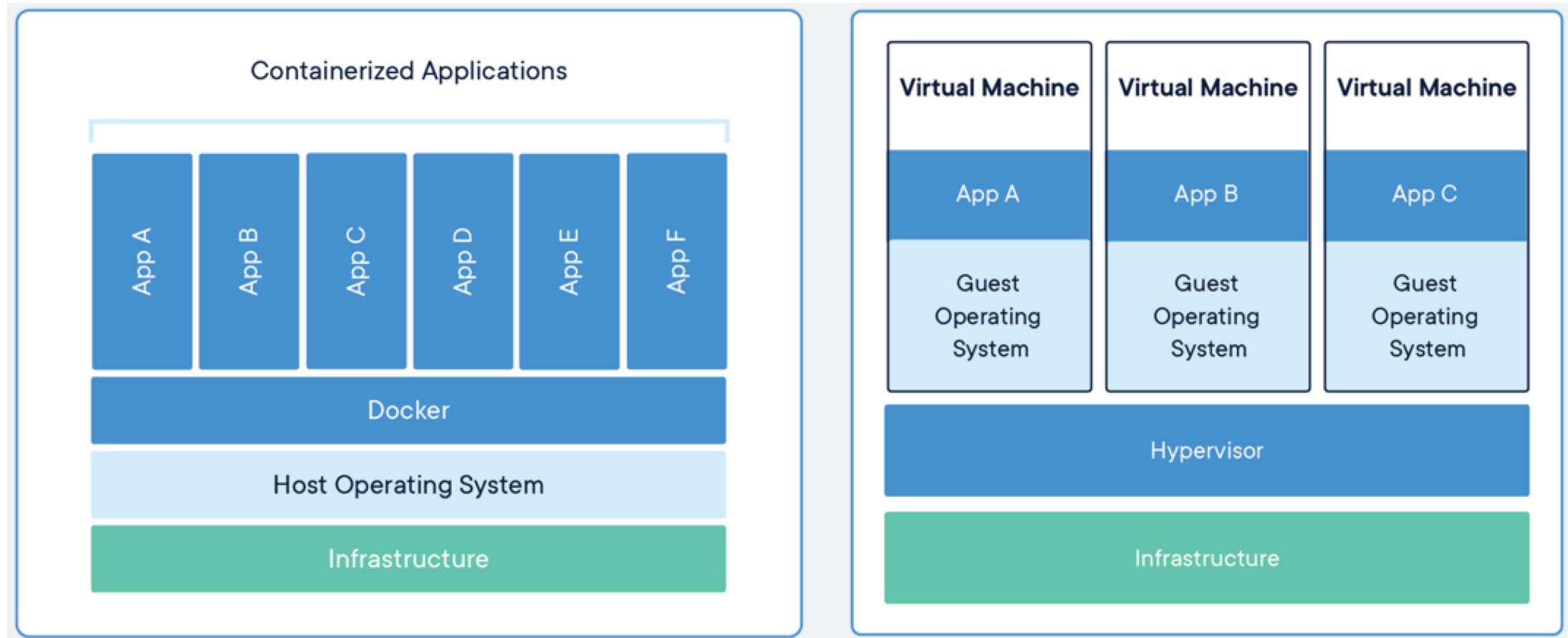
- The runnable instance of a Docker image
- A standardized unit of software
- Container is nothing more than a program
- Writable layer and shared read-only layer
 - Small storage footprint
- Containers has full access to all resources
- Volumes Persistent storage



VM'S VS CONTAINERS

- Comparisons are inevitable
- Virtualization has been around for 15 years
- VM emulates hardware and load an entire OS
- Containers provide isolation but cooperate with base OS kernel
- Processes running on the OS - kernel resources
- Less storage footprint
- CI\CD integration





DOCKER



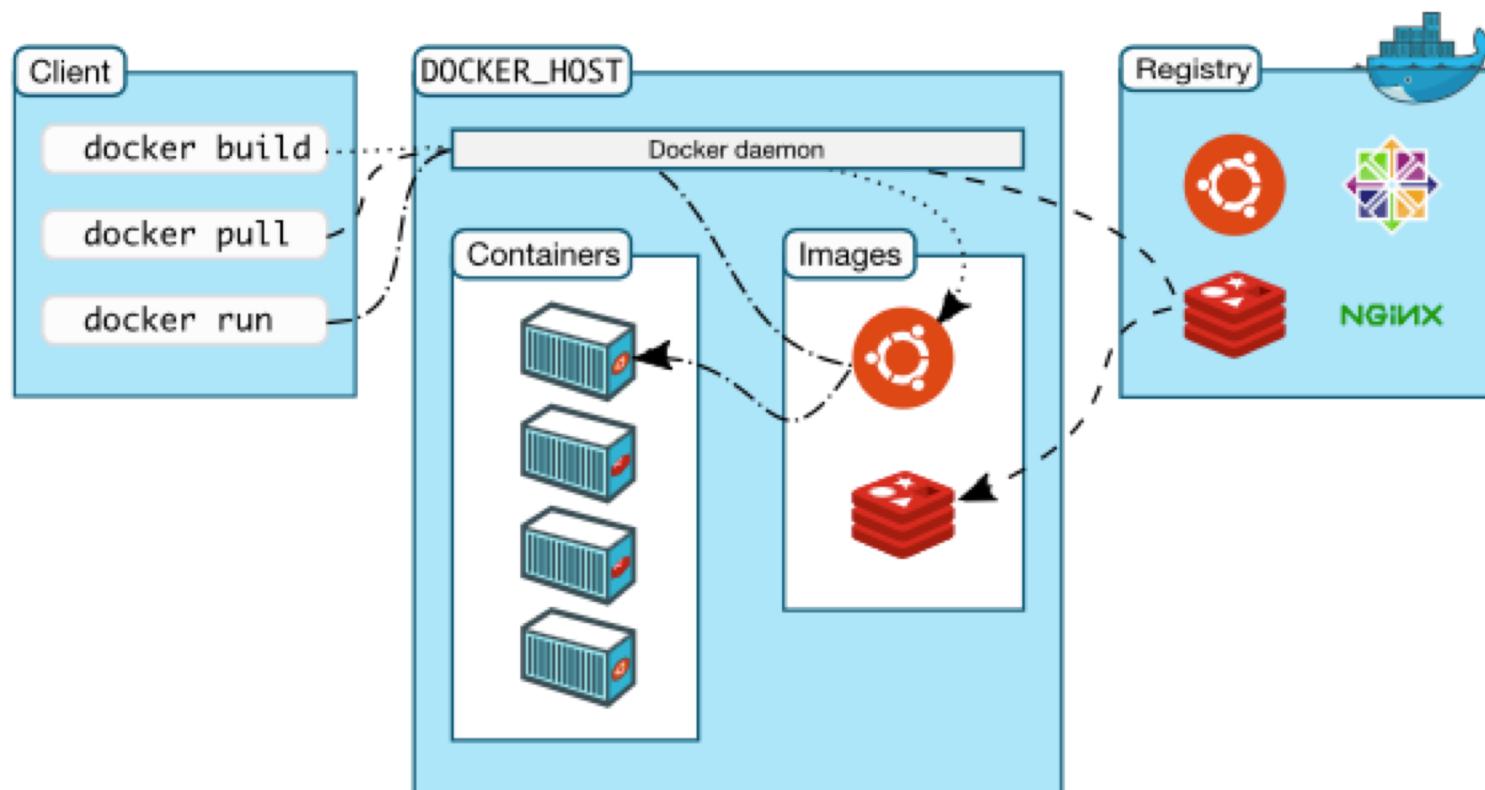
- From Docker docs:

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.

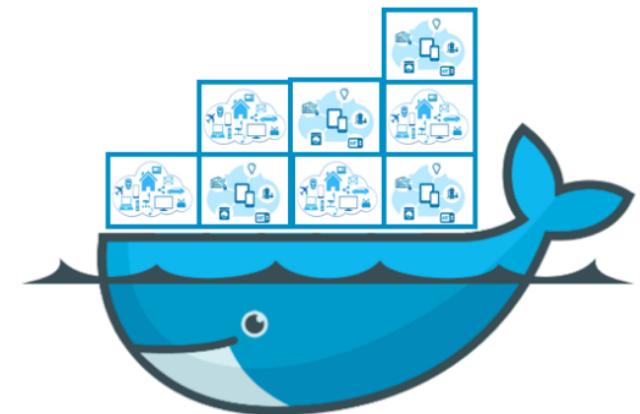


DOCKER ARCHITECTURE



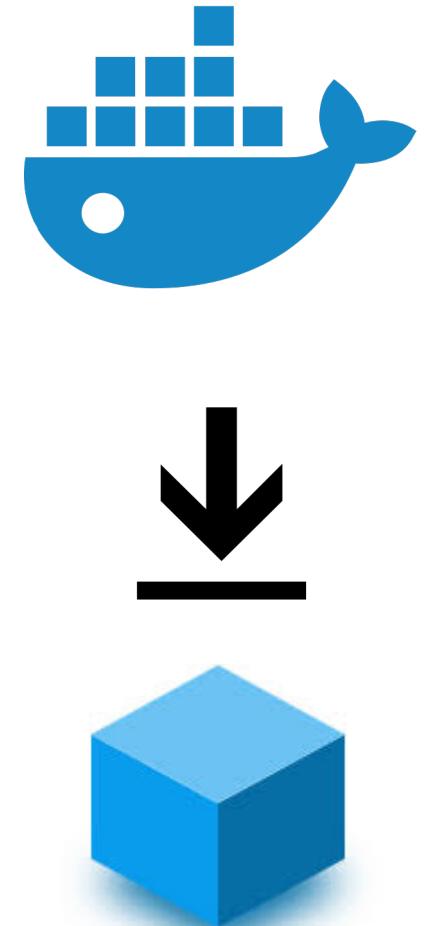
ADVANTAGES

- Easy to use
- Agile application creation and deployment
- CI\CD - DevOps
- Environmental consistency across all environments
- Cloud and OS portability
- Resource isolation
- Resource utilization



SQL SERVER IMAGE

- Docker Hub – Microsoft container registry
- SQL Server 2017
 - Just Ubuntu from RTU to latest CU
- SQL Server 2019
 - Ubuntu and RedHat
 - From RTM to latest CU
- SQL Server is pre-installed
- Backups are compatible between all platforms



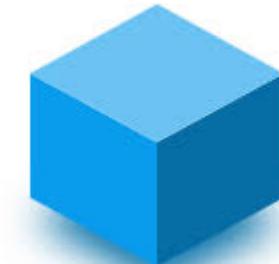
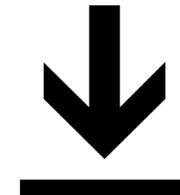
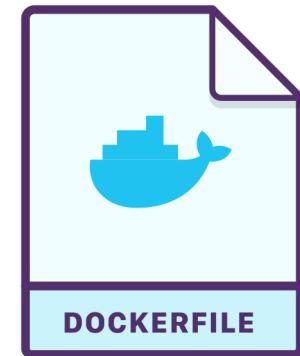
SQL SERVER DOCKERFILE

```
FROM ubuntu:16.04
```

```
EXPOSE 1433
```

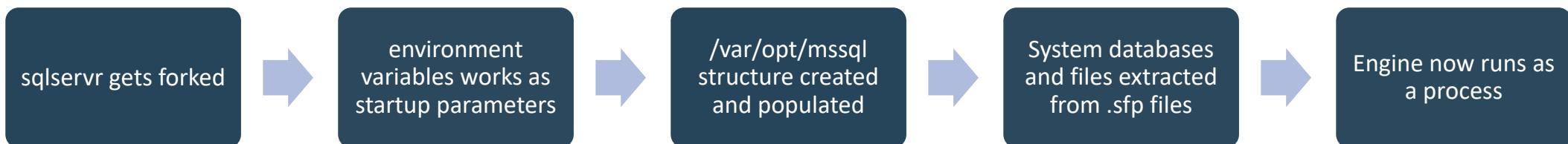
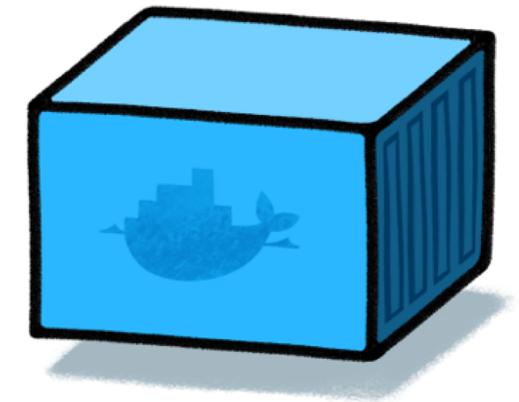
```
COPY ./install /
```

```
CMD ["/opt/mssql/bin/sqlservr"]
```



RUNNING A SQL CONTAINER

```
docker run \
--name sqlsat828 \
--env 'ACCEPT_EULA=Y' \
--env 'MSSQL_SA_PASSWORD=SqlSat828#' \
--publish 1400:1433 \
--detach mcr.microsoft.com/mssql/server:2017-CU11
```

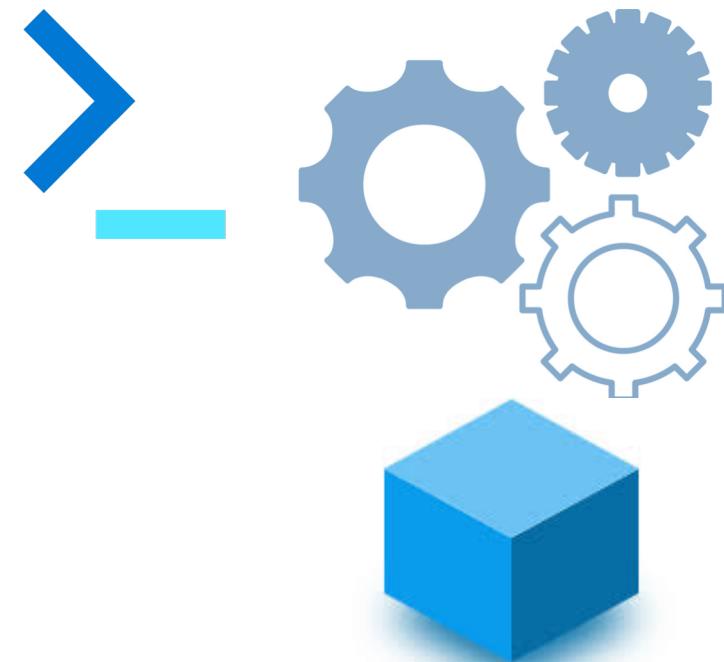


DEMO



MANAGING CONTAINERS

- 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



DEMO



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.



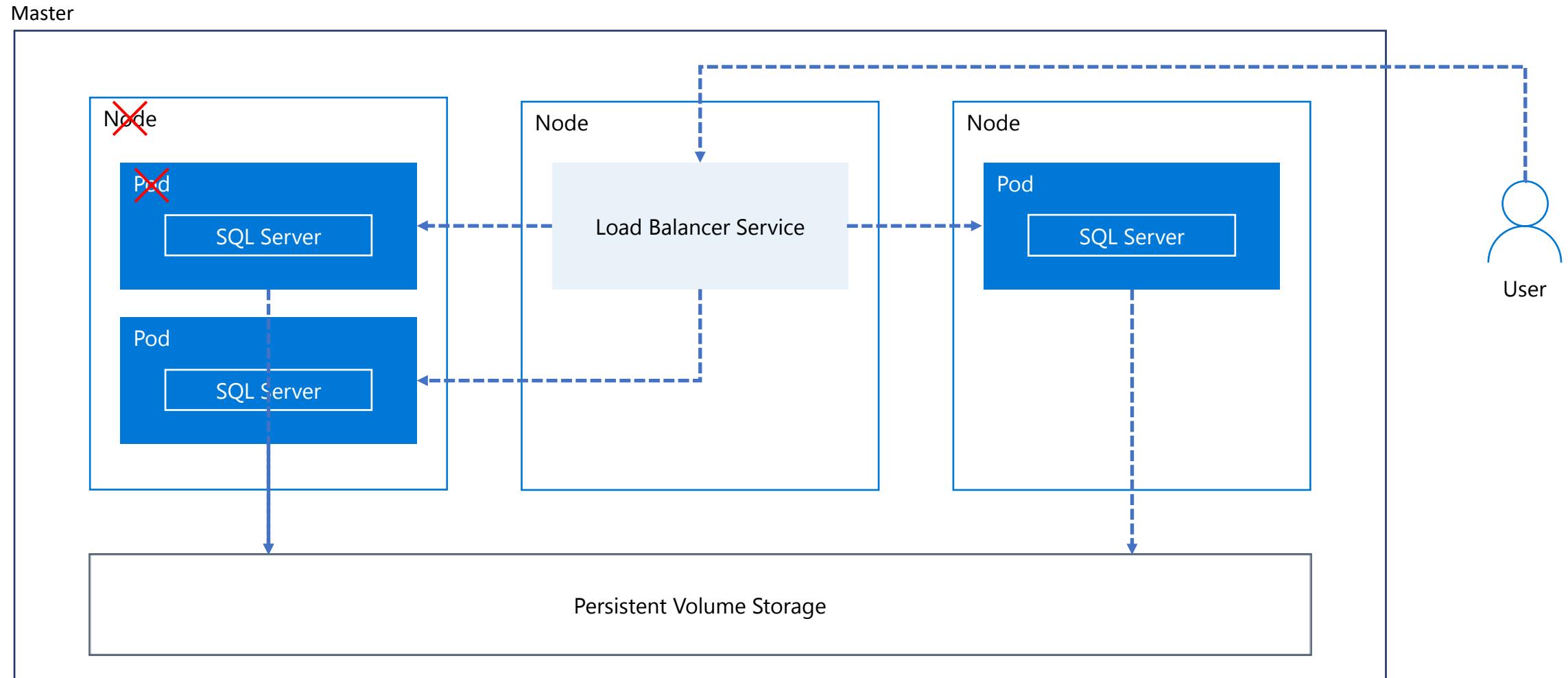
KUBERNETES ARCHITECTURE

- Masters
 - Multiple moving parts
 - Runs on a single server
 - Tells what to do
- Nodes
 - Do the work
 - Aka “minions”
 - Reports the state backup to the master



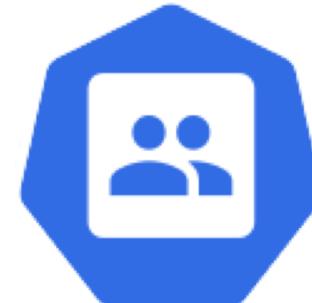
- Pods
 - Containers runs inside of POD's
 - Can have one or more POD's
- Services
 - Hiding multiple POD's behind a service IP address
- Deployments
 - Declarative model
 - Desired state (number of POD's)
 - Manifest file (YAML, JSON)





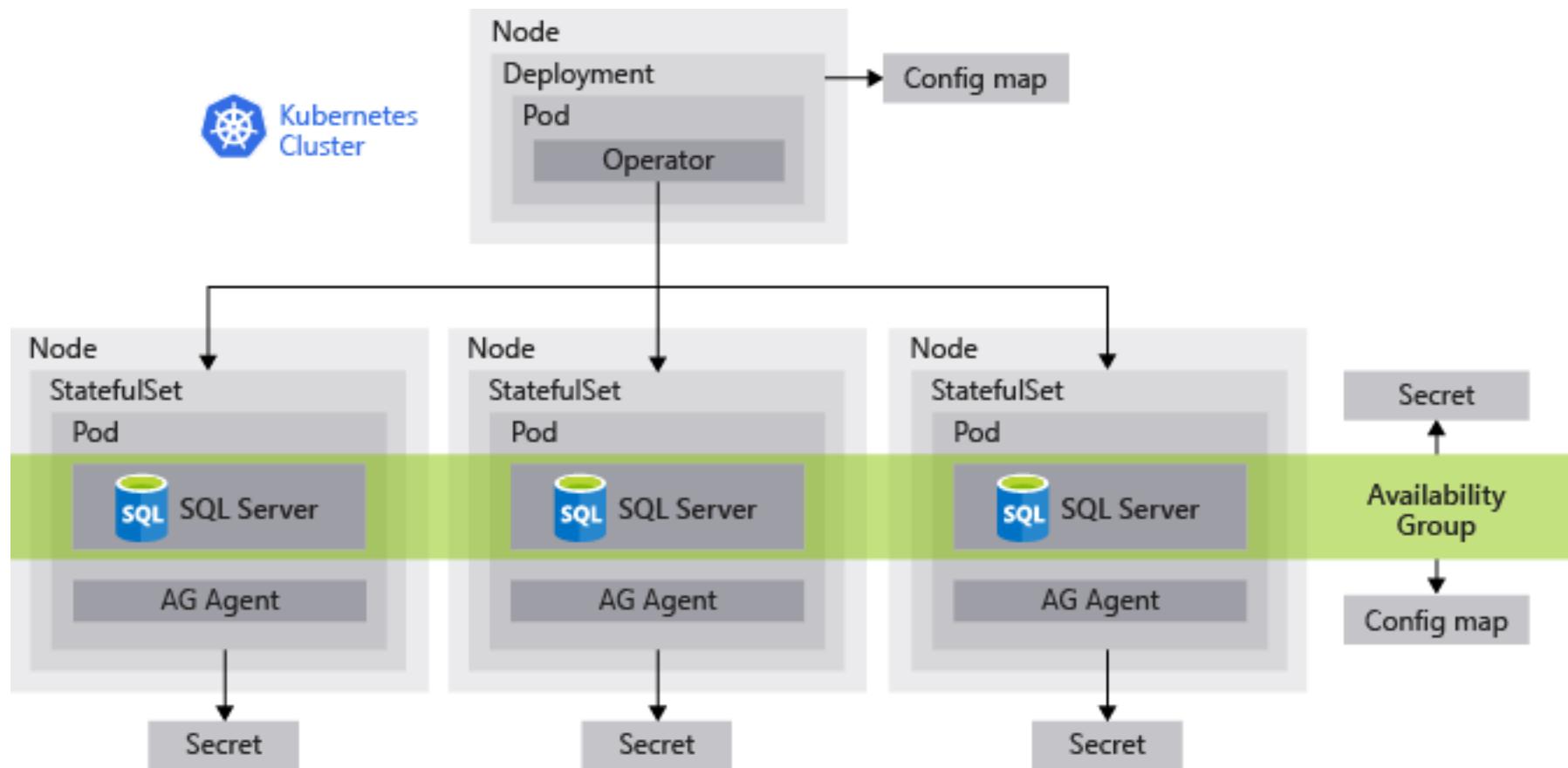
ADVANTAGES

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



DEMO





DEMO



QUESTIONS ?



- For more information
 - [Azure SQL DB](#)
 - [Azure SQL Data warehouse](#)
 - [Azure SQL Database managed instance](#)
 - [Microsoft Hands-on Labs](#)
 - [Microsoft Learn](#)





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THANKS !!!

