

# Containers and Clones

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# Agenda:

- Focus: Dev/Test environments (and BI)
- SQL Server containers
- Database Cloning
- Dev/Test self-service Terabyte class environments in 30 seconds!



# Docker in brief . . .

Linux application packaging and multi-tenancy (2014)

**Images:** immutable, portable spec for a container

**Image Registry:** repository of images

**Containers:** the app process, can include data

**Dockerfile:** config file for a container or image

**Daemon** the supervisory process (Windows Service)

**Docker client** . . . CLI



# Docker for Windows?

- SQL Server Container is a “named instance”
  - Fast: delivered in seconds
  - Simplified: teams share server (5-10x fewer VMs)
  - Popular for Dev/Test, QA, and Reporting
- .NET with IIS is also supported + Java/other stacks



# Challenges of SQL Server containers

## Data Persistence and provisioning:

- Data in the container file system does not persist when a container is replaced/updated
- Containers (instances) can be provisioned in seconds, but data takes time to copy/move

## Two approaches are preferred:

- Mount Volumes: good when SAN based Snapshots and Clones are available
- Windows based database cloning (Red Gate SQL Clone and Windocks)



# Microsoft SQL Server containers

- Windows Server 2016, Windows 10 Pro & Ent.
- SQL Server support developing:
  - SQL Server 2017, SQL Server 2016 Developer
  - New license terms pending . . .
- Other issues
  - Design breaks VSS and SQL writer based apps
  - Lacks SQL Agent support
  - Containers/Images are rebuilt after Windows updates

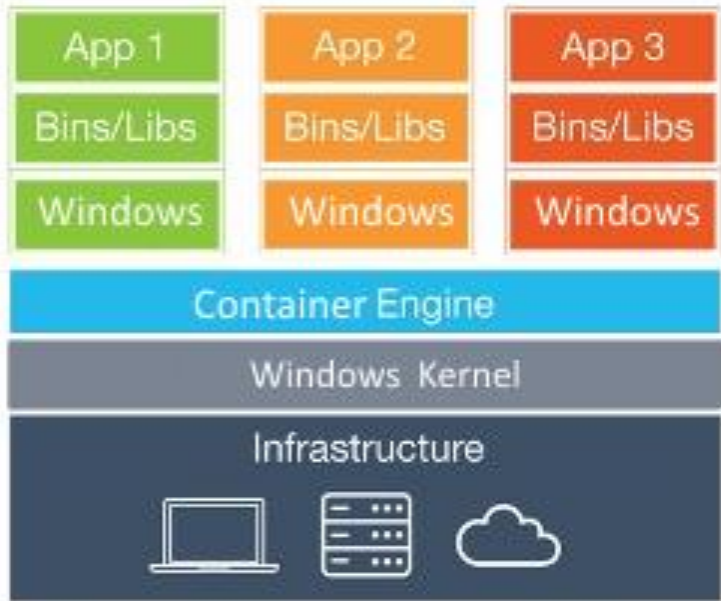


# Windocks SQL Server containers

- All editions of SQL Server 2008 onward
- Use existing systems and licenses, with host default instance
- Windows Server 2012 + 2016
- SQL Server containers are named instances
- Windocks 2.0 adds SQL DB Cloning and Web UI



# Windows and MSFT Containers



Microsoft Container Architecture



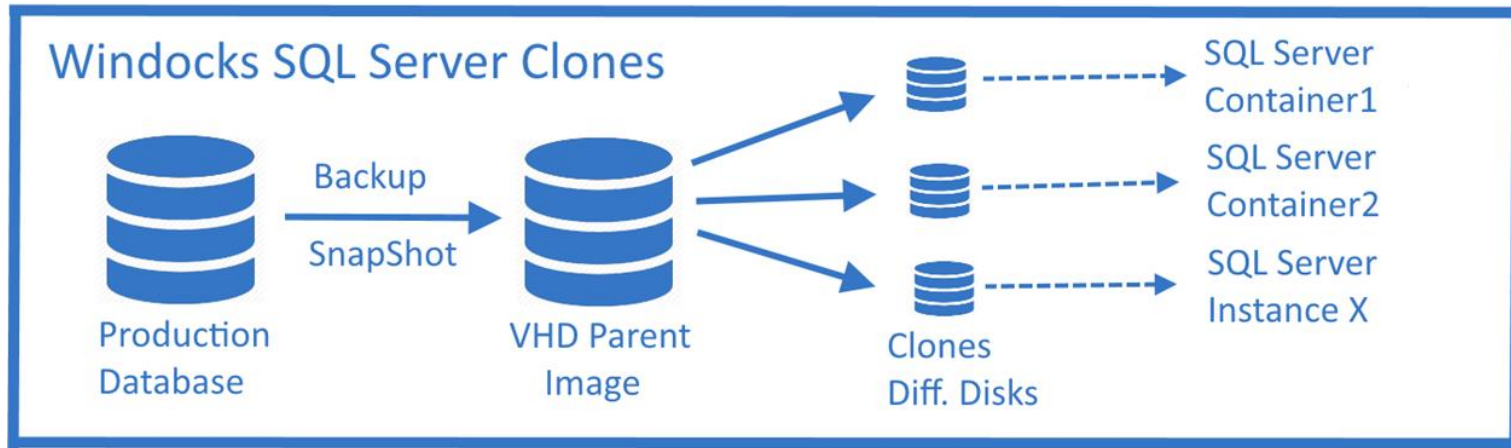
WinDocks Container Architecture





# Database Cloning

- Writable, large (> 100 GB) environments in seconds
- Database Clones are based on Virtual Disks (VHD)
- Databases are provisioned with a “clone” of the VHD



# Database Cloning

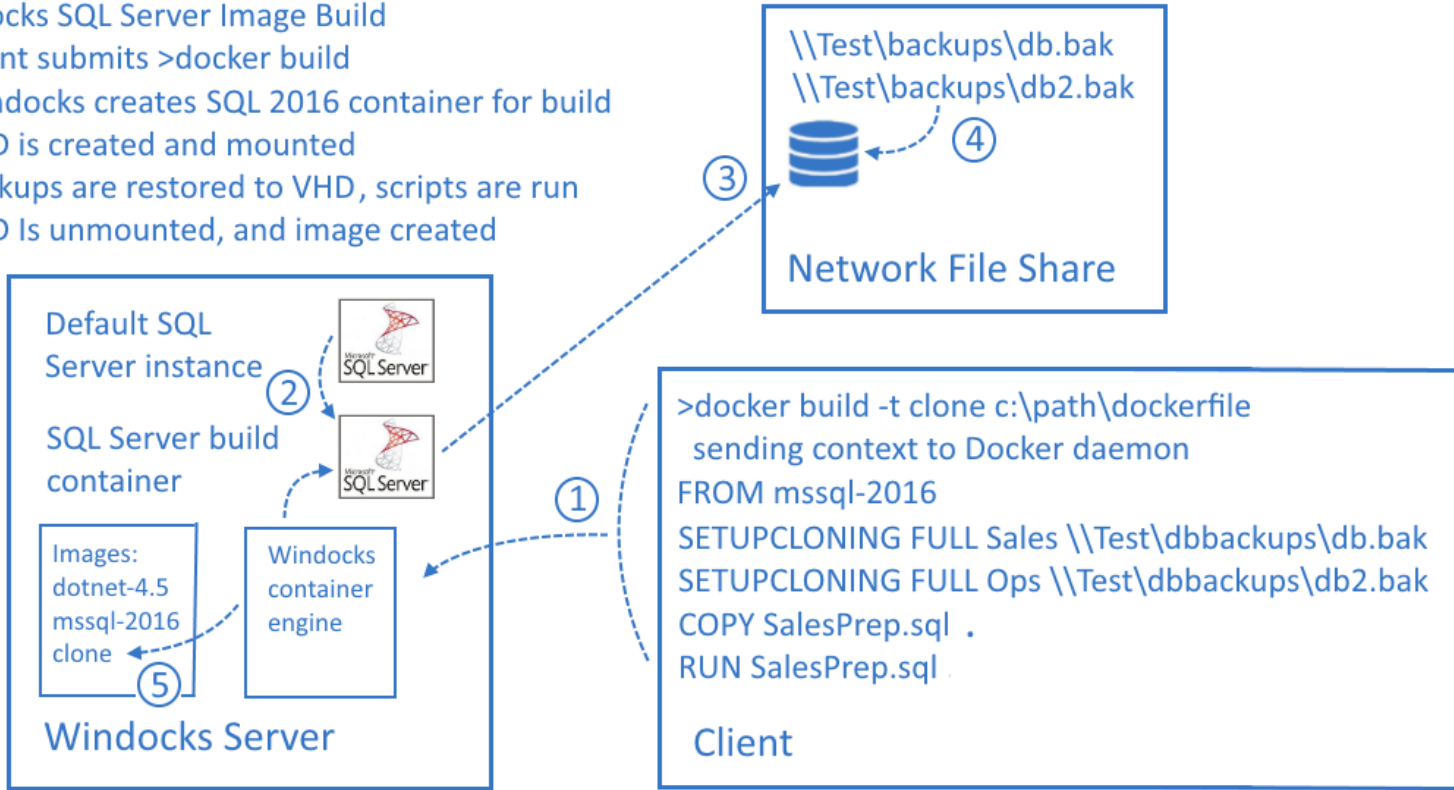
- VHD is a full byte copy. Initial image creation takes time associated with a full backup/restore. Updates, however, are fast, utilizing SQL log shipping
- Clones are writable, delivered in ~30 seconds, and require <40 MB, but expand on writes with a "copy on write"
- Two options for SQL Server ... Windocks and Red Gate's SQL Clone



# Building a SQL Server Image

## Windocks SQL Server Image Build

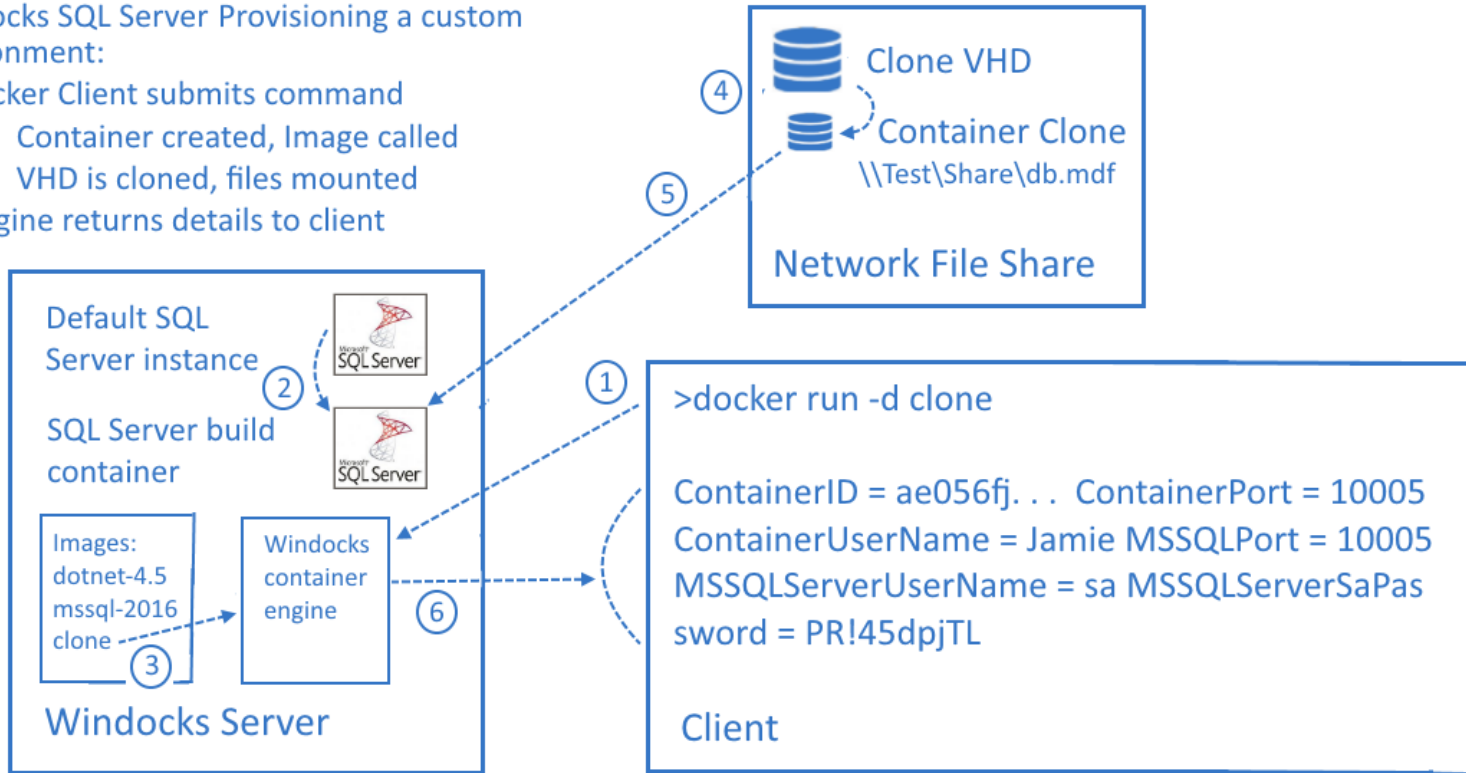
- 1) Client submits `>docker build`
- 2) Windocks creates SQL 2016 container for build
- 3) VHD is created and mounted
- 4) Backups are restored to VHD, scripts are run
- 5) VHD is unmounted, and image created



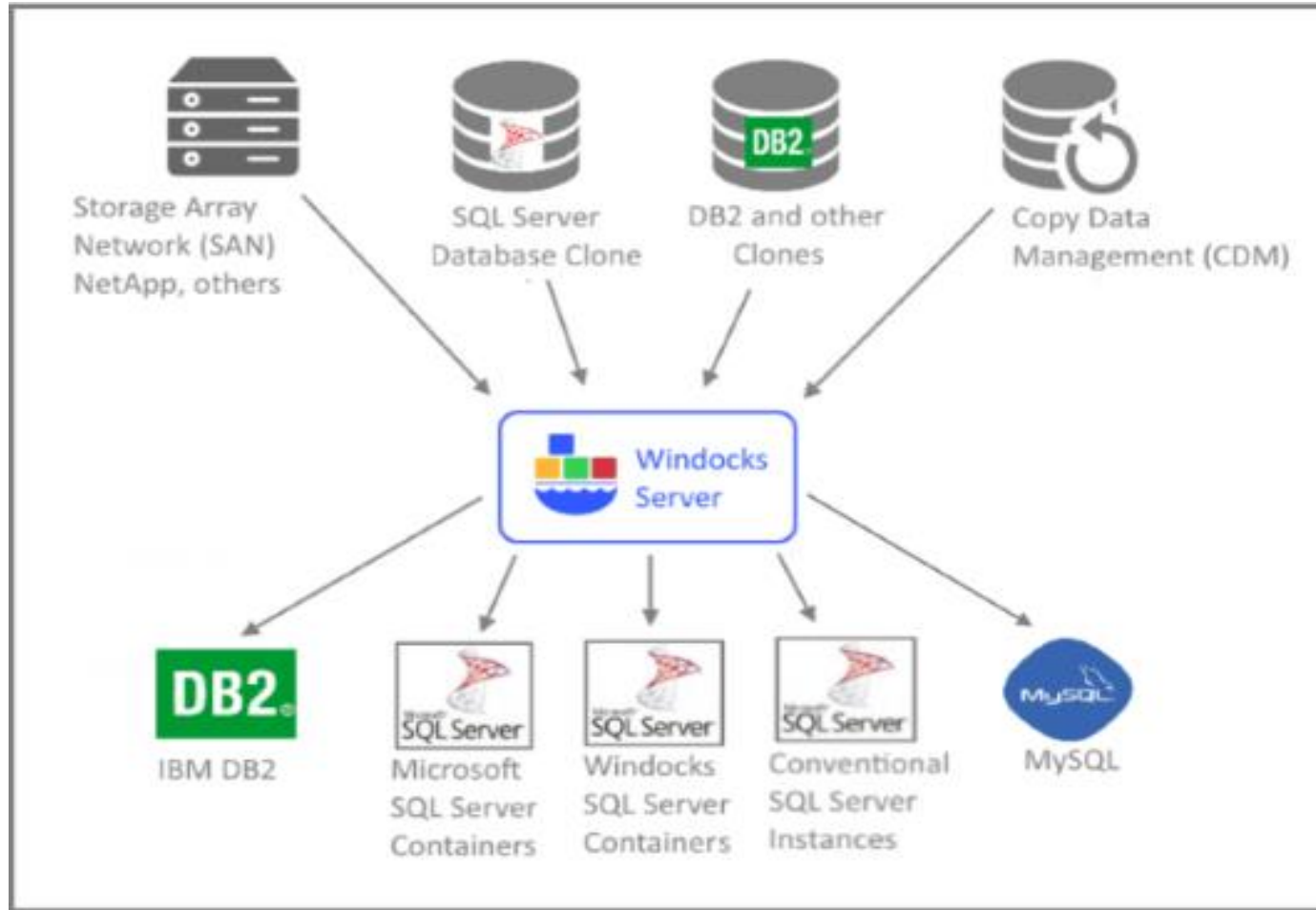
# Provision a SQL Server Container

Windows SQL Server Provisioning a custom Environment:

- 1) Docker Client submits command
- 2 & 3) Container created, Image called
- 4 & 5) VHD is cloned, files mounted
- 6) Engine returns details to client



# Windocks: Open Data Delivery



# Containers and Clones Pros & Cons

- Good for short-lived Dev and Test needs
- Containers for Production? Will happen in time, driven by a bias for consistent tooling. Containers lack support for SQL Agent today
- Clones: not for performance or stress testing due to shared parent disk
- Containers + Clones can enhance data governance and regulatory compliance with data imaging



# Summary: Containers/Clones

- Containers and clones are new options for Dev and Test
- Containers deliver speed on a shared server
- Clones deliver large/complex environments in seconds

Resources:

<https://www.windocks.com/community-docker-windows>

<http://www.red-gate.com/products/dba/sql-clone/>

<https://www.microsoft.com/en-us/cloud-platform/containers>

Questions? [pauls@windocks.com](mailto:pauls@windocks.com)



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