

Containers - You Better Get on Board!

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 - Microsoft MVP – Data Platform – 2017-2020
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Agenda

- Introducing Containers
- Containerizing Apps and Data Centers
- Running SQL Server in Containers
- The Container Universe
- Hands on with Containers
- Container Orchestration
- High Availability Container Scenarios

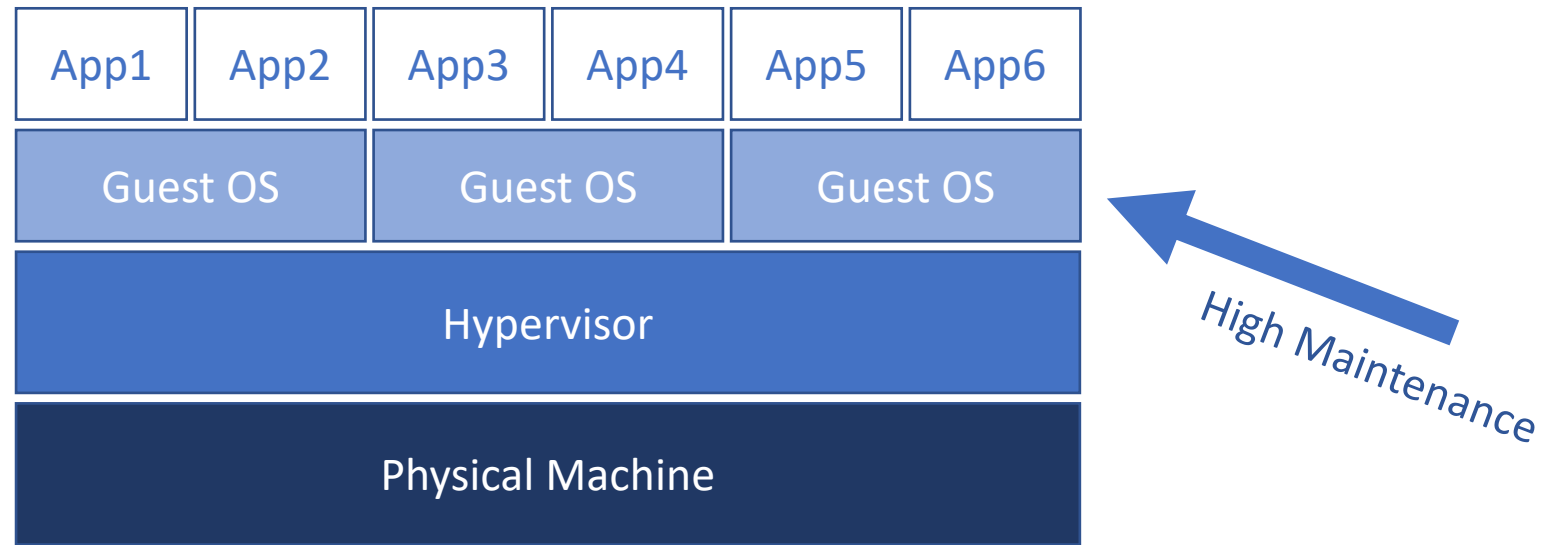


Introducing Containers

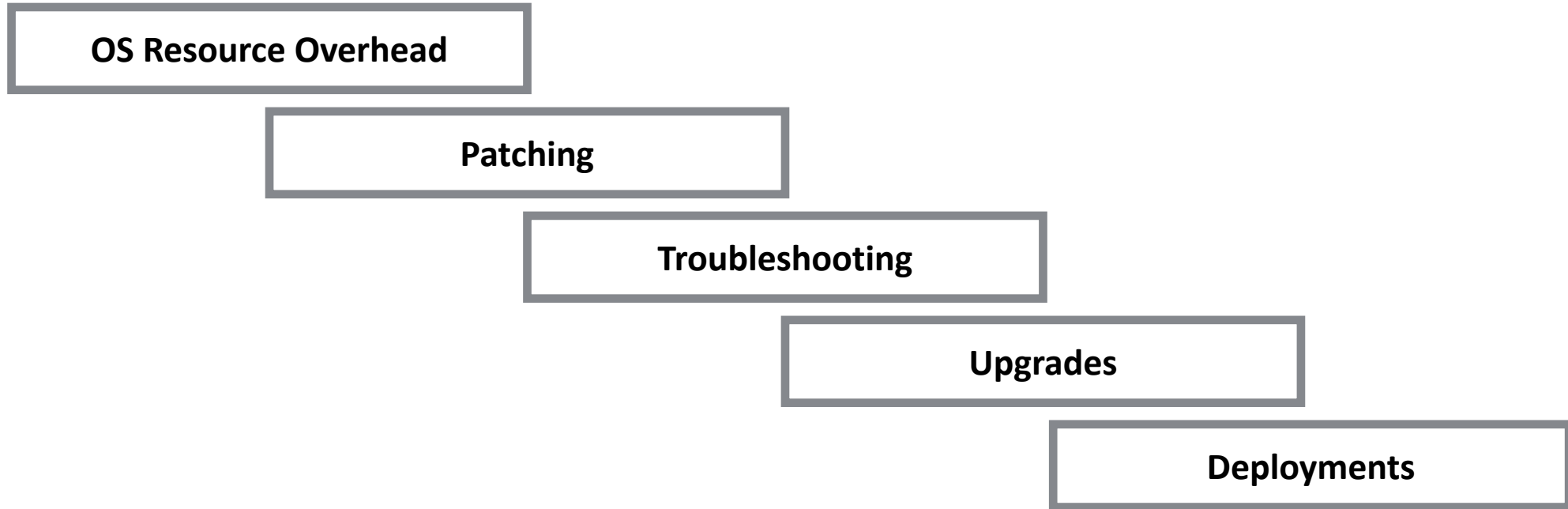
- Operating system virtualization
 - Shared kernel and system resources
- Container...contain...
 - Binaries, libraries and file system
- One app inside the container
 - This is the unit of work
- Containers are ephemeral
- Let's start off with a comparison...



Virtual Machines

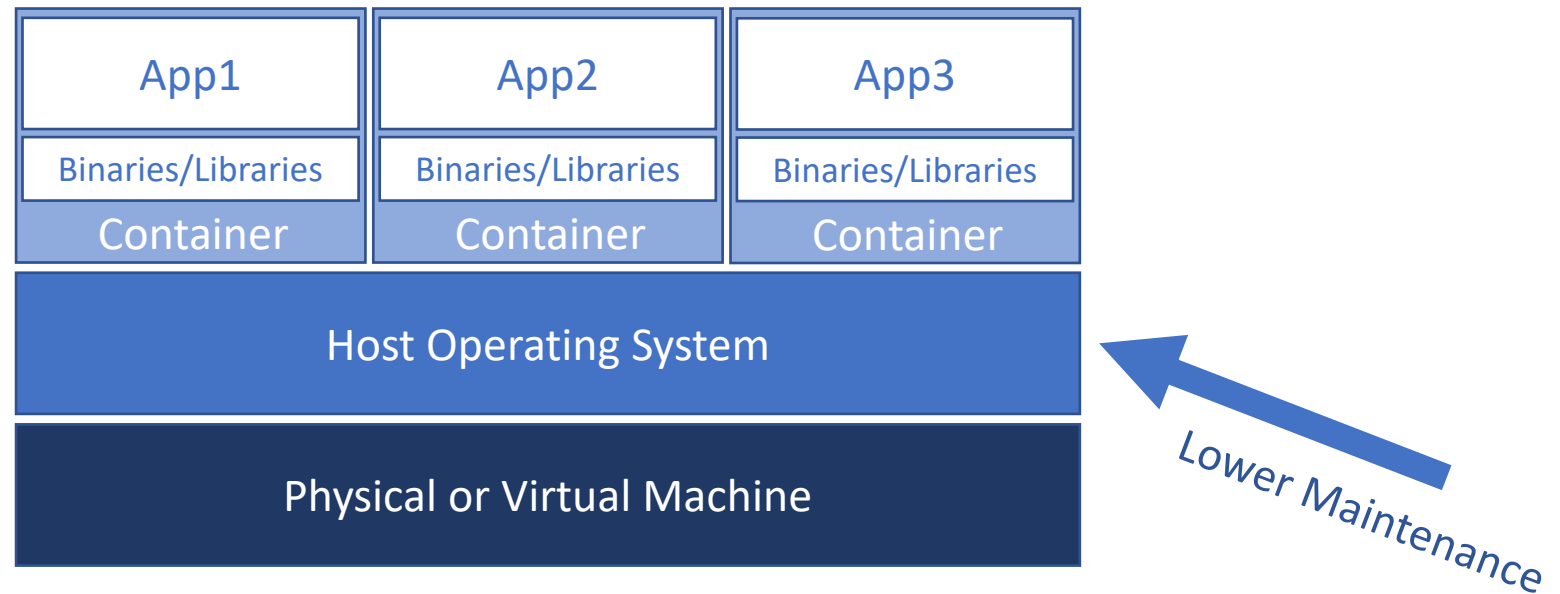


What's so Hard About Virtual Machines?



Does any of this move your business forward?

Containers

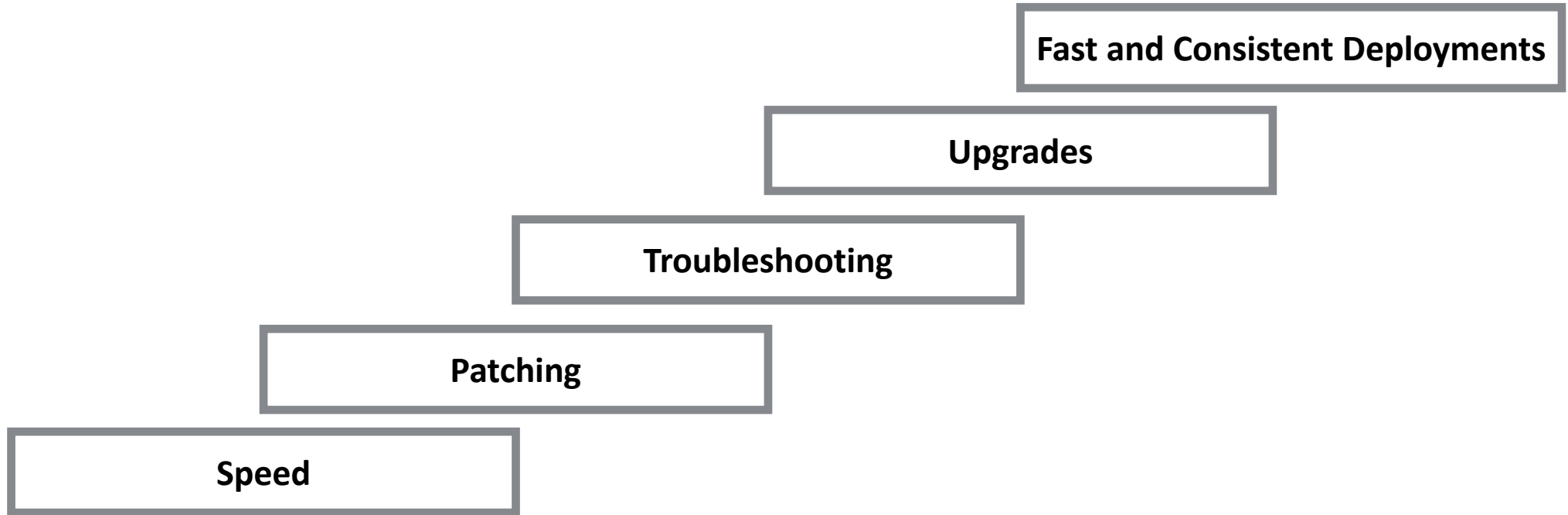




It's all about goin' fast!



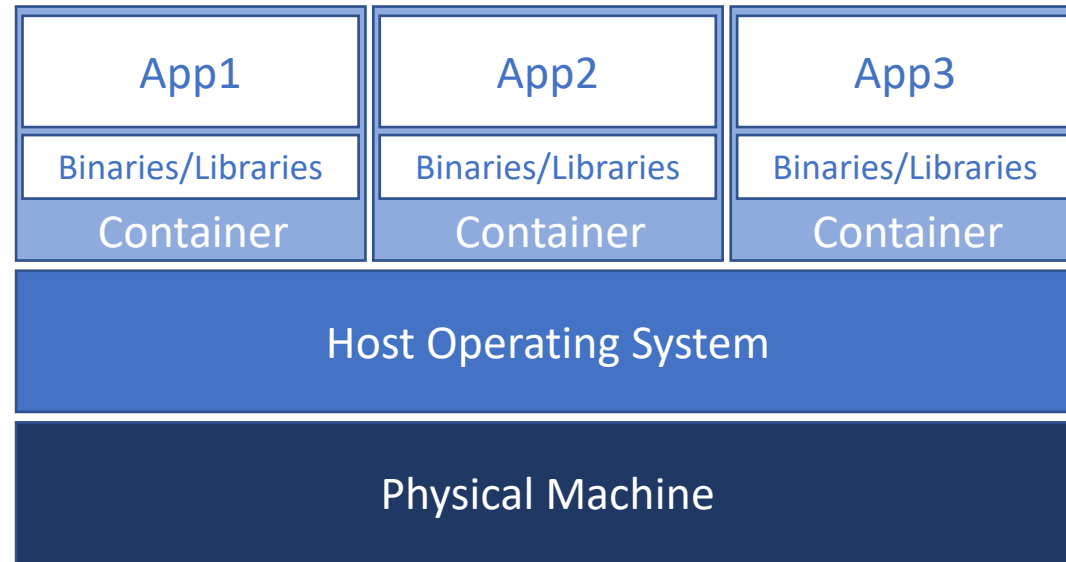
What do Containers Bring to the Table?



Services, we care about getting work done!

Containers

Patching/Deployments/Whatever



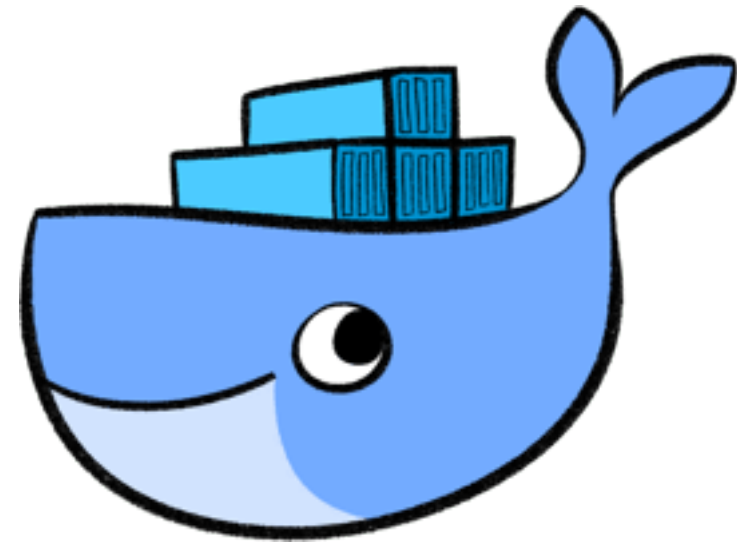
Containerizing Apps and Data Centers

- Reducing development time
- Deployment automation – speed and consistency
- Enables DevOps and CI/CD scenarios
- Orchestration
- Rethink how you deploy - it's the service, not the server



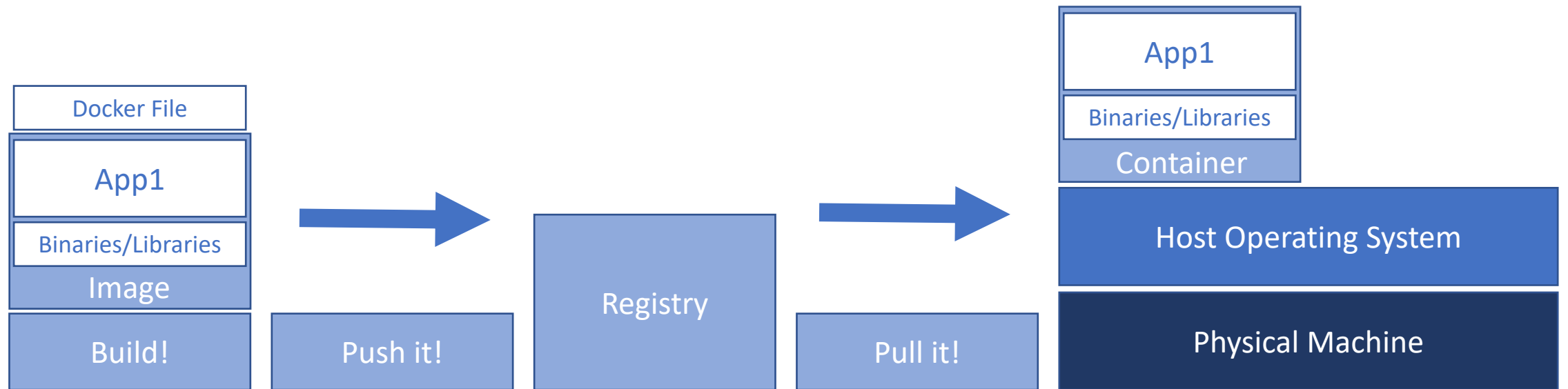
The Container Universe

- Docker
 - Linux
 - Windows
 - Mac
- Docker Inc.
- Other Container Engines
 - CoreOS and rkt
 - Podman
 - Windows
 - chroot...chwhat?



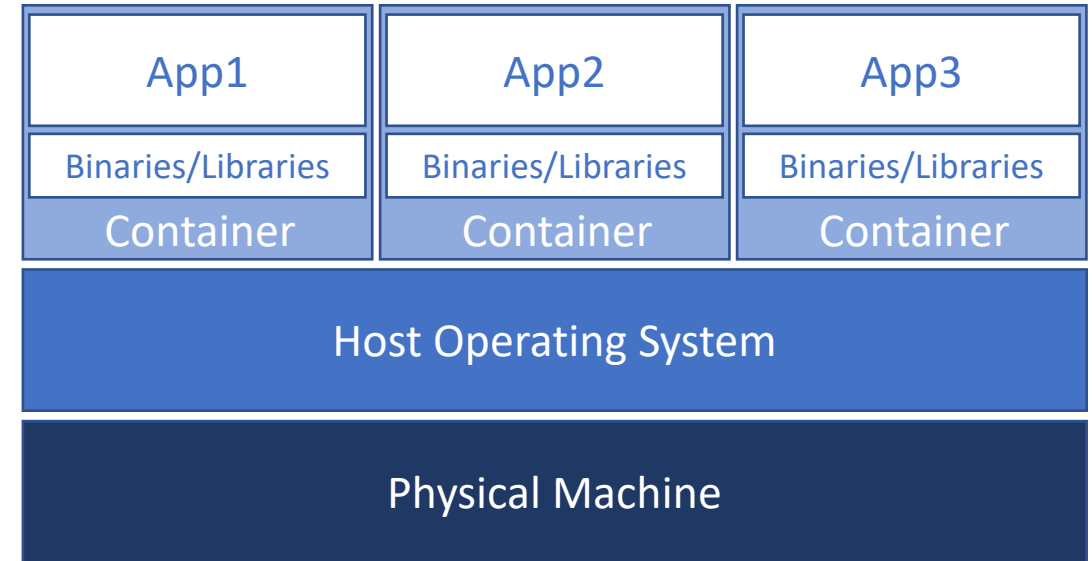
Getting Containers

- **Images** – code, runtimes, libraries, environment variables
- **Registries** – where images live. Docker Hub, Azure Container Registry, internal
- **Docker Files** – defines the container image



Container Internals

- Shared OS
- Resource isolation
 - Namespaces
 - Process Isolation - PID
 - File System – MNT
 - Network – NET
 - Interprocess Communication - IPC
 - Kernel Isolation - UTS
- Resource governing
 - cgroups
- Union file system

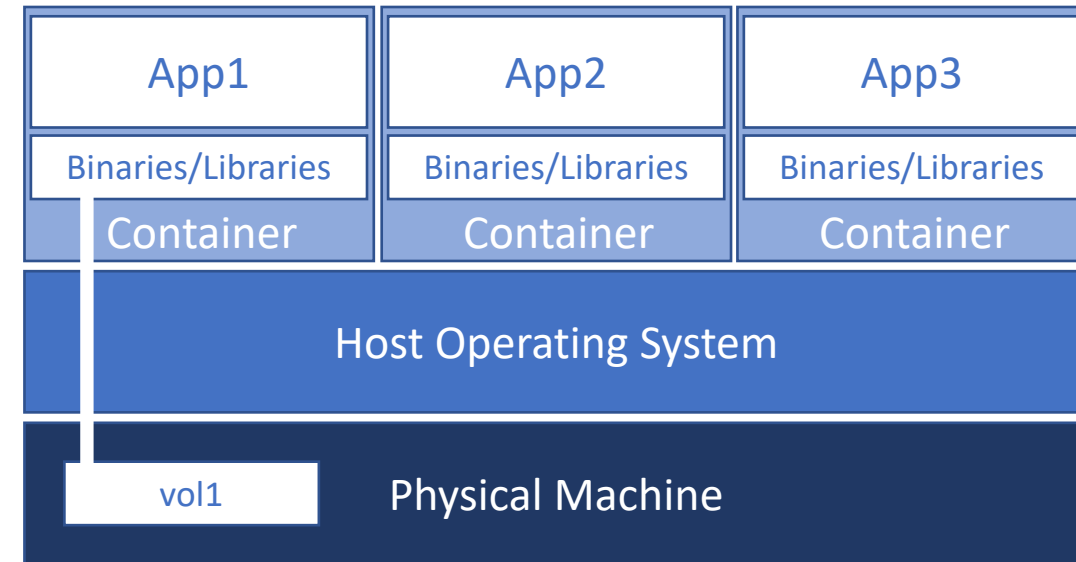


Data Persistency in Containers

- But containers are ephemeral, what about my data?

Data Persistency in Containers

- If your container is alive so is your data,
don't delete the container
 - It's in the writeable layer
- Docker Data Volumes
 - Docker managed resource
 - Independent of the container
- <https://docs.docker.com/storage/>



Running SQL Server on Containers

- Why run SQL Server on a Container?
- Same reasons...
 - Deployments, upgrades, patching, speed...agility
 - What if the unit of persistency IS the database...NOT the Server!
- Windows and Linux is available
 - <https://github.com/Microsoft/mssql-docker>
- Non-production on Windows
- Production on Linux, but no Windows auth...but that's OK, right?

Demo!

- Pull an Image
- Run a Container
- Access our application
- Connect to the Container
- Persisting data with a Container

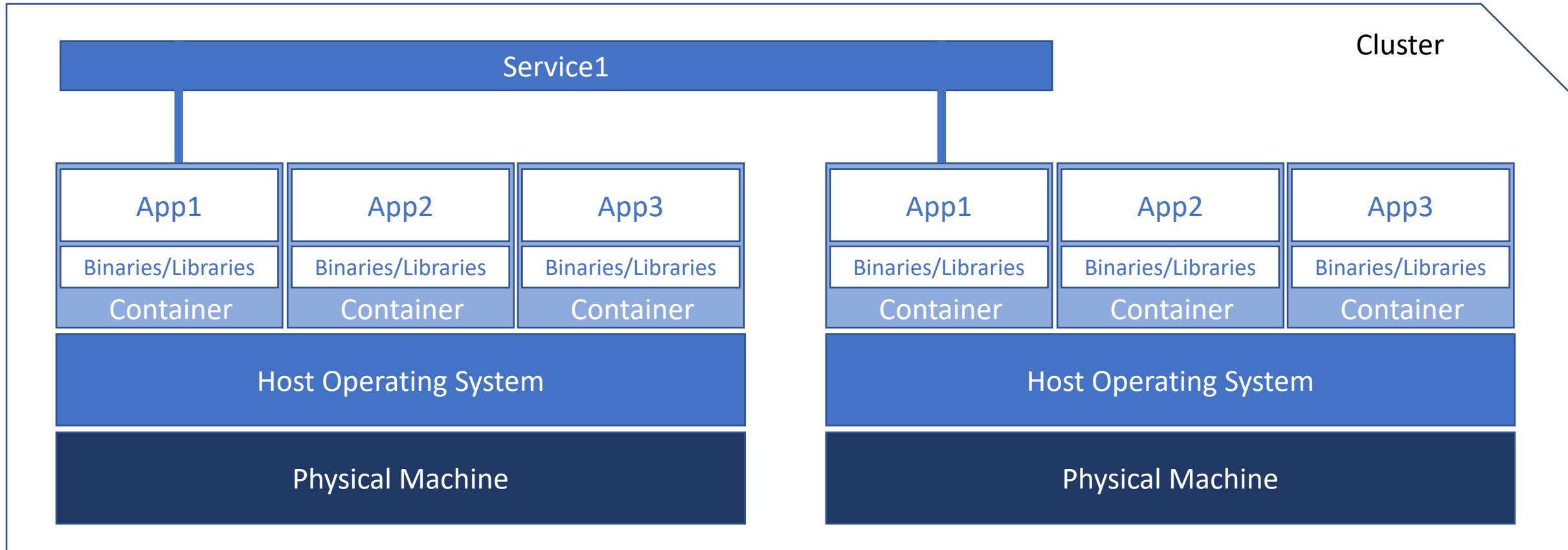
Container Orchestration

- Workload placement
- Managing state, starting things up and keeping things up
- Load balancing for services
- Networking
- Persistent storage
- Declarative model

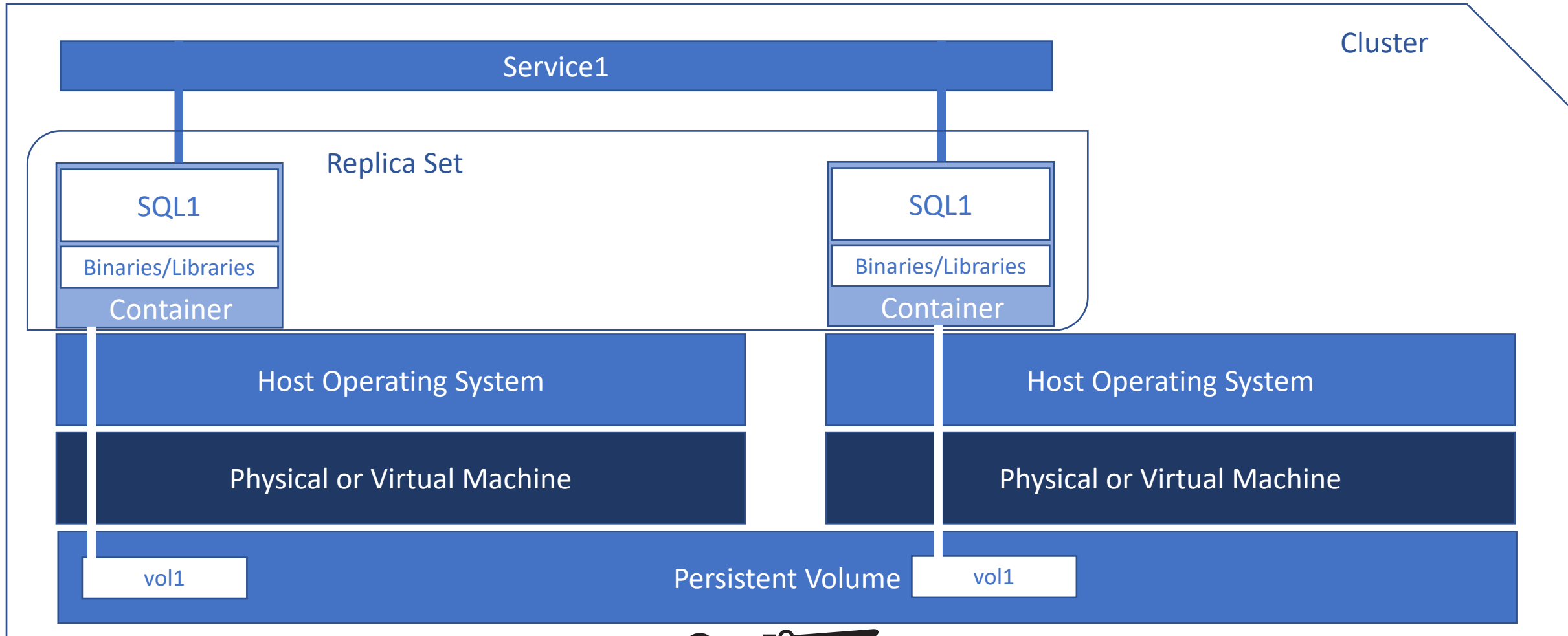
Container Orchestrators

- Docker Swarm/Enterprise
- Kubernetes
- Red Hat OpenShift
- Azure Kubernetes Services (AKS)
- Google Kubernetes Engine (GKE)
- Amazon Elastic Container Service for Kubernetes (EKS)

Container Orchestration - Services



Container Orchestration – High Availability



What's Next?

- Production?
- Drop some Tweets on the Twitters about this session and running SQL Server on containers @nocentino 😊



Review

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Need more data?

- **Contact me!**
 - email: aen@centinosystems.com
 - Twitter: @nocentino
- **Blog**
 - www.centinosystems.com/blog
- **Pluralsight**
 - Understanding and Using Enterprise Linux 7
 - SQL Server on Linux Fundamentals
 - Kubernetes Installation and Configuration Fundamentals



Resources

- Installing Docker
 - <https://docs.docker.com/docker-for-windows/install>
 - <https://docs.docker.com/install/linux/docker-ce/centos>
- Running Docker
 - <https://docs.docker.com/get-started>
 - <https://docs.docker.com/storage>
 - <https://docs.docker.com/engine/security/security>