

# Containers - You Better Get on Board!

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# Anthony E. Nocentino

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# Agenda

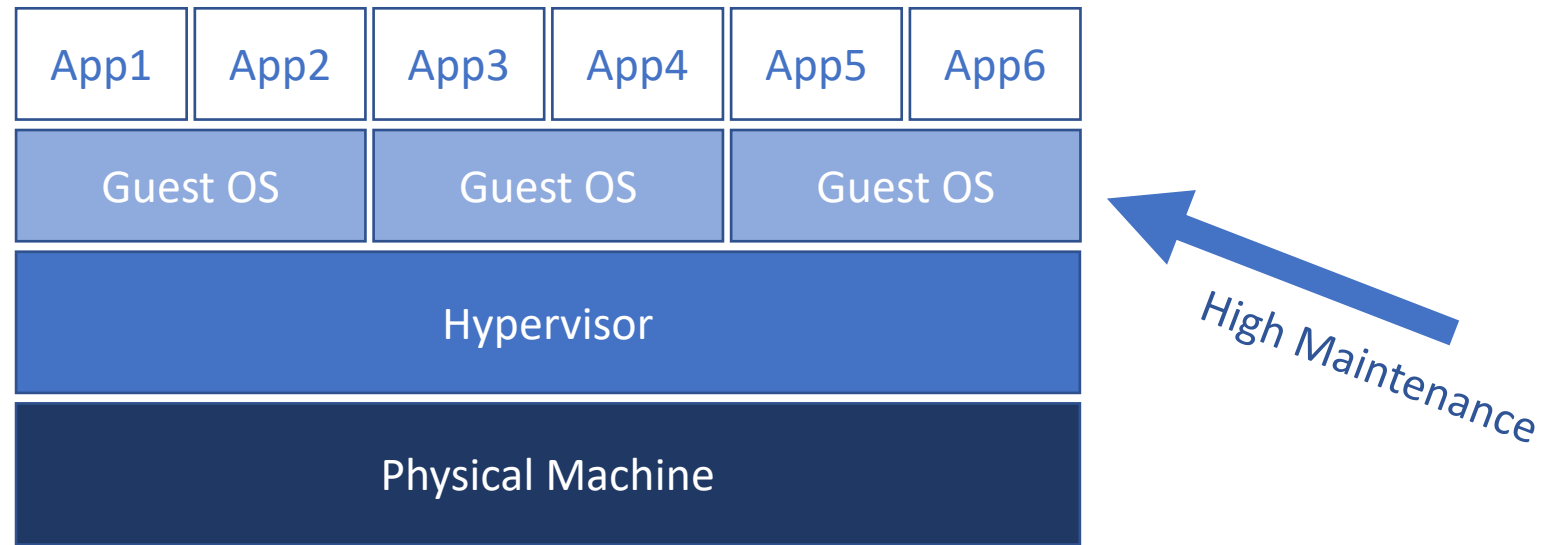
- Introducing Containers
- Running SQL Server in Containers
- The Container Universe
- Hands on with Containers
- Container Orchestration
- High Availability Container Scenarios

# Introducing Containers

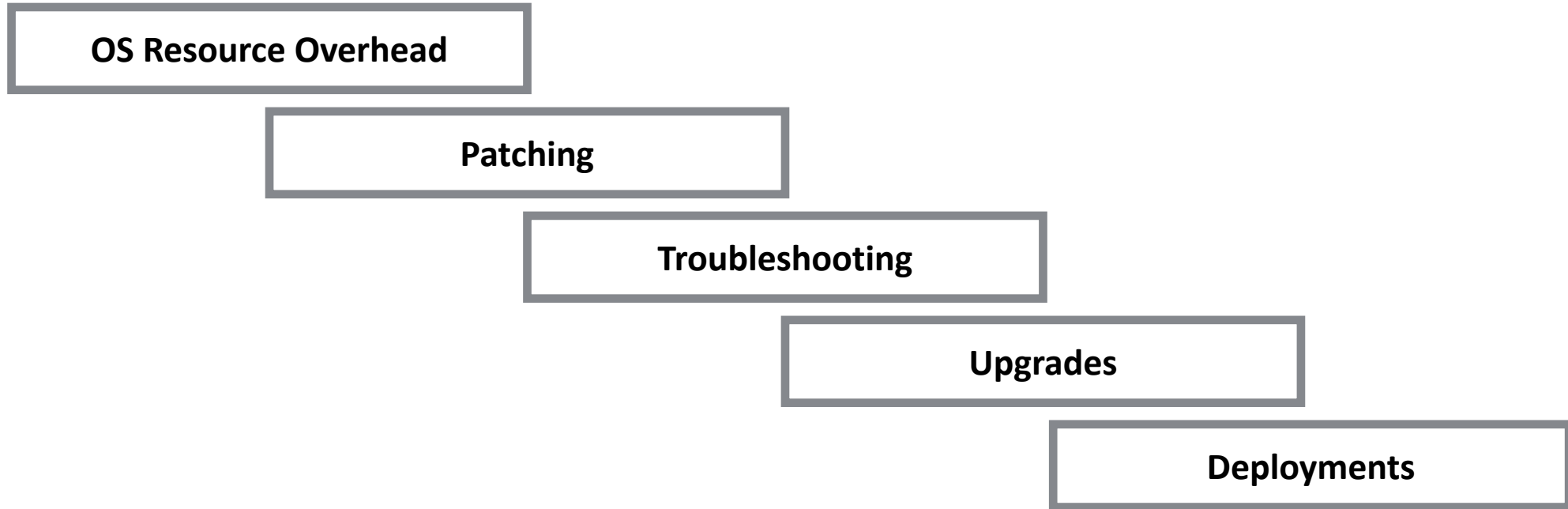
- Operating system virtualization
  - Shared kernel and system resources
- Container...contain...
  - Binaries, libraries and file system
- One app inside the container
  - This is the unit of work
- Containers are ephemeral
- Let's start off with a comparison...



# Virtual Machines

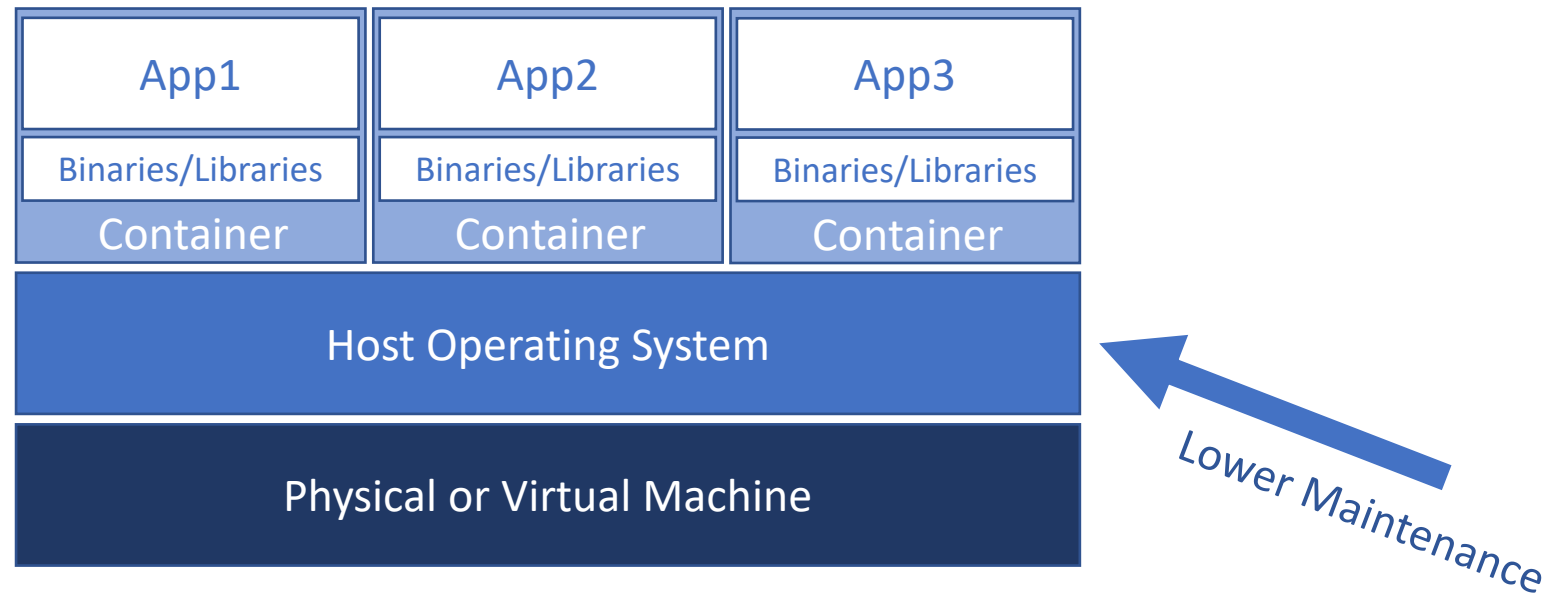


# What's so Hard About Virtual Machines?



**Does any of this move your business forward?**

# Containers



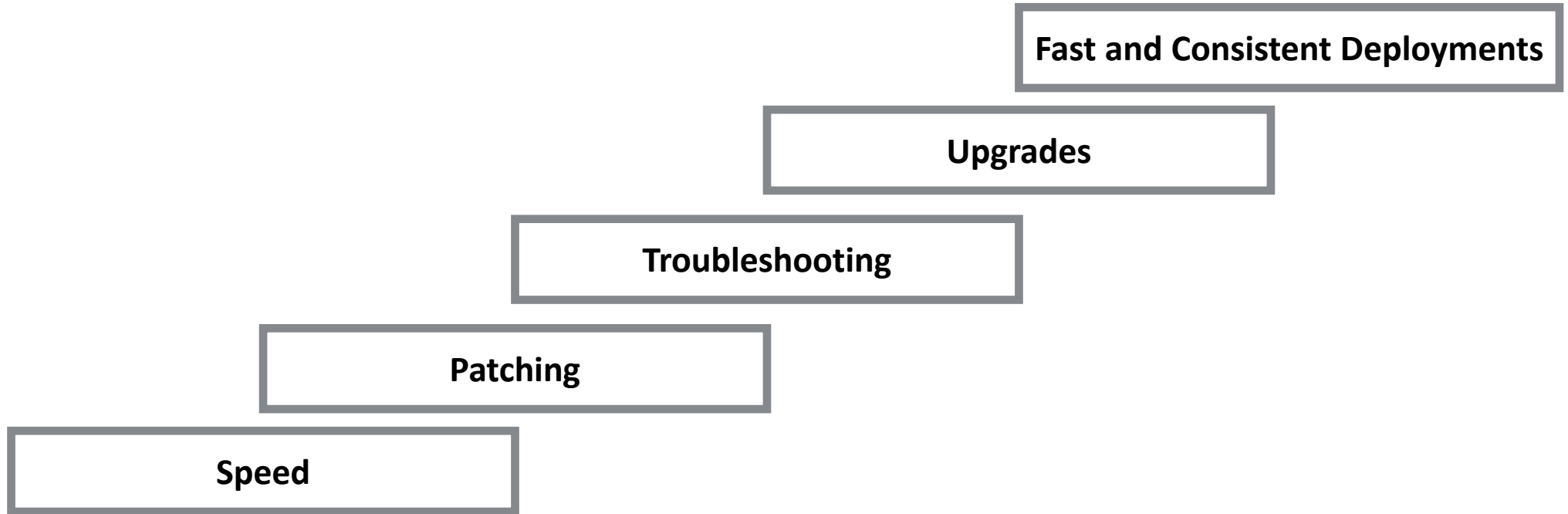


**It's all about goin' fast!**





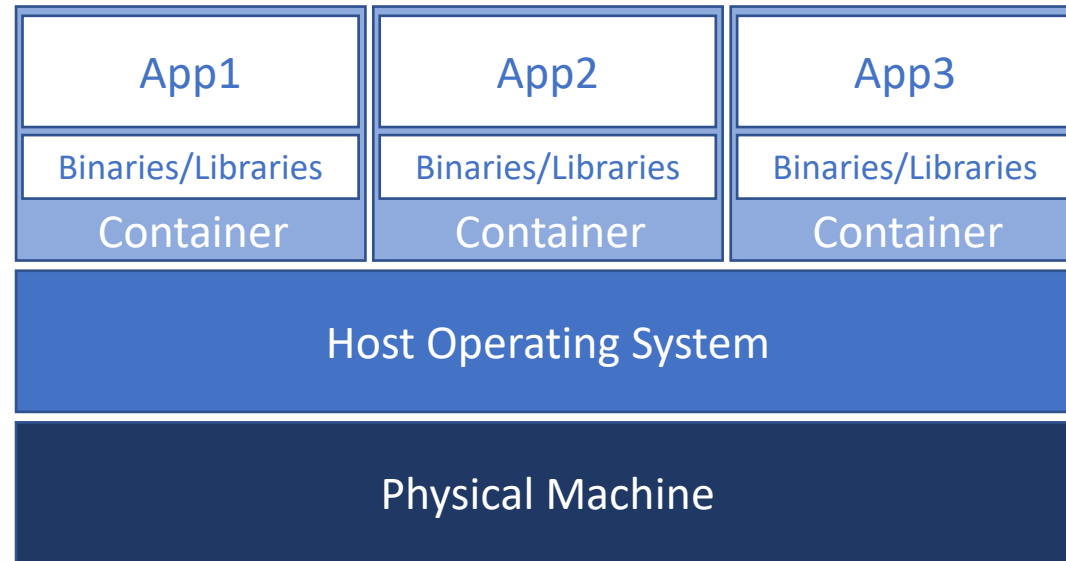
# What do Containers Bring to the Table?



**Services, we care about getting work done!**

# Containers

Patching/Deployments/Whatever



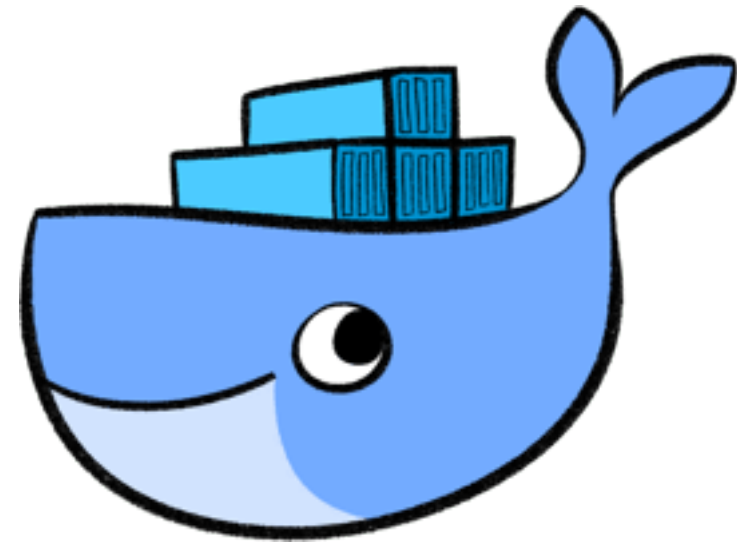
# Containerizing Apps and Data Centers

- 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



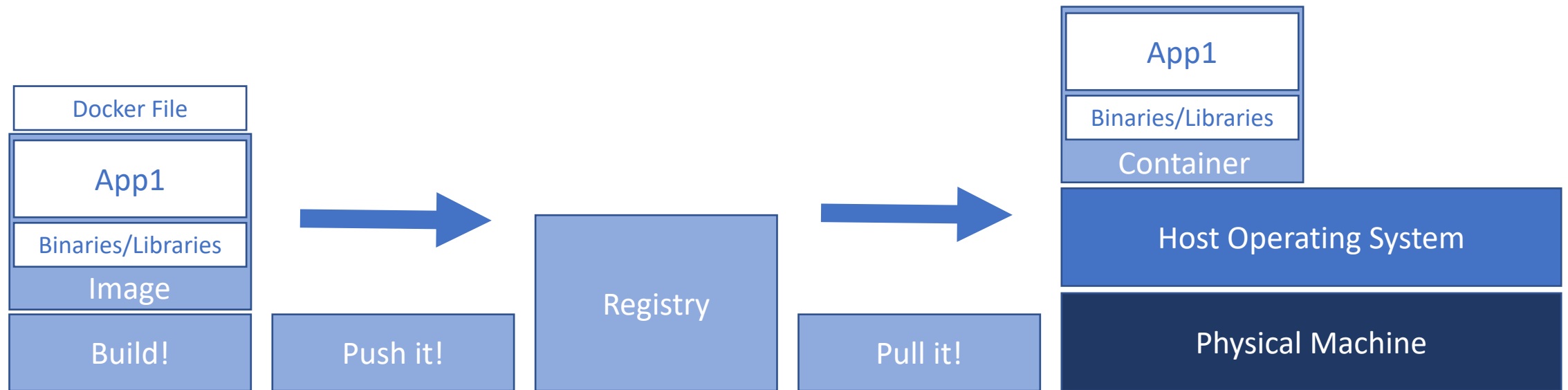
# The Container Universe

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



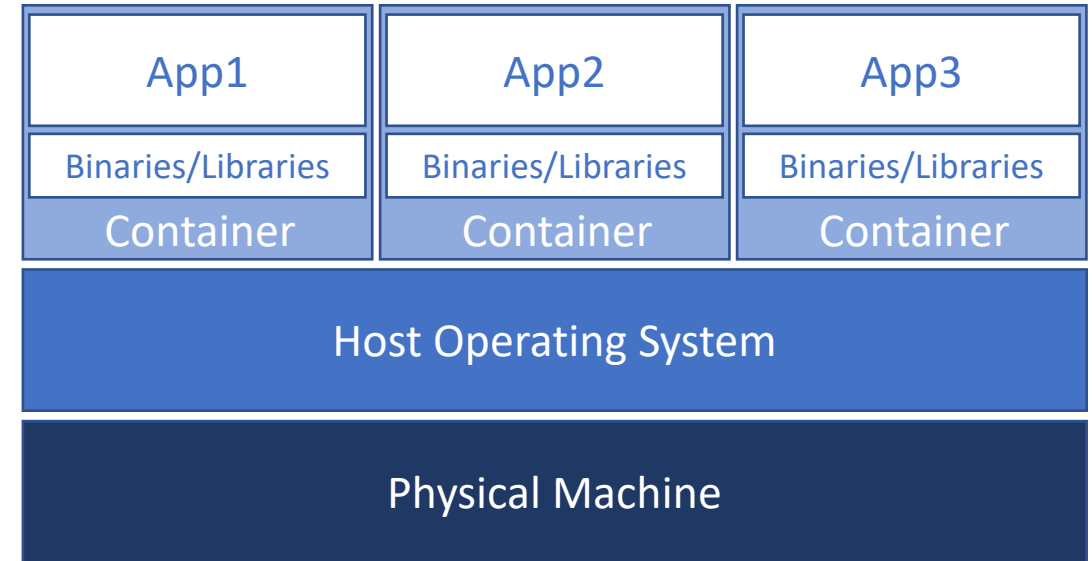
# Getting Containers

- **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

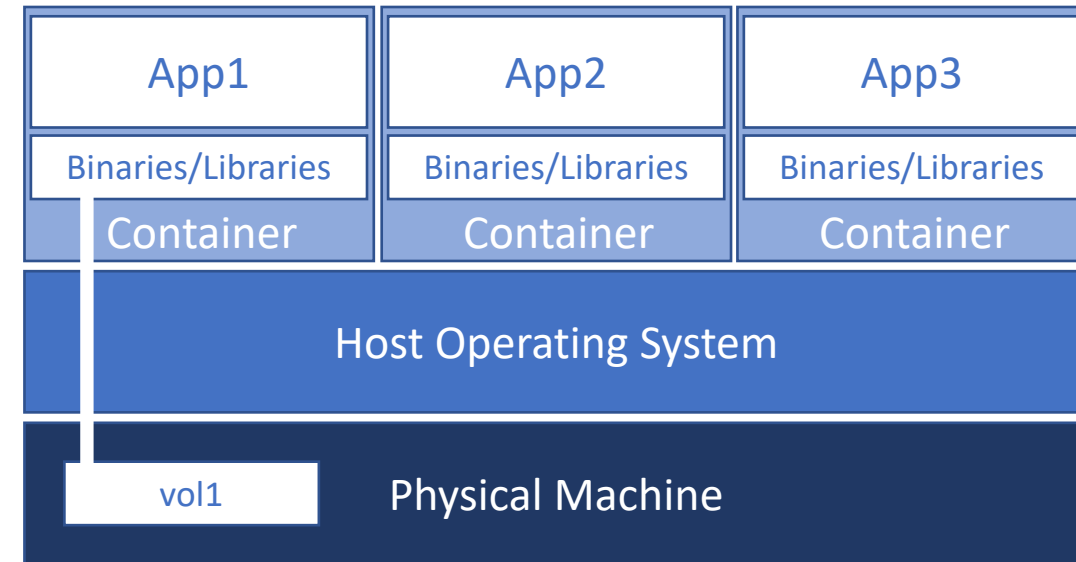


# Data Persistency in Containers

- 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

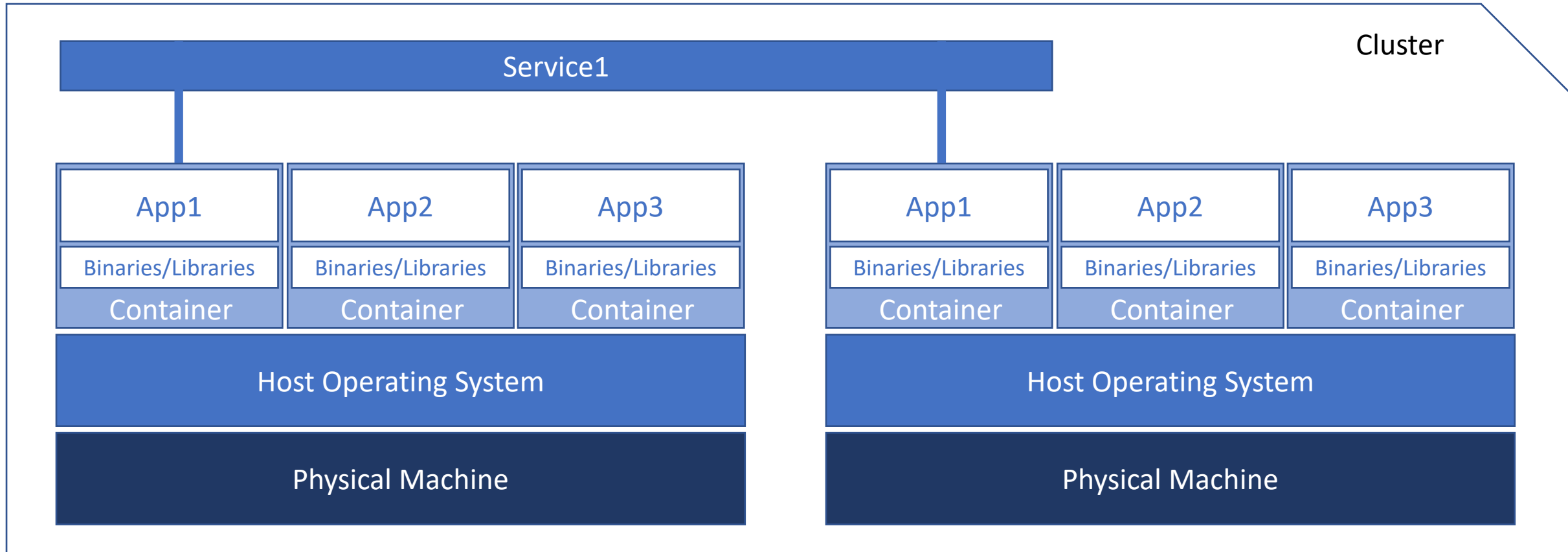
# Container Orchestration

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

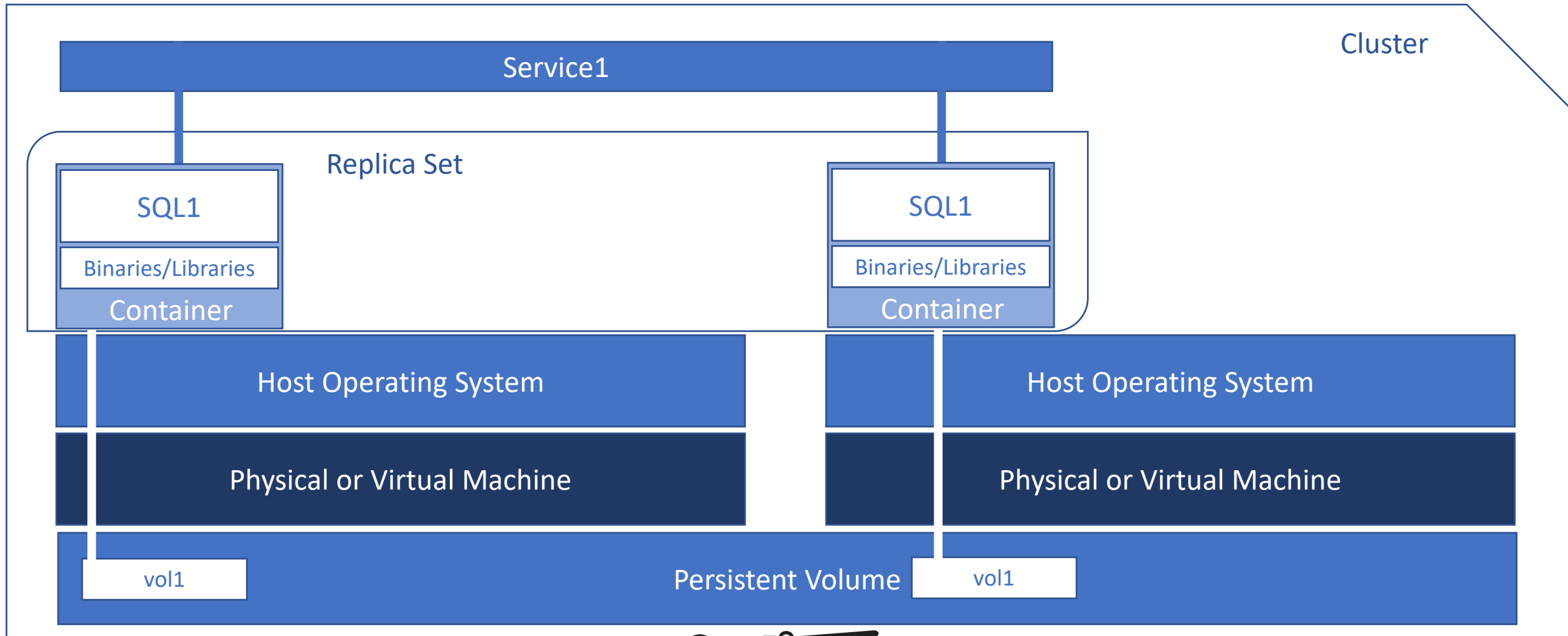
# Container Orchestrators

- 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
- What are you going to run first using SQL Server on containers
- @nocentino 😊



# Review

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- The Container Universe
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# Need more data?

- **Contact me!**
  - email: [aen@centinosystems.com](mailto:aen@centinosystems.com)
  - Twitter: @nocentino
- **Blog**
  - [www.centinosystems.com/blog](http://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>