Containers - You Better Get on Board!

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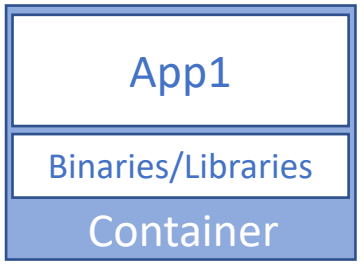
Agenda

- 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…



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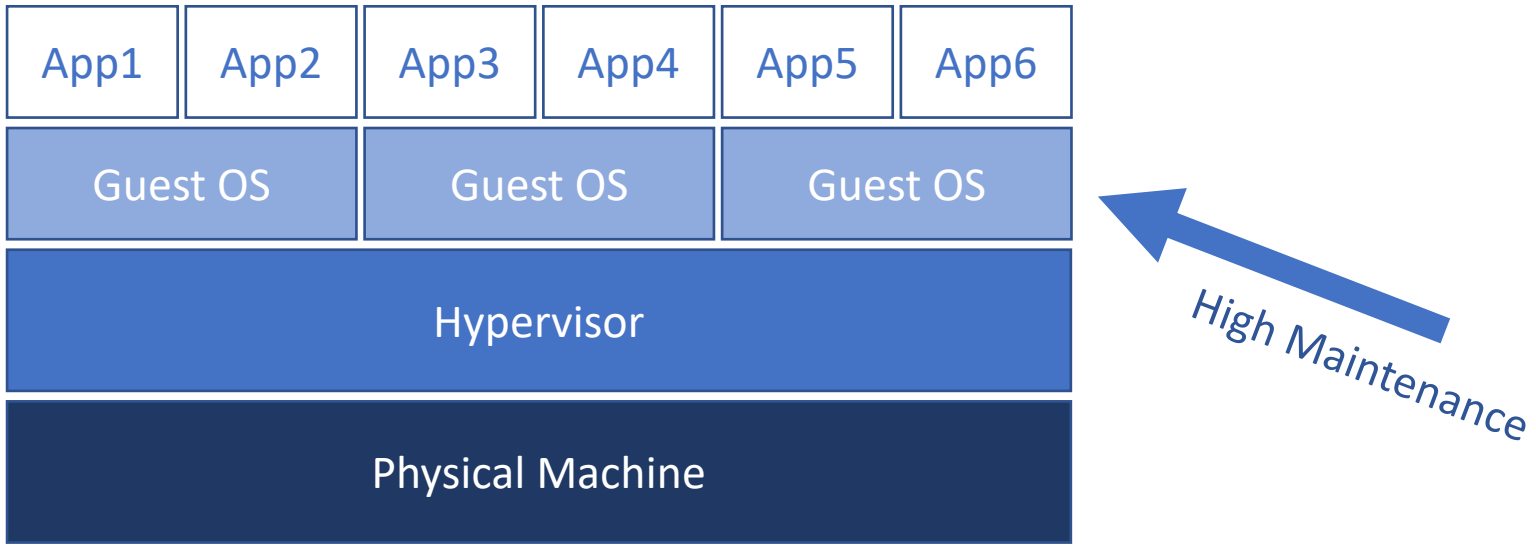
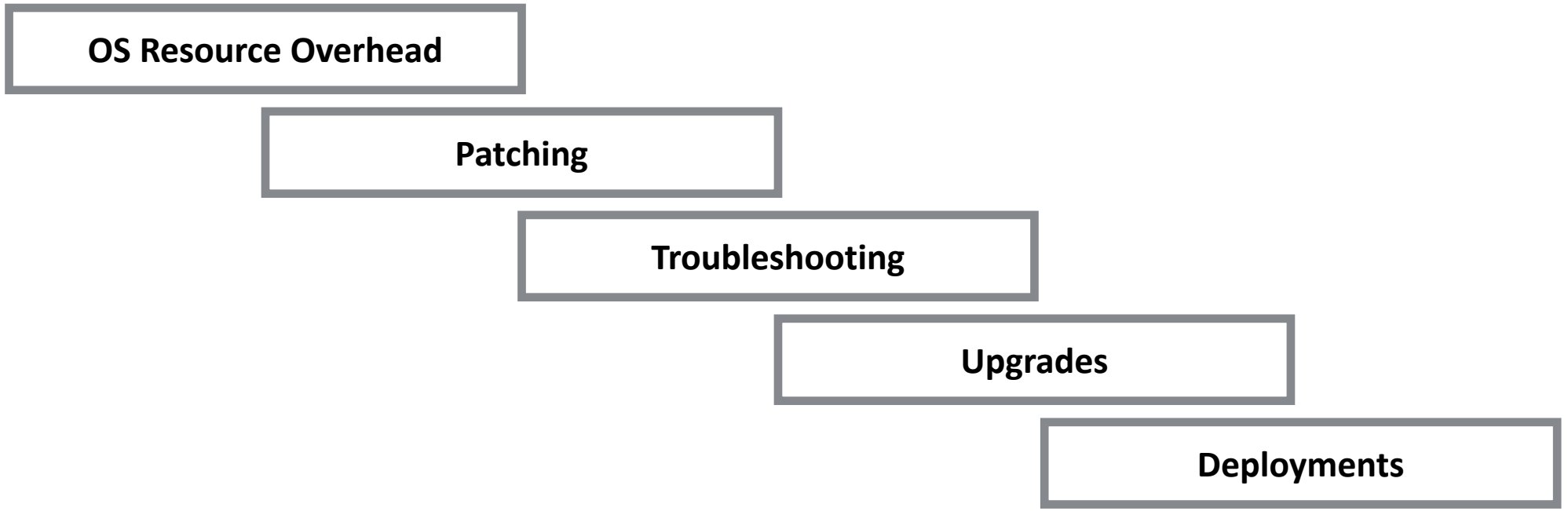
Virtual Machines



What's so Hard About Virtual Machines?



Does any of this move your business forward?

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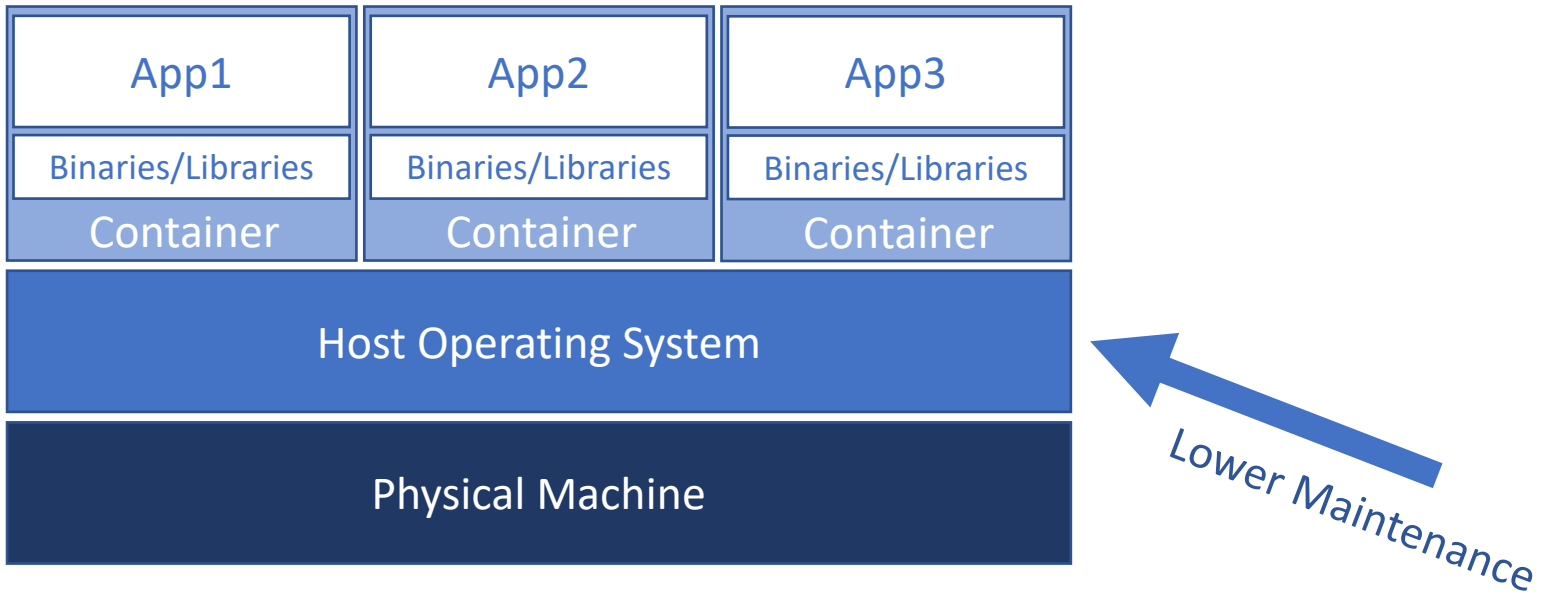
Containers


App1
App2
App3
Binaries/Libraries
Binaries/Libraries
Binaries/Libraries
Container
Container
Container
Host Operating System
Physical Machine
Lower Maintenance

It’s all about goin’ fast!

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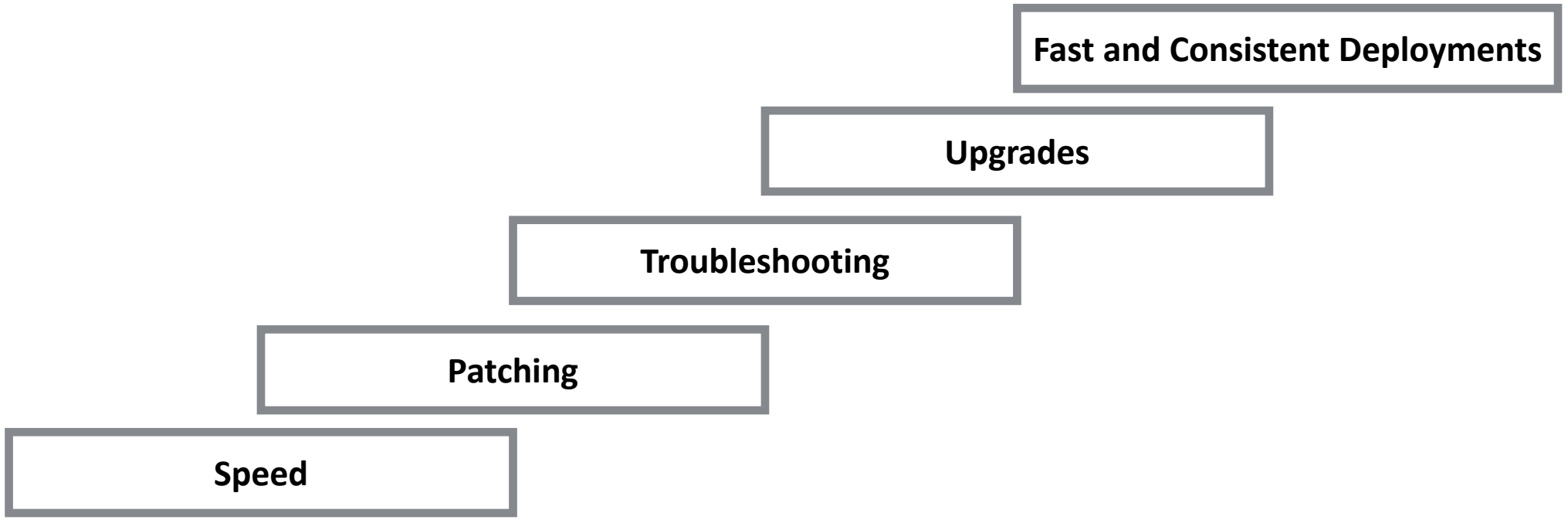
What do Containers Bring to the Table?



Services, we care about getting work done!

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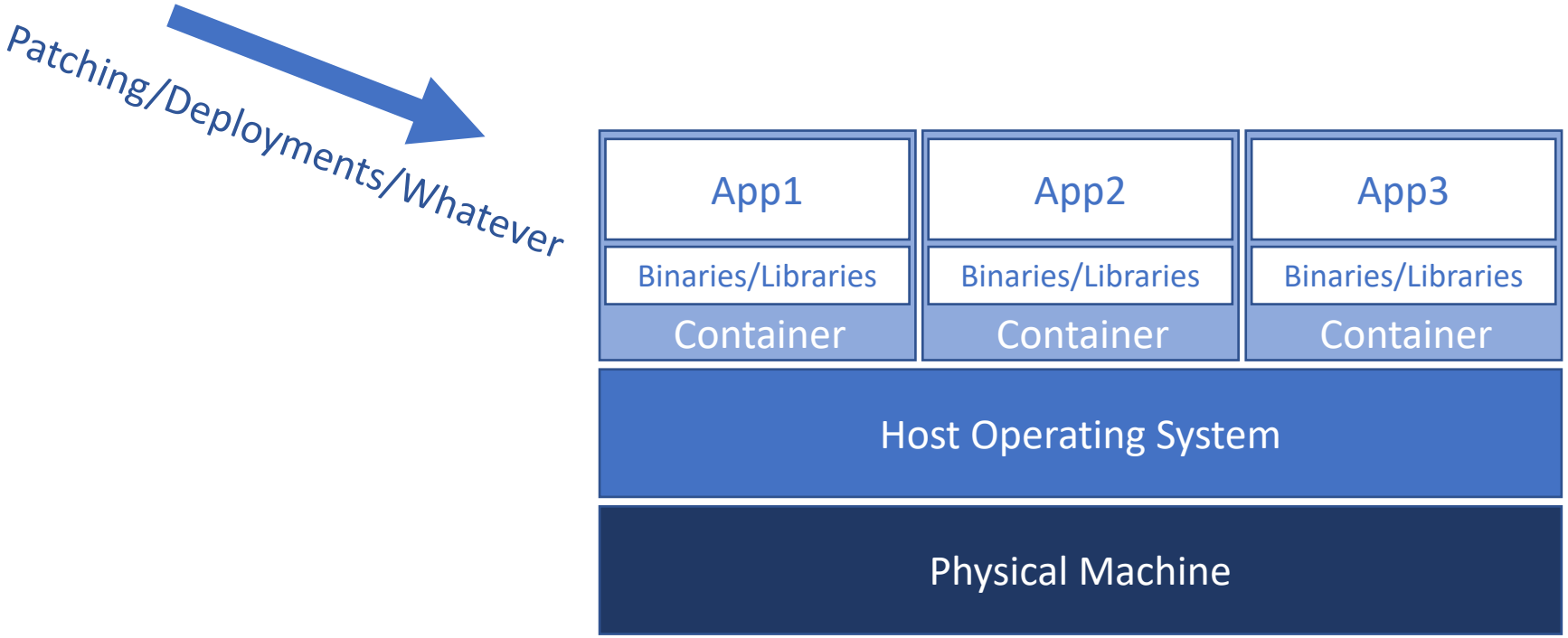
Containers



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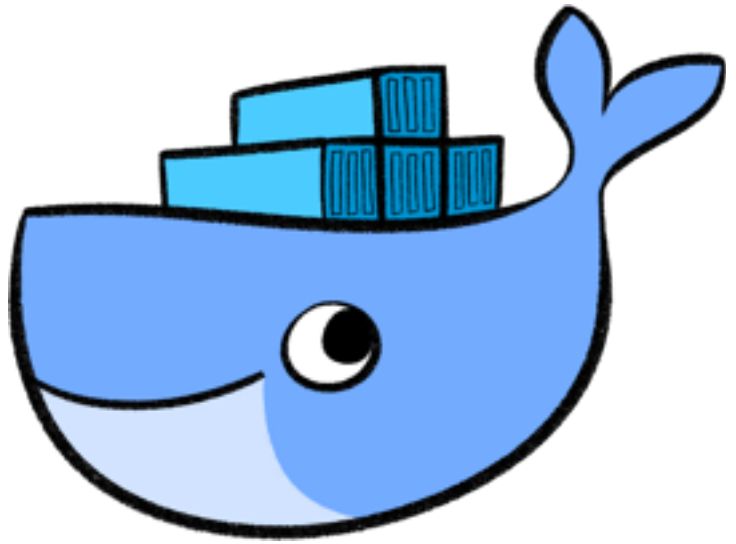
Containerizing Apps and Data Centers

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

The Container Universe

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



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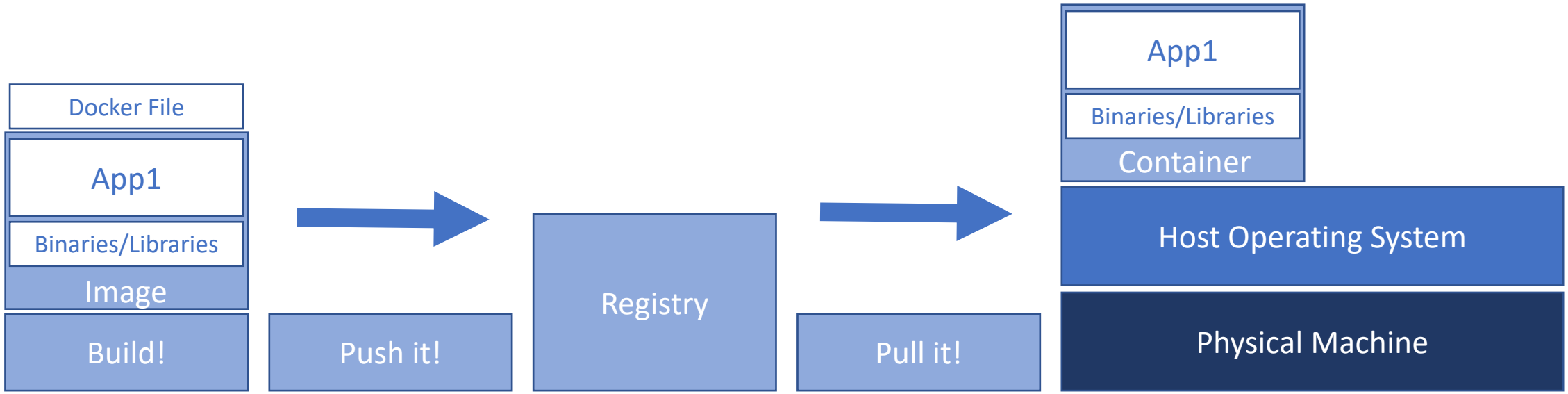
Getting Containers

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



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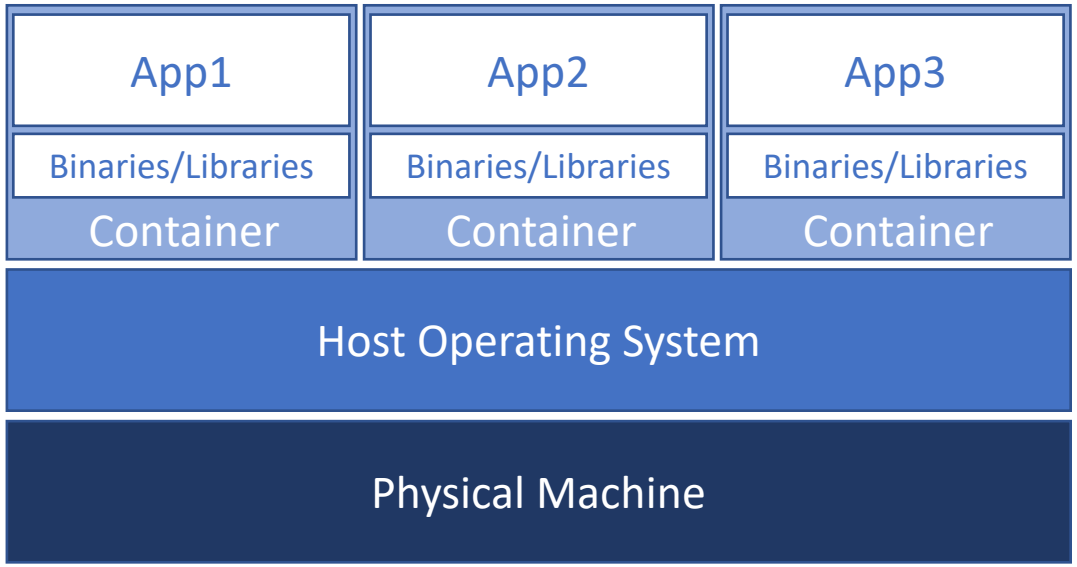
Container Internals

- 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



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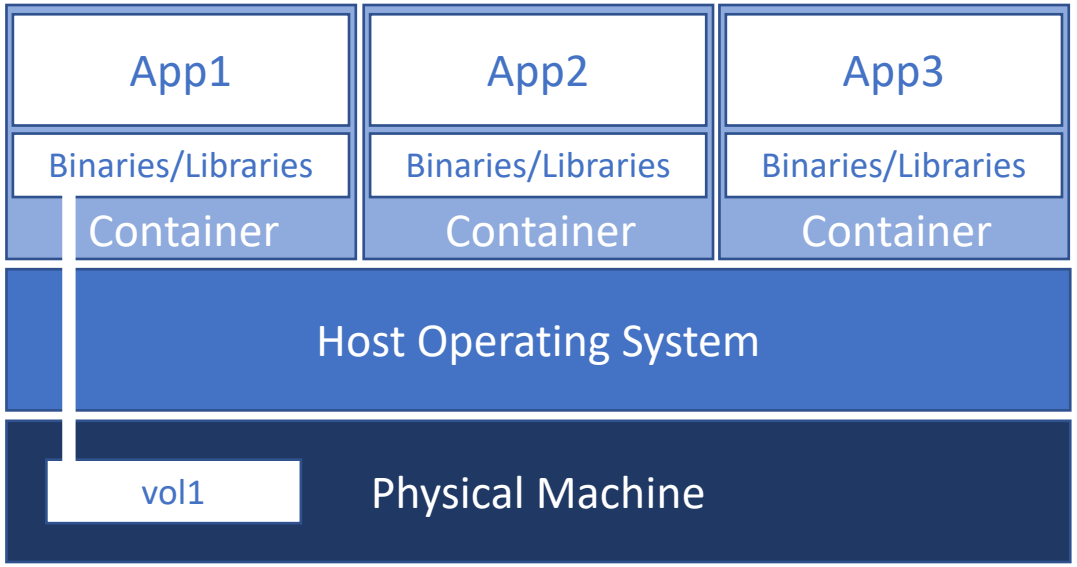
Data Persistency in Containers

- 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
- 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

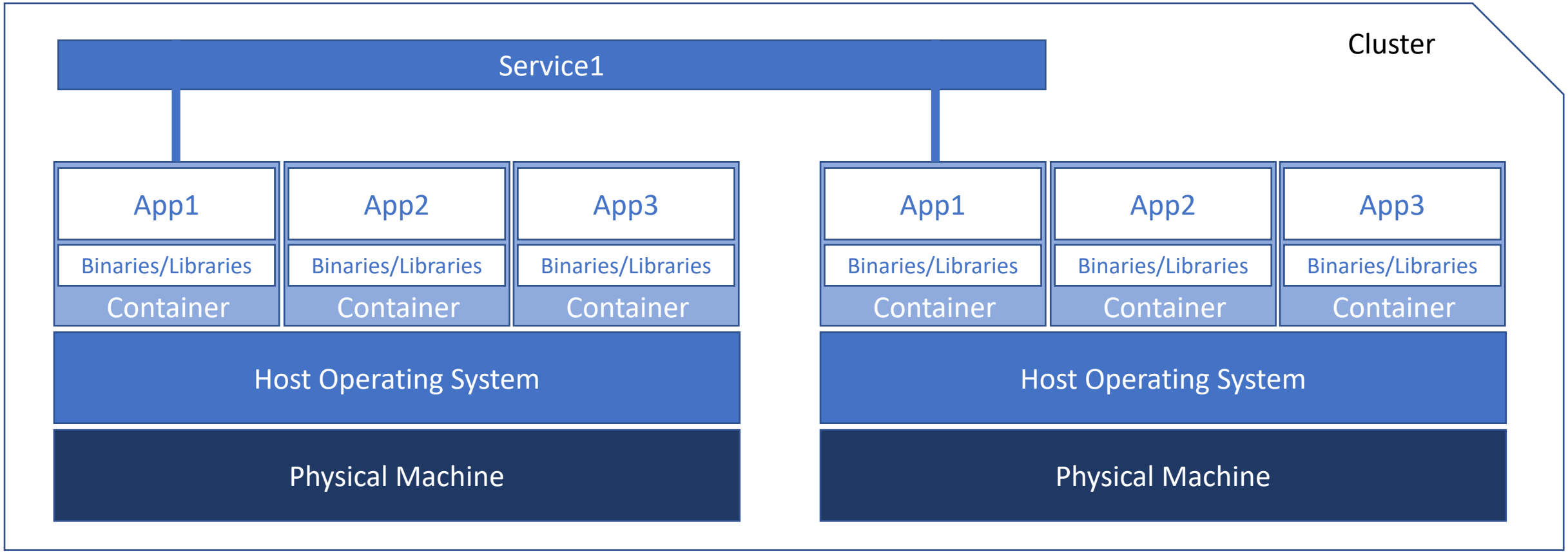
Container Orchestration

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

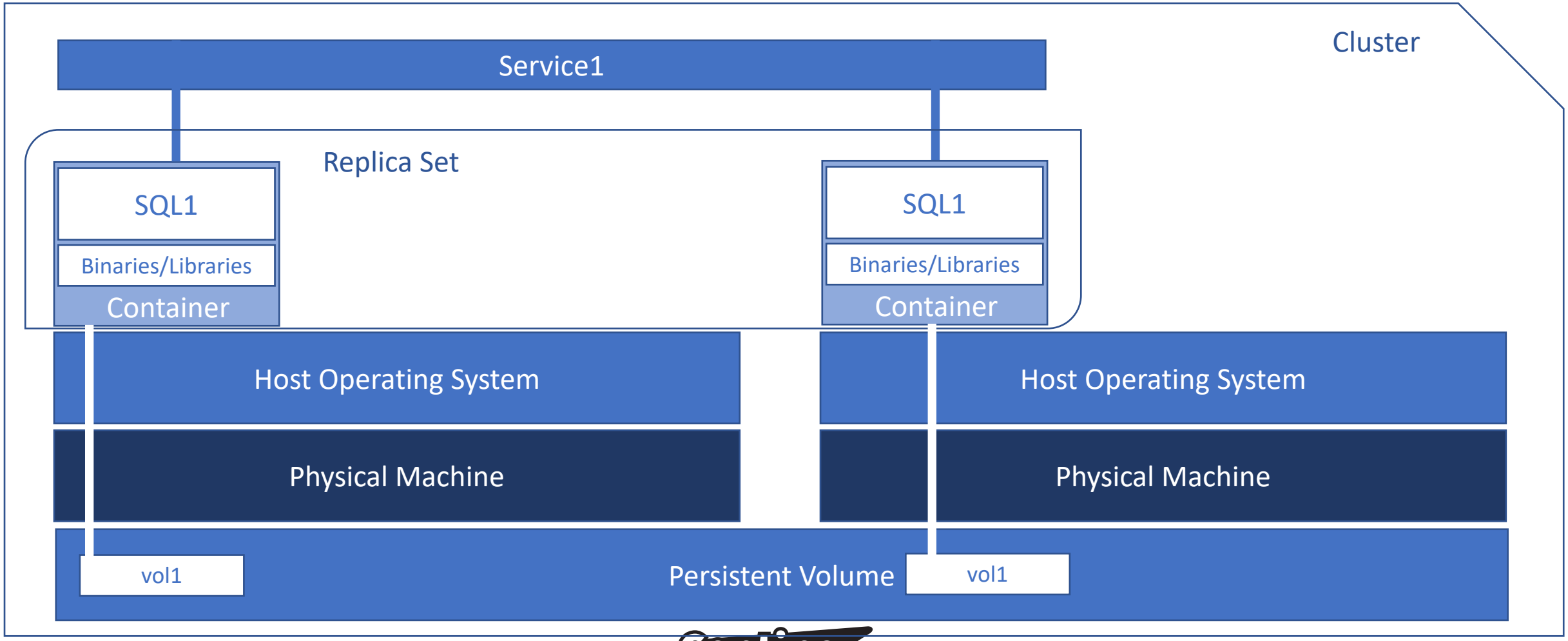
Container Orchestrators

- Docker Swarm
- 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 ;)

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Review

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- Container Orchestration
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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
  - Managing the Kubernetes API Server and Pods

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