

# Containers

DOSAR

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Open Science Grid

# Containers



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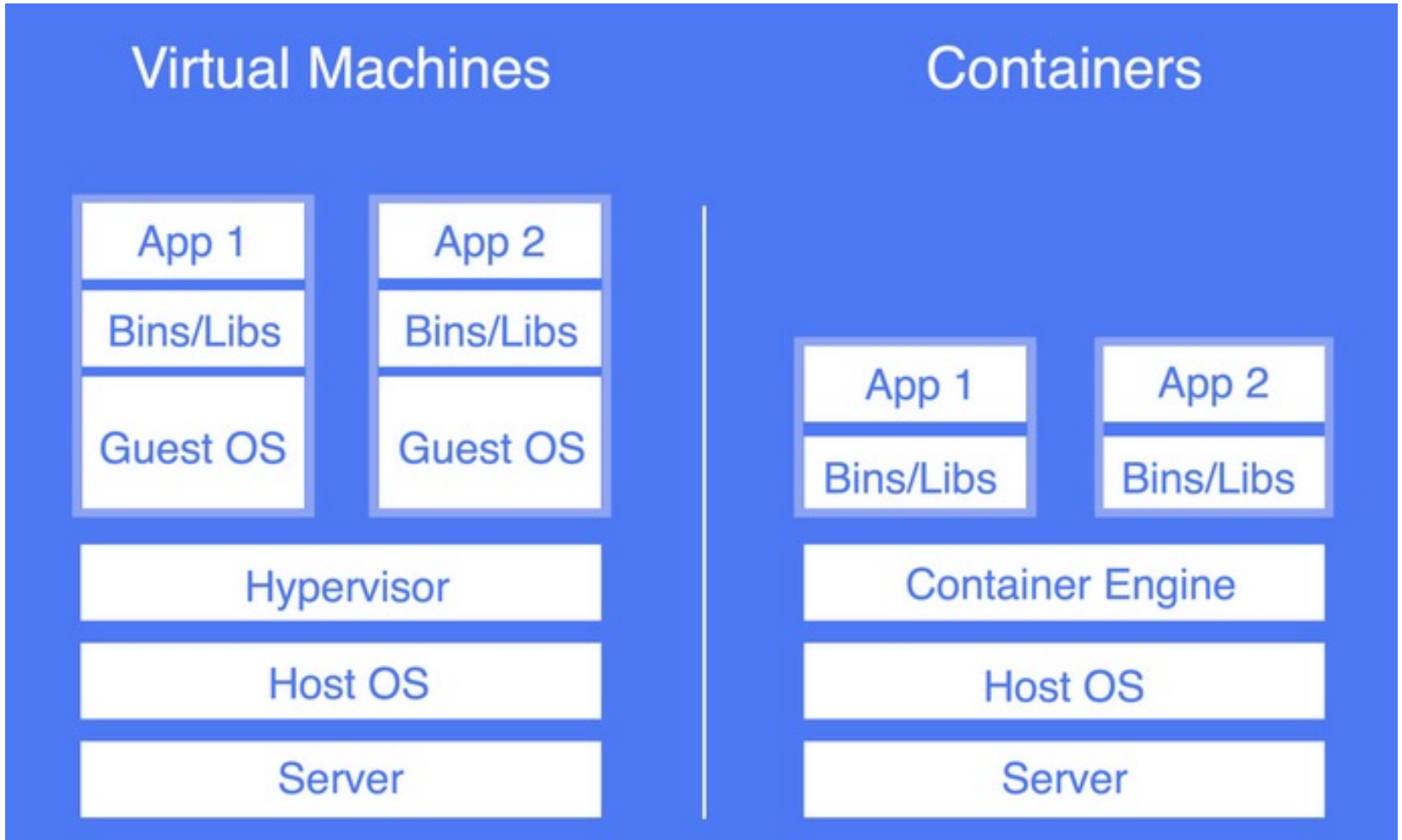


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# What are containers?

- Operating System Level Virtualization
  - Lightweight, providing the minimal level of overhead for the application to function properly.
  - Super minimalist VMs
  - No Hypervisor
  - Abstracts away the operating system and hardware
  - Share the OS Kernel with other containers
  - Container size is very small and therefore quick and easy to provision

# How do they differ from VMs?



# More differences...

- Size
  - Containers are usually 10s of MB
  - VMs can be several GB
- Shared hypervisor vs. shared kernel
- VMs have their own kernels so a deeper level of isolation
- Containers virtualize the OS while VMs virtualize the hardware

# Container Advantages

- Size
- Less resource intensive
- Quick provisioning
- Easy allocation of resources
- Quicker development cycles
- Cost effective
- Very good for microservices

# Container Disadvantages

- Security – shared kernel with root access
- Less flexibility in OS
- Networking can be tricky
  - Properly configuring sufficient networking resources is challenging



# Container Software

- Docker
- Singularity
- LXC, LXD
- Solaris Zones
- RKT
- BSD Jails
- chroot

# Questions?

- Questions? Comments?
  - Feel free to ask us questions now or later:  
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  - Exercises start here:
    - [https://osg-htc.org/dosar/ASP2024/ASP2024\\_Materials/](https://osg-htc.org/dosar/ASP2024/ASP2024_Materials/)
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