Open Science Grid

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A Brief Intro to Clouds and Containers

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What is Cloud Computing?

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- Wikipedia says *"Cloud computing is the use of computing resources (hardware and software) that are delivered as a service over a network (typically the Internet). The name comes from the common use of a cloud-shaped symbol as an abstraction for the complex infrastructure it contains in system diagrams. Cloud computing entrusts remote services with a user's data, software and computation."*

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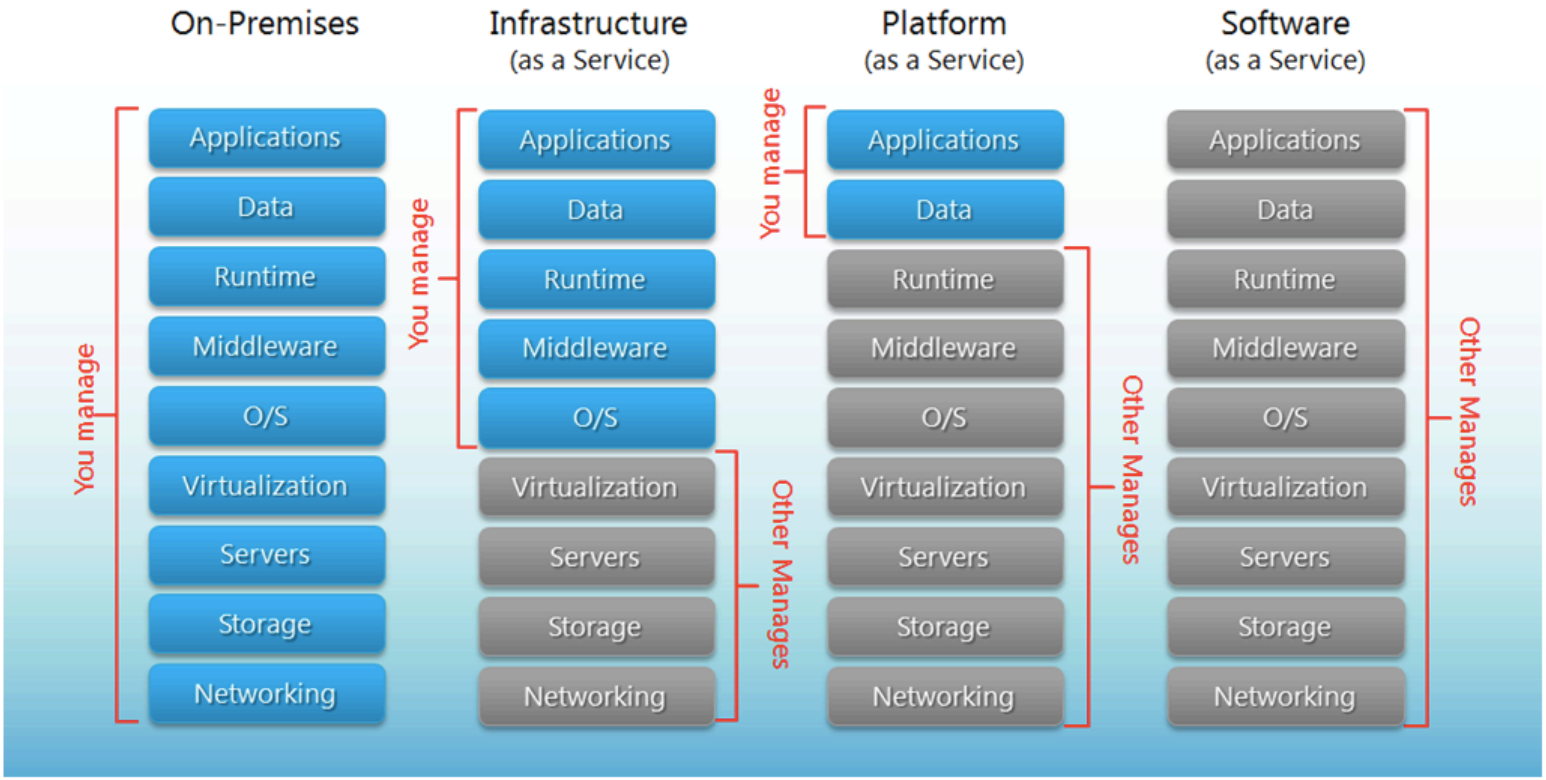
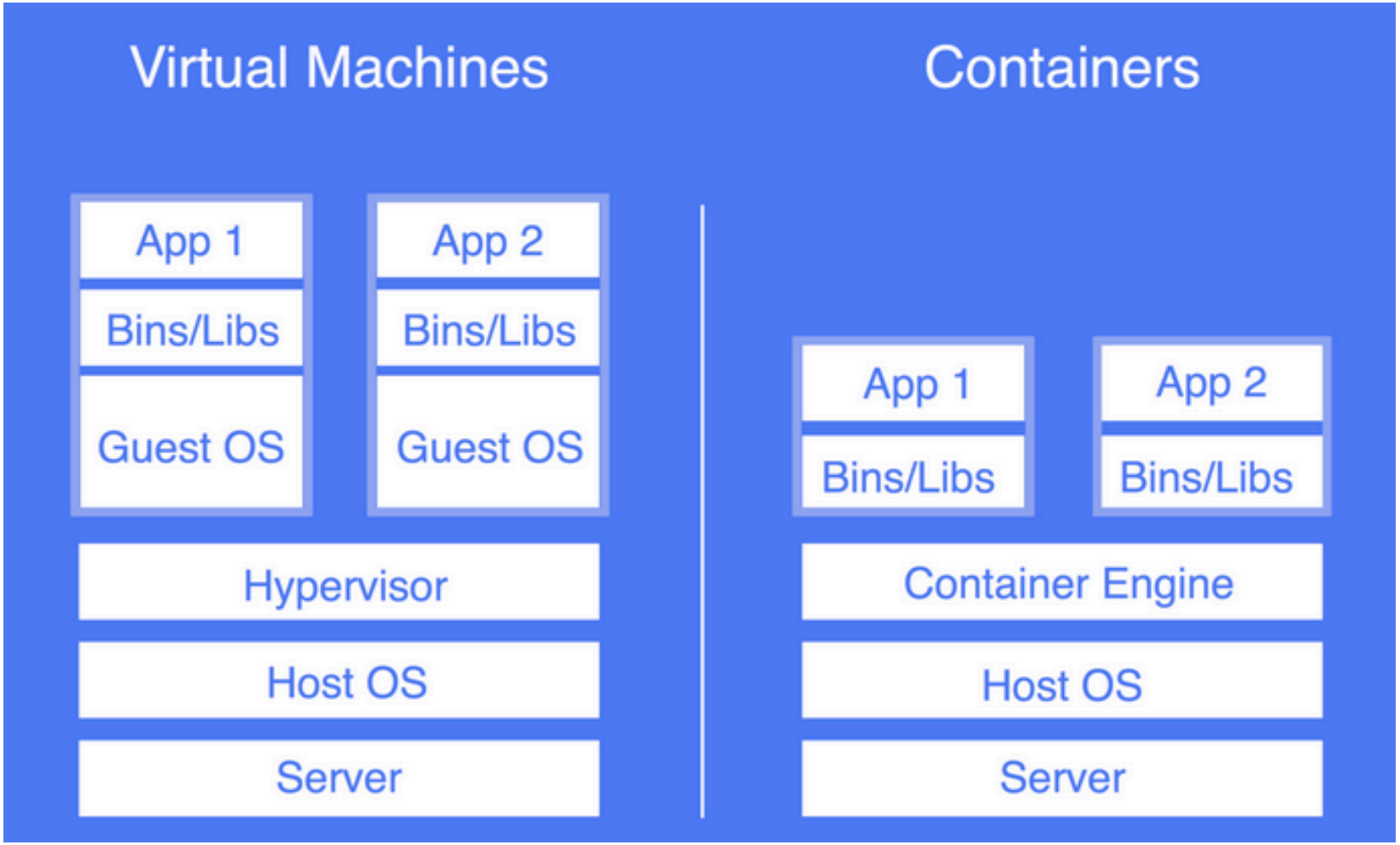


What are containers?

- 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 me questions now or later:
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Exercises start here:

- https://opensciencegrid.github.io/dosar/Materials/DSP_Materials/

Presentations are also available from this URL.