Lecture 3: 虚拟化与云服务

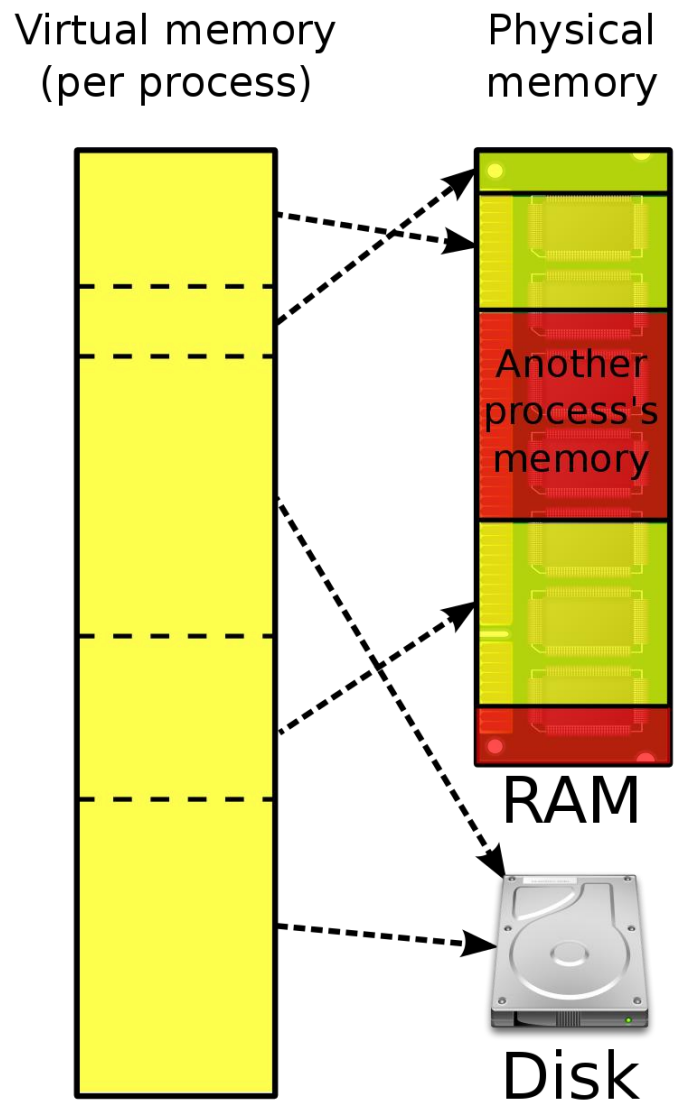
Virtualization & Cloud Service

为什么需要虚拟化？

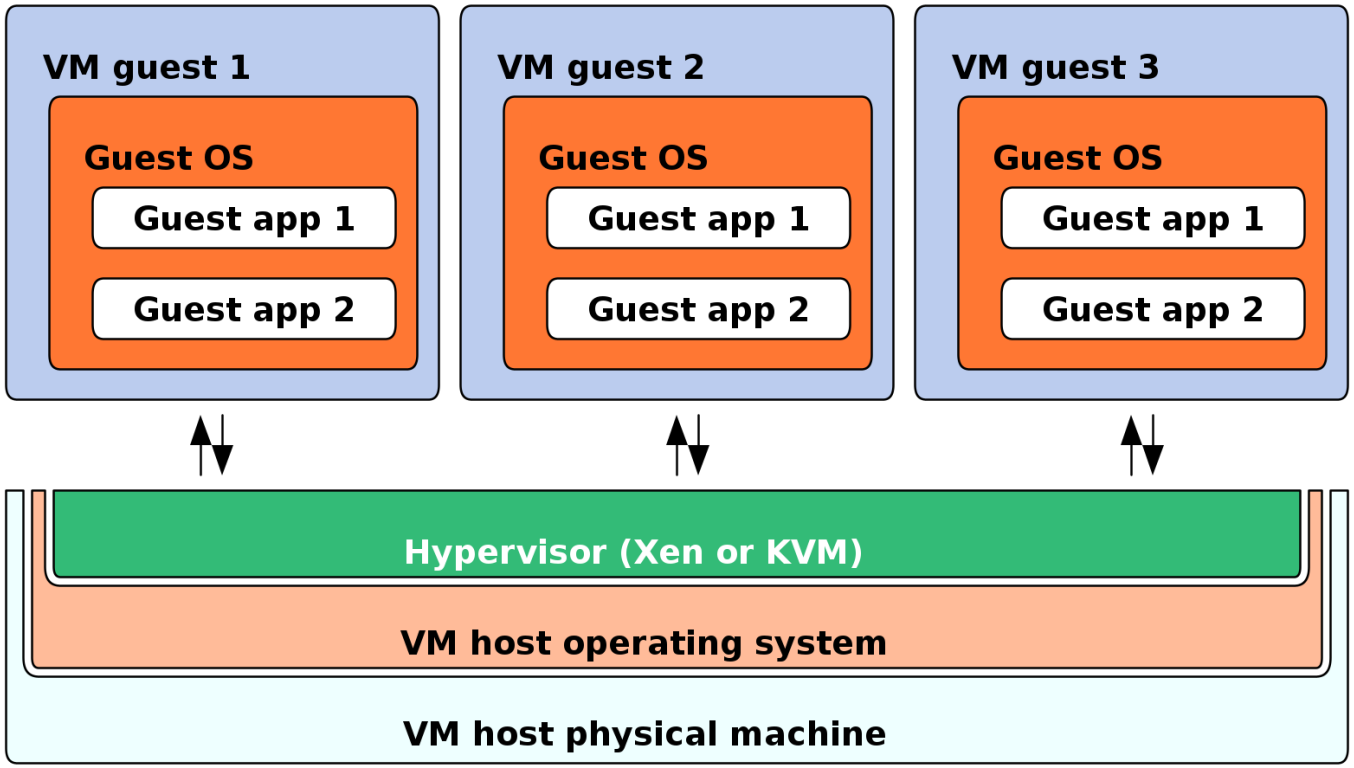
- 例：挂机游戏
- 实现资源有效复用
- 物理硬件资源的逻辑化
- 隔离性与安全性

内存虚拟化

- 虚拟内存空间=主存+磁盘+I/O设备...
- 每个进程有独立的虚拟内存空间
- 虚拟内存空间与物理内存大小无关

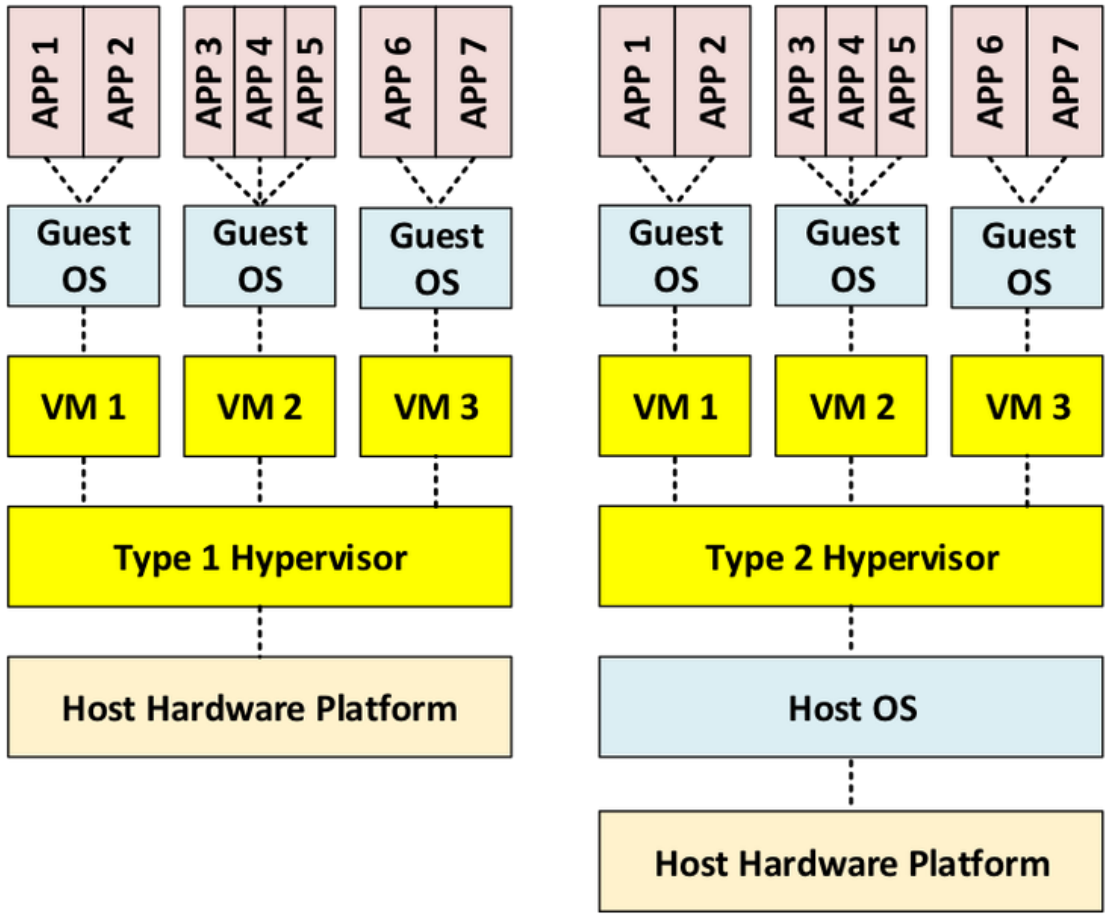


硬件虚拟化


VM guest 1
Guest OS
Guest app 1
Guest app 2
VM guest 2
Guest OS
Guest app 1
Guest app 2
VM guest 3
Guest OS
Guest app 1
Guest app 2
Hypervisor (Xen or KVM)
VM host operating system
VM host physical machine

硬件虚拟化

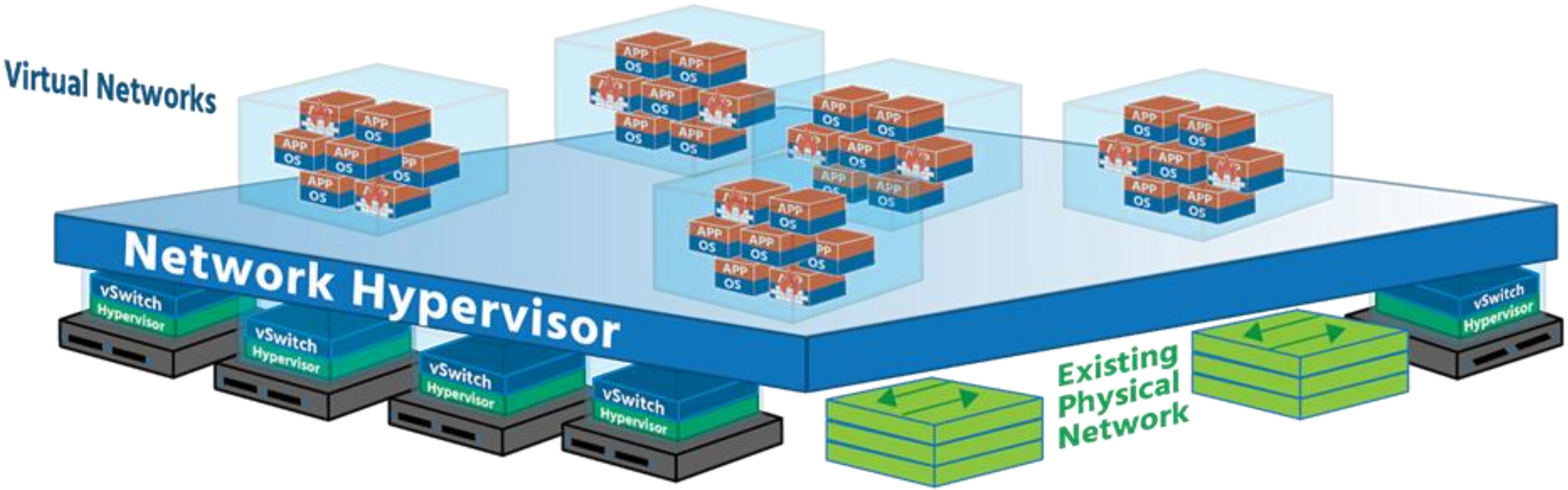
- A type 1 hypervisor, also called a native or bare metal hypervisor, is hosted directly on the underlying hardware.
  - VMWare ESXi, Proxmox
- A type 2 hypervisor, also called a hosted hypervisor, is hosted on top of a host operating system.
  - Vmware Workstation, Virtualbox



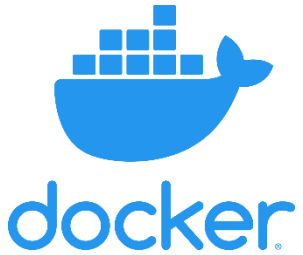
网络虚拟化

- Network virtualization totally separates network resources from physical hardware by recreating those networking resources in software - by virtualizing them.
- Routers, switches, load balancers...
- On-demand

网络虚拟化

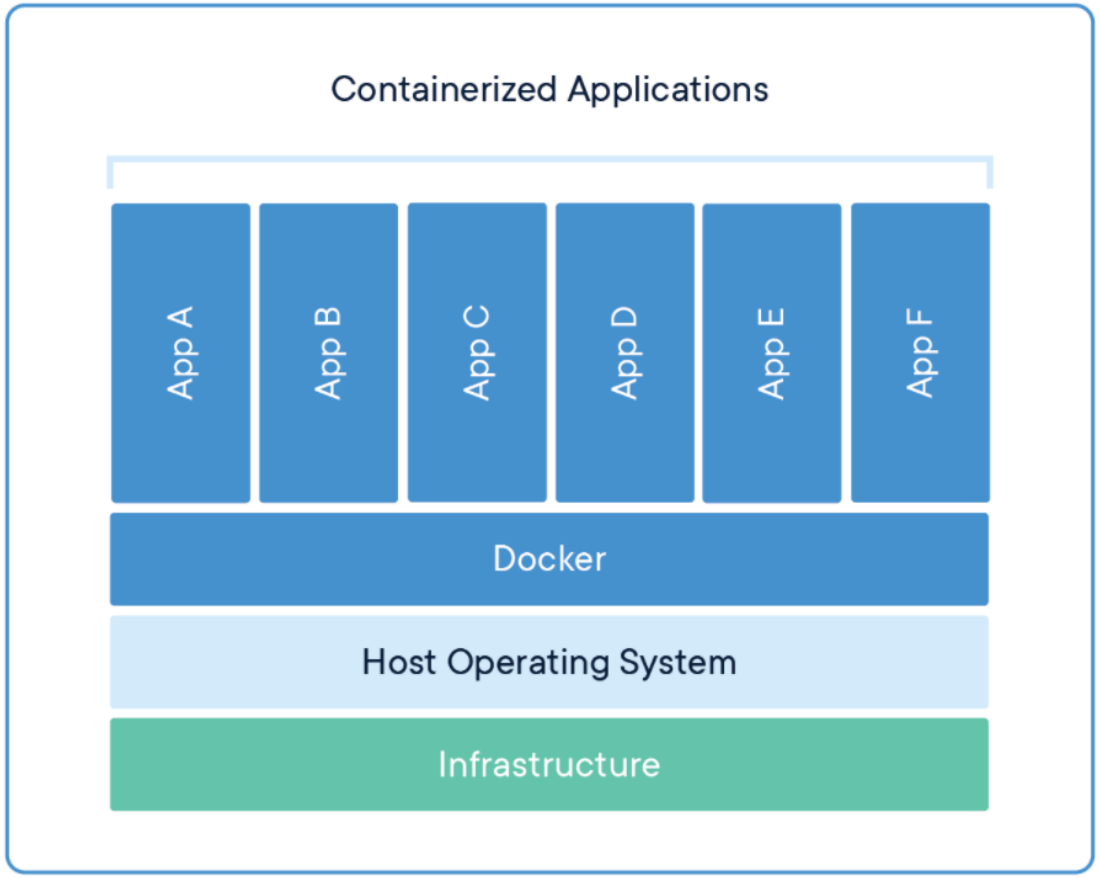

Virtual Networks
APP
OS
Network Hypervisor
vSwitch
Hypervisor
Existing
Physical
Network

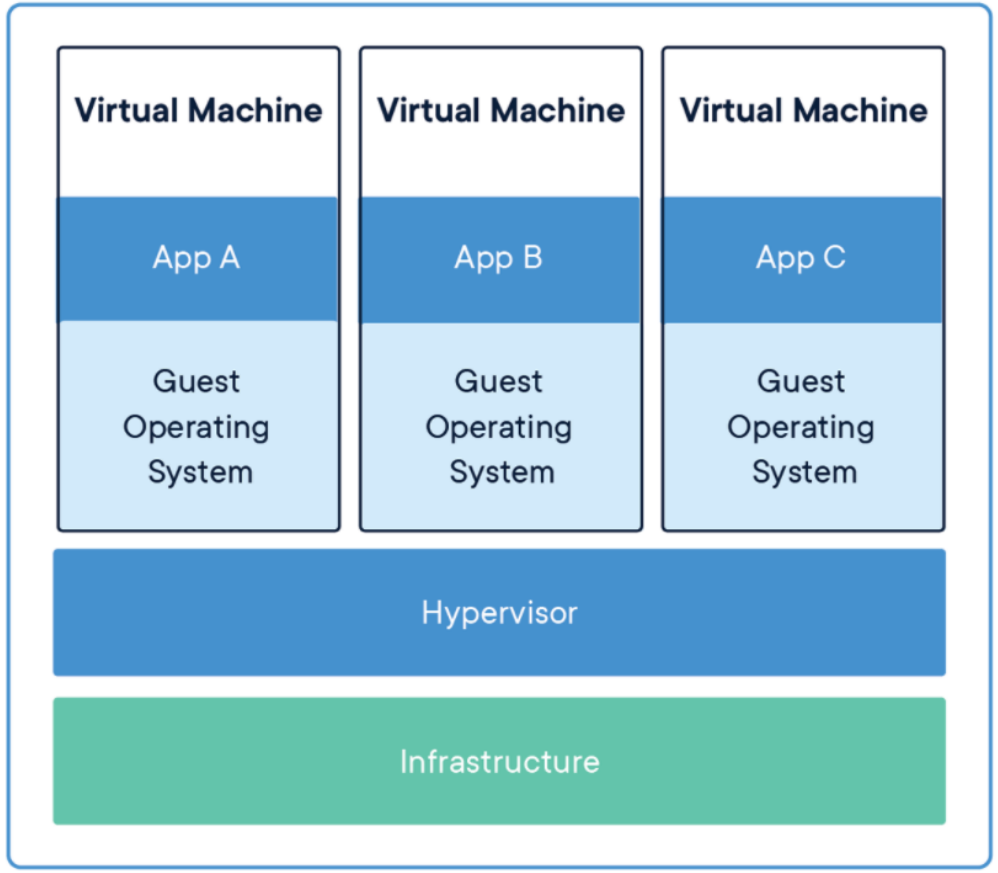
容器化/操作系统虚拟化



- Docker
- Enables users to separate applications from infrastructure
- Package applications into standard units
- Shipping, testing, and deploying code quickly

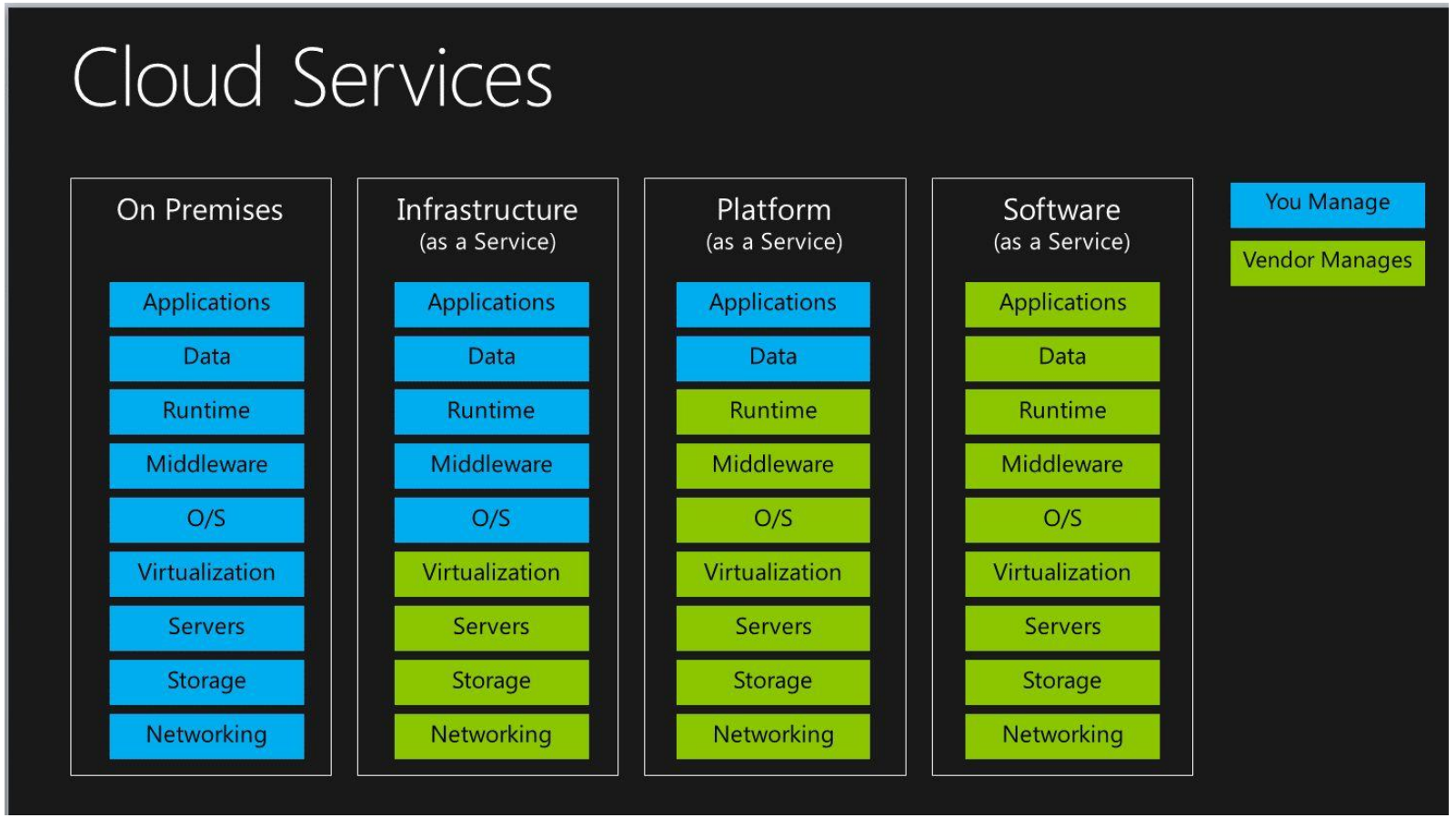
容器化/操作系统虚拟化


Containerized Applications
App A
App B
App C
App D
App E
App F
Docker
Host Operating System
Infrastructure


Virtual Machine
Virtual Machine
Virtual Machine
App A
App B
App C
Guest Operating System
Guest Operating System
Guest Operating System
Hypervisor
Infrastructure

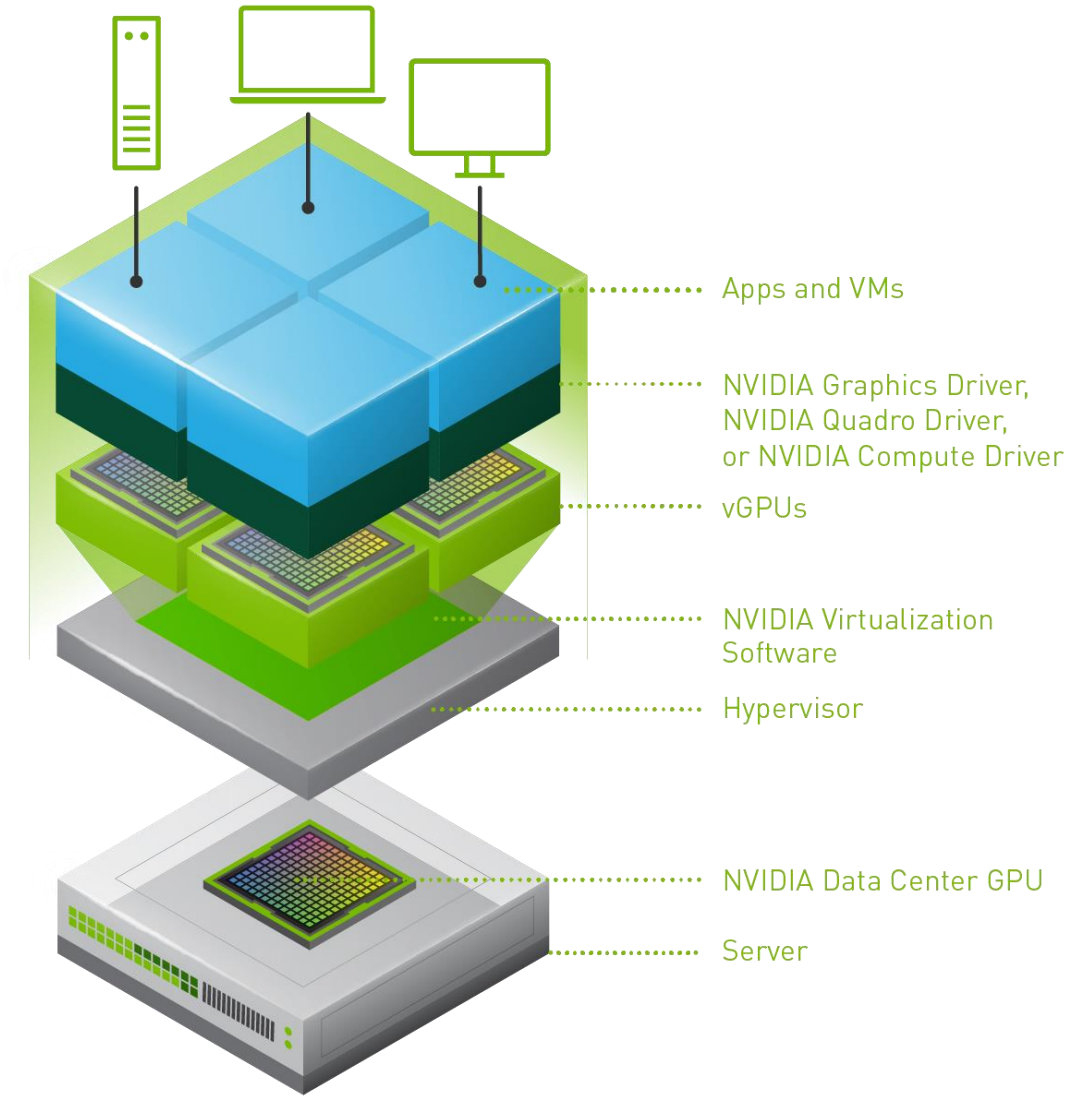
云服务

- IaaS, PaaS, SaaS



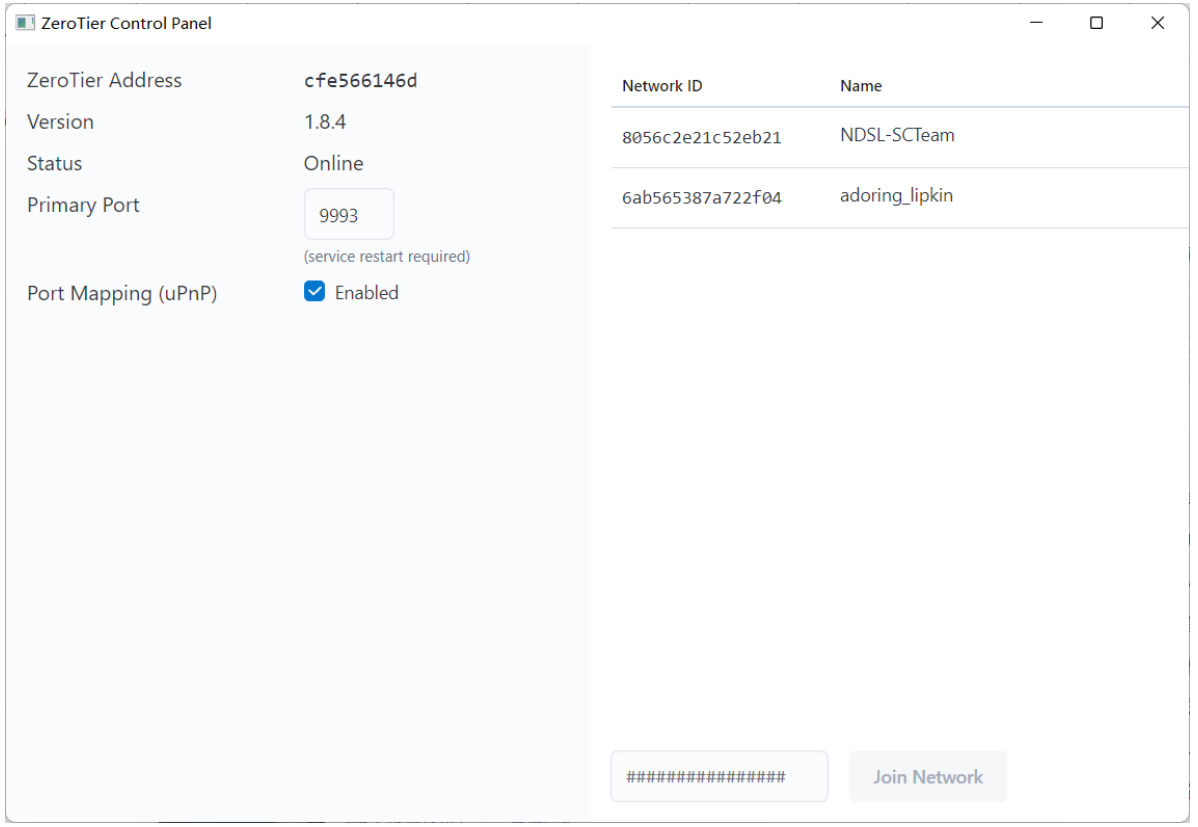
为什么今天需要虚拟化？

- 深度学习, vGPU
- 云分发管理
- 软件微服务架构
  - Kubernetes
- 优秀的工程范式



今日加餐：穿透组网 ZEROTIER

- 对一个懒人来说，可能需要：
  - 随时随地都能远程使用宿舍的电脑
  - 在哪都能一起打联机游戏
  - 以及各种你能想到的联机应用场景
- ZeroTier是一个优秀的穿透组网方案



小练习

- 见Lab5.md