



Virtual Computing and VMWare

Module 4

Virtual Computing

- Cyber Defense program depends on virtual computing
- We will use it for hands-on learning
- Cyber defense competition will be hosted on a virtual computing platform

History of Virtual Computing

- 1960s: Computers were expensive
 - (\$7M - \$10M in 2013)

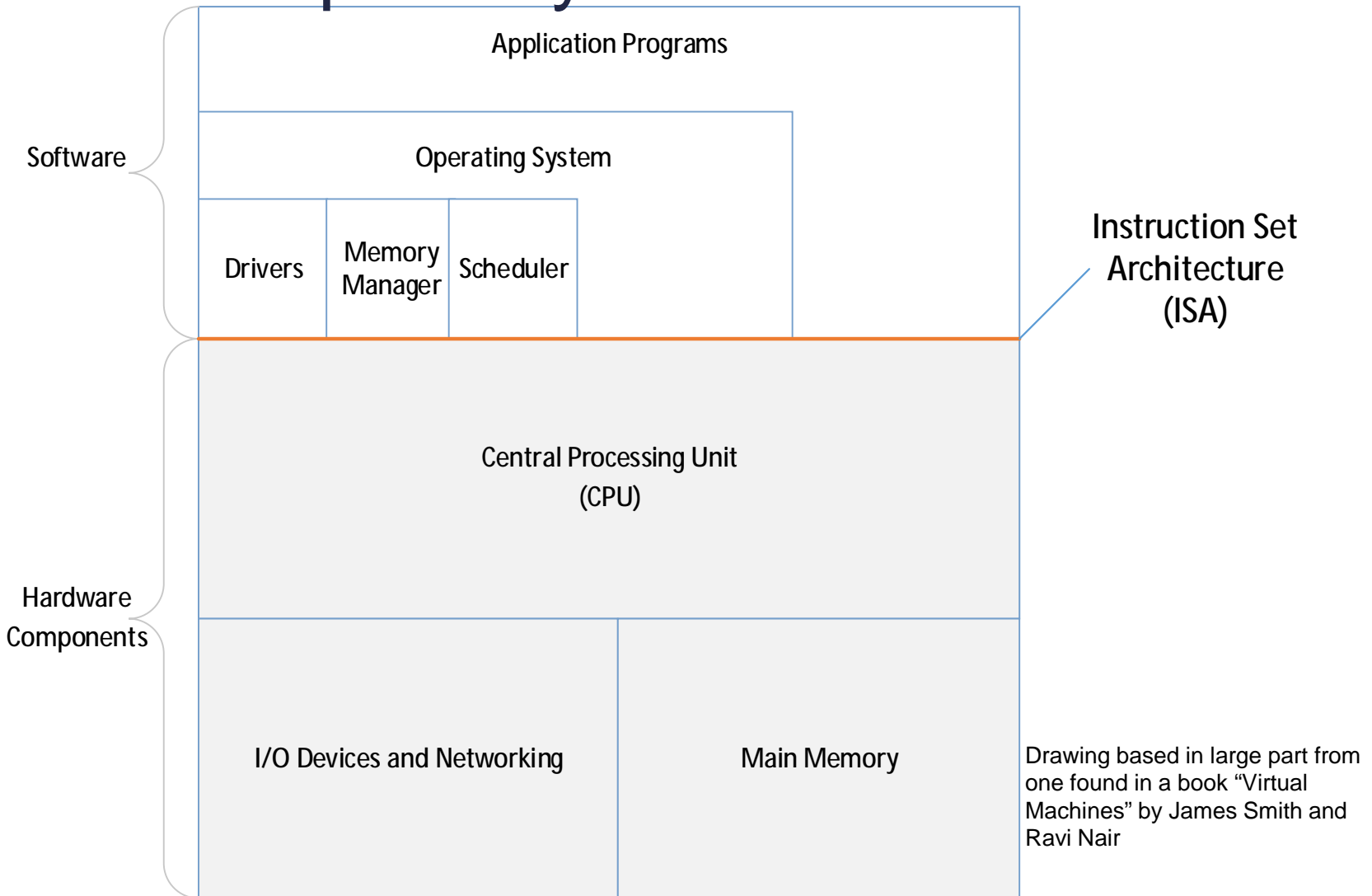


http://www.theregister.co.uk/2011/07/14/brief_history_of_virtualisation_part_2/
Accessed: July 2013

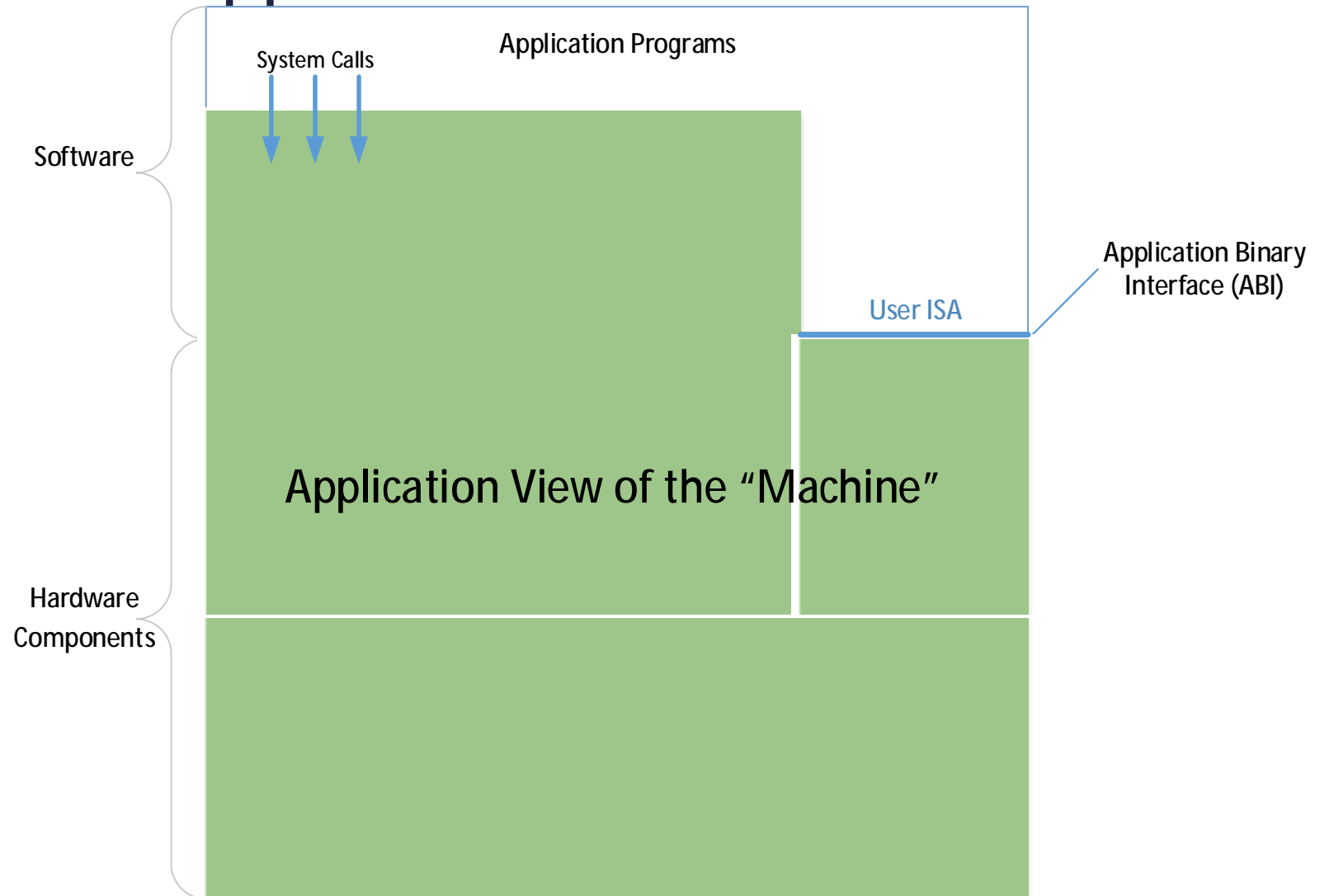
History of Virtual Computing

- 1990's: Interest in virtual computing faded – Hardware was inexpensive
- 2000's – Now: Interest Returned
 - Platforms now servers not just mainframes
 - Why:
 - More efficient use of hardware
 - Better power efficiency (Use of idle power \approx busy power)
 - Space efficiency
 - Set up time much lower
 - OS flexibility \Rightarrow Application flexibility
 - Remote management features & Internet

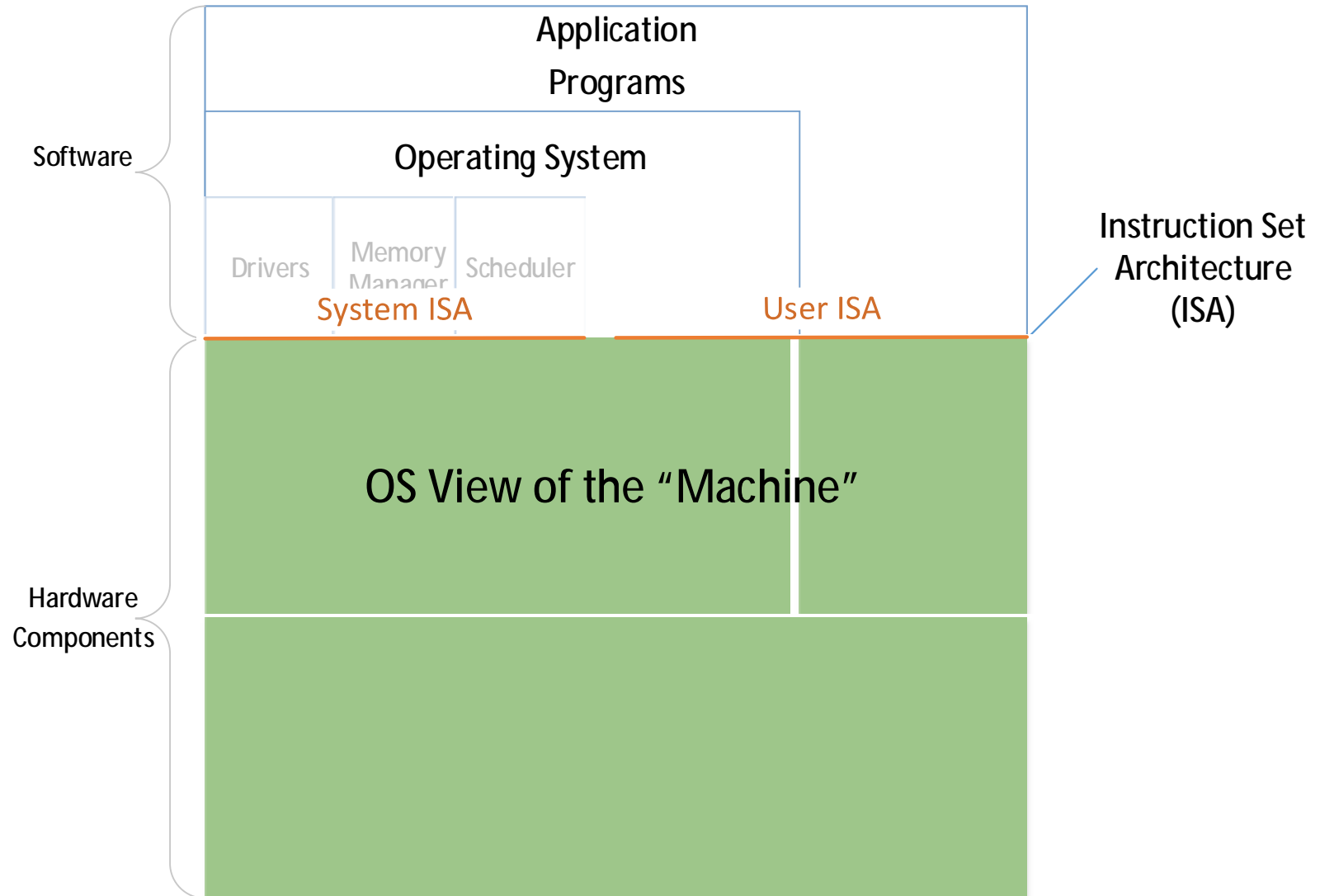
Computer System Architecture



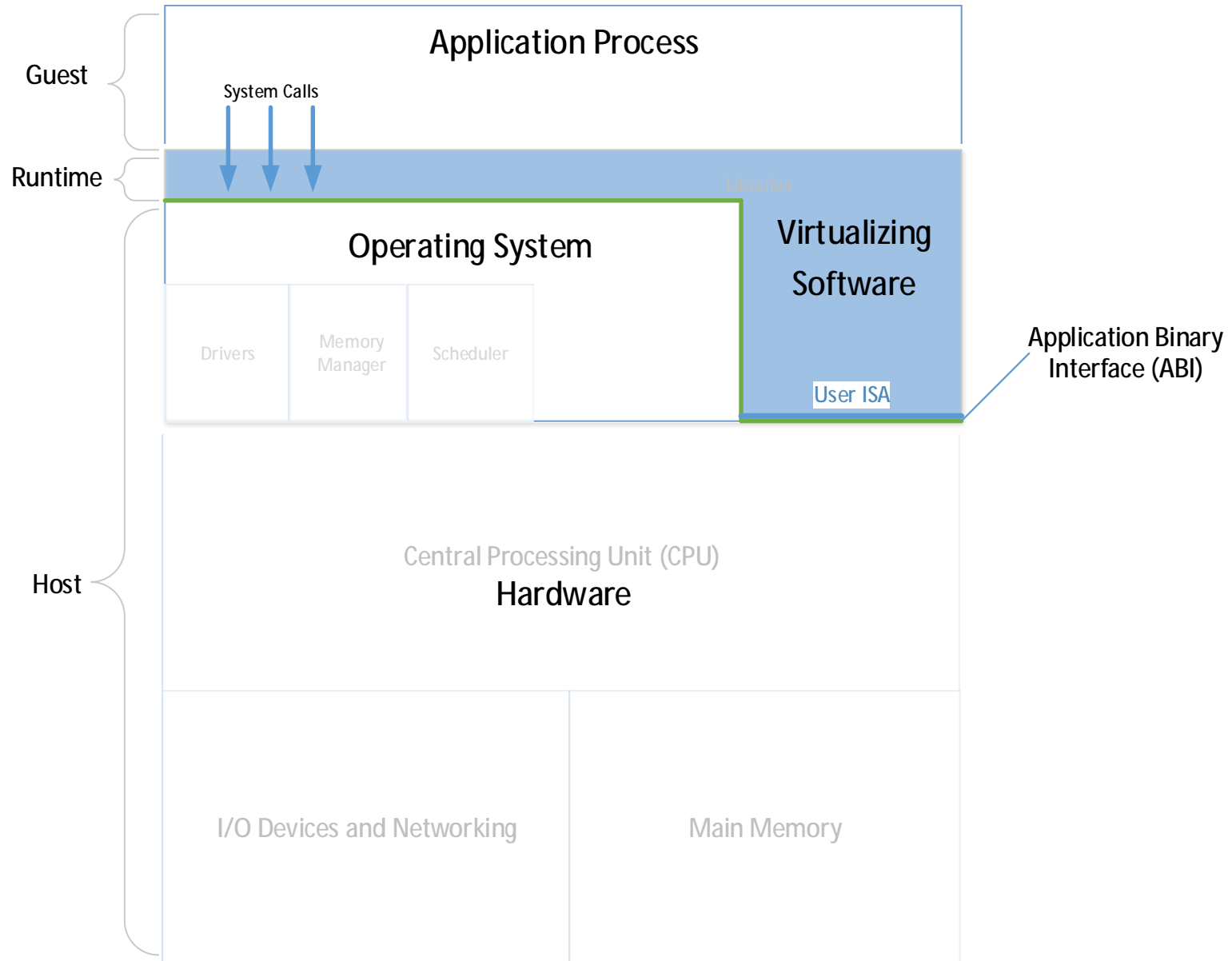
Application's Point of View



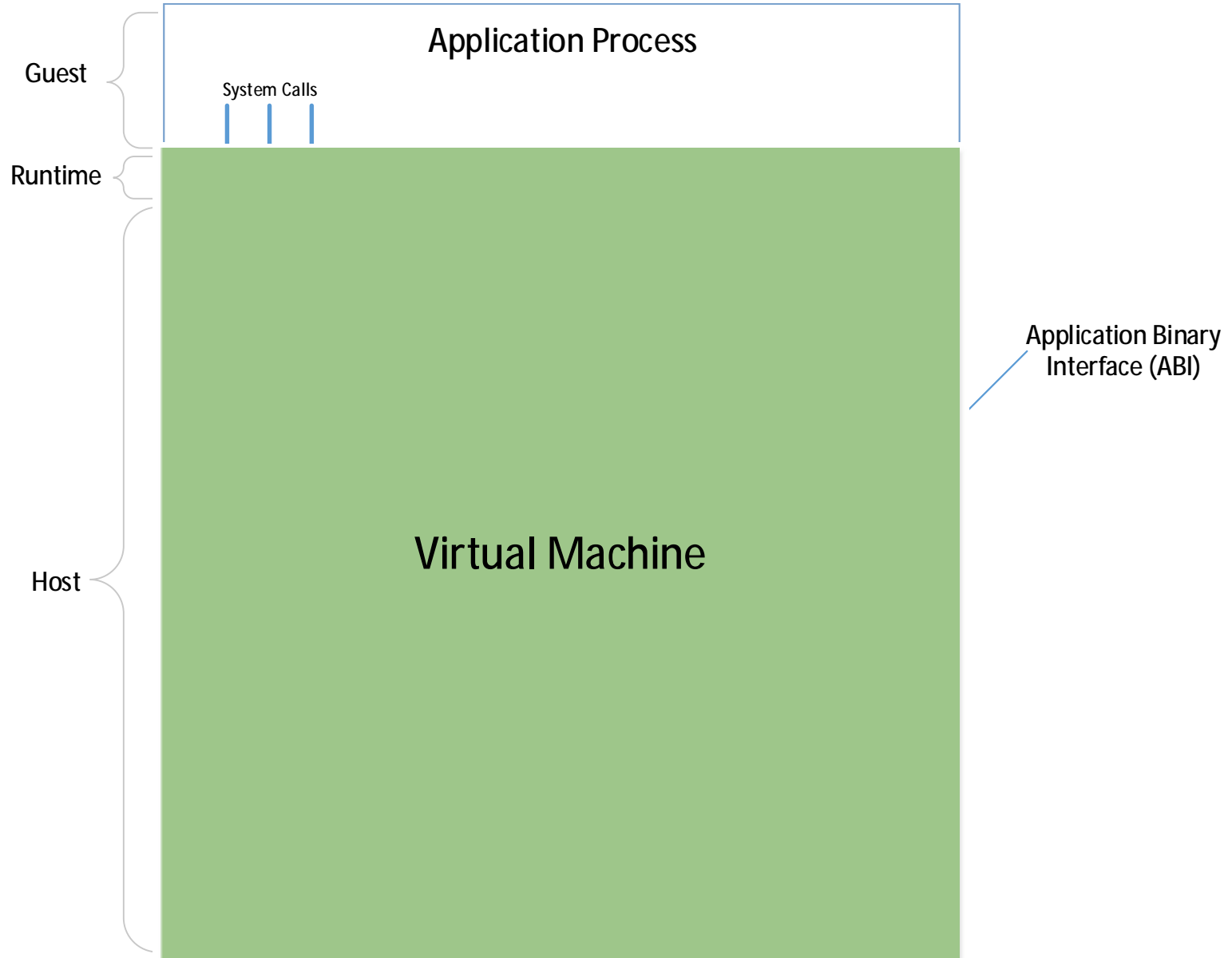
OS's Point of View



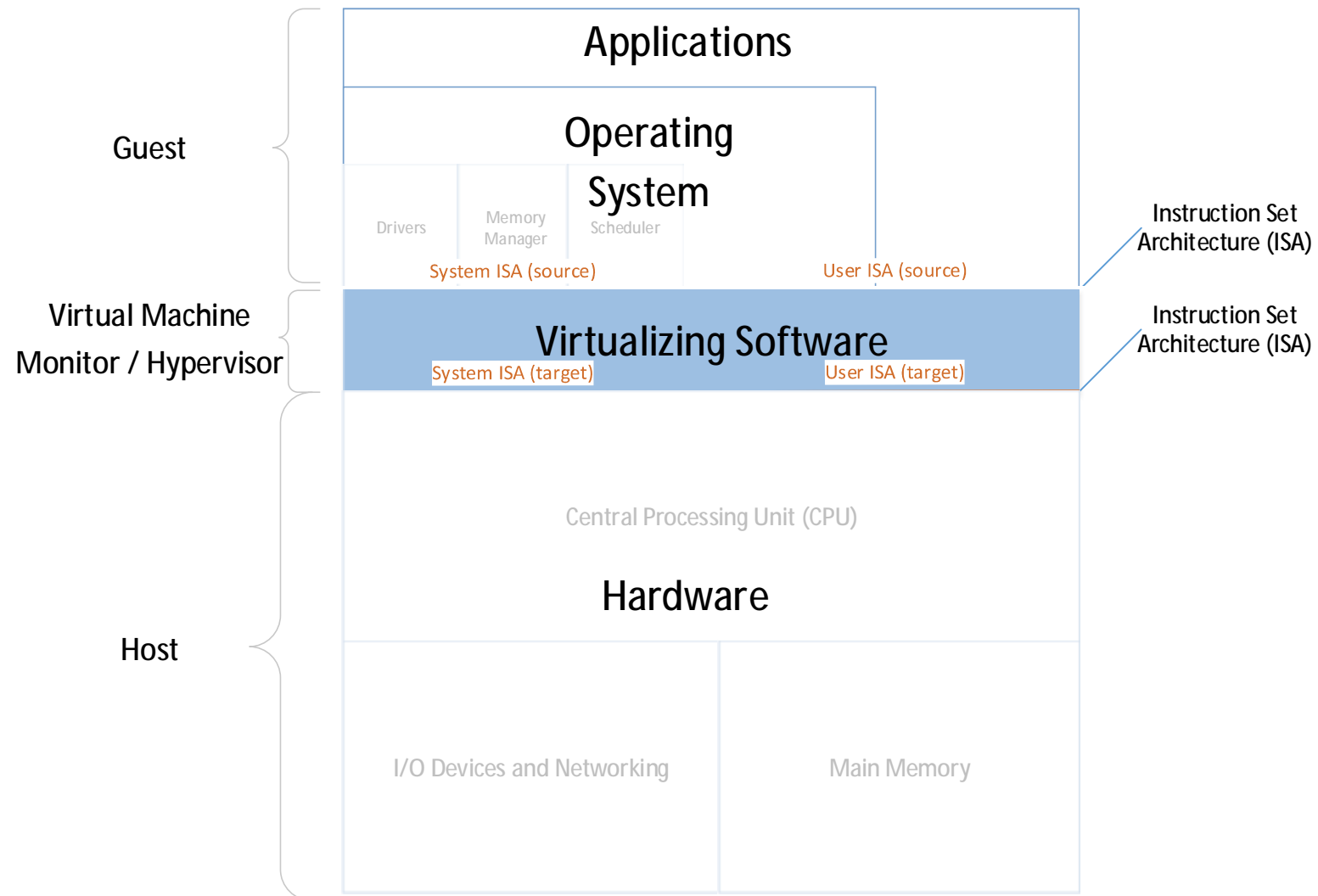
Process Level Virtualization



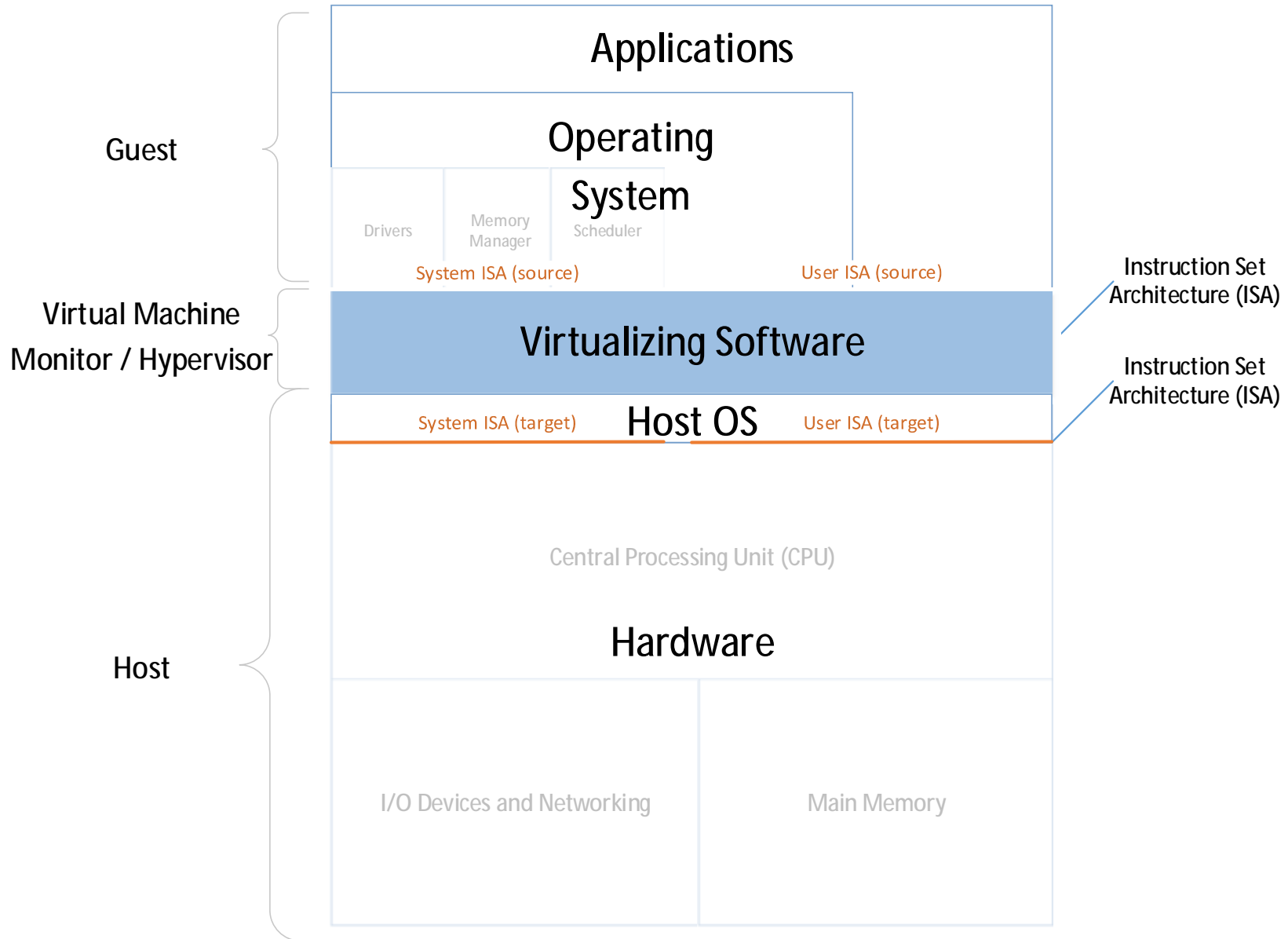
Process Level Virtualization



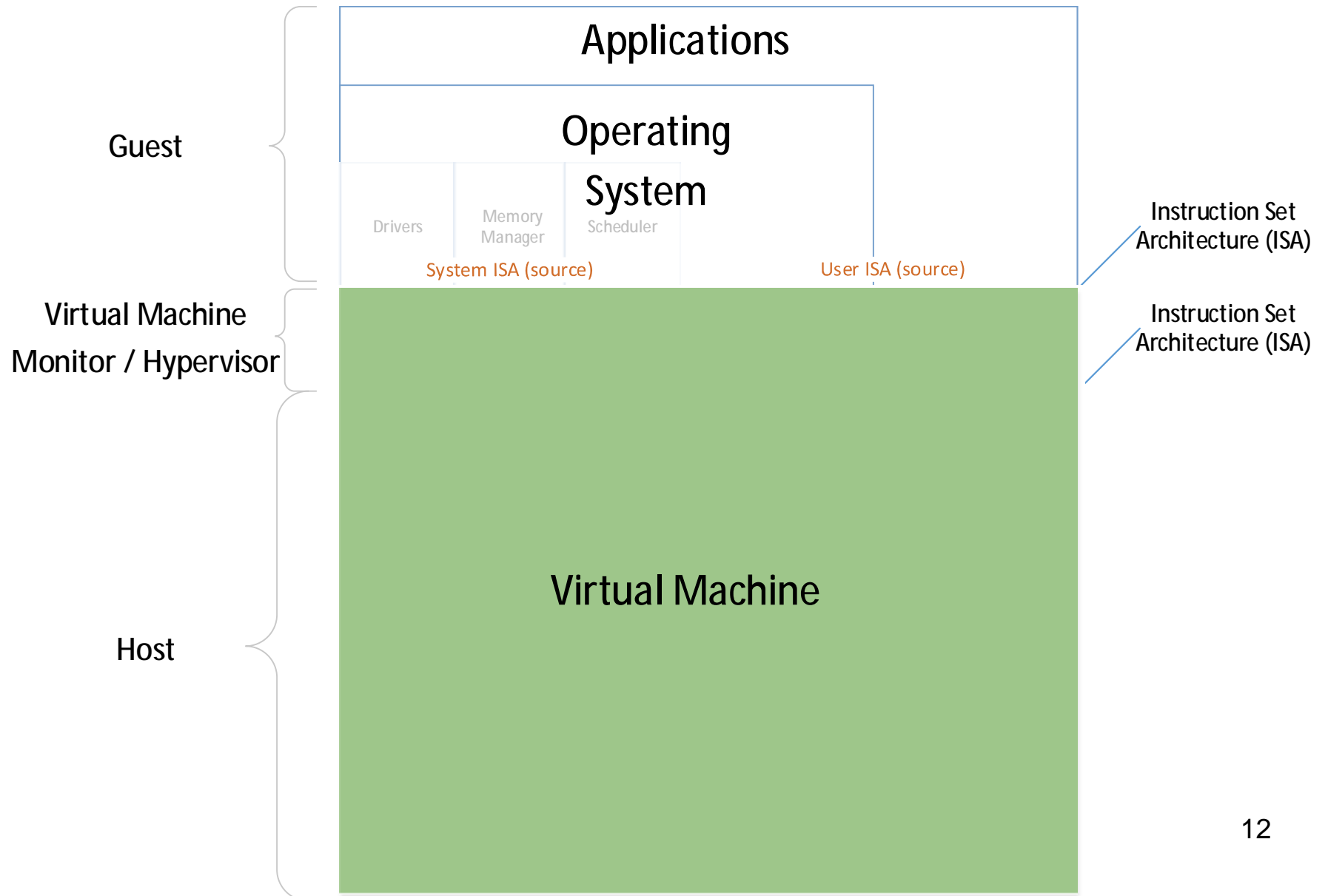
OS Level Virtualization



OS Level Virtualization



OS Level Virtualization

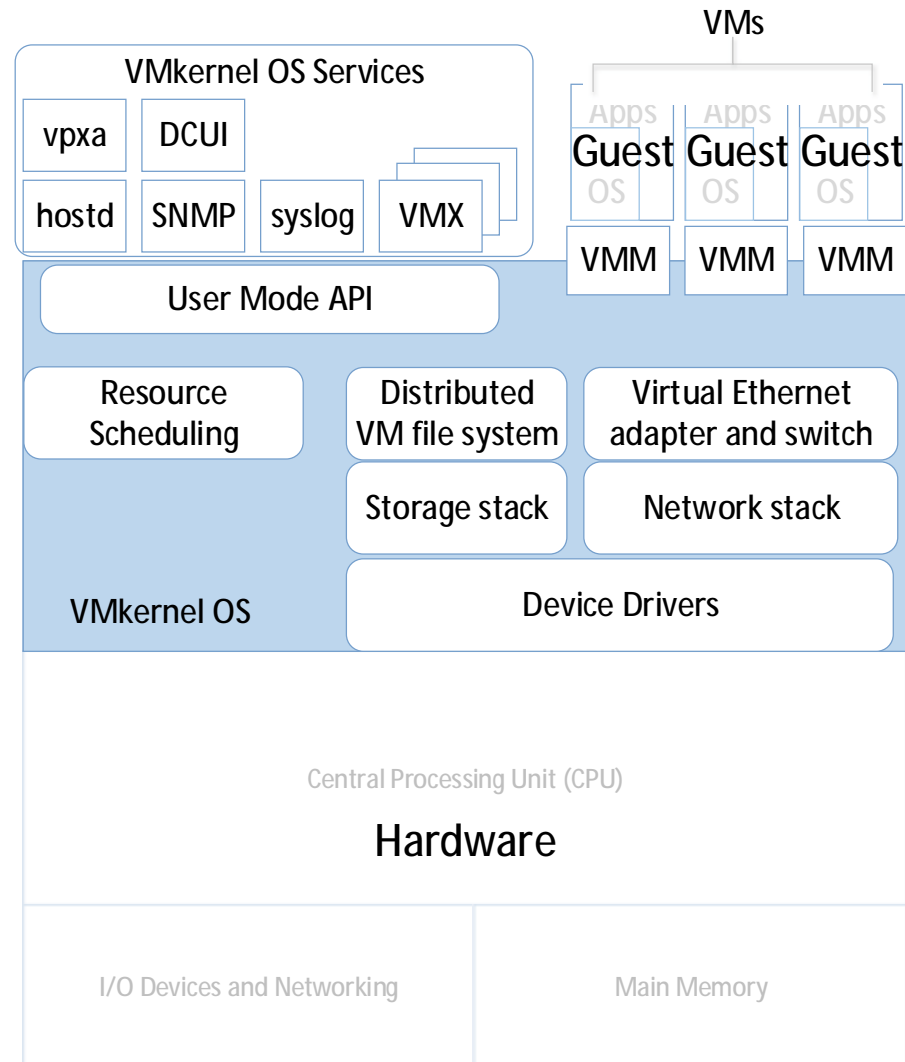


Popular Virtualization Software

- Local Console/Desktop Software
 - VMWare Player or Workstation
 - VMWare Fusion
 - Parallels
- Remote Console/Server Software
 - VMWare ESXi
 - Xen

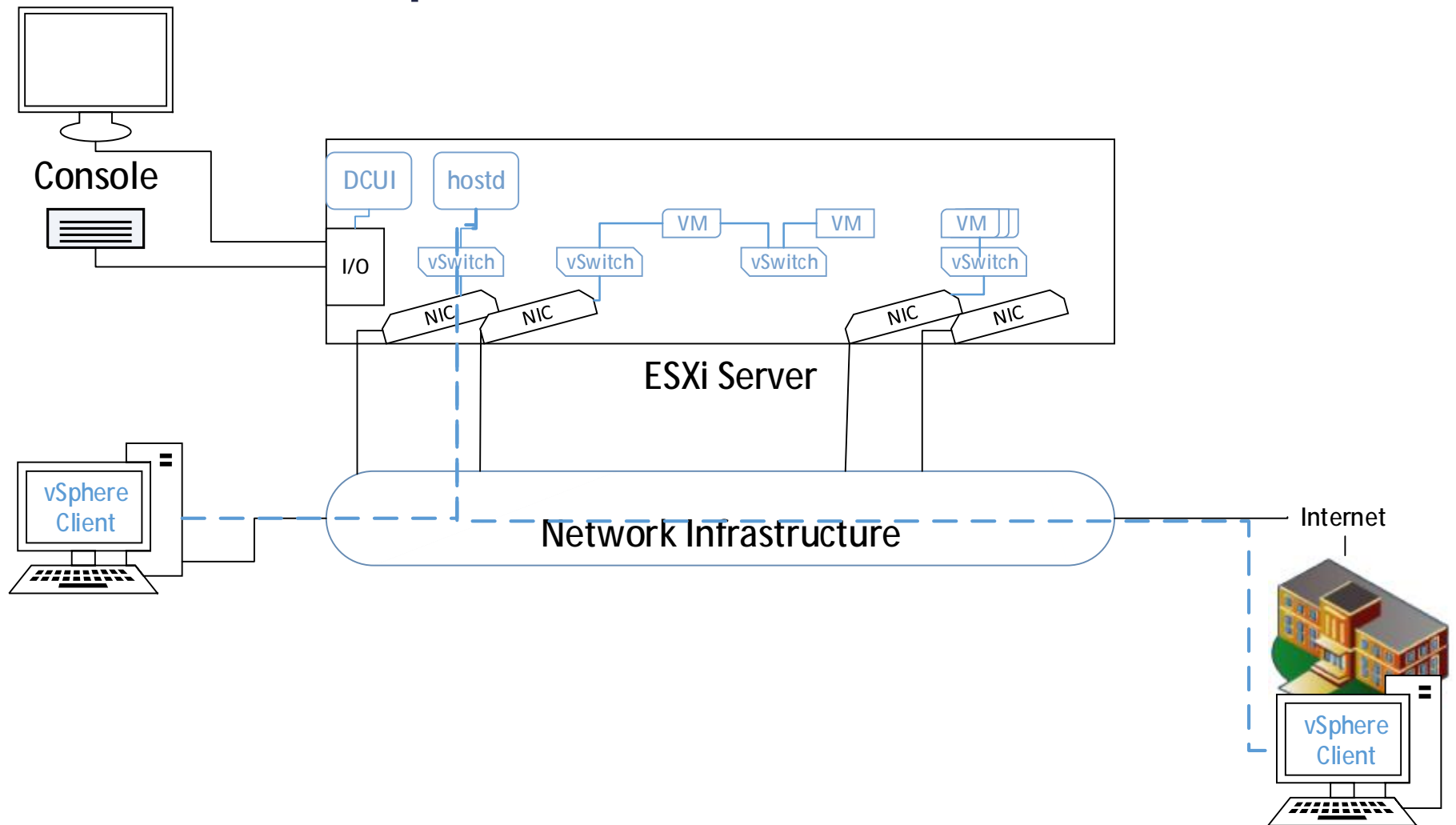
END OF VIDEO SEGMENT 1

ESXi System Architecture



Drawing based in large part from one found in a whitepaper "The Architecture of VMWare ESXi" by Charu Chaubal

Operational Architecture



ESXi Functionality

- If available:
 - Server can access large high speed disk storage
 - Supports 64 CPU cores on one system
 - Supports up to 1 TB or 1,000 GB of RAM
- Single VM can use 8 CPU cores simultaneously
- Virtual networking between VMs
- Supports over 300 guest OS releases