



**Department of Computer Science**  
UNIVERSITY OF COLORADO BOULDER



# Design and Analysis of Operating Systems CSCI 3753

Dr. David Knox  
University of Colorado Boulder

These slides adapted from materials provided by the textbook authors.

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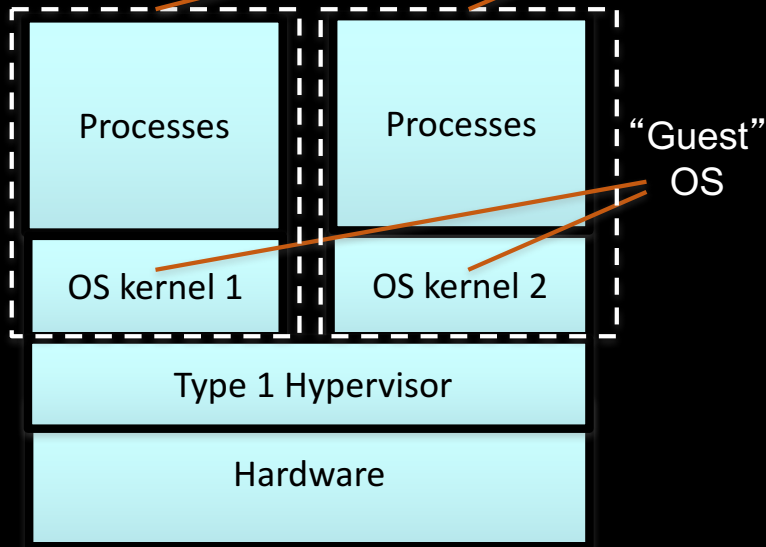


# Virtual Machines

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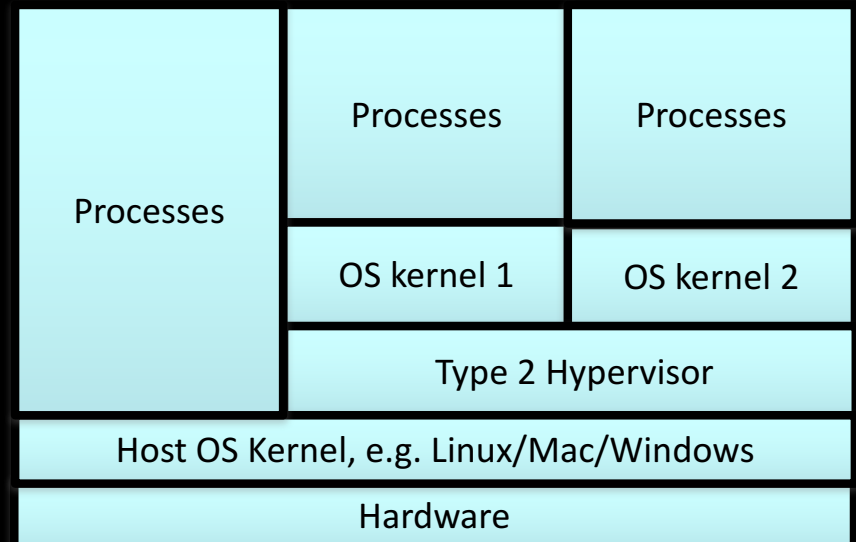


Traditional OS



A Type 1 *Hypervisor* provides a virtualization layer for guest OSs and resides just above the hardware.

A hypervisor is also called a *virtual machine monitor (VMM)*.



A Type 2 Hypervisor essentially runs like an application process on top of the host OS

# VM

- A process already is given the illusion that it has its
  - own memory, via virtual memory
  - own CPU, via time slicing
- Virtual machine extends this idea to give a process the illusion that it also has its own hardware
  - extend the concept from a process to an entire OS
  - OS is given the illusion that it has its own memory, CPU, and I/O devices

## VM Benefits

- Can run multiple OS's simultaneously on the same host
- Fault isolation if an OS fails – doesn't crash another VM. This is also useful for debugging a new OS.
- Easier to deploy applications
  - Can deploy an app within a customized virtual machine instance
  - No need to worry about compatibility with the target OS
  - Useful for cloud server deployments



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