

A decorative graphic on the left side of the slide consisting of two overlapping parallelograms. The front one is blue and the back one is a light green. They are positioned diagonally, with the blue one partially covering the green one.

The Virtual Machine Manager

Janet Madrid, William R Roberts, Logan Ladd, Nicholas Hager

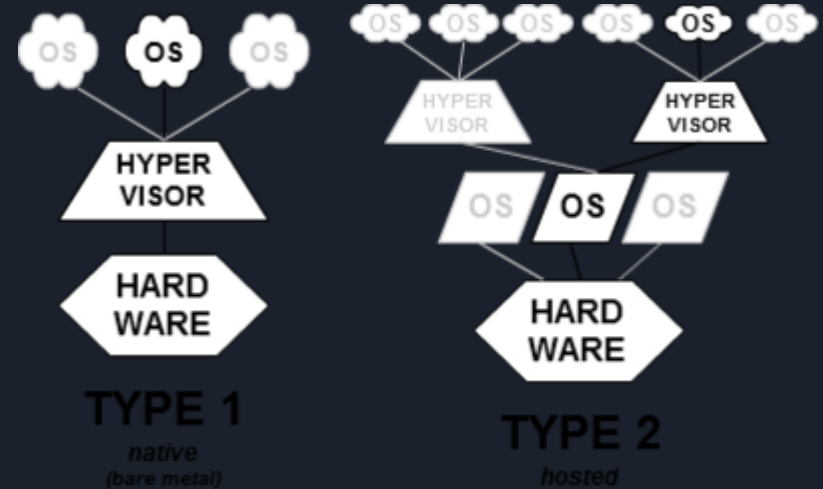
Introduction

What is a hypervisor?

A hypervisor is a piece of software that enables the use of multiple virtualized Operating Systems running on top of the same hardware or Operating System depending on the type.

Also Known As

- Virtual Machine Monitor
- Control Program
- Cambridge Monitor System



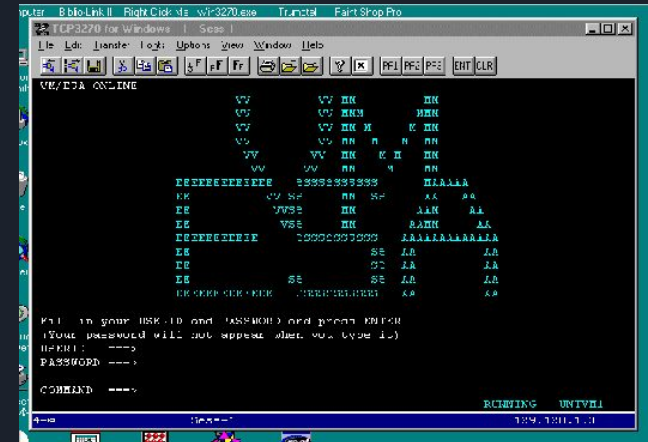
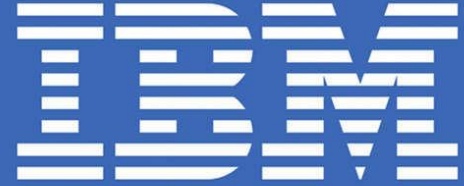
Still Relatively New Technology

1960s- First Virtualization Software - Hypervisor known as the “Control Program”

1970s- Going public with the first release of the VM/370

1980s- Enhancements, Leveraging hardware depending on workload

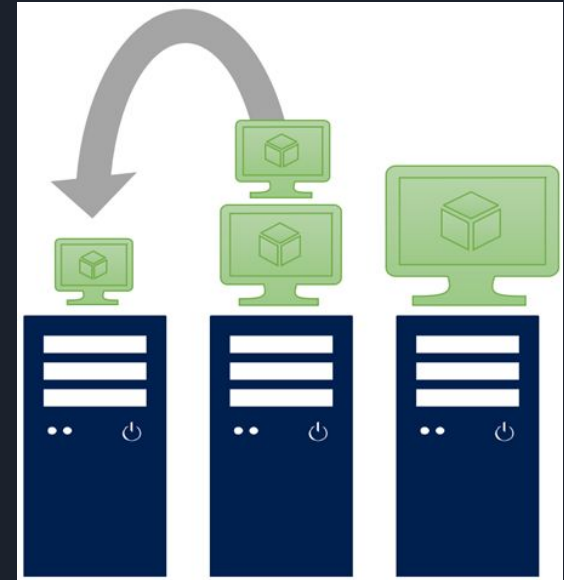
1990/2000s- More enhancements, 64 bit support, firmly set in stone for business/education/consumer application



Importance

Ok... What does it do?

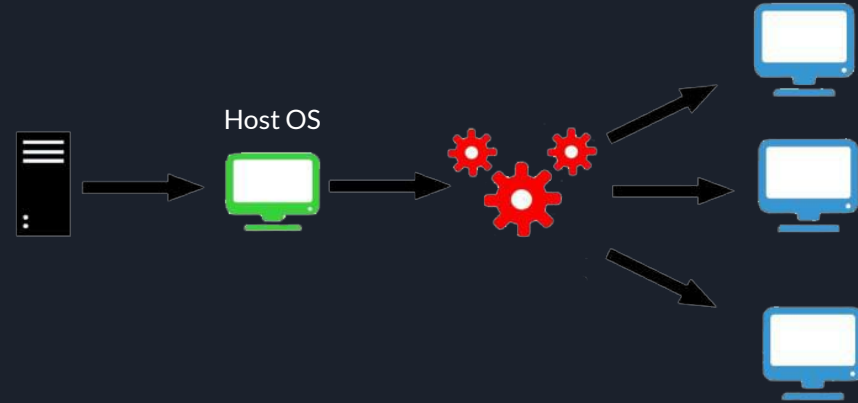
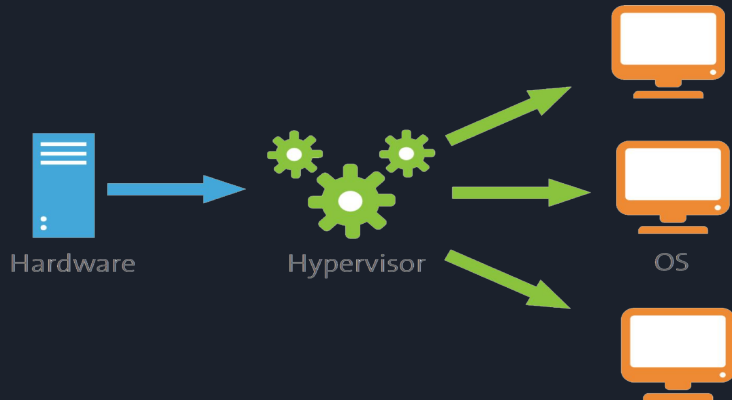
- Server Implementation/Machine Independence
- Administrators can move VM's for workload balancing
- Test Programs
- Consolidate Servers in larger cloud environments for more workload balancing



The Types of Hypervisor

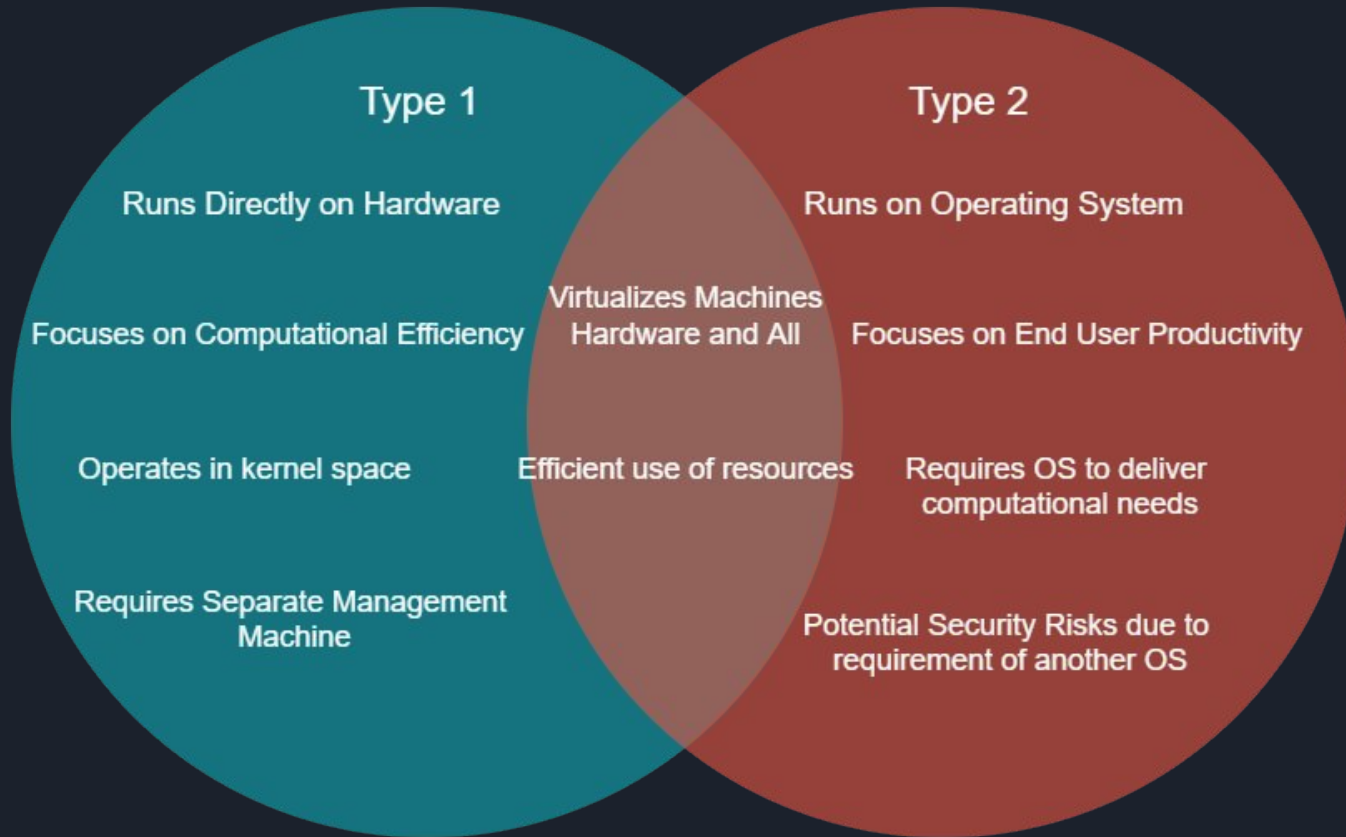
Type 1

- Called “Bare metal” Hypervisors
- Focus on Computational Efficiency
- Primary Hypervisor within Production



- Called “Hosted” Hypervisors
- Focus on End-User Productivity
- Used to ensure a reproducible development environment

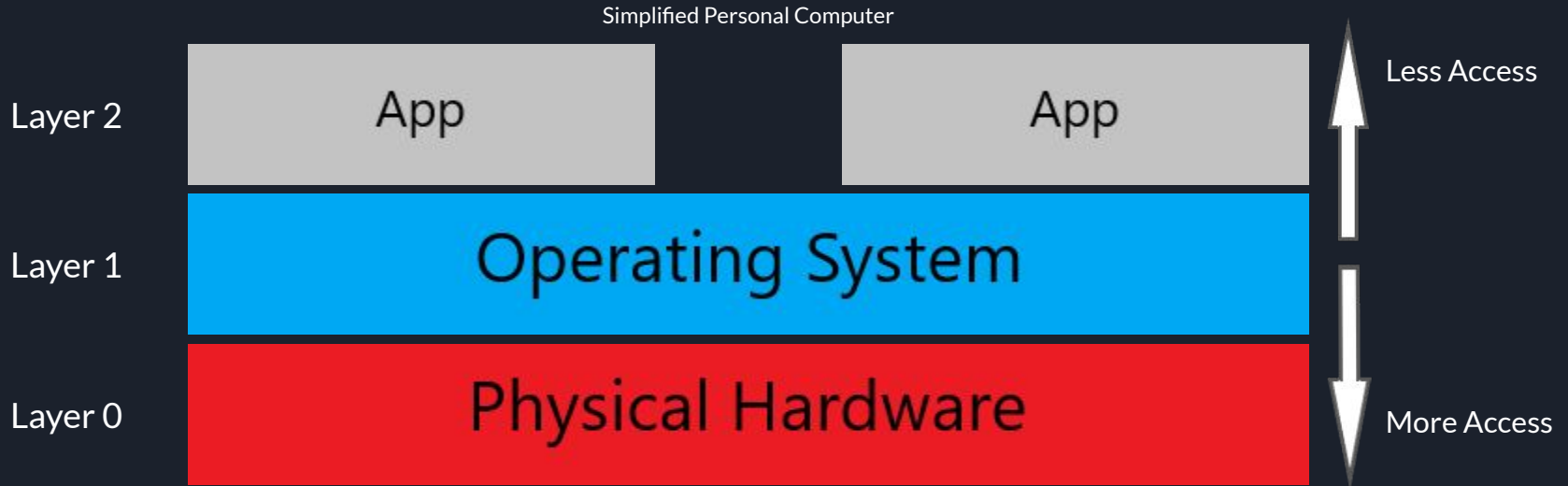
Type 2



Hypervisors

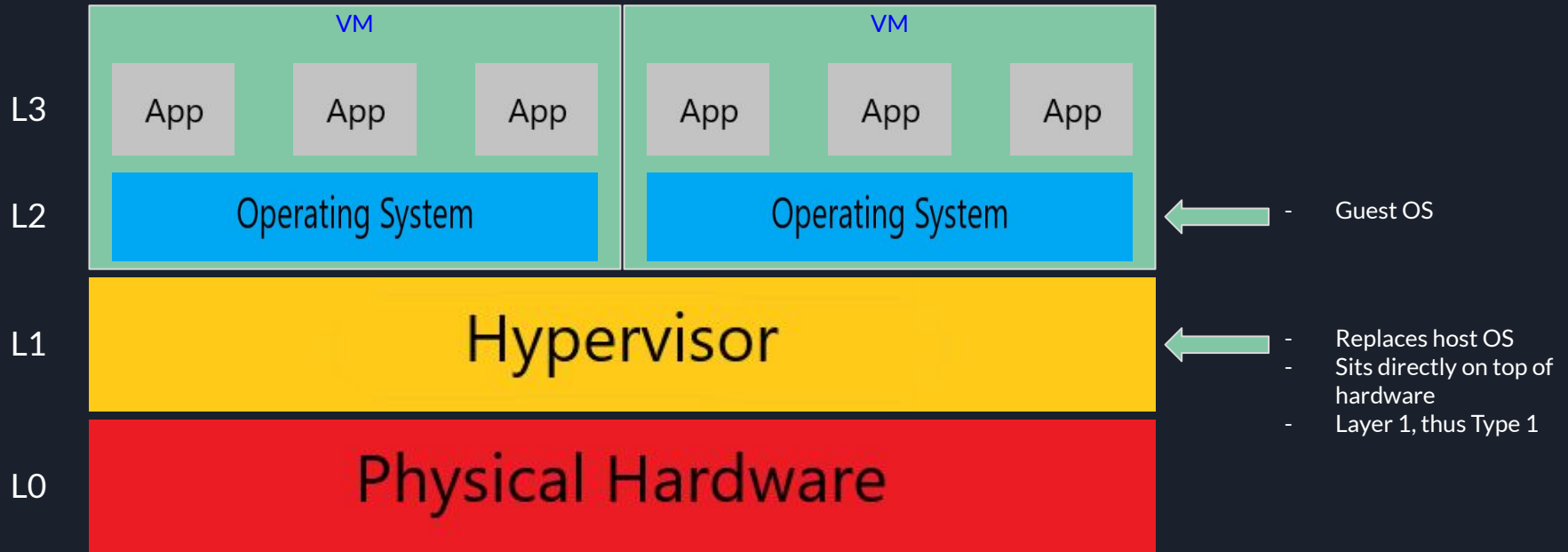
Hypervisor to Host Interactions

- Computer Systems can be visualized in 'Layers'.
- Each layer holds a different component/subsystem.



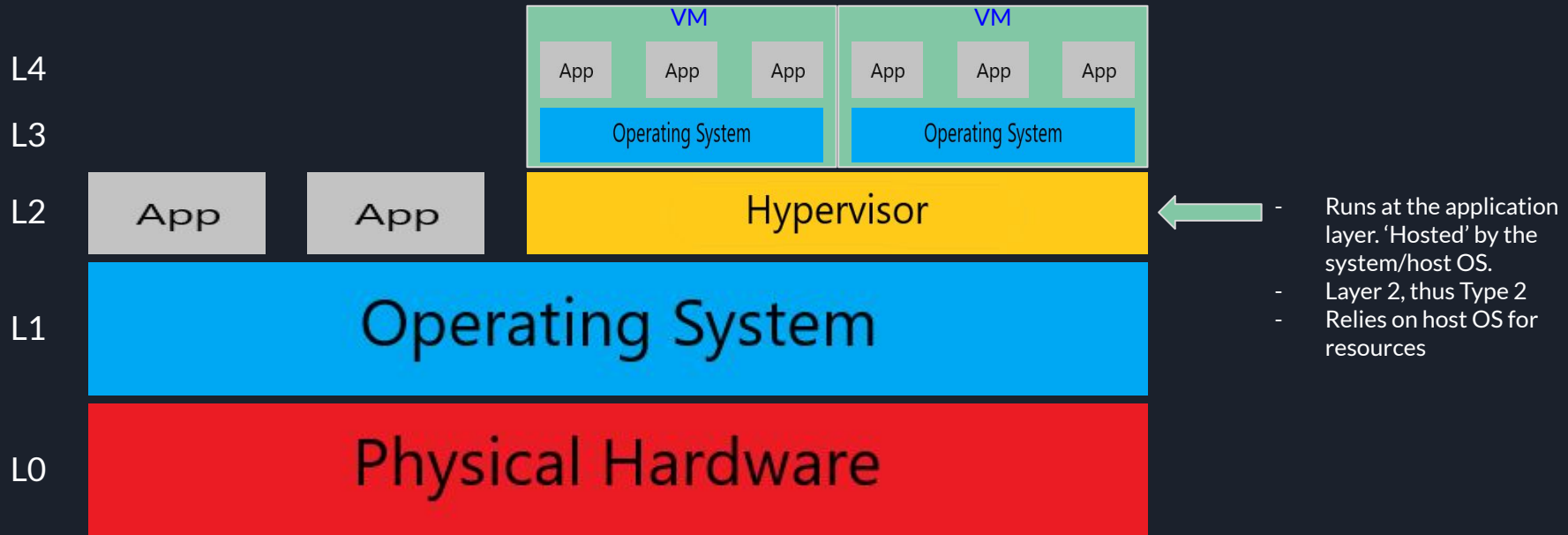
Hypervisor to Host Interactions

Type 1 Hypervisor - 'Bare Metal'



Hypervisor to Host Interactions

Type 2 Hypervisor - 'Hosted'





Hypervisor to Host Interactions

Key Differences in Interactions Between Type 1 & 2 Hypervisors

- Type 1 Hypervisors replace the OS.
 - Directly control of resource allocation.
 - Operates in 'Kernel Mode', unrestricted access
- Type 2 Hypervisors operate in the 'Application Layer'
 - Must request resources. Syscalls to OS/Kernel.
 - Operates in 'User Mode', restricted access

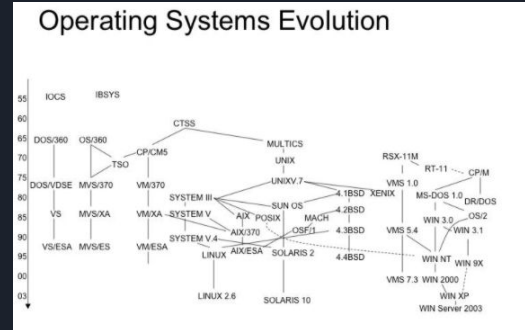
Privilege and control are the big separator between Type 1 and 2 Hypervisors.

Modern Advances in Hypervisor Technology

- Containers
- Evolution of operating systems
- Function as a service (Faas)



Images from : <https://blog.runcloud.io/understand-serverless-computing/#how-does-serverless-work-a-brief-overview-of-faas>



Images from : <https://osm.hpi.de/teaching/origins06/>

Future Work

- Conduct an analysis to assess the performance and reliability differences between containers and virtual machines.

