19CSE447 - Cloud Computing

Ramaguru Radhakrishnan
Assistant Professor

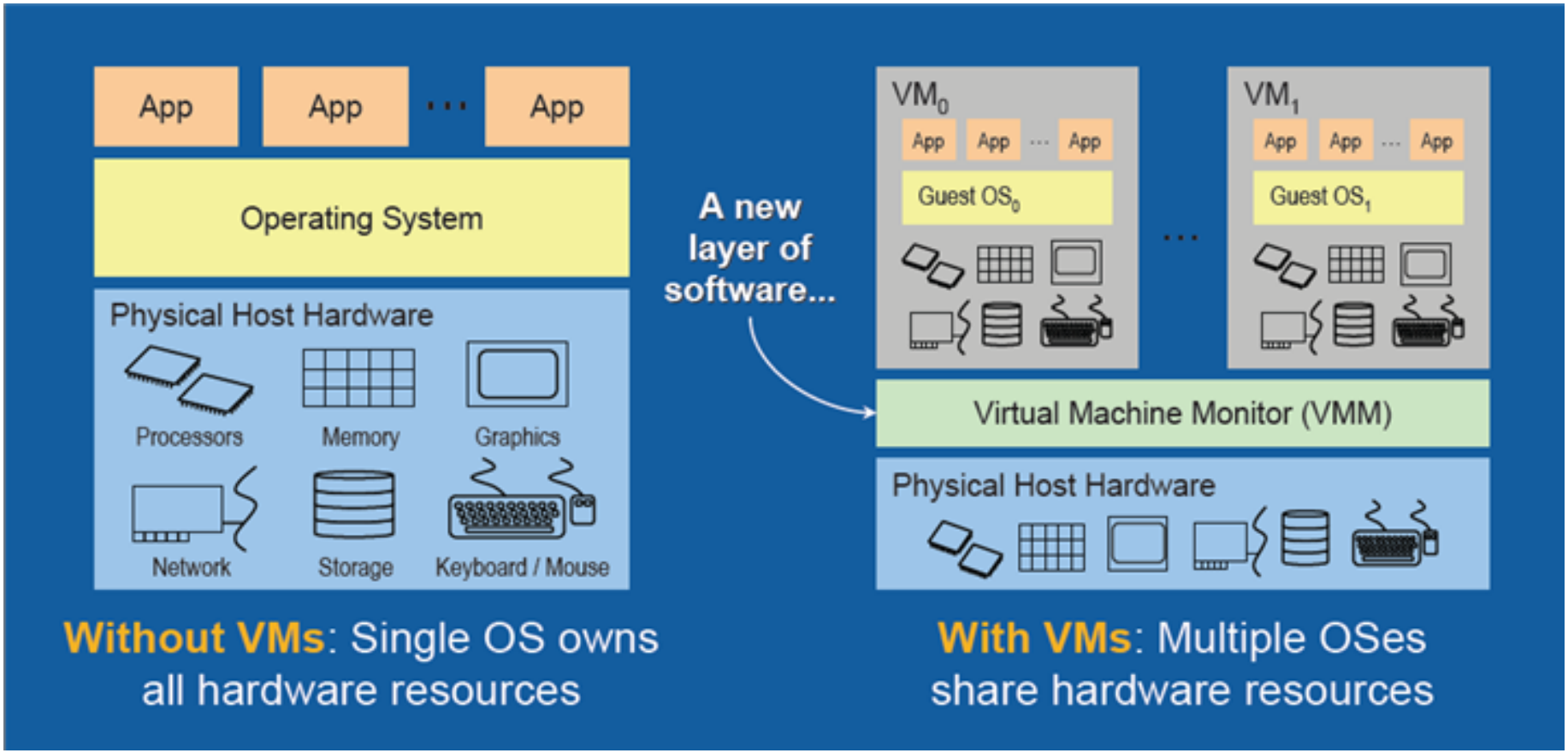
CO2 - Familiarize with architecture of different cloud services and deployments models
CO3 - Introduce to virtualization in cloud computing and various virtualization platforms
Unit - 2 / Lecture - 5 / Class - 1

September 26, 2022

Virtualization

- Underlying technology for Cloud
- Separation of Compute Environment and Physical Infrastructure
- Allows multiple OS and apps to run simultaneously on single machine

Virtualization



Virtualization

- facilitates creating useful IT services using resources that are traditionally bound to hardware
- creating a virtual version at the same abstraction level, including computer hardware platforms, storage devices, and computer network resources.

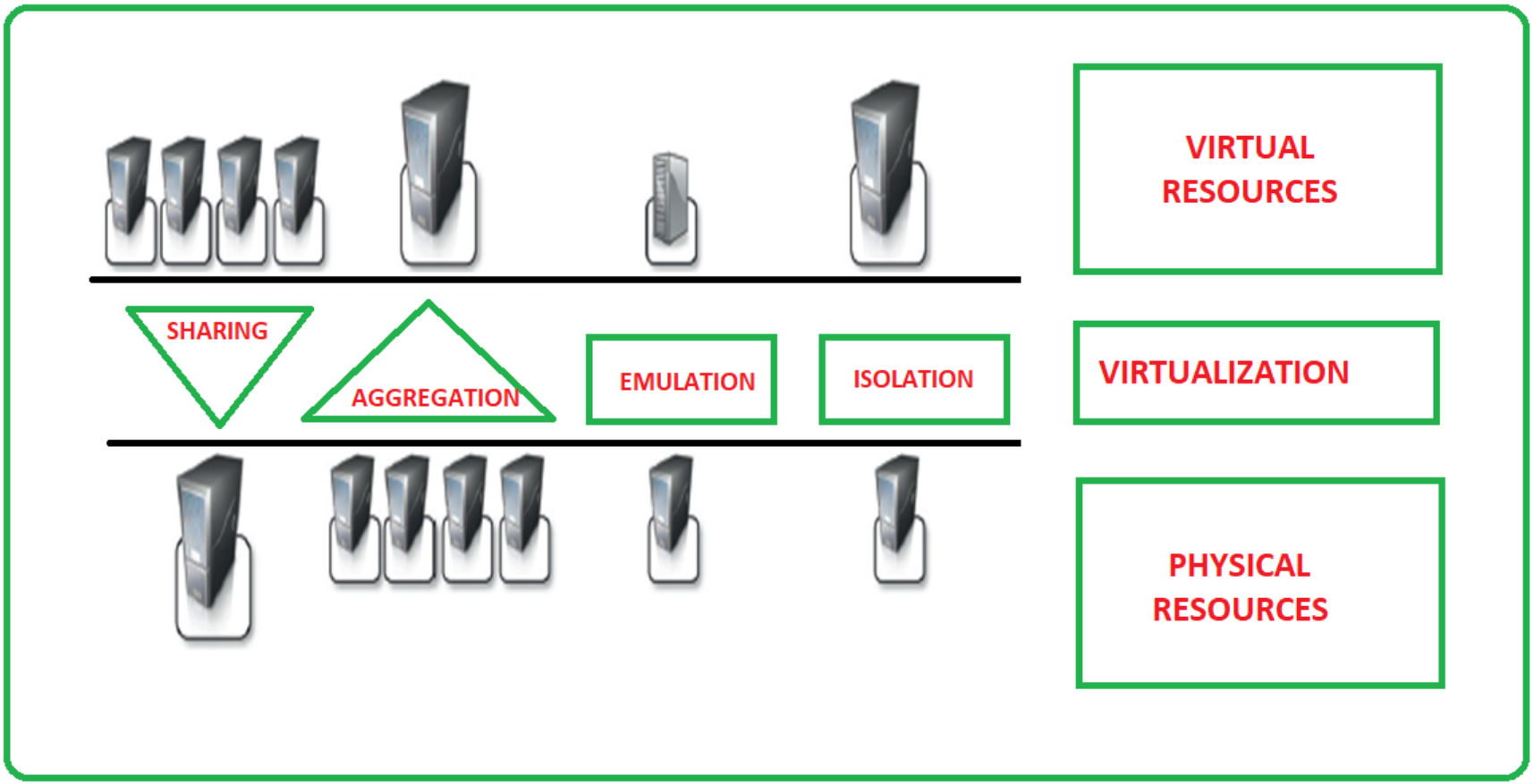
Virtualization Characteristics

- Distribution of resources:
- Accessibility of server resources
- Resource Isolation
- Security and authenticity
- Aggregation

Virtualization Characteristics

- Increased Security
- Managed Execution
- Sharing
- Aggregation
- Emulation
- Isolation
- Portability

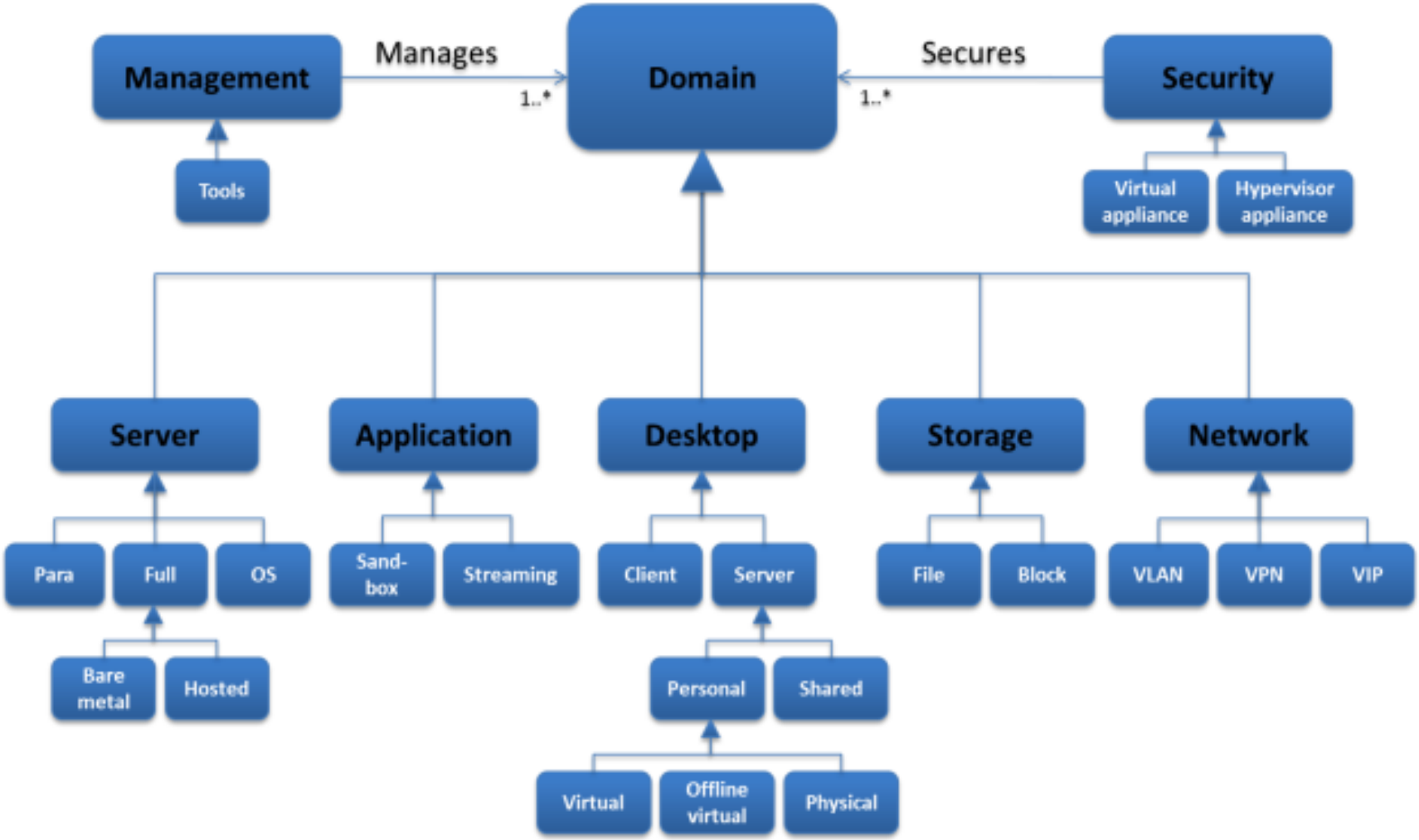
Virtualization Characteristics



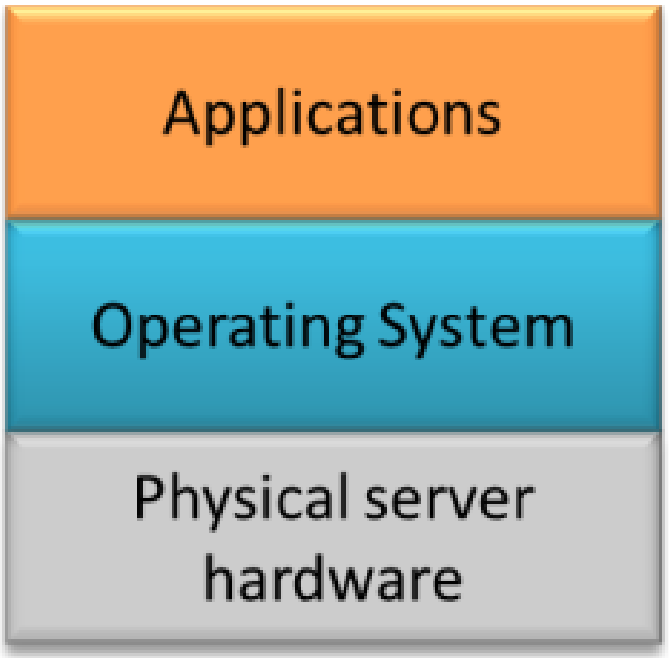
Virtualization Characteristics

- Application Virtualization.
- Network Virtualization.
- Desktop Virtualization.
- Storage Virtualization.
- Server Virtualization.
- Data virtualization.

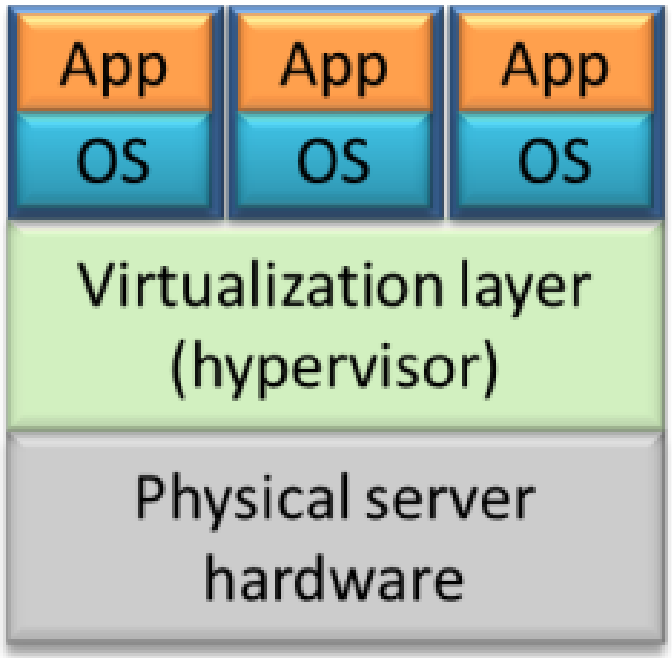
Taxonomy of Virtualization



Server Virtualization



Traditional Architecture



Virtual Architecture

Virtual Machine

- A virtual machine is typically comprised of either a single file or a group of files that can be read and executed by the virtualization layer.
- Each virtual machine is a self-contained operating environment that behaves as if it is a separate computer.

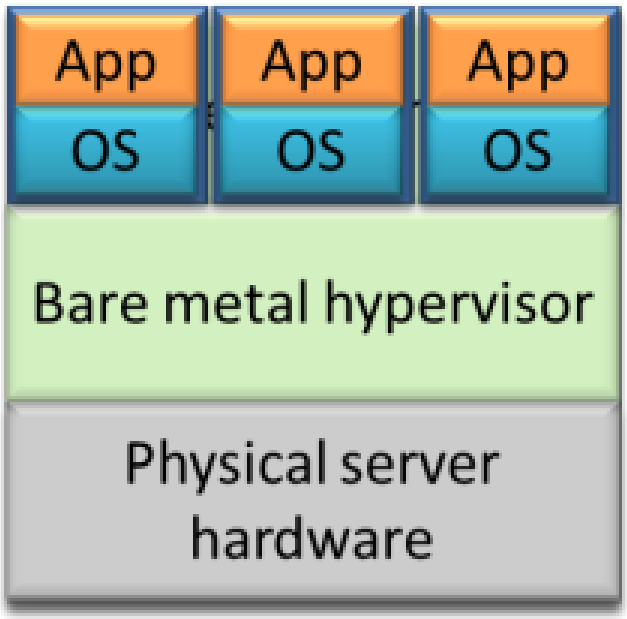
Hypervisor

A hypervisor, also known as the virtual machine monitor (VMM), is the host layer of software that enables multiple virtual machines or operating systems to operate on a single physical server.

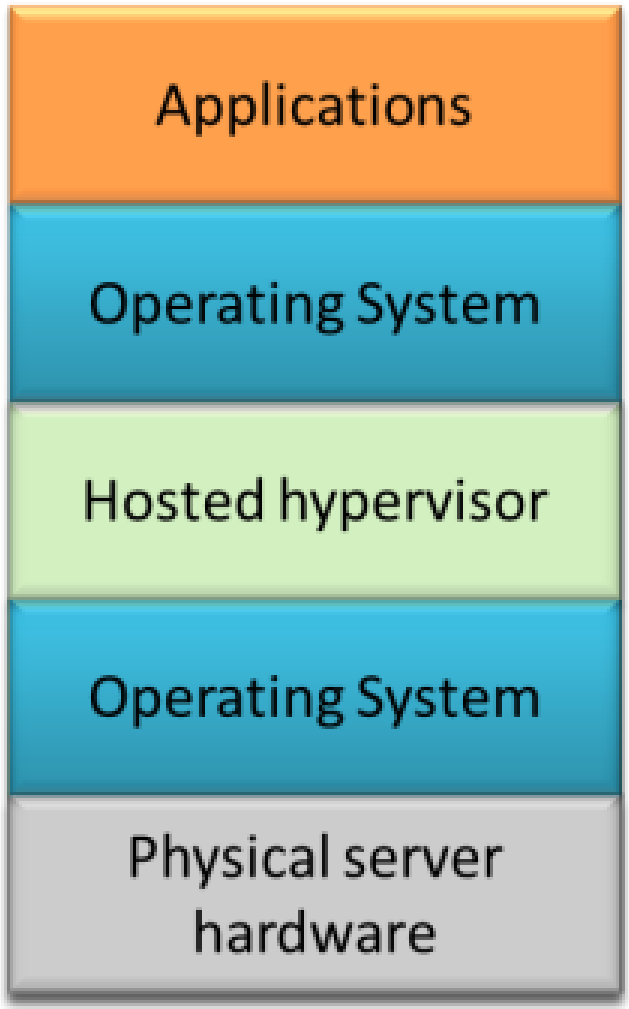
Features:

- High Availability
- Fault Tolerance
- Live Migration
- Distributed Resource Scheduler
- Distributed Power Management

Hypervisor

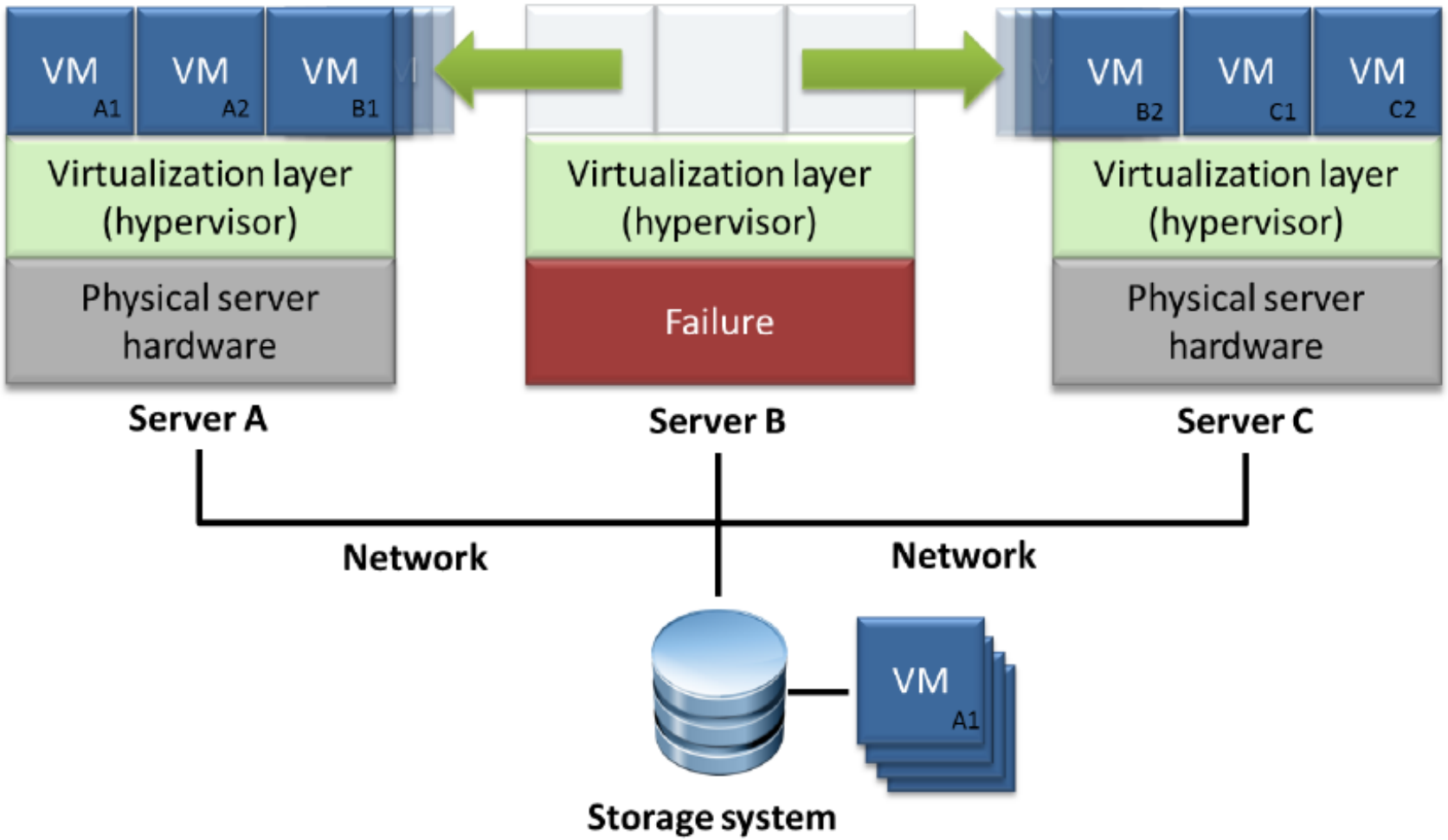


Bare metal hypervisor

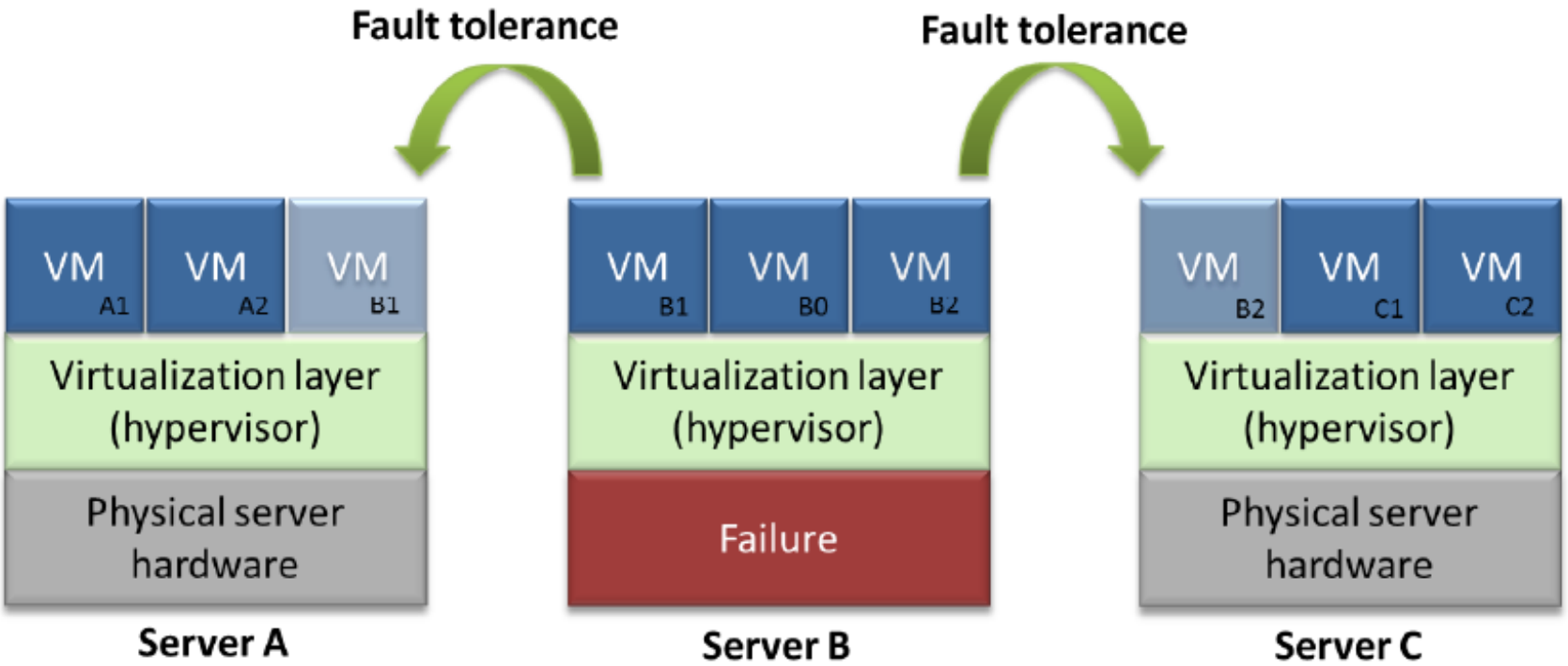


Hosted hypervisor

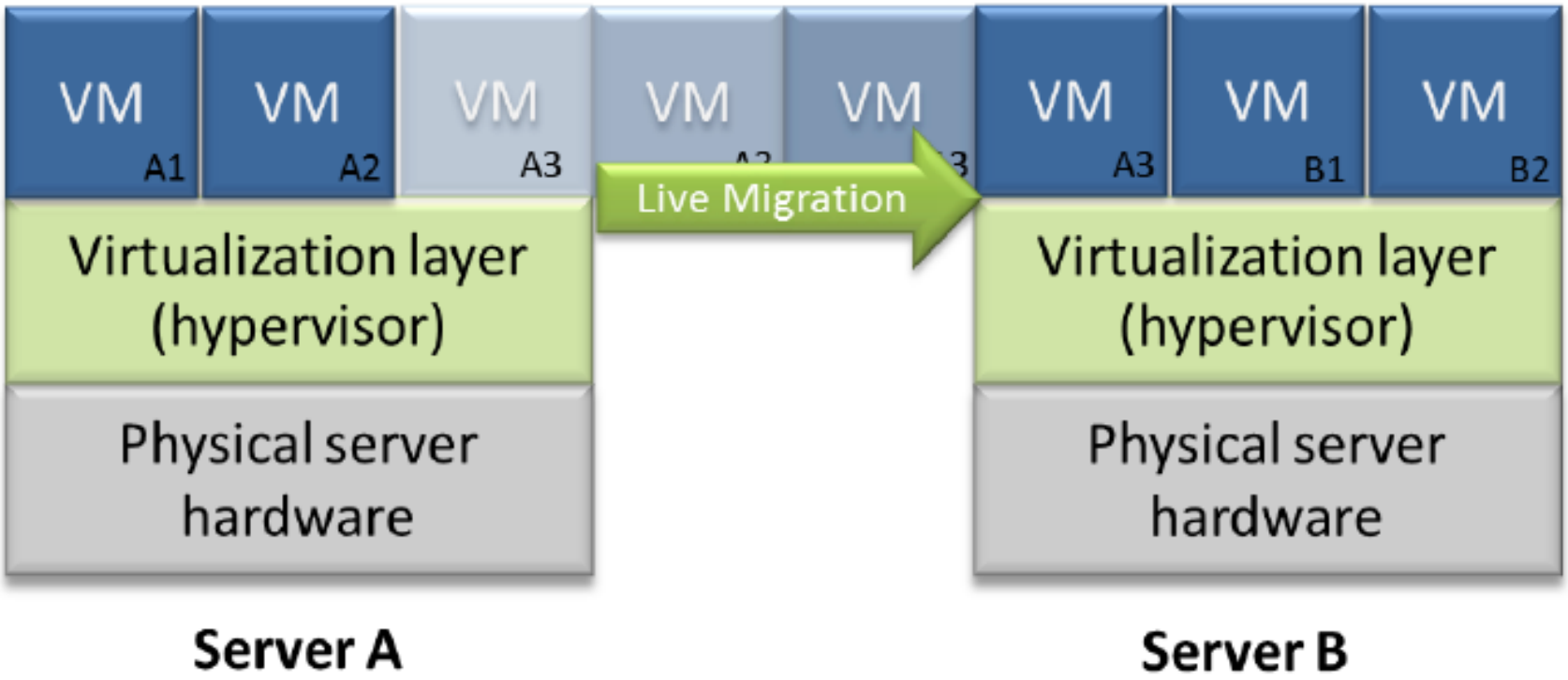
High Availability



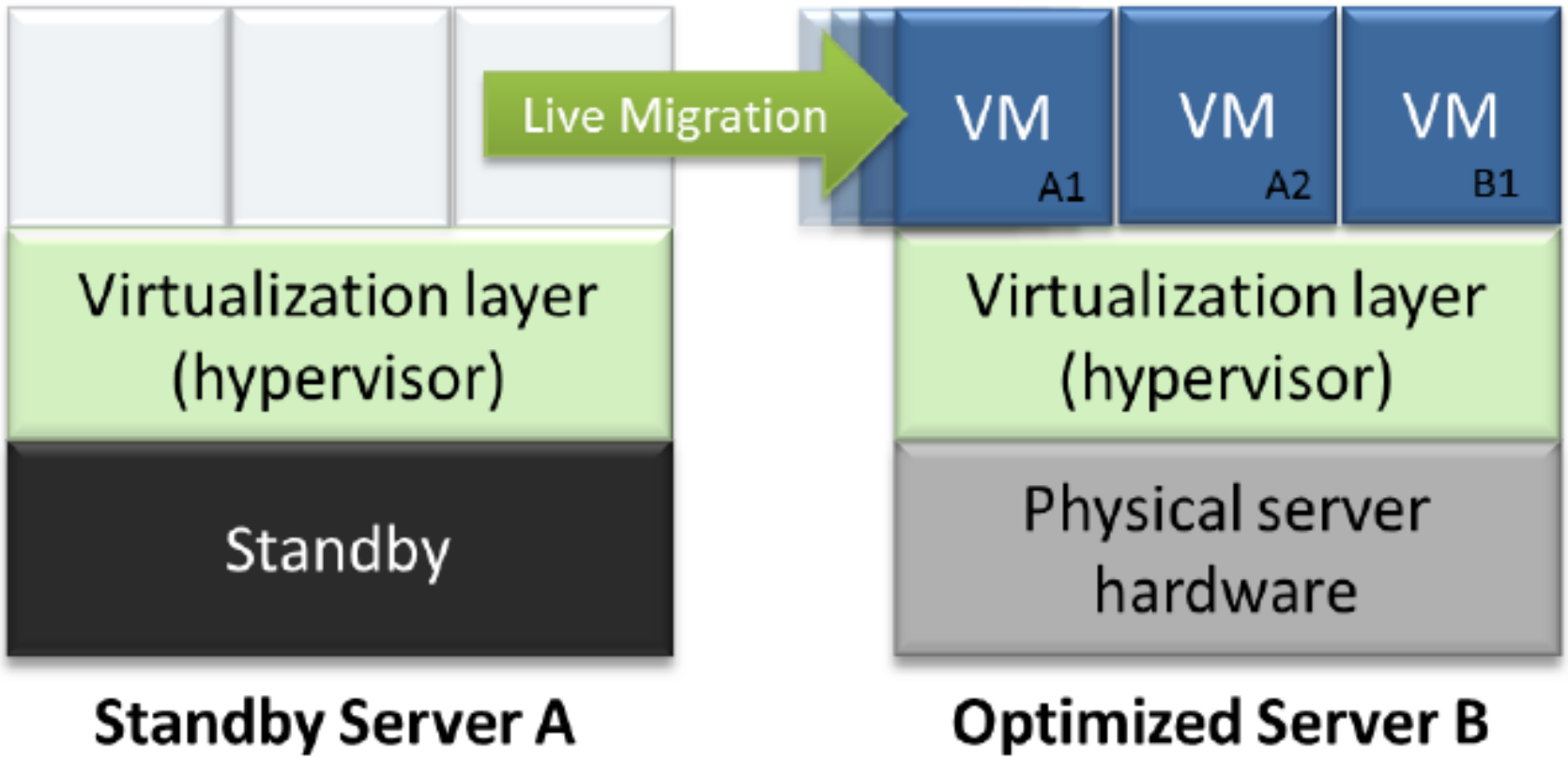
Fault Tolerance



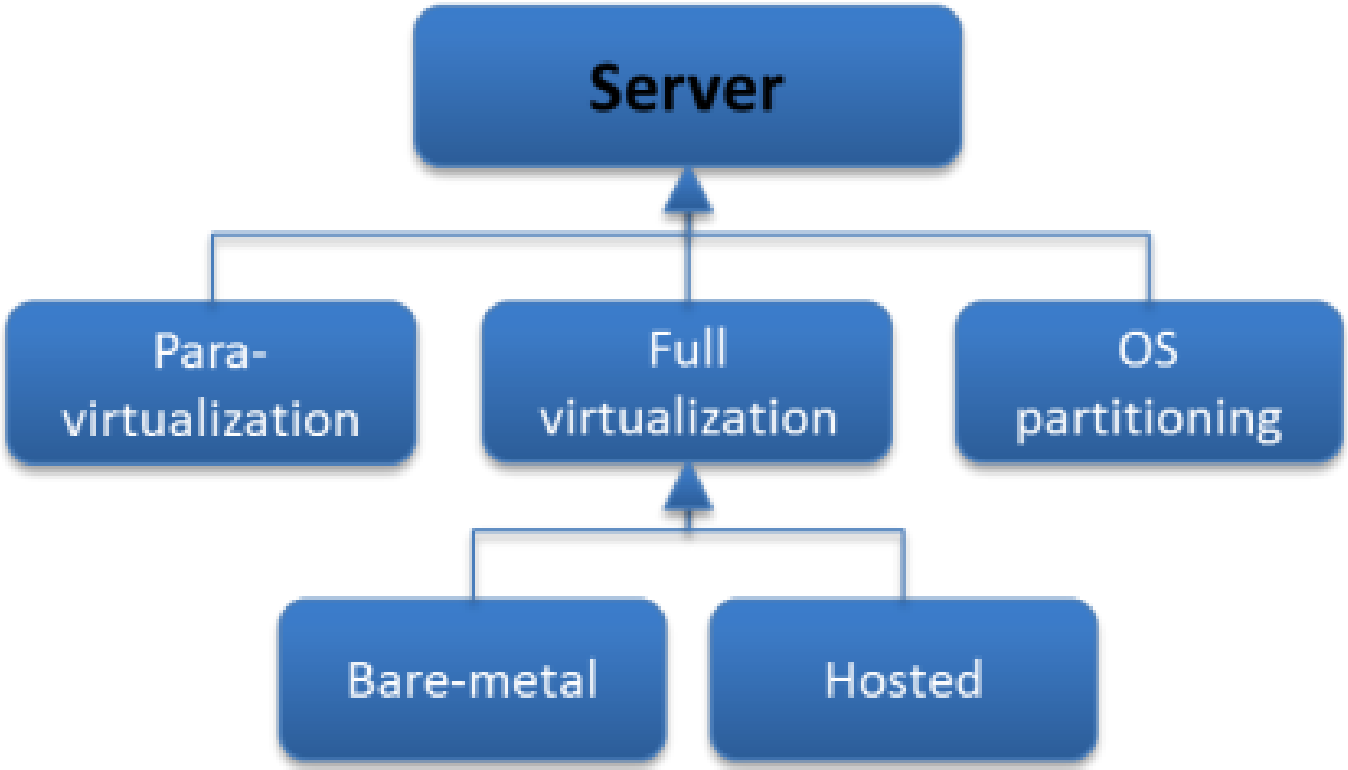
Live Migration



Distributed Power Management



Server Virtualization



Server Virtualization

- **Full Virtualization:** Hypervisor serves as the hardware abstraction layer and can host multiple virtual machines (these are isolated from each other)
- **Para-virtualization:** Specially modified OS are installed on top of hypervisor to host multiple guest OS. OS are aware that they are running in virtual environment.
- **OS Partitioning:** Common OS on a physical server is divided into multiple isolated partitions.

Credits

Thanks to multiple sources, authors and text book presentations.