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Virtualization

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Virtualization

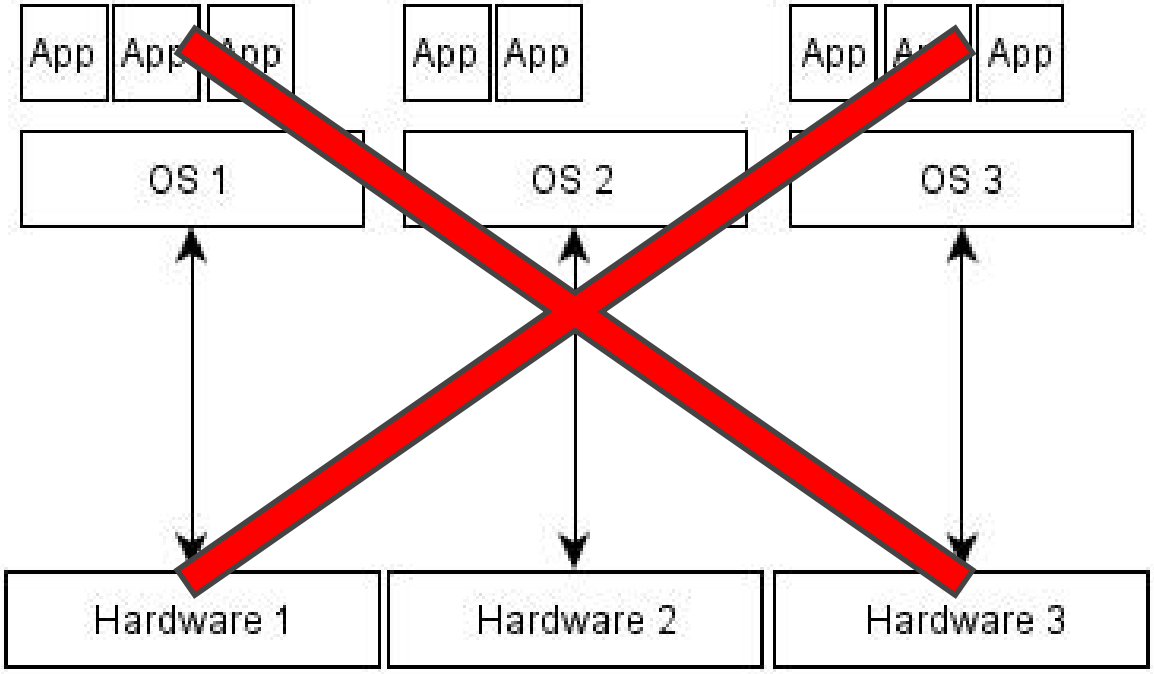
- Technique set for running multiple operating systems on the same hardware

- Resources sharing

  CPU, memory, disk, network, CD/DVD, …

Virtualization

- Reduce the number of hardware machines



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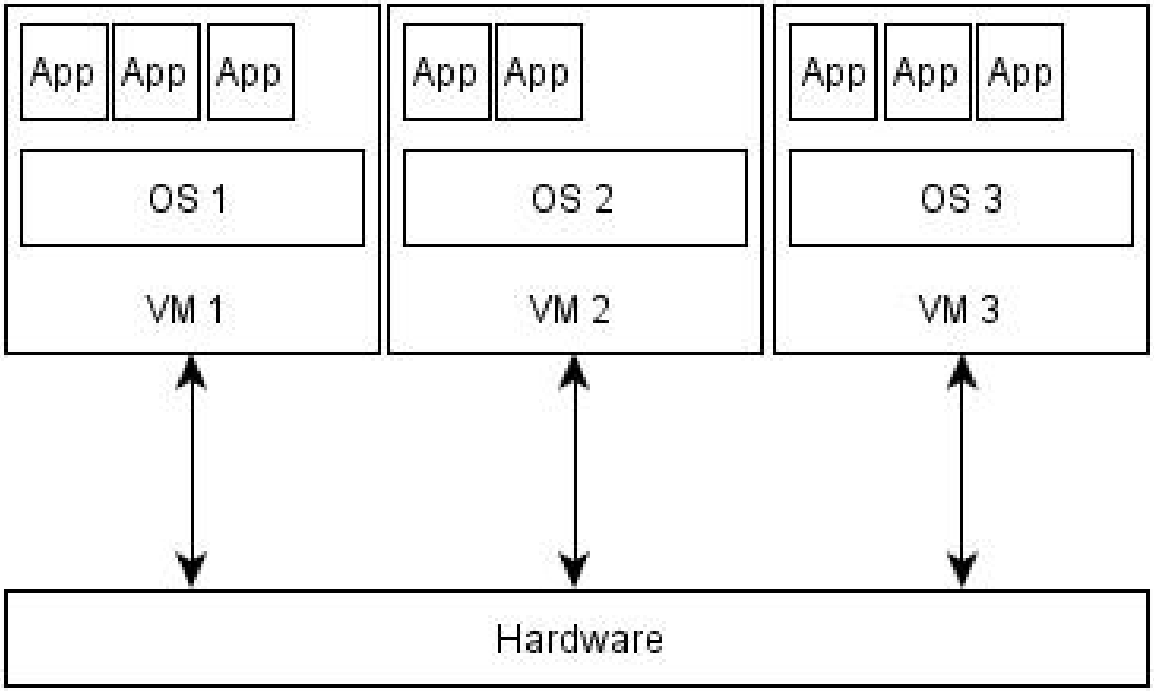
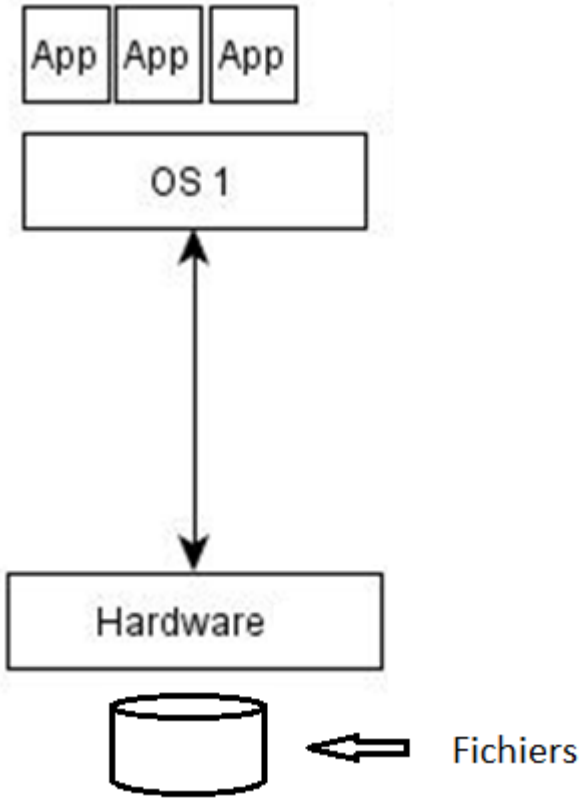
Virtualization

- Reduce the number of hardware machines



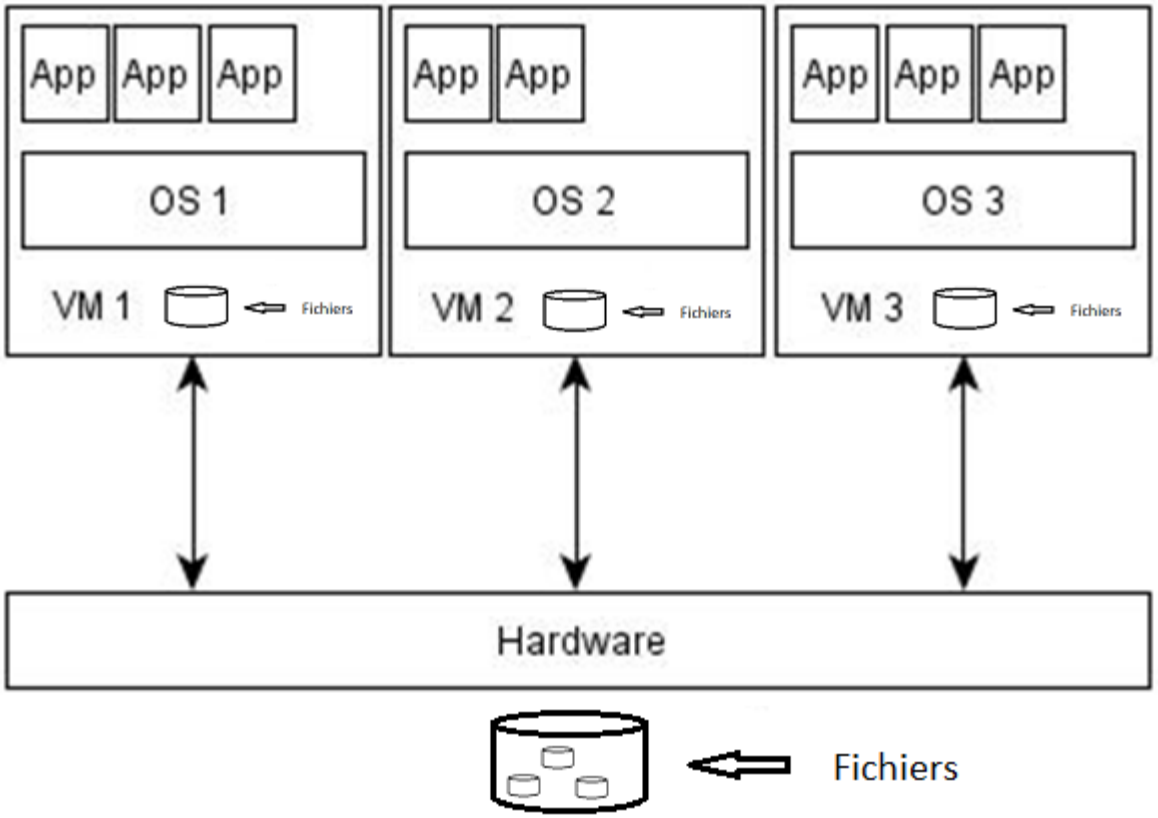
Virtualization

- Without virtualization



Virtualization

- With virtualization



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Virtualization

- **Business**
  - **Optimization of low loaded servers**
  - **Avoid deployment of single-installation applications**

- **Virtualization = exploit server capabilities**

Virtualization

- **Rationalization**
  - **Reduction of space requirement, energy consumption, air conditioning**

- **Virtualization = save space and energy**

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Virtualization

- **Security**
  - **Creation of confined spaces**
  - **Isolation of operating systems and applications**

- **Virtualization = secure services and applications**

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Virtualization

- **Dynamicity**
  - **Modulation of resources (memory, CPU power, cores, disk space, network bandwitdh, …)**
- **Virtualization = optimize management and scaling**

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Virtualization

- Test
  - Operating system and application testing
  - Recovery of previous state (snapshot)

- Virtualization = simplify the evaluation and test

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Virtualization

- **Deployment**
  - **Exportation of items (system, system + application)**
  - **Application migration**

- **Virtualization = manage deployment**

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Virtualization

- What do you virtualize ?
  - Web, mail servers
  - Switches, routers, firewalls, …
  - VPN gateway
  - Supervision applications

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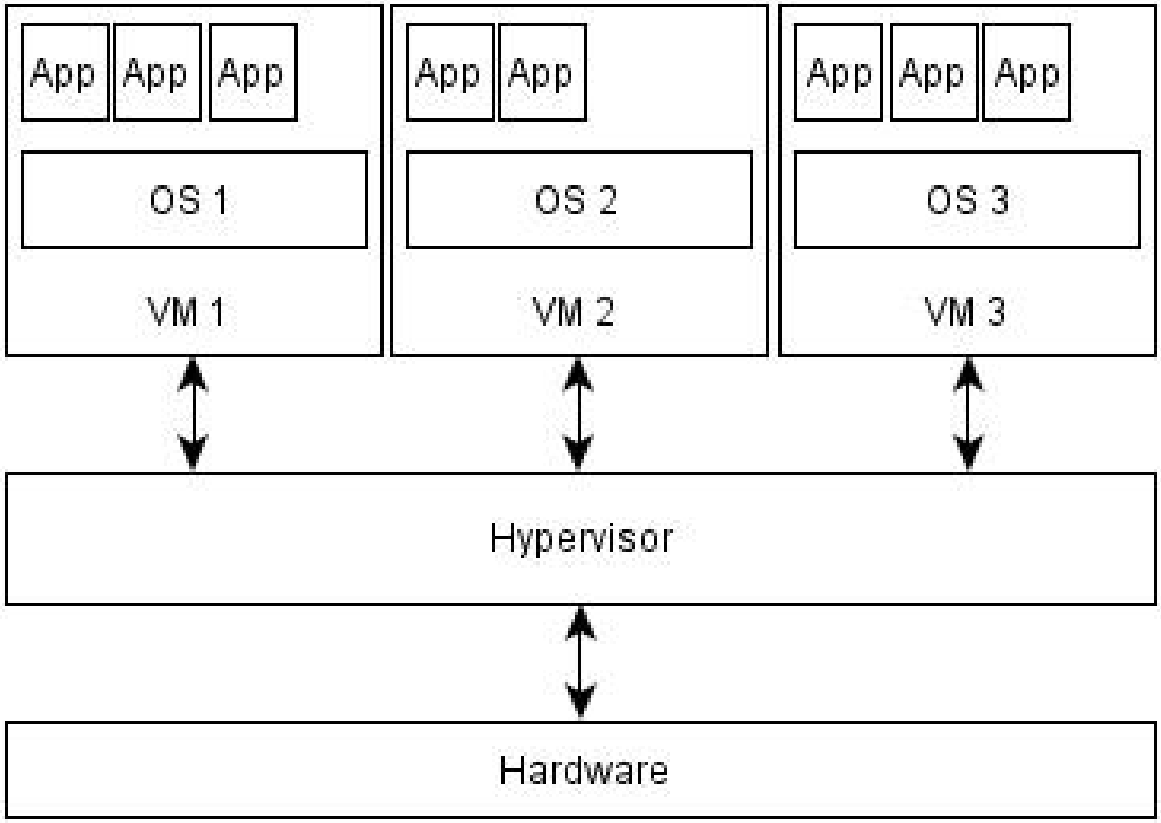
Hypervisor type 1 – Bare Metal

- Runs directly on the hardware and hosts operating systems
  - Builded with a optimized specific core
  - Has a virtual machine management interface
  - More efficient

Hypervisor type 1 – Bare Metal



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Hypervisor type 1 – Bare Metal

- **Acteurs**
  - **VmWare vSphere**
  - **Microsoft Hyper-V**
  - **XEN**
  - **KVM**

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Hypervisor type 2 – Emulator

- Runs as an application installed on an operating system
  - Simulation of physical components
  - Access to the material through the host operating system
  - Less efficient

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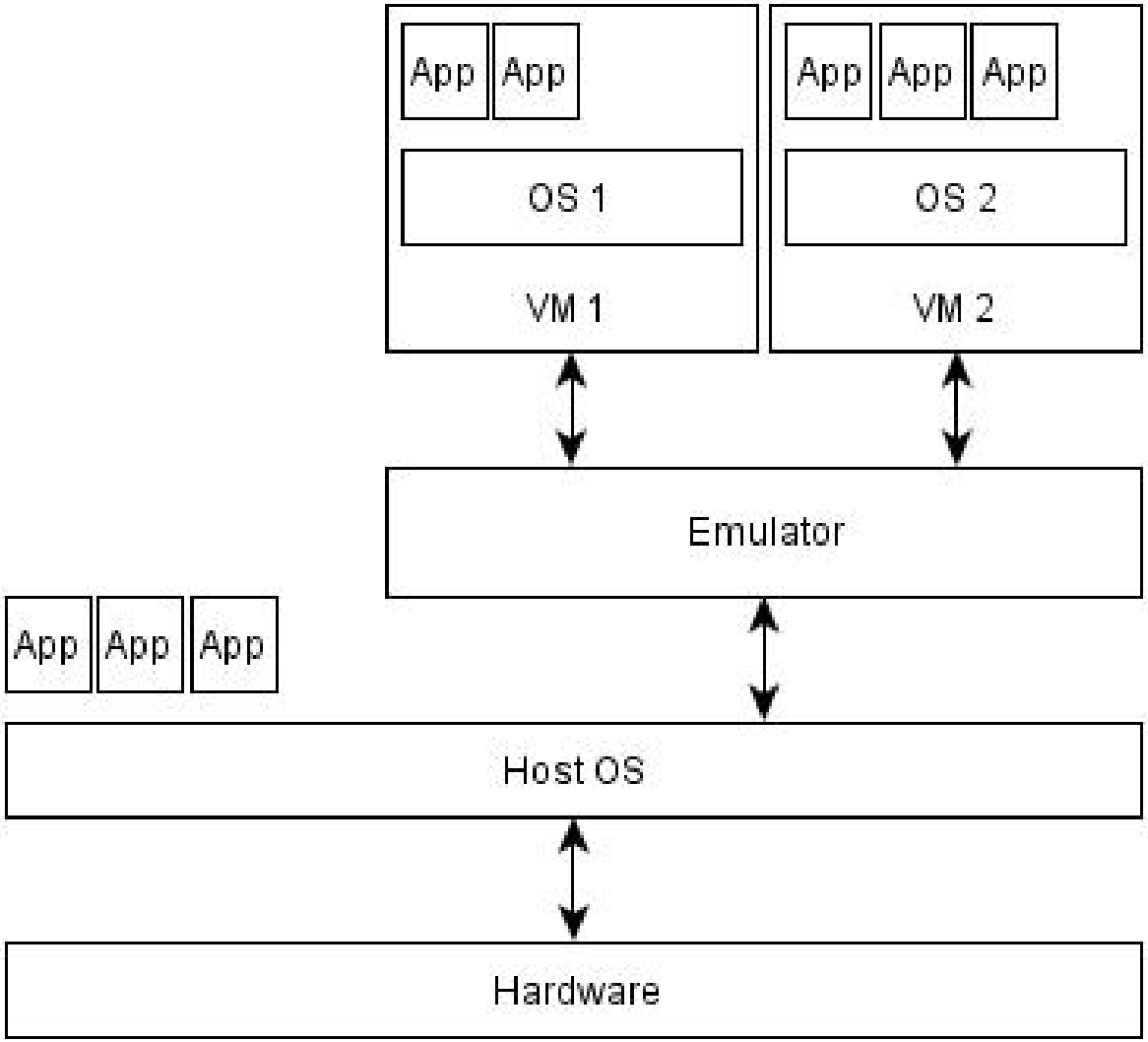
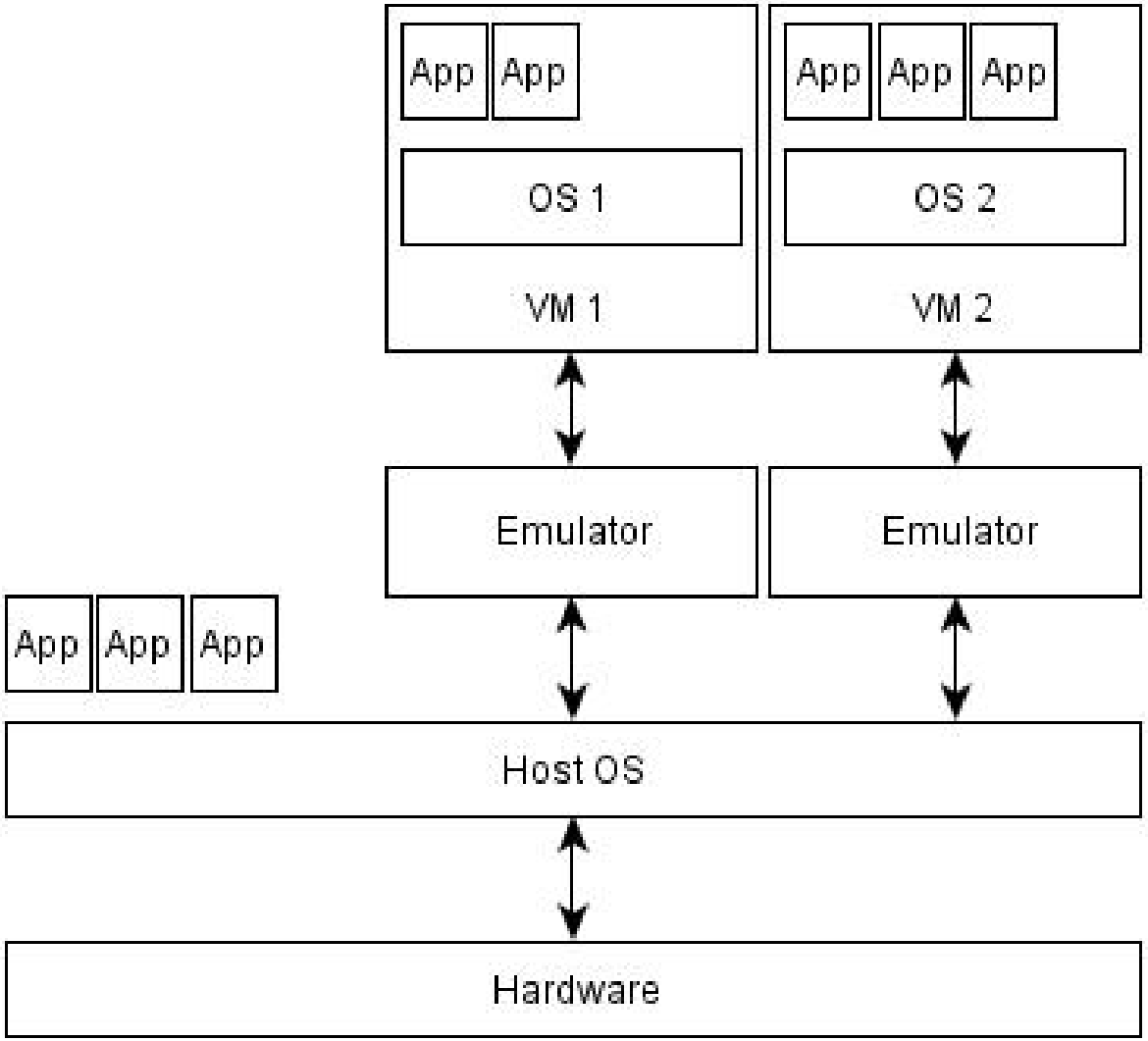
Hypervisor type 2 – Emulator



Hypervisor type 2 – Emulator



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Hypervisor type 2 – Emulator

- **Acteurs**
  - **VmWare (Workstation, Player, Fusion)**
  - **Oracle VirtualBox**
  - **Microsoft Virtual PC**
  - **QEMU**

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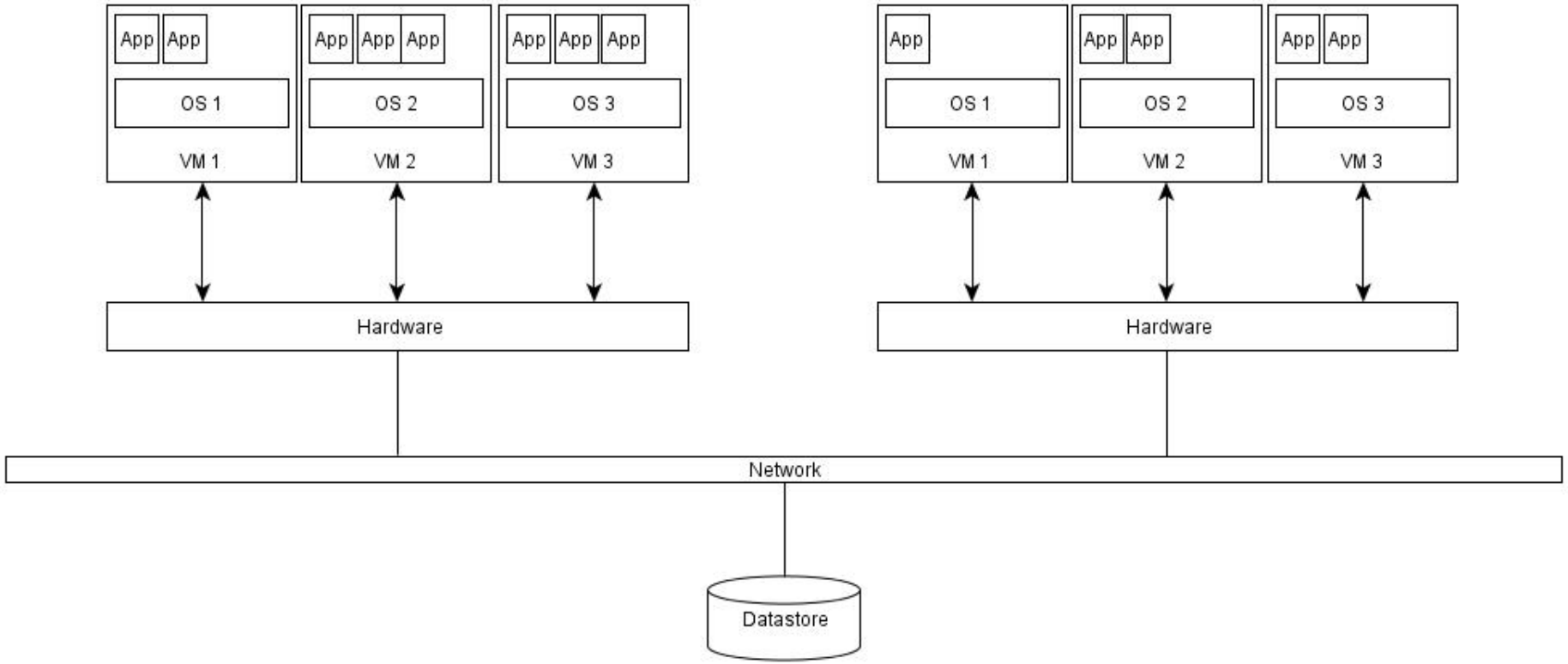
Naming

- Host = Operating system installed on the hardware
- Guests = Virtualized operating systems

Architecture

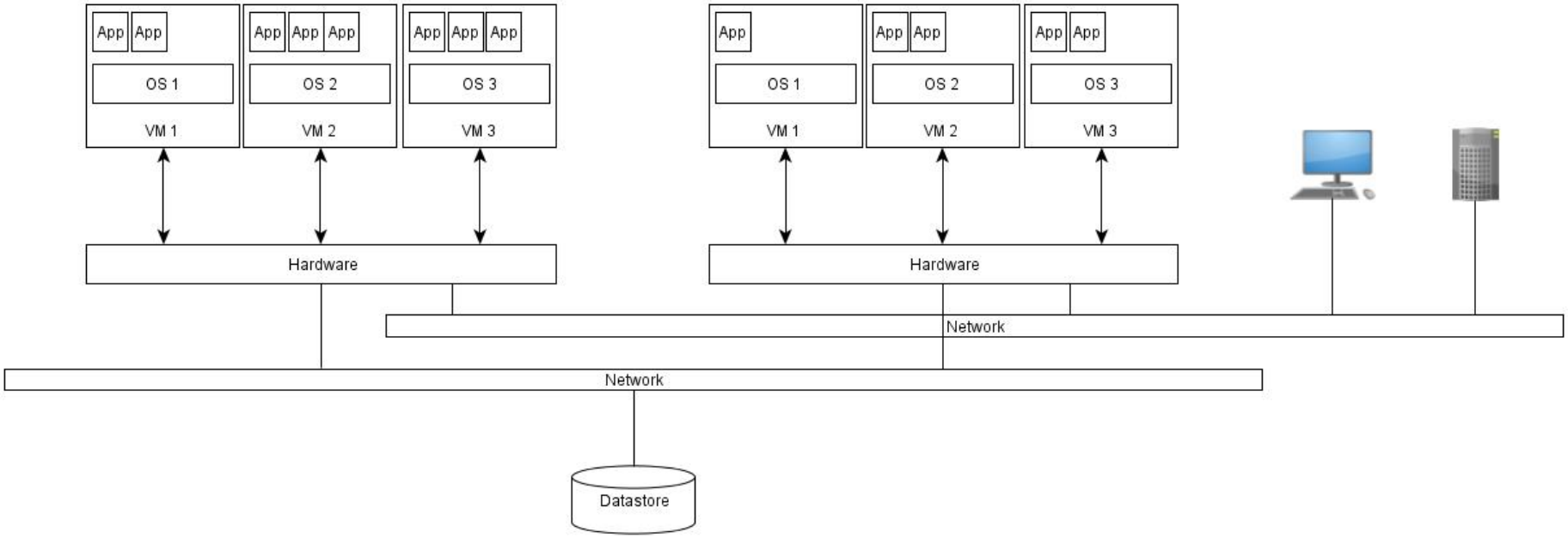


Vmotion

- Virtual machines can be moved from one host to another

- Improve flexibility and availability
  - Cold motion
  - Hot motion (HA)

Architecture



Concepts

- IaaS : Infrastructure as a Service
- SaaS : Software as a Service
- PaaS: Platform as a Service