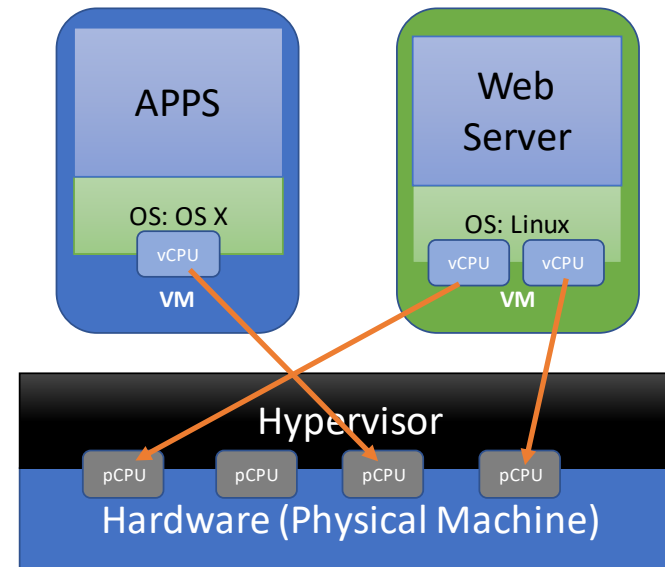


Virtualisation: Hardware & Uses

Frank Walsh

Virtual CPU

- Virtual Processor – vCPU
- Physical Processor – pCPU
- Pool of vCPUs sit on top of pCPUs
- Each pCPU gives some cycles to a pool of vCPUs
 - Called "time division"
- Not necessarily 1 to 1 relationship
 - Oversubscription possible...



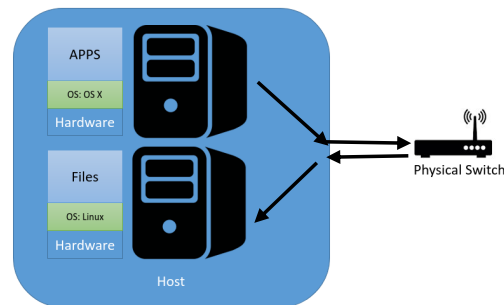
Source: <https://www.l4ka.org/77.php>

Virtual Machines: Memory

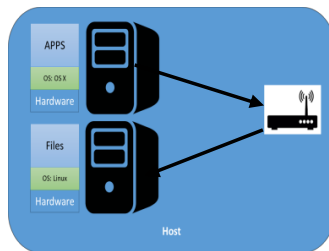
- Hypervisor provides access to physical memory
 - Guest machine gets its own section of physical memory from host
- Set fixed value or range (min and max) in hypervisor
 - Hypervisor will allocate memory when required
- Hypervisor can reclaim memory for host
 - Uses ballooning: insert small program in each guest that grows in memory; all memory used by ballooning program can be reclaimed by hypervisor for host

Virtual Machines: Networking

- Two VMs connecting on the same host:
 - Physical Switch: information leaves host to physical switch and returned to host

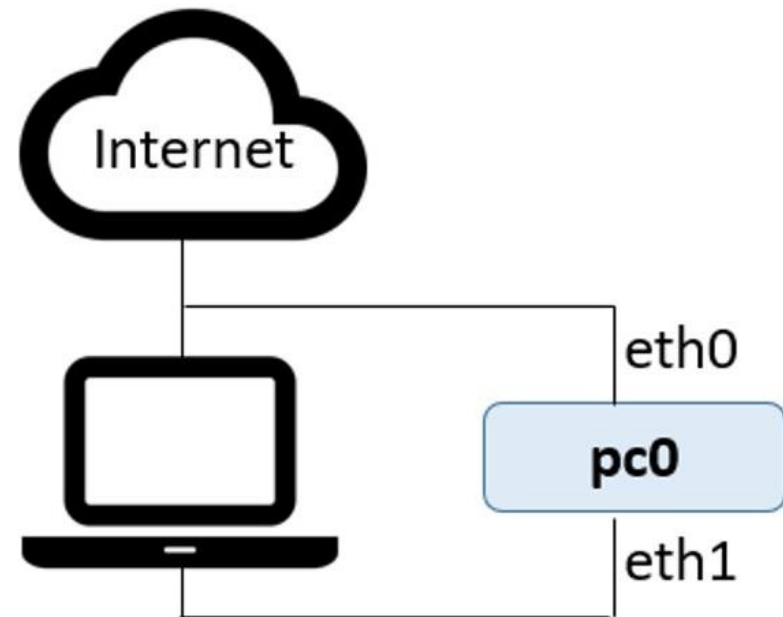


- Virtual Switch (most probable)



Virtual Machines: Networking

- Each guest will have its own IP and MAC and (virtual) network adapter(s)
- Traffic sent out through hosts physical adapter
- One traffic outside host, it's no different from any other physical machine or device.
- Two main modes for connected VMs:
 - Network Address Translation(NAT)
 - simplest way of accessing an external network from a virtual machine.
 - Bridged
 - effectively creates a new network interface in software



Virtualisation: Desktop Computer

- **Problem:** organisation can have many desktop computer environments (developers/admins/support)
 - Difficult to maintain/upgrade
- **Solution:** Virtual Desktop Infrastructure (VDI)
 - Central server pushes correct VM to each user

Typically, most of the work done on remote server

- Virtual processor on server from which it was pushed

Virtualisation: Application

- Certain programs may not run very well, or at all, on some machines
 - e.g. 32 bit app might not run very well on 64 bit machine
- Install hypervisor and build VM with application you want to run
- Run Windows app on Mac

Virtualisation: Development and Testing

- Many companies use virtualised test/dev environments
- Permanent test environment:
 - Set up to replicate "live" environment
 - Practice roll outs
 - Use snapshots to reverse/examine issues when testing
 - Assess resource requirements for certain loads
- Temporary
 - Evaluate new application/product