Virtualization
Benefits and Threats

Physical Computing Resources

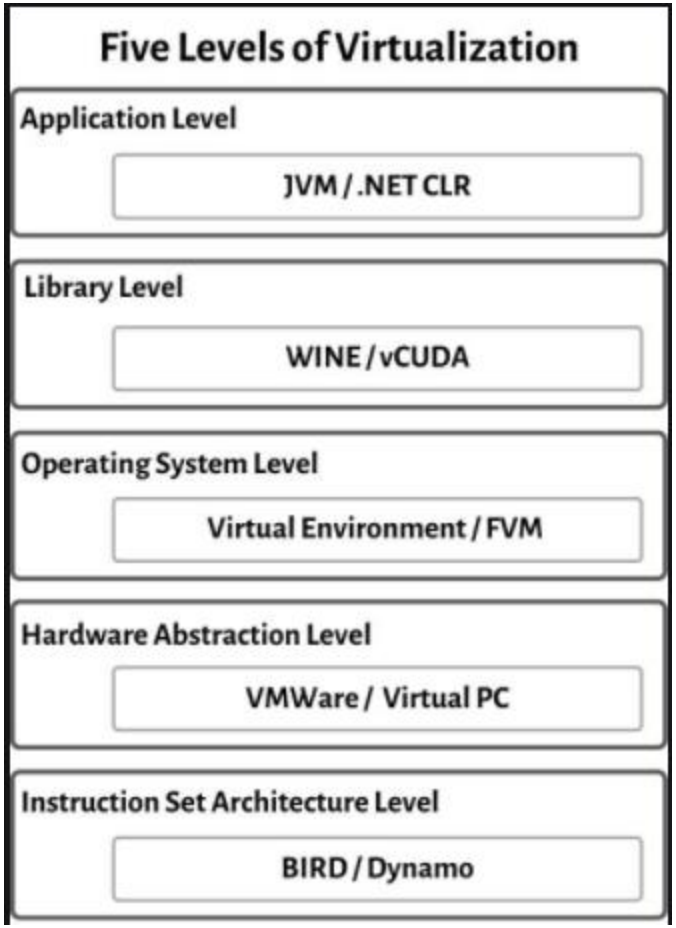
- Any kind of Computer resource can be virtualized
- CPU, Memory, Storage, OS
- Others: N/W Switches, Routers, services, desktop
- Virtualized component only be operational if physical resources empowers it from back-end
- Virtualized devices may or may not resemble the actual physical components (quality or architecture)
- 32 bits CPU be produced from 64 bits CPU

Business Benefits

- Radically improves the flexibility and availability of computing resources
- Organizations can gain in business
  - Lower H/W cost
  - Improvement in server utilization
- Faster provisioning of applications and resources.
- Faster and easier backup and recovery of key application workloads and data
- Minimized or eliminated downtime
- Increased IT productivity, efficiency, agility and responsiveness.

Abstractions

- Hiding the complex characteristics of a system
- Virtualization is abstraction



Emulation

- Convert the binary code of one machine to equivalent binary code of another machine
- Applications running on VMs are complied for the native Instruction Set Architecture (ISA) of the host machine
- OR VMM need to do the conversion(emulation)
- ISA of VM is emulated to ISA of Host

Security Threats

- **Single Point Host:** Any security breach at the physical level may lead to a large no of system break down
- **Hypervisor:** Any security breach can make whole VMs vulnerable
- **Complex Configuration:** Any improper configuration will increase the probability of vulnerabilities

Security Recommendations

- **Hardening VMs:** Any application of VMs cant bypass the VMM
- **Hardening VMM and host OS:** More focus on security of hypervisor and host OS
- **Restrictive Host:** prevent from all external and unauthorized access to host
  - Use of separate NIC for sensitive VMs

References

- Simulation, Emulation, and Virtualization | Their Differences (With the help of Examples) https://www.youtube.com/watch?v=vxg7EgVAxr0
- Cloud computing Black Book, Kailash Jayaswal
- *Cloud Computing*, Sandeep Bhowmik
- *Mastering Cloud Computing*, Rajkumar Buyya