

Virtualization

What is Virtualization ?

Answer :

- Virtualization allows multiple operating system instances to run concurrently on a single computer ; it is a means of separating hardware from a single operating system. Each “guest” OS is managed by a Virtual Machine Monitor(VMM), also known as a hypervisor.
- The virtualization system sits between the guest and the hardware, it can control the guests use of CPU , memory , and storage, even allowing a guest OS to migrate from one machine to another.

Background

- Centralized servers were seen as too expensive to purchase and maintain.
- The trend in the data center has been towards decentralization , also known as horizontal scaling.
- Applications were moved from a large shared server to their own physical machine, often using commodity hardware.
- Decentralization helped with the ongoing maintenance of each application, since patches and upgrades could be applied without interfering with other running systems.
- Decentralization improves security since a compromised system is isolated from other systems on the network.
- Decentralization application sandboxes come at the expense of more power consumption , less physical space and a greater management effort which, together, account for up to
- Many \$\$\$. In addition to this maintenance overhead, decentralization decreases the efficiency of each machine , leaving the average server idle 85% of the time.
- **Virtualization** is a modified solution between centralized and decentralized deployments.
- Instead of purchasing and maintaining an entire computer for one application, each application can be given its own operating system, and all those operating systems can reside on a single piece of hardware.

Why It Matters ?

- Virtualization allows an operator to control a guest operating system's use of CPU, memory , storage , and other resources, so each guest receives only the resources that it needs.
- This distribution eliminates the danger of a single runaway process consuming all available memory or CPU.
- It also helps IT staff to satisfy service level requirements for specific applications.
- Since the guest is not bound to the hardware , it also becomes possible to dynamically move an operating system from one physical machine to another.
- As a particular guest OS begins to consume more resources during a peak period , operators can move the offending guest to another server with less demand.
- This kind of flexibility changes traditional notions of server provisioning and capacity planning.

Different Approaches

- Virtualization comes in a variety of implementations.
 - Full Virtualization : - The hypervisor provides a fully emulated machine in which an operating system can run . VMware is a good example. The biggest advantage to this approach is its flexibility.\
 - Paravirtualization : found in the XenSource open source Xen product, attempts to reconcile these two approaches. Instead of emulating hardware, paravirtualization uses slightly altered versions of the operating system which allows access to the hardware resources directly as managed by the hypervisor. This is known as hardware-assisted virtualization, and improves performance significantly.