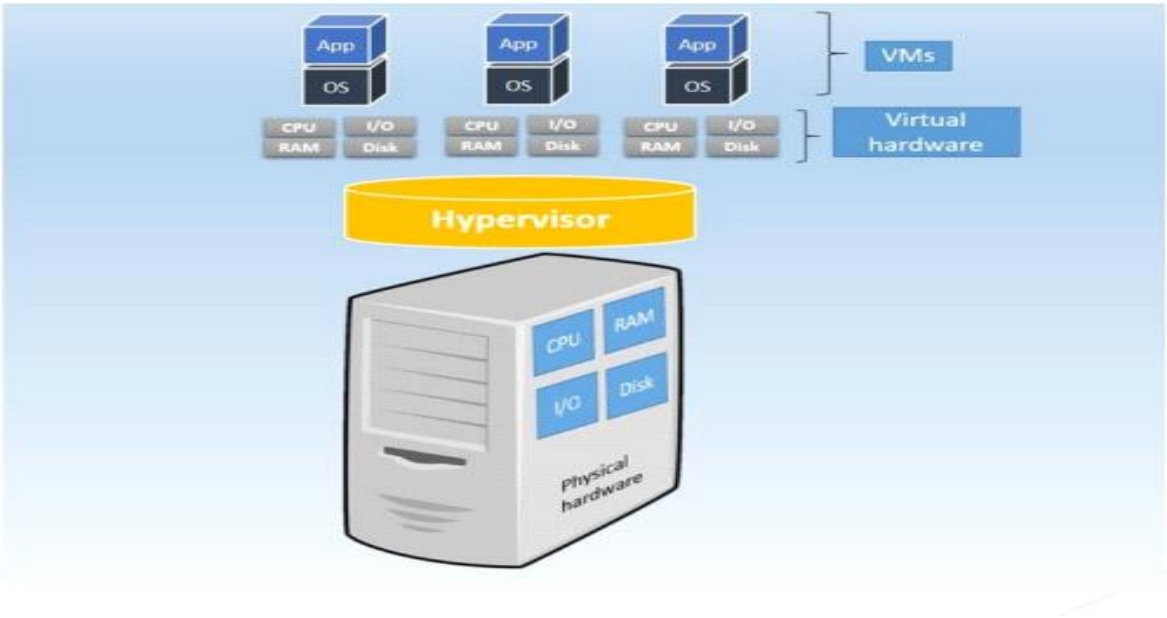
05 February 2024 20:31

Virtualizations and containers

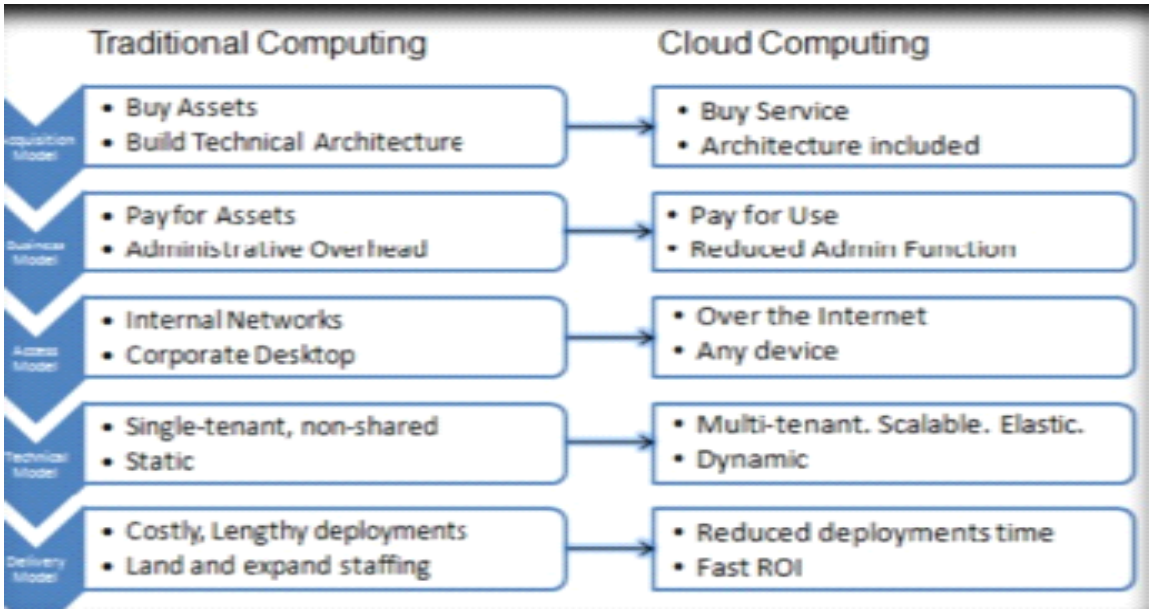
Physical machines(bare metal server)- single server designated to a single user.
resources and components are not shared
Virtual machines (multi tenant)- software computer used as emulation of an actual software using of hypervisor
Resources are virtualized and shared among VMs



- Physical server vs virtual machine :
  performance - physical server is far more powerful
  Management - VM are easier to maintain
  Portability - VMs can moved across the virtual environment and between physical server
  Scalability - VMs provide the option of on demand scaling
  Capacity management(load management)- VMs take care of underutilized resources by distributing among other VMs
  System recovery- VMs can be easily recovered.
  Business continuity - VMs are more fault tolerant, and also minimum downtime
  Security- VMs environment can be protected on universal security model.
  Costs- VMs ensure minimal price

- Traditional Computing :
  Buying of computers , setting in premises , configuring , purchase of software and data/software/storage is limited to only connected network

- Virtual computing:
  User of remote computer from a local computer .Allows remotely access ,software applications and process when they need it.



- Cloud computing vs Virtualization :

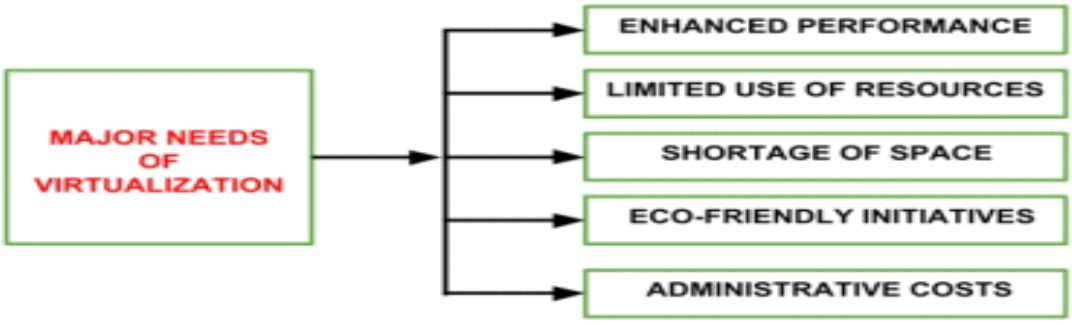
S.NO	Cloud Computing	Virtualization
1.	Cloud computing is used to provide pools and automated resources that can be accessed on-demand.	While It is used to make various simulated environments through a physical hardware system.
2.	Cloud computing setup is tedious, complicated.	While virtualization setup is simple as compared to cloud computing.
3.	Cloud computing is high scalable.	While virtualization is low scalable compared to cloud computing.
4.	Cloud computing is Very flexible.	While virtualization is less flexible than cloud computing.

5.	In the condition of disaster recovery, cloud computing relies on multiple machines.	While it relies on single peripheral device.
6.	In cloud computing, the workload is stateless.	In virtualization, the workload is stateful.
7.	The total cost of cloud computing is higher than virtualization.	The total cost of virtualization is lower than virtualization.
8.	Cloud computing requires many dedicated hardware.	While single dedicated hardware can do a great job in it.
9.	Cloud computing provides unlimited storage space.	While storage space depends on physical server capacity in virtualization.
10.	Cloud computing is of two types : Public cloud and Private cloud.	Virtualization is of two types : Hardware virtualization and Application virtualiza[redacted]

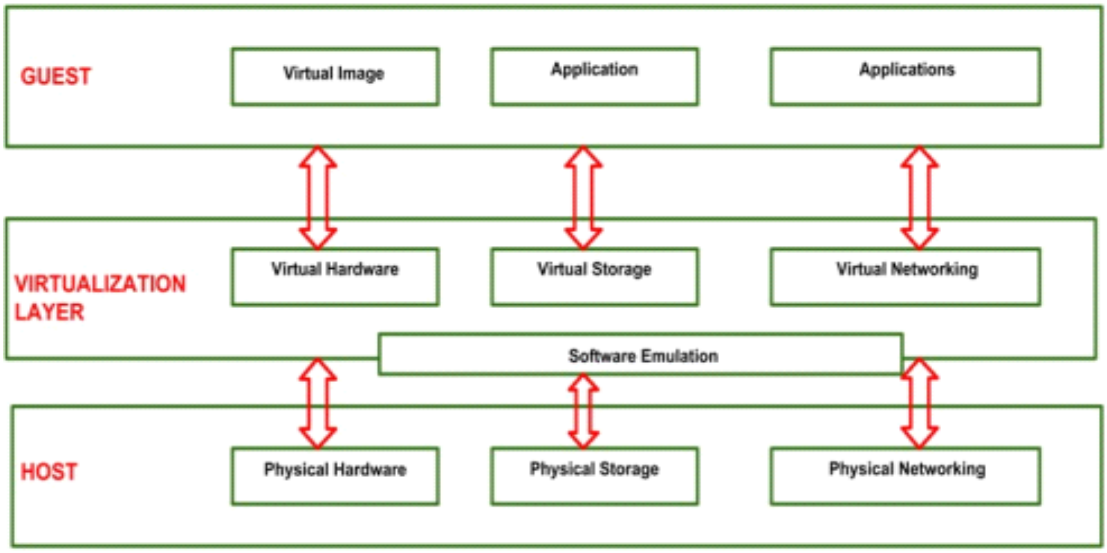
- Virtualization:

  Abstraction of computer resources. This is done by creation of virtual resources from a 1 physical resource or creation of virtual resources from 1 or more physical resources.

  Need of virtualization:



- Virtualization reference model:



Guest- represent the components that interacts with the virtualization layer .
Consists of 1 or more virtual disks files and VM definition file.
VMs are managed by host application.
Host-represent where the original environment where guest is supposed to be managed.
Each guest run on host shared resources by host. OS works as host and manages resources.
Virtualization layer- responsible for recreating the same or a different environment where guest operate.
It is abstraction layer.

(1)Server Consolidation:

- Virtual machines are used to consolidate many physical servers into fewer servers.
- Each physical server is reflected as a virtual machine "guest". They reside on a virtual machine host system.
- This is also known as "Physical-to-Virtual" or 'P2V' transformation.

(2)Disaster Recovery:

- Virtual machines can be used as "hot standby" environments for physical production servers.
- Virtual storage can be replicated and transferred to another location.Virtualization is very useful in planning for disaster recovery.

(3)Testing and Training:

- Virtualization can give root access to a virtual machine.
- This can be very useful such as in kernel development and operating system courses.

(4)Portable Applications:

- Portable applications are needed when running an application from a removable drive, without installing it on the system's main disk drive.
- Virtualization can be used to store temporary files, windows registry entries and other information in the application's installation directory and not within the system's permanent file system.

(5)Portable Workspaces:

- Recent technologies have used virtualization to create portable workspaces on devices like iPods and USB memory sticks.

- Advantages of virtualization:
  - It is cheaper
  - Keep cost predictable
  - Reduces workload
  - Better uptime
  - Faster deployment of resources
  - Promote digital entrepreneurship
  - Provides energy savings
- Limitations:
  - High cost of implementation.
  - Limitations like not every application or server is going to work with environment virtualization (requires hybrid model of operation).
  - Creates security risk
  - Creates availability issues

- Requires several links in a chain that must work together cohesively(like ISP, network card, online storage).
- It takes times (time when upgrading the VMs)