Virtualization Technologies - I

Charles Fomevor

Virtualization

- Virtualization refers to the creation of a virtual (other than the exact or physical/actual object) version of an object or system.
- Examples are operating systems (OS) servers, a storage devices or network resources.

Virtualization

- Virtualization is a way to make things look as if they are actually there.
- Imagine having multiple virtual machines running on one physical machine.

Process

- Virtualization employs software that simulates hardware functionality to create a virtual system.
- This practice allows IT organizations to operate multiple operating systems, more than one virtual system and various applications on a single server. The benefits of virtualization include greater efficiencies and economies of scale.

Motive

- It is an innovative approach for organizations to optimize their limited hardware and get the most out of their investments.
- It is employed by cloud computing services to enable organizations manage their infrastructure better.

Virtual Machine (VM)

- A virtual machine is a software-defined computer that runs on a physical computer with a separate operating system and computing resources.
- The physical computer is called the host machine and virtual machines - guest machines.
- Multiple virtual machines can run on a single physical machine. Virtual machines are abstracted from the computer hardware by a hypervisor.

Hypervisor

- The hypervisor is a software component that manages multiple virtual machines in a computer.
- It ensures that each virtual machine gets the allocated resources and does not interfere with the operation of other virtual machines.

Hypervisor types

- Type 1 hypervisor
- Type 2 hypervisor

Type 1 Hypervisor

- Aka, bare-metal hypervisor
- Hypervisor program installed directly on the computer’s hardware instead of the operating system.
- As a result, they have better performance.
- They are commonly used by enterprise applications.

Type 2 Hypervisor

- Aka, a hosted hypervisor
- It is installed on an operating system.
- Suitable for end-user computing.

Importance of virtualization

- Virtualizing any hardware resource enables a flexible mode of interaction.
- Virtual servers consume less power and generally require less maintenance compared to full-scale physical servers
- Physical hardware functions are abstracted into software
- Easy management

Benefits

- Resources are used efficiently
- Automated IT management
- Faster Disaster Recovery

Resources are used efficiently

- Reduction in the number of underlying physical machines or servers.
- Leads to freeing up space at data center
- Reduces cost of power, cooling equipment, etc.

Automated IT management

- Virtualized PCs implies supervising them with the use of programming tools and concepts
- Managers can capitalize on the VM layouts for daily tasks
- Foundations can be replicated or copied multiple times
-

Faster disaster recovery

- Occurrence of natural disasters, cyber attacks hamper business operations.
- Takes longer to recover or regain access with physical servers. However, it is shorter with virtualized types
- Ensures resilience, business continuity and continuous operation

Types of Virtualization

- Virtualization technology allows the creation of multiple functions of existing physical infrastructure including the benefits of such physical servers.
- One can design and create a host of virtual resources in an environment for easy access and use.
- Many types exist

Server virtualization

- Partitions a physical server into multiple virtual servers.
- An efficient and cost-effective way to use server resources and deploy IT services in an organization.
- Without server virtualization, physical servers use only a small amount of their processing capacities, leaving the devices idle or underutilized.

Storage virtualization

- Physical storage such as Network attached storage (NAS) and storage area network (SAN) can be combined in storage virtualization
- Use of programming tools and management applications allow configuration to allocate size and privileges for administers and other users.
- Multiple network storage devices can be combined into one
- Backups, archiving, recoveries and other functions can be achieved

Network virtualization

- Switches, routers, firewalls and other hardware components generally are present in computer networks.
- Networks of organizations of varying sizes, locations and branches can be designed and created using network virtualization.
- It can be managed virtually too.

Two Approaches to Network Virtualization

- Software-defined networking
- Network function virtualization

Software-defined networking

- Controls traffic routing by taking over routing management from data routing in the physical environment.
- For example, to ensure consistent call quality in all online meetings, you can prioritize this by programming your system video call traffic over application traffic.

Network function virtualization

- Combines the functions of network appliances, such as firewalls, load balancers, and traffic analyzers.
- These work together, to enhance network performance.

Data virtualization

- Contemporary organizations collect data from several sources and store it in different formats in different locations such as in a cloud infrastructure and an on-premises data center.
- Data virtualization creates a software layer between this data and the applications that need it.
- Data virtualization tools process an application’s data request and return results in a suitable format thereby increasing flexibility for data integration and supporting cross-functional data analysis.

Application virtualization

- Application virtualization pulls out the functions of applications to run on operating systems other than the operating systems for which they were designed.
- For example, a user can run a Microsoft Windows application on a Linux machine without changing the machine configuration.

Achieving Application Virtualization

- Application streaming — Users stream the application from a remote server, so it runs only on the end user’s device when needed.
- Server-based application virtualization — Users can access the remote application from their browser or client interface without installing it.

Achieving Application Virtualization

- Local application virtualization — The application code is shipped with its own environment.
- It an run on all operating systems without changes.

Desktop virtualization

- Most organizations have nontechnical staff that use desktop operating systems to run common business applications.
- It may be staff from different departments with different operating systems for different purposes

Desktop virtualization

- You can use desktop virtualization to run different desktop operating systems on virtual machines.
- The teams can access remotely.
- This type of virtualization makes desktop management efficient, secure and cost-efficient.

Types of Desktop Virtualization.

- Virtual desktop infrastructure
  - runs virtual desktops on a remote server. Your users can access them by using client devices.
- Local desktop virtualization
  - you run the hypervisor on a local computer and create a virtual computer with a different operating system.
  - You can switch between your local and virtual environment in the same way you can switch between applications for different tasks.

Questions

Next Meeting

- Cloud Virtualization Technologies 2
-