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Virtualization technology is one of the fundamental components of cloud computing.

Virtualization allows the creation of a secure, customizable, and isolated execution environment for running applications.

Virtualization provides an abstract environment virtual hardware or an operating system to run applications.

Virtualization plays a fundamental role in efficiently delivering IaaS solutions for cloud computing.

Virtualization also provides virtual environment for storage, memory, and networking.

For example, We can run Windows OS on top of a virtual machine, which itself is running on Linux OS.

Following are the causes for Virtualization technology in demand:

1. Increased performance and computing capacity:

Now a days computers are enough capable to support virtualization technologies.

2. Underutilized hardware and software resources:

Most of the computers are used during office hours only, so after office hours these resources can be used for other works too.

3. Lack of space:

Due to additional storage requirements companies such as Google and Microsoft expanding their data centers. where virtualization technology provides additional capabilities to these data centers.

4. Greening initiatives:

Maintaining a data center involves keeping servers on and servers need to be kept cool. Infrastructures for cooling have a significant impact on the carbon footprint of a data center. Hence, reducing the number of servers through server consolidation will definitely reduce the impact of cooling and power consumption of a data center. Virtualization technologies can provide an efficient way of consolidating servers.

## 5. Rise of administrative costs:

Power consumption and cooling costs have now become higher than the cost of IT equipment.

## Some types of virtualization:

### 1. Storage virtualization:

Storage virtualization is the pooling of physical storage from multiple storage devices into what appears to be a single storage device.

### 2. Network virtualization:

Network virtualization refers to the management and monitoring of an entire computer network as a single administrative entity from a single software-based administrator's console.

### 3. Desktop virtualization:

Desktop virtualization is technology that lets users simulate a workstation load to access a desktop from a connected device remotely or locally.

### 4. Application server virtualization:

Application server virtualization abstracts a collection of application servers that provide the same services as a single virtual application server.

## Advantages of virtualization:

### 1. Increased security:

The ability to control the execution of a guest in a completely transparent manner opens new possibilities for delivering a secure, controlled execution environment.

### 2. Managed execution:

Provides sharing, aggregation, emulation, isolation etc.

### 3. Portability:

User works can be safely moved and executed on top of different virtual machines.

## Disadvantages of virtualization:

### 1. Performance degradation:

Since virtualization interposes an abstraction layer between the guest and the host, the guest can experience increased latencies.

### 2. Inefficiency and degraded user experience:

Some of the specific features of the host cannot be exposed by the abstraction layer and then become inaccessible.

### 3. Security holes and new threats:

Virtualization opens the door to a new and unexpected form of phishing. In case of hardware

virtualization, malicious programs can preload themselves before the operating system and act as a thin virtual machine manager.

Virtualization technology examples:

1. Xen
2. VMware