Unit-3

GRID FRAMEWORK

3.1 Virtualization of IT systems

Virtualization is the latest in a long line of technical innovations designed to increase the level of system abstraction and enable IT users to harness ever-increasing levels of computer performance.

At its simplest level, virtualization allows you to have two or more computers, running two or more completely different environments, on one piece of hardware. For example, with virtualization, both Linux operating system and Microsoft Windows operating system can be used on one server.

In slightly more technical terms, virtualization essentially decouples users and applications from the specific hardware characteristics of the systems they use to perform computational tasks. This technology is likely to usher in an entirely new wave of hardware and software innovation. For example, and among other benefits, virtualization can simplify system upgrades (and in some cases may eliminate the need for such upgrades) by allowing users to capture the state of a virtual

machine (VM), and then transporting that state in its entirety from an old to a new host system.

Virtualization is also designed to enable a generation of more energy-efficient computing. Processor, memory, and storage resources that today must be delivered in fixed amounts determined by real hardware system configurations will be delivered with finer granularity via dynamically tuned VMs.

What is a virtual machine (VM)?

In the simplest terms possible, a virtual machine (VM) is a virtual representation of a physical computer.

Virtualization allows an organization to create multiple virtual machines—each with their own operating system (OS) and applications—on a single physical machine.

A virtual machine can't interact directly with a physical computer.

Instead, it needs a lightweight software layer called a hypervisor to coordinate with the physical hardware upon which it runs.

What is a hypervisor?

The hypervisor is essential to virtualization—it's a thin software layer that allows multiple operating systems to run alongside each other and share the same physical computing resources.

These operating systems come as the aforementioned virtual machines (VMs)—virtual representations of a physical computer—and the hypervisor assigns each VM its own portion of the underlying computing power, memory, and storage.

This prevents the VMs from interfering with each other

The Benefits of Virtualization

Up to 80 percent greater utilization of every server.

Reductions in hardware requirements by a ratio of 10:1 or better.

Capital and operations expenses cut by half, with annual savings of more than $1,500 for each server virtualized.

Robust, affordable high availability.

How does Virtualization Help Green Computing?

Virtualization results in far more efficient use of resources, including energy.

Virtualization's purpose in a simple way is virtualize and make a single piece of hardware function as multiple parts.

Different user interfaces isolate different parts of the hardware, thereby making each one behave and function as an individual.

Installing virtual infrastructure allows several operating systems and applications to run on a lesser number of servers, helping to reduce the overall energy used for the data centre and for its cooling.

The energy saved per server would translate into approximately 7000 Kilo Watt hours per year, which is a tremendous potential for energy savings, Virtualization is the best to practice green computing, especially data centres.

3.1.1 Virtualisation can be classified into 3 categories, namely:-

Desktop Virtualisation

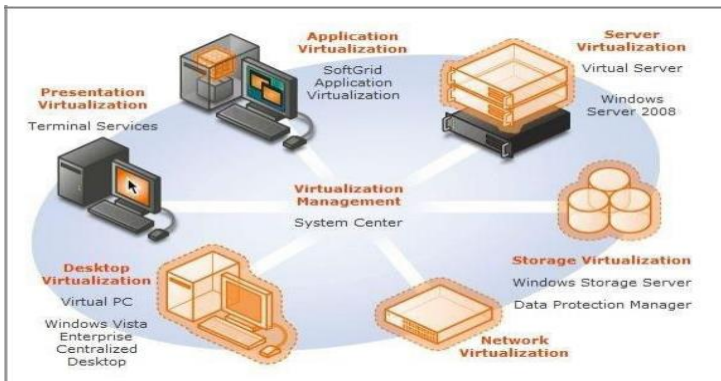Server Virtualisation

Storage Virtualisation

Figure 3.1 Virtualization Management

3.1.1.1 Desktop Virtualisation

Desktop virtualization, often called client virtualization, is a virtualization technology used to separate a computer desktop environment from the physical computer.

Desktop virtualization is considered a type of client-server computing model because the "virtualized" desktop is stored on a centralized, or remote, server and not the physical machine being virtualized.

Desktop virtualization "virtualizes desktop computers" and these virtual desktop environments are "served" to users on the network.

Another benefit of desktop virtualization is that is lets you remotely log in to access your desktop from any location.

Essential documents on Desktop Virtualisation

Managing the Desktop estate: the low risk route to desktop virtualisation
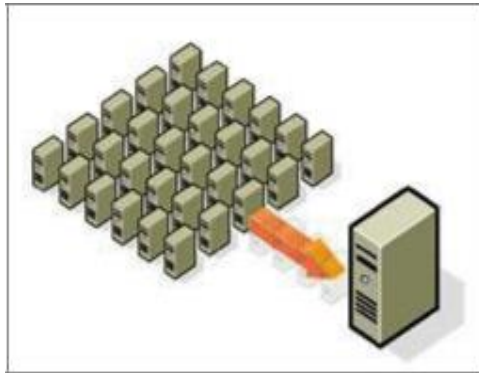
Ten Reasons to modernise the desktop

A Peer Survey: Desktop Virtualisation – Separating the Hype from Reality

The Next Generation Virtual Desktop Solution for Growing businesses

Best Practices for testing Desktop Virtualisation

Desktop Virtualisation: **A buyer's checklist**

3.1.1.2 Server Virtualisation

Server virtualization is the partitioning of a physical server into smaller virtual servers.

In server virtualization the resources of the server itself are hidden, or masked, from users, and software is used to divide the physical server into multiple virtual environments, called virtual or private servers.

One common usage of this technology is in Web servers. Virtual Web servers are a very popular way of providing low-cost web hosting services.

Instead of requiring a separate computer for each server, dozens of virtual servers can co-reside on the same computer.

Essential documents on Server Virtualisation

The Business Value Of Virtualization

The Future of Virtualization

Virtualizing Business-Critical Applications

Five Steps to Determine When to virtualise Your Servers

Benefitting from Server Virtualization - Beyond Initial Workload Consolidation

Getting the most out of virtualisation

User Survey Analysis: Next Steps for Server Virtualisation in the mid market.

3.1.1.3 Storage Virtualisation

Storage virtualization is the amalgamation of multiple network storage devices into what appears to be a single storage unit. Storage virtualization is often used in SAN (storage area network), a high-speed sub-network of shared storage devices.

The management of storage devices can be tedious and time-consuming. Storage virtualization helps the storage administrator perform the tasks of backup, archiving, and recovery more easily, and in less time, by disguising the actual complexity of the SAN.

Users can implement virtualization with software applications or by using hardware and software hybrid appliances.

The technology can be placed on different levels of a storage area network.

Essential documents on Storage Virtualisation

Learn about Storage virtualisation, its benefits and what it can mean for your business and storage infrastructure

Evaluating Storage Technologies For Virtual Server Environments

Storage Virtualisation- what to know and what to look for

Server and Storage Virtualization: A Complete Solution