Unit-3

Virtualization

Introduction

1. Types and Technologies.
2. Accomplishing virtualization.
3. Importance of virtualization in Cloud computing.

Case studies

1. Xen Virtual machine monitors- Xen API.
2. VMware - VMware products – VMware Features.
3. Microsoft Virtual Server - Features of Microsoft Virtual Server

Virtualization

It means to create a virtual version of a device or resource, such as a server, storage device, network or even an operating system.

TYPES OF VIRTUALIZATION AND TECHNOLOGIES	
PARA	It is simple the **modification of an operating system (usually at the kernel level)** so that it can more closely **resemble its physical machines actual hardware** and it can support only a few operating systems.
FULL	
OS	It refers to the **use of software** to **allow system hardware** to **run multiple instances of different operating systems concurrently**, allowing you to run different applications requiring different operating systems on one computer system.
DENSITY	It often refers to **the number of virtual machines that can fit within a single physical machine or rack.** The more virtual machines that a single physical machine can support, the more dense it is said to be.
VIRTUALIZATION SOFTWARE	It is any kind of software that **deals with the emulation of hardware and the splitting up of both physical and software-based resources. Examples**: VMware, Microsoft virtual PC
SOFTWARE VIRTUALIZATION	● It is the **virtualization of applications or computer programs.** ● It involves creating a **virtual layer** or **virtual hard drive space where applications can be installed.** ● From this virtual space, applications can then be run as though they have been installed onto host OS.
HARDWARE	Benefit is that the amount of hardware emulation (effort) required is greatly reduced, improving performance.
RESOURCE	● It involves the virtualization of one/more IT-related system resources. ● It could involve the virtualization of specific system resources such as storage or network resources, or it could involve the virtualization of entire physical resources, such as servers or end-user workstations.
PROCESSOR	It involves the virtualization of a physical processor, so that multiple virtual machines can be run on a single physical machine.
APPLICATION	● It works by making separate copies of shared resources for separate applications. ● For example each virtual application will have a copy of its own

	drivers, registry entries, DLLs and any other resources that would usually be shared with other applications.
STORAGE	● It involves **grouping together multiple physical storage devices** (no matter where they are physically located), so that they appear as one big storage unit. **There are many different storage virtualization technologies including,** **a. NAS (Network attached Storage)** A Network-attached storage device is effectively a server that is dedicated to providing file sharing services. It is not concerned with any other services such as e-mail or printer sharing; it only deals with file sharing. **b. SAN (Storage Area Network)** It is effectively a sub-network that consists of only storage devices. ● Storage devices can consist of either a server which contains nothing but hard drives for storage, or a stand-alone rack of storage devices such as a rack of multiple hard drives. ● ISCSI stands for Internet Small Computer System Interface. SCSI is basically an interface that is used for connecting peripheral devices (including hard drives) to a computer. It acts as a controller, meaning that it doesn't require software to handle data requests, as it deals with this itself.
DATA STORAGE	It is used to standardize things, so that end-users did not have to configure anything or keep track of the physical processes of data storage.
INTEL	●It is Intel's hardware assisted virtualization technology. ● Intel VT technology **utilizes a machine's hardware-based resources** such as its processor, chipset and BIOS to offload some of its software based virtualization workload to its hardware with near native performance ratios, because virtualization is being carried out directly by hardware, rather than just software alone.
RED HAT	● Provides full integration of server and storage virtualization. ● Provides both para-virtualization and full-virtualization
SOFTGRID APPLICATION	Same as ALTRIS but from Microsoft
UBUNTU (SERVER EDITION): offers Kernel-based virtual machine (KVM).	● KVM is basically Linux's own full virtualization solution (for example Microsoft Virtual PC is Microsoft's virtualization solution). ● KVM can run **multiple virtual machines with a wide range of guest operating systems installed.** ● It is implemented within the operating systems kernel; it is much more efficient and requires fewer resources than an application-based virtualization solution would. ● requires far fewer overheads than other application-level virtualization technologies, because it is a part of its operating systems kernel and can communicate directly with the hardware that it is running on.
ALTIRIS	● offer virtualization software known as Altiris SVS (Software Virtualization Solution)

	● SVS **allows you to install software applications** on to your machine but in a virtualized area. ● This means that applications are not actually installed on to your physical machine, instead they reside in a virtual location. This virtual location can then be activated or deactivated at will.

ACCOMPLISHING VIRTUALIZATION

1. MIGRATING TO A VIRTUALIZED ENVIRONMENT

a. migrating from a physical to a virtualized environment is not always as Straight forward as it seems.

b. Ensure that they have a smooth transition from a physical environment to a virtualized one is determine what tools they will use to carry-out their migration.

2. THINGS TO DO AND CONSIDER BEFORE MIGRATION

a. What is going to be virtualized? Servers or Storage or Complete Infrastructure
b. Preparing for Downtime
c. Hardware Requirements
d. Storage Requirements
e. Ensuring that all Software will continue working in a Virtualized Environment
f. Naming Conventions

3. THINGS TO DO AFTER MIGRATION

a. Disabling unnecessary Hardware within the Virtualized Environment
b. Starting-up the Virtual Machine without connecting it to the Network
c. Testing critical or important applications
d. Rebooting the Virtual Machine multiple times
e. Check and configure Server Parameters

4. A SIMPLE HOW-TO GUIDE

Step 1: Order in the correct hardware if it's necessary
Step 2: Select your virtualization software
Step 3: Carry out the actual virtualization process

5. FURTHER MIGRATION CONSIDERATIONS

1. Considering management costs and which management tools to use
2. Deciding on the type of virtualization solution to use
3. Considering performance requirements
4. Virtual server density
5. Virtualization software platform support
6. Virtual server migration and management strategies
7. Deciding on the level of isolation use
8. Customizing a virtualization solution based on its intended purpose
9. Check licensing requirements
10. Use templates for automated system deployment

6. RISKS ASSOCIATED WITH VIRTUALIZATION

1. Not being able to see or manage virtual machines.
2. Having difficulty keeping track of what each virtual machines role is.
3. Not having enough security on a physical host machine.
4. Not knowing who manages what.
5. Not controlling or managing the deployment of virtual machines.
6. Not keeping track of resource utilization or applications.
7. Not preventing virtual machines from being copied by unauthorized.
8. Forgetting licensing costs.
9. Hidden costs.
10. Overloading or underutilizing physical machines.

7. PROBLEMS ASSOCIATED WITH VIRTUALIZATION

a. Uptime requirements increase even more than before.
b. Bandwidth related issues.
c. No support for critical applications.

7. Importance and Advantages of Virtualization to Cloud Computing

Better Use of Existing Hardware
Reduction in New Hardware Costs
Reduction in IT Infrastructure Costs
Simplified System Administration
Increased Uptime and Faster Failure Recovery
Simplified Capacity Expansion
Simpler Support for Legacy Systems and Applications
Simplified System-Level Development
Simplified System Installation and Deployment
Simplified System and Application Testing