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Operating System Assignment 3
(UNIT 4)

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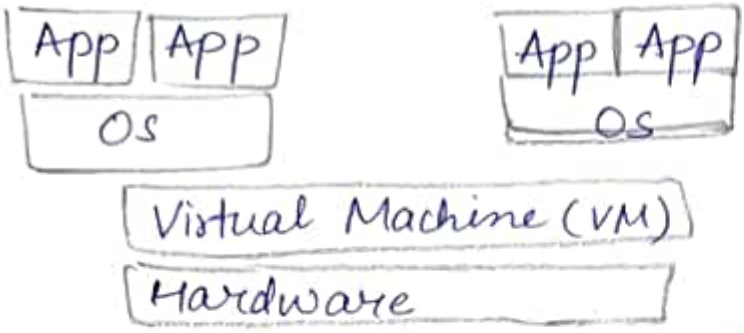
Ques 1: What is Virtualization?
Virtualization is a technology that allows multiple operating systems and applications to run on the same physical hardware simultaneously. It creates a virtual version of computing resources such as servers, storage, network devices etc.

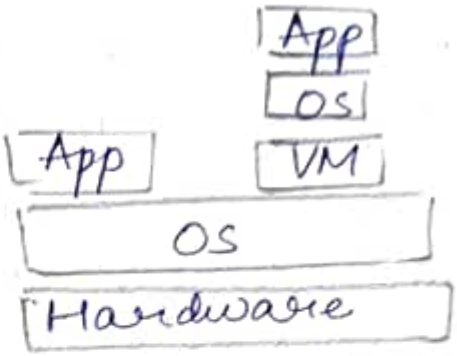
Ques 2: What are virtual machines and their types? with pros and cons of the virtual machine.
Virtual Machines (VM)
- It takes the layered approach to its logical conclusion. It treats hardware and the operating system kernel as they were all hardware.
- It provides an interface identical to the underlying bare hardware.
- The resources of the physical computer are shared to create virtual machines.

Types of Virtual Machines
1. System Virtual Machine
These types of virtual machine gives us a complete system platform and gives the execution of complete virtual operating system.
2. Process Virtual Machine
While process virtual machines unlike system virtual machine does not provide us with facility to install the virtual operating system completely. Rather it creates virtual environment of that OS while using some app or program and this environment will be destroyed as soon as we exit the app.

System Virtual Machine



Process Virtual Machine



#. Pros and Cons of Virtual Machine

Advantages

- Better resource utilization
- provides isolation which enhances security
- highly flexible
- VMs can be scalled up or down based on demand
- Easy migration b/w physical hosts

Disadvantages

- There is some overhead associates with running VMs.
- Slight performance decrease.
- Can increase complexity of the system
- Limited performance for I/O intensive applications.

Ques 3: Explain types of Virtualization.

Virtualization allows one computer system to perform functions of numerous computers by sharing the resources of single hardware across multiple environments. CPU virtualization includes — full virtualization, para-virtualization and Hardware assisted virtualization.

1. Full Virtualization

In this, the VM stimulates a complete hardware environment, allowing guest operating systems to run without modification. The guest OS is unaware that it is running within a virtualized environment. It is slower and less secure than the para-virtualization

2. Para-virtualization

It involves modifying the guest OS to be aware of the virtualization layer. This awareness allows for better communication and coordination between guest OS and the hypervisor, resulting in

improved performance.

3. Hardware Assisted Virtualization (HVM)
It combines aspects of both full and para-virtualization. It leverages hardware features to improve virtualization performance. This type of virtualization aims to reduce the need for modification to the guest OS.

Cycle

App | A
OS
V
H

Ques 4: Explain Hypervisors.

A hypervisor, also known as Virtual Machine monitor (VMM) is a piece of software that allows us to build and run VM which are abbreviated as VMs.

- It allows a single host computer to support multiple VMs by sharing resources including memory and processing
- Also known / allows use of max of system's available resources and provide greater IT versability because the guest VMs are independent of host hardware which is one of the major benefits of hypervisors.
- It helps to reduce
  - Space efficiency
  - Energy usage
  - Maintainence Requirement.