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Cloud Computing Assignment 3

Q Explain in brief: Implementation levels of virtualization.

Ans.

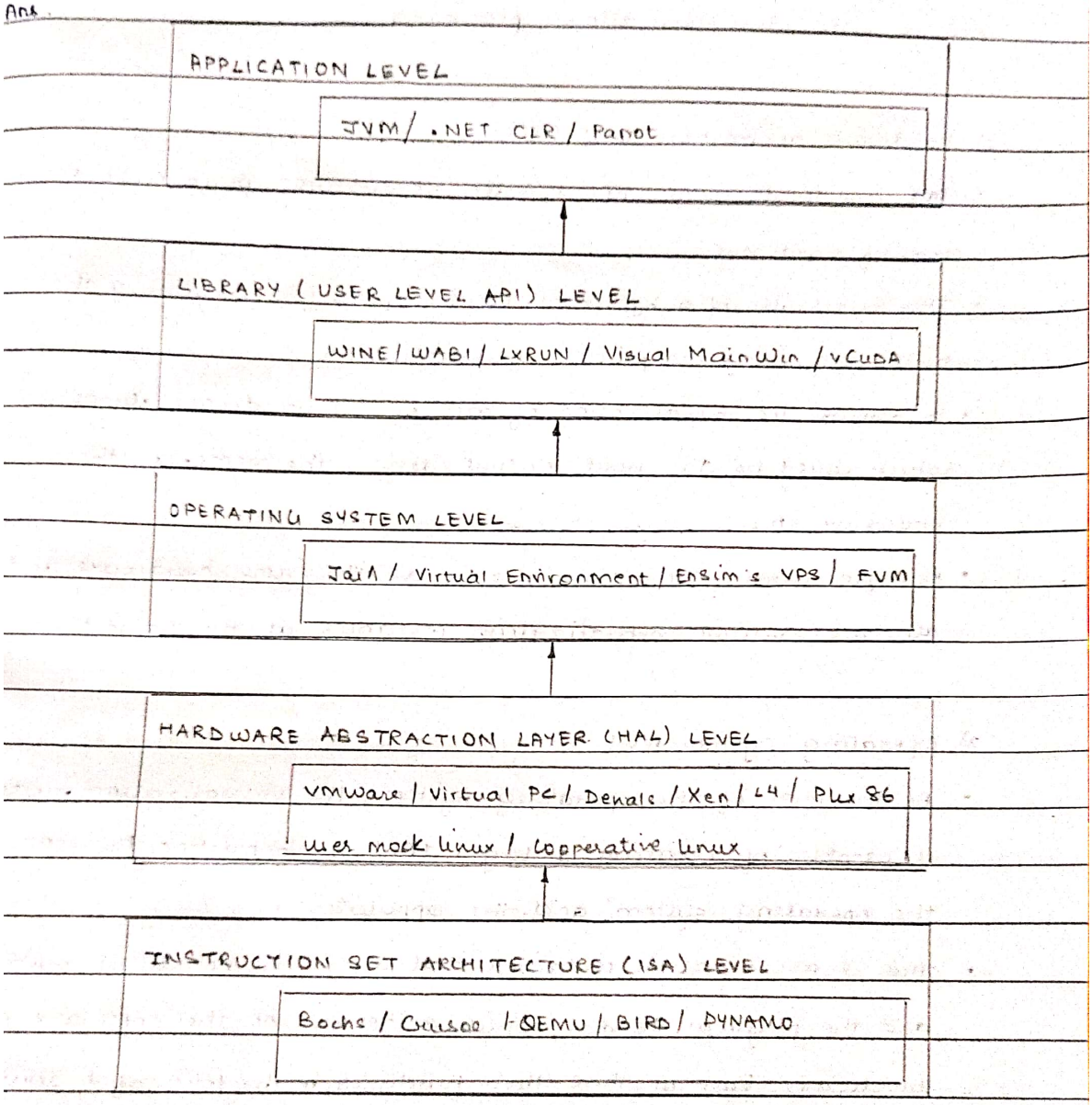

Fig: Implementation levels of virtualization

1) Instruction Set Architecture level (ISA) -

- ISA virtualization can work through ISA emulation. This is used to run many legacy codes that were written for different configuration of hardware.
- These codes run on any virtual machine using the ISA. With this, a binary code that originally needed some additional layers

to run is now capable of running on x86 machine.

- For basic emulation, an interpreter is needed, which interprets the source code and then converts it into hardware format that can be read. This then allows processing.

2) Hardware abstraction level (HAL) -

- True to its name, HAL lets the virtualization perform at the level of hardware.
- This makes use of a hypervisor which is used for functioning the hardware using the process of virtualization.
- It allows the virtualization of each of the hardware component which could be the input-output device, the memory, the processor, etc.
- Multiple users will not be able to use the same hardware and also use multiple virtualization instances at the same time.

3) Operating system level -

- At the level of the operating system, the virtualization model is capable of creating a layer that is abstraction between the operating system and the application.
- This is an isolated container that is on the operating system and the physical server, which makes use of the software and hardware. Each of these then functions in the form of a server.
- When there are several users and no one wants to share the hardware, then this is where the virtualization level is used.
- Every user will get this virtual environment using a virtual hardware resource that is dedicated.

4) Library level -

- The operating system is cumbersome, and this is when the application makes use of the API that is from the libraries at a user level.

- These API's are documented well, and this why the library virtualization level is preferred in these scenarios.
- API hooks make it possible as it controls the link of communication from the application to the system.

5) Application level -

- The application level virtualization is used when there is a desire to virtualize only one application and is the last of the implementation levels of virtualization in cloud computing.
- This is generally used when you run virtual machine that use high-level languages.
- The application will sit above virtualization layer, which in turn sits on the application program.
- It lets the high level language programs compiled to be used in the application level of the virtual machine run. seamlessly.

2) List and explain vmm design requirements.

Ans. There are 3 requirements of VMM -

1) First, a VMM should provide an environment for programs which is essentially identical to the original machine.
2) Second, programs run in this environment should show at worst, only minor decreases in speed.
3) Third, a VMM should be in compute to that which it runs on the original machine directly.

- The later qualification is required because of the intervening level of software and the effect of any other VMs concurrently existing on the same hardware.
- A VMM should demonstrate efficiency in using the VMs
- Complete control of these resources by a VM includes :

1) The vmm is responsible for allocating hardware resources,
2) It is not possible for a program to access any resource not explicitly allocated to it.

3) It is possible under certain circumstance for a VMM to regain control of resources already allocated.

- Not all processors satisfy these requirements for a VMM.

3) Explain in brief virtual clusters and resource management.

Ans. A physical cluster is considered as a group of physical machine called as servers which are interconnected with each other with the help of physical network such as a LAN

- Three critical design issues of virtual clusters :

a) Live migration of VMs -

When there are mixed nodes of host and guest systems in a cluster, the usual method of operation is to execute the whole thing on the physical machine in the situation of failure of one VM another VM on a different node can replace its role until both the VMs are executing with same os.

b) Memory and fill migrations -

There is very high initial costing of ownership due to the factors like space, power conditioning as well as cooling equipment. Hence to share this cost, the leasing or sharing access of a common cluster is a good option when demands vary over time.

c) Dynamic deployment of virtual clusters -

- In the traditional VM, the process of writing configuration information or specifying the configuration sources is done manually.
- When in a network, multiple VMs are joined,
- When more VMs join a network, an ineffective configuration leads to problems with overloading or under utilization.