VIRTUALIZATION WITH HYPERVISOR

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Abstract: This article deals with the important concept in the development of hardware and software, virtualization technology. In this research paper, the topics covered are, virtualizationand types of virtualization, before and after virtualization impacts, hypervisor, comparison between hypervisor types,advantages of virtualization. Main brick in every virtualization platform is hypervisor which carries out virtualization and management tools which deliver the services such as web management, storage management and resources management from one place.

Key words:hypervisor, virtualization.

I. INTRODUCTION:

Virtual – Nothing real.
In computing, virtualization is known as or act as the creation of a virtual (rather than actual) edition of something rather then the original. It is a methodology of separating the property of resources into numerous execution environments, by applying one or more concepts or technologies such as hardware and software partitioning, time-sharing and many others.
In simple words virtualization is that you create a virtual version of something that's generally used for some type of execution. For example, some on wants to partition the basic hard storage drive and wants to create two hard drives, then they would be two 'virtualized hard drives,' as the hardware is technically a single hard drive that was digitally separated into two.

Colloquially speaking, "virtualization abstracts out things."

II. DIFFERENT WAYS/METHODS OFVIRTUALIZATION:

There are 7 primary types of virtualization, and each one differs according to element it is used in-

1. Operating System Virtualization:
It is the most common form of virtualization, virtual operating systems (or virtual machines) which isbecoming a core component of the IT infrastructure.It is a type of server virtualization which works on the core layer of operating system.It involves putting a second instance or multiple instances of an operating system, like Windows, on a single machine. This empowers businesses to reduce the amount of physical hardware required to run their software by cutting down the number of actual machines. It store or save the organization cash on energy, hardware, space, and many more things, while still allowing them to run the same quantity of applications[1][2].

2. Application Server Virtualization:
ApplicationServerVirtualization has beenaround since the first load balancer, whichexplains why "application virtualization" isoften usedasa synonym for advanced load balancing i.e. dividing physical server into many smaller virtual servers. In load balancing it allow the easier management of resources and servers and its applications, since user can manage the recourses as a single instance.

3. Application Virtualization:
Application virtualization is completely different things or concept. they are naturally reside the computer but running to the server computer[1][3].

4. Management/Administration Virtualization:

It is the least-known type of virtualization. The main concept of management or we can say that, virtualization means partitions admin roles through the user polices or group.

5. Network Virtualization:

Network virtualization may be the most ambiguous,specific definition of virtualization. It involves virtually managing IPs, and is accomplished through tools like routing tables, NICs, switches, and VLAN tags.

6. Hardware Virtualization:

It is one of the rarer forms of virtualization and it is very similar in concept to OS/Platform virtualization, and to some degree is required for OS virtualization to occur[1][2][4].

7. Storage Virtualization:

Storage virtualization is an array of servers that are managed by a virtual storage system. The servers aren't aware of exactly where their data is, and instead function more like worker bees in a hive.

III. VIRTUALIZATION IMPACTS:

The impacts of virtualizations summed up in the below table no. 1 -

Table. 1 before and after virtualization impacts

Before Virtualization:	**After Virtualization:**
Single OS image per machine	Hardware-independence of operating system and applications
Software and hardware tightly coupled	Virtual machines can be provisioned to any system creates conflict
Running multiple applications on same machine often	encapsulating them into virtual machines
Underutilized resources	
Inflexible and costly infrastructure	

IV. HYPERVISOR:

The hypervisor is a creation of virtual machine rather then the actual machine by using the host machine . A software hypervisor was created to manage memory sharing in the mainframe. A hypervisor also allows multiple "guest" operating systems to run concurrently on a single physical host computer. The hypervisor functions between the computer operating system (OS) and the hardware kernel[2][3][5].

There are two types of hypervisors:

- Hypervisor type 1.

- Hypervisor type 2.

- *Hypervisor type 1*

This type of hypervisor is shown in Fig. 2. It is installed on original hardware, which basic mean that it is first object or thing which is installed at the server OS is an hypervisor. The main advantages of using this type of software is, that hypervisor program can be directly communicating with the hardware underneath. These hardware resources are then Para virtualized and delivered to the running virtual machines. This is the most preferred type of hypervisor in the enterprise systems.

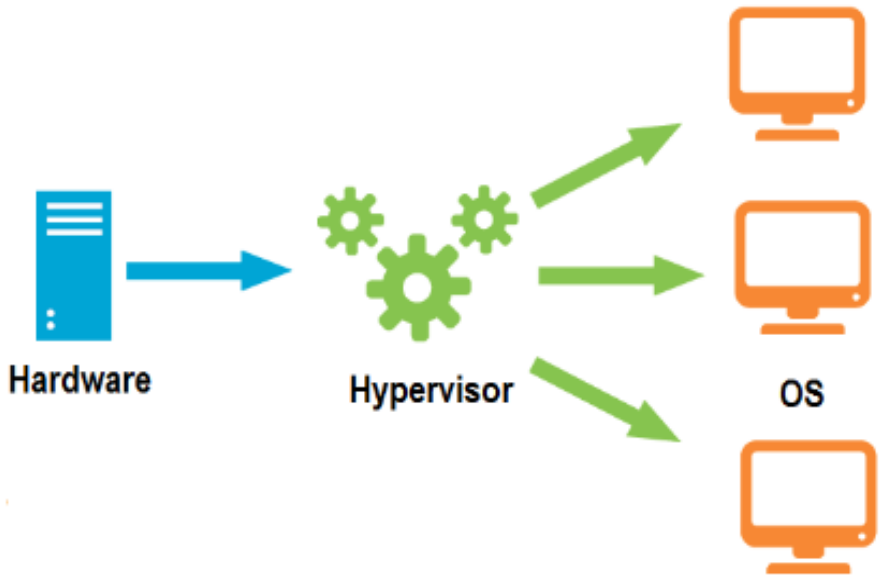

Fig. 2. – hypervisor type 1

- *Hypervisor type 2*

The hypervisor is shown in Fig. 2 and is called as guest hypervisor. Software is not installed directly to the plain hardware, but on the top of the running operating system. VM are the Workstation 8 computer at the top of the OS. Even there is also other jump in between H/W (hardware) and the physical resources, minimal latency , and with now today modern functionality of operating systems, hypervisor type 2 has the optimal power.

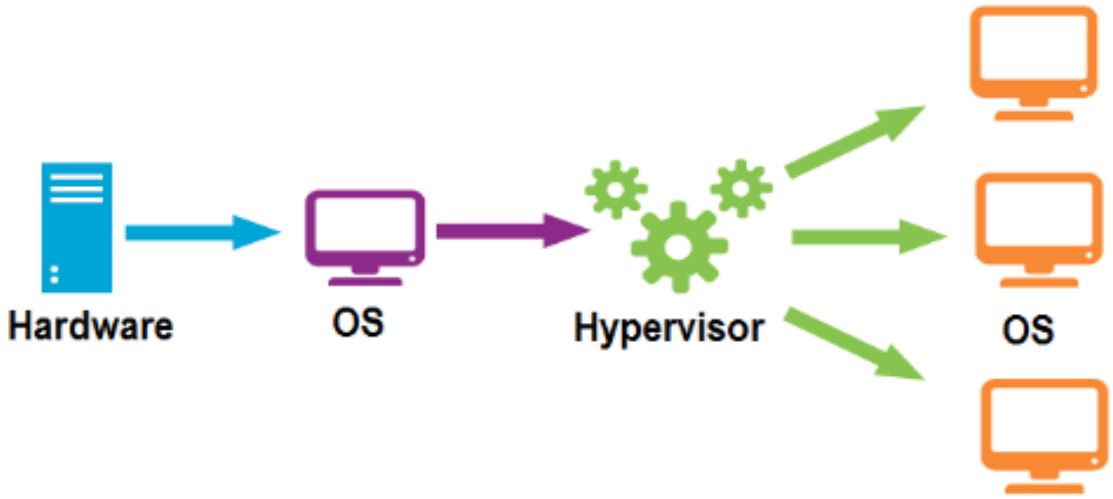

Fig. 2 – hypervisor type 2

Before choosing the suitable hypervisor, there are some points to ponder:
- Compatibility: Be 100% sure that the chosen hypervisor is compatible with hardware to be used.
- Balance between performance, simple management and ability of future integration with new functionalities.
- Availability.
- Reliability.
- Scalability.

V. COMPARISON OF HYPERVISOR TYPE 1 AND HYPERVISOR TYPE 2:

Table 2: Comparative study of hypervisor type 1 and type 2

Properties	**type 1 Hypervisor**	**type 2 Hypervisor**
Hardware resources	Minimum	more
Cost	more expensive, because almost every advanced features are licensed separately	less expensive by usage of open source
Hardware compatibility	drivers for physical devices, but their number is limited, which is limiting the choice of hardware	much bigger, because it runs on Windows or Linux operating system
Installation	Not the need of experts for maintenance	similar in terms of installation but use in other applications in OS
Example	Hyper-V by Microsoft	VMware

VI. ADVANTAGES OF VIRTUALIZATION:

There are several advantages to virtualization across several dimensions:

• *Security*: by compartmentalizing environments with security requirements in different virtual machines one can select the guest operating system and tools that are more appropriate for each environment.

For example, we may want to run the Apache web server on top of a Linux guest operating system and a backend MS SQL server on top of a guest Windows XP operating system, all in the same physical platform. A security attack on one virtual machine does not compromise the others because of their isolation[4][5].

• *Reliability and availability*: A software failure in a virtual machine does not affect other virtual machines.

• *Cost*: It is possible to achieve cost reductions by consolidation smaller servers into more powerful servers. Cost reductions stem from hardware cost reductions (economies of scale seen in faster servers), operations cost reductions in terms of personnel, floor space, and software licenses[5][6].

• *Adaptability to Workload Variations*: Changes in workload intensity levels can be easily taken care of by shifting resources and priority allocations among virtual machines. Autonomic computing-based resource allocation techniques, such as the ones in, can be used to dynamically move processors from one virtual machine to another.

• *Load Balancing:* Since the software state of an entire virtual machine is completely encapsulated by the VMM, it is relatively easy to migrate virtual machines to other platforms in order to improve performance through better load balancing.

• *Legacy Applications:*Even if an organization decides to migrate to a different operating system, it is possible to continue to run legacy applications on the old OS running as a guest OS within a VM. This reduces the migration cost.

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