Lecture 7

Types of Virtualization

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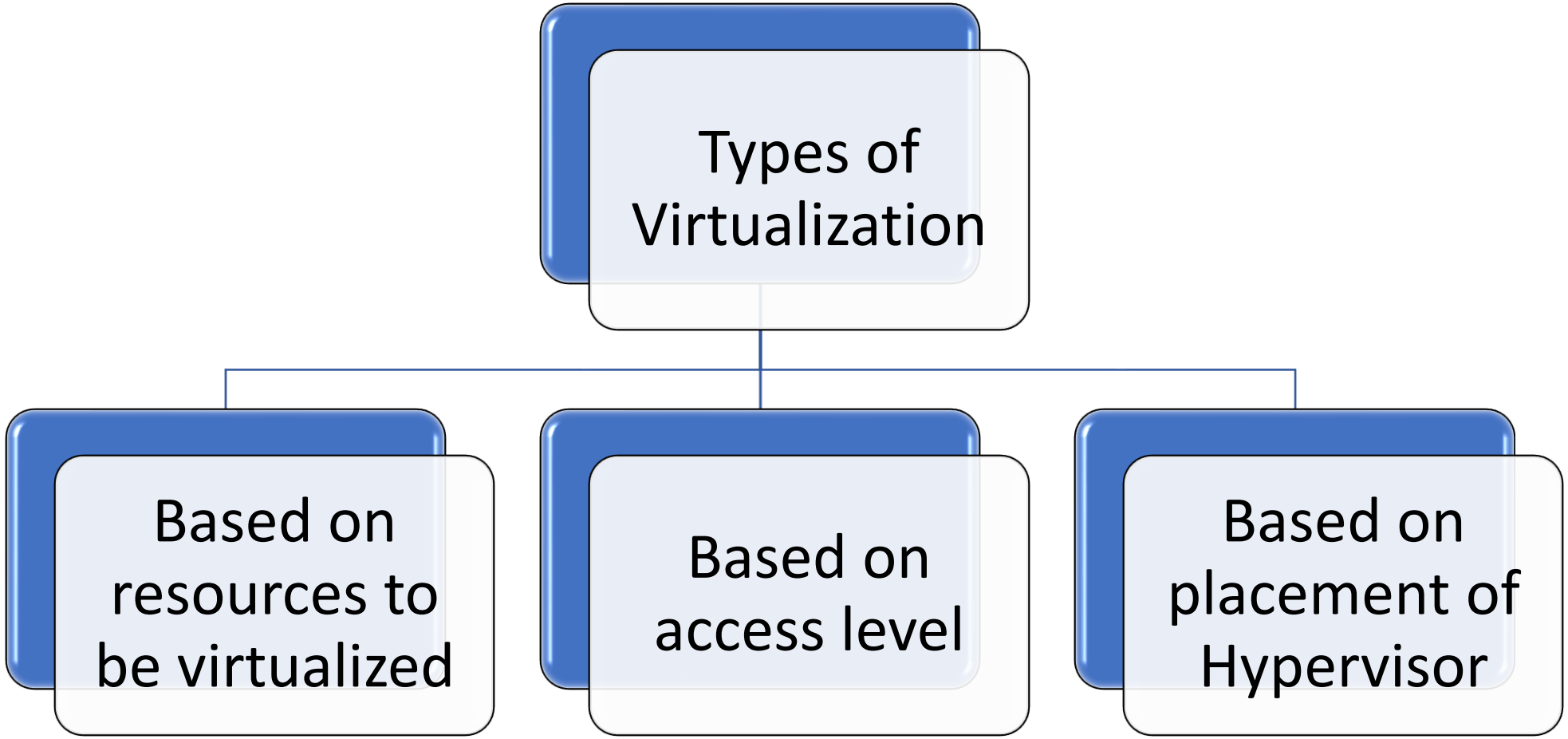

Types of Virtualization: Based on resources to be virtualized

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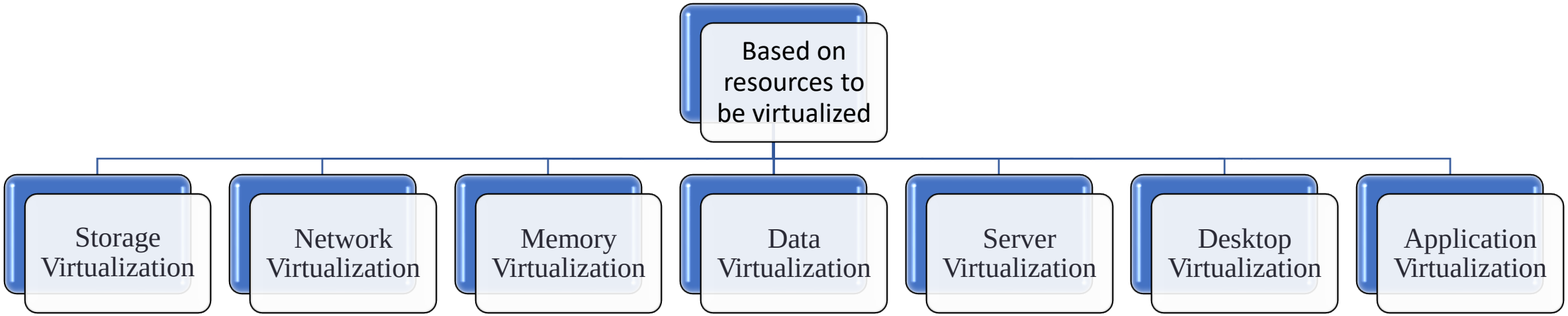
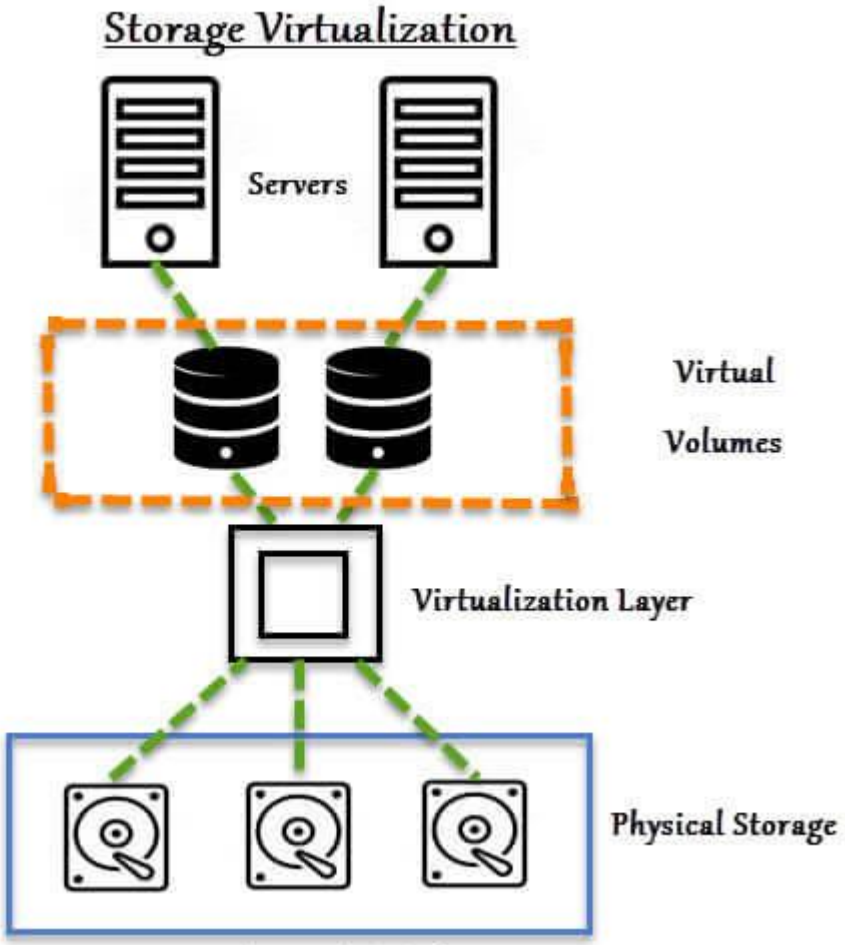


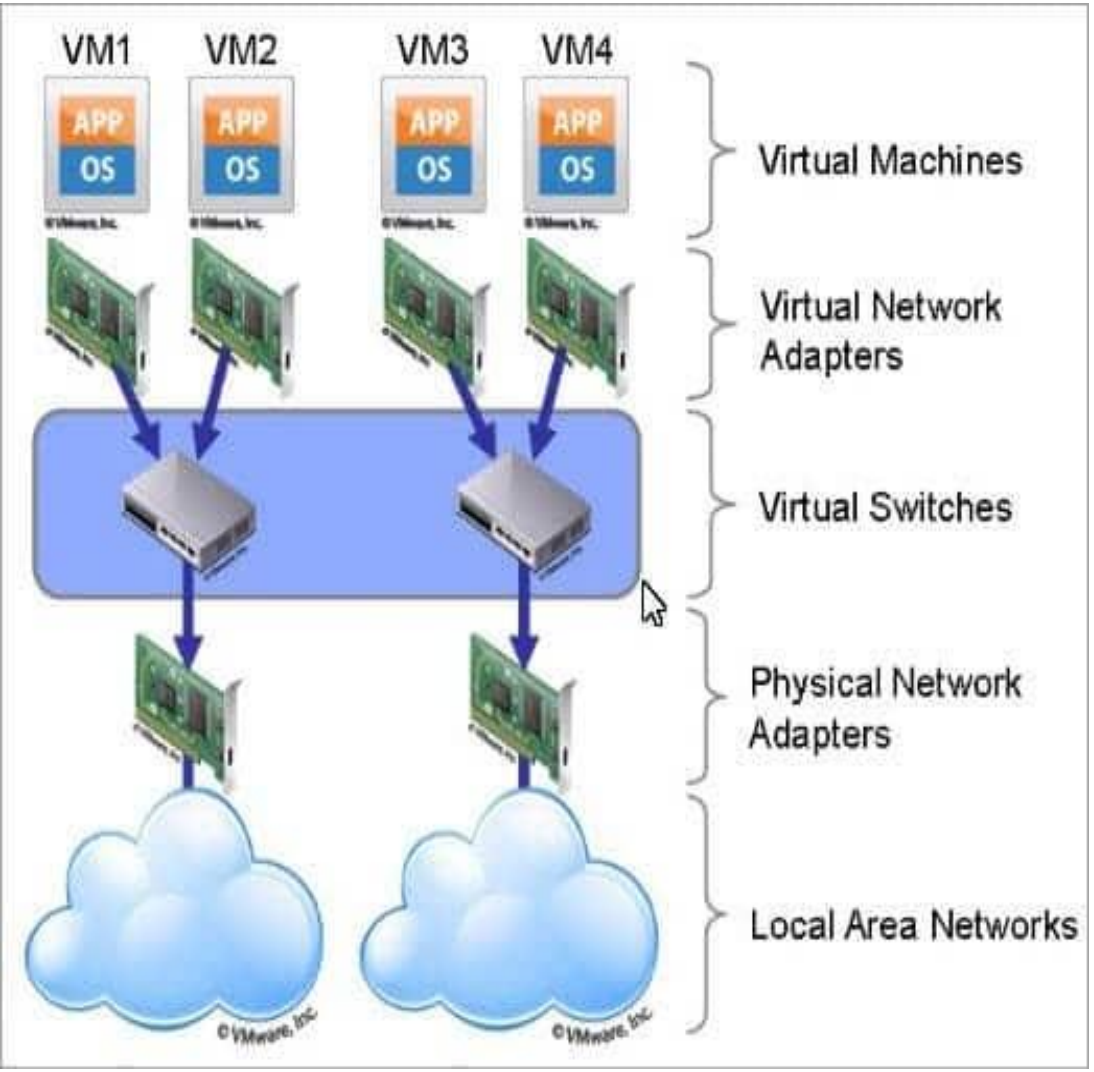
Storage Virtualization



Storage Virtualization basically combines/pools the storage that is available in various devices and keeps it as single storage.

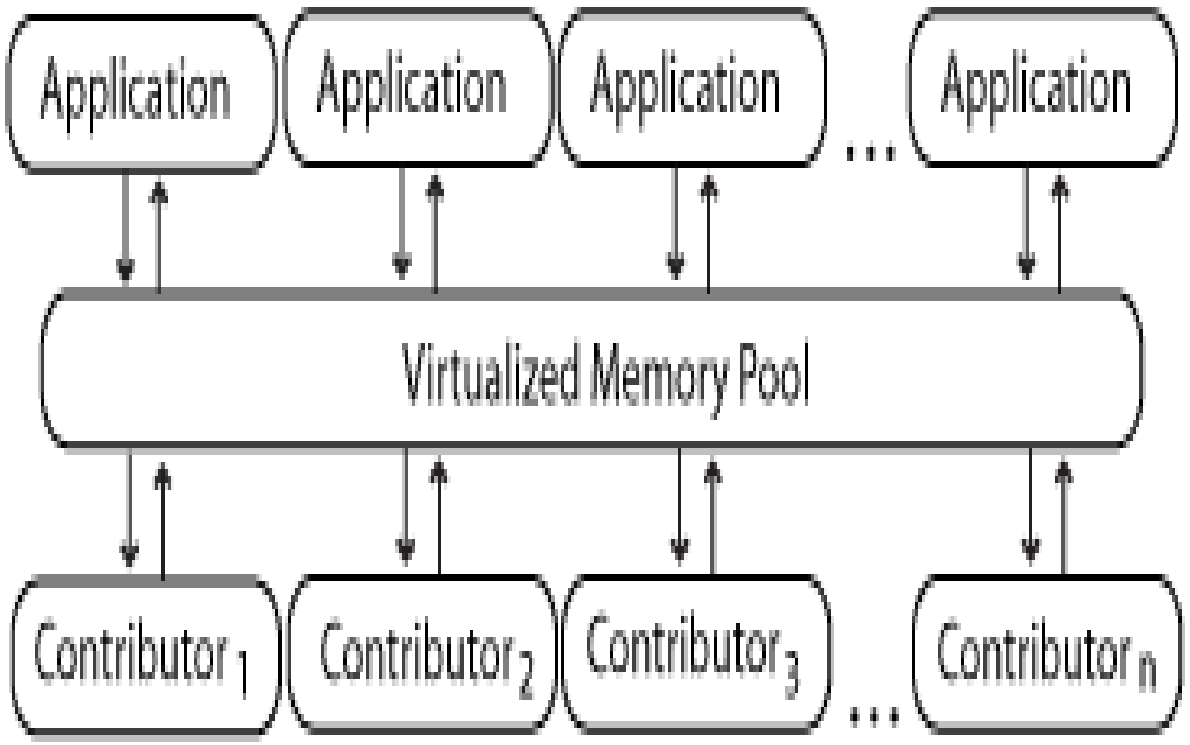
Usage: Storage Virtualization is mainly done for back-up and recovery purposes.

Network Virtualization



- **Network Virtualization** (NV) refers to abstracting network resources that were traditionally delivered in hardware to software. NV can combine multiple physical networks to one virtual, software-based network, or it can divide one physical network into separate, independent virtual networks.
- Network virtualization software allows network administrators to move virtual machines across different domains without reconfiguring the network. The software creates a network overlay that can run separate virtual network layers on top of the same physical network fabric.

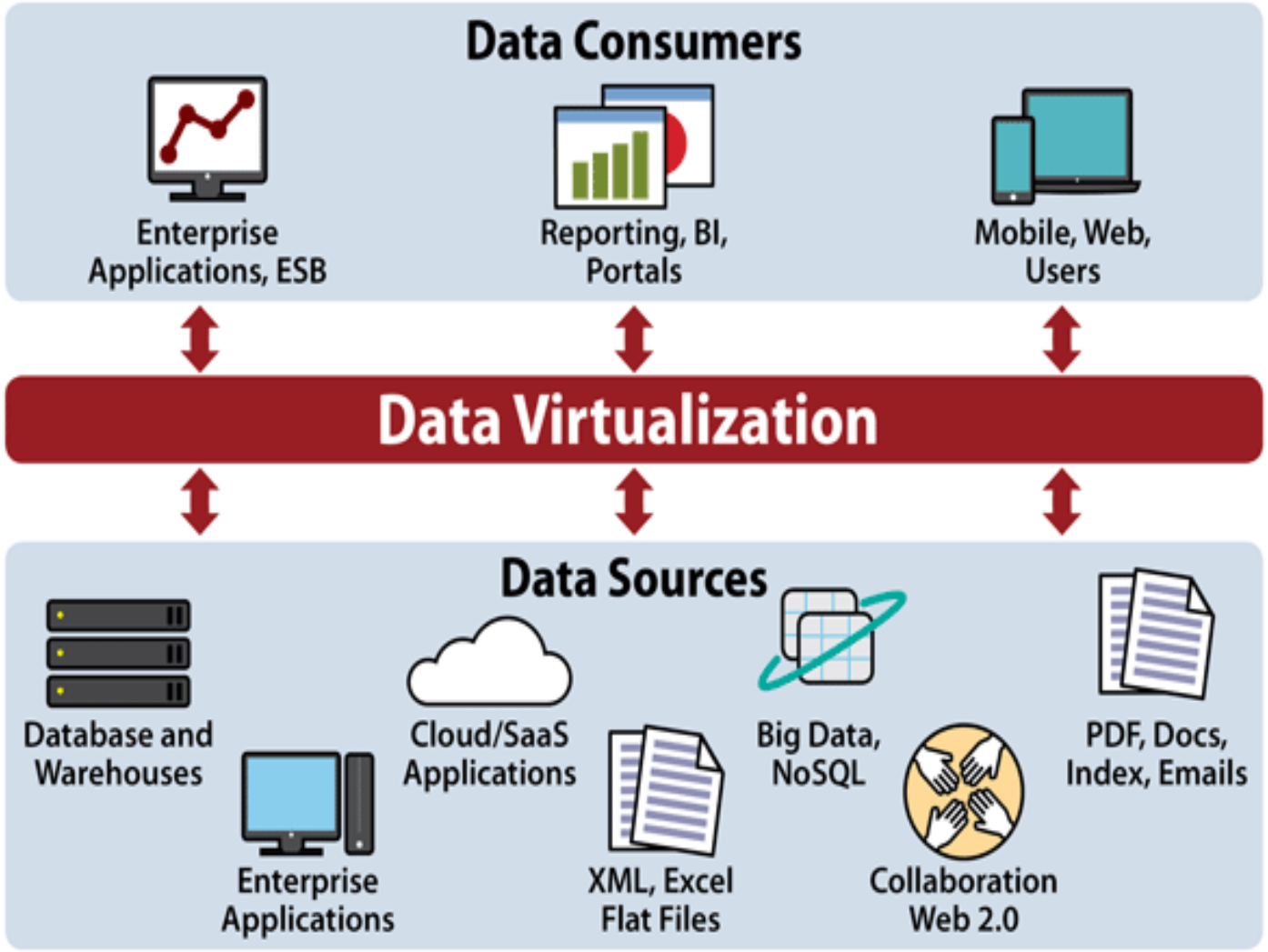
Memory Virtualization



Memory Virtualization: Application Level Implementation

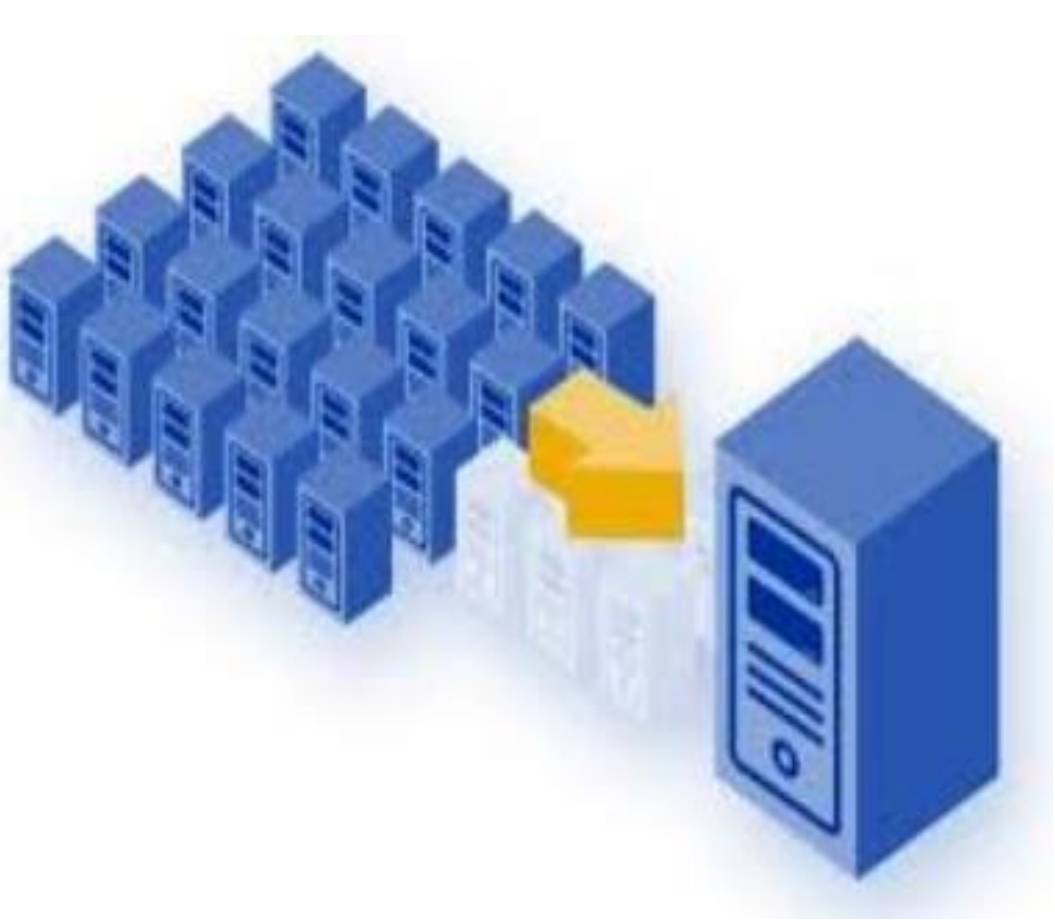
- With memory virtualization, physical memory over various servers is assembled into a unified virtualization memory space that gives the advantage of enlarged adjacent working memory. For example, Microsoft Windows OS permits a segment of storage disk to perform as an extension of RAM.
- Basically, it introduces the mode to disengage memory from the server in order to deliver a shared, delivered or networked function. Also, it increases the performance through providing enlarged memory capacity without any inclusion in the primary memory.

Data Virtualization



- Data virtualization is the process of retrieve data from various resources without knowing its type and physical location where it is stored. It collects heterogeneous data from different resources and allows data users across the organization to access this data according to their work requirements. This heterogeneous data can be accessed using any application such as web portals, web services, E-commerce, Software as a Service (SaaS), and mobile application

Server Virtualization

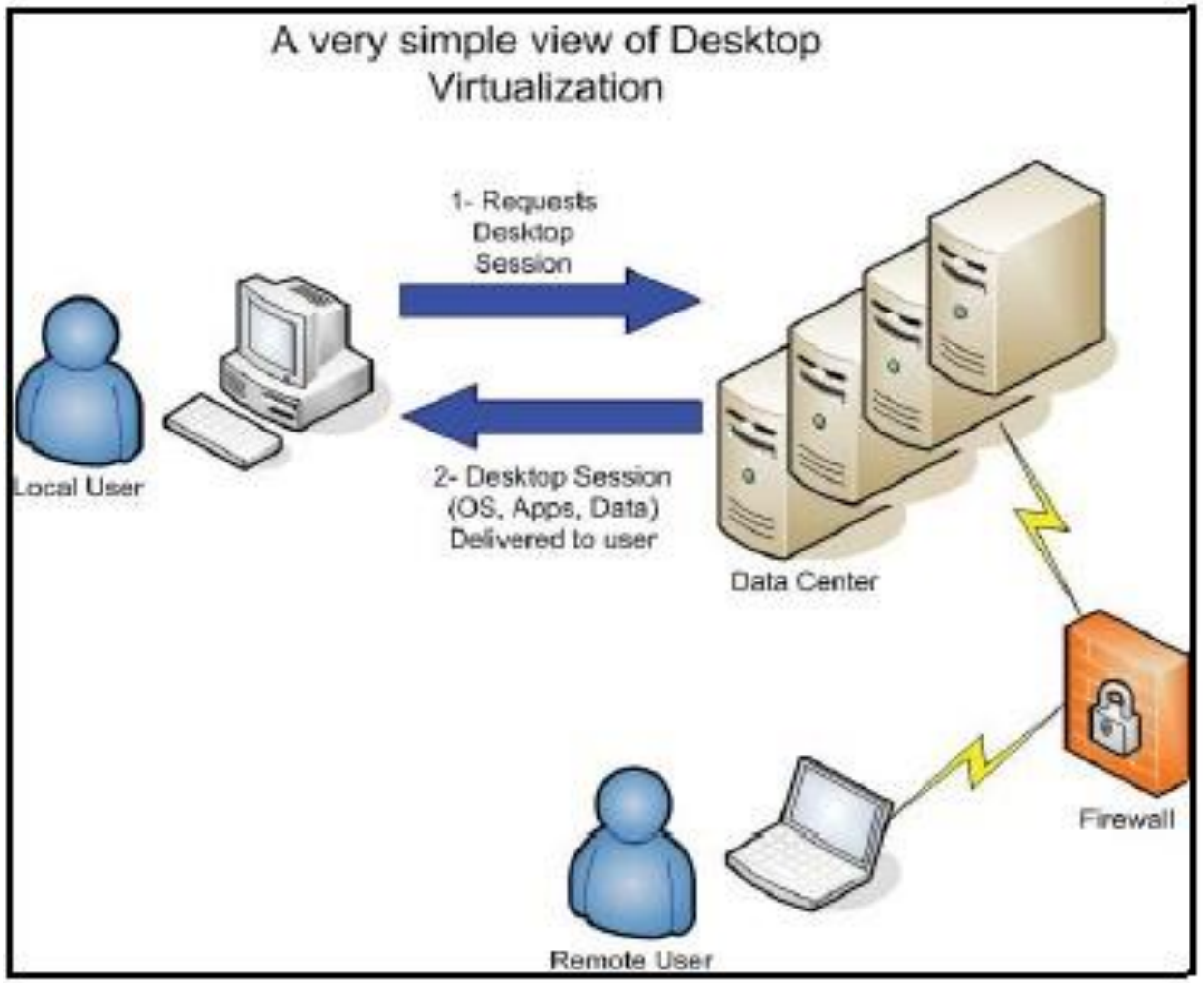


- Server virtualization is the process of dividing a physical server into multiple unique and isolated virtual servers by means of a software application. Each virtual server can run its own operating systems independently.

Key Benefits of Server Virtualization:

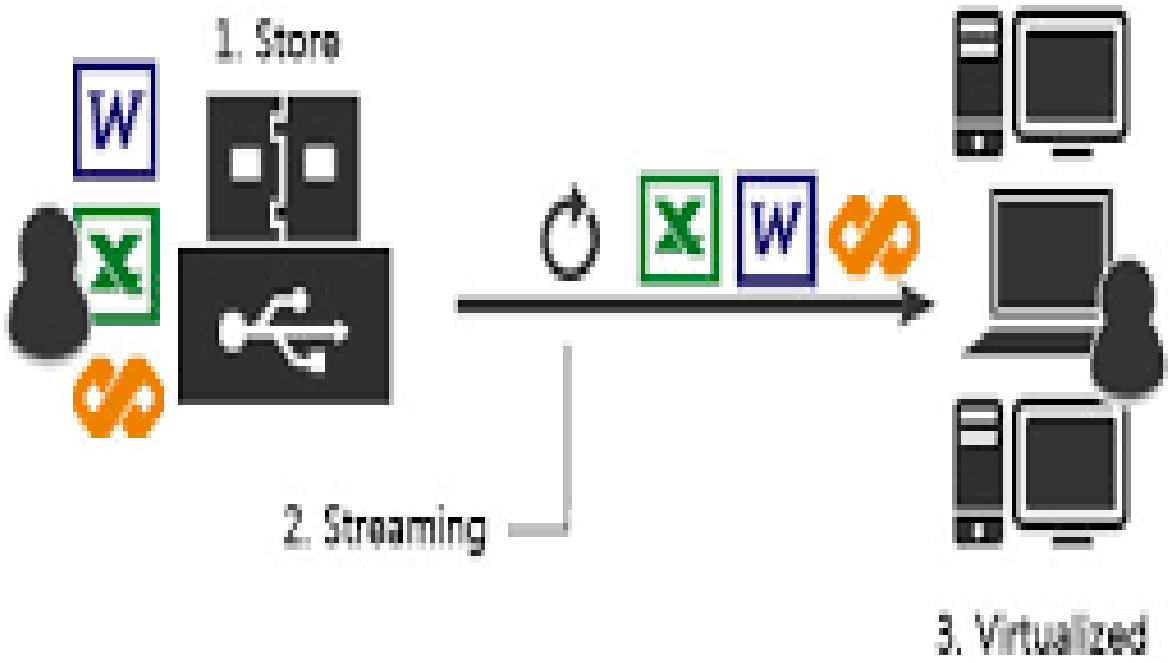
- Higher resource utilization
- Higher server ability
- Cheaper operating costs
- Increased application performance
- Deploy workload quicker

Desktop Virtualization



Desktop virtualization is a method of simulating a user workstation so it can be accessed from a remotely connected device. By abstracting the user desktop in this way, organizations can allow users to work from virtually anywhere with a network connecting, using any desktop laptop, tablet, or smartphone to access enterprise resources without regard to the device or operating system employed by the remote user.

Application Virtualization



Application virtualization or app virtualization is technology that allows users to access and use an application from a separate computer than the one on which the application is installed. Using application virtualization software, IT admins can set up remote applications on a server then deliver the apps to an end user's computer. For the user, the experience of the virtualized app is the same as using the installed app on a physical machine.

Types of Virtualization: Based on access level

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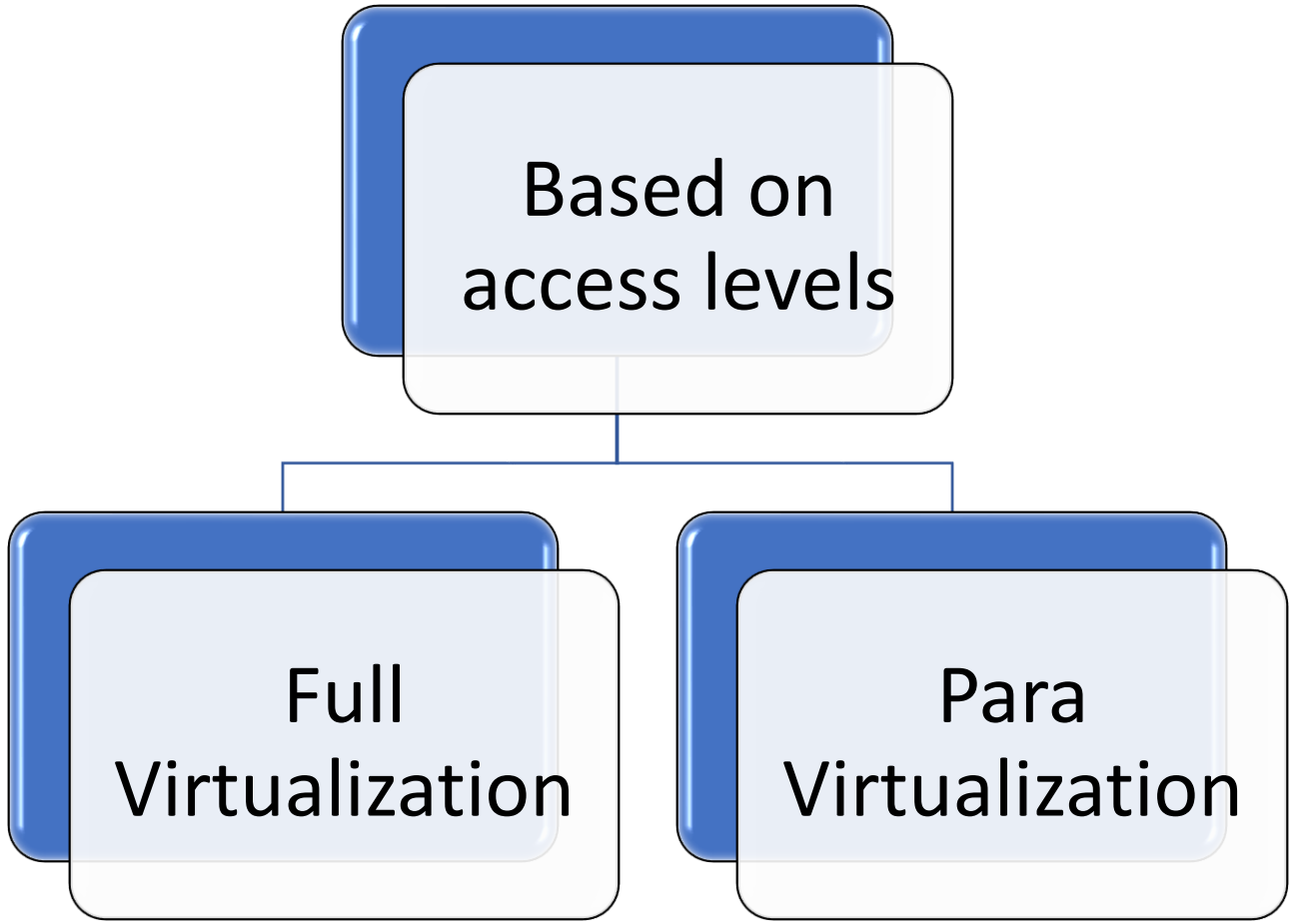
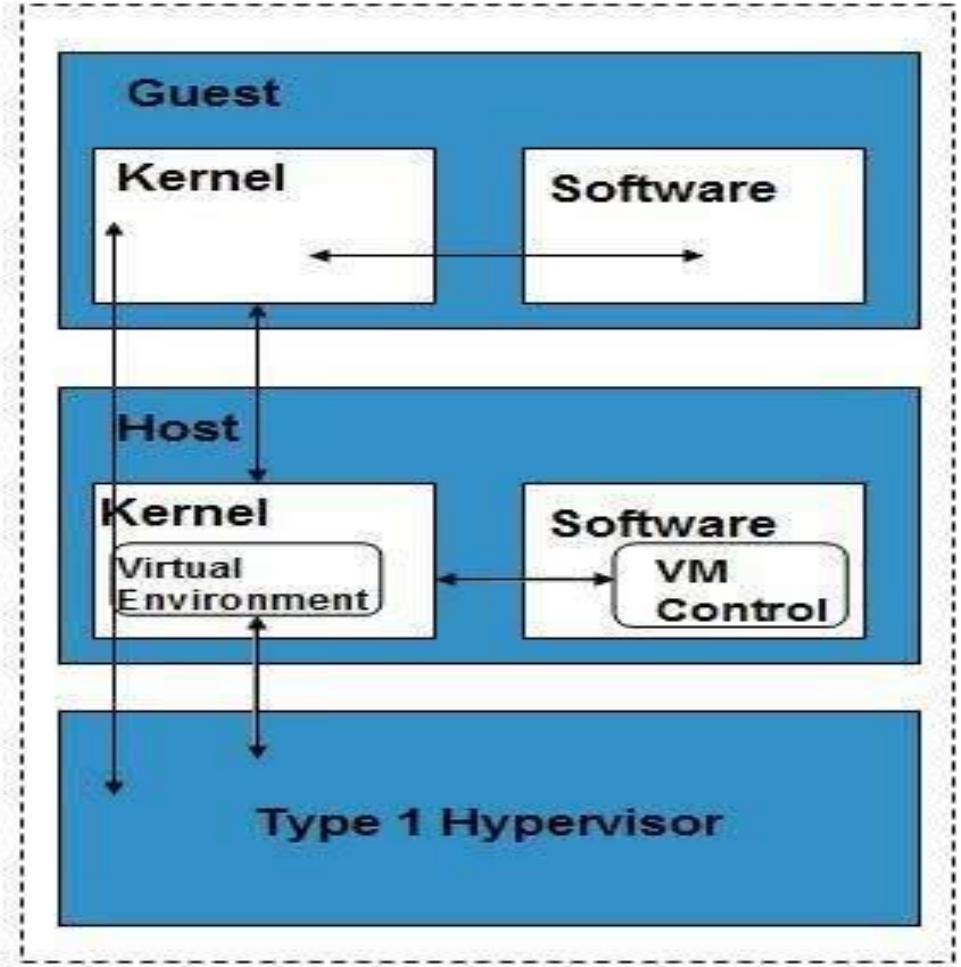
Based on the access of the hardware resources by VM, virtualization can be divided into two parts:



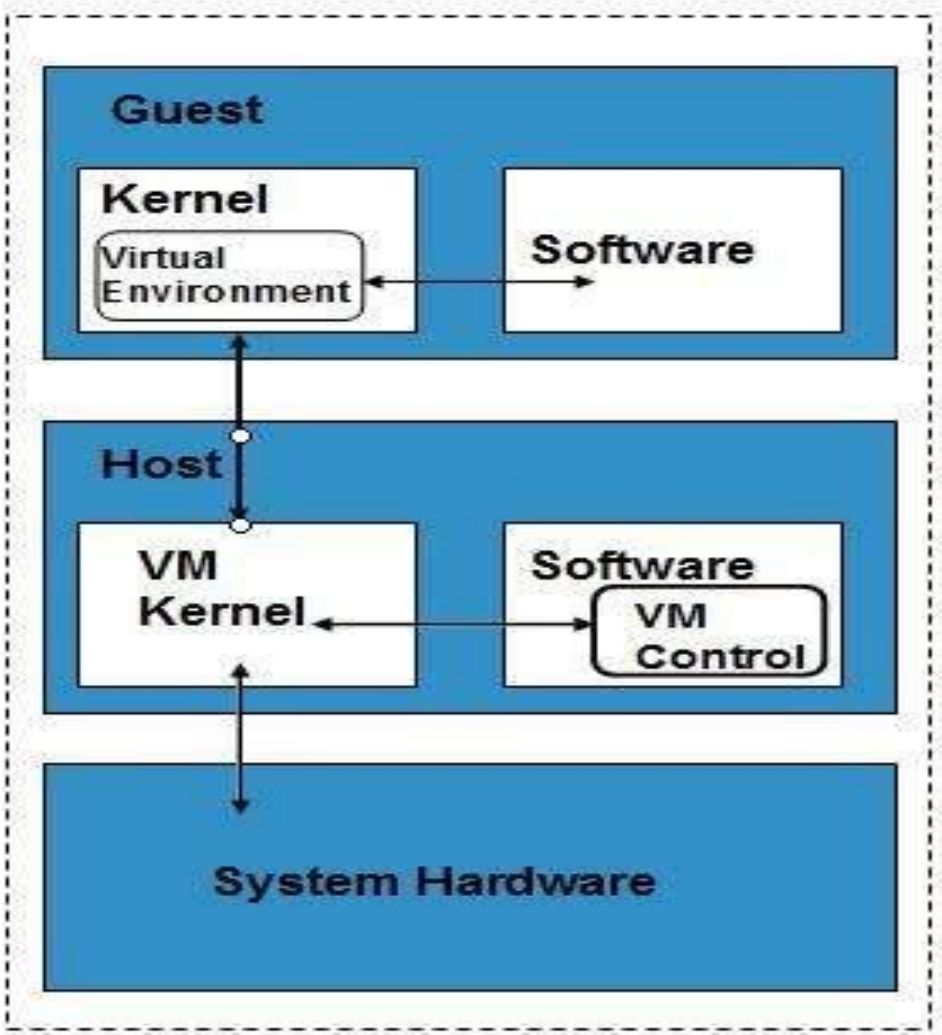
Full Virtualization

The hardware completely supports the virtual machines and we need not to modify the hardware or software. E.g., KVM, VMWare



Para Virtualization

In **Para virtualization,** the hardware is not simulated. The guest software run their own isolated domains.



Types of Virtualization: Based on placement of Hypervisor

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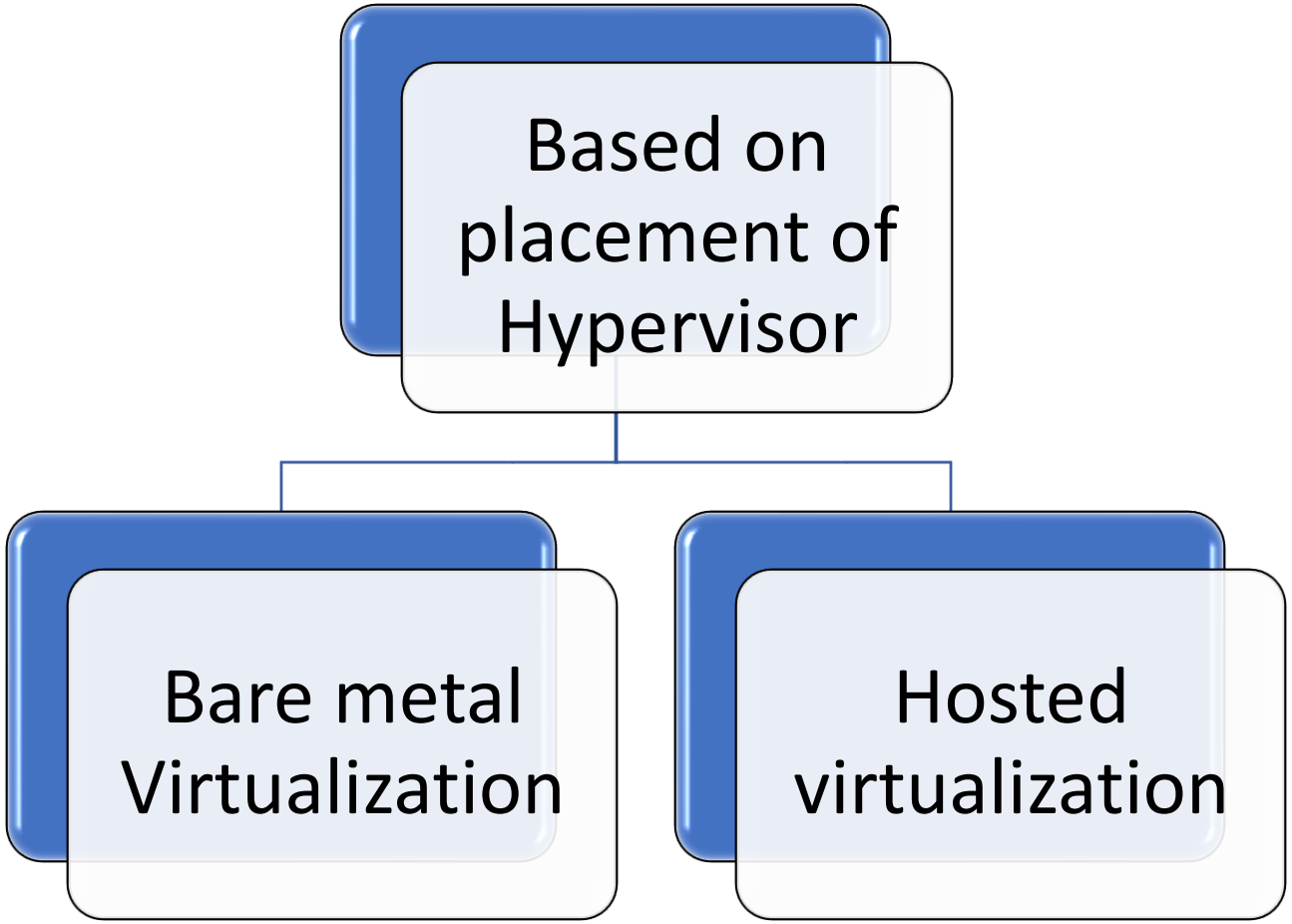
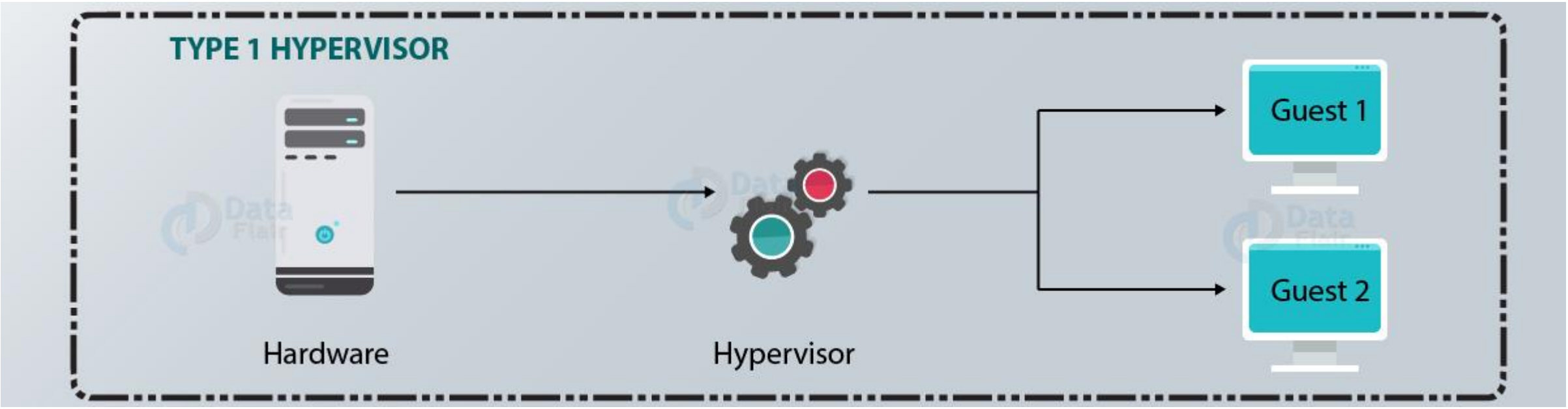


Hypervisor

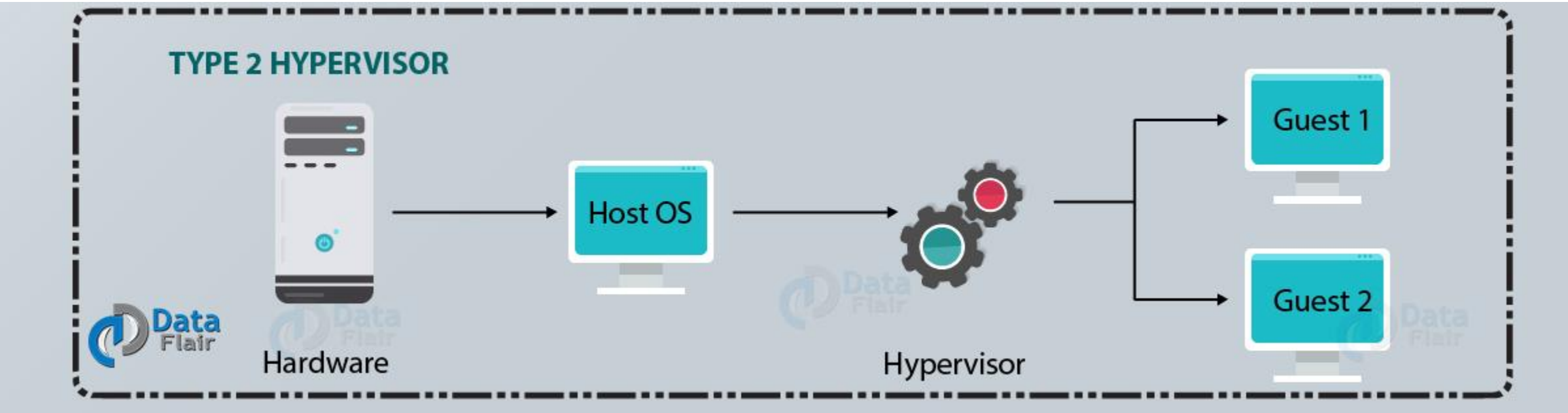
- A Hypervisor is a layer between the **operating system** and hardware. The hypervisor is the reason behind the successful running of multiple operating systems.
- It can also perform tasks such as handling queues, dispatching and returning the hardware request. Host operating system works on the top of the hypervisor, we use it to administer and manage the virtual machines.

Bare-metal Virtualization



The Bare-metal hypervisor is installed directly on the top of the host hardware. It manages all the hardware resources which are installed inside the tin. The hardware resource is further allocated to the virtual machine. VMware vSphere ESXi is an example of the bare metal hypervisor.

Hosted Virtualization

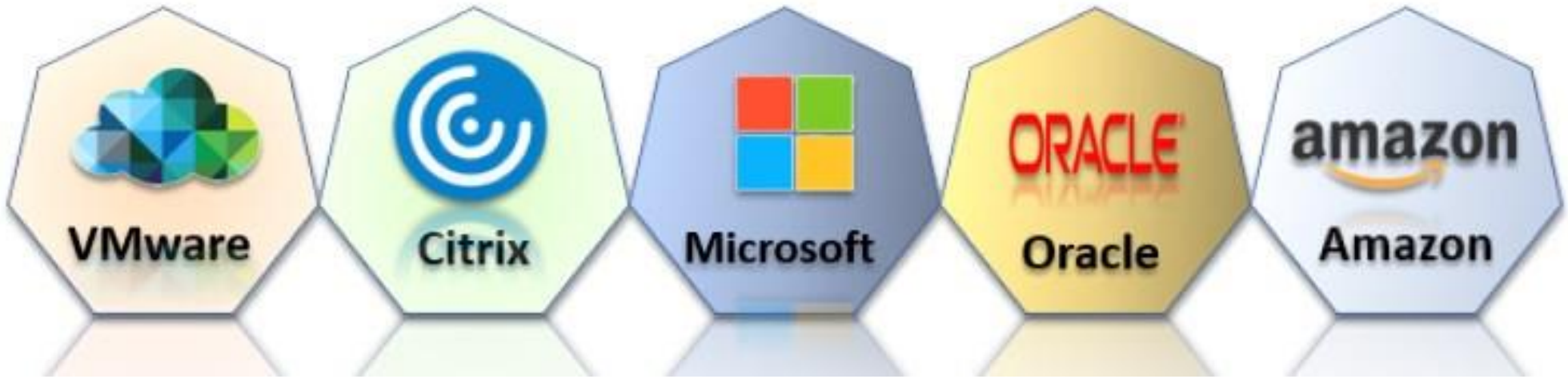


The second type of hypervisor runs directly on the top of the conventional operating system. Type 2 hypervisor has some architecture limitation. They are quite popular in a nonproduction environment and VMware Workstation for VirtualBox is the example of type-2.

Criteria	Type 1 hypervisor	Type 2 hypervisor
AKA	Bare-metal or Native	Hosted
Definition	Runs directly on the system with VMs running on them	Runs on a conventional Operating System
Virtualization	Hardware Virtualization	OS Virtualization
Operation	Guest OS and applications run on the hypervisor	Runs as an application on the host OS
Scalability	Better Scalability	Not so much, because of its reliance on the underlying OS.
Setup/Installation	Simple, as long as you have the necessary hardware support	Lot simpler setup, as you already have an Operating System.
System Independence	Has direct access to hardware along with virtual machines it hosts	Are not allowed to directly access the host hardware and its resources
Speed	Faster	Slower because of the system's dependency
Performance	Higher-performance as there's no middle layer	Comparatively has reduced performance rate as it runs with extra overhead
Security	More Secure	Less Secure, as any problem in the base operating system affects the entire system including the protected Hypervisor
Examples	• VMware ESXi • Microsoft Hyper-V • Citrix XenServer	• VMware Workstation Player • Microsoft Virtual PC • Sun’s VirtualBox

Different Virtualization Platform

Top 5 virtualization platform which can be used and implemented by anyone whether it's a small business or a large company.



VMware

- If we talk about virtualization the first thing which comes to mind is VMware.
- VMware is the best option for virtualization as it’s easy to use and has robust security features.
- VMware offers different solutions to cater to a wide variety of needs for different sized business houses.

Citrix

- Citrix is one of the emerging platforms who provide virtualization
- It has popular remote access tools such as GoToMyPC and GoToMeeting apps.
- Citrix also has specifically designed virtualization software such as XenApp, XenDesktop, and VDI-in-a-box which can be used by small and mid-range business houses.
- Citrix also claims that non-IT staff can provide support and work with their application.
- They also have a free version to try and test their platform.

Microsoft

- Microsoft provides software known as Hype-V for visualization.
- It is in boom since it has very good integration with the Microsoft cloud platform Azure.
- The only drawback for this is that we need to maintain an in-house or outsource IT professional to work with this platform.
- This platform provides everything a business house requires starting from virtualization service to many more others.

Different Virtualization Platform

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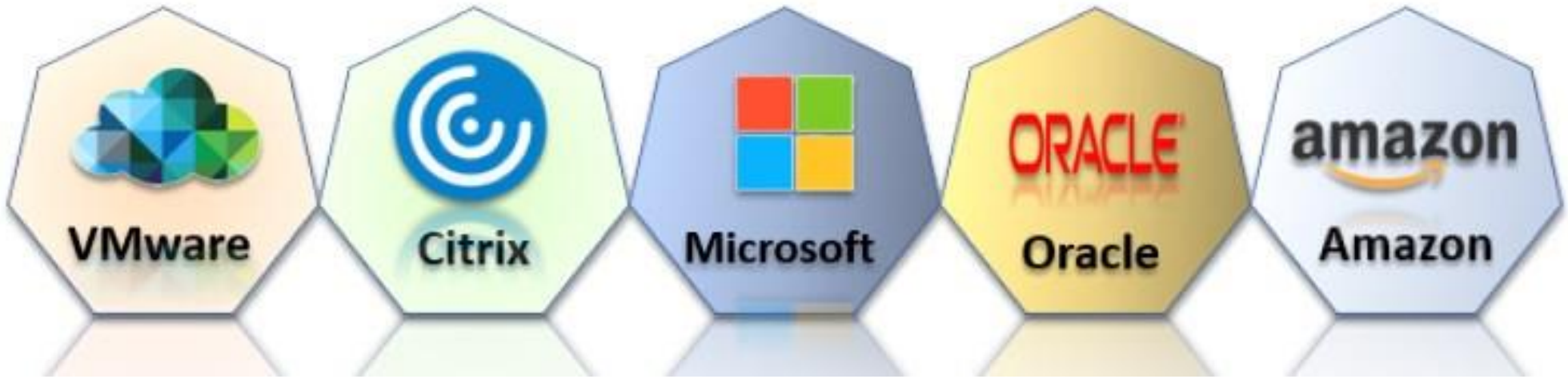

Oracle

- Oracle is the company that provides many services starting from the database management system to customer relationship management.
- Oracle offers everything from Desktop virtualization, to app virtualization.
- There are multiple benefits of using their platform as they consolidate all the services into one and provide you support for the same.

Amazon

- Amazon has a service where the server is provided for the end-user to use.
- Amazon has an EC2 platform that provides the infrastructure for small and mid-range businesses.
- The scalability feature of this platform is unique, and if the business house wants rapid growth it must go with amazon EC2 platform
- Amazon can scale any visualization feature very quickly and finely without any issues.

Cloud Computing v/s Virtualization

- Virtualization is software that requires dedicated hardware's for multiple virtual machines while cloud computing refers to a service that results from that manipulation.
- Virtualization is a primary element of cloud computing and it helps deliver on the value of cloud computing.
- Virtualization limits the scalability of Virtual Machine configuration while Cloud computing can be extended as per your wish.
- Virtualization is a Software as a Service while Cloud Computing is an Infrastructure as a Service.
- Virtualization offers you to install multiple operating systems on a single server or a computer while Cloud Computing offers a large number of the user to access the network through the same link.
- Virtualization doesn't depend upon cloud computing, while we need virtualization for cloud computing.
- Virtualization is Image-based while Cloud Computing is Template bases.

Links

- https://www.geeksforgeeks.org/virtualization-cloud-computing-types/
- https://www.analyticssteps.com/blogs/10-types-virtualization-cloud-computing
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Thanks