

CLOUD-COMPUTING

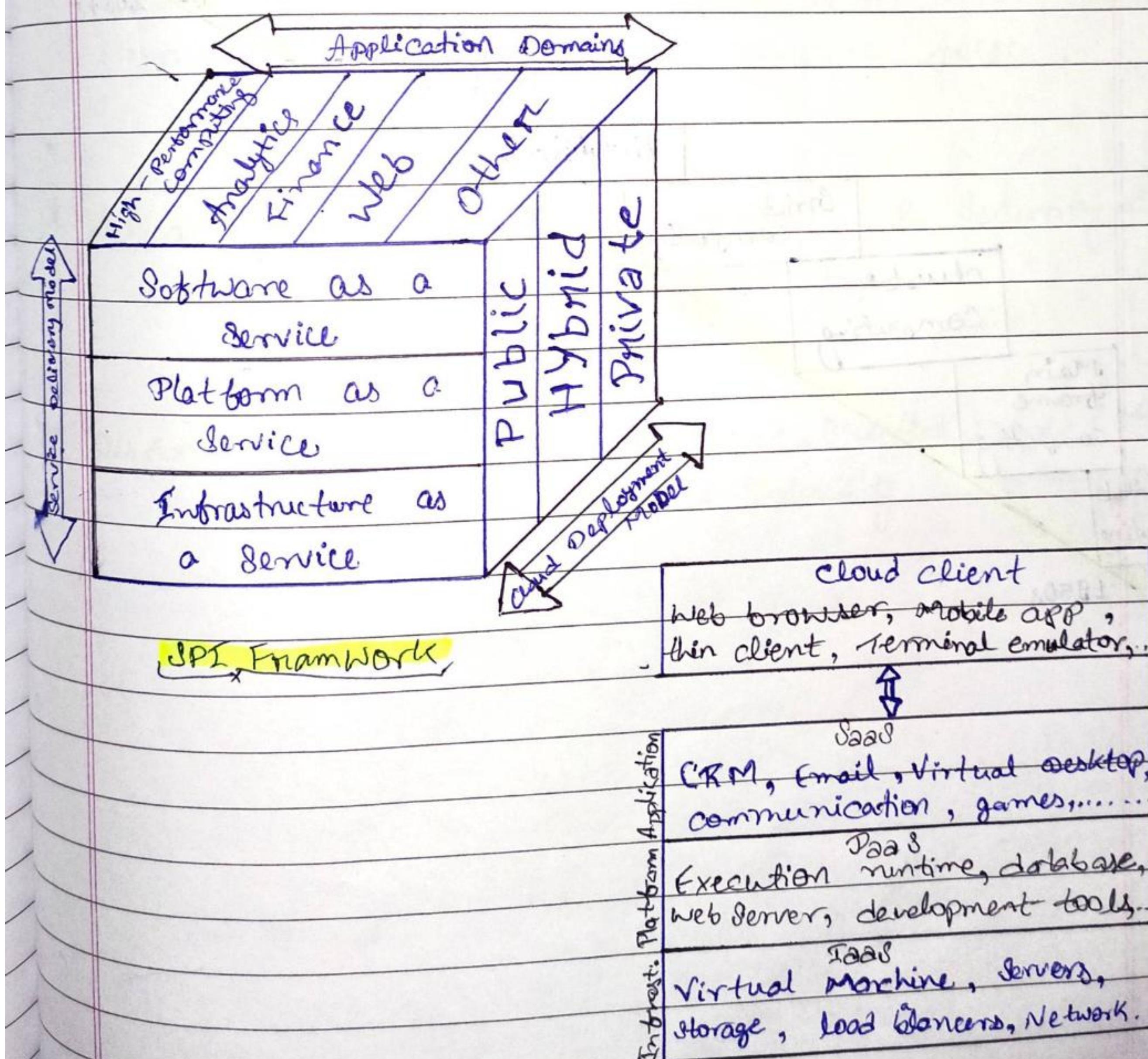
INTRO TO C.C.

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► SPI Framework :- It refers to most common service models of CC. SaaS, and PaaS, IaaS (SPI).

⇒ SPI MODEL is a term that encompasses three popular types of cloud computing services:-

► This model can be useful in combining various types of vendor services for business use.

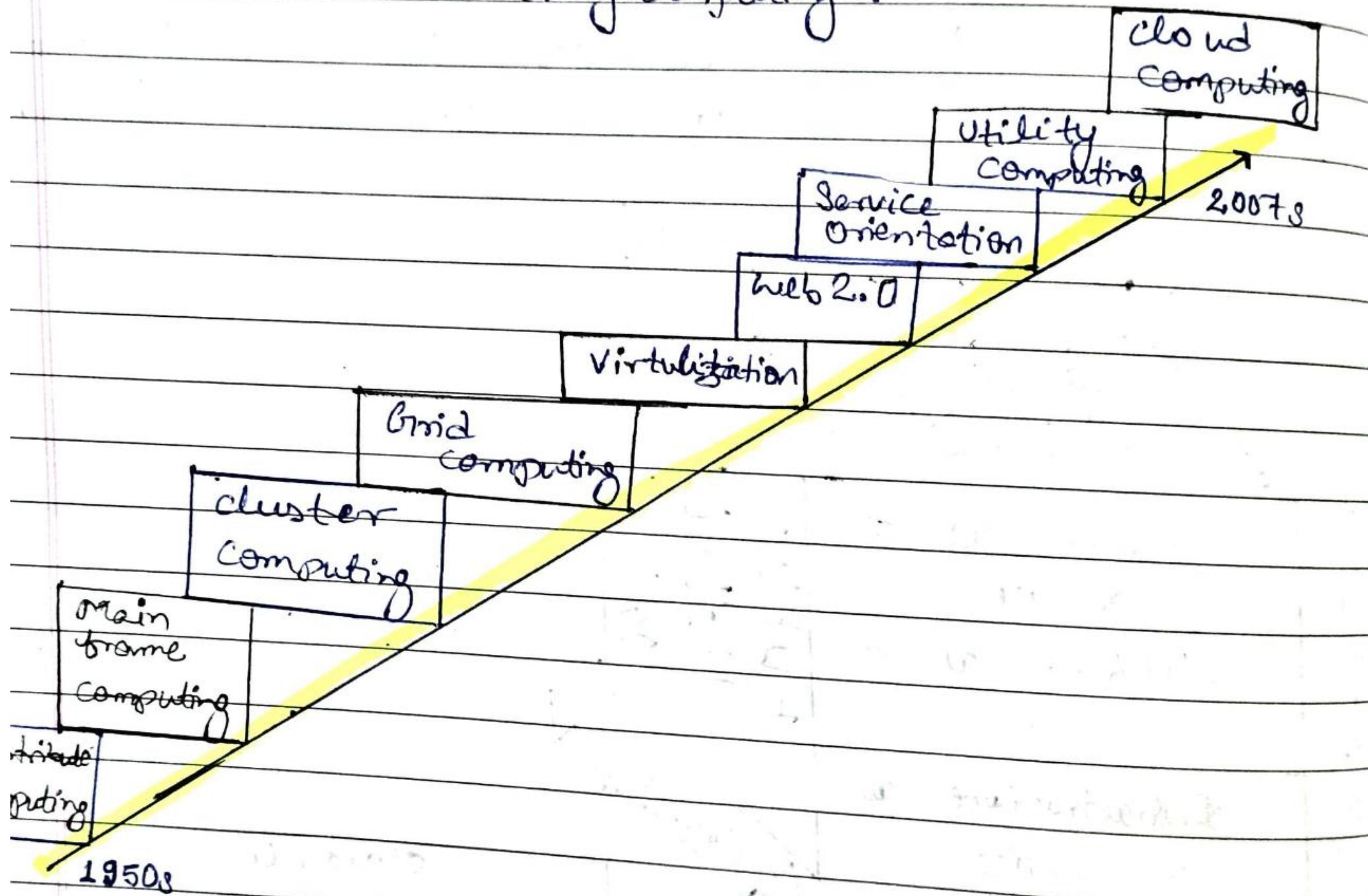


EVOLUTION OF CLOUD COMPUTING

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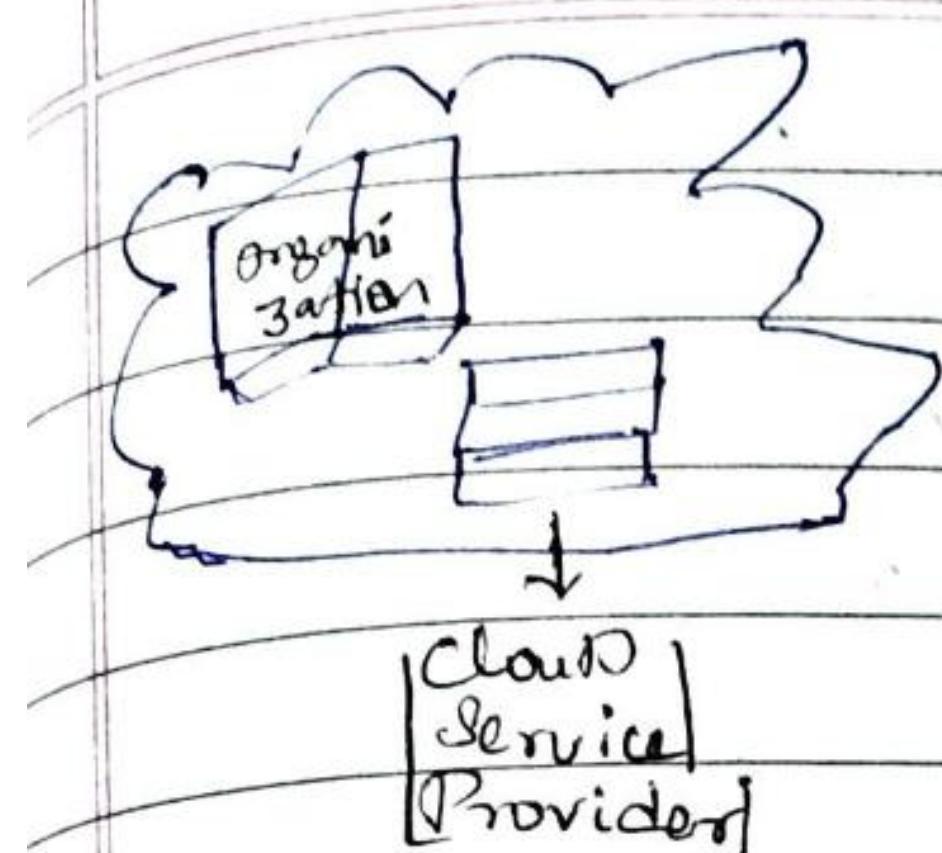
CC is all about renting computing resources or services. The idea first came in the 1950s. In making cloud-computing what it is today.

- Five Technology played a vital role. These are, distributed systems and its peripherals, Virtualization, web 2.0, Service orientation & Utility computing.



Public & Private Internal/Corporate Cloud

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* Fig - private cloud model.

* The aggregation of resources in a data center into a single pool of resources through virtualization of the hardware components, organizations increase the efficiency of utilization of their 'private cloud'.

→ It provides computing services to a private internal n/w (within the organization) and Selected Users instead of the general public.

* Advantages :- 1. More control 2. Security & privacy
3. Improved performance

* DisAdvantage :- 1. High cost 2. Skilled people (only can operate)
3. Limited scalability 4. Restricted area of operation

Public Environment

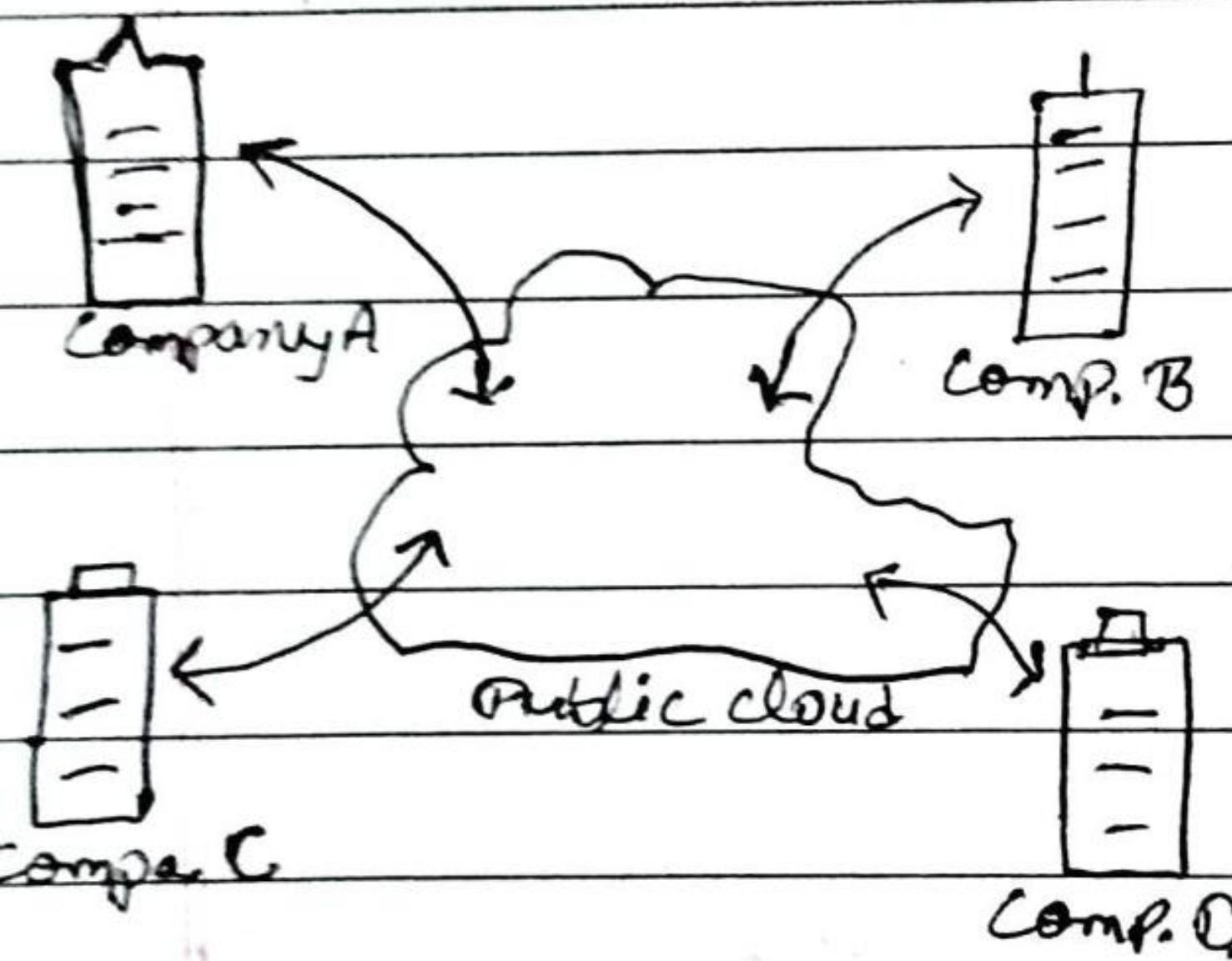
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Public cloud is defined as computing service offered by third - party provider over the public internet.

o Making them available to anyone who wants to use or purchase them. They may be free or sold on-demand allowing customers to pay only per user for the CPU cycles, storage, or bandwidth they consume.

e.g.: - M3 Azone, AWS, Cloud, EC2.



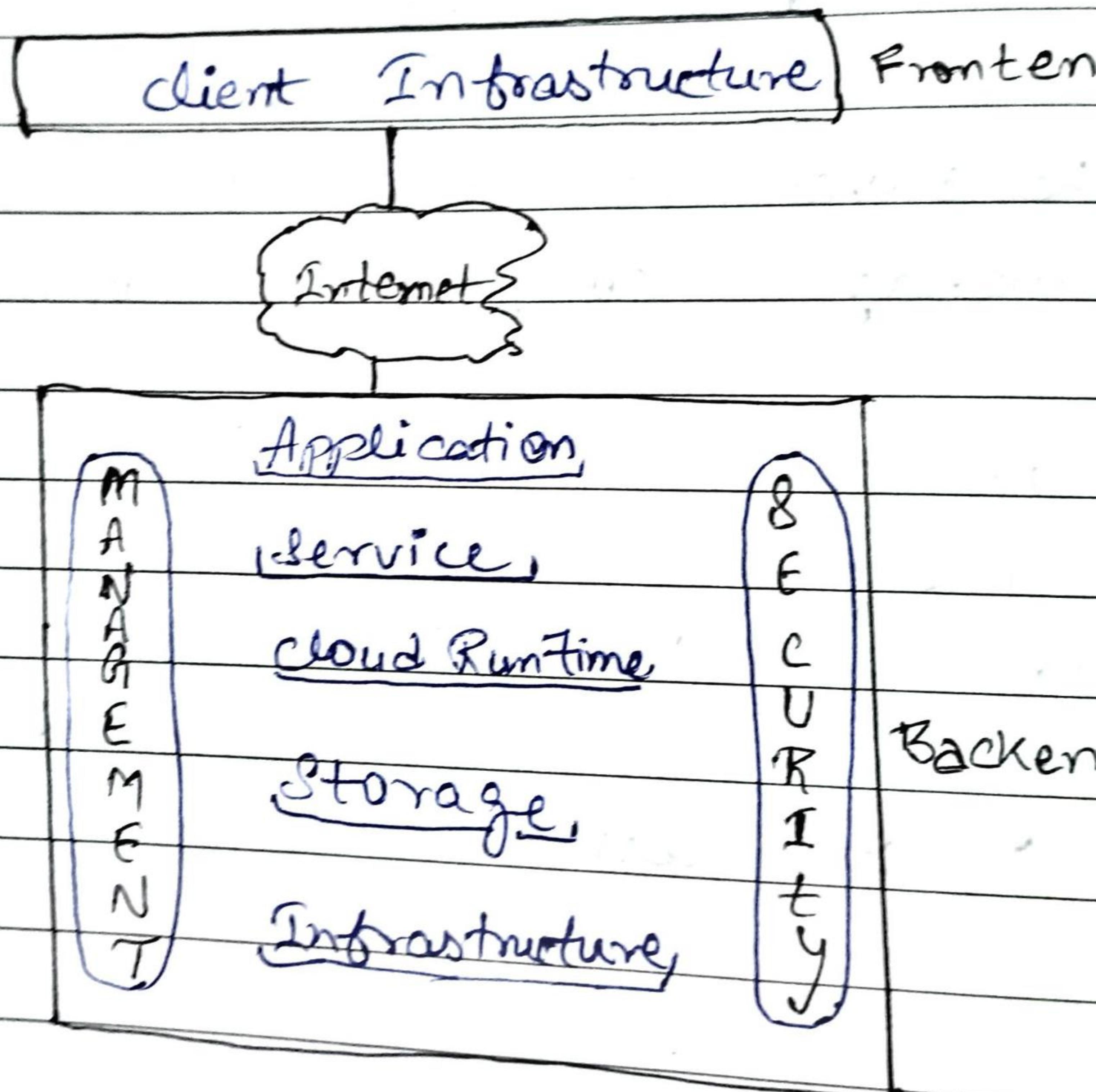
Advantage :-

- ① Low cost * 24x7
- ② Location Independent
- ③ Save time
- ④ Quickly & easily set-up
- ⑤ Business Agility
- ⑥ Scalability and reliability

* DisAdvantage:-

- ① Low Security
- ② performance
- ③ Less customizable.

CLOUD Architecture



Virtualization concept

① Virtualization :- is the creation of a virtual (rather than actual) version of something, such as a server, a desktop, a storage device, an operating system or network resources.

2nd P It is a technique, which allows to share a single physical instance of a resource or an application among multiple customers & organizations.

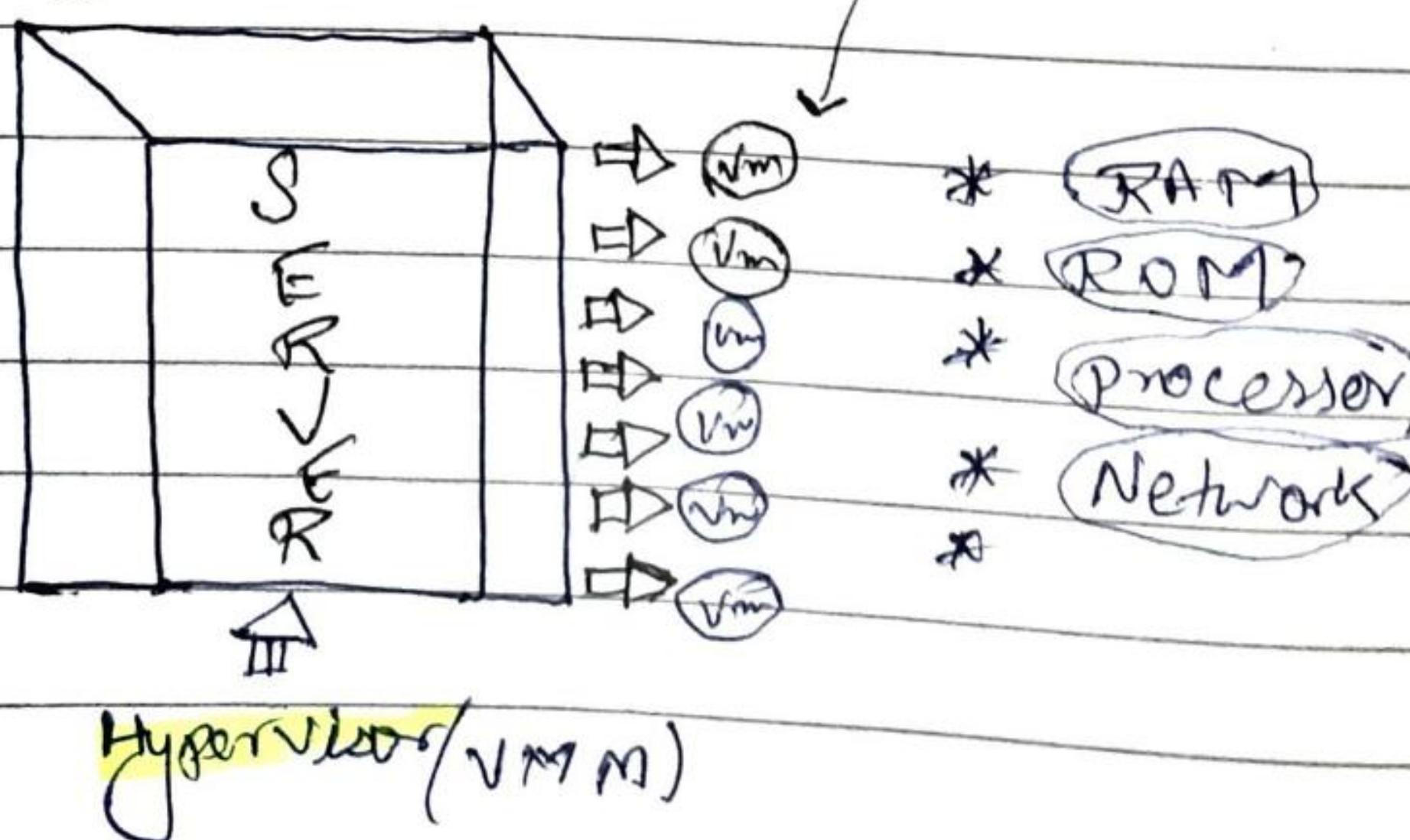
It does by assigning a logical name to a physical storage and providing a pointer to that physical resource when demanded.

concept:- Creation of a virtual machine over existing O-Operating System & hardware is known as H/w Virtualization.

A virtual machine provides an environment that is logically separated from the underlying H/w.

* Host Machine
[PC/Laptop]

* Guest Machine
[Vmware/et]



* Benefits OF Virtualization:-

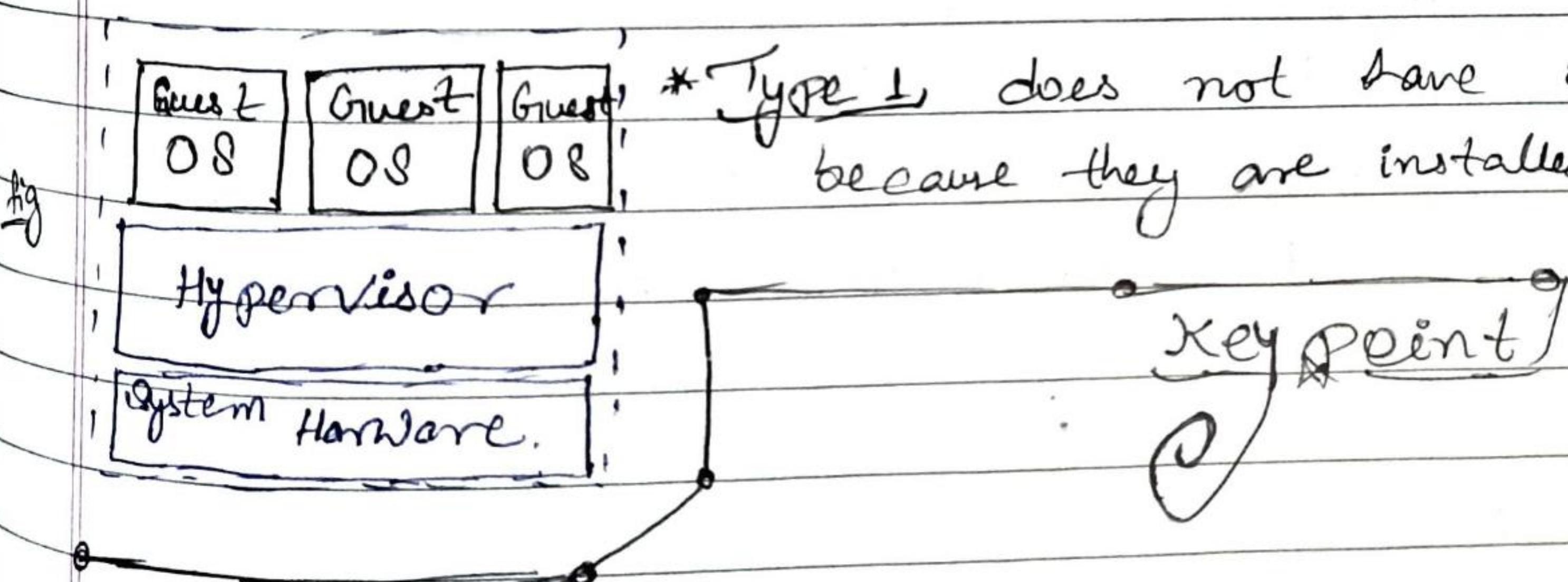
* Effective Server utilization.

* easy maintenance

1. More flexible and efficient allocation of resources.
2. Enhance development productivity.
3. It lowers the cost of IT infrastructure.
4. Remote access and rapid scalability.
5. High availability and disaster recovery.
6. Pay per-use of the IT infra. On Demand.
7. Enables running multiple Operating System.

* Hypervisor:- It is a firmware or low-level program that acts as a 'Virtual Machine Manager'. There are two types of hypervisor.

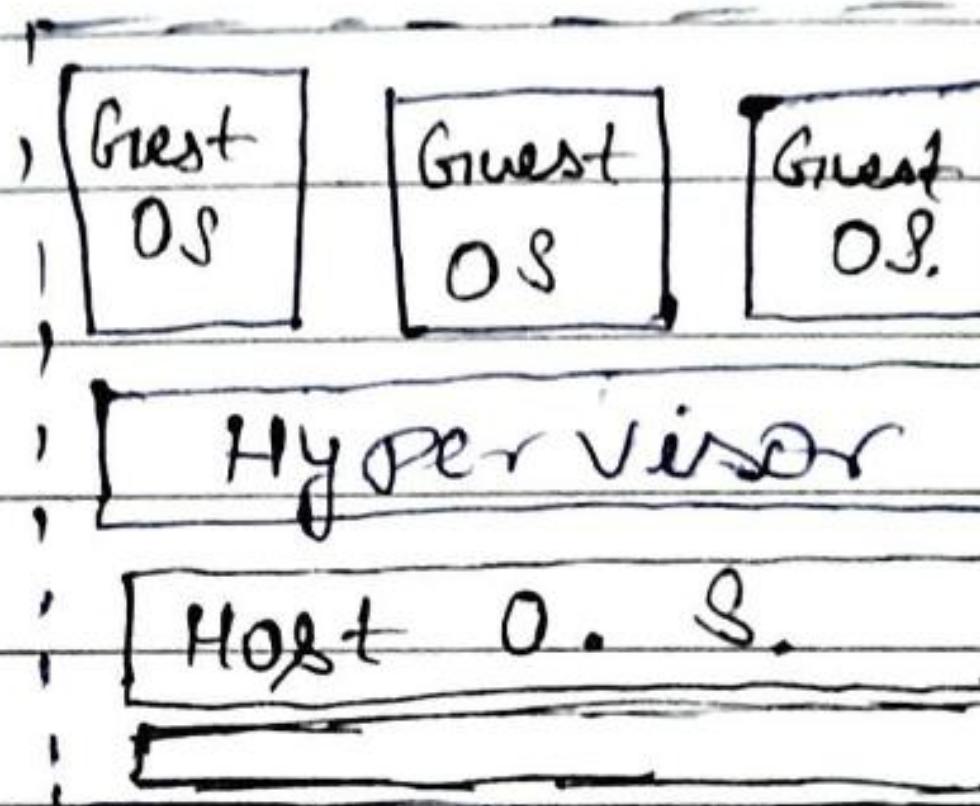
→ Type I hypervisor executes on bare system. LynxSoft, RTS Hypervisor, Oracle VM, SunVM, Virtual Logic, VLTx are examples comes under 'Type I Hyperv.



* Type I does not have any host OS because they are installed on a bare system.

- **Type 2 hypervisor** - is a software interface that emulates the devices with which a system normally interacts.
Containers, KVM, Microsoft Hyper V, VMWare Fusion, Virtual Server 2005 R2, Windows Virtual PC and VMWare Workstation 6.0 are examples of Type 2 hypervisor.

Type 2. fig



Server OS

- **Hardware Virtualization** - It is the abstraction of computing resources from the software that uses cloud service resources. It involves embedding virtual machine software into the server's hardware component. That software is called the hypervisor. The hypervisor manages the shared physical hardware resource b/w the guest OS & host OS. The abstracted hardware is represented as actual hardware.

- **Advantages** -
 - Lower cost
 - Efficient resource utilization.
 - Increase IT Flexibility
 - Advanced HW virtualization Features

Ex:-

Microsoft hyper-v, Xen

- Types of HW Virtualization :-
1. Full Virt.
 2. Emulation
 3. para-virt.

* Software Virtualization :- It is a technique that allows one computer server to work with more than one virtual system.

The primary function of Software Virtualization is to develop virtual software and make the work easier. It produces a simple virtual machine on which the system can work as regularly.

Eg:- VMware, virtual box .etc.

- Advantages :-
1. Client Deployments Become Easier
 2. Easy to manage
 3. Software migration

► Application Virtualization :- It helps a user to have remote access of an application from a server. The server stores all personal information and other characteristics of the application but can still run on a local work-station through the internet.

► Storage Virtualization - It is process of grouping the physical storage from multiple Network storage devices so that it looks like a single storage device.

⇒ It is also implemented by using S/w App.
 ① Block ② File

* Use :- Mainly for 'Back-ups & recovery'.



■ Server Virtualization :- When the virtual machine software or virtual machine manager is directly installed on the server system is known as Server Virtualization.

server Virtualization is done because a single physical Server can be divided into multiple servers on the demand basis & for balancing the load.

* Network Virtualization :- The ability to run multiple virtual networks with each has a separate control and data plane. It provides a facility to create and provision virtual private network (VPN) and workload scenario within days or even in weeks.

► Data Virtualization - is an approach to Data that allows an application to retrieve and manage isolate data without requiring technical details about the data, such as how it is formatted at source or where it is physically located and can provide a single customer view of the overall data.
eg:- E-commerce, Web Portal etc.

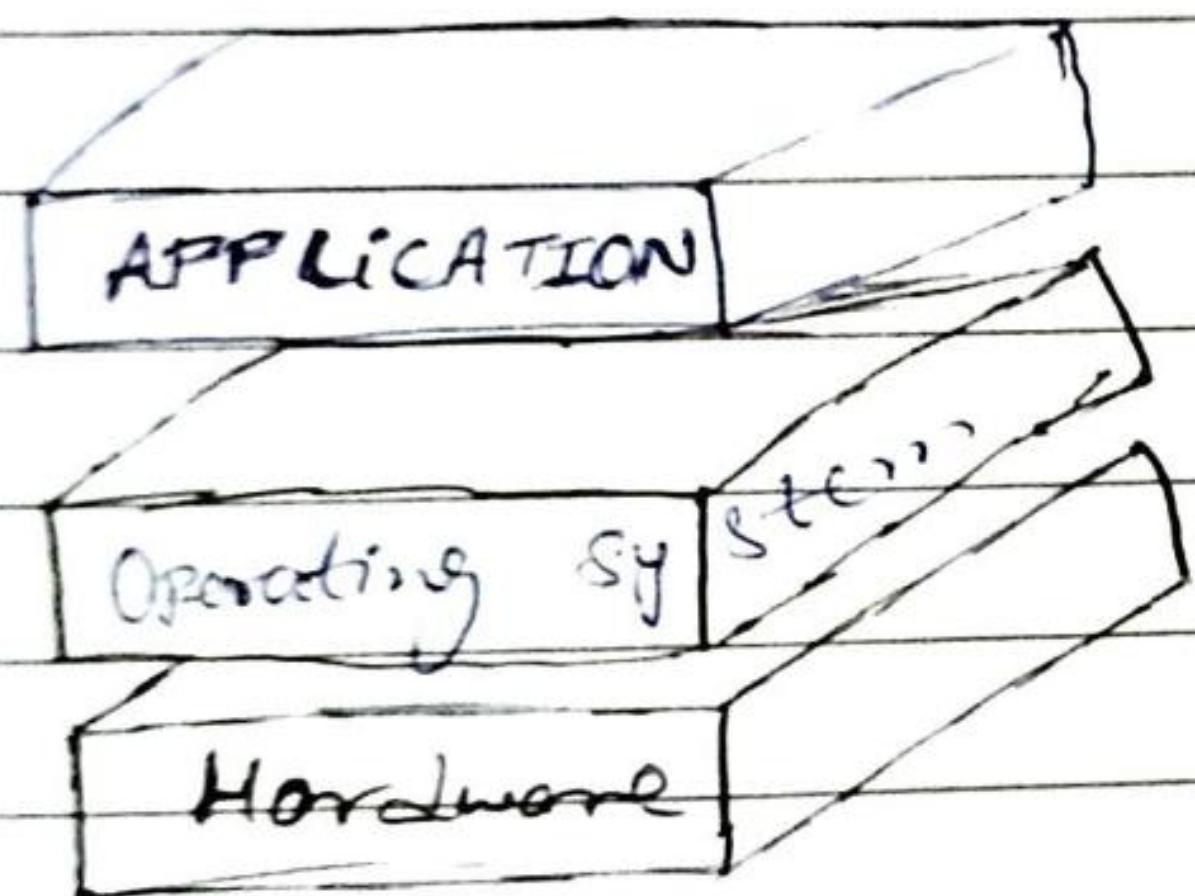
* thin clients (PC) * your client (smartphone).

- VII**
- **Desktop Virtualization** :- abstracts client GUI (OS and App) from a physical thin client which connects to applications and data remotely, typically via the Internet.
 - This abstraction enables users to utilize any number of devices to access their virtual desktop.
 - Anydesk, citrix, xen desktop etc.

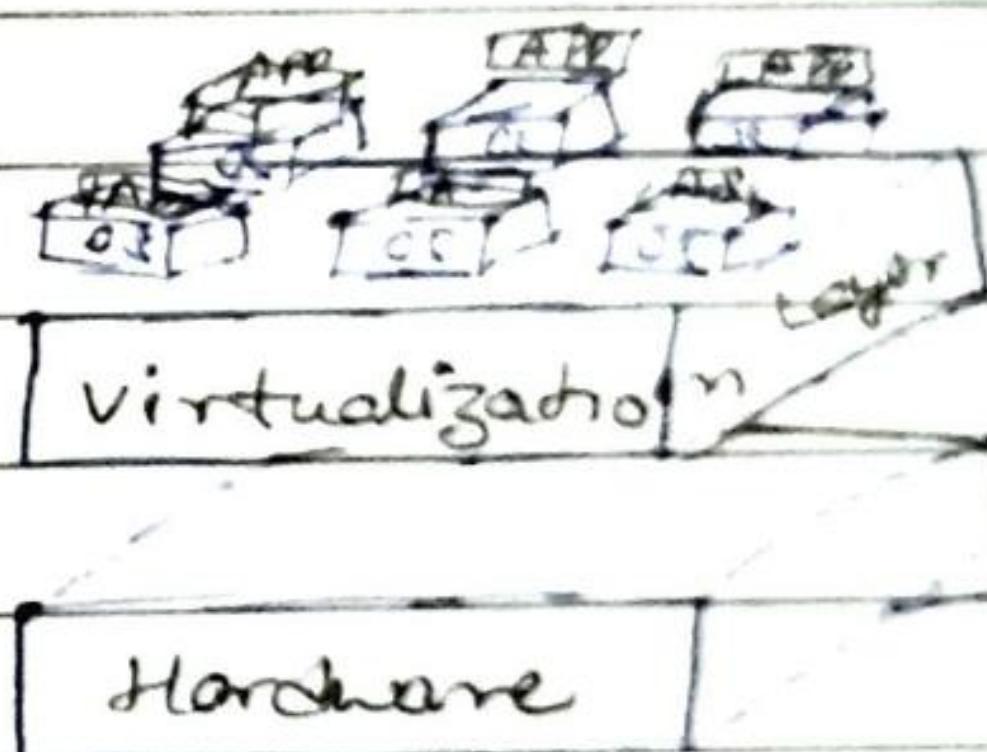
Security in Virtualization

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- Virtualized security, or security virtualization, refers to security solutions that are S/W-based and designed to work within a virtualized IT Environment.
- This differs from Traditional, hardware-based network security, which is static and runs on devices such as traditional firewalls, routers, and switches.



o Traditional Architec.



o Virtual Archi.



Introduction to Various Virtualization in OS

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OS virtualisation is a Server Virtualization technology that involves tailoring a standard OS so that it can run different applications handled by multiple users on a single computer at a time. The OS don't interfere with each other even though they are on the same computer.

Some major OS-based Services are given below:-

1. Backup and Recovery
2. Security Management
3. Integration to Directory services.

* Various major Operations of OS-Based Virtualization are described below:-

1. Hardware capabilities can be employed, such as the I/O connection and CPU.
2. Connected peripherals with which it can interact, such as webcam, printer, keyboard, or scanner.
3. Data that can be read or written, such as files, folders, and network shares.

VMWARE

• 1998,

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- ⇒ It is a subsidiary of Dell Technologies.
- ⇒ Emc was acquired by Vm. in 2004 & later Dell acquired EMC in 2016.
- * VMware bases its virtualization Tech. on its bare-metal hypervisor ESX/ESXi in X86 Arch.
- with VMware Server virtualization, a hypervisor is installed on the physical server to allow multiple virtual machine to run on the same physical server.
- * VMware products include virtualization, networking and security Manage. Tools, S/w - defined data center s/w, and storage software.

KVM (KERNEL-BASED VM)

2006

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→ It is an Open-Source virtualization technology built into Linux into a hypervisor that allows a host machine to run multiple, isolated virtual environments called guests or VMs.

* KVM is part of Linux.

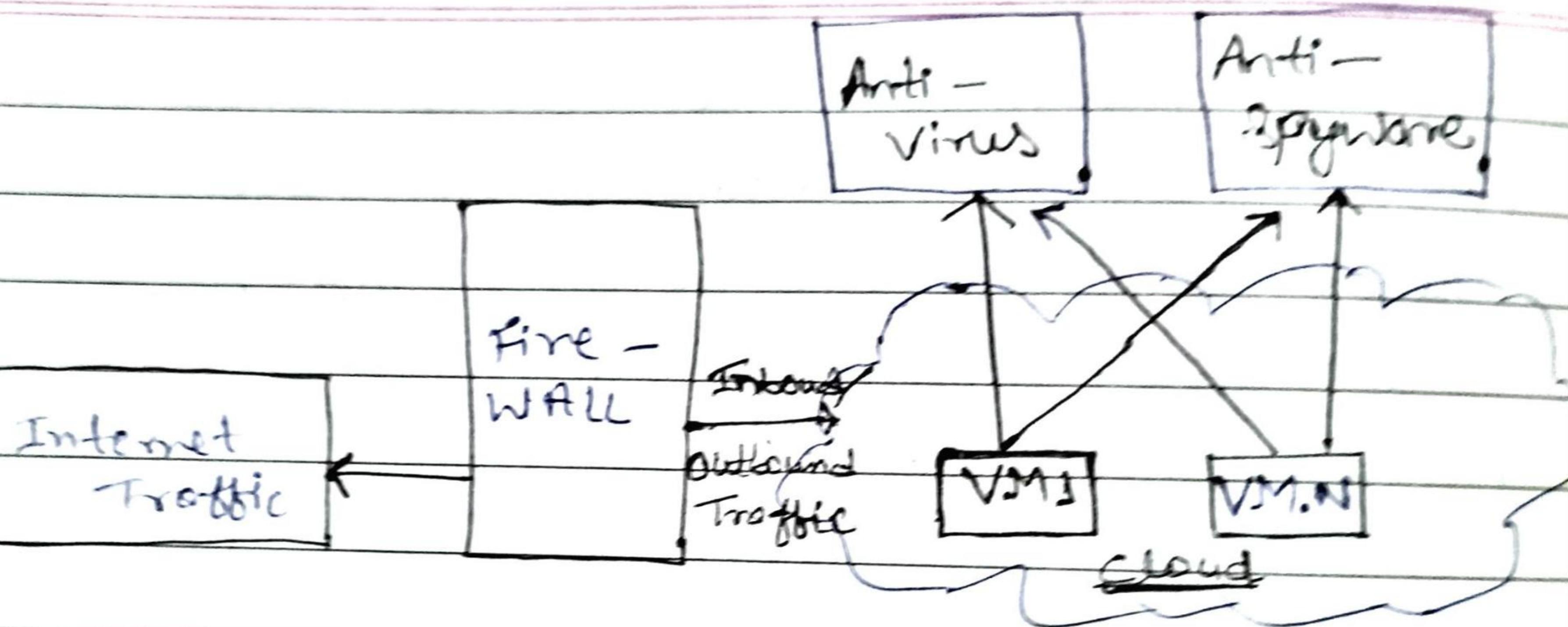
Q How does KVM work?

= KVM converts Linux into a type-1 (bare-metal) hypervisor. All hypervisors need some O.S.-level components - such as a memory manager, process scheduler, I/O (I/O) stack device drivers, security manager, a V/W stack & more - to run VMs. KVM has all these components because it's part of Linux.

► **KVM Features:-** 1. Security 2. Storage
3. Hardware Support 4. Live Migration.
5. Memory Managem. 6. Performance & Scalability

Virtual Machine Security

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⑧ IN Smart □, x - (2008)

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- * Android OS (open source) - It is one of the popular - It's developed by Android Inc company. It's an excellent rise because it was created just in 2008.
- * Features :-
 - The interface of Android was developed in order to fulfill all user requirements.
 - You can decorate your screen pages by Widget or you can place icons for your fav. apps whenever you would like them on.
- * Apple IOS (closed-source) - 2007