program which is loaded in memory and executing is called a process

Operating-System operations:

User mode Vs kernel mode

when we are using any application like netflix, word etc then computer executes in User mode

If we want to use any core functionalities of OS computer executes in Kernel mode

→ Processor switches b/w the user mode & kernel mode

Dual mode

To execute any problem if you need hardware usermode can't directly interact with Hardware,

instead it uses system call and switches to kernel mode

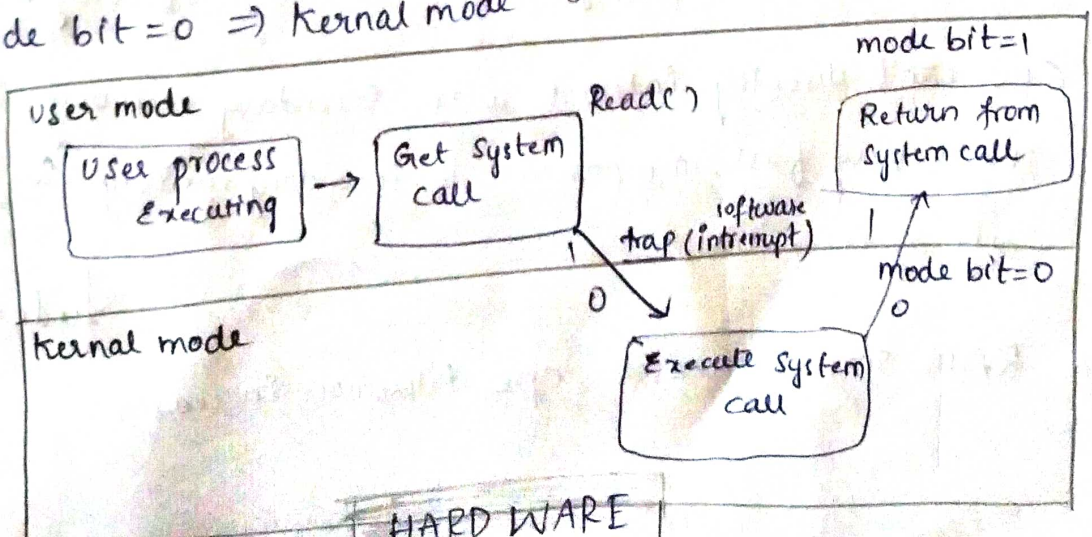
↓ default

Read system call

and again returns to user mode after Reading/writing of hardware using Kernel mode

→ Mode bit = 1 ⇒ user mode } distinguishing factor

Mode bit = 0 ⇒ Kernal mode



CPUs also support multi-mode

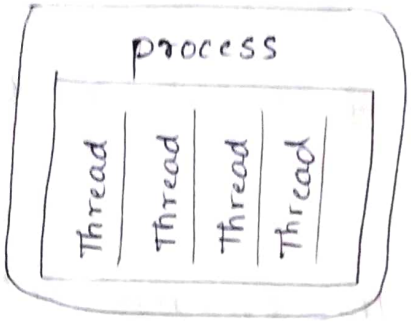
eg: Virtual machine manager (VMM) mode

process Management

Process: A process is a program in execution

Thread: A thread is a unit of execution within a process.

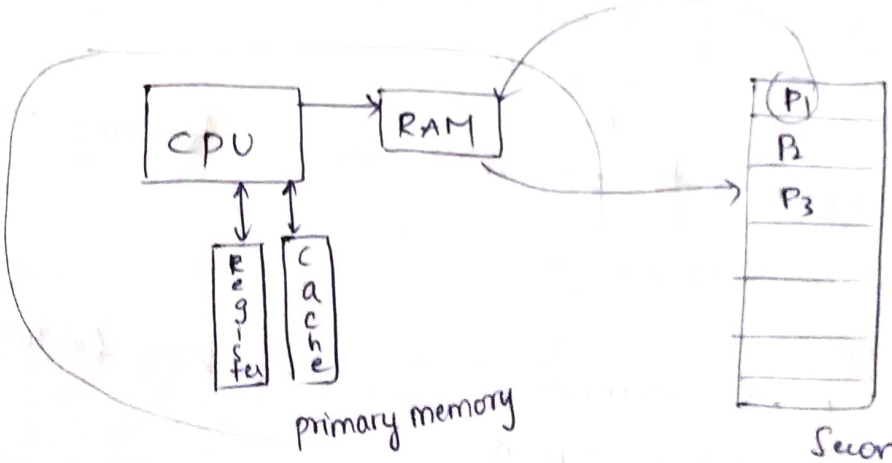
a process can have one thread to many threads.



Slide no: 34,35

Memory management: — method of managing main memory

Goal: Efficient ultilization of memory



CPU can't directly interact with secondary memory since cpu is very fast comparitive to secondary memory so RAM acts as a mediator

Slide no: 36

as RAM size increases CPU utilization increases

Storage structure — Slide - 37 to 40

I/O subsystem

Kernel provides many Services related to I/O (I/o services)

→ its main motive is to protect the system from errors and fast execution

I/O subsystem services:-

1) I/o scheduling — 1) Schedule all requests
2) Improve efficiency
3) prevent from deadlock

1) Buffering - Buffer storage
3) Caching - fast execution
4) Spooling - the overlapping of o/p data of one job with i/p data of other job

5) Error handling - protect system, provide the info of error to resolve it

6) I/o protection — Error handling
follow system calls

Protection & Security — slide - 42

Data structures:-
Single linked lists, double linked list, circular linked list, hash map, bit map, BST

linux:-
include files <linux/list.h>, <linux/kfifo.h>, <linux/rbtree.h>

Traditional Computing environments:

→ It consists of pc's connected to a network with servers

→ Remote access and portability were achieved by laptop Computers

→ portal provide web access to internal systems

→ even home systems use firewalls to protect from internet attacks

mobile Computing environments

Compared to traditional computing environments it has extra features (GPS, gyroscope) and allows new types of apps like augumented reality

→ use IEEE 802.11 wireless, or cellular data networks for Connectivity

eg:- Apple ios, Google Android

Distributed Computing environment

In distributed computing environment the systems are physically Seperated but connected through network → TCP/IP most common networks

→ There is a dependency b/w one system to all other systems

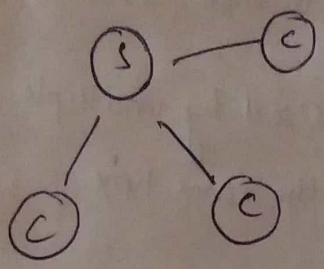
- LAN (Local Area network) - systems are within a building
- WAN (wide Area Network) - Two cities are Connected
- MAN (metropolitain Area network) - Network connection b/w two buildings of same city
- PAN (Personal Area network)
  - ↳ like bluetooth

environment

the diff b/w previous one and this one is here the systems are independent of each other

client-server System Computing evnmt:

This is a type of distributed computing evnmt where there is a centralised system called server which provides all the services to clients



Compute - Server

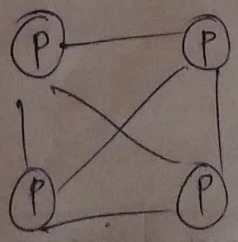
client requests service from the server then server in return provides its request

File - Server:

Here no need to request client can create, write, read, delete files on the server

Peer to peer computing evnmt:
(P-2-P system)

Here the system can be a client or server depending upon the situations



→ If a new peer is entered it can request resources from other peers in 2 ways

① Centralised lookup Service

here services provided by all peers are listed in a table so it can look and establish direct contact with that peer which provides required service

② discovery protocol:-

If new peer generates a broadcast request to all the peers, so that they will know each other & connect.

OS Virtualization

with OS virtualisation nothing is pre-installed or permantly loaded on the local device

→ No HDD is needed, everything run from the network using a kind of virtual disk

private virtual disk

- used by one client only, depending on the rights assigned, the user can save information on the virtual disk

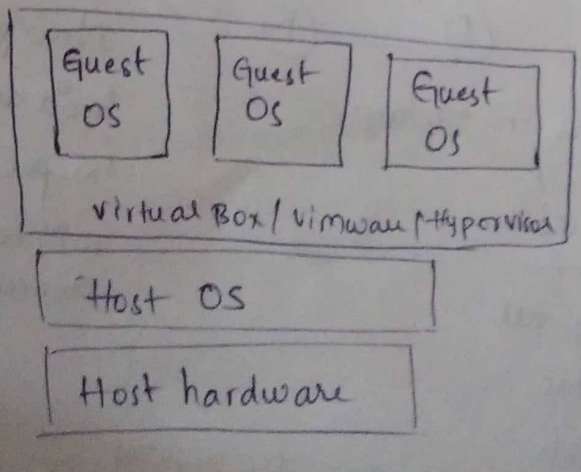
shared/common virtual disk

- Used by multiple clients at the same time

Os Virtualization is done by 3 ways

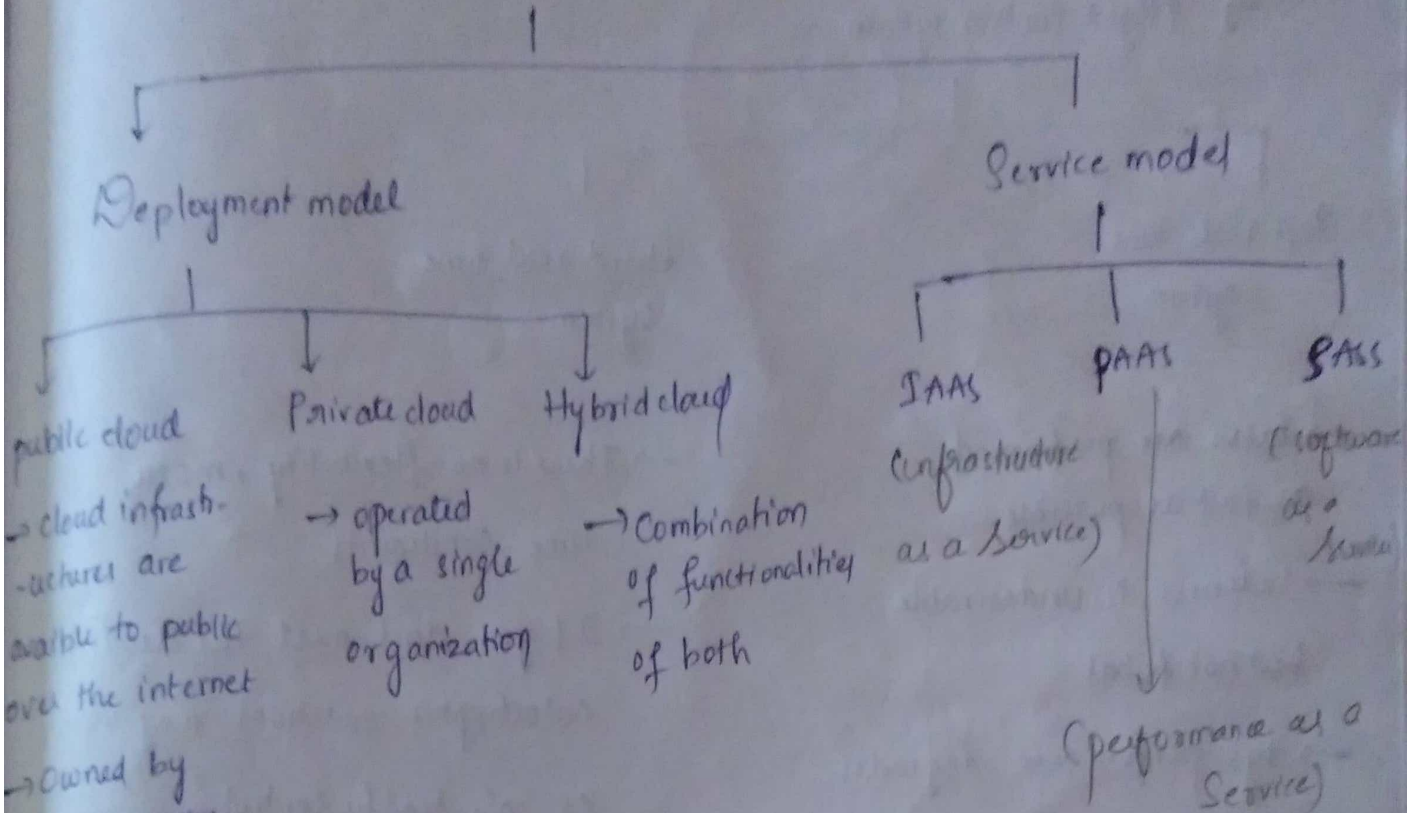
- Hypervisor
- VMWare workstation
- Virtual Box

eg:- Linux os virtualization, WINDOWS OS VIRTUALISATION



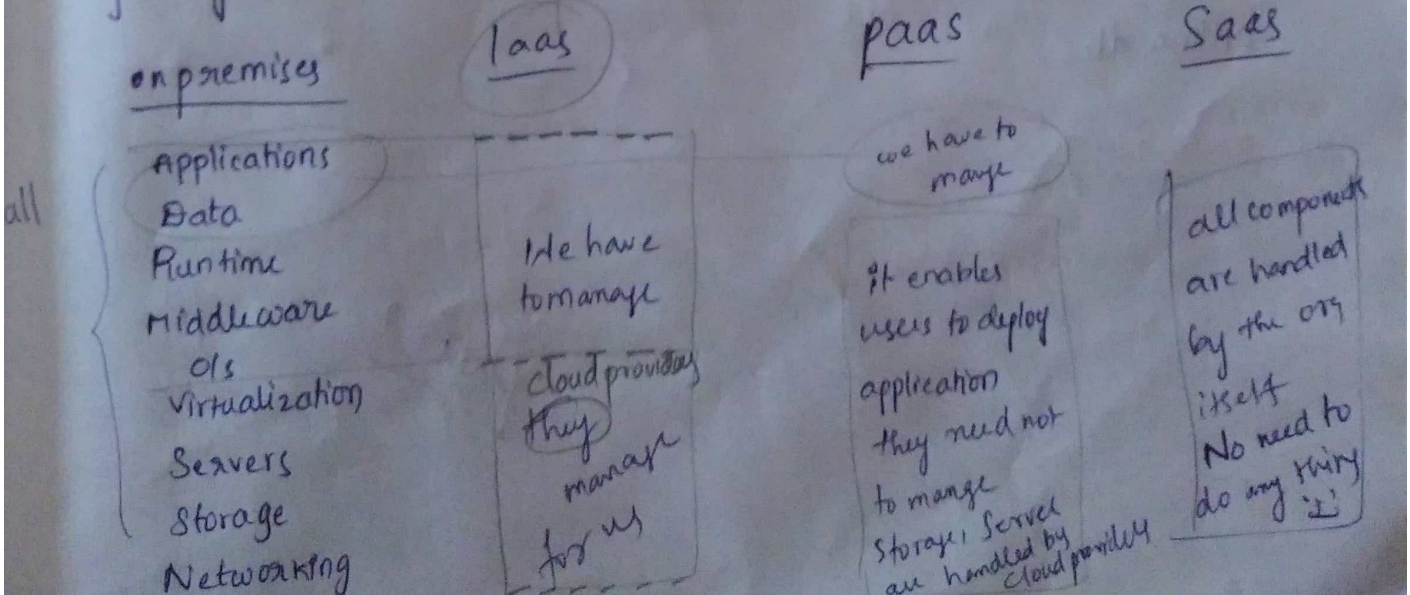
Cloud computing:

rather than managing files and services on a local storage device we will be doing same over the internet in a cost coefficient manner



In on-premises u need to control every thing

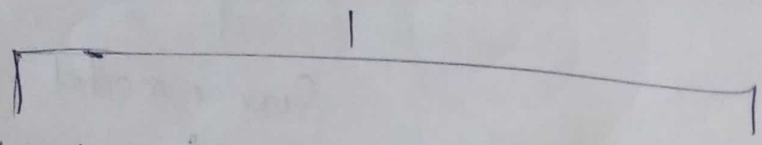
used by IT administrators



Real-time embedded systems. (Micro oven)

A system is said to be real time, "If it is required to complete its work & deliver its services on time"

eg: flight control system



Soft real time system

→ Tasks are performed as fast as possible

→ lateness is undesirable but not fatal

→ sys performance degrades as more & more jobs miss dead line

eg: multimedia transmission & reception

website services, app services, Games

online db

Hard real time System

→ There is no flexibility, more time constraints

→ If you don't meet the deadline catastrophic reactions may occur

eg: air traffic control

nuclear power plant control

Part-2