SOS

lec 1 - Intro to OS. (Part 1)

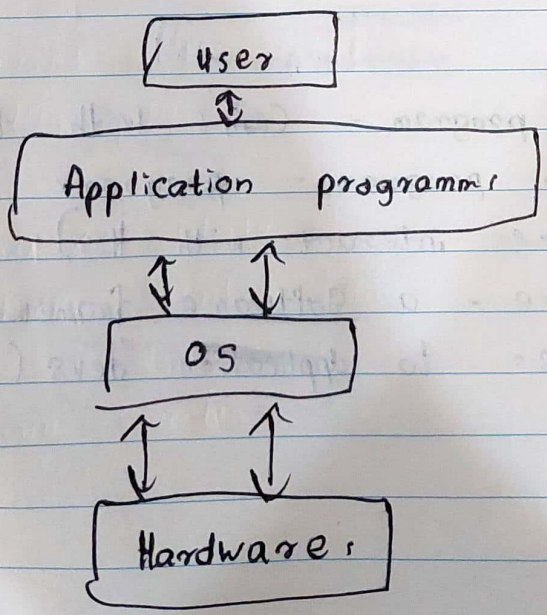
- A program that act between user and Computer hardware is called OS.

goals of OS.

- execute user programms.
- Make system easy to use.
- Provide an interface (graphical)
- we computer's hardwares in efficient way.

Computer System Structure
- main 4 parts.

- Hardware - cpu, memory, Ilo devices
- Operating System.
- Application program. - browser, apps, games.
- Users - those who using the computer.



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What OS Do,

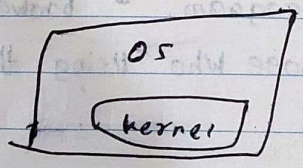
User View.

- easy to interact with System
- good performance
- if System connected to network should manage individual usage and sharing of resources.
- if device is a remote like mobile battery capacity and speed should be enough to long last.

System's view,

- Allocate resources respectivly to the processes.
- Control programs,
- Make sure I/o devices work in proper manner,
- handle all application programs.

- The program always running in the Computer is kernel. (part of os)



- System program - Coms with the os (not kernel)
- Application program - programs not associated with os (users interact with this).
- middleware - a Software framework that provide additional services to application devs (DB, graphics, etc).

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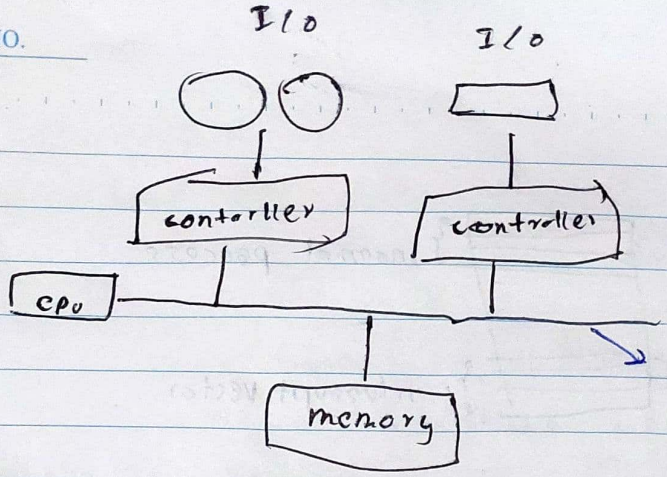
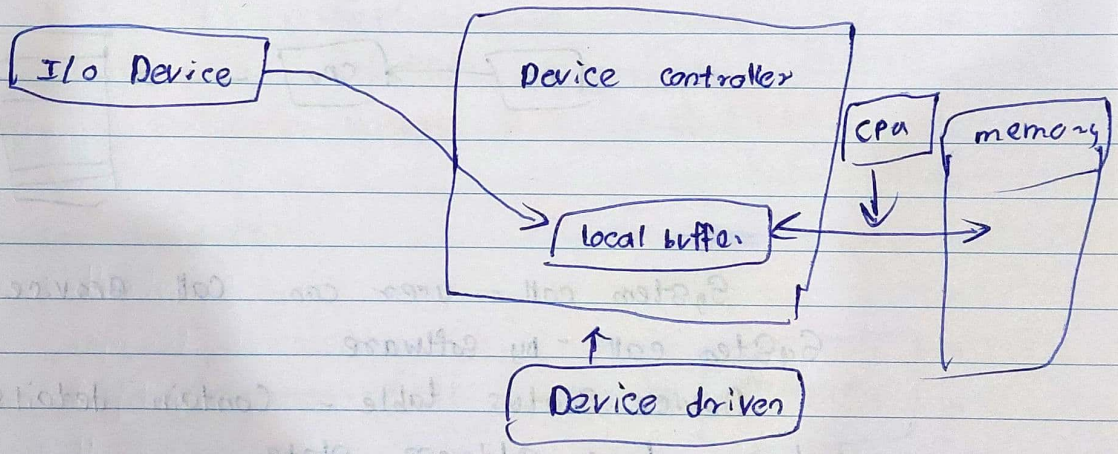


- all I/o devices has a Separate device controller
- Connected to cpu using a bus.
- Memory is Shared.

Computer System operation.

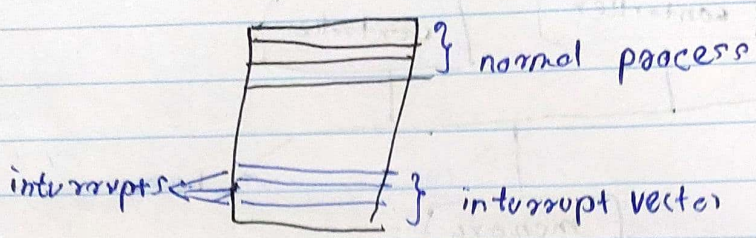


(Read lecture slide 1.16 for details)

- Interrupt vector - a table containing Starting location of all interrupts.

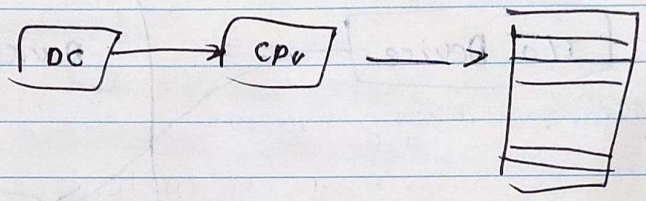
OS notes state of cpu by Storing registers and the program counter before executing the next proces.

- Program counter - Stored the address of next proces.



I/O handling (2 methods)

- Control returns to user program only if I/O completed.
- Control return to user program without Whoiting for I/O Completion.



System call - user can call Services using System call. - by software

Device Status table - Contain details of I/O device Such as type, address, state.

(Read lecture Slide 1.22 for more)

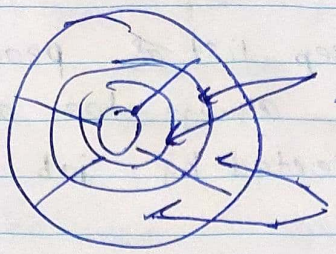
1.23.

Storage

main memory (Volatile)
- Random access
- RAM
- DRAM
- cpu can directy acces.

Secondary Storage (non-Volatile)
- HDD
- USB
- CPU can't access directly

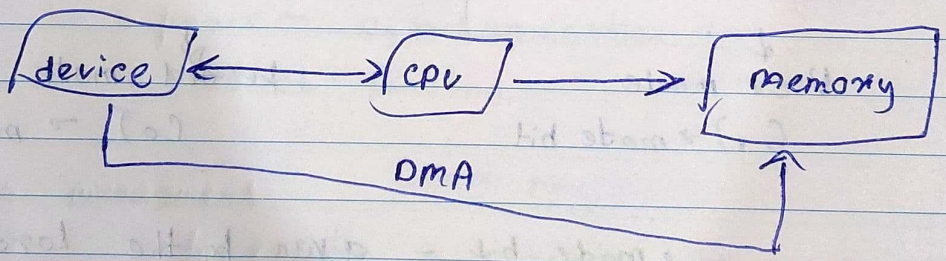
HDD - hard disk drive.



Storage hierarchy

Categorized using
Speed
Cost,
Volatility,
(Refer lecture slide 1.28 / P.29)

Modern computer



- has a DMA (Direct memory access)
- Can access memory without using cpu.
- DC send data as blocks to memory directly.
- Also refered as Von Neuman architecture.

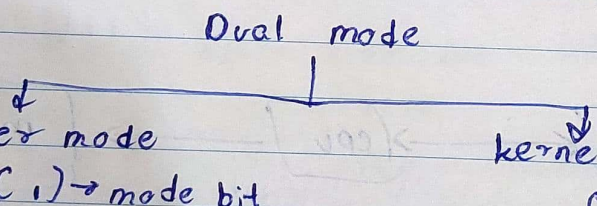
Multiprogramming (Batch)

- always keep list of programs to be executed in the memory. Cpu always has a process.
- Jobs selected by job Scheduling

Multitasking. (Timesharing)

- Cpu switches between processes frequently
- several programs ready to run at the same time (cpu Scheduling).
- if process doesn't have enough space in memo - rs swap to virtual memory, many users simultainously

Dual mode operation.



- mode bit - given by the hardware.

Timer - used to prevent from infinite loop . each process given a time to be executed.
(lecture slide , 38 for more)

Process managment

- process is a program in executions
  - program → passive entity.
  - process → active entity

process need - cpu, memory, I/O, files, data

Process

Single threaded	Multi - threaded
• one pc	one pc per thread
• one program at a time	• multiple programs at a time.

Process managment activities

- Create / delete processes.
- Suspend / resume processes.
- process synchronization.
- deadlock handling.

Memory managment.

- to execute a program all intructions must be loaded to memory.

Memory managment activities.

- Keep track of which part of memory being used.
- Allocating / deallocating memory space
- Decicding which data and processes should be in the memory

File - System managment.

- files organized into directories

Activities.

- Create / delete files.
- manipulate files and directories
- mapping files into secondary storage
- Backup files.

Mass - Storage Managment

- used to store data for kept 'long'.

Activities:

Mounting / unmounting
storage allocation
partitioning
protection.

SOS

lec 1 - intro to os (Part 2)

Caching

method of storing frequently used data to RAM. Whe program need to be exeecuted it first looks for cashe. if cashe not there fetch it and execute it first.

Migration of a data from Disk to registers,

if a data originally initiated as 5 in the storage and when it in processing it should be as 5, mainly in multiprocessor environment.

magnetic disk → main memory → cache → register

a = 5 a = 5 a = 5 a = 5

Cashe coherency → means all cpu's must have the most recent value of the variable in cache.

I/o Sub system jobs,

- Memory managment
- Buffering - storing data temporarily while transfer
- Caching
- Spooling - overlapping a output of another job with input of another job.
- general device-driver interface.

Protection and Security.

Protection - Controlling / limiting the users or proce-ses can happen at a given time.

Security - protecting the system from internal and external attacks. (user ID, group ID)

- Privilege escalation - allows users to change ID to more effetive way.

Virtualization.

- having different OS's withing the one device.
- Used VMM (virtual machine manager).

Emulation - used when cpu type different from target type. (slow)

Virtualization - OS compiled according to CPU structure, guest OSes also compiled according to CPU.

Distributed Systems.

- Collection of devices that connected though the internet.

ex: LAN
WAN
MAN
PAN

Network operating system - provide features between systems along the network.

Computer System architecture

multiprocessors / parallel systems / tightly coupled system - which having more than a 1 processor.

Advantage:
- increased reliability
- increased processing speed
- fast output.

Types of multiprocessing systems. (2)
- Asymmetric - each processor has separat task
- Symmetric - perform all tasks. ~~(bet~~
  - Dual core design
  - Non-uniform memory Access System

refer lec slid 1.56 - 1.57

Clustered systems,

Some as multiprocessor systems but in here multiple systems work together Storage shared using Storage-area-network (SAN)

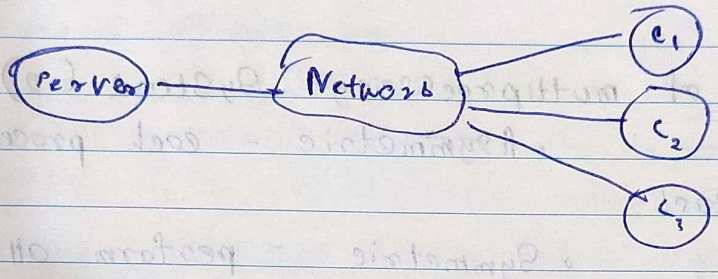
- Asymmetric clustering - have one machine stand by.
- Symmetric clustering - multiple devices running applications. (better)

Distributed lock manager (DLM) - have to avoid collision between operations.

Computing environments.

- Traditional - refer 1.63
- Mobile - refer 1.64
- Client-server
- Pear to pear
- Cloud computing
- Real time Embedded

Client - server.



- Servers responding to request made by Client.
- Compute - Server Systems - provide an interface to request services (~~PP~~ PB) ~~(PP)~~
- File - server system - provide interface to store and retrieve files.

Peer to peer (P2P)

- Connection between client, client act as Server and client.

Cloud computing.

Computing, storage, app can be used over the network. Use virtualization.

Cloud types.

Date: / /

public cloud - available to everyone.
Private cloud - run by a company for their use
Hybrid cloud - include both private and Publice.

Cloud computing provides.

- Software as service (saas)
- Platform as service (paas)
- infastructure as a service (iaas)

Real-Time Embedded Systems.

- Special purpose real time oses.

Can perform tasks without os as well.

kernel data structure

(refer 1.73 - 1.76)