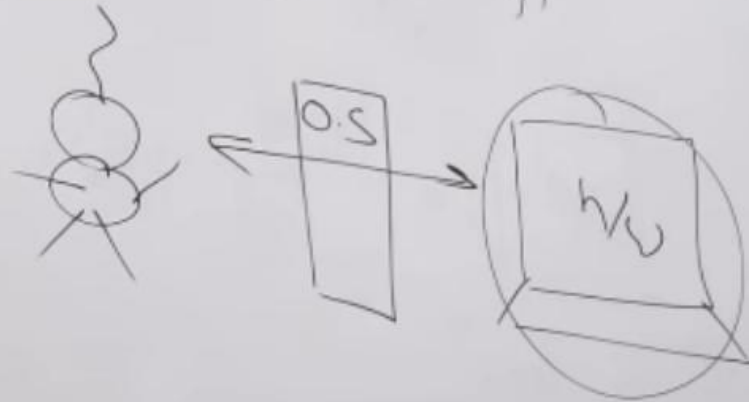Operating System is system software
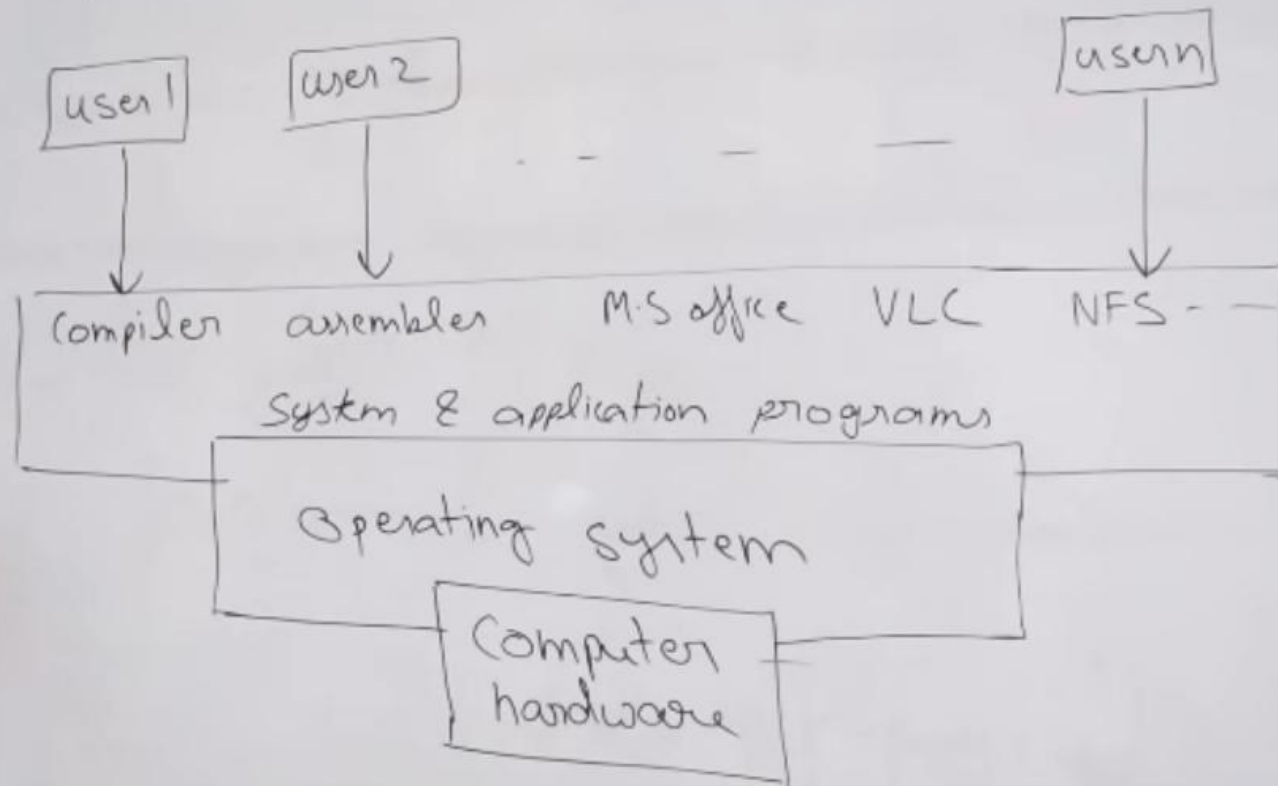
→ It acts as an intermediatory between h/w & user

→ Resource manager — manage system resources in an unbiased fashion both h/w & s/w.

→ provides a plateform on which other application programs are installed

Abstract view of system :-

user1   user2   —   —   —   —   usern

Compiler   assembler   M.S office   VLC   NFS - —

System & application programs

Operating system

Computer hardware

Goals of operating system	Functions of Operating system
Primary goal	→ Process management
→ convenience/user friendly	→ Memory management
	→ I/O device management
Secondary goal	→ File management
→ Efficiency	→ Network management
	→ Security & Protection

$$\cup$$
$$\downarrow$$
OS
$$\downarrow$$
India   H/W

In starting mainframe computers

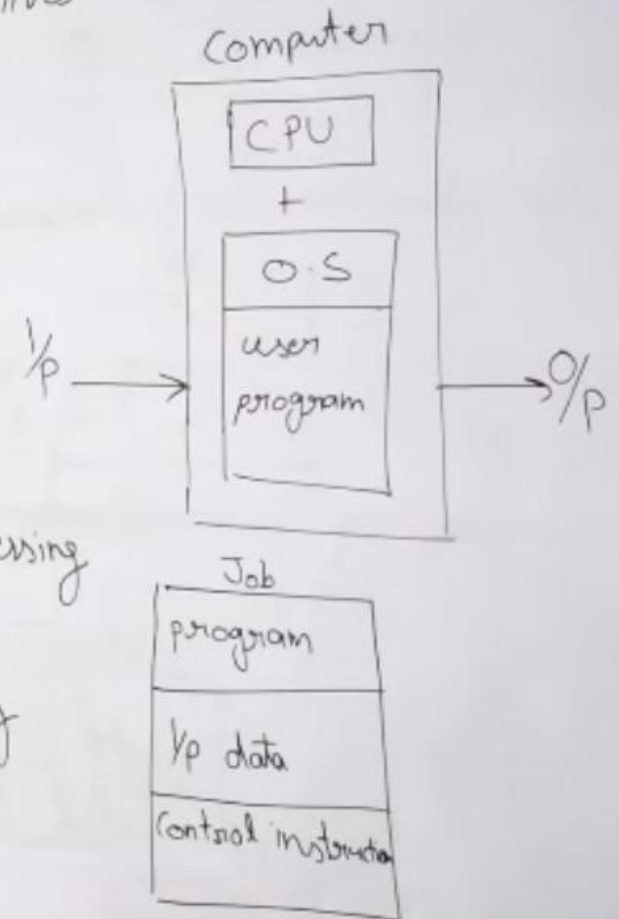→ common I/p & o/p devices were card readers & tape drives

→ user prepare a job which consisted of the program
, I/p data and control instructions

→ I/p Job is given is the form of punch cards
and result also appear in form of punch card after processing

→ So OS was very simple, always present in memory
major task is to transfer the control from one job
to another.

Computer

| CPU |
| + |
| O.S |
| user program |

I/p → | | → O/p
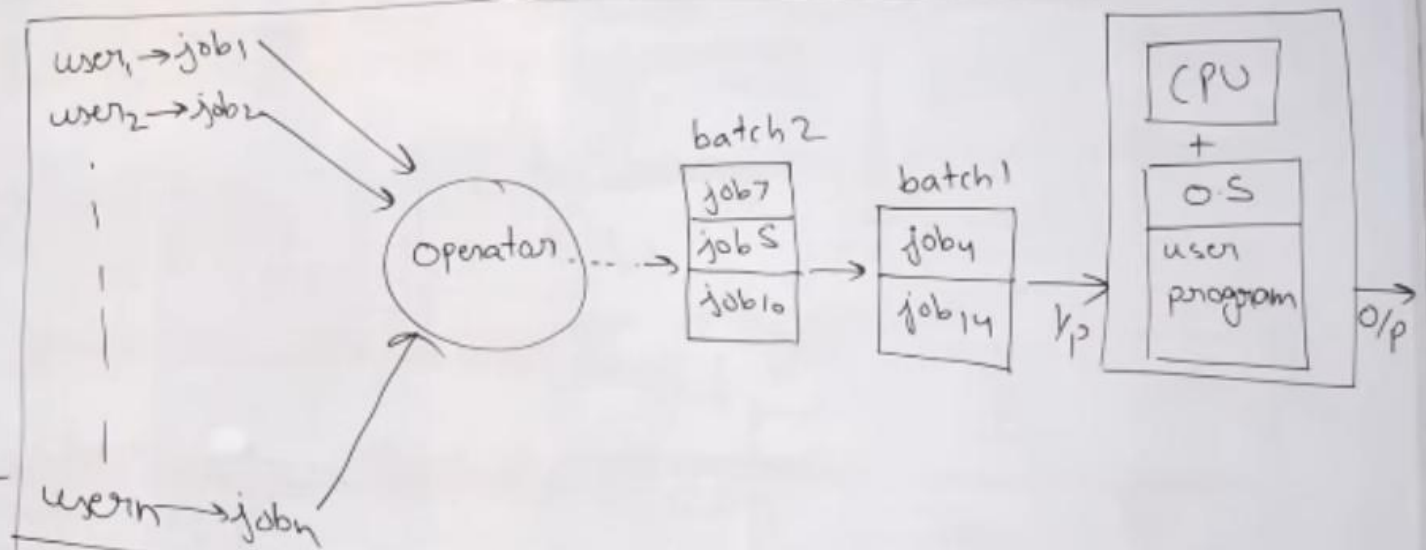
Job
| program |
| I/p data |
| Control instruction |

Batch processing :-

→ jobs with similar needs are batched together and executed through the processor as a group

→ operator sort jobs as a deck of punch cords into batch with similar needs

→ e.g. FORTRAN batch, COBOL batch etc.

user₁ → job₁
user₂ → job₂
⋮
userₙ → jobₙ

Operator

batch2
| job7 |
| jobS |
| job10 |

batch1
| job4 |
| job14 |
I/p

CPU
+
O.S
user program
O/P

Advantage

→ in a batch job execute one after another saving time from activites like loding compiler

→ during a batch execution no manual intervention is needed

Disadvantage

→ memory limitation

→ interaction of I/p & o/p devices directly with CPU.

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Spooling:- Simultaneous peripheral operations online

→ I/p & o/p devices are relatively slow compare to CPU (digital)

→ In spooling data is stored first onto the disk and than CPU interact with Disk (digital) via M.M.
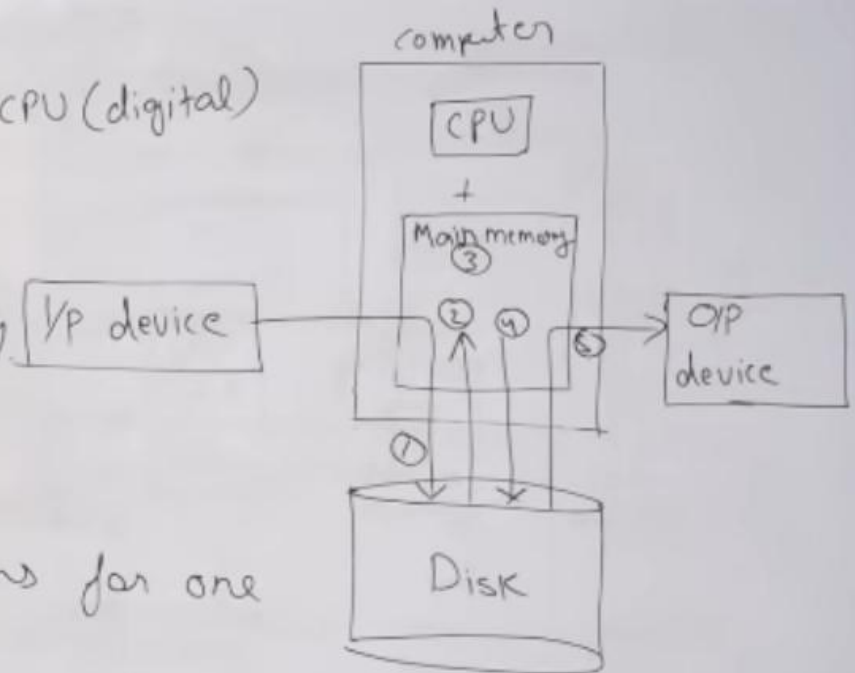
→ Keyboard, mouse, printer etc

→ Spooling is capable of overlapping I/o operations for one job with CPU operations of other jobs.

Disk

Advantage

→ no interaction of I/p & o/p device with CPU
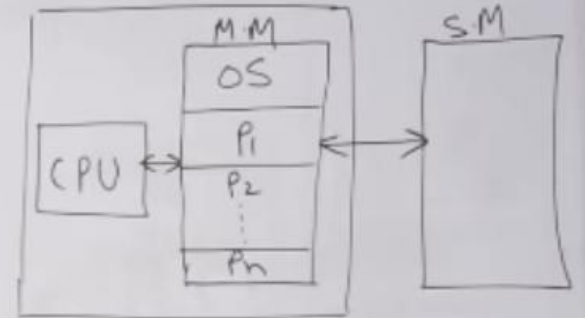
→ CPU utilization is more as CPU is busy most of the time

Disadvantage

→ In starting Spooling was uniprogramming

Multiprogramming Operating System :-

→ Maximize CPU utilization

→ Multiprogramming means more than one procer in Main Memory which are ready to execute.

→ Procers generally require CPU time and I/o time. So if running procers perform I/o ar some other event which do not require CPU then instead of sitting idle. CPU make a context switch and picks some other procers, and this idea will continue.

→ CPU never idle unless, there is not procers ready to execute ar at time of context switch

Advantage	Disadvantage
→ High CPU utilization	→ Difficult scheduling
→ less waiting time, response time etc	→ Main memory management is required
→ May be extended to multiple users.	→ Memory fragmentation
a-days usefull When load is more.	→ Paging (Non-contiguous memory allocation)