

Operating Systems (L-6)

What is physical and logical address
address translation

Non-contiguous memory allocation
Segmentation

Memory Mgt Tech

Contiguous

divide

Process

Non-contiguous

process

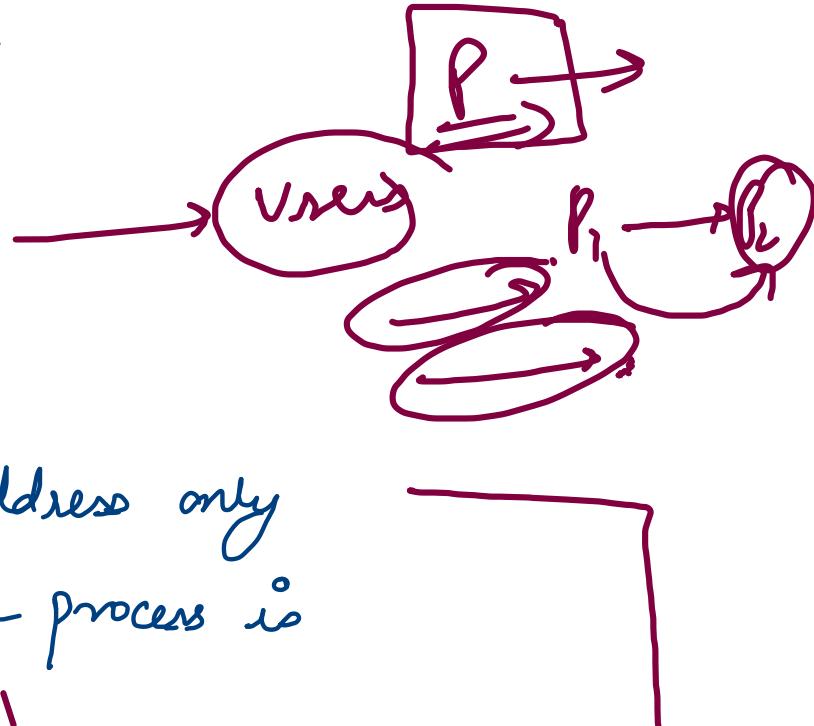
can be divided

Segmentation

Logical and physical address space

logical address / virtual

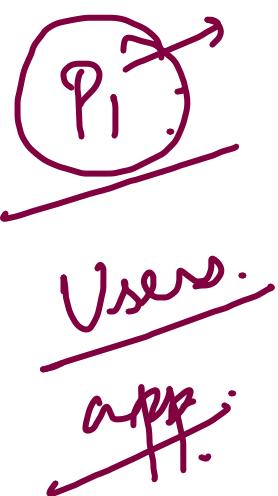
- 1) Generated by CPU
- 2) Apps and user can see logical address only
- 3) Creates an illusion that only one process is in main memory



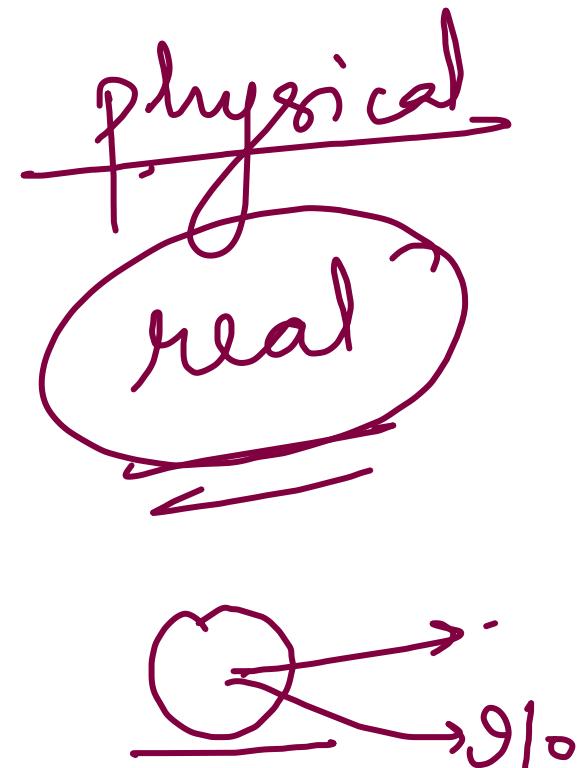
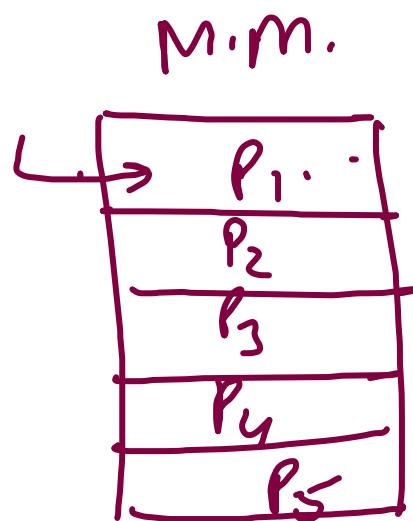
Physical address \Rightarrow real

- 1) identifies physical location of req. data in memory.
- 2) User can never access the physical address directly.
- 3) Computed by MMU.

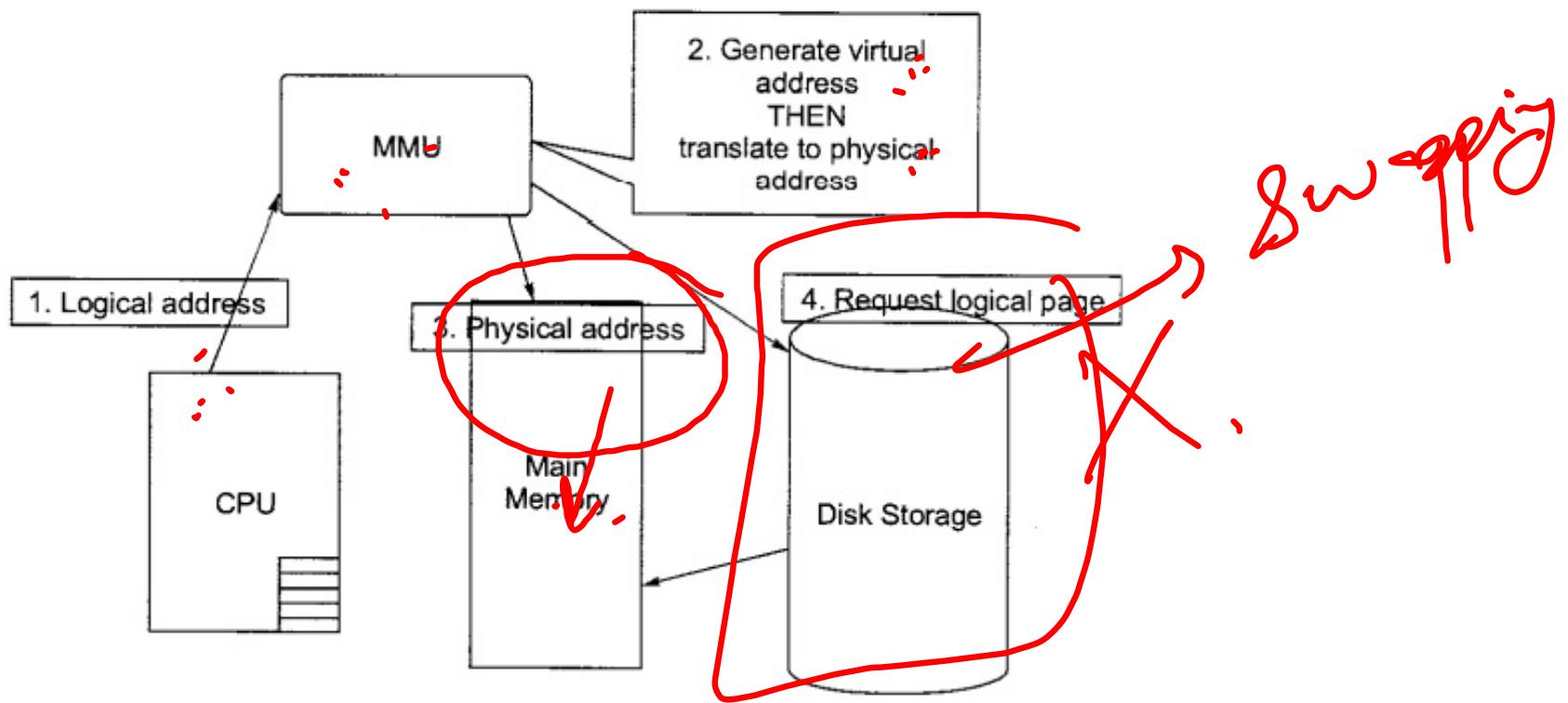
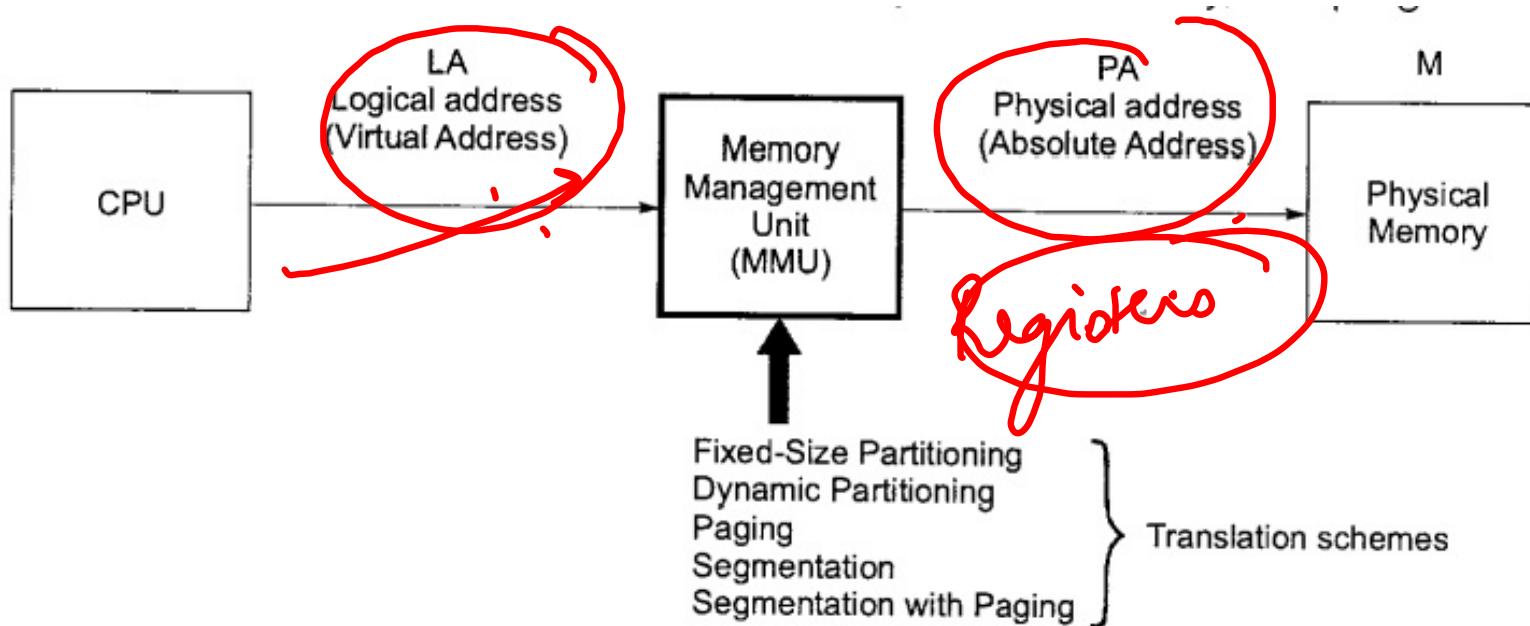
Memory Mgt Unit



logical
↔
virtual



Address Translation

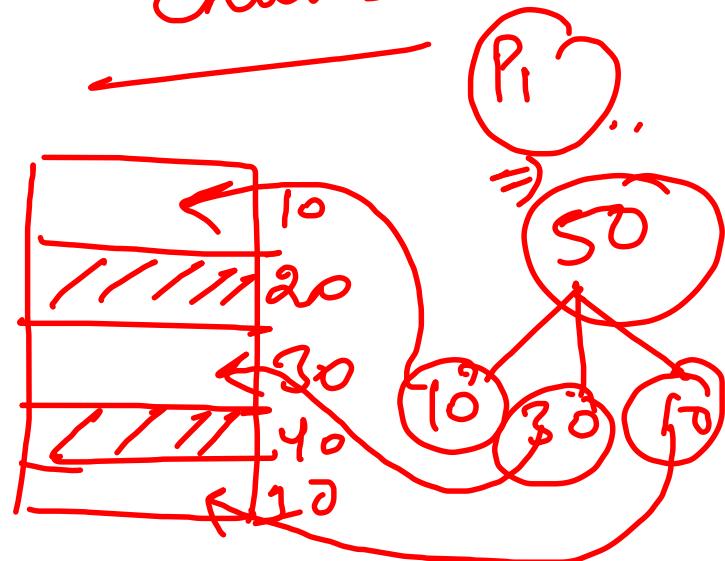


Non-contiguous

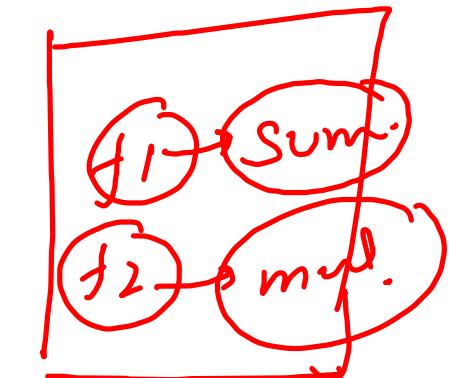
Paging Segmentation

- Process can be divided into multiple parts.
- Processes can be stored in a non-contiguous manner.

Process → multiple chunks

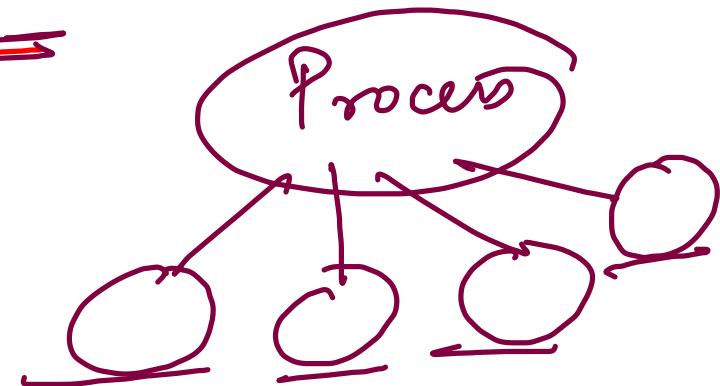


Code



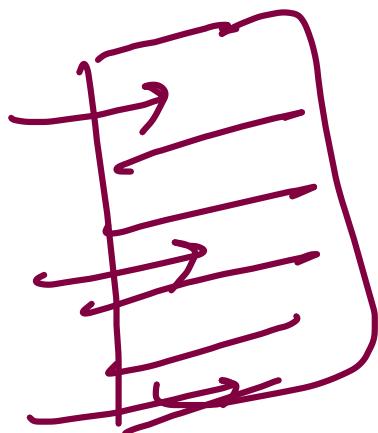
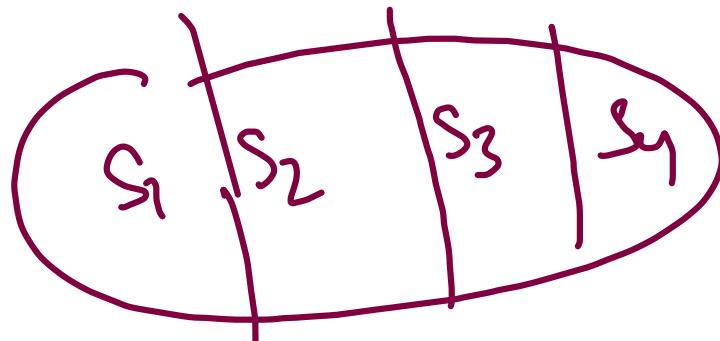
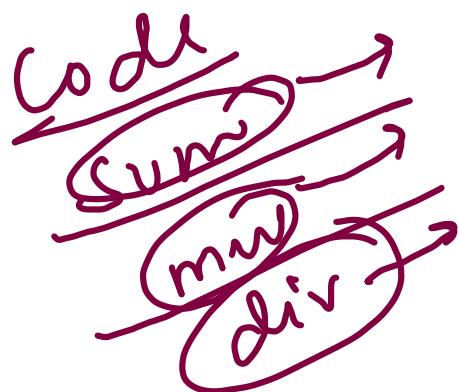
Segmentation

Process → ~~logical segments~~



Segmentation:-

- divides process into variable sized logical parts.
- Variable sized parts → segments*
- for each segment memory is allocated.



1) Address mapping

Logical add \rightarrow Segment no., offset



2) Segment Table -

\rightarrow exists for each segment

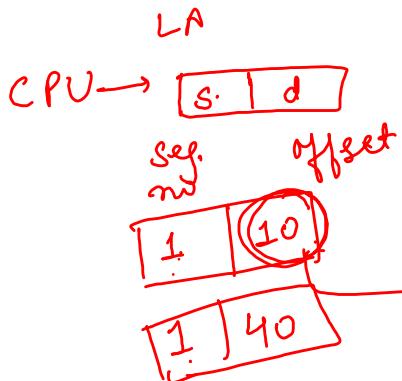
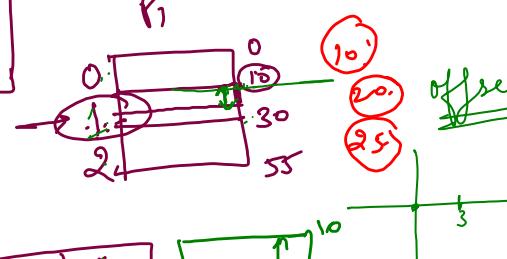
\rightarrow Base, limit

\rightarrow Base \rightarrow starting address where segment resides

\rightarrow limit/bound = length of segment

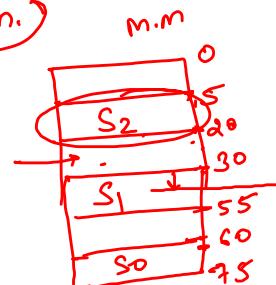
S TBR - Segment Table base register

Segmentation fault

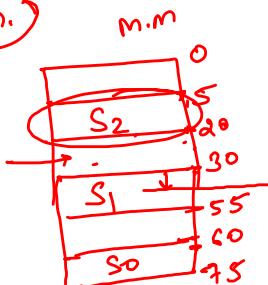


Segment table

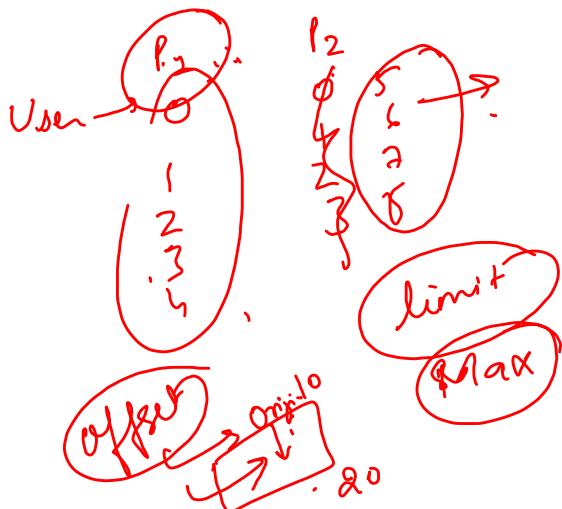
	Limit	Base add.
S ₀	15	60
S ₁	25	30
S ₂	15	5



M.M.



M.M.



$$100 \xrightarrow{70} 80 + 100 \Rightarrow \text{bound}$$

S.No	Base	limit
0	1000	256
1	80	100
2	1327	172
3	306	500

S.T.

Seg no.	Seg offset
1	70
3	567
2	256
0	128

Logical add.

Seg-0

128

off < limit

128 < 256 \rightarrow valid

Seg-1

70 < 100 \rightarrow valid

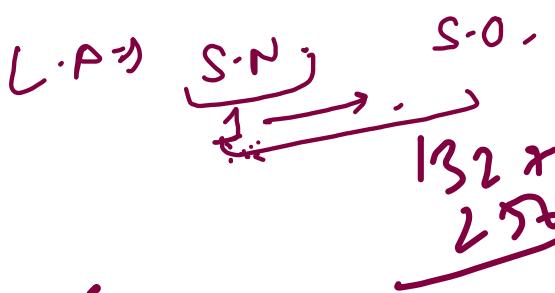
Seg-2

256 < 172

fault

Seg-3 \rightarrow 567 < 500
fault

(873)

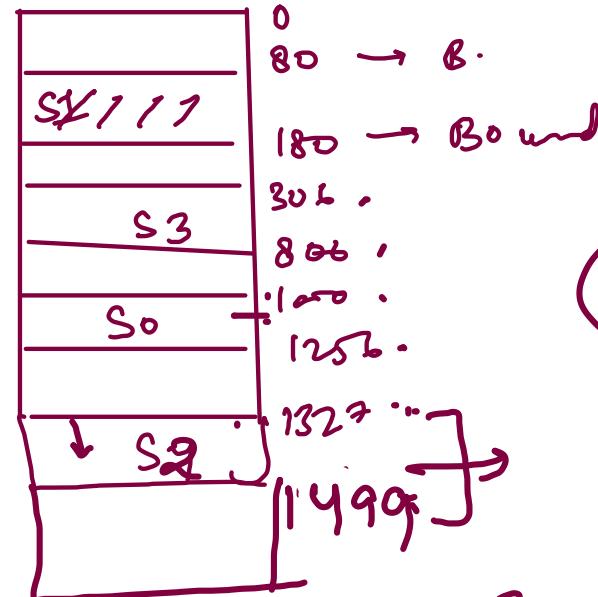


$$2 \xrightarrow{70} 80 + 200 \Rightarrow 280$$

(1-573)

$$80 + 90$$

150 uni



$$1000 + 128$$

$$1128$$

$$\begin{array}{r} 1327 \\ 256 \\ \hline 1583 \end{array} X$$

