CS & IT ENGINEERING

Operating System

Memory Management

Lecture -1

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Recap of Previous Lecture

Topic Deadlock

Topics to be Covered

- Topic: Memory Management
- Topic: Memory Management Technique
- Topic: Contiguous Memory Management Technique

Topic : Memory Management

module of OS

manages main memory (RAM)

Topic : Functions of Memory Management

1. Memory allocation
2. Memory deallocation
3. Memory protection

Topic : Goals of Memory Management

1. Maximum Utilization of space
2. Ability to run larger programs with limited space

Topic : Memory Management Techniques

Contiguous	Non-contiguous
entire process should be stored on consecutive mem. locations.	process is divided into partitions and those partitions are stored in mem. on any locations. (not necessarily consecutive)

Topic : Contiguous Memory Management

- Entire process should be stored on consecutive memory locations

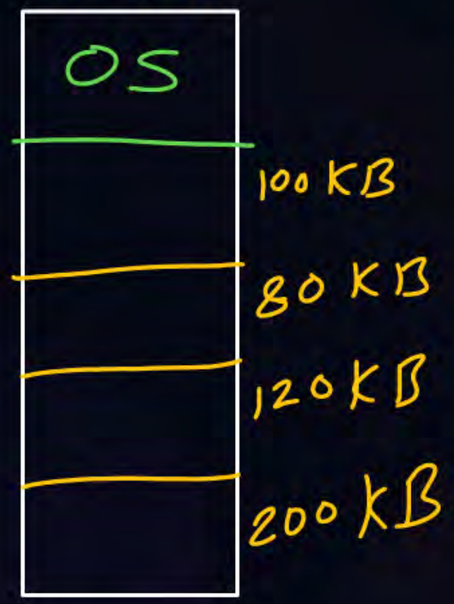
Types

fixed partition

variable partition

Topic : Fixed Partition Contiguous MMT

mm is divided into multiple partitions of variable sizes possible and each partition can be used to store one process.



suffers from internal fragmentat^{n}

⇒ degree of multiprogramming is limited by no. of partitions

Topic : Partition Allocation Policy

which partition to be allocated to a new process.

1. First Fit :-

2. Best fit :-

3. worst Fit :-

4. Next Fit :-

Topic : Partition Allocation Policy

4 partitions of size: 100KB, 120KB, 150KB and 80KB

← Allocated into partition →

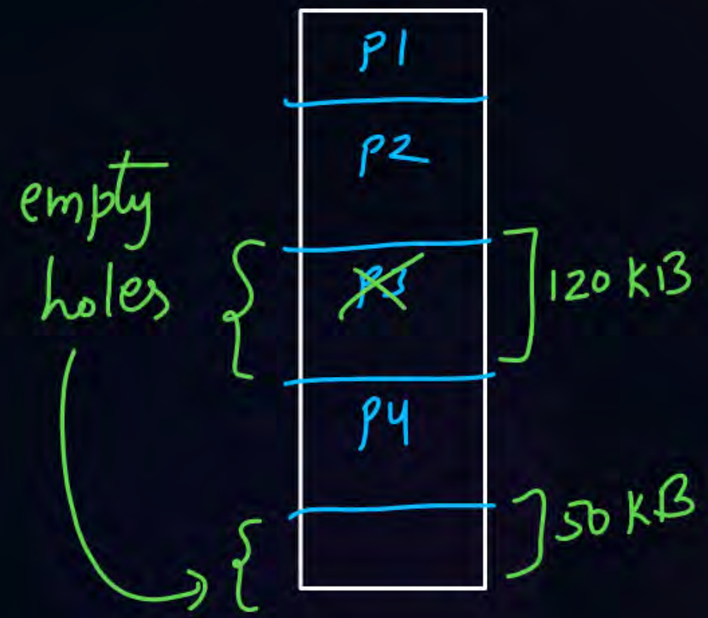
	P1 (Size = 110KB)	P2 (Size = 70KB)	Total amount of internal fragmentation
First Fit	120 KB	100 KB	10 + 30 = 40 KB
Best Fit	120 KB	80 KB	10 + 10 = 20 KB ✓
Worst Fit	150 KB	120 KB	40 + 50 = 90 KB
Next Fit	120 KB	150 KB	10 + 80 = 90 KB

Topic : Variable Partition Contiguous MMT

when a new process arrives then a partition created of size equal to process size.

⇓

no any internal fragmentation



new process P5 with size ⇒ 140KB

⇓

can not be stored ⇒ external fragmentation

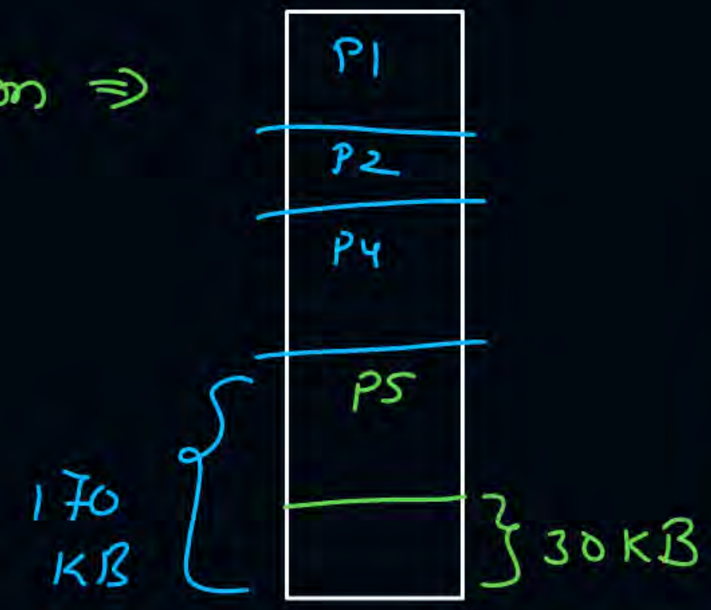
⇓

soln ⇒ Compaction

↓

enough space available to store process but not consecutive

after compaction ⇒



[MCQ]

holes

#Q. Consider the requests from processes in given order 300K, 25K, 125K, and 50K. Let there be two blocks of memory available of size 150K followed by a block size 350K. Which of the following partition allocation schemes can satisfy the above requests?

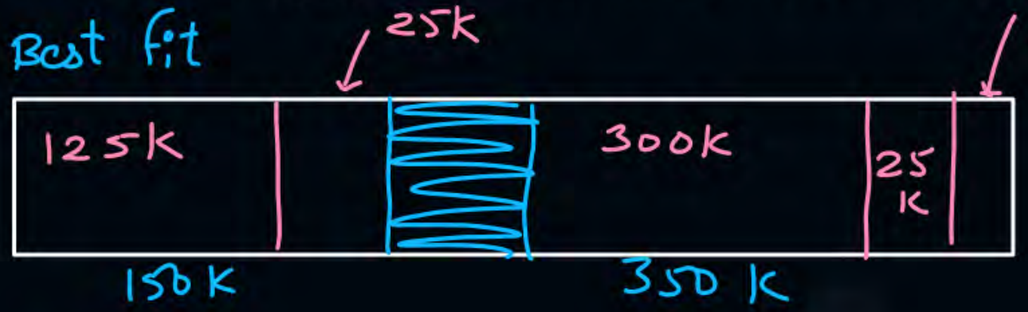
A. Best fit but not first fit

B. First fit but not best fit

C. Both First fit & Best fit

D. neither first fit nor best fit

Best fit



First fit

fixed partition contiguous mmT	variable partition Contiguous mmt
→ Best fit works best	→ worst fit works best
→ Internal fragmentatⁿ	→ External fragmentatⁿ

[MCQ]

#Q. Consider the process execution tree:

min size of memory required to execute all processes

⇓

120 KB

Non-contiguous mm T

Paging

⇓

equal size partitions of process

Segmentation

⇓

variable size partitions of process

Topic : Paging

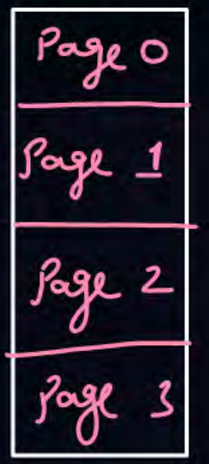
- Process is divided in equal size of partitions called as pages
- Physical memory is divided in same size of partitions called as frames
- Pages are scattered in frames

- OS maintains a page table to map which page is stored on which frame.
- OS maintains separate Page table (P.T.) for each process.
- No. of entries in each page table = No. of pages in the process
- Each page table entry => frame no. + extra bits

Topic : Paging

Example:

Process P1

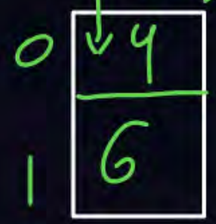


Page table

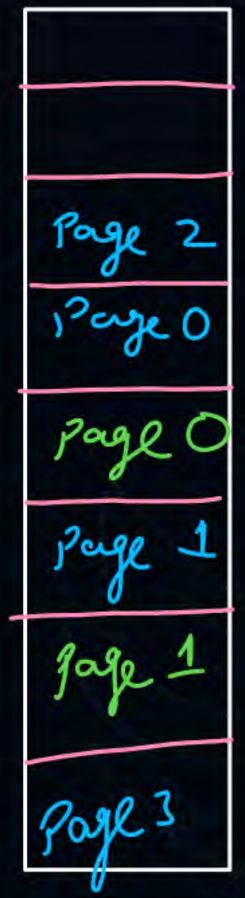
P2

frame no.

Page table



mm.



frame 0
1
2
3
4
5
6
7

Topic : Paging

Consider

- A process has 4 pages
- Main memory has 8 frames

Process

00	
01	
10	
11	

P.T.

00	011
01	101
10	010
11	111

mm.

000	
001	
010	Page 10
011	page 00
100	
101	page 01
110	
111	page 11

2 mins Summary

Topic Memory Management

Topic Memory Management Technique

Topic Contiguous Memory Management Technique

Happy Learning

THANK - YOU