



TD N°5: Management memory (Segmentation) and Page-replacement algorithms

Exercise n°1

We consider the following table of segments for a process P₁:

Segment	Base	Limite
0	540	234
1	1254	128
2	54	328
3	2048	1024
4	976	200

- 1) Calculate the physical addresses corresponding to the following virtual addresses (you may indicate any addressing errors) where the addresses are given in the form (n° segment:offset):
(0:128), (1:100), (2:465), (3:888), (4:344)
- 2) Is the virtual address (4,200) valid?

Exercise n°2

We consider a system with a paged segmented virtual memory where the size of a page is 4KB and a physical memory of 64KB. The address space of a process P is made up of three segments S₀, S₁ and S₂ of sizes 16KB, 8KB and 4KB respectively. At a given moment, for process P, pages 1 and 2 of segment S₀, page 1 of segment S₁ and page 0 of segment S₂ are loaded into physical memory, in slots 2, 0, 9 and 12 respectively. For data located in the address space of process P at decimal address 8212, indicate:

- 1) The segment number
- 2) The page number in the segment
- 3) The offset within the page
- 4) The frame number
- 5) The offset within the frame
- 6) The physical address (in decimal and binary)

Exercise n°3

We consider a system with 64 KB of physical memory managed in a segmented and paged way. Each process can use 16 segments of 1 KB and the system supports up to 256 processes. The page frames are 512 Bytes in size.

- 1) What is the size of the physical address?
- 2) What is the size of the logical address?
- 3) What is the size of the virtual memory?
- 4) How many pages can a process use at most? Justify your answer.

Exercise n°4

We consider a memory managed using the "pagination on demand" technique with 3 frames and a sequence of page references in this order: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2. The frames are initially empty.

- 1) Calculate the number of page faults generated by the FIFO, OPTIMAL, LRU, LFU and SECOND CHANCE replacement algorithms.
- 2) Calculate the number of page faults generated by the Second chance algorithm with FIFO for the sequence of page references in this order: 2, 3, 2, 1, 5, 2, 4, 5, 3, 2, 3, 5, 5.