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Exercises in SSDS

Virtual Memory - Exercise 8

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1. Virtual memory is an important mechanism used by operating systems. On virtual memory, it is INCORRECT to state that:

	Virtual memory is a type of memory management that only involves a primary type of memory
	Paging is a technique responsible for mapping a virtual address to a physical one
	Page-fault occurs when a page does not exist in the operating system.
	Thrashing occurs when the virtual memory of a computer is rapidly exchanging data for data on hard disk, to the exclusion of most application-level processing.
	Segmentation is a technique that allows to allocate dynamic portions of memory to process segments

2. Regarding Virtual Memory management concepts, check if the following sentences are **true** or **false** and mark the correct alternative.

I. If you use the virtual memory technique, an operating system can load and run a 32 Mb program on a computer with 8 Mb of main memory.
II. In virtual memory systems, the Memory Management Unit (MMU) is responsible to map virtual addresses to physical addresses.
III. The advantage of segmented virtual memory systems is the impossibility of incurring in fragmentation.

	Only I, II are **true**
	I, II and III are **false**
	Only I and III are **true**
	I, II and III are **true**
	Only II and III are **false**

3. In the implementation of virtual memory in operating systems, it is necessary to define, among other elements, the policy of replacing pages. These algorithms choose which page should leave the actual memory (called the victim page) and return to the secondary storage medium in order to make room for the other page requested by the processor and to satisfy the page fault request. One way of implementing these page replacement mechanisms is to use auxiliary bits associated with pages. In this context, what is the function of the **dirty bit**?

	Avoid using a local class page replacement algorithm
	Prevent a page from being chosen as a "victim", i.e., need to leave memory
	Indicate when a page has changed during the execution of a process
	Indicate if the page is a candidate for thrashing
	Indicate whether the page was referenced within a time frame

4. In virtual memory management, it is a feature relevant to the Least Recently Used (LRU) page replacement algorithm:

	Select the most referenced page in main memory
	Require an additional bit known as a reference bit
	Select the first page in main memory
	Choose the page randomly
	Select the page in main memory that is longer without being referenced

5. Modern operating systems use a concept called virtual memory, which has the following features or features, EXCEPT:

	Reallocation, ensuring that each process has its address space starting at zero
	Swapping that may load pages of a process from a secondary medium storage to a physical memory, to begin its execution
	Use the paging concept, allowing applications to use more memory than physically exists
	Access restrictions, to prevent a process from accessing memory areas allocated to other processes
	Use different algorithms to efficiently handle page-faults in the physical memory

6. "Memory management scheme that allows the physical address space of a process to be allocated in a non contiguous spaces. It avoids external fragmentation and the need for compaction." Mark the correct concept which the sentence is refererring:

	Paging
	Swapping
	50% Rule

	Internal fragmentation
	Segmentation

7. On a computer with a typical operating system it is not always possible to keep all processes in memory because of lack of space. A solution commonly adopted in these situations is the use of an area of the disk for the placement of processes that are momentarily locked. This mechanism is known as:

	Swapping
	Paging
	Particioning
	Segmentation
	Compaction

8. In **paged-based** virtual memory, only the following items are allocation policies:

	Pagination on-demand and early pagination
	Local replacement and global replacement
	Fixed allocation and variable allocation
	FIFO and LRU
	Random and FIFO.

9. A process references 5 pages identified as p1, p2, p3, p4 and p5 in the following order:

p1, p2, p3, p1, p4, p2, p5, p1, p2, p5, p2, p1

Considering that the page replacement algorithm is **LRU** and that the main memory is initially empty, what is the number of page transfers in a system with **3 frames** in main memory?

	6
	7
	8
	9
	10

10. A process references 5 pages identified as p1, p2, p3, p4 and p5 in the following order:

p1, p2, p3, p4, p1, p2, p5, p1, p2, p3, p4, p5

Considering that the page replacement algorithm is **FIFO** and that the main memory is initially empty, what is the number of page transfers in a system with **3 frames** in main memory?

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