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Exercises in SSDS

Memory Management - Exercise 7

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Contiguous Memory Allocation, Paging, Page Table Structure, Segmentation and Swapping.

1. In modern operating systems, it is possible to load software that is larger in size than RAM, due to the concept of (**mark the correct alternative**):

	Real Machine
	Virtual Machine
	Extended Memory
	ROM Memory
	Virtual Memory

2. In memory management, there are several types of allocation. Analyze the assertions below and check the alternative that points to the **correct one(s)** about simple **contiguous allocation**.

I. The simple contiguous allocation was implemented in the first developed operating systems, but is still present in some monoprogrammable systems.
II. With contiguous allocation, the concept of fixed size partitions was eliminated.
III. In this type of allocation strategy, the size of partitions is defined at system boot time, depending on the size of the programs that would run in the environment.
IV. In a simple contiguous allocation, the main memory is divided into two parts: one for the operating system and one for the user program.

	I
	I, II and III
	I, III and IV
	I and IV
	I, II, III and IV

3. Memory Management of a typical operating system is designed for a variety of functions, such as (**mark the correct alternatives**):

	Prevent the fragmentation of memory that would lead to its wastage
	Avoid the use of virtual memory as it would reduce processing speed

	Allows programs to run larger than the available physical memory
	Prohibit execution of more than one program at a time
	Prevent the occurrence of swapping as it would reduce utilization rate to main memory

4. Concerning the allocation of paged memory in an operating system, it is correct to state that (**mark the correct alternatives**):

	The page table enables the mapping between pages of a process and blocks of physical memory of the computer
	Pages associated with a process cannot be allocated anywhere in the physical memory available to processes, only in the area reserved for dynamic processes
	The address space is divided into blocks of memory, each with a specific size, determined by the size of the process
	Has a small address space associated, which is not linear.
	One of the activities involved in translating a logical address into a physical address foresees the decomposition of the logical address into two page numbers (the lower and the upper) and the offsets (main and secondary)

5. "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 but it may lead to *internal fragmentation*." **Mark the correct** concept which the sentence is refererring:

	Paging
	Swapping
	50% Rule
	Contiguous Allocation
	Segmentation

6. On a computer with a typical operating system it is not always possible to keep all processes in memory. 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 (**mark the correct alternative**):

	Swapping
	Paging
	Particioning
	Segmentation
	Compaction

7. On operating systems, virtual memory can be managed by segmentation. Management by segmentation is a technique in which (**mark the correct alternative**):

	Programs are divided into segments of varying sizes, each with its own address space

	The logical address space of a process is divided into fixed-length logical pages
	The physical memory is divided into pages with fixed size equal to the logical page size
	The logical page number is used as the index in the page table access, in order to obtain the corresponding physical page number
	All alternatives are wrong

8. It can be defined as "the excessive transfer of pages/segments between main memory and secondary memory, being present in systems that implement both paging and segmentation strategies." Please tick the **correct alternative** about this statement:

	Pipeline
	Thrashing
	Overhead
	Reallocation
	Segmentation

9. About operating system memory management, judge the following statements as true or false.

I. The swapping technique consists in dividing the program into modules of different sizes in order to load the module that has the size of the free area into main memory.
II. The difference between internal and external fragmentation is that the first occurs in main memory, and the second, in the disk.
III. Segmentation is a technique where virtual address space is divided into blocks of different sizes called segments. Segmentation does not show internal fragmentation, since the exact amount of memory required is allocated for each segment.
IV. In pagination there is no external fragmentation.

Regarding the above statements, it can be stated that (**mark the correct alternative**):

	Only two alternatives are correct
	Only three alternatives are correct
	Only one alternative is correct
	All alternatives are correct
	All alternatives are wrong

10. Regarding Memory Management, consider the following statements:

I. Memory management systems can be divided into two major classes: those that move processes between main and secondary memory (typically the disk) during execution, and those that keep processes fixed in primary memory. In the first class, management is based on swapping or paging techniques.
II. The simplest possible memory management scheme consists in keeping only one process in memory throughout its execution. The user loads a program from the disk to the memory, which can make use of any machine. If the memory is insufficient, the program simply has its execution rejected. Although this technique was common in the mid-sixties, it is no longer used.
III. Among other tasks, the memory manager monitors which parts of memory are in use and which parts are available; However, it does not release memory to the processes because it is the task of the store release that also manages the process exchange between main and secondary memory (when main memory is not able to host all processes).

This is **correct alternative** is only in:

	III
	I
	II and III
	II
	I and II