



## OPERATING SYSTEMS COURSE

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### Topic 4 Presentation Guide: Memory Management.

This topic describes the concepts related to memory management in operating systems. An overview of the theoretical concepts required is carried out, including the concept of virtual memory.

These concepts are fundamental to the operating system and processes and threads executing on a computer, since they must all be in memory to run. The operating system is responsible for loading memory resources, allocating, and mapping entities in the RAM of the computer. For this, the operating system provides a memory map for each process.

However, the memory map of a process is not homogeneous, but consists of different regions or segments. When running a program is activated, several regions within the memory map are created from the information in the executable. The initial parts of the process are to correspond basically to the different sections of the executable. To solve these problems, modern operating systems provide a dynamic memory model in which a process map consists of a variable number of regions that can be added or removed during execution. In addition to the initial regions, during the process execution new regions may be created on demand by the programs through system calls.

In virtually all modern operating systems, virtual memory technique is used to allow processes to provide logical memory space very large, usually greater than the existing RAM in the device. The memory system is organized as a hierarchy of storage levels. Virtual memory techniques deal with the transfer of information between main and secondary memory. The secondary memory is usually supported on a disk (or partition) that, since it is implemented on a paging scheme, is called paging device or swap .

The topic includes two lessons:

- Introduction to Memory Management

- Virtual Memory

The primary objective of the subject is to present concepts related to memory management in operating systems, both physical and virtual, as well as the main algorithms used in memory management .

This general objective is broken down into a series of specific objectives, which are listed below:

- To know the functions of the memory manager .
- To Know stages in generating an executable and the structure of the memory map of a process.
- To understand allocation schemes in contiguous memory.
- To be able to use services for dynamic memory management and archives and libraries projected in memory.

### **Associated Materials**

The theoretical lessons are complemented with exercises for each of them, to be resolved after the classes, as specified in the schedule associated with the teaching guide.

Mandatory and recommended reading with more problems and solved exercises are included, so that students can complete their training.