Al-Hamdaniya University

College of Education

Computer Science

Stage: 4th

Memory Management in Operating System

The task of subdividing the memory among different processes is called Memory Management. Memory management is a method in the operating system to manage operations between main memory and disk during process execution. The main aim of memory management is to achieve efficient utilization of memory.

Why Memory Management is required?

- Allocate and de-allocate memory before and after process execution.
- To keep track of used memory space by processes.
- To minimize fragmentation issues.
- To proper utilization of main memory.
- To maintain data integrity while executing of process**.**

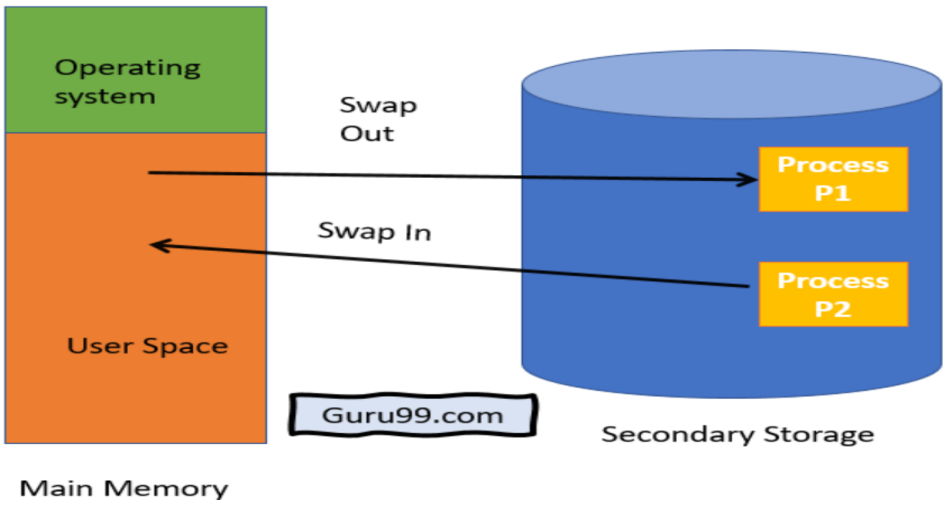

Figure 1- memory management

Logical and Physical Address in Operating System

Parameter	LOGICAL ADDRESS	PHYSICAL ADDRESS
Basic	generated by CPU	location in a memory unit
Address Space	Logical Address Space is set of all logical addresses generated by CPU in reference to a program.	Physical Address is set of all physical addresses mapped to the corresponding logical addresses.
Visibility	User can view the logical address of a program.	User can never view physical address of program.
Access	The user can use the logical address to access the physical address.	The user can indirectly access physical address but not directly.
Editable	Logical address can be change.	Physical address will not change.
Also called	virtual address.	real address.

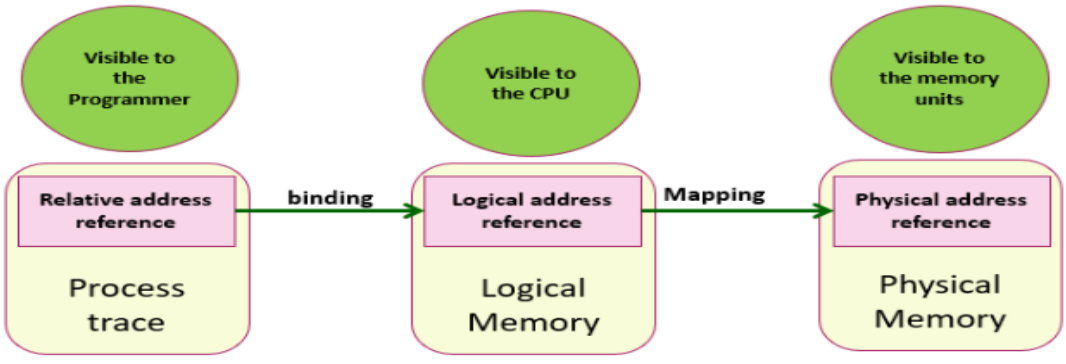

Figure 2- Memory address spaces

Paging in Operating System

Paging is a memory management scheme that eliminates the need for a contiguous allocation of physical memory. The process of retrieving processes in the form of pages from the secondary storage into the main memory is known as paging. The basic purpose of paging is to separate each procedure into pages. Additionally, frames will be used to split the main memory. This scheme permits the physical address space of a process to be non – contiguous.

Important Features of Paging in PC Reminiscence Management

1- **Logical to bodily address mapping**.
2- **Fixed web page and frame length.**
3- **Page desk entries:** Each page within the logical address area of a method is represented through a page table entry (PTE).
4- **A number of page desk entries.**
5- **Page table stored in important memory.**

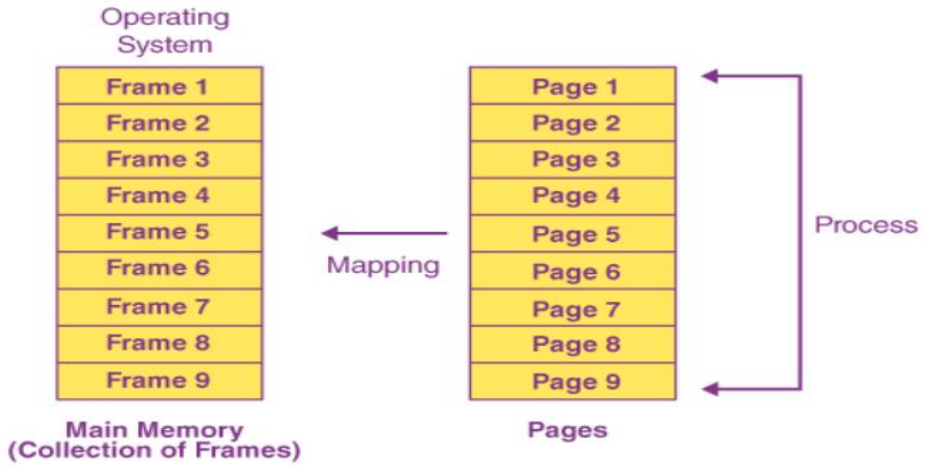

Figure 3- Paging in OS

Important Points About Paging in Operating Systems

1- **Reduces internal fragmentation**: Paging facilitates lessening internal fragmentation by using allocating memory in fixed-size blocks (pages), which might be usually a whole lot smaller than the size of the process's facts segments.
2- **Enables reminiscence to be allotted on call for**: Paging enables memory to be allocated on call for, this means that memory is most effectively allocated when it's far needed. This allows for extra efficient use of memory in view that only the pages that are absolutely used by the manner want to be allocated inside the physical memory.
3- **Protection and sharing of memory**: Paging allows for the protection and sharing of reminiscence between methods, as each procedure has its own web page table that maps its logical deal with area to its physical address space. This permits techniques to proportion facts at the same time as preventing unauthorized get right of entry to every other's memory.
4- **External fragmentation**: Paging can result in outside fragmentation, wherein memory turns fragmented into small, non-contiguous blocks.
5- **Overhead**: Paging involves overhead because of the renovation of the web page table and the translation of logical addresses to physical addresses.