B.Com 6th Semester
Information Technology
Unit – 2

Memory management is the functionality of an operating system which handles or manages primary memory and moves processes back and forth between main memory and disk during execution. Memory management keeps track of each and every memory location, regardless of either it is allocated to some process or it is free. It checks how much memory is to be allocated to processes. It decides which process will get memory at what time. It tracks whenever some memory gets freed or unallocated and correspondingly it updates the status.

Memory Management Techniques

Here, are some most crucial memory management techniques:

Single Contiguous Allocation : It is the easiest memory management technique. In this method, all types of computer's memory except a small portion which is reserved for the OS is available for one application. For example, MS-DOS operating system allocates memory in this way. An embedded system also runs on a single application.

Partitioned Allocation : It divides primary memory into various memory partitions, which is mostly contiguous areas of memory. Every partition stores all the information for a specific task or job. This method consists of allotting a partition to a job when it starts & unallocate when it ends.

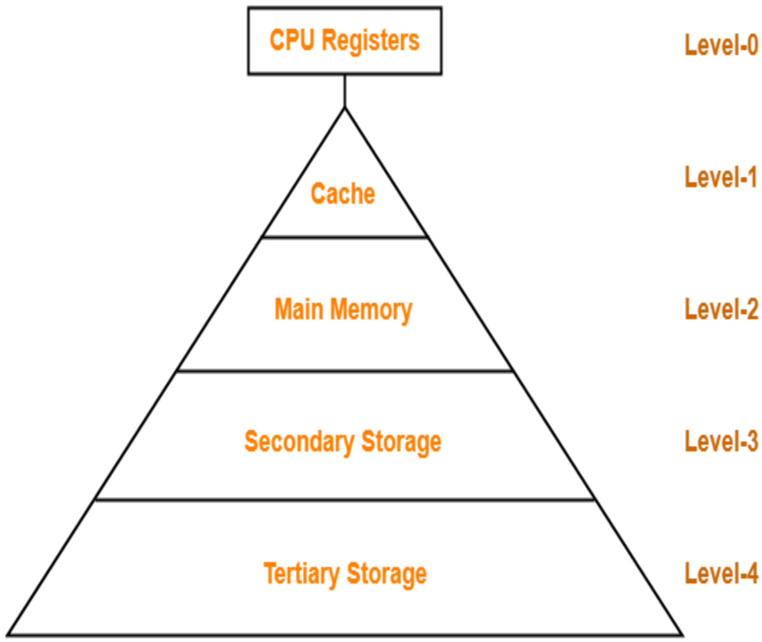
Paged Memory Management : This method divides the computer's main memory into fixed-size units known as page frames. This hardware memory management unit maps pages into frames which should be allocated on a page basis.

Segmented Memory Management : Segmented memory is the only memory management method that does not provide the user's program with a linear and contiguous address space. Segments need hardware support in the form of a segment table. It contains the physical address of the section in memory, size, and other data like access protection bits and status.

Memory Hierarchy

In computer architecture, the memory hierarchy separates computer storage into a hierarchy based on response time. Memory hierarchy affects performance in computer architectural design, algorithm predictions, and lower level programming constructs involving locality of reference.

Memory Hierarchy Diagram-



Memory Hierarchy

Level-0:

- At level-0, registers are present which are contained inside the CPU.
- Since they are present inside the CPU, they have least access time.
- They are most expensive and therefore smallest in size (in KB).
- Registers are implemented using Flip-Flops**.**

Level-1:

- At level-1, Cache Memory is present.
- It stores the segments of program that are frequently accessed by the processor.
- It is expensive and therefore smaller in size (in MB).
- Cache memory is implemented using static RAM.

Level-2:

- At level-2, main memory is present.
- It can communicate directly with the CPU and with auxiliary memory devices through an I/O processor.
- It is less expensive than cache memory and therefore larger in size (in few GB).
- Main memory is implemented using dynamic RAM.

Level-3:

- At level-3, secondary storage devices like Magnetic Disk are present.
- They are used as back up storage.
- They are cheaper than main memory and therefore much larger in size (in few TB).

Level-4:

- At level-4, tertiary storage devices like magnetic tape are present.
- They are used to store removable files.
- They are cheapest and largest in size (1-20 TB).