NAME:- RAJIB DEY

ROLL:-24

DEPARTMENT:- CSE

SEM:-5TH

SUBJECT:- OPERATING SYSTEM

TOPIC :- TERM PAPER ON " MEMORY MANAGEMENT"

Introduction:-

In a multiprogramming computer the operating system resides in the part of memory and the rest is used by multiple processes. The task of subdividing the memory (not used by the operating system) among the various processes is called memory management.

Goal:- The efficient utilization of memory by minimizing internal and external fragmentation.

Functionality:- Allocating and deallocating the memory to the processes .

Memory Layout:-

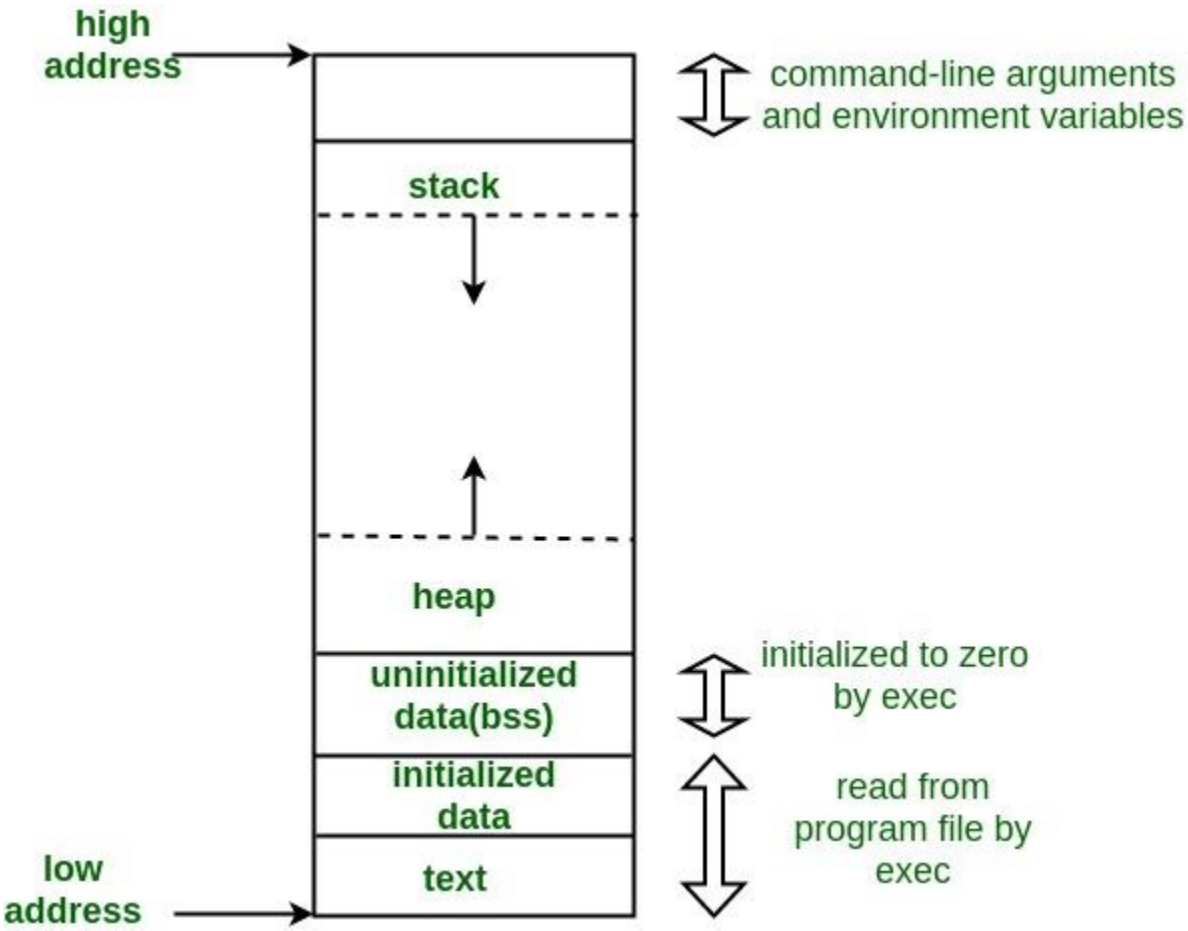
A process has four regions in the memory. In general memory is divided into two sections . One is Data segment and other is used as Text segment , but uses up to three data segments , depending on the storage class of the data being stored there. The four segments are Text segments, Stack segments , Data segments , Heap Segment.

code/Text Segment:- This segment contains the machine instructions of the application(program) being executed. It is read-only, so that programs cannot modify their code during execution. It allows sharing a number of processes that all execute the same program.

Data Segment:-

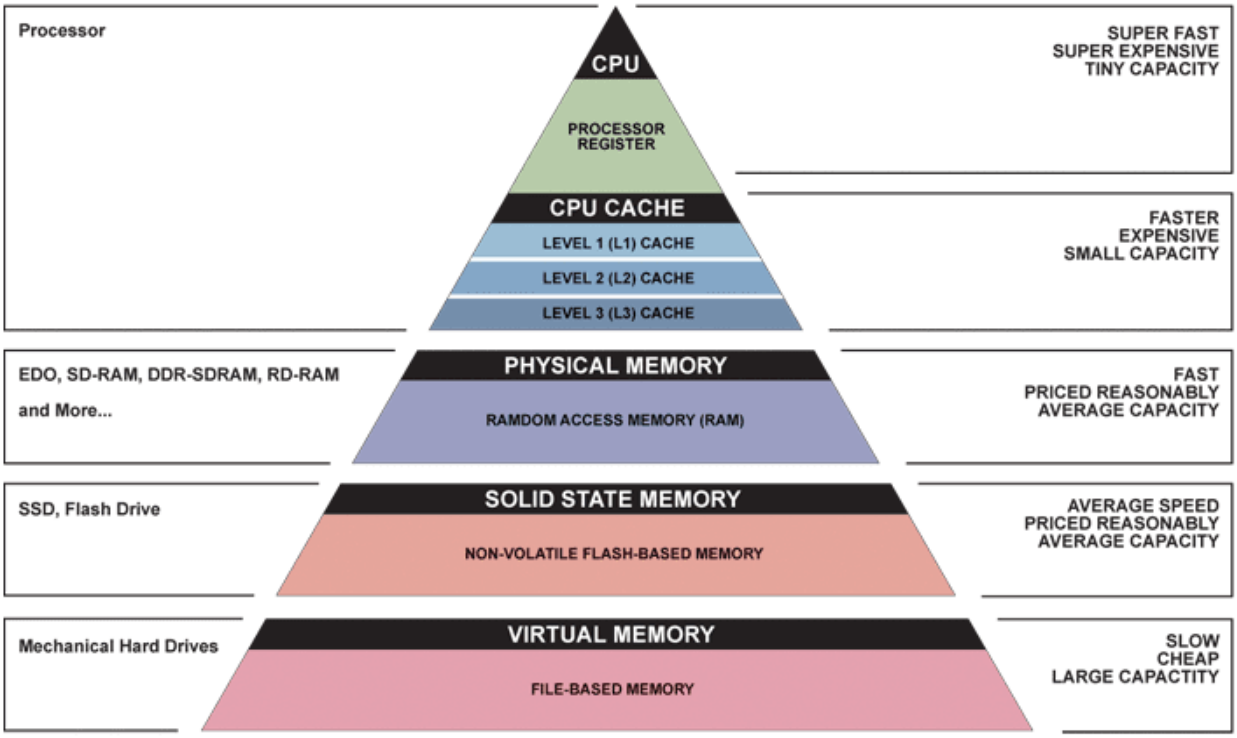
The data segment contains the static data of the program i.e. the variables that exists throughput program execution. Global variables and static variables of the program are stored in this segment.

Heap:- The heap segment is a pool of memory used for dynamically allocated memory. Example:- malloc() in C.



Stack:- The stack segment contains the system stack, which is used as temporary storage. It stores the execution frames (activation record) of functions called by the program.

Memory hiarchy:-

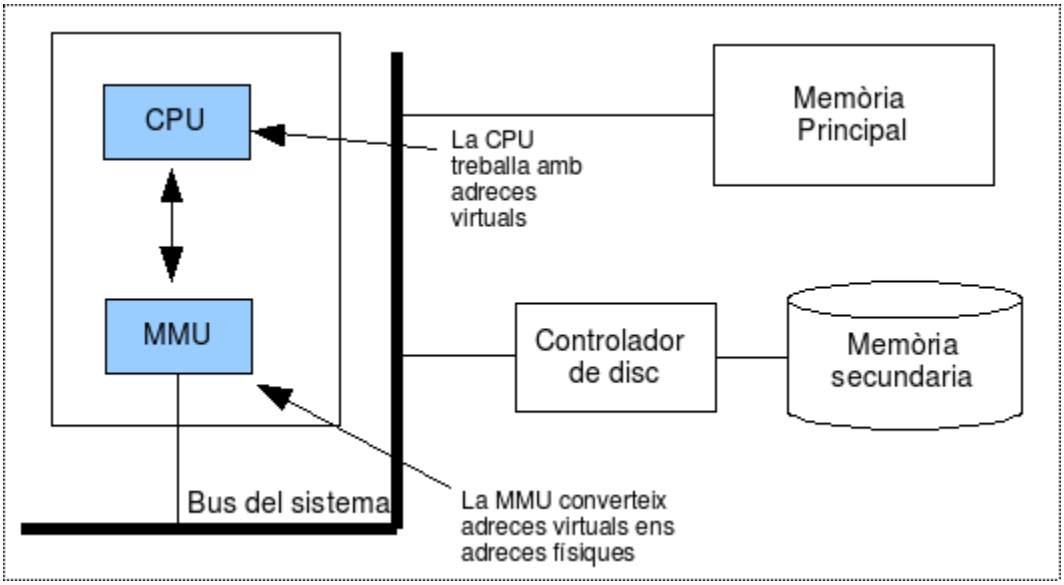


▲ Simplified Computer Memory Hierarchy
Illustration: Ryan J. Leng

Memory management unit (MMU):-

Hardware device that maps virtual to physical address . In MMU scheme, the value in the relocation register is added to every address generated by a user process at the time it is sent to memory. The user program deals with logical address; it never sees the real physical addresses. The basic register contains(or relocating register) contains values which is added to every address generated by user process at the time the address is sent to memory. For example here base case is

14000 and is added to CPU generated address 346. The final address i.e physical address is 14346 which is located in memeory.



- Memory allocation Techniques:-

Main memory is divide into a set of non-overlapping memory regions called partition . Memory can be allocated in contiguous or non-cartiguous partition.

Contiguous partition

- Contiguous partition categorized into two ways:-

1) Single partitioning

2) Multiple partitioning

Single partitioning allocation:-

Only one user present and one process is running at any time in the system . Main memory is divided into only two pairs as Operating System and user program currently being executed . A single process is loaded into the memory at a time .

Advantage:- Simple and no special hardware needed to implement .

Disadvantages:- Wastage of cpu time , main memory not utilized fully, and program size is fixed.

Multiple-partition allocation

If user memory is divided into more than one partition then such partition is called as multiple partition.

1. Flexible portioning(Static):- Size of each partition is static.

2.Variable portioning(Dynamic) :- Partition done based on process size

90

- Non-contigious memory allocation:-

1)Paging:-Paging is a memory management scheme that eliminates the need for contiguous allocation of physical memory. This scheme permits the physical address space of a process to be non – contiguous.

2) Segmentation:-

Paging does not allows user's view of memory allocation. To achieve user's view of memory allocation, segmentation is used.

3) Segmented paging:-

To avoid overhead of bringing large size segment into memory, segmented paging will be implemented . In segmented paging , paging will be applied on the segment and instead of bringing entire segment into memory , the pages of segment will be brought.