

⇒ Memory Management

→ Memory management is the process of controlling & coordinating a computer's main memory.

→ Memory management is the functionality of an operating system which handles or manages primary memory & moves processes back & forth b/w main memory & disk during execution.

⇒ Requirements of Memory Management:

(1) Relocation:-

while the program is executing it may be swapped to disk & returned to main memory at a different location.

→ When a program is run it doesn't know in advance what location it will be loaded at. Therefore, the program cannot simply generate static addresses. Instead,

they must be made relative to
where the program has been
loaded.

3 Protection:

whenever we are dealing with
multiple programs at the same
time, there always exists a
danger - one program might
write to the address space
occupied by another program.
Thus, every process has to be
protected against all unwanted
interferences - when all the other
processes try to write into a
process, whether it is accidental
or incidental.

3 Sharing:

- It allows several processes to access
the same data
- It must allow several processes

to access a common portion of main memory without compromising protection -

→ Protection mechanism allow various processes to access a similar section of main memory -

4 Logical Organization:-

Main memory is organized as linear or it can be a one-dimensional address space which consist of a sequence of bytes or words. Most of the programs can be organized into modules.

5 Physical Organization:

The structure of computer memory has two levels

- Main Memory
- Secondary Memory.

Main memory is relatively very fast & costly as compared to the secondary memory. Main memory is volatile. Thus, secondary memory is provided for storage of data on long-term basis while the main memory holds currently used programs.

Memory Partitioning:

Memory Partitioning means dividing the main memory into chunks of same or different sizes so that they can be assigned to process in the main memory.

Memory Partitioning

There are two type of memory partitioning.

→ Virtual Memory

→ Non-virtual memory.

→ Virtual Memory:

→ Segmentation or Paging.

The operating system partitions

memory with several addresses

into pagefiles or swap files

while moving virtual machine

memory to physical memory.

→ It is a Storage allocation scheme.

in which secondary memory can

be addressed as though it were

part of Main memory.

Types of V.M:

→ Paging → Segmentation.

Paging divide memory into sections or Paging files.

They translate the virtual address that the OS

gives application User into Physical address.

It manage V.M. This approach

divide V.M into segment or diff lengths.

segmented information are tracked

into segmented table as addressed.

Non-Virtual Memory:

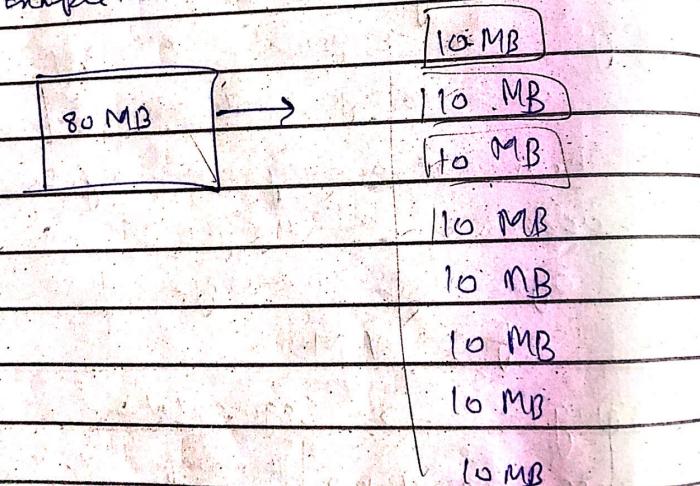
Included in that memory.

Partitioning Two type of Partitioning are included in that memory.

- Fixed Partitioning
- Dynamic Partitioning.

Fixed: In Fixed Partitioning memory the main memory is divided into block of same or different sized, either (Equal, unequal size).

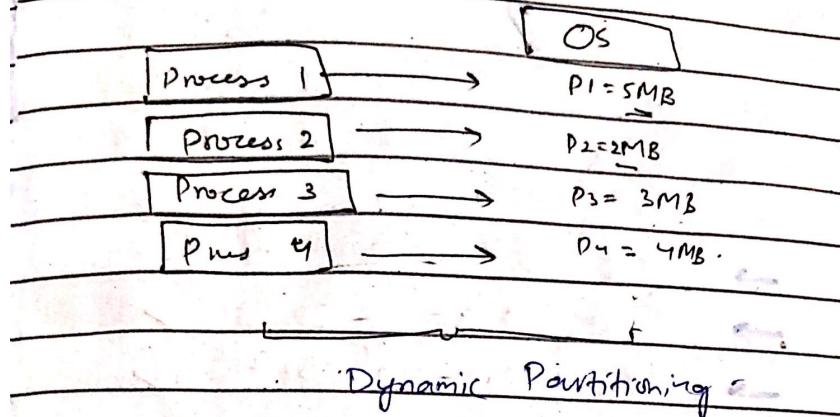
Example:



Dynamic:

In Dynamic Partitioning, the partition size initially is not declared, it's declared at the moment OR

Process Loading



Internal Fragmentation:

Internal fragmentation occurs when the memory is distributed into fixed-size blocks. If the memory allocated to the process is slightly larger than the memory demanded, then the difference b/w allocated & demanded memory is known as internal fragmentation.

1 MB → 9

Dynamic Partition Placement algorithm.

Operating System must decide which free block to allocate to a process →

→ Best Fit algorithm ✓

→ First Fit algorithm ✓

→ Next Fit algorithm ✓

→ Best

→ In Best Fit algorithm the operating system searches through the list of free blocks of memory to find the block that is closest in size to the memory request from the process.

→ Next

→ Next fit algorithm is similar to the First except the fact that, Next fit scans the linked list from the node where it previously allocated a hole.

• More often allocates a block of memory at the end of memory.

where the largest block is found-

First Fit:

It starts scanning from beginning & choose first available block that is large enough.
→ It is fastest.

What is Paging:

→ Memory divide into small equal size chunks → chunks of memory called Frames.

→ Divide each process into the small sizes chunks. Chunks of process called Pages.

→ Operating System maintains a Page Table for each process.

→ Pages & frames are always of the same size.