

Contiguous Memory Allocation

In older systems, memory allocation is done by allocating a single contiguous area in memory to the processes. When there was multiprogramming or multi-user system, memory was divided into two partitions. one for the OS, and other for the user processes

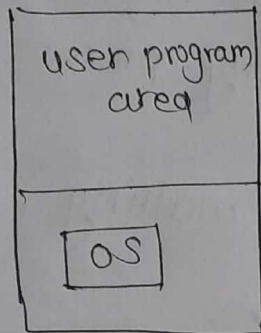


Fig: single partition in memory.

After that, multiple processes are accommodated by having multiple partitions in the memory.

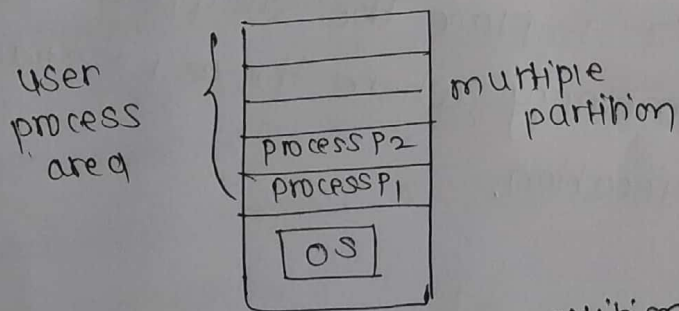


Fig: multiple partition of memory

The contiguous allocation method was implemented by partitioning the memory into various regions.

The memory can be partitioned, using either fixed memory or variable memory partitioning

In this method, a process is allocated a contiguous memory in a single partition.

Thus, the memory partition, which fits the process, is searched and allocated.

The memory partition which is free to allocate is known as hole.

A) contiguous allocation with fixed partitioning.

Fixed partitioning can be done at the time of system generation. The partition can be of fixed or variable size, but once fixed, it cannot be changed.

If there is need to change the partition size, the OS must be generated again with modified partition. To allocate memory to the processes in partitions, the OS creates a table to store the information, regarding the partitions in the memory. This table is called as partition description Table (PDT).

partition ID	starting Add	size	Allocation status

Fig: partition description table.

- In this method, the long-term scheduler performs job scheduling, and decides which process is to be brought into the memory.
- It then finds out the size of the process to be loaded and requests the memory manager to allocate a hole in the memory.
- The memory manager uses one of the allocation techniques to find a best match for the process.
- After getting a hole, the scheduler places the

process in the allocated partition

⑥ Next, it enters the partition id in the PCB of the process, and then PCB is linked to the chain of the ready queue.

⑦ Memory manager marks the status of the partition as 'allocated'.

As soon as, the process terminates, OS updates all the allocation status of the partition.

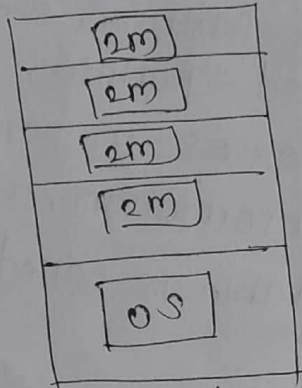


Fig: fixed equal size partitioning based cont. mem. allocation.

Unequal size partitioning

unequal size partitions can be chosen, such that smaller to bigger size processes can be accommodated, thereby wasting less memory.

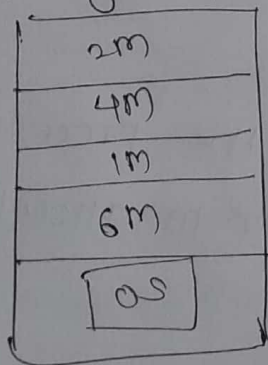


Fig: fixed unequal size mem allocation.

In this method, degree of multiprogramming will be decreased & internal fragmentation can occur.

Contiguous Allocation with Dynamic/variable Partitioning.

- Contiguous allocation with fixed partitioning suffers from drawback of internal fragmentation.
- To overcome this dynamic partitioning was devised.
- The number and size of partitions are not fixed at the time of system generation.
- They are variable and are created at runtime by the OS.
- The procedure for memory allocation in this method is the same as fixed partitioning. The only difference is that partitions for processes are created at runtime.
- Initially, there is only a single hole i.e. partition allocated to user process.
- The first process is allocated the required memory, out of this large hole, and the rest of memory is returned.
- Now there are two partitions - one which is allocated to process & one which is available.
- In this way, the processes are allocated the required space in the hole and variable sized partitions are produced.
- Two contiguous holes can be combined into a single partition if they are free.
- The advantage of variable partitioning is that the process is given exactly as much space as it requires, reducing internal fragmentation.