Fragmentation

① When a process is allocated to a partition, it may be possible that its size is less than the size of partition, leaving a space after allocation, which is ~~this~~ unusable by other process.

This wastage of memory, internal to a partition, is known as internal fragmentation.

② While allocating and de-allocating memory to the processes in partition through various methods, it may be possible that there are small spaces left in various partitions throughout the memory, such that if these spaces are combined, they may satisfy some other process' request.

But these spaces cannot be combined. This total memory space fragmented, external to all the partitions, is known as external fragmentation.

example:

Three processes P_1, P_2, P_3 of size 21900, 21950, 21990 bytes, resp, need space in the memory. If equal size of partitions of 22000 bytes are allocated to P_1, P_2 & P_3 will there be any fragmentation in this allocation?

⟹ After allocating the partitions to the processes, the leftover space in each partition is estimated by the difference between partition size and process size.

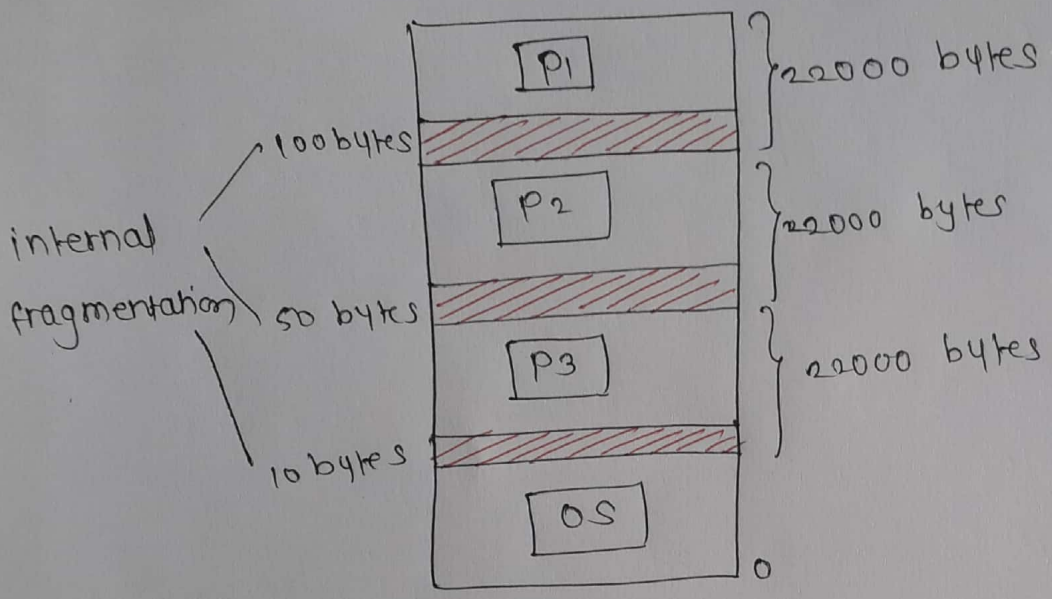
Hence,

P_1 = 22000 - 21900 = 100 bytes

P_2 = 22000 - 21950 = 50 bytes

P_3 = 22000 - 91990 = 10 bytes

This leftover space in each partition is nothing but internal fragmentation, as shown in the following fig.



<u>example</u>

Three processes P_1, P_2, P_3 of size 19900, 19990, 19888 bytes resp, need space in memory. If partitions of equal size i.e. 20000 bytes, are allocated to P_1, P_2 & P_3 will there be any fragmentation in this allocation? Can a process of 200 bytes be accomodated?

⟹ After allocating the partitions to the processes, the first, second and third partition are left with 100 bytes, 10 bytes, 1112 bytes resp. This leftover space in each partition is internal fragmentation.

The total space left = 100 + 10 + 112 = 222 bytes

process of 200 bytes cannot be accomodated, even if the total space left is more than 200 bytes.

This is because the space left is not contiguous.

Hence this partitioning also leads to external fragmentation.