

Definition of Internal Fragmentation

- Internal fragmentation occurs when the memory is divided into **fixed sized blocks**. Whenever a process request for the memory, the fixed sized block is allocated to the process. In case the memory assigned to the process is somewhat larger than the memory requested, then the difference between assigned and requested memory is the **Internal fragmentation**.
- This leftover space inside the fixed sized block can not be allocated to any process as it would not be sufficient to satisfy the request of memory by the process. Let us understand Internal fragmentation with the help of an example. The memory space is partitioned into the fixed-sized blocks of 18,464 bytes. Let us say a process request for 18,460 bytes and partitioned fixed-sized block of 18,464 bytes is allocated to the process. The result is 4 bytes of 18,464 bytes remained empty which is the internal fragmentation.
- The overhead of keeping track of the internal hole created due to internal fragmentation is substantially more than the number of internal holes. The problem of internal fragmentation can be solved by **partitioning the memory into the variable sized block** and assign the best-sized block to a process requesting for the memory. Still, it will not totally eliminate the problem of internal fragmentation but will reduce it to some extent.

Definition of External Fragmentation

- External fragmentation occurs when there is a sufficient amount of space in the memory to satisfy the memory request of a process. But the process's memory request can not be satisfied as the memory available is in a non-contiguous manner. Either you apply first-fit or best-fit memory allocation strategy it will cause external fragmentation.
- When a process is loaded and removed from the memory the free space creates the hole in the memory space, and there are many such holes in the memory space, this is called External fragmentation. Although the first fit and best fit can affect the amount of external fragmentation, it can not be totally eliminated. **Compaction** may be the solution for external fragmentation.
- Compaction algorithm shuffles all memory contents to one side and frees one large block of memory. But compaction algorithm is expensive. There is an alternative solution to solve external fragmentation issue which will allow a process to acquire physical memory in a non-contiguous manner. The techniques to achieve this solution are paging and segmentation.