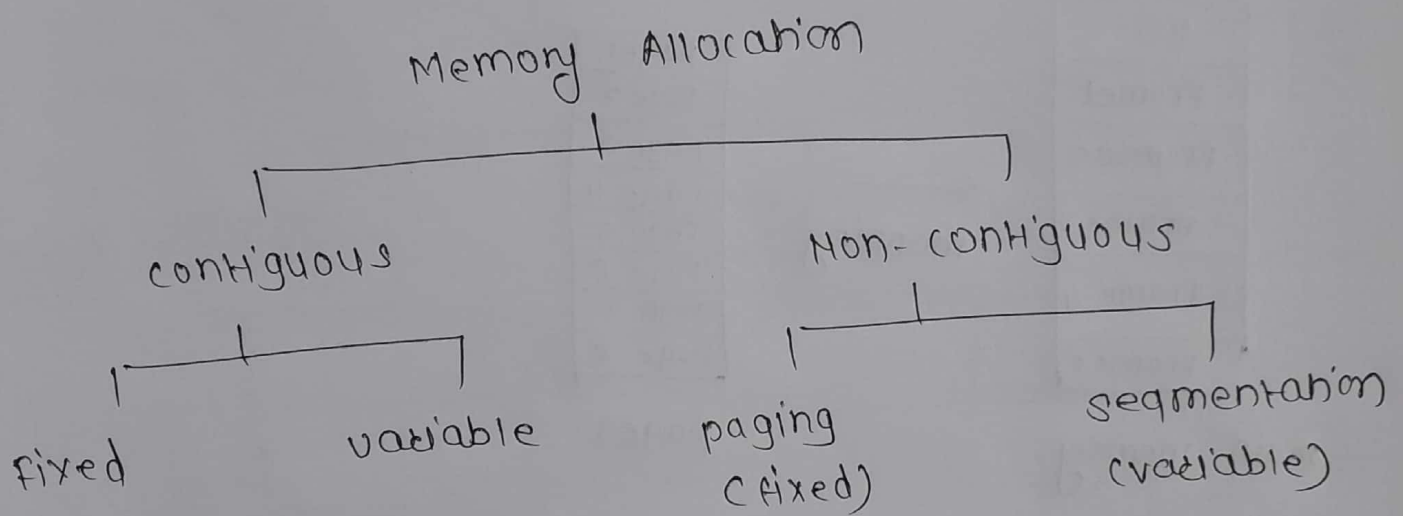


Non-contiguous memory Allocation

In this method, the holes do not need to be contiguous. They may be scattered in the memory and can be allocated to a process.

The non-contiguous memory allocation is classified as fixed-partitioning which is called as paging and variable-partitioning called as segmentation.



Paging

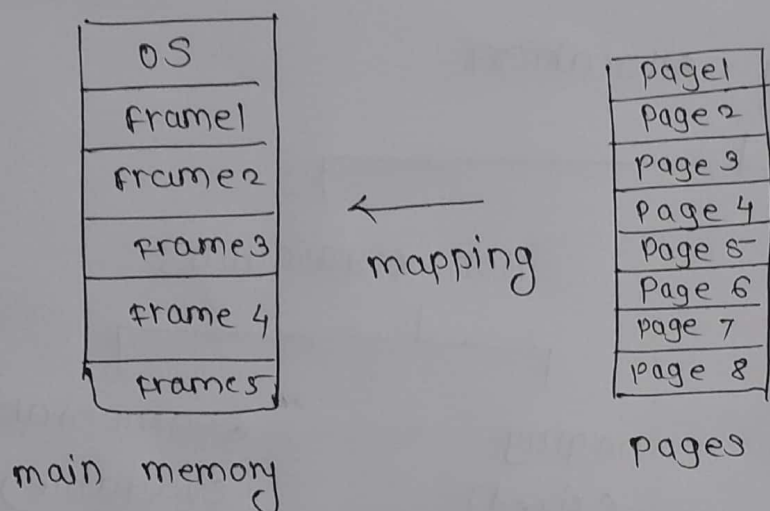
① In os. paging is a storage mechanism used to retrieve processes from the secondary storage into the main memory in the form of pages.

② In this method, each process is divided into pages.

③ The main memory also divided in the form of frames.

④ one page of the process is to be stored in one of the frames of the memory.

- ⑤ The pages can be stored at the different locations of the memory but the priority is always to find the contiguous frames or holes.
- ⑥ Pages of the process are brought into the memory only when they are required otherwise they reside in the secondary storage.
- ⑦ Page size is equal to the frame size.



Address translation in paging

- ① The logical address is the address generated by the CPU for every page while the physical address is the actual address of the frame where each page will be stored.
- ② conversion of logical address to physical address will be done by memory management unit (MMU)
- ③ logical address has two parts:
 - ① page number
 - ② offset
- ④ MMU needs to convert the page number to the frame number.

④ page table is a data structure used by the virtual memory system to store mapping between logical addresses and physical addresses.

page 0	frame no
Page 1	frame no
page 2	frame no
page 3	:
page 4	frame no

Fig: Page table

Process:

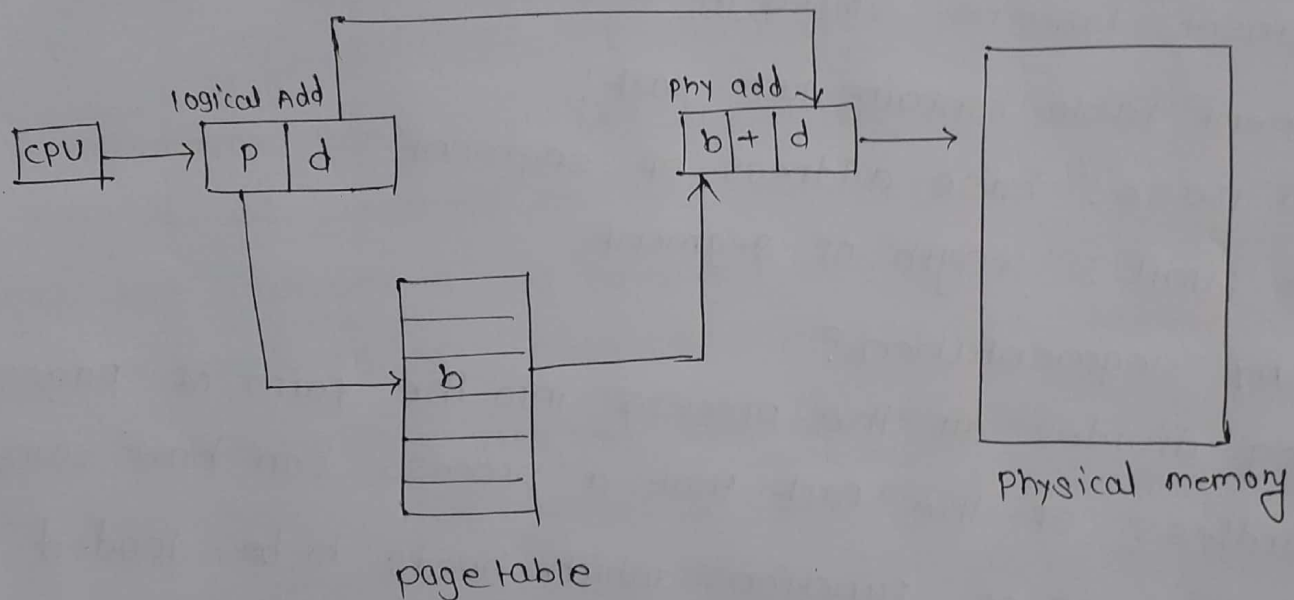


Fig: Address translation in paging.

- ① In this processor generates two dimensional logical address (P, d).
- ② page number P is extracted from the logical address, and is used as an index in the page table.
- ③ Base address b, is corresponding to the page number, is retrieved
- ④ b is added to the offset d to get the corresponding physical address.

Segmentation

① In O.S., Segmentation is a memory management technique in which, the memory is divided into the variable size parts. Each part is known as segment, which can be allocated to a process.

② Information about segment is stored in segment table.

③ Segment table is stored in any one of the segment.

Segment table contains two part:

① Base: base address of segment

② Limit: length of segment

Why Segmentation?

① Paging divides all the process into the form of pages regardless of the fact that a process can have some relative parts of functions which needs to be loaded in the same page.

② Segmentation divides the process into segments. Each segment contains same type of functions such as main function can be included in one segment and the library functions can be included in the other segment.

Address translation in segmentation:

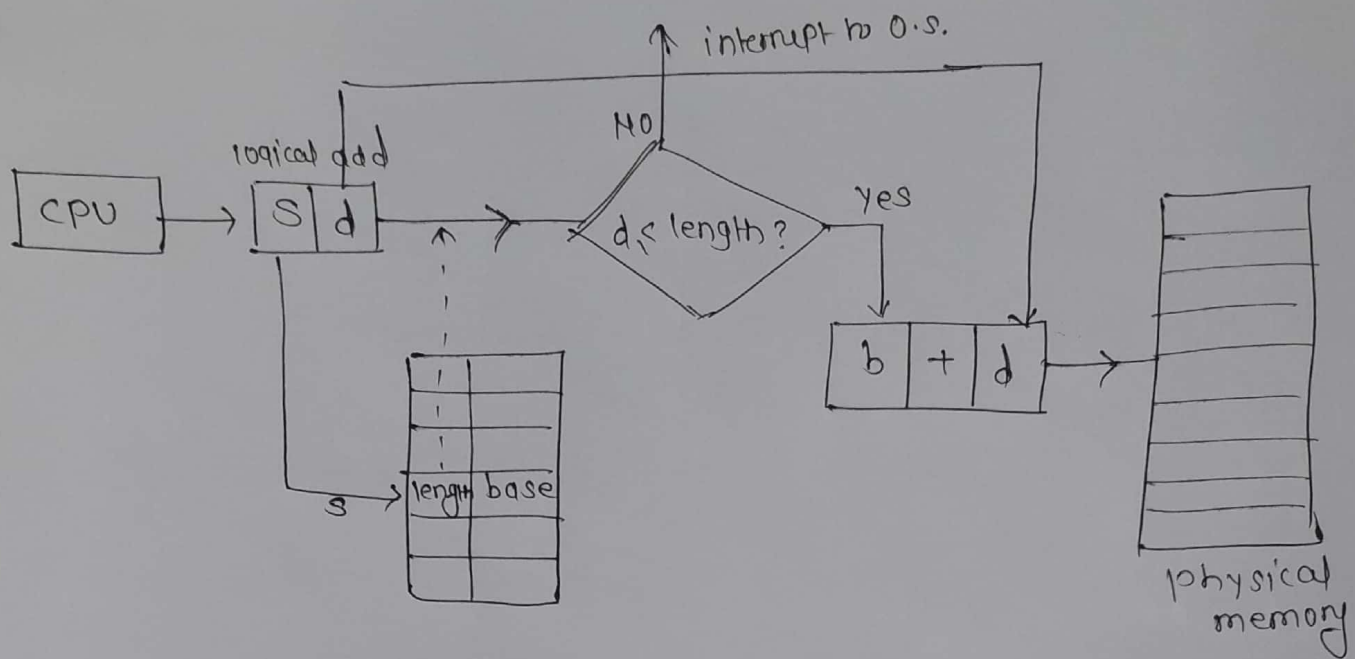


Fig: Address translation in segmentation.

- ① A processor generates two dimension logical address consist of segment no and offset. (S & d)
- ② Segment number S is extracted from the logical address and is used as an index of the segment table.
- ③ After reaching the desired segment number in the segment table, its offset d is checked with the limit of the segment. If $d \leq \text{length}$, then go to the next step. otherwise an interrupt is generated to indicate that the address in segment is not valid.
- ④ The base address, corresponding to the segment number, is retrieved.
- ⑤ The base address is added to d to get the physical address.