**Very Important questions from memory management**

1. Why page sizes are always power of 2?

* The paging is implemented by breaking an address (logical address) into a page number and page offset. It is most efficient to break the address into X page bits and Y offset bits rather than perform arithmetic operation on the address to calculate the page number and offset number. Each bit position represents a power of 2, so splitting an address between these bits results in a page size power of 2.

1. Under what circumstances do page fault occurs? Describe the action taken by OS when page fault occurs?

* A page fault occurs when an access to a page that has not been brought into main memory takes place.
* When page fault occurs,
* At first the operating system verifies the memory access and aborts the program if it is invalid.
* If it is valid, a free frame is located and I/O is requested to read the needed page into the free frame.
* Up on completion of I/O , the process table and page table are updated and the instruction is restarted.

1. What is segmentation? Why are segmentation and paging sometimes combined into one scheme?

* Segmentation is the process of dividing the logical address into independent parts called segments. Each segment can have its own name and size. The growing and shrinking of each segment does not affect the others.
* Segmentation and paging are combined into one scheme due to the following reasons
* Segmented paging (segmentation+ paging) improves the performance up on each other.
* Paging with segmentation reduces the wasted memory due to external fragmentation as well as simplify the allocation.
* While segmentation and paging are combined one can get a large address space without having to buy more physical memory (advantage of paging) as well as provides the sharing and protection mechanism (advantage of segmentation).

1. What type of fragmentations occurs in paging? Explain with example.

* Since in paging, any free frame can be allocated to a process that needs it there is no chance of external fragmentation. However it may have internal fragmentation occur.
* Example:

Consider we have a page size= 2,048 bytes and process size= 72,766 bytes.

So, the number of pages= (72,766/2048) = 35. 5302

Hence we have to allocate 36 frames in main memory.

When allocating 36 frame we can have memory size of = 36\* 2,048 bytes= 73,728 bytes.

Since the 36th frame contains size of = (0.53\* 2048) byes = 1086 bytes (nearly)

So, Internal fragmentation results wastage of = (2048-1086) bytes= 962 bytes.

1. Differentiate between logical address and physical address.
2. Differentiate between internal fragmentation and external fragmentation?
3. Differentiate Segmentation and Paging.

* see notes

1. What is TLB, TLB hit and TLB miss? Explain paging with TLB?

* see notes

1. Describe how TLB increases performance in paging?

* see notes

1. What is demand paging? What are the advantages of demand paging? Explain.

* see notes