OPERATING SYSTEM
WEEK 11 ASSIGNMENT

What is Virtual Memory? Explain in detail about the methods of implementing virtual memory?

- Virtual memory is a technique that allows the execution of processes that are not completely in memory
- One major advantage of this scheme is that programs can be larger than physical memory
- Further, virtual memory abstracts main memory into an extremely large, uniform array of storage, separating logical memory as viewed by the user from physical memory
- This technique frees programmers from the concerns of memory-storage limitations
- Virtual memory also allows processes to share files easily and to implement shared memory
- In addition, it provides an efficient mechanism for process creation

Background

· Virtual memory – separation of user logical memory from physical memory

- Only part of the program needs to be in memory for execution
- Logical address space can therefore be much larger than physical address space
- Allows address spaces to be shared by several processes
- Allows for more efficient process creation
- More programs running concurrently
- Less I/O needed to load or swap processes
- Virtual memory can be implemented via:

1. Demand paging
2. Demand segmentation

Shared Library Using Virtual Memory

· In addition to separating logical memory from physical memory, virtual memory allows files and memory to be shared by two or more processes through page sharing

· This leads to the following benefits:

- System libraries can be shared by several processes through mapping of the shared object into a virtual address space
- Similarly, processes can share memory
- Pages can be shared during process creation with the fork() system call, thus speeding up process creation

Demand Paging

Could bring entire process into memory at load time
Or bring a page into memory only when it is needed

- Less I/O needed, no unnecessary I/O
- Less memory needed
- Faster response
- More users
- · Similar to paging system with swapping (diagram on right)
- · Page is needed Þ reference to it
- invalid reference Þ abort not-in-memory Þ bring to memory
- Lazy swapper – never swaps a page into memory unless page will be needed

- Swapper that deals with pages is a pager