# 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