1.1.3 Services Offered by an Operating System

An operating system offers the undermentioned services:

(a) *Process Management:* A process is a program under execution. It is the job which is currently being executed by the processor (CPU). During its execution, a process would require certain system resources, such as processor time, main memory, files, I/O devices etc.

UNIX supports multiple processes simultaneously. The process management module of UNIX takes care of creation and termination of processes, assigning required resources to different processes currently running, scheduling the processor's time to different processes and providing mechanisms for synchronization and communication among processes.

(b) *Memory Management*: Memory Management module of an Operating System takes care of allocation and de-allocation of main memory to various processes. It allocates the main memory and secondary memory to the system-programs, user-programs and data. For executing a program, its binary image must be loaded into the main memory. Also, a program would require main memory to hold data from disk files, the contents of which it is reading or manipulating at the execution time.

(c) *Input/Output Management*: The Input/Output Management module of the OS co-ordinates and assigns different input and output devices, namely terminals, printers, disk drives, tape drives etc. It controls all I/O devices, keeps track of I/O requests, issues commands to these devices and takes measures which would ensure that data is transmitted efficiently and correctly to and from I/O devices.

(d) ***File Management***: Data is stored in a computer system as *files*. The File Management module of the operating system would manage files held on various storage devices as well as transfer of files from one storage device to another. Thus, file management takes care of organization, storage, retrieval, naming, sharing and protection of different files. It also allows files to be read and modified by using text editors or some other file manipulation software packages.

(e) ***Scheduling***: The Operating System also establishes and enforces process-priority. That is, it determines and maintains the *order* in which jobs are to be executed by the computer system. This is so because the most important jobs must be executed first followed by less important jobs.

☞ ***Scheduler*** *in the OS selects the most deserving process to run, out of all the runnable processes in the system, based on their relative priority.*

(f) ***Security Management***: Security Management module of the OS ensures data security and integrity. That is, it protects data and programs stored in the computer system from destruction and unauthorized access. It keeps the different programs and data, which are executing concurrently in the memory, in such a manner that they do not interfere with each other. Moreover, it protects files from being accessed or modified by unauthorized users.

(g) The Operating System also creates dumps, traces, error messages, and other debugging and error-detecting codes for correcting programs.

(h) OS maintains internal time clock and log of system usage for all the users.

(i) OS facilitates easy communication between the computer system and the computer operator (human), and thus provides user interface.

(j) ***Processor Management:*** The OS assigns processor (if a computer has more than one processor) to different tasks that must be performed by the computer system. Whenever the OS finds any processor idle, one of the processes waiting to be executed is assigned to this idle processor. The objective of the Processor Management module of the OS is to ensure that a process is run on each processor at all times.