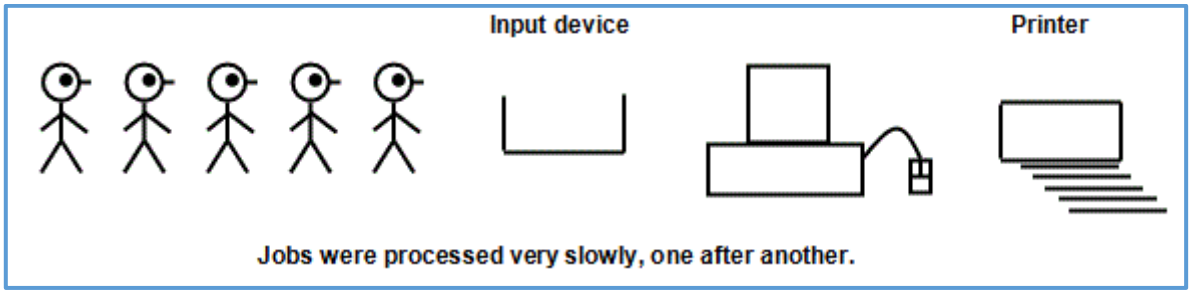
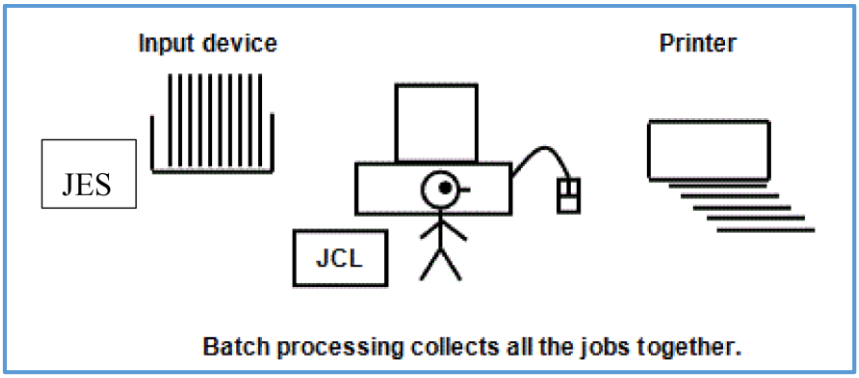
Operating System Processing

Processing techniques (in the OS): are methods to process different types of data. There are a number of processing techniques depending upon the hardware and software capabilities of a computer and the type of data that needs to be processed. The types of processing techniques are the following:

1) Batch Processing

This type of operating system technique does not interact with the computer directly. There is an operator who takes similar jobs having same requirement and group them into batches. It is the responsibility of operator to sort the jobs with similar needs. Then the jobs are processed without user intervention.





Job Entry Subsystem JES receive jobs into the operating system. Job Control Language JCL is to say which programs to run (priority).

Advantages of Batch Operating System:

- It is very difficult to guess or know the time required by any job to complete. Processors of the batch systems know how long the job would be when it is in queue.
- Multiple users can share the batch systems.

- The idle time for batch system is very less.
- It is easy to manage large work repeatedly in batch systems.

Disadvantages of Batch Operating System:

- The computer operators should be well known with batch systems.
- Batch systems are hard to debug.
- It is sometime costly, because the data needs to be accumulated and then processed.
- The other jobs will have to wait for an unknown time if any job fails.

2) Spooling

Spooling technique is used to improve the processing speed of batch processing. Spooling means Simultaneous Peripheral Output On Line. The process of storing input data and output results on secondary storage is known as Spooling. The input data is stored on magnetic disks and is fed to the CPU when it is not too busy.

Spooling is a process in which jobs are put into a buffer, disk, or a particular area in the memory so that a device can access these jobs when it is ready. Buffer offers a waiting station so that data can respite at the time when the slower device catches up.

A buffer is a temporary storage region, typically in RAM. The idea of the buffer was employed to prevent data congestion from an incoming port to an outgoing port of transfer. Most of the buffers are used for holding data to be forwarded to the I\O.

The processor then, processes the data and the resulting output is again stored on a secondary storage device. Thus in Spooling the magnetic storage media acts as a buffer between the memory and the input \ output devices. Buffer store the data through I\O operation, because I\O operation is slow and CPU operation fast. (Fig. below Shows Spooling OS).

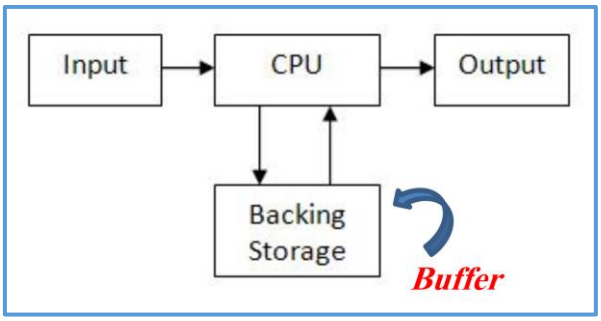


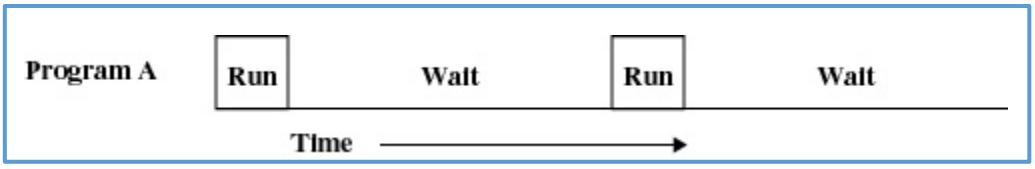
Fig. Spooling Operating System

3) Multiprogramming

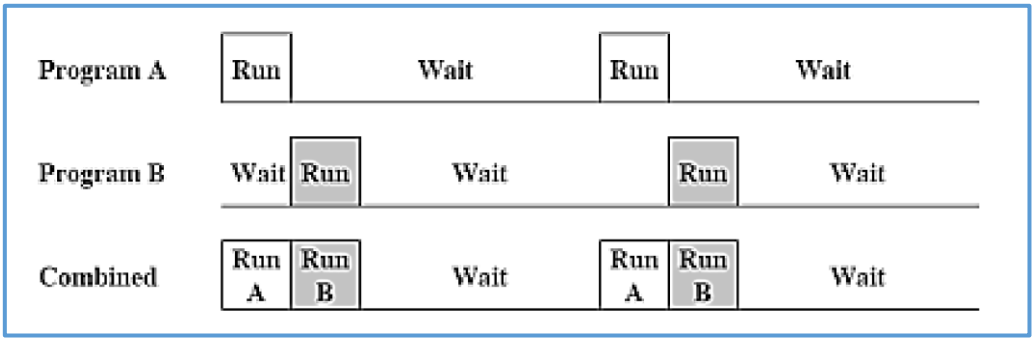
In Multiprogramming the CPU is capable of running more than one program concurrently. More than one program can reside in the main memory at any given time, however, the processor is able to execute only more instruction at a time.

The operating speed of the CPU is much faster than that of the I\O device. Therefore when one program is busy with I\O device operations, the CPU is able to allocate time to other programs instead of running idle. Thus a number of users can share CPU time.

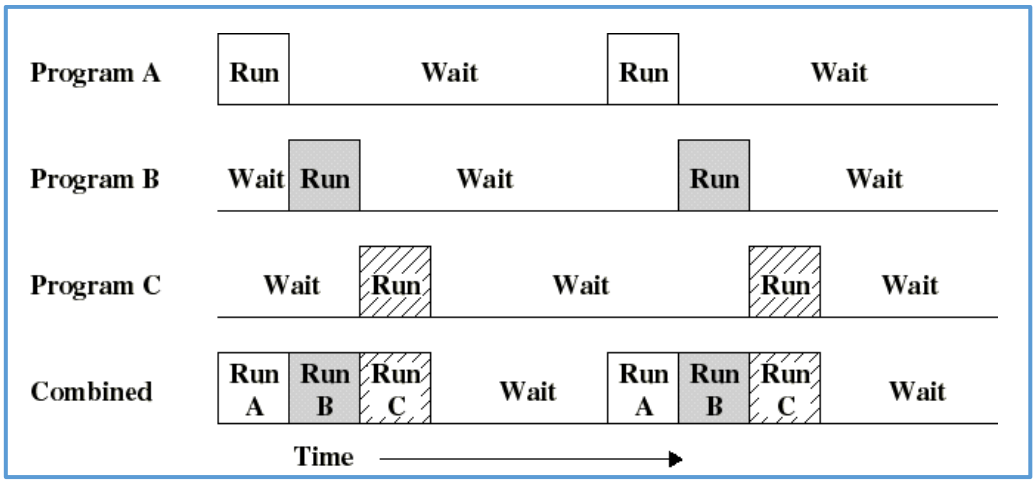
Multiprogramming increase both the throughput and response time of the computer system. However, operating systems that can support Multiprogramming are required to have high memory capacity and at the same time effective mechanism of protecting the memory.



(a) Uni-programming



(b) Multiprogramming with two programs



(c) Multiprogramming with three programs

- The processor spends a certain amount of time executing, until it reaches an I/O instruction; it must then wait until that I/O instruction concludes before proceeding.
- When one job needs to wait for I/O, the processor can switch to the other job, which is likely not waiting for I/O.
- Multiprogramming also known as Multitasking.
- Memory expanded to hold three, four, or more programs and switch among all programs.

4) Multiprocessing

In Multiprocessing system, two or more CPUs are connected together within a single computer system. Therefore it is possible to execute instructions from different programs at the same time. Thus more than one instruction can be executed simultaneously. The idle time of the computer reduces; since there is no user intervention.

The disadvantage of Multiprocessing are:

Execute different instructions of the same program.

- Some systems have a common main memory for all the CPUs.
- In some systems, each system has its own main memory

- While in still others each CPU can have its own memory as well as share a common memory with other processors.
- Multiprocessing systems require a very complex and sophisticated operating system to coordinate all the activities of the multiple CPUs and other devices. Multiprocessing systems are also very expensive.

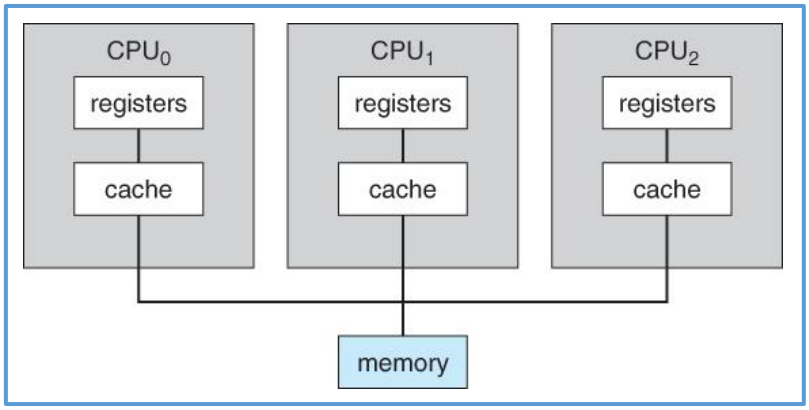


Fig. Multiple Processor Systems

5) Time Sharing

In time sharing, it is possible for multiple users to run more than one application at the same time on the computer. This is accomplished by providing a separate terminal to each user. All these terminals are connected to main computer.

The CPU time is divided among all the users on a scheduled basis. The time that each user gets is called a time slice. The CPU switches from one user to another, and executes a part of the process in the time slice. This process continues till the job is executed. In the time sharing, like a multi programming only one program is in a control of the CPU at any given time.

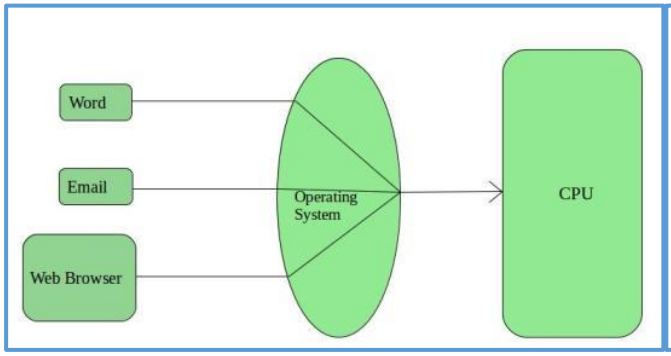


Fig. Time sharing OS

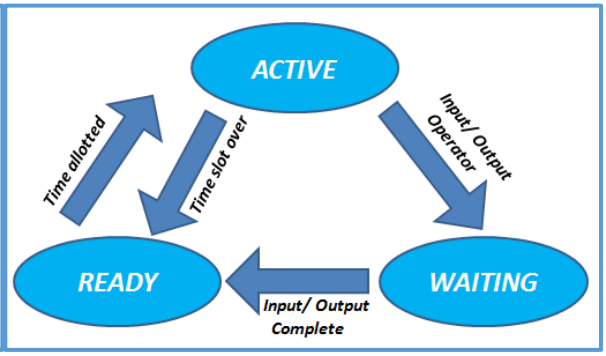


Fig. Process State of time sharing OS