**Multi Tasking**

(of a person) deal with more than one task at the same time.

(of a computer) execute more than one program or task simultaneously.

Multitasking, in an operating system, is allowing a user to perform more than one computer task (such as the operation of an application program) at a time.

**Multi Programming**

In a multiprogramming system there are one or more programs loaded in main memory which are ready to execute. Only one program at a time is able to get the CPU for executing its instructions (i.e., there is at most one process running on the system) while all the others are waiting their turn.  
The main idea of multiprogramming is to maximize the use of CPU time. Indeed, suppose the currently running process is performing an I/O task (which, by definition, does not need the CPU to be accomplished).

**Multi Processing**

Multiprocessing sometimes refers to executing multiple processes (programs) at the same time. This might be misleading because we have already introduced the term “multiprogramming” to describe that before.

In fact, multiprocessing refers to the hardware (i.e., the CPU units) rather than the software (i.e., running processes). If the underlying hardware provides more than one processor then that is multiprocessing. Several variations on the basic scheme exist, e.g., multiple cores on one die or multiple dies in one package or multiple packages in one system.

Anyway, a system can be both multi programmed by having multiple programs running at the same time and multiprocessing by having more than one physical processor.

Multiprocessing is the use of two or more central processing units (CPUs) within a single computer system. The term also refers to the ability of a system to support more than one processor or the ability to allocate tasks between them.

**Multithreading**

Up to now, we have talked about multiprogramming as a way to allow multiple programs being resident in main memory and (apparently) running at the same time. Then, multitasking refers to multiple tasks running (apparently) simultaneously by sharing the CPU time. Finally, multiprocessing describes systems having multiple CPUs. So, where does multithreading come in?

Multithreading is an execution model that allows a single process to have multiple code segments (i.e., threads) run concurrently within the “context” of that process. You can think of threads as child processes that share the parent process resources but execute independently.