Processes

Process = Program Code + Data + PCB
- A program in execution
- An instance of a running program
- The entity that can be assigned to a processor
- An unit of activity characterized by a single sequential thread of execution

Process Control Block (PCB)
- Contains the process elements
- Enable Interrupts on a running process
- Created and managed by the OS
- Key to that allows support for multiple processes

Process Trace
The sequence of instructions executed for that process.

Process Dispatcher
A program which switches the processor to one process to another.

Time Slice
A period of time given to process to execute it's instructions (not necessarily to completion).

Process States (Two-State)
- Not Running
- Running

Process Creation (Reasons)
- Batch jobs
- Interactive logon
- Providing a service
- Spawned by an existing process

Process Creation
When the Operating System creates a process, it is only at the explicit request of another process. The original creating process is known as the Parent, whereas the newly created process is known as the Child.

How does it happen?
- Assigns a unique ID to the new process
- Allocates space for the new process
- Initializes the PCB
- Sets the appropriate linkages
- Creates or expands other data linkage

Process Termination
In order for a process to indicate completion, it sends a OS system call for termination.

Reasons for termination:

- Normal completion
- Parent request
- Time limit exceeded
- Memory unavailable
- Memory bounds violation
- Protection error
- Arithmetic error
- Time overrun
- I/O failure
- Invalid instruction
- Privileged instruction
- Data misuse
- OS intervention
- Parent termination

Process States (Five-State)

- Created (New)
- Ready
- Running
- Exit
- Blocked (Waiting)

Suspended Processes

Refers to swapping some or all of the process from Main Memory to disk. When none of the processes in Main Memory is in the ready state, the OS swaps one of the blocked processes out on to the disk into a suspend queue.

Characteristics:

- Not immediately available for execution
- Intentionally placed into the suspended state by some Agent (OS, Parent Process, etc.)
- Cannot be removed out of suspended state until explicitly ordered by the Agent.
- The suspended process may or may not be waiting on an event.

Two-State Model

- Ready/Suspend
- Blocked/Suspend

Both are in secondary memory, but differ in their state prior to being swapped out.

Reasons for a process to be suspended:

- Swapping
- Other OS reason (e.g. Process Deadlock)
- Interactive use request
- Timing
- Parent process request