Operating System

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Modes of Execution

- To provide protection to PCBs (and other OS data) most processors support at least 2 execution modes:
  - Privileged mode (a.k.a. system mode, kernel mode, supervisor mode, control mode)
    - manipulating control registers, primitive I/O instructions, memory management...
  - User mode
- For this the CPU provides a (or a few) mode bit which may only be set by an interrupt or trap or OS call

Process Creation

- Assign a unique process identifier
- Allocate space for the process image
- Initialize process control block
  - many default values (ex: state is New, no I/O devices or files...)
- Set up appropriate linkages
  - Ex: add new process to linked list used for the scheduling queue

Reasons for Process Creation

New batch job	The OS is provided with a batch job control stream, usually on tape or disk. When the OS is prepared to take on new work, it will read the next sequence of job control commands.
Interactive logon	A user at a terminal logs on to the system.
Created by OS to provide a service	The OS can create a process to perform a function on behalf of a user program, without the user having to wait (e.g., a process to control printing).
Spawned by existing process	For purposes of modularity or to exploit parallelism, a user program can dictate the creation of a number of processes.

Process Creation

Process spawning	*Parent process*	*Child process*
• when the OS creates a process at the explicit request of another process	• is the original, creating, process	• is the new process

Process Termination

There must be a means for a process to indicate its completion

A batch job should include a HALT instruction or an explicit OS service call for termination

For an interactive application, the action of the user will indicate when the process is completed(e.g. log off, quitting an application)

Reasons for process termination

The process terminate from the running state includes so many causes. Generally the process terminates when execution finished. Some other causes are:

- Time slot expired
- Memory Violation
- I/O failure
- Parent termination
- Parent request
- Invalid Instruction

Operations on process

System that manage process must be able to perform certain operations and with process. These include

- Create a process
- Destroy a process
- Resume a process(restart the process)
- Change the priority of process
- Block of process
- Wakeup a process
- Dispatch a process
- Enable a process to communicate with other process