OSC

Chapter 3 processes
- Process concept
- Process scheduling
- Operations on processes
- Interprocess communication

Process concept
- An operating system executes a variety of programs
    - Batch system - jobs
    - Time-shared systems - user programs or tasks
- Textbook use the terms jobs and process almost interchangeably
- Process a program in execution, process executing must progress in sequential fashion
- Multiple parts
    - The program code, also called text section
    - Current activity including program counter, processor registers
    - Stack containing temporary data
        - Function parameters, return address, local variables
    - Data section containing global variables
    - Heap containing memory dynamically allocated during run time
- Program is passive entity stored on disk (executable file) process is active
    - Program becomes process when executable file loaded into memory
- Execution of program started via GUI mouse clicks, command line entry of its name, ec
- One program can be several processes
    - Consider multiple users execution the same program

Process state
- As a process executes it changes state
    - New: the process is being created
    - Running: instruction are being executed
    - Waiting: the process is waiting for some event to occur
    - Ready: the process is waiting to be assigned to a processor
    - Terminated: the process has finished execution

Process control block (PCB)
- Information associated with each process (task control block)
    - Process state - running, waiting, ect
    - Program counter - location of instruction to next execute
    - CPU registers - contents of all processcentric registers
    - CPU scheduling information - priorities, scheduling queue pointers
    - Memory - management information - memory allocated to the process
    - Accounting information - CPU used, clock time elapsed since, start, time limits
    - I/O status information- i/O devices allocated to process, list of open files
    - Layout
        - Process state
        - Process number
        - Program counter
        - Registers
        - Memory limits
        - List of open files

Threads

- So far process has a single thread of execution
- Consider having multiple program counters per process
  - Multiple locations can execute at once
    - Multiple threads of control -> threads
- Must then have storage for thread details, multiple program counters in PCB
- See next chapter

Process scheduling

- Maximize CPU use quickly switch processes onto CPU for time sharing
- Process scheduler selects among available processes for next execution on CPU
- Maintains scheduling queues of processes
  - Job queue - set of all processes in the system
  - Ready queue - set of all processes residing in main memory, ready and waiting to execute
  - Device queue - set of processes waiting for an i/O device
  - Processes migrate among the various queues