Today

- Lab Review
- Scheduling: FCFS, SJF, Priority, RR

Lab Review

Reset/Kill switch monitor process

- Power failure monitor process
- Reset/kill switch monitor process

CPU Scheduling

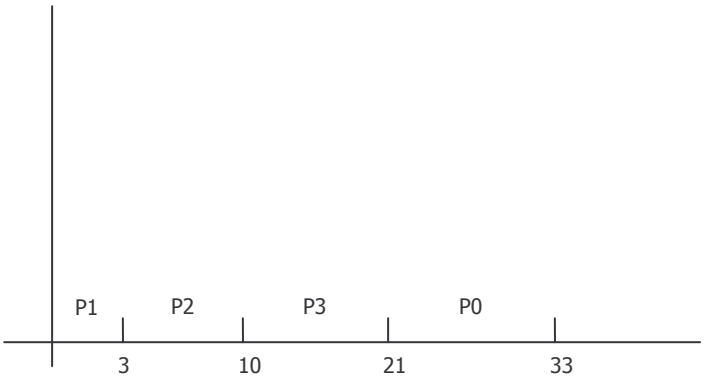
First Come, First-Served Scheduling (FCFS)

Simplest
Only used in a non-preemptive environment

Shortest Job First (FJS)

Provably optimal – gives the minimum average waiting time
Uses a priority queue data structure whose priority key is time length
Shortest job is at the head of the queue
Longest job is at the end of the queue
After every insertion or deletion, it is reordered

Can be used preemptively



Prc	CPU Bur
0	12
1	3
2	7
3	11

The challenge: how do you predict the CPU burst time?

- User designing software predicts it
  - Not very accurate; puts a lot of responsibility of the user
- System predicts using exponential average

$\tau_{n+1} = \alpha \cdot t_n + (1-\alpha)\tau_n$

$0 \le \alpha \le 1$

$t_n = current\ CPU\ burst$

$\tau_n = historical\ average$

Typically, alpha is set to ½, which gives an equal weight to the two. As processes enter, they have a poorly represented historical set of data.

Prioritized Scheduling

In general, add a priority number to the PCB, which the scheduler uses to determine how the process is ordered in the priority queue.

OS is constantly monitoring process. Based on historical I/O wait times, CPU burst times, memory usage, etc., the scheduler uses some sort of algorithm to determine which should have the highest priority.

Principal methods of assigning priorities:
Dynamic
User
(On *nix: NICE)
Programmer Assigned / Fixed

Primary challenge with priority scheduling: starvation
Lowest priority process gets blocked out

Whole class goes to lunch; I'm at the back of the line and am told that I can't eat until they're done. Since they never stop eating, I starve and die.

Solution: Aging
Decrease priority of high priority processes
Increase priority of low priority processes
The process of higher priority processes is never messed up.
When a low priority process is run, its priority is reset
This is a much more common way of aging

Two bytes: priority and aging priority

This week's lab:

Implement priorities for processes. This priority will be fixed.
This is the final change to the PCB.
The challenge is to implement aging.