

COM S 352 Homework 4

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Question 1

I/O-bound: will have voluntary context switches because a process will need a resource that is currently being used when it gives up CPU control.

CPU-bound: will have non-voluntary context switches because when its time slice has expired or is preempted by another process it will be removed from its current process.

Question 2

First-come, first-served: This cannot result in starvation because everything in the datastructure will be touched eventually.

Shrotest job first: This can result in starvation because the longer processes will have to wait longer which could cause them to starve.

Round robin: This cannot result from starvation because each process has equal priority and will have equal times.

Priority: This can result in starvation because lower priority processes will never be touched, causing them to starve.

Question 3

a.

This formula will always take 100ms to predict the next CPU burst.

b.

$$0.5t_n + 0.5T_{n+1}$$

If the CPU burst is 30 milliseconds the resulting time will be 20 milliseconds

c.

Most recent process behavior is given higher priority since the formula is t_n milliseconds.

Question 4

FCFS

P1	P2	P3	P4	P5	
0	4	6	7	17	20

$$\frac{(4-0 + 6-0 + 7-0 + 17-0 + 20-0)}{5} = 10.8 \text{ average turnaround time}$$

$$\frac{(4-4 + 6-2 + 7-1 + 17-10 + 20-3)}{5} = 6.8 \text{ average wait time}$$

Shortest Job

P3	P2	P5	P1	P4	
0	1	3	6	10	20

$$\frac{(1-0 + 3-0 + 6-0 + 10-0 + 20-0)}{5} = 8 \text{ average turnaround time}$$

$$\frac{(1-1 + 3-2 + 6-3 + 10-4 + 20-10)}{5} = 4 \text{ average wait time}$$

Non-preemptive priority

P2	P3	P4	P1	P5	
0	2	3	13	17	20

$$\frac{(2-0 + 3-0 + 13-0 + 17-0 + 20-0)}{5} = 11 \text{ average turnaround time}$$

$$\frac{(2-2 + 3-1 + 13-10 + 17-4 + 20-3)}{5} = 7 \text{ average wait time}$$

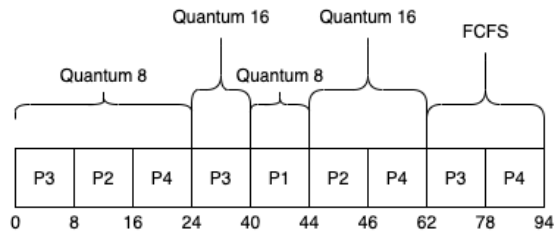
Round robin

P1	P2	P3	P4	P5	P1	P4	P5	P4	P4	P4	
0	2	4	5	7	9	11	13	14	16	18	20

$$\frac{(11-0 + 4-0 + 5-0 + 20-0 + 14-0)}{5} = 10.8 \text{ average turnaround}$$

$$\frac{(11-4 + 4-2 + 5-1 + 20-10 + 14-3)}{5} = 6.8 \text{ average wait time}$$

Question 5



$P3 = 8 - 0 = 8$
 $P2 = 16 - 1 = 15$
 $P4 = 24 - 2 = 22$
 $P1 = 40 - 28 = 12$

Process 4 has the worst response time with 22 milliseconds

$P1: 1 + 1$
 $P2: 1$
 $P3: 1 + 1 + 1$
 $P4: 1 + 1 + 1$

9 total context switches

$$\frac{(94-40-2 + 78-40-0 + 46-10-1 + 44-4-28)}{4} = 34.25 \text{ average wait time}$$

Question 6

a.

A has a higher priority runtime will move slower, since they are CPU bound they will runtime will be smaller for A.

b.

A will require less CPU time than B

c.

B will use the CPU less than A