KING SAUD UNIVERSITY
COLLEGE OF COMPUTER AND INFORMATION SCIENCES
DEPARTMENT of COMPUTER SCIENCE

CSC 227: Operating Systems   **Midterm 2 Exam**   **Spring 2012/2013**

                                        Date: May 4, 2013   **Time: 7:00 pm– 9:00 pm**

Student Name: ………………………………. **ID#: …………………….**   **Section#: ………………**

This examination is close notes and close book.

QUESTION 1 [6.0 marks]

1. --------------- is a communication model in which processes communicate with each other without resorting to shared variables

   Answer: Message passing

2. How many processes exist when a fork ( ) system call is followed by an exec ( ) system call

   Answer: 2

QUESTION 2 [4.0 MARKS]

1.
2. [1.0 mark] When is a process control block (PCB) updated by the operating system?

Answer:

It is updated when a process is preempted (switched from) – context switching

3. [1.0 mark] Why is it useful for the scheduler to differentiate between CPU-bound process and a I/O-bound process

Answer:

I/O-bound programs have the property of performing only a small amount of computation before performing I/O. Such programs typically do not use up their entire CPU quantum. CPU-bound programs, on the other hand, use their entire quantum without performing any blocking I/O operations. Consequently, one could make better use of the computer's resources by giving higher priority to I/O-bound programs and allow them to execute ahead of the CPU-bound programs.

....

QUESTION 3 [4.0 MARKS]

1. [1.0 mark] In what way are user-level threads better than the kernel-level threads.

Answer: Since user-level threads are generally fast to create and manage, they are better than kernel-level threads when no blocking system call is performed.

2. [1.0 mark] What are the two main approaches used for thread cancellation?

Answer:

- Asynchronous cancellation terminates the target thread immediately
- Deferred cancellation allows the target thread to periodically check if it should be cancelled

3.
4. [1.0 mark] As a programmer, what will be your main consideration when designing a multithreaded process?

. ANSWER

(Challenges of multi-cores could be a part of the answer)

- Deciding which activities can be run in parallel
- Identifying data dependencies between tasks.
- Synchronization

QUESTION 4 [6.0 MARKS]

1. [4.0 marks] Below is a table of five CPU-bound processes P1, P2, P3, P4, P5 and P6 and their associated arrival times and CPU burst times.

Process ID	Arrival Time	CPU Burst Time
P1	0	12
P2	3	7
P3	6	2
P4	8	5
P5	9	2
P6	12	12

CSC 227: Operating Systems	**Midterm 2 Exam**	**Spring 2012/2013**
	Date: May 4, 2013	**Time: 7:00 pm– 9:00 pm**

Student Name: ……………………………………. **ID#:** …………………… **Section#:** ………………

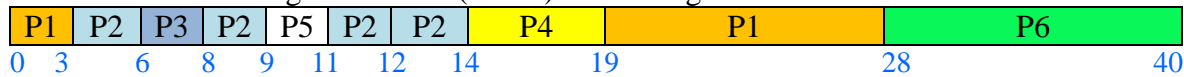**This examination is close notes and close book.**

---

    a. ...

    b. [2.0 marks] Draw a Gantt chart illustrating the execution of these processes using Shortest-Remaining-Time-First (SRTF) scheduling method.

P1	P2	P3	P2	P5	P2	P2	P4	P1	P6
0	3	6	8	9	11	12	14	19	28 ... 40

....

2. [1.0 mark] Why is Round Robin (RR) scheduling said to be unfair to I/O bound processes compared to CPU-bound process?

Answer: An I/O bound process uses a CPU for a short period of time, releases the CPU, waits for I/O to be completed, joins back the ready queue at its tail end and waits there for the next allocation of the CPU. On the contrary, a CPU bound process uses a complete time quantum at almost every selection. So, CPU bound processes monopolize the CPU and I/O bound processes receive unfair treatment

....