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Second Semester MCA Degree Examination, June/July 2014
Operating Systems

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions.

- 1
 - a. What is a processor register? What functions does it serve? (10 Marks)
 - b. What are interrupts? With a neat diagram, explain instruction cycle with interrupts. (10 Marks)
- 2
 - a. What is an operating system? What are the goals of an operating system? (05 Marks)
 - b. With a neat diagram, explain the MS-DOS layer structure. (06 Marks)
 - c. What do you mean by bootstrap program? Explain. (04 Marks)
 - d. What is a system call? Explain the types of system call. (05 Marks)
- 3
 - a. What is a process? With the help of a state transition diagram, explain the various states of a process. (07 Marks)
 - b. Briefly explain : i) Threads ii) Dispatcher iii) Context switch. (06 Marks)
 - c. Which are the different CPU scheduling algorithms? What is the criteria suggested to compare CPU scheduling algorithms. (07 Marks)
- 4
 - a. Consider the following set of processes, with the length of CPU burst time given in milliseconds. All the processes are assumed to have arrived in the order P1, P2, P3, P4, P5 at time 0.

| Process | Burst time | Priority |
|---------|------------|----------|
| P1 | 10 | 3 |
| P2 | 1 | 1 |
| P3 | 2 | 3 |
| P4 | 1 | 4 |
| P5 | 5 | 2 |

Draw four Gantt charts that illustrate the execution of these processes and their average waiting time using FCFS, SJF, non preemptive priority (smaller number higher priority) and RR (quantum = 1). Which of these algorithms is efficient? (10 Marks)

- b. What is a semaphore? Explain their usage. Define wait() and signal() operations. (05 Marks)
 - c. What is a deadlock? What are the necessary conditions for a deadlock to occur? (05 Marks)
- 5
 - a. With a neat diagram, explain the steps in handling page fault. (08 Marks)
 - b. Explain thrashing, virtual memory and Belady's anomaly. (12 Marks)
- 6
 - a. Explain the two level directory systems. (07 Marks)
 - b. Why is file protection needed? Briefly explain the different types of file access methods. (06 Marks)
 - c. Explain the virtual file system with a schematic diagram. (07 Marks)

- 7 a. Consider the following page references string :
7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1

How many page faults would occur in the case i) LRU ii) FIFO iii) Optimal algorithm, assuming three frames. (Note : initially all frames are empty). **(10 Marks)**

- b. Consider the following snapshot of a system :

| | Allocation | | | | Max | | | | Available | | | |
|----------------|------------|---|---|---|-----|---|---|---|-----------|---|---|---|
| | A | B | C | D | A | B | C | D | A | B | C | D |
| P ₀ | 0 | 0 | 1 | 2 | 0 | 0 | 1 | 2 | 1 | 5 | 2 | 0 |
| P ₁ | 1 | 0 | 0 | 0 | 1 | 7 | 5 | 0 | | | | |
| P ₂ | 1 | 3 | 5 | 4 | 2 | 3 | 5 | 6 | | | | |
| P ₃ | 0 | 6 | 3 | 2 | 0 | 6 | 5 | 2 | | | | |
| P ₄ | 0 | 0 | 1 | 4 | 0 | 6 | 5 | 6 | | | | |

Answer the following using Banker's algorithm :

- i) What is the content of matrix 'Need'?
- ii) Is the system in a safe state?
- iii) If a request from process P1 arrives for (0, 4, 2, 0) can the request be granted immediately? **(10 Marks)**

- 8 a. Explain the different disk scheduling algorithms. **(10 Marks)**
- b. Write short notes on :
- i) Synchronization
 - ii) Components of a Linux system. **(10 Marks)**

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