10CS53

Fifth Semester B.E. Degree Examination, Dec.2015/Jan.2016

Operating Systems

Time: 3 hrs.   Max. Marks:100

Note: *Answer FIVE full questions, selecting*
at least TWO questions from each part.

PART – A

1   a.   Define an operating system? What is system's viewpoint of an operating system? Explain the dual mode operation of an operating system. **(08 Marks)**

    b.   Explain the types of multiprocessor systems and the types of clustering. What are fault tolerant systems? **(06 Marks)**

    c.   Explain the concept of virtual machines. **(06 Marks)**

2   a.   What is a process? Draw and explain the state diagram of a process. Give a note on context switch. **(08 Marks)**

    b.   Consider the following set of processes. Assume the length of the CPU burst time is given in milli seconds.

Process	Arrival Time	Burst Time	Priority
P_1	0	10	3
P_2	0	1	1
P_3	3	2	3
P_4	5	1	4
P_5	10	5	2

Draw Gantt charts illustrating the execution of these processes using FCFS and pre-emptive priority scheduling algorithms. Assume highest priority = 1 and lowest priority = 4. Also, calculate average waiting time and average turn around time of both the algorithms.

            (06 Marks)

    c.   Discuss any 3 threading issues that come with multithreaded programs. **(06 Marks)**

3   a.   What are semaphores? Explain any three use cases of semaphores. **(04 Marks)**

    b.   Describe an n-process solution to critical section problem which uses test and set ( ) hardware instruction. Prove how this algorithm satisfies all the requirements of critical section problem's solution. **(08 Marks)**

    c.   Discuss how Readers – writers problem can be solved using semaphores. **(08 Marks)**

4   a.   With the help of a system model, explain a deadlock and discuss the necessary conditions that must hold simultaneously in a system for a deadlock to occur. **(06 Marks)**

    b.   Using Banker's algorithm determine whether the following system is in a safe state.

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P_0	0	0	2	0	0	4	1	0	2
P_1	1	0	0	2	0	1			
P_2	1	3	5	1	3	7			
P_3	6	3	2	8	4	2			
P_4	1	4	3	1	5	7			

If a request from process P_2 arrives for (0 0 2), can the request be granted immediately?

            (10 Marks)

    c.   How is a system recovered from deadlock? **(04 Marks)**

PART – B

5   a.   Discuss paging with an example.   **(08 Marks)**
   b.   Consider the following page reference string
      1, 2, 3, 5, 2, 3, 5, 7, 2, 1, 2, 3, 8, 6, 4, 3, 2, 2, 3, 6.
      Assuming there are 3 memory frames, how many page faults would occur in the case of
      i) LRU   ii) Optimal Algorithm.
      Note that initially all frames are empty.   **(06 Marks)**
   c.   What is thrashing? Explain.   **(06 Marks)**

6   a.   Explain the different file access methods.   **(06 Marks)**
   b.   Describe the various directory structures.   **(08 Marks)**
   c.   Write a note on any four different methods for managing free space.   **(06 Marks)**

7   a.   Suppose the position of cylinder is at 53. The disk drive has cylinders numbered from 0 to 199. The queue of pending request in FIFO order is : 98, 183, 37, 122, 14, 124, 65, 67. Starting from the current head position, what is the total distance traveled (in cylinders) by the disk arm to satisfy the requests using algorithms FCFS, SSTF, SCAN and LOOK. Illustrate with figures in each case.   **(12 Marks)**
   b.   Describe the access matrix model used for protection purpose.   **(08 Marks)**

8   Write short notes on :
   a.   Process Management in Linux
   b.   Linux file system.
   c.   Benefits of Multi threading
   d.   Inter process communication.   **(20 Marks)**

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