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06CS53

Fifth Semester B.E. Degree Examination, December 2010
Operating Systems

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Define an operating system. Explain two view points of OS role. **(05 Marks)**

b. What are OS operations? Explain. **(06 Marks)**

c. Define a virtual machine (VM). With a neat diagram, explain the working of a VM. What are the benefits of a VM? **(09 Marks)**

2 a. Define IPC (Inter process communication). What are the different methods used for logical implementation of a message passing system? Explain any one. **(06 Marks)**

b. Discuss three common ways of establishing relationship between the user thread and kernel thread. **(06 Marks)**

c. Consider the following set of processes, with the length of CPU burst in milliseconds.

Process	P_1	P_2	P_3	P_4	P_5
Arrival time	00	02	03	06	30
Burst time	10	12	14	16	05

i) Draw a Gantt chart that illustrates the execution of these processes using the preemptive shortest job first (SJF) algorithm. Hence find the average waiting time.

ii) Draw a Gantt chart that illustrate the execution of these processes using preemptive priority scheduling algorithm. Given priority of each process is $P_1 = 4$, $P_2 = 3$, $P_3 = 5$, $P_4 = 1$ and $P_5 = 1$. Also find the average waiting time. **(08 Marks)**

3 a. What do you mean by a binary semaphore and a counting semaphore? Along with the necessary 'C'-struct, explain the implementation of wait() and signal() semaphore operations. **(10 Marks)**

b. With the necessary syntax, describe the term monitor. Explain the solution to the classical dining philosopher's problem, using monitor. **(10 Marks)**

4 a. Define the terms: safe state and safe sequence. Give an algorithm to find whether or not a system is in a safe state. **(10 Marks)**

b. Consider the following snapshot of the 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				

Using the Bankers algorithm, answer the following:

i) What is the content of a matrix NEED?

ii) Is the system in SAFE state? If yes, give the SAFE state.

iii) If a request from a process P_1 arrives for (0,4,2,0), can the request be granted immediately? **(10 Marks)**

PART – B

5 a. What do you mean by a address binding? Explain with the necessary steps, the binding of instructions and data to memory addresses. **(08 Marks)**

b. On a system using demand paged memory it takes 0.12 μs to satisfy a memory request, if the page is in memory. If the page is not in memory the request takes 5000 μs. What would the page fault rate need to be to achieve an effective access time 1000 μs? Assume the system is only running a single process and the CPU is idle during the page swaps. **(08 Marks)**

c. What do you mean by a copy-on-write? Where is it used? Explain in brief. **(04 Marks)**

6 a. What do you mean by a free space list? With suitable examples, explain any two methods of implementation of a free space list. **(08 Marks)**

b. What are the major methods used for allocating a disk space? Explain each, with suitable examples. **(12 Marks)**

7 a. Discuss the steps in handling a page fault, with the help of a neat diagram. **(10 Marks)**

b. Given the page reference string:

0 9 0 1 8 1 8 7 8 7 1 2 8 2 7 8 2 3 8 3

Three frames allocated for the program in the main memory. Determine the number of page faults using i) LRU policy ii) Optimal replacement policy. **(10 Marks)**

8 a. Discuss the directory implementation using

i) Linear list ii) Hash table **(10 Marks)**

b. What are the components that the kernel module support under Linux? Explain in detail. **(10 Marks)**

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