MCA (Revised)

Term-End Examination

June, 2009

MCS-041 : OPERATING SYSTEMS

Time : 3 hours *Maximum Marks :100*

(Weightage : 75%)

Note : *Question **one** is **compulsory**. Attempt **any three** questions from the rest.*

1. (a) State the Dining philosopher problem and with its semaphore based algorithm. Also explain all the steps and the assumption take with algorithm. **10**

   (b) Consider a paging system with the page table stored in memory. Calculate the following :

   (i) If a memory reference takes 100 nanosecond, how long does paged memory reference take ? **5**

   (ii) If we add associative registers and 75 percent of all page table references are found in associative registers, what is the effective memory reference time ? The access to associative registers takes 10 nsec. **5**

(iii) Consider a swapping system in which memory consists of the following hole size in memory order : 10 k, 4 k, 20 k, 18 k, 7 k, 9 k, 12 k and 15 k. Which hole is taken for successive segment requests of : **6**

(a) 12 k (b) 10 k (c) 9 k

for first fit, best fit and worst fit ?

(iv) What are the main advantages of the micro kernel approach to OS design as opposed to monolithic kernel approach ? **4**

(v) Illustrate a 3-dimensional hypercube system and describe its features. **5**

(vi) Illustrate and discuss inter process communication features in Window's. 2000 OS. **5**

2. (a) Compare the merits and demerits of various disk scheduling algorithms. **10**

(b) The queue of pending cylinder request is 80, 1500, 900, 1700,1501,1000 the disk head is currently serving at cylinder 140. Calculate the total disk head movements for FCFS and SSTF (Shortest Seek Time First) based disk scheduling algorithms. **5**

(c) Describe the lattice model for security...? **5**

3. (a) Briefly describe the following CPU scheduling algorithms : **6+4**

(i) FCFS

(ii) RR

(iii) Multilevel Feedback Queue

Explain the difference in the degree to which the above scheduling algorithms discriminate in favour of short processes.

(b) Explain the Job, Process, Thread and Fibre. **4+6** Also mention how the operating system handles these entities.

4. (a) What are the limitation of the Bankers **5** algorithm used for Deadlock avoidance ? Explain.

(b) An OS contains 10 units of some sources of **4** the resource class R_i. There are three processes P_1, P_2 and P_3. P_1 requires maximum 10 units of R_i, P_2 requires maximum 6 units of R_i and P_3 requires maximum 2. Initially P_1 has been allocated 4, P_2 has been allocated 4 and P_3, 2 units. Show the possibility sequence of events in the system for blocked processes and the running process. Will there be any existence of a deadlock situation at the end.

(c) Illustrate and explain distributed shared 4+2
memory architecture of distributed
operating system. How is it different from
the client - server model ?

(d) What is synchronization mechanism ? 5
Discuss Test and Set mechanism for
multiprocessor synchronization.

5. (a) Explain virtual to physical address mapping 10
with illustration. Also, explain the steps
taken inserving the page fault.

(b) Why must the bitmap for the file allocation 4
be kept on mass storage rather than in main
memory ? Explain.

(c) What are different kinds of file systems in 6
Unix ? Explain.

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