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06CS53

Fifth Semester B.E. Degree Examination, December 2011
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. List the operating system responsibilities in connection, with a process management and memory management. **(08 Marks)**

b. Explain the 'graceful degradation' and 'fault tolerant' in a multiprocessor system. **(06 Marks)**

c. What is a 'virtual machine'? Explain the just–in–time (JIT) compiler, used in a java virtual machine. **(06 Marks)**

2 a. Explain the process state, with the suitable diagram. **(08 Marks)**

b. Explain the benefits of multithreaded programming. **(08 Marks)**

c. Explain the hard real time system. **(04 Marks)**

3 a. Define test and set instruction and implement mutual exclusion, using test and set. **(05 Marks)**

b. Sleeping – barber and sleeping – customers problem: **(15 Marks)**

A barbershop consists of a waiting room with 'N' chairs (chair [1], chair [2],....chair [n]) as shown in Fig. Q.3(b) and the barber room containing the barber chair (chair [0]). If there are no customers to be served, the barber goes to sleep. If a customer enters the barbershop and all the chairs are occupied, then the new customer goes to sleep. If the barber in busy, but the waiting chairs are available, then the new customer occupies the next free chair to maintain the queue. If the barber in asleep, the customer wakes up the barber and occupies the barber chair.

Assume chair [0] in one of the critical regions and all waiting chairs together are another critical region. Also assume only the following abstract functions are available:

i) Haircut ( ) ;
// barber busy in his work.

ii) Customers – shift – to – next – chair ( ) ;
// after haircut the customer gets up from the barber chair and all other customers shift by one position to the next chair towards the barber chair.

iii) Customer – occupies – free – chair ( ) ;
// new customer occupies the next free chair to maintain the queue, or, if no customers are waiting then new customer directly occupies the barber chair.

Write an abstract C program to coordinate the barber and customers in sleeping – barber and sleeping – customer problem, using semaphores with atomic operations wait ( ) and signal ( ). Assume suitable data structures for abstract implementation.

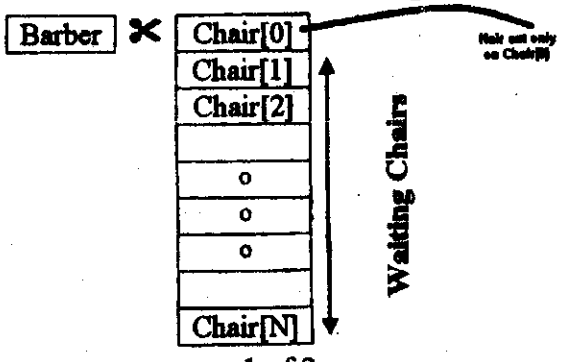

Fig. Q.3(b)

4 a. List any four examples of deadlock that are not related to computer systems. **(08 Marks)**

b. Explain the safety algorithm used in Banker's algorithm, with suitable data structures. **(12 Marks)**

PART – B

5 a. What is dynamic storage allocation? Explain the commonly used strategies for dynamic storage allocation. **(12 Marks)**

b. Explain the buddy – system, used for managing free memory assigned to kernel process. **(08 Marks)**

6 a. List the common file types along with its extensions and functions. **(10 Marks)**

b. How do the modern operating systems concurrently support multiple types of file system? Explain its implementation, in detail. **(10 Marks)**

7 a. Explain sector slipping, with an example. **(04 Marks)**

b. Assume the disk queue, with request fun I/O to block on cylinders as 80, 30, 15, 100, 125, 90, 45, and 10. If the disk head is initially at cylinder 35, illustrate the disk movements, using the SSTF scheduling algorithm. Also calculate the total head movement. **(08 Marks)**

c. Explain the various questions that arise in revocation of access rights. **(08 Marks)**

8 a. Distinguish between fork ( ) and clone ( ) system call. Also customize the clone ( ) system call to fork ( ) functionality, with suitable modifications/settings. **(08 Marks)**

b. Explain the Linux device drive the block structure. **(12 Marks)**

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