Question Paper Code : 21400

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Seventh Semester

Electrical and Electronics Engineering

CS 2411/ CS 609/ 10144 CS 405 — OPERATING SYSTEMS

(Common to Electronics and Instrumentation Engineering and Instrumentation and Control Engineering

(Regulations 2008/2010)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the three main purposes of an operating system?

2. What are the situations in which change of state of one process may cause a change in the state of another process?

3. "Apparent concurrency increases the scheduling overhead without providing any speed up of an application program". Comment on this statement.

4. A system has two processes and three identical resources. Each process needs a maximum of two resources. Is deadlock possible? Justify the answer.

5. Compare internal fragmentation with external fragmentation.

6. How many page frames are allocated for two processes having 20 and 250 pages in logical address space with respect to physical memory consisting of 62 page frames using equal and proportional allocations?

7. List the various methods for file allocation. If the inventory DB want to perform direct access to records which is the feasible method?

8. Write about combined scheme in indexed allocation method of file system.

9. What are the services provided by kernel to I/O sub system?

10. Is disk scheduling other than FCFS useful in a single user environment? Justify the answer

PART B — (5 × 16 = 80 marks)

11. (a) Define the essential properties of the following types of operating systems:

(i) Batch

(ii) Time sharing

(iii) Real time

(iv) Distributed.

Or

(b) A Scalable application server is to be implemented to handle a web-based application. The server handles request received in the form of messages. It starts a new thread if the request queue exceeds a certain number of entries and shuts down some threads if the message load decreases. Explain how the server can be implemented using threads. Can signals be used to advantage?

12. (a) Discuss about the types of process scheduling and various CPU scheduling criteria considered while dispatching the process. Compare the scheduling policies, HRRN, FCFS, SRT, SPN for the following set of processes.

Process name	Arrival time	Processing time
A	0	1
B	1	9
C	2	1
D	3	9

Or

(b) What is critical region? How does hardware approach is followed by OS for handling the critical section? Consider the following resource allocation policy. Requests and releases for resources are allowed at any time. If a request for resources cannot be satisfied because the resources are not available, then we check any processes that are blocked, waiting for resources. 1f they have the desired resource, then these resources are taken away from them and are given to the requesting process. The vector of resources for which the waiting process is waiting is increased to include the resources that were taken away. Can deadlock occur in the above system? Justify with an example. Can indefinite blocking occur in the above system? Why?

13. (a) Describe the following allocation algorithms: Best-fit, first-fit and worst-fit. Given memory partitions of 100 KB, 500 KB, 200 KB, 300 KB and 600 KB, how would each of the above algorithms place processes of 212 KB, 417 KB, 112 KB and 426 KB? Which algorithm makes efficient use of memory?

Or

(b)　The page table for the process currently executing on the processor looks like the following. The page size is 1024 bytes

Virtual page #	Valid bit	Reference bit	Modify bit	Page frame #	Time loaded	Time referenced
0	1	1	0	4	60	161
1	1	1	1	7	130	160
2	0	0	0	–	26	162
3	1	0	0	2	20	163
4	0	0	0	–	30	170
5	1	0	1	0	35	100

(i)　Describe exactly how, in general a virtual address generated by the CPU is translated into physical address.

(ii)　What physical address, if any, would each of the following virtual addresses correspond to?

(1) 1052　(2) 2221　(3) 5499

(iii)　Which page will be selected if there is a page fault for virtual page 4 has occurred, using (1) FIFO (2) LRU (3) CLOCK?

14.　(a)　Explain the various file allocation methods and calculate the number of I/O operations required for each of the file allocation method to perform the following operations:

(i)　the block is added at the beginning

(ii)　the block is added in the middle

(iii)　the block is removed from the end.

Or

(b)　Describe the free-space management followed in file system. And consider the beginning of a free space bitmap looks like this after the disk partition is first formatted 1000 0000 0000 0000 (the first block is used by the root directory). The system always searches for free blocks starting at the lowest numbered blocks, show the bitmap after each of the following actions

(i)　File A is written using 6 blocks

(ii)　File B is written using 5 blocks

(iii)　File A is deleted

(iv)　File C is written using 8 blocks

(v)　File B is deleted.

15.　(a)　Explain the types of I/O devised and its characteristics. Also explain the following concepts: buffering and caching in I/O subsystem.

Or

(b)　None of the disc scheduling disciplines, except FCFS are truly fair. Why this assertion is true. Perform FCFS, SSTF, SCAN algorithms for the following set of request 10, 22, 20, 2, 40, 6, 38 and calculate the average seek time. Arm is initially at cylinder 20 and maximum numbers of cylinders are 50.

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