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Question Paper Code : 20363

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Fourth Semester

Computer Science and Engineering

CS 6401 – OPERATING SYSTEMS

(Common to Electronics and Communication Engineering, Electronics and Instrumentation Engineering, Instrumentation and Control Engineering, Medical Electronics and Information Technology)

(Regulations 2013)

(Also common to PTCS 6401 — Operating System B.E. (Part-Time) Third Semester Computer Science and Engineering – Regulations 2014)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Some computer systems do not provide a privileged mode of operation in hardware. Is it possible to construct a secure operating system for these computer systems?
2. Can traps be generated intentionally by a user program? If so, for what purpose?
3. What is the meaning of the term busy waiting?
4. Can a multithreaded solution using multiple user-level threads achieve better performance on a multiprocessor system than on a single-processor system?
5. Under what circumstances would a user be better off using a timesharing system rather than a PC or single-user workstation?
6. State the effect of Thrashing in an operating system.
7. Mention the significance of LDT and GDT in segmentation.
8. List the major attributes and operations of a file system.
9. Do FAT file system advantageous? Justify your answer.
10. Mention the importance of a Kernel in LINUX Operating system.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Explain the various types of system calls with an example for each. (8)
- (ii) Discuss the functionality of system boot with respect to an Operating System. (5)

Or

- (b) Discuss the essential properties of the following types of systems
- (i) Time sharing systems. (4)
- (ii) Multi-processor systems. (4)
- (iii) Distributed Systems. (5)

12. (a) (i) Explain why interrupts are not appropriate for implementing synchronization primitives in multiprocessor systems. (7)
- (ii) Compute the average waiting time for the processes using non-preemptive SJF scheduling algorithm. (5)

Process	Arrival time	Burst time
P ₁	0.0	7
P ₂	2.0	4
P ₃	4.0	1
P ₄	5.0	4

Or

- (b) Discuss how the following pairs of scheduling criteria conflict in certain settings.
- (i) CPU utilization and response time. (4)
- (ii) Average turnaround time and maximum waiting time. (5)
- (iii) I/O device utilization and CPU utilization. (4)

13. (a) Compare paging with segmentation in terms of the amount of memory required by the address translation structures in order to convert virtual addresses to physical addresses.

Or

- (b) Most systems allow programs to allocate more memory to its address space during execution. Data allocated in the heap segments of programs is an example of such allocated memory. What is required to support dynamic memory allocation in the following schemes?

- (i) Contiguous memory allocation (4)
- (ii) Pure segmentation (5)
- (iii) Pure paging. (4)

14. (a) Consider a file system where a file can be deleted and its disk space reclaimed while links to that file still exist. What problems may occur if a new file is created in the same storage area or with the same absolute path name? How can these problems be avoided?

Or

- (b) Illustrate an application that could benefit from operating system support for random access to indexed files.

15. (a) UNIX coordinates the activities of the kernel I/O components by manipulating shared in-kernel data structures, whereas Windows NT uses object-oriented message passing between kernel I/O components. Discuss three pros and three cons of each approach.

Or

- (b) Discuss virtualization techniques used in different operating systems.

PART C — (1 × 15 = 15 marks)

16. (a) Which of the following scheduling algorithms could result in starvation?
- (i) First-come, first-served (5)
- (ii) Shortest job first (5)
- (iii) Round robin (5)

Detail with Justification.

Or

- (b) Outline a solution using semaphores to solve dining philosopher problem. (15)