Question Paper Code : 90157

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019

Fourth/Fifth Semester

Computer Science and Engineering

CS8493 – OPERATING SYSTEMS

(Common to Electronics and Communication Engineering/Information Technology)

(Regulations 2017)

Time : Three Hours   Maximum : 100 Marks

Answer ALL questions

PART – A   **(10×2=20 Marks)**

1. What are the main advantages of multiprocessor systems ?
2. Define the term trap or an exception.
3. State the primary distinction between short-term and CPU scheduler.
4. What are the conditions must hold for a deadlock to occur ?
5. State the differences between logical and physical addresses.
6. Under what circumstances do page faults occur ? State the actions taken by the operating system when a page fault occurs.
7. Why is it important to balance file system I/O among the disks and controllers on a system in a multitasking environment ?
8. Why is it important to scale up system-bus and device speeds as CPU speed increases ?
9. State the components of Linux system.
10. What are the advantages and disadvantages of writing an operating system in a high-level language, such as C ?

PART – B   **(5×13=65 Marks)**

11. a) Distinguish multiprogramming and time-sharing environment.   (7)

    In a multiprogramming and time-sharing environment, several users share the system simultaneously. This situation can result in various security problems.

    i) What are two such problems ?   (3)

    ii) Can we ensure the same degree of security in a time-shared machine as in a dedicated machine ? Explain your answer.   (3)

    (OR)

b) i) What are system calls ? State and explain the types of system calls. **(7)**

ii) List five services provided by an operating system and explain how each creates convenience for users. In which cases would it be impossible for user-level programs to provide these services ? Explain your answer. **(6)**

12. a) What are threads ? Discuss different types of threads. What resources are used when a thread is created ? How do they differ from those used when a process is created ?

(OR)

b) What are the classical problems of synchronization ? State and explain any one of the problem with example.

13. a) State the need for page replacement. State and explain the procedure for FIFO page replacement with example. What is belady's anomaly ? Consider the following page reference string : 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. How many page faults would occur for the following replacement algorithms, assuming one, two, three, four, five, six or seven frames ? Remember all frames are initially empty, so your first unique pages will all cost one fault each.

- LRU replacement
- FIFO replacement
- Optimal replacement.

(OR)

b) What is the need of swapping in storage management ? State and the explain in detail with example.

14. a) i) State and explain the swap space management. **(6)**

ii) Explain file system mounting and protection in detail. **(7)**

(OR)

b) i) State and explain streams in the I/O systems. **(7)**

ii) Discuss disk scheduling algorithms in detail. **(6)**

15. a) Multithreading is a commonly used programming technique. Describe three different ways to implement threads and compare these three methods with the Linux clone () mechanism. When might using each alternative mechanism be better or worse than using clones ?

(OR)

b) i) The Linux kernel does not allow paging out of kernel memory. What effect does this restriction have on the kernel's design ? What are two advantages and two disadvantages of this design decision ? **(7)**

ii) Dynamically loadable kernel modules give flexibility when drivers are added to a system, but do they have disadvantages too. Under what circumstances would a kernel be compiled into a single binary file and when would it be better to keep it split into modules ? Explain your answer. **(6)**

PART – C **(1×15=15 Marks)**

16. a) i) Suppose that a system is in an unsafe state. Show that it is possible for the processes to complete their execution without entering a deadlock state. **(8)**

ii) Discuss the features of Mobile Operating System. **(7)**

(OR)

b) i) Explain the architecture of Android OS. **(8)**

ii) Consider a demand-paged computer system where the degree of multiprogramming is currently fixed at four. The system was recently measured to determine utilization of CPU and the paging disk. The results are one of the following alternatives. For each case, what is happening ? Can the degree of multiprogramming be increased to increase the CPU utilization ? Is the paging helping ? **(7)**

   a) CPU utilization 13 percent; disk utilization 97 percent

   b) CPU utilization 87 percent; disk utilization 3 percent

   c) CPU utilization 13 percent; disk utilization 3 percent