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**Question Paper Code : 71191**

M.E. DEGREE EXAMINATION, JUNE/JULY 2013.

Second Semester

Computer Science and Engineering

CS 9222/CS 922 — ADVANCED OPERATING SYSTEMS

(Common to M.E. Mobile and Pervasive Computing)

(Regulation 2009)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is a virtual machine and what are the advantages of virtual machine?
2. State the Owicki and Gries mutual exclusion theorem.
3. What are the limitations of logical clock?
4. Define global state and consistent global state.
5. What are the relative advantages and disadvantages of stateless server over stateful server?
6. Distinguish between sequential and weak consistency.
7. Distinguish between deadlock and livelock.
8. List the properties of an atomic action.
9. Compare tightly-coupled systems with loosely-coupled systems.
10. What is the difference between concurrency control and mutual exclusion?

PART B — (5 × 16 = 80 marks)

11. (a) (i) What is a monitor and what are the drawbacks of monitor? Give monitor solution to print the smallest job first when multiples user share a printer. (8)
- (ii) What are the requirements for advanced operating systems? Describe the classification of advanced operating systems. (8)

Or

- (b) (i) Compare and contrast the communication and synchronization mechanisms of CSP and Ada. (6)
- (ii) Assume that N processes share M identical units of a reusable resource unit. If each process can claim at most two units of the resource, show that the system will be deadlock free iff  $N \leq M - 1$ . (10)
12. (a) (i) Describe the design and implementation issues in RPC. (8)
- (ii) Illustrate Chandy-Misra-Haas algorithm for deadlock detection using edge chasing. (8)

Or

- (b) (i) Illustrate Suzuki-Kasami's broadcast algorithm for mutual exclusion. (8)
- (ii) Explain how a solution to the consensus problem can be used solve the interactive consistency problem. (8)
13. (a) (i) What is false sharing and when does it will occur? Explain why false sharing does not occur in object based systems. (8)
- (ii) Explain the symmetrically initiated algorithm for load distribution. (8)

Or

- (b) (i) Describe the issues in task migration in detail. (8)
- (ii) What is distributed file systems? Describe the mechanism for building a distributed file system. (8)
14. (a) (i) Explain the operations of autonomous vote reassignment protocol in detail. (10)
- (ii) What are the problems caused by rolling back of processes in concurrent systems? Explain. (6)

Or

- (b) (i) What is asynchronous checkpointing? Describe the Juang and Venkatesan algorithm for asynchronous checkpointing and recovery. (8)
- (ii) What is two-phase commit protocol? Design a decentralized two-phase commit protocol. (8)

15. (a) (i) What are the relative advantages and disadvantages of implanting threads at user-level and at kernel-level. (6)
- (ii) What are the two approaches to the database systems design and what are the advantages and disadvantages of each approach? (4)
- (iii) Compare the relative advantages and disadvantages of three basic classes of multiprocessor operating systems. (6)

Or

- (b) (i) Describe the memory management system of Mach multiprocessor operating system. (8)
- (ii) Explain why timestamp based concurrency control algorithms are free from deadlock. (8)
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