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CSE 1817 OE 31

Roll No. of candidate | | | | | | | | | | |

2022

B.Tech. 7th Semester End-Term Examination

CSE

DISTRIBUTED SYSTEMS

New Regulation (w.e.f. 2017 - 18) &
New Syllabus (w.e.f. 2018-19)

Full Marks – 70 Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer question No. 1 and any *four* from the rest.

1. Answer the following (MCQ/ Fill in the blanks) : (10 × 1 = 10)

(i) Which among the following is a design issue in distributed computing?

(a) Scalability (b) Fault tolerancez

(c) Flexibility (d) All above

(ii) What is not true about a distributed system?

(a) All processors are synchronized

(b) It is a collection of independent computers

(c) No processors shared their memory

(d) Each processor has their own clock

(iii) The major reason (s) for building distributed system is/are

(a) Simplicity (b) Resource sharing

(c) Reliability (d) Computation speedup

(iv) _____ are used to identify deadlocks in a distributed system.

(a) Wait-for-graphs (b) Linear graphs

(c) Undirected graphs (d) None

[Turn over

(v) The Chandy et al. 's Edge-Chasing algorithm at most exchanges _____ messages to detect a deadlock that involves m processes and span over n sites.

(a) mn (b) m+n

(c) m(n–1) (d) m(n–1)/1

(vi) Inherent limitations of distributed systems are

(a) Absence of global clock (b) Absence of shared memory

(c) Absence of physical clock (d) None of the above

(vii) Limitations of Lamport clock is/are

(a) Can not detect causal relationship

(b) Partial order of events

(c) If a→ b, then it is true that TS (a) <TS (b)

(d) None of the above

(viii) Which among the following are/is used for performance metrics for mutual exclusion algorithms

(a) Message complexity (b) Synchronization delay

(c) Response time (d) System throughput

(ix) The response time (low load) and synchronization delay of Recart Agrawala are respectively

(a) 2T + E and 2T (b) 2T + E and T/2

(c) 2T + E and T (d) T +2 E and 2T

(x) The characteristics of the tightly coupled system are

(a) Different clock (b) Use communication links

(c) Same clock (d) Distributed systems

2. (a) Explain the challenges involved in building distributed systems. (7)

(b) What is a logical clock? Discuss Lamport's logical clock with its merits and demerits if any. (8)

3. (a) Explain the following terminologies with time-space diagram and geometrical interpretation (9)

(i) Consistent global state

(ii) Transit less global state

(iii) Strongly Consistent global state

(b) Explain violation of causal ordering of messages with an example. Describe a broadcasting protocol that makes use of vector clocks for causal ordering of messages in distributed systems. (3 + 3 = 6)

4. (a) Differentiate between resource and communication deadlock with example. (3)

(b) Briefly explain the two basic issues in deadlock detection and resolution. (4)

(c) Discuss with proper explanation the two centralized deadlock detection algorithms proposed by Ho and Ramamoorthy. (8)

5. (a) Illustrate Lamport's algorithm for distributed mutual exclusion with a time-space diagram. Prove that Lamport's algorithm achieves mutual exclusion. (6 + 2 = 8)

(b) Write a token-based mutual exclusion algorithm that is free from both deadlock and starvation. (7)

6. (a) Differentiate between flat and nested distributed transactions with the help of diagram. (5)

(b) Explain architecture of a distributed file system and its components. (10)

7. (a) Discuss design and implementation issues in Distributed Shared Memory (DSM). (5)

(b) Differentiate the following: (10)

(i) Load balancing vs load sharing

(ii) Preemptive vs non preemptive transfer