No. of Printed Pages : **2**

Sl. No.

B3.E3-R5 : DISTRIBUTED AND PARALLEL COMPUTING

NOTE :

1. **Answer question 1 and any FOUR from questions 2 to 7.**
2. **Parts of the same question should be answered together and in the same sequence.**

Total Time : 3 Hours **Total Marks : 100**

1. (a) In the Bully algorithm, a recovering process starts an election and will become the new coordinator if it has a higher identifier than the current incumbent. Is this a necessary feature of the algorithm ?

(b) Write the difference between distributed computing and parallel computing.

(c) Describe the role of stubs in Remote Procedure Calls.

(d) Explain cache coherence in parallel computing.

(e) What are different data centric consistency model ?

(f) Describe edge chasing Algorithm in deadlock detection.

(g) Explain the need of code migration in detail. **(7x4)**

2. (a) Illustrate the architecture of data management system in fog computing.

(b) Explain steps of enumeration sort using CRCW model.

(c) Illustrate flynn's classification of parallel computing. **(4+8+6)**

3. (a) Describe PRAM algorithm with suitable example.

(b) Describe network challenges of Edge computing.

(c) Explain the Centralized algorithms for Mutual Exclusion in Distributed Systems. **(6+4+8)**

4. (a) Differentiate Synchronous and Asynchronous message passing.

(b) Differentiate between pipes and message queuing.

(c) Suppose that the time to do a null remote procedure call (RPC) (i.e., 0 data bytes) is 1.0 msec with an additional 1.5 msec for every 1K of data. How long does it take to read 32 K from the file server as 32 1K RPCs ? **(8+6+4)**

5. (a) Explain ring based algorithm to address mutual exclusion.

(b) Describe various challenges faced while using distributed computing.

(c) Explain process of data management in Edge computing. **(5+8+5)**

6. (a) Consider the use of timestamp ordering with each of the example interleavings of transactions T and U. Initial values of ai and aj are 10 and 20, respectively, and initial read and write timestamps are t0. Assume each transaction opens and obtains a timestamp just before its first operation, for example, in (a) T and U get timestamps t1 and t2 respectively where 0 < t1 < t2. Describe in order of increasing time the effects of each operation of T and U. For each operation, state the following :

(i) whether the operation may proceed according to the write or read rule;

(ii) timestamps assigned to transactions or objects;

(iii) creation of tentative objects and their values. What are the final values of the objects and their timestamps ?

(b) Define remote procedure call (RPC). Describe the working of RPC in detail.

(c) Network transmission time accounts for 20% of a null RPC and 80% of an RPC that transmits 1024 user bytes (less than the size of a network packet). By what percentage will the times for these two operations improve if the network is upgraded from 10 megabits/second to 100 megabits/second ?

(9+5+4)

7. (a) What are the mapping techniques for load balancing ?

(b) A server manages the objects a1, a2,... an. The server provides two operations for its clients : read

(i) returns the value of ai; write(i, Value) assigns Value to ai. The transactions T and U are defined as follows: T : x = read (j); y = read (i); write(j, 44); write(i, 33); U : x = read(k); write(i, 55); y = read (j); write(k, 66).

(ii) Give two serially equivalent interleavings of the transactions T and U.

(c) You are on a network with a 9 Mbps downstream bandwidth and a 1 Mbps upstream bandwidth. Your client makes a request at 9 : 10 : 00.0 and gets a response 200 msec later. If the time on the server is 8 : 42 : 00.0, what would be the time set on your client ? [Note : time is expressed as HH : MM : SS.msec]

(6+8+4)

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