

Mode of Examination: Online
M.Sc. Semester – III Examination, 2020

2020
Subject: Computer Science
Paper Code & Name: CSM302 – Advances in Operating System

Date: 12.03.2021

Full Marks: 70

Time and Duration: 12pm to 3pm

Please follow the instructions below carefully:

The figures in the margin indicate full marks

Promise not to commit any academic dishonesty.

Marks will be deducted if the same/similar answers are found in different answer-scripts.

Candidates are required to answer in their own words as far as applicable.

Each page of the answer scripts should have your University Roll # on the right-top corner.

The name of the scanned copy of the answer script will be of the following format:

(Example: CSM-302-AOS-My Roll Number.pdf)

The subject of the mail should be the file name only.

The name of the scanned answer-script is to be sent to **cucse2020@gmail.com**

The report should have the top page (Page #1) as an index page; mention page number(s) against the answer of each question number.

The answer-script may not be accepted after the scheduled time.

Answer Question No. **1, 2,** and **any Four** from the rest.

1. Answer any five (5) out of the following:
 - a) Define the local and global states of a system.
 - b) What is access transparency?
 - c) What is the role of IDL (interface definition language) in RPC?
 - d) Define user mobility in a distributed system.
 - e) What is a distributed file system?
 - f) Why token-based algorithms are said to be inherently safe?
 - g) What would be the nature of a global state recording curve on the time line of an event trace diagram?
 - h) What is marshalling and un-marshalling?

2x5=10

2. Comment on the correctness of the following statements and justify your opinion - answer any five (5):
 - a) "A clock cannot be taken back for the sake of synchronization in a distributed system."
 - b) "Raymond's algorithm may grant access to processes out of turn."
 - c) "Migration of resources is a greater concern than address-space migration."
 - d) "Symmetric algorithms involve lower communication overhead in comparison with the diffusion computation approach."
 - e) "Recording Global State for a distributed system is impossible."
 - f) "*Call by Reference* is best suitable for RPC."
 - g) "It's easier to achieve semantic transparency as compared to syntactic transparency for a distributed system."

4x5=20

3. a) What is symmetric algorithm?
- b) Define correctness of control algorithms for a distributed system.
- c) What do understand by fairness property in a distributed system?
- d) Somebody suggested that a greedy algorithm can be developed by modifying Ricart-Agrawala algorithm such that a process P_i wishing to enter its critical section does not send a "go ahead" reply to any other process till P_i itself has used its critical section. Give your views on the correctness of the revised algorithm.

2+2+2+4=10

4. a) Describe a token-based algorithm to ensure mutual exclusion of processes run from multiple nodes in a distributed system connected using a hierarchical topology.
- b) What would be the worst-case complexity for the above algorithm for a system with N processes running in that many nodes?
- c) Compare performances of symmetric algorithms vis-a-vis token-based algorithms for mutual exclusion.

6+1+3=10

5. a) Define cut of a system.

- b) What are forward and backward intersections?
- c) The following events occur in a system of three processes:

<u>process p1</u>	<u>process p2</u>	<u>process p3</u>
event e1;	event e4;	event e6;
send message to p2;	receive message from p3;	send message to p2;
event e2;	receive message from p1;	event e7;
event e3;	event e5;	receive message from p2;
	send message to p3;	event e8;

- i) Draw a valid timing diagram (event trace diagram) for the system.
- ii) Show the event precedence in the system.
- iii) List the concurrent events.

2+2+6=10

- 6 a) State at least two different motivations behind process migration.
- b) Describe the sender-initiated process migration approach.
- c) What is stability? What is done to improve the stability of the system for sender-initiated process migration?
- d) Define preemptive and non-preemptive process migrations.

2+4+2+2=10

7. a) What are the drawbacks of the centralized deadlock detection algorithm?
- b) Describe Mitchell-Merritt algorithm for deadlock detection in a distributed environment. Illustrate the same with an example.

3+7=10

8. a) Explain the role of stubs towards implementing RPC mechanism.
- b) What are the different components in typical request message for RPC?
- c) Explain the relative merits and demerits of using binding agents vis-à-vis binding by broadcasting requests from client side for implementing RPC system.
- d) What is an Orphan Call in RPC?

3+2+3+2=10