Term Test 01
Course: Distributed System
Course Code: SWE 325

Marks: 20 Time: **50 mins**

1. A **monolithic** application is an application that contains all the functionalities within a single process/service/program. On the other hand, an application that follows **microservice** architecture has its functionalities distributed over multiple processes/services/programs. Now, suppose you are designing a complete system to automate every operation in SUST.
   a. Which one of the above architectures you may follow to design the application of SUST? What are the reasons behind that choice? - **05**
   b. What are the communication entities of that system from a programming perspective? Explain in brief. - **05**
   c. Write down two mechanisms you may follow to communicate with those entities you think in the answer to question **1.b**. - **05**

2. Suppose, a guy named CHIKNA PROTTOY is developing a multiplayer online game for his company. For streaming, he needs to choose between TCP and UDP protocols. What do you think about which one he should choose? What advantage he may have from it over the other? - **05**

Term Test 02

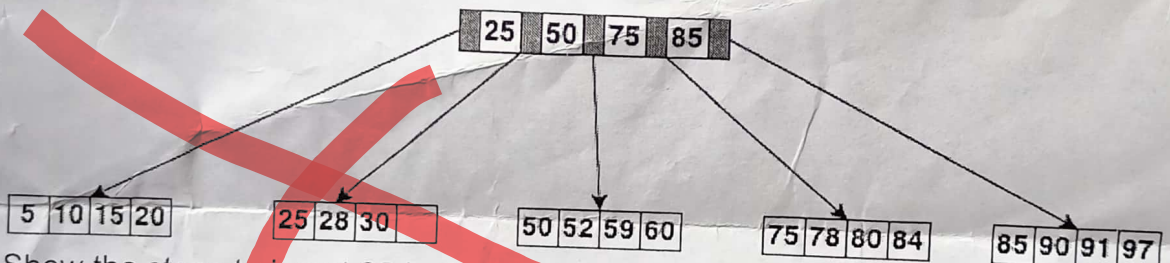
Course: Distributed System

Course Code: SWE 325

Marks: 20 Time: **50 mins**

(Answer all the questions)

1. Name a communication paradigm that is *TIme* and *Space Uncoupled*. Explain how. - 03
2. What do you understand by the term *Memory Coherence* in DSM? - 02
3. What is *Thrashing* in DSM? - 02
4. What is *MapReduce*? Briefly state how it works. - 03



5. Show the steps to insert **92** in the above B+ tree. - 05

6. Suppose you are given the following dependency between 4 transactions of a schedule.

T2 → T3
T2 → T1
T3 → T1
T3 → T4
T1 → T4
T2 → T4

Now determine whether the given schedule is conflict serializable and recoverable or not. - 05

7. Briefly explain the pub-sub system. Give a proper diagram and example. -04

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3rd[illegible]ware Engineering
Semester Final Exa[illegible]r 1st Semester
Course Code: SWE-325 [illegible]ne 2019 (Session 2016-17)
Marks: 50 [illegible]ourse Title:Distributed System
Time: 2 hours

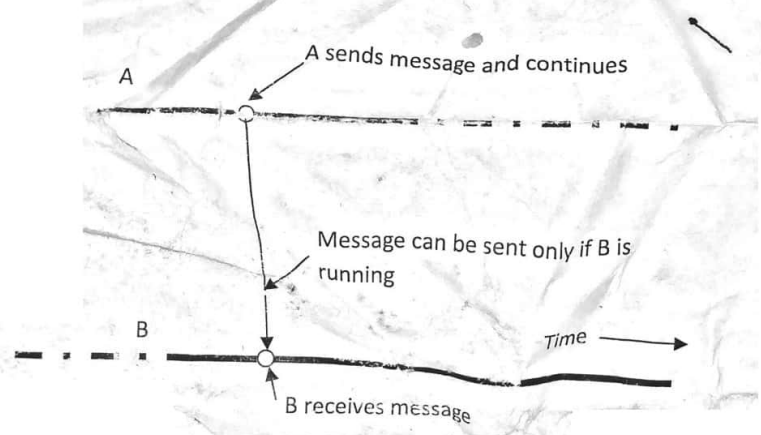
(Answer 2 questions from each group)

Group A

1 a) Describethe common properties of distributed system? ✓ 2.5
b) What does Hadoop do? How does MapReduce work? explain with an example ✓ 7
c) Write down the steps of remote procedure call ✓ 3

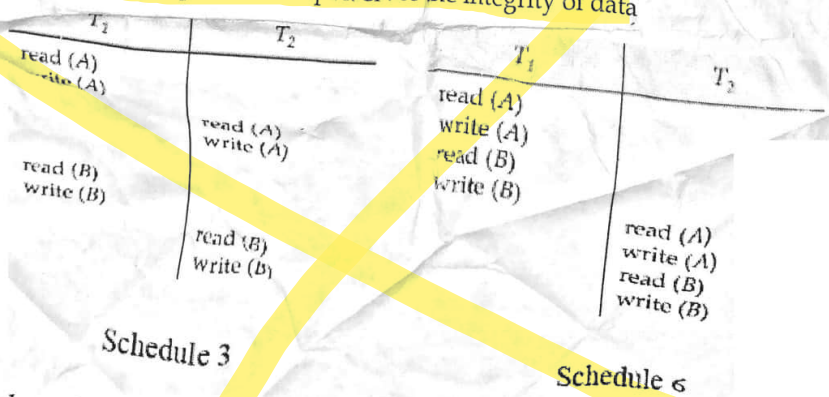
2 a) What is MPI? Based on type of send, define different communication mode. 2.5
b) Show the difference between synchronous and asynchronous RPC? Explain with a diagram. 4
c) Define Transient and Persistent communication in terms of synchronous and asynchronous communication. 6

3 a) What is distributed shared memory (DSM)? Write the advantages of DSM? 2.5
b) Define full replication algorithm. What is the role full replication sequencer? 6
c) What type of communication is this? Justify your answer. 4



Group B

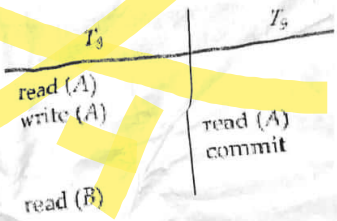
4 a) Explain ACID properties that preserves the integrity of data 4
b)



Schedule 3 Schedule 6

Which one is conflict serializable and why?

4) Why following schedule is non recoverable schedule?



5 a) Define three potential problem of consistency? 3
b) Write down the main methods of concurrency control. Describe the idea of each method. 6
c) Show difference between dense indexing and sparse indexing? 3.5

6 a) What are the characteristics of distributed mutual exclusion? 2.5
b) How does Ring algorithm work? Describe briefly. 6
c) What are the differences between token based solution and permission based solution for distributed mutex? 4

Shahjalal University of Science and Technology

Institute of Information and Communication Technology

3rd year 1st Semester

Semester Final Exam (Session 2017-18)

SWE325: Distributed System

Group A

1 Demonstrate the application of Distributed System in Web. 5

2 Why the Election process is required in Distributed systems? 6
A group of 5 processes (P0..P4) uses the bully algorithm to pick a leader with the highest numbered process ID. Process 1 detects the death of process 4. Explain the new election process using bully algorithm.

3 A user arrives at a railway station that they has never visited before, carrying a PDA that is capable of wireless networking. Suggest how the user could be provided with information about the local services and amenities at that station, without entering the station's name or attributes. What technical challenges must be overcome? 4

Group B

4 Suppose you are designing a ticketing system where slot is assigned to the used based on first come first serve way. How can you implenet this system in a relaible way that it ensures the validity and integirty of the assignment? State a model for your soloution with digram view. 5

5 What are the communication paradigms for Distributed System? 6
Suppose you are designing a stock market application where user can get update about price of their preferred stock category or any particular stock. You need a system for this real time notification. Design the communication process for this system and explain with diagram.

4

6 Write an algorithm in pseudo-code to describe the serialization procedure as Java object serialization. The algorithm should show when handles are defined or substituted for classes and instances. Describe the serialized form that your algorithm would produce when serializing an instance of the following class, Couple:

```
class Couple implements Serializable{
        private Person one;
        private Person two;
                public Couple(Person a, Person b) {

                one = a;
                two = b;
        }
}
```

Institute of Information and Communication Technology (IICT)

Software Engineering

3rd Year 1st Semester Final Examination' June 2022 (Session: 2018-19)

Course Code: SWE 325 Credits: 2 Course Title: Distributed System

Time: 2 hrs Total Marks: 50

Group A

[Answer all the questions]

1. Answer any FIVE 5x1=5

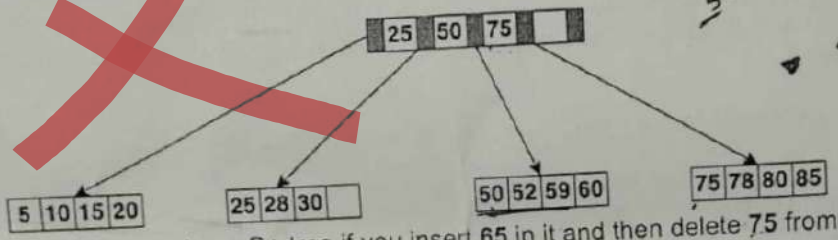
a) What is "Mobile Code"?
b) What is RPC and RMI?
c) What is a *stub* in RPC?
d) What is *MapReduce*?
e) What is *Thrashing* in DSM?
f) What do you understand by the terms Marshalling and Unmarshalling?
g) Mention two Memory Coherence Protocols used in DSM.
h) What is *Secondary index* in an Ordered indexing system?

2. Answer any FOUR 4x2.5=10

a) Name a communication paradigm that is Time and Space Uncoupled. Explain how.
b) Is the World Wide Web (WWW) itself a distributed system? Discuss.
c) What is the relationship between microservices and distributed systems? Explain in brief.
d) What are the differences between *Thread* and *Process*?
e) What is the difference between *connection oriented* communication and *message oriented* communication?
f) What is MapReduce? Briefly state how it works.

3. Answer any TWO 2x5=10

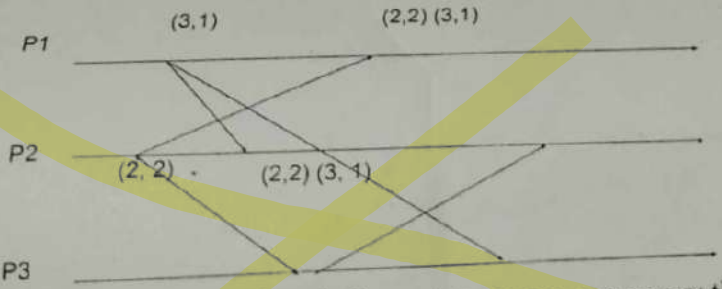
a)



Draw the state of the above B+ tree if you insert 65 in it and then delete 75 from it.

b) *The Election service must ensure that a vote is recorded whenever any user thinks they have cast a vote. Discuss the effect of maybe call semantics on the Election service. Would at-least-once call semantics be acceptable for the Election service or would you recommend at-most-once call semantics?*

c)



Suppose processes p1, p2 and p3 want to access a memory that is shared among them. They use messages based on Lamport's total ordering relation to vote among them. For example a message (4,3) consists of (timestamp, process-id). Now complete the diagram and determine which process will get the access to the memory first?

Group B

[Answer all the questions]

4. Answer any FIVE

a) What do you understand by the term "Heterogeneity"?
b) What is meant by Serialization?
c) What is Indexing? Give two examples of indexing mechanisms.
d) Give an example where multicast communication can be used.
e) What is Space Uncoupling in a distributed system?
f) Name 3 applications that can use the Publish-Subscribe system.
g) What is DSM?
h) What is the disadvantage of Sparse Indexing?

5. Answer any FOUR 4x2.5=10

a) Suppose you are facing performance bottlenecks while printing from your laptop. Assume that the processing power of your laptop is significantly greater than the one of the printing machine. What measures can you take to avoid this bottleneck?
b) What are the differences between Ordered Indexing and Sparse Indexing?
c) What do you understand by *Transient Asynchronous Communication* (in message oriented communication)? Explain with a diagram?
d) What advantages may you have using Sparse Indexing over Dense Indexing? Discuss in brief.
e) Which pattern does Berkeley Socket follow between connection oriented communication and message oriented communication? Explain why.
f) What is the *Conflict Equivalent Schedule*? When can we say that a schedule is *Conflict Serializable*?

6. Answer any TWO 2x5=10

a) Suppose, you have to develop a voice calling (VoIP - Voice over IP) application for a client. For streaming, you need to choose between TCP and UDP protocols. What do you think about which one you should choose? What advantage you may have from it over the other? 5

b) Suppose you are developing a simple e-commerce website for a client.

i. What are the communication entities of that system from a programmer perspective? Explain in brief. 2.5

ii. Write down two mechanisms you may follow to communicate with those entities you think in the answer to question *i*. 2.5

c) Suppose you are given the following words. 5
Dear, Bear, River, Car, Car, River, Deer, Car, Bear.
Now count the occurrences of these words using MapReduce.