AHSANULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course No: CSE4125
Course Title: Distributed Database Systems
Fall 2021 | Quiz – 1 | Marks 20 | Time: 40 Minutes | Set - A

1.   UNIVERSITY_DDB

A university has three campuses at three different locations. At each campus, a mainframe computer controls the terminals and maintains the student database of that campus. Each computer with its local student database constitutes one site at one campus. These different computers are connected via a communication network on a ring topology. During normal operations the applications which are requested from the terminals of a campus need only to access the database of that campus. Moreover, one campus can also request an application from its own terminal to access the database located at another campus. Each campus uses the same distributed database management system named 'Oracle'.

a. Do you think the *UNIVERSITY_DDB* supports an appropriate distributed database system?   4
   Show reason behind your answer.

b. In which situation the DDBMS for the given scenario will become heterogeneous? Which type   6
   of remote access method will you prefer if it becomes a heterogeneous system? Describe the
   method briefly.

c. Describe a scenario where an organization needs to transfer centralized database into distributed   4
   database.

2.   If R and S are the input relations, and T is the output relation, for which relational algebraic   6
      operations the following statements are true? Explain with example.
      i.   grade(R) = grade(T) - grade(S)
      ii.   cardinality(R) > cardinality (T)
      iii.   grade(R) – grade(T) = 0

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a. Do you think the *UNIVERSITY_DDB* supports an appropriate distributed database system? Show reason behind your answer.   4

b. In which situation the DDBMS for the given scenario will become heterogeneous? Which type of remote access method will you prefer if it becomes a heterogeneous system? Describe the method briefly.   6

c. Which one of the following two distributed database environments lends itself more to centralized control and why?   4
    i.   Distributed database on a geographically dispersed network
    ii. Distributed database on a local network

2. If R and S are the input relations, and T is the output relation, for which relational algebraic operations the following statements are true? Explain with example.   6
    i.   grade(R) = grade(T) - grade(S)
    ii.   cardinality(R) > cardinality (T)
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AHSANULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course No: CSE4125
Course Title: Distributed Database Systems
Fall 2021 | Quiz – 2 | Marks 20 | Time: 15 Minutes

Student ID =

Consider the global relational schema:
Hospital (HNAME, HID, CITY, MGRID, CAPACITY, CHARGE, RATINGS)

Given the following fragmentation schema:

$Hospital_1 = PJ_{HNAME, HID, CITY, MGRID} (Hospital)$

$Hospital_2 = SL_{CAPACITY < 500} \, PJ_{HID, CAPACITY, CHARGE, RATINGS} (Hospital)$

$Hospital_3 = SL_{RATINGS < 10} \, SL_{CAPACITY \geq 500} \, PJ_{HID, CAPACITY, CHARGE, RATINGS} (Hospital)$

$Hospital_4 = SL_{RATINGS \geq 10} \, SL_{CAPACITY \geq 500} \, PJ_{HID, CAPACITY, CHARGE, RATINGS} (Hospital)$

1(a). Draw the fragmentation tree.

1(b). Write the reconstruction formula to obtain **Hospital** from the fragments.

1(c). Suppose the hospital having **HID = 15**, has done some new construction. Its capacity has degraded from **600 to 450**. Write an application that does the necessary updates at **Level - 2** of distribution transparency.

P.S: No extra writing. Only draw a tree, only write a single line formula, and only write the level-2 code.

Consider the following global and fragmentation schemata.

Global Schema:

$$PATIENT \ (\underline{PNUM}, NAME, DEPT, TREAT, DNUM)$$

Fragmentation schema:

$$PATIENT_1 = SL_{DEPT = \text{"SURGERY" AND TREAT = "INTENSIVE"}} \ PATIENT$$

$$PATIENT_2 = SL_{DEPT = \text{"SURGERY" AND TREAT} \neq \text{"INTENSIVE"}} \ PATIENT$$

$$PATIENT_3 = SL_{DEPT \neq \text{"SURGERY"}} \ PATIENT$$

APP1 = Select PNUM, TREAT from PATIENT where DEPT = "SURGERY";
APP2 = Update PATIENT set TREAT = 'Regular' where PNUM = 100;
APP3 = Update PATIENT set NAME = "Z" where PNUM = 99;

Data for PATIENT relation:

PNUM	NAME	DEPT	TREAT	DNUM
99	A	Surgery	Intensive	10
100	B	Pediatrics	Intensive	11
101	C	Surgery	Regular	22
102	D	Medicine	Intensive	13
103	E	Surgery	Regular	24

Determine the set of simple predicates P_r to obtain the relation **PATIENT** from its fragments. If **APP1**, **APP2**, and **APP3** applications are issued, do you think the set P_r will maintain completeness property? If not, do necessary changes to make the set complete. Justify your answer.

Consider the following global and fragmentation schemata.

Global Schema:

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