ENGINEERING & MANAGEMENT EXAMINATIONS, DECEMBER – 2008

DISTRIBUTED DATABASE

SEMESTER – 7

Time : 3 Hours] [Full Marks : 70

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct answer any *ten* of the following : 10 × 1 = 10

i) Autonomy refers to the distribution of

a) data b) control

c) function d) none of these.

ii) The condition which must be followed while defining horizontal fragmentation is

a) completeness b) reconstruction

c) disjointness d) all of these.

iii) Join graph is used in

a) primary horizontal fragmentation

b) vertical fragmentation

c) derived fragmentation

d) all of these.

iv) The query optimizer acts as

a) access path selector

b) to manage local database remains constant

c) interpret user command

d) all of these.

v) Distributed database is basically placement of

a) data and function b) data and program

c) program and control d) data and control.

vi) Granularity means

a) size of memory b) size of data

c) locks d) transaction.

vii) During growing phase of two-phase locking locks are

a) released b) acquired

c) both (a) and (b) d) none of these.

viii) In distributed system the time stamp ordering consider the time stamp of

a) site of origin b) site of destination

c) both (a) and (b) d) none of these.

ix) In which level of transparency distributed database system appears to be same as centralized system to the user ?

a) Allocation transparency level

b) Replication transparency level

c) Fragmentation transparency level

d) Location transparency level.

x) In a distributed database system, the deadlock prevention method by aborting the transaction can be used such as

a) time-stamping b) wait-die method

c) wound-wait method d) all of these.

xi) Which of the following is the function of a distributed DBMS ?

a) Distributed data recovery

b) Distributed query processing

c) Replicated data management

d) All of these.

xii) In collaborating server architecture,

a) there are several database servers

b) each server is capable of running transactions against local data

c) transactions are executed spanning multiple servers

d) all of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Explain 3-phase commit protocol. Why is it non-blocking ? 3 + 2

3. Describe catalogue management in distributed database systems. 5

4. What is false deadlock ? How is it overcome ? 2 + 3

5. Differentiate between distributed database and parallel database. 5

6. What is join graph ? What are the different types of a join graphs ? Indicate briefly the use of join graphs in distributed database systems. 1 + 2 + 2

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following questions. 3 × 15 = 45

7. a) What do you mean by simplification of joins between horizontally fragmented relations ? Explain with an example.

b) Define the term "Qualified Relation".

c) Prove that R IN S = S IN R using R IN S = R DF (R DF S).

d) Describe the simplification of horizontally fragmented relations using an example. 6 + 2 + 3 + 4

8. a) What are the methods to prevent unauthorized users in remote accessing in distributed database ?

b) Explain the concurrency control mechanisms ?

c) Suppose that 2 PC with Presumed Abort is used as the commit protocol. Explain how the system recovers from failure and deals with a particular transaction *T* in each of the following cases :

i) A subordinate site for *T* fails before receiving a *prepare* message.

ii) A subordinate site for *T* fails after receiving a *prepare* message but before making a decision.

iii) A subordinate site for *T* fails after receiving a *prepare* message and force-writing an abort log record but before responding to the *prepare* message.

iv) A subordinate site for *T* fails after receiving a *prepare* message and force-writing a prepare log record but before responding to the *prepare* message.

v) A subordinate site for *T* fails after receiving a *prepare* message, force-writing an abort log record, and sending a no vote.

vi) The coordinator site for *T* fails before sending a *prepare* message.

vii) The coordinator site for *T* fails after sending a *prepare* message but before collecting all votes.

viii) The coordinator site for *T* fails after writing an *abort* log record but before sending any further messages to its subordinates.

ix) The coordinator site for *T* fails after writing a *commit* log record but before sending any further messages to its subordinates.

x) The coordinator site for *T* fails after writing an *end* log record. Is it possible for the recovery process to receive an inquiry about the status of *T* from a subordinate ? 2 + 3 + 10

9. What is the blocking problem in 2-phase commit protocol ? Explain how does 3-phase commit overcome this problem. Describe the distributed deadlock detection algorithm with an example. 3 + 6 + 6

10. a) What are the criterion we have to consider for simplifying a query ?

b) Simplify the following queries into its optimized equivalent :

i) $PJ_{NAME,TAX}$ (($EMPJN_{DEPTNUM=DEPTNUM}$ $SL_{AREA="North"}$DEPT) **DF** ($EMPJN_{DEPTNUM=DEPTNUM}SL_{DEPTNUM<10}$DEPT)

ii) $SL_{DEPTNUM=10}$DEPT **NJN** ($SL_{PNUM="P1"}$ SUPPLY **DF** $SL_{PNUM="P2"}$ SUPPLY)) **UN** ($SL_{DEPTNUM=10}$ DEPT **NJN** $SL_{PNUM="P1"}$ SUPPLY)

Having following relations

EMP (EMPNUM,NAME,SAL,TAX,MGRNUM,DEPTNUM)

Fragments horizontal EMP1, EMP2, EMP3 based on DEPTNUM

DEPT (DEPTNUM,NAME,AREA,MGRNUM)

Fragments horizontal DEPT1, DEPT2, DEPT3 based on DEPTNUM

SUPPLIER (SNUM,NAME,CITY)

SUPPLY (SNUM,PNUM,DEPTNUM,QUAN)

Fragments horizontal SUPPLIER1,SUPPLIER2 based on CITY

Fragments derived horizontal SUPPLY1, SUPPLY2 based on SNUM of corresponding fragments of SUPPLIER relation. 5 + 10

11. Write short notes on any *three* of the following : 3 × 5

a) Distributed deadlock detection and handling.

b) Time stamping and synchronisation

c) Distributed database administration

d) ODBC connectivity.

e) Loosely and tightly coupled system.

END