

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 1414

Roll No.

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## MCA

FIFTH SEMESTER EXAMINATION, 2005-2006

### DISTRIBUTED DATABASE SYSTEM

Time : 3 Hours

Total Marks : 100

- Note :** (i) Answer *ALL* questions.  
(ii) All questions carry equal marks.  
(iii) Be precise in your answer.

1. Attempt *any four* of the following parts : (5x4=20)

- What do you understand by distributed database ? What are advantages of distributed databases ? Discuss.
- "Two phase commit is required in order to guarantee a coordinated transaction on a shared-memory multiprocessor". Do you agree or disagree with the statement above ? Explain.
- Comment on the following statement : "A transaction in a prepared state can still commit after the site machine on which it lives has crashed and later recovered".
- Differentiate between the homogeneous and heterogeneous distributed database management system.

- (e) What is phantom deadlock ? Explain with an example.
- (f) Briefly describe and compare the client-server and collaborating servers architectures.

2. Attempt *any two* parts : (10x2=20)

- (a)
  - (i) What is meant by data allocation in distributed database design ? What typical units of data are distributed over sites ?
  - (ii) What is the difference between synchronous and asynchronous replication ? Explain.
- (b)
  - (i) What is the difference between log-based & procedural approaches to implementing capture ?
  - (ii) Discuss the naming problem in distributed databases with suitable example.
- (c) How is the decomposition of an update request different from the decomposition of a query ? How are guard conditions and attribute lists of fragments used during the decomposition of an update request ?

3. Attempt *any two* parts : (10x2=20)

- (a) Define multi database system and also describe how queries that span multiple sites are executed in a multi database system.
- (b) What is gateway ? Explain the role of gateway with respect to lock management, two-phase commit and recovery.

- (c) Consider the following the relation :

BOOKS (book#, primary\_author, topic, total\_stock, \$price)

BOOKSTORE (Store#, City, State, Zip, Inventory\_Value)

STOCK (Store#, Book#, Qty)

Total-stock is the total no. of books in stock and inventory\_value is the total inventory value for the store in dollars. Based on the above answer the following :

- (i) Show predicates by which books may be horizontally partitioned by topic.
- (ii) How would a derived horizontal partitioning of STOCK be defined based on the partitioning of BOOKSTORE ?

4. Attempt *any two* parts :

(10x2=20)

- (a) A server uses timestamp ordering for local concurrency control. What changes must be made to adapt it for use with distributed transactions ? Under what conditions could it be argued that the two-phase commit protocol is redundant with timestamp ordering ?
- (b) Describe the following with suitable example :
  - (i) Grouping and aggregate function in distributed database system.
  - (ii) Query optimization

- (c) (i) Define distributed query processing using semijoin by suitable example.
- (ii) Give an overview of 3-tier client-server architecture.

5. Attempt *any two* parts : (10x2=20)

- (a) What is a nonce ? Explain why each of the nonces used in the Needham and Shroeder protocol is included, giving an example of the type of attack by an intruder against which each is designed to guard and the type of security breach that could result if they were not included ?
- (b) (i) Discuss an example of distributed database systems.
- (ii) Describe catalog management.
- (c) Describe the following :
  - (i) Distributed Database Administration
  - (ii) Security aspects of distributed database systems.

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