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53 (IT 402) DBMS

2015

DATA BASE MANAGEMENT SYSTEM

Paper : IT 402

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

Answer Question no. 1 and any four from the rest.

1. Answer the following questions :

- (a) What is meta data ? 2
- (b) What are the categories of data model ?
Give one example from each category. 3
- (c) Define entity integrity and referential integrity constraints. 4
- (d) Give one example of Domain Relational Calculus. 1

Contd.

- (e) What is functional dependency ? What is lossless join property of a decomposition ? Why is it important ?
2+2+2=6
- (f) Why do we need concurrency control ?
4
2. (a) Describe three schema architecture with one diagram. 10
- (b) What are the advantages of DBMS over traditional file processing system ?
10
3. (a) Discuss the variations of two phase locking protocol. Why is strict or rigorous locking protocol preferred ?
6+4=10
- (b) Explain Basic Timestamp Ordering algorithm. 10
4. (a) Why Armstrong's inference rules are said to be sound and complete ? Prove decomposition, union and pseudo transitive inference rules from Armstrong's inference rules. 4+6=10
- (b) Consider the following relation :
- CAR_SALE (CAR#, Date_sold,
Salesman#, Commission%,
Discount_amt)

Assume that a car may be sold by multiple salesman, and hence { car #, Salesman# } is the primary key.

Additional dependencies are

Date_Sold \rightarrow Discount_amt

Salesman # \rightarrow Commission%

In this relation in 1NF, 2NF or 3NF ?

Why or why not ? How would you successively normalize it completely ?

10

5. (a) Briefly describe ACID properties of a transaction. Explain the distinction between the term serial schedule and serializable schedule. 5+5=10

- (b) Consider the three transactions T_1 , T_2 and T_3 , and the schedules S_1 and S_2 given below. Draw the precedence graph for S_1 and S_2 , and state whether each schedule is serializable or not. If a schedule is serializable write down the equivalent serial schedule(s).

$T_1: r_1(x); r_1(z); w_1(z);$

$T_2: r_2(x); r_2(y); w_2(z); w_2(y);$

$T_3: w_2(x); r_3(y); w_3(y);$

$S_1: r_1(x); r_2(x); r_1(z); w_3(x); r_3(y);$

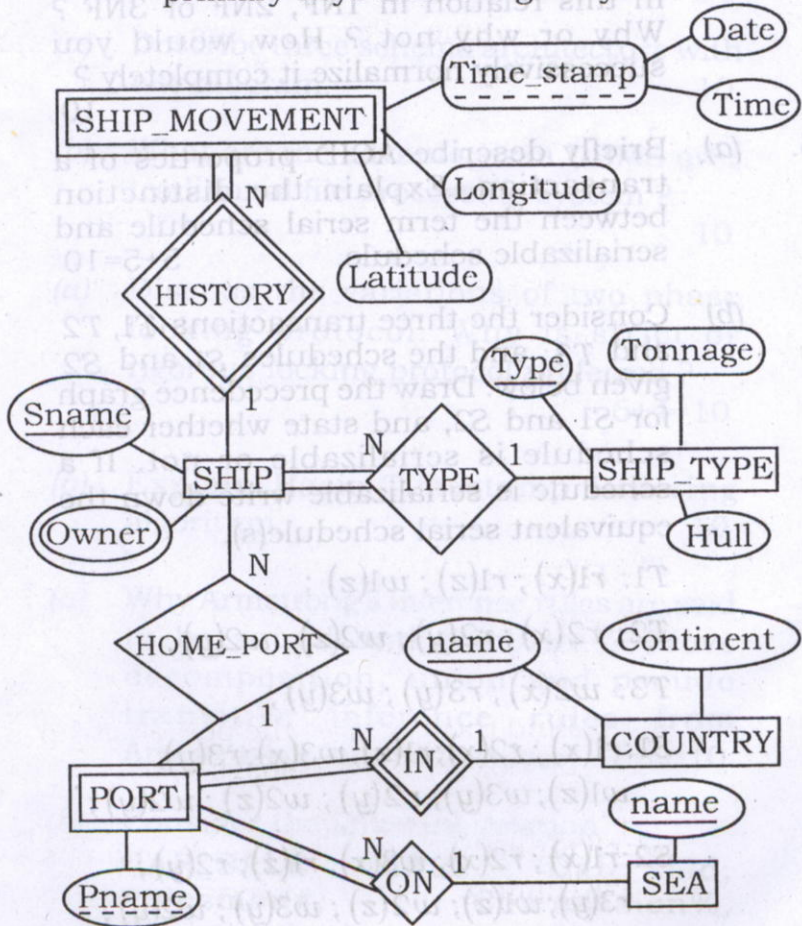
$w_1(z); w_3(y); r_2(y); w_2(z); w_2(y);$

$S_2: r_1(x); r_2(x); w_3(x); r_1(z); r_2(y);$

$r_3(y); w_1(z); w_2(z); w_3(y); w_2(y);$

10

6. (a) Explain with an example concept of a sub-class and super-class. 5
- (b) Develop the relational schema for the ER schema of SHIP-TRACKING database shown in figure below. Specify the primary keys and foreign keys. 15



7. (a) Consider the following tables : (d) 10

Works (Pname, Cname, Salary)

LIVES (Pname, Street, City)

LOCATED_IN (Cname, City)

MANAGER (Pname, Mgrname)

Where Pname - Person name,

Cname = Company name

Mgrname = Manager name

Write the SQL for the following :

- (i) List the names of the people who work for the company 'Wipro' along with the cities they live in.
- (ii) Find the people who work for the company Infosys' with a salary more than Rs. 50,000/-. List the names of the people, along with street and city addresses.
- (iii) Find the names of the persons who live and work in the same city.
- (iv) Find the names of the persons who do not work for 'Infosys'.
- (v) Find the names of the companies that are located in every city where the company 'Infosys' is located.

(b) Differentiate between : $2 \times 5 = 10$

- (i) Outer join and inner join
- (ii) Relational Calculus and relational algebra.