CSCM59. Relational and Object-Oriented Database Systems

Attempt all questions

Some questions refer to the following Suppliers and Parts Database (Bold Underlined headers represent the primary key)

S

SNumber	SName	Status	City
S1	Smith	20	London
S2	Jones	10	Paris
S3	Blake	30	Paris
S4	Clark	20	London
S5	Adams	30	Athens

SP

SNumber	**PNumber**	Qty
S1	P1	300
S1	P2	200
S1	P3	400
S1	P4	200
S1	P5	100
S1	P6	100
S2	P1	300
S2	P2	400
S3	P2	200
S4	P2	200
S4	P4	300
S4	P5	500

P

PNumber	PName	Colour	Weight	City
P1	Nut	Red	12.0	London
P2	Bolt	Green	17.0	Paris
P3	Screw	Blue	17.0	Oslo
P4	Screw	Red	14.0	London
P5	Cam	Blue	12.0	Paris
P6	Cog	Red	19.0	London

1. Show the result of executing the following query on the Suppliers and Parts Database:
   {S join SP where PNumber = 'P2'} {SNumber, City}; **[5 marks]**

2. Explain the following in your own terms (maximum 1 paragraph each)

   - DBA
   - DBMS

   [6 marks]

3. A lending-library holds a number of books and wants to create a database to keep track of which members of the public borrow which books. They will keep data on their users' names, card number and books they either have borrowed in the past or are currently borrowing. Each book has a title, an author and a genre. Every time a book is borrowed a record is to be kept of who borrowed the book, the date they borrowed it and the date it was returned. Design suitable relations for the database in (at least) 3NF. (There is no need to specify the types of the attributes.) You must indicate the primary key for each relation in your database (by underlining), and any foreign keys. (State for each foreign key, which attribute of which relation it references.)

   [5 marks]

4. Give a **Relational Variable Predicate** for the **S** relation above, stating that each supplier's status must be between 10 and 100.

   [2 marks]

5. Briefly (one or two sentences each) explain the following security aspects of a database:

   (a) Authorisation.

   (b) Views.

   (c) Integrity constraints.

   (d) Schemas

   (e) Access Controls

[10 marks]

6. Suppose during a phase of computation a **checkpoint** is taken at time **tc** and then a system failure occurs shortly afterwards at time **tf**. Give the five different cases of transactions, and show which ones will need to be **Redone** and which **Undone**

[8 marks]

7. Explain, with the use of an example, the difference between **Relational Algebra** and **Relational Calculus**.

[7 marks]

8. Give an expression using **Relational Algebra** to answer the question "What is the name and city of suppliers who supply parts P1". **[7 marks]**