UNIVERSITY OF COLOMBO, SRI LANKA

FACULTY OF SCIENCE

THIRD YEAR EXAMINATION IN SCIENCE - 2002

CS 3123 – Designing, Managing and Administrating Database Systems

Three Hours

Answer ALL FOUR questions

No of Pages = 4 No of Questions = 4

1. (a) Briefly describe the stages in constructing a set of relational database tables from the ER diagram. Use an example to describe each stage.

(06 marks)

(b) A database is to be used to maintain information in an order-entry system. The following information is to be included:

- For each customer unique customer number, one or more delivery addresses, an account balance, a credit limit and a discount rate is to be recorded.
- For each product a unique product number, a product description, the names of manufacturing sites making this product, the current stock level and the minimum stock level for each site is to be recorded.
- A customer places an order of one or more products to be delivered to a specified address. For each order a customer number, a delivery address and date of the order is to be recorded. The product number and the quantity being ordered are to be recorded for each detailed line on an order.

(i) Determine the potential entities, their attributes and other relevant information for this order-entry system.

(05 marks)

(ii) Draw a detailed E-R diagram for the above system, indicating clearly the entity and relationship types and cardinality constraints.

(08 marks)

(iii) Explain how the system could determine the orders that can be fulfilled by manufacturing sites located in the same city.

(02 marks)

(iv) Design a set of relational database tables that could be used to implement the ER diagram of (ii) above. Identify the mapping rules applied.

(04 marks)

2. (a) Define the terms determinant, functional dependency and fully functional dependency. Describe them using the table given in (b) below.

(06 marks)

(b) A district contains one or more towns. A town contains one or more hotels and has accommodation at a fixed price per day during a particular month. Hotels are uniquely named within a district. Assume that distinct names are used for identification of districts, towns and months. Part of the hotel rates table is given below.

District	**Town**	**Hotel**	**Telephone**	**Month**	**Price per day**
Colombo	Colombo 1	Hilton	01 564820	August	60
Kalutara	Waduwa	Palm Beach	08 684231	August	40
Galle	Hikkaduwa	Bay Beach	07 586425	August	35
Kalutara	Kalutara	Riverside	08 674826	September	40
Colombo	Colombo 1	Hilton	01 564820	September	65
Matara	Weligama	Riverside	09 233548	October	35

(i) In what normal form is the above table? Justify your answer.

(02 marks)

(ii) Draw a functional dependency diagram(s) for the information on hotel rates.

(06 marks)

(iii) Assuming no additional data is required, design a set of third normal form (3NF) relations for the above information. Using functional dependency diagrams, show clearly each stage in deriving the 3NF relations.

(06 marks)

(iv) Identify the sources of redundancy in each stage of the transformation process.

(03 marks)

(v) It is necessary to add November rates for hotel Hilton in Colombo district. If the 3NF relations of (iii) are used for this purpose, could there be any more redundancies present in the relations? Justify your answer.

(02 marks)

3. (a) Describe the term data views. Identify its' roles and how the 3-tier architecture supports this concept.

(04 marks)

(b) A stockbroker has built a relational database for his clients share holdings. Part of its schema is shown below with key attributes underlined:

Client(ClientCode, ClientName, CleintAddress, ClientTelephoneNo)
Company(CompanyCode, CompanyName, TypeOfShare, OriginalShareValue)
Transactions(ClientCode, CompanyCode, TransactionDate, TransactionValue, QuantityOfShares, SaleOrPurchase)

(i) Write SQL statements to create the three relations with appropriate constraints for the above Stockbroker database. Refer parts (ii) to (vii) for some of the sample data and constraints for these relations.

(05 marks)

(ii) Write an SQL statement to list the names of all clients with their telephone number (if any).

(02 marks)

(iii) Write an SQL statement to list the names of companies who had share transactions on "23/10/2002".

(02 marks)

(iv) Write an SQL statement to list the company name and number of shares purchased for clients on "23/10/2002" in descending order of the number of shares purchased.

(03 marks)

(v) Write an SQL statement to insert new purchase transaction record representing 1000 ordinary type of shares of the company Hayleys Ltd. with company code HAYL at Rs. 150 per share (original share value is Rs. 10) for the client D.H.L. Perera with client code "700300400-00".

(03 marks)

(vi) Write an SQL statement to remove client A.B.C. Dias with client code "666222333-00" from the database. Ensure that all the client's transactions (if any) are automatically removed.

(03 marks)

(vii) Write an SQL statement to create a view of client name, company name, transaction date and value for those with share transactions of Rs. 100,000 or more.

(03 marks)

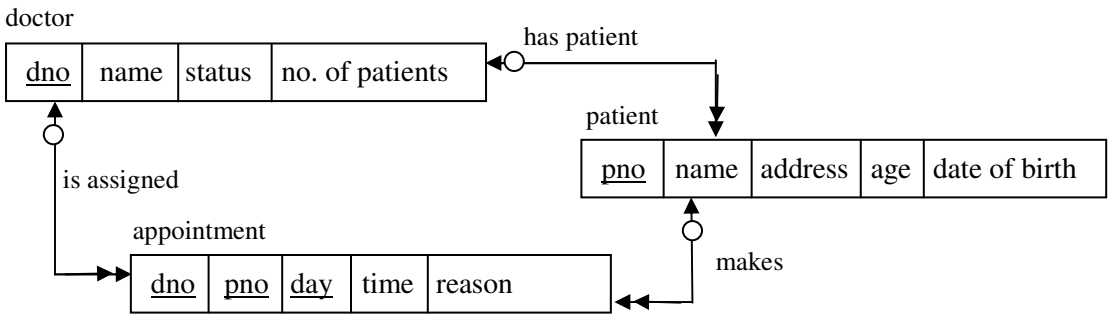
4. (a) Describe the four phases of a database design process when the database requirements are considered.

(06 marks)

(b) Using examples, explain the following constraints and their benefits.
(i) Primary key
(ii) Foreign Key
(iii)Unique Key

(06 marks)

(c) The following diagram models the appointment system for a medical practice. Patients can make an appointment to see any of the doctors in the practice, but they are the patients of a specific doctor.



(i) Describe the components and the represented information of the above diagram.

(04 marks)

(ii) Map the diagram into a set of relations of a relational data model. Clearly indicate the applicable constraints of part (b) for these relations.

(06 marks)

(iii)Explain the existence conditions represented in the diagram. Discuss how you would implement them.

(03 marks)

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