Database Design Term Project (CS6360)

Project Description

Dallas Care is a hospital and medical care center. Dallas Care would like one relational database to be able to smoothly carry out their work in an organized way. The hospital has following modules: Person, Employee, Patient, Visitors, Pharmacy, Treatment, Rooms, Records and Medical Bill Payment.

A Person can be an Employee or a Class 1 Patient. Details of a person such as Person ID, Name (First, Middle, Last), Address, Gender, Date of Birth, and Phone number (one person can have more than one phone number) are recorded. A person ID should be in the format, 'PXXX', where XXX can be a value between 100 and 999. A Class 1 patient is a person who visits the hospital just for a doctor consultation. A person can be both an employee and a Class 1 patient.

Employee is further classified as Doctors, Nurses or Receptionists. The start date of the employee is recorded. The specialization of the doctor is stored and doctors are further classified into Trainee, Permanent or Visiting. Every Class 1 patient consults a doctor. A Class 1 patient can consult at most one doctor but one doctor can be consulted by more than one Class 1 patient.

A Class 2 patient is a someone who is admitted into the hospital. A Class 2 patient can be an Employee or a Class 1 Patient or both. A doctor attends Class 2 patients. One doctor can attend many Class 2 patients but a Class 2 patient can be attended to by at most 2 doctors. The date of patient being admitted into the hospital is recorded.

A Visitor log is maintained for the Class2 Patients, which stores information such as patient ID, visitor ID, visitor name, visitor's address, and visitor's contact information.

Pharmacy details such as Medicine code, Name, Price, Quantity and Date of expiration is recorded. The database also stores the information of the various kinds of treatments that are offered in the hospital. The treatment details such as ID, name, duration and associated medicines are recorded. When a treatment is assigned to a Class 2 patient, the treatment details, medicine details and patient details are recorded so that the doctor can easily access this information.

Nurses governs rooms. Each nurse can govern more than one room, but each room has only one nurse assigned to it. The room details such as room ID, room type and duration is recorded. Each Class 2 patient is assigned a room on being admitted to the hospital.

A records database is maintained by the receptionist who keeps record of information such as record ID, patient ID, date of visit, appointment and description. The receptionist also records the payment information with the patient's ID, date of payment and the total amount due. Payment is further classified into Cash or Insurance. A person can pay by cash, or by insurance or pay via a combination of both. The cash amount is recorded if a person pays by cash. For Insurance, the insurance details such as Insurance ID, Insurance Provider, Insurance coverage and the amount is recorded.

Project Questions

1. Is the ability to model superclass/subclass relationships likely to be important in a dealership environment such as Dallas Motors? Why or why not?

2. Can you think of 5 more business rules (other than the one explicitly described above) that are likely to be used in a travel agency environment? Add your rules to the above requirement to be implemented.

3. Justify using a Relational DBMS like Oracle for this project.

Project Exercises

Phase I. Draw an EER to accurately represent this set of requirements. This will be your Conceptual Design. Clearly specify any assumptions that you are making. You can use any tools (software) to draw the EER.

Phase II. It has been decided to use a relational DBMS to implement the database. Perform the following steps.

 a. Convert your Conceptual model (Phase I) to a Logical model that can be implemented in a relational DBMS like Oracle. During this process you replace M-N relationships and multi-valued attributes with constructs that can be implemented in the relational DBMS. Draw EER for the logical model after your modifications. Feel free to change your conceptual model (first delivery) if needed.

b. Convert the EER (item a) to a database design. Document your design in Database Schema format like the one we discussed in the class.

Phase III. Now, you are ready for implementation. Use appropriate naming conventions for all of your tables and attributes.

   a. Normalize all of your tables to third normal form. Make any necessary changes to the EER from Phase II b. Explain why these changes needed to be made.
   b. Draw a dependency diagram for each table from Phase III a.
   c. Write SQL statements to create database, tables and all other structures. Primary key and foreign keys must be defined as appropriate.
   d. Update data dictionary from previous delivery (phase III c.) to add data type for each attribute in addition to specifying if it is primary key, foreign key, NULL is permitted, or its value is UNIQUE.
   e. Use the Create View statement to create the following views:
      1. TopSalesmen- This view returns the First Name, Last Name and Date of Joining of those salesmen who have made more than 3 sales.
      2. CostPrice- This view returns the cost price for each type of vehicle.

3. ProductProfit- This view returns the profit per product. (Assuming summation of cost of each part is the cost price)
4. PotentialBuyer- This view returns the name, phone number and ID of customers who visited the dealership but did not make any purchase
5. TopManufacturer- This view returns the top 5 manufacturers of vehicles purchased by customer.

f. Answer the following Queries. Feel free to use any of the views that you created in part (e.):
1. For each salesperson class, list the employees belonging to this class.
2. Find the names of employees who are also a customer and purchased a vehicle but from a different branch than the branch that they work for.
3. Find the average salary for the top five salesmen in the dealership.
4. Find the name of the manufacturer that makes parts for the type of vehicle that is sold most at each branch.
5. Find all the salesman who have not made any sale at all or have not made any sale in the last 5 months.
6. Find the total number of customers who have paid by loan and the bank name.
7. Find the most preferred vehicle feature of a customer.
8. Find the month and year and with the maximum sales for each branch.
9. Find the name of the manufacturer who sell the maximum number of parts to each of the branches.
10. List all the sales that have been made after the most current employee was hired.
11. List all the purchases that have been made by customers within a week of their date of visit.
12. Find the profit for each branch in the last 2 months.
13. Find the name of the salesperson of customers who have visited the dealership but have not made any purchases.
14. Find the top 5 most interactive (most sales) salesmen in each branch.

Phase IV. Document the final term project report.

a. Problem description (Copy it from Web site).
b. Project questions (Answer 3 questions listed in the project, justify your solution).
c. EER diagram with all assumptions (Solution for Phase II a).
d. Relational Schema after normalization. All relations must be in 3NF. The relational schema should include Primary key as well as foreign keys (if any) for all relations. (Solution for Phase III a).
e. All requested SQL statements (Solution for Phase III-c, e and f).
f. Dependency diagram (Solution for Phase III-b).