

# Computer Science 431

## Database System Design

### Term Project

In this term project, you are asked to design a small database system, create and populate this database using ORACLE, mySQL, SQL server, DB2 and write a number of application programs to access the database. The topic of the project is to design the database system that a car dealer can use to manage car sales, service appointments and service rendering, and some sale statistics per car type. In the following, you are given a project guideline (Section 1), the requirements for the database design (Section 2) and the requirements for application design (Section 3).

## 1 GENERAL GUIDELINES

The following guidelines apply for the project:

1. The projects will be done in **groups of two**. You should form your own groups and post a message in the 'Project Partners' forum.
2. You are required to demonstrate your programs. You should treat these demonstrations as if you were giving them to your customer. So, prepare them professionally. The demonstrations will take place at the end of the term, after classes are over (It is better to have a Web-base application, you can use your own computer with a local database or NJIT DBMSs). We will put up a sign-up sheet before the demo.
3. You are required to submit a typed project report at the end of the process. This report should have minimally cover (a) a summary of the system requirements and any additions you may have made; (b) Database design (the entity-relationship design, the relational logical database design, and the application program design; (c) a user manual manual (instructions to use the system). For each of the items in the design part, you should identify the major design decisions that you faced and the design decisions that you made with justifications for those decisions. Also include, as an appendix, a list of the relational instances you have used to populate your database. Your report should sale your work! Write your report in a way to make your design and implementation part easy to understand, and modify for a computer programmer. The user manual part should be directed towards users with no computer background and should contain all the information needed to run the applications.

## 2 DATABASE DESIGN REQUIREMENTS

You are in charge of designing a database to help a car dealership engage in CRM (customer relationship management). Your database should store data about each vehicle purchase and each service appointment. You must store enough data that an analyst can use to answer the following questions:

- How recently did each customer purchase a vehicle?
- How many vehicles has each customer purchased?
- How much money has each customer spent in total on all vehicle purchases?
- How much in profit has each customer provided in total on all vehicle purchases?
- How recently did each customer make a service appointment?
- How long has each service appointment taken (from car drop-off to car pick-up)?
- How to contact a customer of interest (for prospective marketing campaigns for vehicle purchases or vehicle maintenance)?

Your database does not have to store directly every answer to these queries. Instead, your database should store enough data from which answers to these questions can be derived. It is suggested that you use the following steps.

## 3 APPLICATION DEVELOPMENT REQUIREMENTS

The car dealer is interested in an application program interface that is easy to use so that they do not have to spend time unnecessarily to train their employees. So, you are expected to write a menu-based main program which consists of the following three application programs for their daily transactions and is open for the inclusion of future programs.

### 3.1 Application Program 1: Car Sale

When a car is sold to customer, there is some information that have to be entered into the database before a bill is printed for the customer. For instance if the customer is not a returning customer, his/her information should be entered. The sold price and the date should also be recorded.

### 3.2 Application Program 2: Service scheduling and service rendering

From time to time, cars sold by the dealer have to be serviced. In order to schedule a car maintenance, the owner contacts the car dealer to book an appointment. An appointment is booked for a given car for a given time. For each appointment, the dealer have an idea of the time it will take for the car to be serviced. When the car is brought in for service, the dealer records the time the car arrives and lists everything that is done to the car and how much every maintenance item costs. When owner comes to pick up the car, a detailed bill is printed and presented to him/her.

### **3.3 Application Program 3: Sale statistics**

This program is used by dealer to analyze the sales per period. The input for this program is 2 dates (begin date and end date) and the program will return the number of car sold the the profit made per car type (same make, model and year).