

# CS422 - DBMS COURSE PROJECT

## PROJECT DETAILS

In this project you can apply all the knowledge you learned so far about relational databases.

- You do the project individually.
- You are expected to research some new aspects like views, user defined functions, triggers and cursors. You have to study these concepts yourself and implement them in SQL Server. See this project as your first project on your new job and you want to impress your boss with how good you are.
- You are allowed to help each other, but you are not allowed to share solutions.
- What to submit for this project:
  - A PDF file that shows the solution of the different steps of this project. If you write a query for example, show the query and the result of the query (screenshot of SSMS).
  - A recorded presentation where you present and demo the important parts of this project. This video presentation should not be longer than 15 minutes.
    - You can do a Teams call and by sharing your screen, do a demo of the project and record this meeting. Upload your video to One Drive, make sure everyone has access to this video, and submit the URL in Sakai.
- Due dates:
  - Monday March 11 – 10am
    - Submit the first 4 questions of Part 1 along with any 3 queries for question 5.
  - Thursday March 21 - 3 PM
    - Submit your complete project pdf for Part 1 (with completed question 5 with all the remaining queries) and Part 2 along with the demo video recording URL.

[PROJECT PART 1 \(5 POINTS\)](#)

[PROJECT PART 2 \(5 POINTS\)](#)

## **PART 1**

- 1) Draw the ER diagram for the [EasyDrive School of Motoring](#) that you find in paragraph B.2 in Appendix B of the book.
  - 2) Translate the ER diagram to tables (logical DB design).
  - 3) Normalize the above tables to the highest normal form that you can.
  - 4) Input these tables into SQL Server and put some data into them (populate them).
  - 5) Write, execute and test (make sure the output is correct!!) all [queries](#) given in paragraph B.2 in Appendix B of the book using SSMS/ADS with SQL Server.
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## **PART 2**

### **STORED PROCEDURES**

- 1) Write a stored procedure that takes in one argument, the staff number of an instructor. The procedure outputs all details of all the lessons for that instructor.
- 2) Write a stored procedure that takes in two arguments, a staff number and a date. The procedure shows details of all lessons for that staff instructor, starting at the date of the argument, and ending seven days later.
- 3) Do the same as questions 1 and 2 above, but for a client number instead of a staff number.
- 4) Create some stored procedures yourself which do something you would like to see being done.

### **VIEWS**

Research how to make views in SQL server.

- 5) Create a View called Client\_Lesson which does an inner join on the Client and Lesson tables. Run it to make sure it works properly!
- 6) Create a View called Lesson\_Info which calls the View above Client\_Lesson, and outputs all the information from Client\_Lesson, along with who the staff person is for the lesson, i.e. the staff person's name and staffID.

One View can call another view, which makes things very flexible.

- 7) Create two more views that may be useful to you. Test them!

## USER DEFINED FUNCTIONS

Research what user defined functions are and how to make them in SQL Server.

- 8) Create a user defined function that returns the total lessons that a client has taken up to today.
- 9) Create a user defined function that returns the total lessons that a client has taken before a date supplied by the user.
- 10) Create a user defined function that returns a table which does an inner join on the Client and Lesson tables, for a particular client which is supplied by the user. Run it to make sure it works properly!

## TRIGGERS

Research what triggers are and how to make them in SQL Server.

- 11) In the Staff table, add an attribute to keep track of the total number of clients that an instructor has. Whenever a new client is added to the Client table, we add one to the above new attribute, to the staff person who is working with this new client. A similar thing is done if a client is removed from our Client table.

## CURSOR

Research what a cursor is and how to make it in SQL Server.

- 12) Use a cursor to read the rows of the Lesson table.
  - If the mileage for the lesson was over 20 miles, increase the fee by \$5.
  - If the mileage for the lesson was over 25 miles, increase the fee by \$8.
  - If the mileage for the lesson was over 30 miles, increase the fee by \$10.

You can use an If ... ELSE ... statement.

- 13) Do the same thing as question 12, but now use a Case statement.
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## B.2 The EasyDrive School of Motoring Case Study

The *EasyDrive School of Motoring* was established in Glasgow in 1992. Since then, the school has grown steadily and now has several offices in most of the main cities of Scotland. However, the school is now so large that more and more administrative staff are being employed to cope with the ever-increasing amount of paperwork.

Furthermore, the communication and sharing of information between offices, even in the same city, is poor. The Director of the school, Dave MacLeod, feels that too many mistakes are being made and that the success of the school will be short-lived if he does not do something to remedy the situation. He knows that a database could help in part to solve the problem and has approached you and your team to help in creating a database system to support the running of the *EasyDrive School of Motoring*. The Director has provided the following brief description of how the *EasyDrive School of Motoring* operates.

### B.2.1 Data Requirements

Each office has a Manager (who tends to also be a Senior Instructor), several Senior Instructors, Instructors, and administrative staff. The Manager is responsible for the day-to-day running of the office.

Clients must first register at an office, which includes completion of an application form, which records their personal details. Before the first lesson, a client is requested to attend an interview with an Instructor to assess the needs of the client and to ensure that the client holds a valid provisional driving license. A client is free to ask for a particular Instructor or to request that an Instructor be changed at any stage throughout the process of learning to drive.

After the interview, the first lesson is booked. A client may request individual lessons or book a block of lessons for a reduced fee. An individual lesson is for one hour, which begins and ends at the office. A lesson is with a particular Instructor in a particular car at a given time. Lessons can start as early as 8:00 a.m. and as late as 8:00 p.m. After each lesson, the Instructor records the progress made by the client and notes the mileage used during the lesson.

The school has a pool of cars, which are adapted for the purposes of teaching. Each Instructor is allocated to a particular car. As well as teaching, the Instructors are free to use the cars for personal use. The cars are inspected at regular intervals for faults.

Once ready, a client applies for a driving test date. To obtain a full driving license, the client must pass both the driving and written parts of the test. It is the responsibility of the Instructor to ensure that the client is best prepared for all aspects of the test. The Instructor is not responsible for testing the client and is not in the car during the test, but should be available to drop off and pick up the client before and after the test at the Testing Center. If a client fails to pass, the Instructor must record the reasons for the failure.

### B.2.2 Query Transactions (Sample)

The director has provided some examples of typical queries that the database system for the *EasyDrive School of Motoring* must support:

- 1) The names and the telephone numbers of the Managers of each office.
- 2) The full address of all offices in Glasgow.
- 3) The names of all female Instructors based in the Glasgow, Bearsden office.
- 4) The total number of staff at each office.
- 5) The total number of clients (past and present) in each city.
- 6) The timetable of appointments for a given Instructor next week.
- 7) The details of interviews conducted by a given Instructor.
- 8) The total number of female and male clients (past and present) in the Glasgow, Bearsden office.
- 9) The numbers and name of staff who are Instructors and over 55 years old.
- 10) The registration number of cars that have had no faults found.
- 11) The registration number of the cars used by Instructors at the Glasgow, Bearsden office.
- 12) The names of clients who passed the driving test in January 2013.
- 13) The names of clients who have sat the driving test more than three times and have still not passed.
- 14) The average number of miles driven during a one-hour lesson,
- 15) The number of administrative staff located at each office.