Advanced Databases
Project (50%)

Bachelor of Science in Computing - Year 3

Objective

You are required to perform a basic requirements analysis, design and implementation a small database system for one of the following application domains:

- Bookshop;
- Pharmacy;
- Library;
- Medical Practice;
- Real-estate agent;
- Concert hall;
- Motor mechanic;
- Primary School; or
- Role-playing game.

Other domains not in this list can be considered, but you will need approval from your lecturer before embarking on any work.

Learning Objectives Assessed

- LO 1. Write complex SQL using cursors, triggers, stored procedures and procedural SQL.
- LO 3. Comprehend how to translate an informal problem specification into a well-formed relational schema using advanced modelling techniques.

Details

Your analysis and design, as well as evidence of your implementation, should be presented in the form of a technical report, which should contain the following::

Part A - Database analysis and design

- As **a group**, provide a complete description of the application domain and any assumptions made; **5%**
- As **a group**, provide complete **design documentation** in the form of complete table descriptions and an **enhanced entity-relationship diagram**; **20%**
- An example of each of the following:
  - One view **per student** incorporating at least two tables and a WHERE clause; **5%**
  - One stored procedure **per student** that performs a multi-table SELECT query and includes at least one IN and one OUT parameter; **5%**
  - One stored procedure **per student** that performs a correlated subquery and includes at least one IN parameter; **5%**
  - One triggers **per group**, each of which must be a separate type (e.g. on UPDATE, on DELETE, on INSERT); **5%**
  - One stored function **per group**; **5%**

Each of the examples in Part A should include a description of the objective of the design (ie, what it is intended to achieve) and in the case of stored procedures and functions, an example of the output of the procedure/function when it is used in a query.

For tasks carried out by individual students, the student name should be provided along with the answer.

Submission of Part A will be on **week 9**. Part A will be provisionally marked after submission. However, Part A will be resubmitted with the rest of the project on **week 13**. The resubmitted Part A should incorporate improvements based on feedback and will be remarked, with the second (final) mark forming part of the overall grade.

Part B - Query Optimisation

Each of these tasks should be completed **per group**

- Create two multi-table queries, one that is a correlated subquery and one that is not. Then create imaginary usage statistics for your chosen queries: i.e. "we will suppose that this query runs 60 times per hour on average & 150 times per hour at peak". Provide a transaction analysis as described in the Connolly and Begg book, figure 18.4 in 5th and 6th Editions, figure 17.4 in 4th Edition; **10%**
- Analyse the query with the EXPLAIN command. Provide a detailed analysis containing:
  - the state of the database before the query execution; **5%**
  - the output of the EXPLAIN command; **5%**
  - the state of the database after the query execution; **5%**
  - the time taken for query execution **5%**
  - Comment on the actual outcome versus the expected outcome. State whether or not there is a difference between what you expected and what you got. **5%**
- Create a query to perform an update, delete or insert operation. Propose an optimisation to the query and/or database structure to improve the performance. Outline the effect your optimisation can be expected to have. Test your query before and after the optimisation using the EXPLAIN command. **10%**

Part C - Group Work

This final part should contain a separate section written by each team member, answering the following questions: **5%**

1. What did you learn from working within a team?
2. What would you do differently if you had to build it again?
3. What did you find most difficult to implement or understand.

Note

Students should familiarise themselves with the CCT's policies on academic misconduct before submitting any assignment for assessment.