CS 432: Databases

Assignment 2: DEVELOPING THE DBMS

Total marks: **100M**	**Submission deadline: 23:59:59 Hrs, Feb 28, 2023**

1. Assignment Instructions

Please refer to the following assignment instructions:

1. Regarding the late submission, we will be following the penalty as per the table:

Late Submission	Penalty (Out of 100)
Till 1-hour past deadline	5 points
1 to 12 hours past deadline	10 points
12 to 24 hours past deadline	20 points
24 to 36 hours past deadline	40 points
36+ hours past deadline	100 points

2. No assignment-related queries will be answered after Feb 27, 2023, 23:59:59.
3. We will follow the zero plagiarism policy, and any act of plagiarism will result in a zero for the assignment.
4. Please cite and mention others' work and give credit wherever possible.
5. If you seek help and discuss it with the stakeholders or individuals, please ask for their permission to mention it in the report/submission.

2. Problem Statement & Requirements

1. G1 and G2 have to come up with a system for which they have to design a SQL database with screenshots of queries. The topic per group is already assigned (here).
2. The submission should have the following:
   - ☐ Natural join & Outer (Left/Right) join
   - ☐ Average functions (Avg/Max/Count)
   - ☐ INSERT/DELETE/UPDATE
   - ☐ RENAME
   - ☐ AND/OR/NOT
   - ☐ Set Comparison
   - ☐ The case construct

- ☐ A View.
- ☐ Commit/Rollback
- ☐ Check Referential Integrity
- ☐ Creating an Index
- ☐ Store an image in the database (Encoded image or the address).
- ☐ User-defined data types
- ☐ Table extensions
- ☐ Grant and revoking of the privilege

3. Tasks

3.1 Responsibility of G1: 40 Pts.

1. Populate the tables that you created in the previous assignment with random data with the following constraints. All tables must follow the ACID properties and the previous constraints mentioned in Assignment 1. **20 x 1 = 20 Pts**
2. Please explain and implement the indexing over one of the columns (where the search needs to be optimized), user-defined data types, and table extensions. **20 x 1 = 20 Pts**

3.2 Responsibility of G2: 40Pts.

To demonstrate the process of creating a user, granting different permissions on tables and views, and revoking the permissions in a database management system. You are supposed to use the database created by the G1.

1. Create a user named "user1" with the password "password1". **1 x 1 = 1 Pts**
2. Create Views on any of the two tables formed by G1 as view1 and view2. And make sure that views contain columns from at least two tables and one additional column with the user-defined data type. **6 x 1 = 6 Pts**
3. Grant "user1" the following permissions on "table1": **3 x 1 = 3 Pts**
    - SELECT
    - UPDATE
    - DELETE
4. Grant "user1" the following permissions on "view1": **2 x 1 = 2 Pts**
    - SELECT
5. Try to perform SELECT, UPDATE, and DELETE operations on "table1" and "view1" as "user1" and report your findings. **6 x 1 = 6 Pts**
6. Revoke the UPDATE and DELETE permissions on "table1" for "user1" and report your findings. **4 x 1 = 4 Pts**
7. Try to perform SELECT, UPDATE, and DELETE operations on "table1" and "view1" as "user1" again. **3 x 1 = 3 Pts**

2. Mention the situation that violates the referential integrity, show the updates in the table, and how we can solve such problems. **15 x 1 = 15 Pts.**

Make sure to document all the steps and the results, along with screenshots of each step, clearly and comprehensively.
Document the steps taken to complete this assignment and include screenshots as evidence of the permissions granted and revoked.

3.3 Responsibility of G1 & G2: 20Pts

Using the optimized ER diagram, write **five** operations, their corresponding **nested** SQL queries, and tuple relational calculus/relational algebra with the following specifications:

1. Two queries must throw an error due to violation of constraints specified by **G1**.
2. One of the functions should involve storage of an image along with a caption into the database.
3. Include cases of natural join, outer join, renaming, two or more different kinds of aggregate functions, and case statements in one or more queries.

Clearly mention the specifications each operation satisfies. For, e.g., if operation *f1* involves storing an image, write "*f1 satisfies specification 2*". Also, submit screenshots of the results.
(5 x 4 = 20 Pts.)

4. Submission

1. The submission file (final PDF) will have four sections with screenshots of the operations over the table:
    a. Responsibility of G1 (Answers to the above questions)
    b. Responsibility of G2 (Answers to the above questions).
    c. Responsibility for both G1 and G2.
    d. Contributions with a list of members in G1 and G2.
2. Combine all the work into one file in PDF format, and submit the document in this Google form.
3. While compiling the final PDF, please make sure that all the responsibilities and contributions are mentioned clearly (Also, please justify the individual contributions). The contributions can be added in the last.
4. PLEASE ADD THE LINK IN THE SUBMISSION FOR SQL DUMB AND THE ***.sql*** FILE WITH QUERIES.

Note: By submitting this assignment solution, you confirm to follow the IITGN's honor code. We shall strictly penalize the submissions containing plagiarised text/code.

5. References:

If required, please feel free to take help from the following references:

1. SQL slides
2. Storing image in mysql.
3. Relational calculus (here).

6. Timeline:

1. Assigned is released on Feb 14th, 2023
2. First reminder - Feb 20th, 2023
3. Second reminder - Feb 25th, 2023
4. Submission - Feb 28th, 2023