Department of Mathematics and Computing

Group Assignment 2: Database Implementation (10% of grade)

Due: March 26, 2025 (in class)

You will choose to do this assignment in groups of TWO or THREE. Only one submission per group is required. Ensure ALL your names are included on the title page of the assignment AT THE TIME OF SUBMISSION.

Grading Breakdown (50 Marks Total):

1. Database Design and Schema Creation: 15 Marks
2. Data Population: 5 Marks
3. SQL Query Development: 20 Marks
5. Team Collaboration and Presentation: 10 Marks

Project Title: Canadian Apt Rentals: Apartment Booking and Management System

Objective:

The objective of this project is to design, implement, and query a database system for **Canadian Apt Rentals**, a company managing apartment buildings and reservations. Students will work in teams of three to create a comprehensive database schema, populate it with realistic sample data, solve practical queries, and analyze the data to extract insights. This project encourages teamwork, problem-solving, and practical application of database design and SQL skills.

Project Description:

Canadian Apt Rentals owns several apartment buildings in Calgary, each managed by a specific property manager. The company offers various types of apartments for rental in these buildings. Guests can book apartments throughout the year. The reservation system tracks building details, apartment information, and guest bookings.

Your task:

Design and implement a database system for Canadian Apt Rentals to manage:

1. Building details.
2. Apartment information.
3. Guest bookings and reservation statuses.

The system should support queries to retrieve, analyze, and report on the data effectively.

Tasks and Deliverables:

Task 1: Database Design and Schema Creation (15 Marks)

Requirements:

- Create an Entity-Relationship (ER) diagram for the database.
- Identify relationships between entities like Building, Apartment, Guest, and Booking.
- Convert the ER diagram into a relational schema. Ensure the schema adheres to 3NF.
- Write SQL scripts to create tables with appropriate constraints (primary keys, foreign keys, unique constraints, etc.).

Deliverables:

- ER diagram.
- SQL scripts for creating the database schema.

Evaluation Criteria:

- Completeness and correctness of the ER diagram (10 Marks).
- Proper normalization and use of constraints in schema creation (5 Marks).

Task 2: Data Population (5 Marks)

Requirements:

- Populate the database with realistic sample data:
  - At least 5 buildings with detailed information (e.g., name, address, manager).
  - At least 15 apartments across various buildings with realistic attributes.
  - At least 10 unique guests.
  - At least 20 bookings, with varied booking statuses and durations.
  - . Use SQL INSERT statements to populate the tables.

Deliverables:

- A SQL script to insert data into the tables.

Evaluation Criteria:

- Realism and relevance of the sample data (3 Marks).
- Correctness of the SQL script (2 Marks).

Task 3: SQL Query Development (20 Marks)

Requirements:

Write SQL queries to answer the following:

1. Retrieve the details of all apartments in a specific building, sorted by apartment type. *(3 Marks)*
2. Find all available apartments (not booked during a given date range). *(4 Marks)*
3. List the buildings with the highest number of booked apartments. *(3 Marks)*
4. Retrieve the total revenue generated by each building from bookings (assume booking cost = $100 per day). *(3 Marks)*
5. Find guests who have made more than 2 bookings. *(3 Marks)*
6. List all bookings that are currently active (ongoing based on the current date). *(2 Marks)*
7. Generate a report showing booking details (apartment, guest name, booking status) for a specific date range. *(2 Marks)*

Deliverables:

- SQL script with all queries.
- Screenshots or outputs of query results.

Evaluation Criteria:

- Correctness and completeness of each query (25 Marks distributed as indicated).

Task 4: Team Collaboration and Presentation (10 Marks)

Requirements:

- Divide the tasks equitably among team members and document contributions.

- Present your project to the class, explaining the schema, queries, and insights.
- Submit a short reflection document (200 words per team member) detailing each person's role and contribution.

Deliverables:

- A quick demo of the database in class.
- Individual reflection documents.

Evaluation Criteria:

- Quality of demo (6 Marks).
- Evidence of equal contribution and teamwork (4 Marks).

Submission Requirements:

Submit the following items in a compressed .zip file:

1. SQL scripts for schema creation, data population, and queries.
2. ER diagram and relational schema.
3. Query screenshots/results.
4. Reflection documents (one per team member).

- Upload the .zip file to the course D2L portal by the deadline. Only 1 student in the group should upload.

Notes for Students:

- Plan and divide work among the team members for efficient execution.
- Include comments in your SQL scripts to explain your code.
- Ensure all deliverables are organized and labeled properly before submission.