Database Systems

Requirements for Semester Project

The objective of this semester project is to provide the practical, hands-on experience in designing and implementing a complete relational database system using SQL Server. This project simulates real-world data modelling and query processing tasks and enables students to:

- Design database schemas using Entity-Relationship (ER) Diagrams and Enhanced ER Diagrams (EERDs)
- Normalize database schemas to at least Third Normal Form (3NF)
- Implement and populate the database using SQL Server
- Write and document key SQL queries for CRUD operations (Create, Read, Update, Delete)

Bonus: Students may optionally develop a basic frontend interface (Windows Forms, Web forms, etc.) for data entry and reporting, which will be considered for bonus marks.

Project Scope

Each group is required to select an enterprise system or real-world scenario. After gathering and analyzing requirements, you will complete the following phases of the project:

Project Phases

Phase 1: Database Schema Design

- Design a complete Entity-Relationship (ER) Diagram of your system.
- Extend it to an Enhanced ER Diagram (EERD) if applicable (for generalization/specialization, aggregation, etc.).
- Normalize all relations to Third Normal Form (3NF).
- Prepare a document that clearly explains:
  - Schema design decisions
  - Entity-attribute relationships
  - Assumptions made during design

Phase 2: Database Implementation

- Implement the normalized schema in SQL Server.
- Insert realistic sample data (at least 10–20 records per table).

- Write and test SQL queries for:
    - Data Insertion (INSERT)
    - Data Retrieval (SELECT)
    - Data Modification (UPDATE)
    - Data Deletion (DELETE)
- Add any necessary constraints (primary keys, foreign keys, unique, check constraints, etc.)

Phase 3: Frontend Integration (optional bonus)

- Design basic data entry or reporting forms using any platform such as:
    - Windows Forms (.NET)
    - HTML/CSS/JavaScript
- Connect forms to your SQL Server database
- Include:
    - Screenshots
    - Brief documentation on form functionality

Project Submission Guidelines

Final Demo & Submission Deadline: 12-06-2025

Git Repository Requirements:

1. Create a group repository on GitHub.
2. Name your repository using the following format:

    DB_ProjectName

3. The repository must include a README.md file containing:
    - Group members' names and student IDs
    - Project title and description
    - Setup instructions (how to restore the database, how to run sample queries)
    - Bonus section (if frontend is implemented)
4. Ensure clear and meaningful commit messages, such as:
    - Added ERD and normalized schema
    - Inserted sample data
    - Implemented basic CRUD queries
5. Make your repository public or share it with your instructor.

6. Include the repository link in your final project submission form.

Project Guidelines

To ensure consistency, quality, and fair evaluation, all project groups must adhere to the following guidelines:

1. Group Size
   - Each group must consist of 2 students.
   - Collaboration is mandatory; individual submissions are not allowed.

2. Database Platform
   - The database must be designed, implemented, and tested using Microsoft SQL Server.

3. Minimum Database Complexity
   - Your final database should contain at least 12 distinct relations (tables).
   - Each table must be meaningfully structured with appropriate primary and foreign keys, attributes, and constraints.

4. Submission Format
   - All project deliverables must follow the official templates and folder structure provided by the instructor.
   - Your final submission folder should include:
     - ERD_Diagram
     - Normalized_Tables
     - SQL_Scripts.sql (for schema and data population)
     - CRUD_Queries.sql
     - Frontend_Screenshots/ (if implemented)
     - README.md (if using Git)
     - Presentation.pptx (for demo)

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