SAIT CPRG 250 Database Anwar Alabbas March 2025

Database Modeling and Reporting Project

Objective

The goal of this project is to transform business rules into a well-structured database system using **Postgres**. This includes designing conceptual, logical, and physical models, implementing the database, populating it with sample data, and generating reports. Note that there will be errors in the business rules. See the marking rubric in D2L for grading criteria.

Phase 1: Database Design

1. Conceptual Model

- Develop an initial draft of the **Conceptual Model** based on the business requirements.
- List any **assumptions** made to clarify missing or ambiguous requirements.

2. Logical Model

- Expand the conceptual model into a **Logical Model** with:
  - **Entities, attributes, primary keys (PKs), and foreign keys (FKs)**
  - **Resolution of many-to-many (M:M) relationships**

3. Physical Model

- Convert the logical model into a **Physical Model** by defining:
  - **Datatypes and constraints** (e.g., `NOT NULL`, `CHECK`, `UNIQUE`)
  - **Check constraints** (documented within the diagram)

Phase 2: Database Implementation

4. Create Tables with Constraints

- Implement the physical model by creating database tables using **SQL commands**:
  - `CREATE TABLE` statements with **column-level** and **table-level constraints**
  - `ALTER TABLE` for additional constraints
- Follow best practices:
  - **Drop tables in reverse order (with `CASCADE`)** when needed
  - **Create tables in order** (parent tables first, followed by child tables)
  - **Use table-level constraints for composite primary keys**

5. Populate Tables with Sample Data

- Insert sample data to **demonstrate system functionality**.
- **Minimum data volume:**
  - **All Tables:** 1000 rows

Phase 3: SQL Queries and Reporting

6. Develop Reports Using SQL Queries

- Implement queries using the following SQL concepts:
  - **Joins** – Combining data from multiple tables
  - **Single-row functions** – Applying functions to individual rows
  - **Restricting and sorting data** – Filtering and ordering results
  - **Group functions** – Aggregating data (e.g., `COUNT`, `AVG`)

  - **OLAP** – Analytical queries
  - **Subqueries** – Using queries within queries

7. Report Formatting and Documentation

- Each **SQL script** must include:
  - A title with the report name
  - **In-line comments** explaining the report purpose
  - **A script name and screenshots** including the author's initials

Phase 4: Client Presentation

8. Video Presentation (10 minutes MAX)

- Prepare a **client-facing demonstration** showcasing the prototype system.

Presentation Structure

1. **Overview of the Physical Model**
   - Explain **tables and relationships** in non-technical terms.
   - Highlight **key features** of the model.
2. **Report Demonstrations**
   - **Explain the purpose** of each report and its value to the customer.
   - **Show the SQL source code** for the report.
   - **Demonstrate execution** of the report in Postgres.
   - **Interpret the results** for the client.
3. **Submission**
   - Upload the video to **D2L** or share a **YouTube link**.

Final Deliverables

- **Database Models:** Conceptual, Logical, and Physical Diagrams
- **SQL Scripts:** Table creation, data population, and reports
- **Documentation:** Assumptions, constraints, and report descriptions
- **Client Presentation Video:** Demonstrating system features