

## **CSU 44D01 Project Specification**

***Deadline: 12 noon, Monday 17<sup>th</sup> Nov. 2025***

The CSU44D01 project is to develop an ER Model for an application of your OWN choice and implement it as a MySQL database. The project is designed to integrate conceptual modelling with practical SQL implementation, emphasizing data integrity, query design, and automation using triggers.

### **Project Submission Components**

The project submission will consist of a:

1. An Assessment and Examination Declaration
2. A report file
3. A text file containing commented SQL source code

A template Assessment and Examination Declaration is available on the module website.

**More details on each of the components of the project along with submission instructions are provided on the following pages.**

## 1. Report File

The **report file** should include:

### (a) Domain Description

Provide a textual description of the chosen domain, describing the entities, attributes, and relationships.

The domain description should include:

- a. at least 4 entities,
- b. at least one 1:1 binary relationship,
- c. at least one 1:N binary relationship,
- d. at least one M:N binary relationship,
- e. at least one recursive relationship,
- f. and either a weak entity or a multivalued composite attribute.

### (b) An ER diagram in (**CHEN notation** i.e., the notation we have used in the lectures)

An ER diagram for the domain you have described. The ER diagram can be drawn using any tool you prefer or hand-drawn, and a photograph can be inserted into the report. The important thing is that the diagram should be legible and use the correct notation.

### (c) Mapping to Relational Schema

A mapping from your ER diagram to a relational schema using the 7-step algorithm we covered in lectures. It is required that your description of the mapping from ER diagram to relational schema corresponds to the stages in the 7-step algorithm we presented in class, i.e. your description should build up the relational diagram step by step. For each step in the algorithm:

- Identify relevant components of your ER diagram.
- Explain how the relational schema expands or changes.
- If a step has no corresponding features in your design, state this explicitly

### (d) SQL Implementation, Integrity, and Query Demonstration

This section provides an explanation of how the database was implemented in MySQL using SQL code. It should cover:

- Creation of database tables
- Population of the database
- Explanation of the rationale and design of the data integrity constraints and triggers related to one or more tables in the database and a worked examples demonstrating how the constraints and triggers enforce data integrity
- Execution of SQL queries that demonstrate course-taught concepts

## 2. Source Code File

The source code must include fully commented SQL that implements the relational schema developed from your ER model.

It should consist of the following:

### (a) Creating and Populating the Database Schema

- SQL commands to create tables, including all **primary, foreign, and check constraints** that enforce entity, referential, and semantic integrity.
- SQL commands to **populate each table** with at least four rows of data.

### (b) Implementing Data Integrity and Triggers

- At least one **BEFORE** or **AFTER** trigger that maintains data integrity or enforces a business rule (e.g., preventing invalid updates or deletions that violate referential integrity).
- A clear explanation (in comments and the report) of the trigger's purpose and logic.

### (c) SQL Querying and Data Manipulation

Include SQL queries demonstrating practical use of:

1. A **SELECT** query using an **INNER JOIN** between two or more tables.
2. An **aggregation query** using **GROUP BY** and **HAVING**.
3. A **subquery** or **EXISTS** predicate.
4. A **data modification command** (INSERT, UPDATE, or DELETE) to illustrate data integrity behaviour and trigger operation.

Each query should reflect typical data retrieval or manipulation within the domain.

You are required to implement the database using MySQL, you may wish to use the MySQL workbench which is available for free and downloadable to your own machines, i.e., your source code should work with MySQL.

The 'Table of Contents' for the report (see below) indicates the sections and aspects of the database design and SQL implementation which need to be contained in the report.

## Submission Instructions

Submissions must include:

- The Declaration file (template provided)
- The Project Report in PDF format
- A .txt file containing commented SQL source code

Submission will be via a Project Submission link which will be made available via the Blackboard Course site before the project deadline.

**NOTE:** The student may be expected to participate in a demonstration of their working project two weeks after submitting the project report.

**Note2:** The *project must be the student's original own work.*

**Deadline for submission of Project is: 12 noon, Monday 17<sup>th</sup> Nov. 2025**

# **Example Table of Contents for the Project Report**

## Contents of Project Report

1. Domain Description
2. Entity Relationship Diagram for the Database
3. Mapping to Relational Schema to Relational tables
4. Creating and Populating the Database Schema (with constraints)
5. SQL Implementation, Integrity, and Query Demonstration
  - a. Data Integrity and Triggers
  - b. Querying the Database: Joins, Aggregates, and Subqueries
  - c. Integrity Enforcement and Data Modification