Campus Tutoring Center – Project Report

1. Process Documentation

This section documents the comprehensive system design process for the Campus Tutoring Center database. The goal of this system is to manage tutoring sessions efficiently by connecting students, tutors, subjects, and rooms through appointments, ensuring no double-booking conflicts occur.

System Design Requirements

The Campus Tutoring Center supports the following requirements:
1. Manage student and tutor records, including unique emails and IDs.
2. Maintain a list of subjects offered and rooms available for tutoring.
3. Allow tutors to teach multiple subjects (M:N relationship).
4. Allow students to enroll in multiple subjects (M:N relationship).
5. Enable students to book tutoring appointments by subject, room, and tutor.
6. Prevent double-booking of tutors, students, and rooms at the same start time.
7. Track session status (Scheduled, Completed, Cancelled, NoShow) and session notes.

Decision-Making Process

To meet the project requirements, a relational database model was selected using MySQL Workbench. The key entities—Student, Tutor, Subject, Room, and Appointment—represent the major participants in the tutoring process. Two associative entities, Enrollment and Teaches, were introduced to resolve many-to-many relationships.

The Appointment entity was modeled as a dependent entity connecting all others, as each session requires a student, tutor, subject, and room. Constraints were added to enforce data integrity and scheduling rules, including unique composite keys for tutor, student, and room at specific start times.

Design Tools and Approach

MySQL Workbench was used to design and implement the database. The project followed the following steps:
- Defined functional requirements based on real tutoring scenarios.
- Created the Chen ER model to visualize entities and relationships.
- Converted the Chen ER into a UML model within MySQL Workbench.
- Applied normalization principles to remove redundancy and ensure referential integrity.
- Used forward engineering to generate SQL scripts for the database schema.
- Populated the database with realistic sample data for testing and validation.

2. Completeness and Quality of Final Report (10 Points)

Project Scope

The project covers the full lifecycle of database design and implementation for a tutoring management system. It defines all key entities, relationships, and constraints necessary to manage tutoring operations, including enrollment, teaching assignments, and appointment scheduling. The database also supports data retrieval through queries such as tutor workload reports and upcoming session lists.

Challenges Encountered

Some challenges included determining how to properly represent the Appointment entity, which required connections to multiple parent entities. Another challenge was enforcing no double-booking constraints in SQL, which was resolved through unique composite indexes. Additionally, ensuring all relationships maintained referential integrity across cascading deletions required testing and validation in MySQL Workbench.

Outcomes and Lessons Learned

The final database successfully captures the structure and operations of a real-world tutoring center. The Chen ER model provides a clear conceptual overview, while the UML model demonstrates normalized implementation. Throughout the project, a key takeaway was the importance of designing with constraints in mind early in the process to prevent logical errors later. This project also reinforced knowledge in database normalization, entity-relationship modeling, and SQL implementation.

Academic Quality and Writing Standards

This report adheres to academic standards through clear structure, consistent formatting, and formal tone. Each section aligns with the grading rubric, covering design rationale, implementation steps, and reflection on challenges and results. The report demonstrates understanding of both theoretical database concepts and practical application in MySQL Workbench.