CS 33007 Introduction to Database Systems
Fall 2025
Department of Computer Science
Kent State University

Project

Overview: The database design and implementation project is a major graded event, totaling 200pts.

- Database design (75 points)
- Database and application implementation (100 points)
- Project presentation (25 points).

This is a group project, and students may work in groups of 2 people.

- Students may work in groups of 2 people.
- Each group submits all materials.
- Students in the same group receive the same score.
- Remainder of semester long project.

Objectives: The objectives of the project are:

1) Provide a realistic experience in the design, implementation, operation, and maintenance of a relational database and associated applications.

2) Provide a challenging and rewarding opportunity for each student to apply concepts learned in the course to their own intellectual pursuits.

3) Provide an opportunity for each student to implement a database system that meets the needs of a typical business.

4) Provide an opportunity for each student to verbally summarize their work in a conference-like setting.

Phase 1, Due October 30th

Based on the database provided in the class, your first job will be to extract and create the ER diagram for it. This ER diagram must contain all the relationships between entities and cardinalities for each relationship, also all attributes must be broken down into their correct versions, composite values, multivalued attributes, etc.

Once the ER diagram is created, create the database using the SQL queries necessary to make it usable, all restrictions for the usage of the database must be included, e.g. primary key can't be duplicated in different instances, cardinality of relationships, prevent null values, etc.

The database implementation must be normalized to the 3rd level or normalization covered in class, keep in mind that the original design for the database provided is faulty and can't be used directly for this.

Construct and list the SQL Queries needed for CRUD (Create, Read, Update and Delete) as necessary for all major tables (instructor, student, section) also the major transactions needed to start the system going (enroll in class, assign an instructor to a class, drop a section, give a grade to a section). As we go through the course, look for opportunities to add features of the SQL language to your project, such as joins, views, triggers, etc.

Deliverables:

Database implementation.

Implement the design outlined in the section above and deliver the following elements:

1. ER diagram, in a digital form, not a picture or a paper.
2. Create the database schema in MySQL.
3. Populate the database with sufficient data to demonstrate the queries used by your application.
4. Create the list of SQL queries necessary for all the operations needed in an SQL file.

Grading for phase 1

Item	Points
ER Diagram	20 pts
Database schema	30 pts
SQL Queries	20 pts

Phase 2, due November 25th

Using the programming language of your choice (flask or PHP): Construct a front-end application for your database (webapp or text console app) to be used by the users that you identified in your proposal. The application should implement the SQL queries that you developed (and more) on the first phase of the design stage of the database.

This application should have the ability to perform the following tasks:

1. Login/logout as administrator, instructor or student, using a username and password. Password must be encrypted at a database level.

Based on the user's role, each user will be able to perform the following tasks:

Administrator	Instructor	Student
CRUD Course	Submit grades	Register for classes
CRUD Section	Change grades	Drop classes
CRUD Classroom	Add students as advisor	Check final grade for classes
CRUD Department	Remove students as advisor	Check courses based on the semester, including status
CRUD Time slot	Modify course prerequisites	Check for section's information
CRUD Instructor	Remove student from section	Check for advisor's information
CRUD Student	Check section roster	Modify personal information, except ID
Assign/modify/remove teachers to classes	Check sections teaching based on the semester	
	Modify personal information, except ID	

Since the main focus of the class is the database, most of the points will be assigned to the functionality of the different requirements, however GUI is expected to help the user to execute each task and not just be a basic HTML code, some styling is important.

Presentation requirements

In this final presentation students will show their results to the rest of the class, including the final report as well as a fully functional project.

The presentation must cover the following topics:

- Team members.

- A brief description of the overall project.
- Technologies used in the development of the project.
- A brief description of the project's architecture.
- Demo of the project.
- Conclusion, about the level of competition and satisfaction with the project.

Total time: 15min

5 min for presentation slides.

10 min for demonstration.

Deliverables

1. SQL code.
2. System code.
3. Presentation slides

Grading for phase 2

Login 20 pts	
Login/logout as student	7 pts
Login/logout as instructor	7 pts
Login/logout as administrator	6 pts

Administrator 30 pts		Instructor 30 pts		Student 20 pts	
CRUD Course	3 pts	Submit grades	5 pts	Register for classes	3 pts
CRUD Section	3 pts	Change grades	4 pts	Drop classes	3 pts
CRUD Classroom	3 pts	Add students as advisor	3 pts	Check final grade for classes	3 pts
CRUD Department	3 pts	Remove students as advisor	3 pts	Check courses based on the semester, including status	3 pts
CRUD Time slot	3 pts	Modify course prerequisites	3 pts	Check for section's information	3 pts
CRUD Instructor	5 pts	Remove student from section	3 pts	Check for advisor's information	3 pts
CRUD Student	4 pts	Check section roster	3 pts	Modify personal information, except ID	3 pts
Assign/modify/remove teachers to classes	3 pts	Check sections teaching based on the semester	3 pts		
Modify personal information, except ID	3 pts	Modify personal information, except ID	3 pts		

Keep in mind that all the transactions must follow the rules established by the ER diagram and maintain the integrity of the database, things like deleting an instructor that teaches a class are not permitted, nor deleting a department with instructors in it, etc.

To obtain all the points for each topic, these constraints will be tested during the presentation. Last thing to keep in mind is that no user should be able to perform actions outside of their scope, e.g. a student shouldn't be given the chance to modify grades or assign instructors to sections, etc.

Presentation grade

Presentation 25 pts	
All members participation	5 pts
Sections covered properly	10 pts
Demo of the project	5 pts
Format of the presentation	5 pts