

## Assignment – Database Design

### Objectives

- Be able to draw E/R diagrams for application problems.
- Be able to convert an E/R diagram to relational database table design.
- Be able to create tables on real database system.

### Key Ideas

- E/R diagram
- Mapping between E/R diagram and relational database tables.

### Problems

#### 1. Problem 1: Company Personnel Database

Design a database for a company to store its personnel information. The company has a set of departments. Each department has a set of employees, a set of projects, and a set of offices. Each employee has a job history (set of jobs the employee has held during their employment with the company). For each such job, the employee also has a salary history (set of salaries received while employed on that job). Each office has a set of landline phones.

The database is to contain the following information:

- For each department, department number (unique), budget, and the department manager's employee number (unique).
- For each employee, employee number (unique), current project number, office number, and phone number, plus title of each job the employee has held, plus date and salary for each job.
- For each project, project number (unique) and budget.
- For each office, office number (unique), floor area, and phone number for all the phones in that office.
- If the description of the problem is not clear to you or not given at all, state the assumptions you used in your design.
- The standard notations for E/R diagrams and relational table mapping rules should be followed.

**Instructions:**

- Draw an E/R diagram for the problem.
- Convert the E/R diagram to relational database tables.
- Create tables on the MySQL database on the course server.
- Insert some sample data records into the tables to check if the design reflects the requirements of the problem.
- Revise the design if necessary.
- Submit all the work (a single pdf file) to Canvas. The file need to include E/R diagram either by hand or software drawing, relational database tables with sample data records populated, and preferably test SQL queries.

**2. Problem 2: Student Record System Database**

Design a database system for the Student Records Office of Texas Wesleyan University to keep student academic records. Detailed requirements for the database system are given below:

The information to be stored in the database system includes four major categories of data: personal information about faculty and students, academic records of students, information about courses and course offerings, and teaching records of faculty. Information about classrooms and other auxiliary data are also stored in the system. After the database is implemented, the user should be able to retrieve the following information:

1. Student personal information such as name, major, classification, and GPA.
2. Faculty information includes name, rank, discipline, and department.
3. Student transcript
4. Faculty teaching history
5. History of course offerings by discipline
6. Course description and prerequisites <sup>1</sup>
7. Classroom schedules <sup>2</sup>
8. Class information <sup>3</sup>

**Instructions:**

- Draw E/R diagrams for the problem.
- Convert the E/R diagrams to relational database tables.

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<sup>1</sup>A course may require multiple other courses as prerequisites

<sup>2</sup>The schedules for all classes held in a classroom during a given semester.

<sup>3</sup>Classes differ from courses. A course is an entity described in degree plan (or catalog), whereas a class is an “instance” of a course delivered in classroom. A course can be taught in multiple classes (or sections) during a semester.

- Create tables on the MySQL database on the course server.
- If the primary key for a table is a combination of multiple columns, consider using an auto-increment counter as primary key for the table.
- Insert some sample data records into the tables to check if the design reflects the requirements of the problem.
- Revise the design if necessary.
- Submit all the work (a single pdf file) to Canvas. The file includes E/R diagrams either by hand or software drawing, relational database tables with sample data records populated, and test SQL queries.