

# Course 1-02-322: Database Systems

## Semester Project

### Entity-Relationship Diagrams

Michael J. May

**Due November 11, 2009**

Having selected your topic for the Database Systems semester project, the next step is to perform the conceptual design for the database that you will build. As discussed in class, a useful tool for doing conceptual design of a large database is *Entity-Relationship Diagrams* (ERD).

Since ERDs are derived from an analysis of the application's needs and data model, we will develop the ERDs for the project in two phases: (1) Planning the conceptual model and (2) creating ERDs based on it. We next discuss the two steps in a bit more depth.

## 1 Planning the Conceptual Model

Developing a database for a real world application requires significant work, meetings, planning, and design. Some of the techniques that we have discussed in the Information Systems Engineering 1 course would be useful, such as gathering information about the project's needs, the current state of the organization, and requests for new features.

**Scope** Since we have limited time and resources, it is important to focus on a portion of the functionality of the project which is doable in the course of the semester. Students or teams which have already decided on a project of feasible size for the semester will not need to reduce their scope. For those who have not thought thoroughly through their topic, now is the time to consider how much is reasonable to accomplish during the semester. I would rather see a project with a smaller scope that works well than one that is broad but is not efficient or well designed.

**Research** Since we doing the database development without the previous steps of systems analysis, initial design, and customer consultation, students should spend some time researching the needs of their project. If the student or team does not already recognize what are the significant entities and relationships that the database should support, they should spend time researching. Research can be done in the library, online, or by talking to others with experience in the project area chosen.

**What to do** For this phase, you should do the following steps:

1. Write down (in natural language), a detailed description of the entities and relationships that you will be including in your database.
2. Write explanations for each entity or relationship (unless obvious) and point out aspects such as key constraints, participation constraints, and general constraints.
3. Point out places where you will be using the following, more advanced concepts: Aggregation, Inheritance, 3-way (ternary) or greater relationships, weak entity sets. In each place, explain why.

## 2 ERDs

We have already done some exercises related to drawing ERDs in lecture, recitation, and in the homework. We will now use those techniques to create ERDs for our conceptual model of the database.

### 2.1 What to do

You should take the plan that you have developed and draw it graphically using Entity-Relationship Diagrams. To be clearer, do not make one huge ERD (unless you feel it necessary), but break it into logical pieces showing related parts. You can create your ERDs using any graphical tool: paper, Microsoft Power Point, Visio, etc.

### 2.2 Minimum Requirements

While each ERD will differ based on the specific application chosen, at a minimum your ERD should include following elements:

1. 9 entity sets
2. 1 instance of inheritance (with coverage and overlap noted as applicable)
3. 6 relationship sets
4. 3 instances of participation or key constraints
5. 1 instance of two of the following features: {aggregation, ternary or higher order relationships, weak entity sets}. For instance, you may have:
  - 1 weak entity set and 1 ternary relationship
  - 1 aggregation instance, 1 weak entity set
  - 1 ternary relationship and 1 aggregation
  - etc.

ERDs which are more complex and show more thought will be appreciated and reflected in the Project Report's grade.

*Be ambitious!*

## 3 What you must turn in by November 11

You must turn in the parts mentioned above by **November 11**:

1. (10%) A description (in natural language) of the entities and relationships that you will be using in your database.
2. (15%) Explanations for the different entities and relationships chosen. Point out and explain any place where you use aggregation, inheritance, weak entity sets, or 3-way or higher relationships. Point out any explain any key constraints, participation constraints, or general constraints. Be **brief** but clear.
3. (75%) The graphical Entity Relationship Diagrams.

If you plan to draw the ERDs on paper, please scan them and upload them to Telem. You will need them later when you create your project report, so I would rather not have the only copy.