Fitchburg State University

CSC7500 Database Design

Class Project

The focus of this project will be to design a database management system using proper design methods. Students will be asked to work in teams of 2. You are responsible for the following:

1. Researching a project - coming up with a detailed project description and scope of work.

2. Presenting the instructor with a one to two page summary of the project including the name of the project, approximate number of database components (tables (entities), forms, queries) and a brief plan for completing the project.

3. Obtaining approval for the project. Please do not proceed with the project until the instructor has approved the topic.

4. Performing systems analysis and database design including production of an E-R diagram, conversion to Relational model and Normalization.

5. Creating the database (tables and indexes) and writing a simple front-end or set of queries.

6. Handing in a final report that includes all of the above.

7. Presenting a synopsis of the project at the end of the semester.

Please see the more comprehensive Stages of the Project shown below.

Project Ideas

You are encouraged to come up with projects of your own. The project ideas listed below can serve as a guide or as inspiration for a slightly different project.

1. **Scheduling Application** - A consulting company has a lunch room, 12 conference rooms, 6 overhead projectors, 3 portable PCs, etc. They need to be able to schedule each of these resources for a given day and time period and avoid conflicting use of resources. Also, management would like reporting on resource utilization per week, month, and year. They are also considering renting out resources to other companies if resource utilization is low. Queries might include:

    - When is the next day resource X is free between 1:00 and 5:00.

    - How many hours per week on average is conference room X occupied?

2. **Supply Cabinet** - A company centrally maintains supplies for each of its branch offices. They need a database to keep track of what they have in stock, requests from branch offices for supplies and purchasing of supplies from vendors. Should keep track of the vendor with the best price for a particular supply. They would also like to minimize shipping costs by shipping several supplies at one time to a given branch office. Queries might include:
    - When should supply X be replenished
    - How many shipments, on average, go out to the branch offices per week?
3. **Baseball Statistics** - A professional baseball team would like to maintain a database that records player statistics on all team members and complete records of every game (on an inning-by-inning basis). Each player would have a set of offense and defense statistics. Queries include:
    - What is the batting average for player X
    - Who is the best relief pitcher to use against a left-handed batter

Stages of the Project

1. First, you should submit for approval a project idea. This proposal should include:
    - A separate cover page indicating the title of your project, your name and e-mail, the course number and course section.
    - A narrative description of the business used for the project or application being created. This should also include a description of the problem or opportunity being addressed.
    - Identification of the information needs - what information would help solve the problem or allow one to take advantage of the opportunity?
    - Initial list of entities (tables) that have been identified. This should come naturally from the above discussions.

    Informal discussions with the instructor can help to refine the project and proposal.

2. The next step is to take the requirements from the "users" and draw an Entity Relationship diagram.
   The E-R Diagram should then be submitted to the instructor for approval before proceeding.
   Students may use a specific E-R modeling tool, drawing tools available in MS Word or MS PowerPoint, or in very neat pen or pencil.

   Note: The "Relationship View" in MS Access *is not an E-R modeling tool.*

3. Given the E-R diagram and sets of attributes for each entity, the next step is to convert the E-R model into a relational model and go through the process of normalization. This step will require you to list all of the functional dependencies. The normalized relations should be approved by the instructor before proceeding.

4. You should then implement the database tables from the normalized set of relations created in the previous step. Data should be supplied for each table. The amount of data should be such that the need for a database is clear. In other words, provide enough examples to demonstrate why a database was required in the first place.

The application can then be created on top of the tables. For Queries, provide the associated SQL statements.

5. The final step is to prepare a formal report and brief presentation. This report should include:

   - A separate cover page.
   - An introduction section similar to the proposal.
   - Two E-R diagrams: One showing just entities and relationships on a single page, and a second E-R with attributes and identifiers included.
   - The collection of normalized relations and functional dependencies, and a brief discussion as to the normal form(s) achieved, the methods used to achieve these normal forms, and reasons why any de-normalization was done.
   - A listing of the metadata for each table in the database.
   - An example printout of each of the forms and queries accompanied by a description of the function of each.

- A narrative conclusion section that describes:
  a) your experience with the project (which steps were the most difficult? Which were the easiest? What did you learn that you did not imagine you would have? If you had to do it all over again, what would you have done differently?)
  b) If the proposed benefits can be realized by the new system
  c) any final comments and conclusions

The presentations will take place the last week of classes You should be prepared to give a brief description of the project (essentially what is in the proposal), show their E-R diagram and describe how you created it, talk briefly about the application development process and offer some conclusions.