Database Design Term Project

Project Description

The goal of this project is to design, develop, and test a database management system. This project is divided into four parts: conceptual design and requirements analysis (Phase I), database design of the requirements (Phase II), normalization (Phase III) and final report/demo (Phases IV/V).

XYZ Company depends on a front-end interface based database management system for its success. All employees are divided into four groups: Manager, Financer, Marketing group, and HR. Each employee can belong to only one group.

Each employee in the four groups has the following attributes: Employee_ID, Name (Last Name, First Name), Gender, Rank, Title (e.g. CEO, Team leader), Supervisor_ID, Address (street name, apartment number and zipcode), and Phone number (one individual can have more than one phone number). Each employee of the company must have only one supervisor.

Each employee just owns one computer which has an attribute of Computer_ID and each computer has one owner in this system. In addition, the system maintains the information of each employee's salary which includes transaction number, pay_date, and amount.

Manager:

Managers can be CEO, Vice Presidents, or others. Each individual has an attribute of percentage of stock.

Financer:

In this group, each financer has a special attribute named task, including budgetary, financial statement analysis, analysis of changes in financial position, etc.

Marketing Group:

Employees in marketing group can be divided into two types: one group is advertisers and the other is sales. One employee can be an advertiser and a sales person at one time. Each employee in this group has an attribute of sales volume.

Each advertiser may be assigned to several marketing sites which

have attributes: Name, Size, and Location. Name and location form a key. For example, one advertiser can be charge of several sites.
Each sales man should sell one or more products with attributes Name and Product_ID at one or more marketing sites.

HR:
HR has an attribute Certification. HRs and CEO (called administrators) have the authority to manage the information of employees in the company.

Project Questions

- Can you think of more rules (like the rule that one cannot view/modify her supervisors' information) that make the system more reasonable? If yes, add your rules to our project and implement them.
- Can you think of more roles that make the system more practical? If yes, add your roles to our project and implement them.
- Justify using a Relational DBMS and a front-end interface for this project.

Project Exercises

I. Draw an EER diagram to accurately represent this set of requirements. This will be your Conceptual Design. Clearly specify any assumptions that you are making. You can use any tools (software) to draw the EER. You don't need describe the value constraints of the attributions in the EER diagram. (20%) (Due 9/24/13)

II. Use a relational DBMS to implement the database. Perform the following steps. (20%) (Due 10/15/13)

a) Convert your Conceptual model to a Logical model that can be implemented in a relational DBMS like Oracle. During this process, you replace M-N relationships and multi-valued attributes with constructs that can be implemented in the relational DBMS. Draw EER for the logical model after your modifications. Feel free to change your conceptual model (first delivery) if needed.

b) Convert the EER to a database design. Document your design in Database Schema format showing all the details.

c) Decide which front end interface technology will be used for your project and provide reasons why you chose it for this project (advantages).

III. Use appropriate naming conventions for all of your tables and attributes. (40%) (Due 12/3/13)

a) Normalize all of your tables to third normal form. Make any necessary changes to the EER. Explain why these changes were needed.

b) Draw a dependency diagram for each table.

c) Write SQL statements to create database, tables, and all other structures. Primary keys and foreign keys must be defined appropriately. The quantity constraints of the relation between the entities, which should be described in EER diagram, are not required.

d) Use the Create View statement to create the following views:

1) Employee: This view returns Employee_ID, First Name, Last Name, Rank, Supervisor_ID and Title of the employee.

2) Senior employee: This view returns the Employee_ID, First Name, Last Name, and Graduation School of the employees whose Rank is above 6 including 6.

3) Marketing information: This view returns the Employee_ID, Name of employee who are in the marketing group, and the marketing sites the employee is in charge of.

4) Administrators' information: This view returns the Employee_ID and Name of employee who can update others' information.

e) Answer the following Queries. Feel free to use any of the views that you created in part (d) in association with your designed DBMS interface.

1) For certain group, list the number of employees in the group.

2) For certain title, list the number of employees who hold it.

3) List the Last Name, Employee_ID, and Rank of the employees whose Rank is exactly 7.

4) List the Last Name, Employee_ID, Rank, and Title of the female employees whose Rank is above 6 including 6.

5) For a certain street---Campbell Rd., find Employee_ID of all employees living in the street.

6) For a certain employee, find the salary he was paid in a certain month.

7) List Employee_ID, Phone numbers, and Name of employees who have two or more phone numbers.

8) For an employee one of whose phone numbers begins with 972 and has Rank 8, list the employee's Employee_ID, Last Name, and Phone Number.

9) Find all the marketing sites which have at least 5 employees.

10) List the information of products in a certain marketing site and list the Name and Employee_ID of the employees belonging to the products.

11) List one given employee's Employee_ID and Marketing Sites which he is in charge of in the Marketing & Sales Department.

12) For a certain employee, find the employees who can update his information in the system.

IV. Document the final term project report. (15%) (Due 12/9/13)

- **a)** Problem description.
- **b)** Project questions (Answer questions listed in this project).
- **c)** EER diagram with all assumptions.
- **d)** Relation schema after normalization. All relations must be in 3NF. The relation schema should include primary keys as well as foreign keys (if any) for all relations.
- **e)** All requested SQL statements.
- **f)** Front end interface details and presentation of data.
- **g)** Dependency Diagram.

V. Schedule a demo to show the working of your project through the designed interface. (5%) (Due 12/9/13 – 12/11/13)