CS/SE 4347.004 – Database Systems
Fall 2023
Term Project
Date: October 09, 2023
Due: November 29, 2023 @ 11:59PM

In this project, you will use the following information to develop a database system.

There is an ABC Company, which purchases parts from vendors to produce some products. The company has several departments, marketing sites, and parts supply vendors.

1. For each department, department id and department name will be recorded.

2. People in the company can be divided into three types -- employees, customers, and potential employees. Each person can belong to more than one type. Each person in the company has the following attributes: Personal_ID, Name (Last Name, First Name), Age (below 65), Gender, Address (address line 1, address line 2, city, state, zip code), and Phone number (one individual may have more than one phone number). For customers, their preferred salespeople were recorded in the system. Rank and Title (e.g., CEO, Principle, Partner, etc.) will be recorded for employees.

3. Each company employee must have only one direct supervisor, while each supervisor can have several supervisees. One employee can work for one or more departments at different times. But at one time, one employee can only work for one department. The system needs to record each shift's start and end times among different departments for one employee.

4. Each job position's information is recorded to hire new people. It contains the Job ID, job description, and posted date in the system.

5. The departments post the job positions. Both existing and potential employees can apply for each job post by any department. The company will select some candidates from the applications and make interviews.

6. For each job position, several interviews will be made to select a suitable person.

7. For each interview, candidates (interviewees), interviewers, job positions, and interview times are recorded. After each interview round, the interviewers give a grade ranging from 0 to 100. A grade over 60 represents that the interviewee passes the interview. One person is selected when her/his average grade is over 70, and she/he passes at least five rounds of interviews.

8. For each product in the company, the system needs to record Product ID, Product Type, Size, List Price, Weight, and Style.

9. There are many marketing sites for the company. Site ID, Site Name, and Location are recorded for each site.

10. Several people work for each site, and one can work on different sites. It can track the details of each sale history --- salespeople, customers, product, sale time, and sites.

11. Part purchase is also a vital activity in the company. The system needs to record each vendor's Vendor ID, Name, Address, Account Number, Credit Rating, and Purchasing Web Service URL.

12. One vendor may supply many types of parts. The price of the same part type may vary from different vendors, but the price of one part type of one vendor will keep the same. It can track which part types are used in each product and the number of each type of part used for the product.

13. In addition, the system maintains the information of each employee's monthly salary, which includes transaction number, pay_date, and amount (Note: transaction number could be the same among different employees. However, for each employee, the transaction number is unique).

Project Deliverables:

I. Draw an EER to represent this set of requirements accurately. This will be your Conceptual Design. Clearly specify any assumption that you are making. You can use any tools (software) to draw the EER. You don't need to describe the value constraints of the attributions in the EER diagram. **(30%)**

II. Use a relational DBMS to implement the database. Convert the EER to a database design. Document your design in Database Schema format like the one we discussed in the class. **(25%)**

III. Use appropriate naming conventions for all of your tables and attributes. **(45%)**
   a) Normalize all of your tables to the third normal form. Make any necessary changes to the EER. Explain why these changes needed to be made.

   b) Draw a dependency diagram for each table

   c) Write SQL statements to create databases, 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 the EER diagram, are not required.

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

1. View1: This view returns the average salary each employee has earned from the company monthly after she/he becomes an employee in the company.

2. View2: This view returns the number of interview rounds each interviewee pass for each job position.

3. View3: This view returns the number of items of each product type sold.

4. View4: This view returns the part purchase cost for each product.

e) Answer the following Queries. You may use any of the views you created in part (d).

1. Return the ID and Name of interviewers who participate in interviews where the interviewee's name is "Hellen Cole" arranged for job "11111".

2. Return the ID of all jobs which are posted by department "Marketing" in January 2011.

3. Return the ID and Name of the employees having no supervisees.

4. Return the Id and Location of the marketing sites with no sale records during March 2011.

5. Return the job's id and description, which does not hire a suitable person one month after it is posted.

6. Return the ID and Name of the salespeople who have sold all product types whose price is above $200.

7. Return the department's id and name, which has no job post during 1/1/2011 and 2/1/2011.

8. Return the ID, Name, and Department ID of the existing employees who apply for job "12345".

9. Return the best seller's type in the company (sold the most items).

10. Return the product type whose net profit is highest in the company (money earned minus the part cost).

11. Return the name and id of the employees who have worked in all departments after being hired by the company.

12. Return the name and email address of the interviewee who is selected.

13. Retrieve the names, phone numbers, and email addresses of the interviewees selected for all the jobs they apply for.

14. Return the employee's name and id whose average monthly salary is the highest in the company.

15. Return the ID and Name of the vendor who supplies part whose name is "Cup" and weight is smaller than 4 pounds, and the price is lowest among all vendors.

IV. **Document the final term project report.**

a) Problem description

b) Individual contribution breakdown

c) Project questions (Answer questions listed in this project).

d) EER diagram with all assumptions.

e) Relation schema after normalization. All relations must be in 3NF. The relation schema should include primary and foreign keys (if any) for all relations.

f) All requested SQL statements.

g) Dependency diagram.

Please reach out to TA/me in case of questions or concerns.