There is an XYZ Company, which purchases some parts from vendors to produce some products. It has several departments, marketing sites, and parts supply vendors in the company.

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, zipcode), and Phone number (one individual may have more than one phone number). For customers, his/her preferred salesmen were recorded in the system. For employees, Rank and Title (e.g. CEO, Principle, Partner, etc.) will be recorded for them.

3) Each employee of the company must have only one direct supervisor, while each supervisor can have several supervisees. One employee can work for one or more departments at different time. But at one time, one employee can only work for one department. The system needs to record start time and end time for each shift among different department 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 job positions are posted by the departments. Both existing employees and potential employees can apply 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 position and interview time are recorded. After each round interview, the interviewers give a grade to it ranging from 0 to 100. The grade over 60 represents that the interviewee pass the interview. One person is selected when her/his average grade is over 70 and she/he passes at least 5 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. For each site, Site ID, Site Name, and Site Location are recorded.

10) There are several people working for each site, and meanwhile, one person can work on different sites. It is able to track the details of each sale history --- salesmen, 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 same. It is able to track which part types 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 same among different employees. However, for each employee, the transaction number is unique).

Project Questions

· Can you think 5 more rules (other than the one explicitly described above) that are likely to be used in a company.

· Is the ability to model super-class/subclass relationships likely to be important in such environment? Why or why not?

· Justify using a Relational DBMS like Oracle for this project.

Project Exercises

I. Draw an EER to accurately represent this set of requirement. 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 describe the value constraints of the attributions in the EER diagram. (25%)

II. Use a relational DBMS to implement the database. Perform the following steps. (20%)

    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 like the one we discussed in the class.

III. Use appropriate naming conventions for all of your tables and attributes. (40%)

    a) Normalize all of your tables to 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 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) 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. Feel free to use any of the views that 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 any superviesees.

4) Return the Id and Location of the marketing sites which have no any 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 salesmen who have sold all product type 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 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 has worked in all departments after hired by the company.

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

13) Retrieve the name, phone number, email address of the interviewees selected for all the jobs they apply.

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

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

IV. Document the final term project report. (15%)

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) Dependency diagram.