**CS 6360 Database Design Term Project**

**Project Description**

The EasyDelivery Company provides food/products delivery service for customers. Customer can place takeout/delivery orders through the EasyDelivery App. Now, EasyDelivery would like one relational database to store the information about their management system to be able to carry out their work in an organized way. They have some major modules such as Employee and Customer, Restaurant and Order.

Employee’s information is stored in the database, such as employee ID, Name (First, Middle, Last), Address, Gender, Date of Birth (should be constrained as 16 years or older) and Phone number (one person may have more than one phone number). The Employee’s ID should have the format “EXXX” (“E” followed by exactly 3 digits), where X is a number from 0-9. (Hint: you can use regexp\_like() function).

Details of a customer such as ID, Name (First, Middle, Last), Delivery Address and Phone number, Joining Date are recorded. You are free to define the format of customer ID. A Customer may have multiple delivery addresses. Customer is further classified as Ordinary Customer and Silver Member. Every silver member owns one unique member card issued by Staff. Card issuing date is stored. Employee and Silver Member can be Premium Member who have extra privileges. Every premium member owns a Meal Pass, which can allow the member has free delivery fee for their orders 10 times monthly. The Meal pass has effective dates and expiration dates.

Employee is further classified as Area Manager, Deliverer and Staff. The start date of the designation of each employee is stored. Every deliverer is supervised by an area manager, an area manager may supervise many deliverers. Every deliverer needs to register at least one Vehicle for delivery. Vehicle’s information such as Plate Number, Maker, Model and Color are stored. An area manager works in an Area (Richardson, Frisco, Plano, Dallas, etc.), and is responsible for making contracts with the Shops in his working area. The contract start time of each shop is stored.

There are two types of Shops: Restaurants and Supermarkets. Restaurants’ Name, Type (Fast Food, BBQ, Buffet, Drink, etc.), Address, Area, Business Phone Number are recorded. A Restaurant can have more than one type. Supermarkets’ Name, Address, Business Phone Number are recorded. Supermarkets sell various Products, one product may be sold in different supermarkets at different price. Supermarkets maintain Inventories of their products showing how many products in stock. Every product has ID which is only guaranteed unique in each store, but different product may have the same ID in different stores. Product names and description are also stored.

Each Shop opens and closes at specific times following a schedule table. Shops may have different open and close time in different days in a week. Shops sometimes may provide Promotion. Each Promotion includes a unique Promotion code, and its description. When Customers place orders, customer may choose to use promotion codes. Customers can make Comments to the Shops. The comments include rating score (can be 1,2,3,4,5), and comment contents.

Details of Orders such as Order ID, Order Contents, Subtotals are recorded. Each order belongs to corresponding Restaurants. Customer can select different payment types to pay for the order. Details of Payment such as unique Payment Confirm Number, Payment Type, Payment Time is recorded. Deliverer will deliver the order with a specific registered vehicle.

**Project Questions**

1. Is the ability to model superclass/subclass relationships likely to be important in the shopping mall management system like above? Why or why not?

2. Can you think of 5 more business rules (other than those explicitly described above) that are likely to be used in a shopping mall environment? Add your rules to the above requirement to be implemented.

3. Justify using a Relational DBMS like Oracle for this project (Successfully design a relational database system, show all the design in final report).

**Project Exercises**

**Phase I**. Draw an EER 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 but must use the symbols consistent with our textbook.

**Phase II.** Logical Database Design. It has been decided to use a relational DBMS to implement the database. Perform the following steps.

1. Convert your Conceptual model (Phase I, feel free to change your conceptual model if needed and draw EER after your modifications) to an implementation data 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.
2. Document your design in Database Schema, explain how you obtained you schema.

The output of Phase II is the schema of database derived from your EER design. **Please indicate the primary keys and foreign keys of each relation**.

**Phase III.** Now, you are ready for implementation. Use appropriate naming conventions for all your tables and attributes.

1. Normalize all your tables to third normal form, show the normalized schema.
2. On the normalized schema, draw a dependency diagram for each table from Phase III a.
3. Write SQL statements to create database, tables and all other structures. Primary key and foreign keys must be defined as appropriate. Also specify data type and constraints for each attribute and in addition to specify the referential integrity. Include all the SQL statements for Phase III in your submission.
4. Use the Create View statement to create the following views:
   1. Annual Top 3 Customers: This view returns the First Name, Last Name, Total Order Subtotals of the customers who paid top 3 total subtotals of all orders in past 1 year.
   2. Popular Restaurant Type: This view returns the Type of restaurants that have the most number of orders in past 1 year.
   3. Potential Silver Member: This view returns the information of the customers (not a silver member yet) who have placed orders more than 10 times in the past 1 month.
   4. Best Area Manager: This view returns the information of the area manager who successfully made the most number of contracts with shops in her/his working area in past 1 year.
   5. Top Restaurants: This view returns the top restaurant **in each restaurant type** that have the most orders in past 1 month.
5. Show the SQL statement of the following Queries. Feel free to use any of the views that you created in part (d.):
   1. Find the names of employee who supervises the most number of deliverers.
   2. Find the average number of orders placed by Potential Silver Member.
   3. Find all the customers who placed orders of the restaurants that belong to Popular Restaurant Type. Please also report the name of restaurants.
   4. List all the customers that have become a silver member within a month of joining the system.
   5. Find the names of deliverers who delivered the most orders in past 1 month.
   6. Find the restaurants that provide most promotion in past 1 month.
   7. Find the customer who have place orders of all Fast Food restaurants.
   8. For each restaurant, list all the customers who placed the order there, and the price of each order.
   9. Find the area that have the most number of restaurants located.
   10. Find the schedule of the restaurant that have the most orders in past 1 month.
   11. Find the names of employee who are also a Premium Member.
   12. Find the supermarket that have most different products in stock.
   13. For each product, list all the supermarket selling it, and the price of the product at the supermarket.

**Phase IV.** Document the final term project report. The report includes:

1. Problem description (Copy it from the description).
2. Project questions (Answer 3 questions listed in the project).
3. EER diagram with all assumptions (Solution for Phase II).
4. Relational Schema after normalization. All relations must be in 3NF. The relational schema should include Primary key as well as foreign keys (if any) for all relations. (Solution for Phase III a).
5. Dependency diagram (Solution for Phase III-b).
6. All requested SQL statements (Solution for Phase III-c, d and e).