CPSC 4620 Project:
Part 1 – Database Design

Due: Friday 10/20 @ 11:59 pm
110 pts

The database system you are creating will be used by Pizzas-R-Us to track the day-to-day operations of their pizzeria. For this assignment you will use the following information to create an Enhanced ER model of this pizzeria and you will submit the Enhanced ER diagram for this assignment. You must use the Crow's Foot notation from our lectures and Chapters 4-5 to complete this design.

Pizzas-R-Us:
The most obvious thing that needs to be tracked as part of this database system is the information about each pizza. A pizza has a crust type (thin, original, pan, gluten free) and a size (personal, medium, large, x-large). A pizza has an associated price and cost to the company, both of which are determined by the size of the pizza and the toppings on the pizza. A pizza can be in two states: completed by the kitchen or still being processed by the kitchen. Each pizza can have multiple toppings. Each topping has a name, a price to the customer, a price to the business, an amount used for each pizza size, a minimum inventory level, and a current inventory level (which is updated whenever a pizza is ordered). The same topping can be on many pizzas (i.e., several pizzas can have pepperoni on them). A customer can request extra of any topping, which is always a double amount. Cheese counts as a topping (there is no free cheese in this organization).

Pizzas belong to orders. An order can be for dine in, pickup, or delivery. An order can have multiple pizzas on it. An order can be marked as complete once all its pizzas are complete. Each order has a total cost to the business, which is calculated by adding up the costs of each pizza. Each order should have a timestamp for when the food was ordered (so the kitchen can prioritize orders). Each order also has a total price to the customer, which is calculated by adding the prices of each pizza. If an order is for a dine in customer, then we need to know the table number. If an order is for pickup, then it needs to have a pickup customer associated with it. That customer must have a name and a phone number. If an order is for delivery, then it must have a delivery customer associated with it and include a name, phone number and address. A customer can have many orders, since the information is saved for the next time they order pizza. A customer could have some pickup orders, and some delivery orders. While other pizza places might allow a customer to save multiple addresses, Pizzas-R-Us only allows a customer to have one address. Note, we don't need any customer information for a dine in customer. When designing your database, the type of order should be used as your discriminator.

Furthermore, Pizzas-R-Us offers discounts. Discounts can be applied to individual pizzas or an entire order; although you can't apply to same discount to both a pizza and an order. Discounts have a name and either a dollar amount off or a percentage off. A pizza or order can have multiple discounts applied to it, and a discount can be applied to many pizzas or orders. Order discounts are applied to the entire order after all the pizza discounts have been applied.

The pizzeria also needs to track the base prices for their pizzas. Each pizza needs a base price (to the customer) and a base cost (to the business) based on the crust type and pizza size. To compute the price of a pizza, you would look at the size and crust of the pizza and find the corresponding base price. To that you would add the price for each topping on the pizza (accounting for double topping quantities). Finally, you would apply any discounts to the pizza. To find the total for the order, you would add up the price for

each pizza, then apply any discounts that apply to the order. While the base prices and topping prices will change over time, those changes should not be reflected in past orders. So, a pizza's price should be calculated once and saved. To find the cost of a pizza to the business, the same process is used, with base cost instead of base price. Discounts do not lower the cost of the order to a business.

The pizzeria is under new management and will be very closely monitoring profitability. To make this easier to do, you will need to implement three views that support these reports. Management would like reports (aka views) on:

- Popular Toppings: rank order of all the toppings (accounting for extra toppings) from most popular to least popular
- Profit by Pizza: a summary of the profit by pizza size and crust type over a selected time period ordered by profit from most profitable to least profitable
- Profit by Order Type: a summary of the profit for each of the three types of orders by month with a grand total over all the orders at the pizzeria

The tables you create must contain all the information you need to create the views above. More details on the views will come in Part 2. The views will be used in Part 3 to generate the reports defined above.

Notes:
Nowhere in this description does it mention a unique ID or primary key. This is because your customer is unfamiliar with databases and does not know that primary keys are important. Be sure to add an appropriate primary to the entities when necessary. Also, make sure you have all the bridge entities you need to properly represent the M:M relationships (this is a conceptual design of the database after all).

Given your client's lack of knowledge about databases, there may be other things you need to interpret for them as well. For instance, from your client's viewpoint the distinction between a customer and an order can be fuzzy. For each attribute carefully consider whether the information is about the order or about the customer or the pizza. Your client may also provide extra information that may not be directly shown in the ER diagram (like some of the details about how pricing is determined) but will give you an idea of how the information will be used. Feel free to ask follow-up questions if something is unclear.

Help:
Use MS Teams to ask questions. **Do not wait until the last day to ask questions or get started!**

Groups:
You may work as an individual or work with **one partner** for this project. **Please note that once you have selected a partner, you are only allowed to work with that partner for the rest of the semester on this project.** If you work with someone and decide you do not want to work with them on a later stage, you each have to complete the project on your own. So, pick your partner carefully. If you work with a partner, **actually work with them**. Divide and conquer will not work well for this assignment. Discuss and work on the diagram together. You could also try crafting an ERD individually, and then meet to compare and combine the designs, but either way **you will still need to work together on the assignment.**

You may only work with one partner. Any larger groups would be violating the academic integrity rules for this class. Any groups that work together would also violate the academic integrity rules. For this assignment, there is not much that can be discussed without violating academic integrity, so it is best not to discuss it with anyone other than your partner. If working with a partner, make sure select your partner when submitting to Gradescope and both partner's names must be on the document.

Submission:
You will submit an electronic copy of your ERD as a PDF file via Gradescope by the due date (the assignment is linked to Canvas). When submitting to Gradescope you must indicate who your partner is (if you have one). Only 1 partner needs to make the submission. **No late assignments will be accepted. Make sure you associate all the rubric items with your document in Gradescope.**

You must use a diagramming tool to create your diagrams (such as draw.io, LucidChart, or Visio). Do not submit the source file, export your document to PDF format and submit the ".pdf" file. Hand drawn diagrams, even if scanned in, will not be accepted. If you find another diagramming tool, make sure you follow the notation used in this course. There are alternative notation styles out there that other tools may use for ER diagrams, but **for this course we will only use the Crow's foot notation and style shown in Chapters 4 & 5 of the course textbook**.