

## **Spring 2018 Comp 533**

### **Assignment 3**

#### **Entity Relationship Diagramming**

The goal of this assignment is to create an entity-relationship model for the system described below and to create a use case for ordering an ice cream cone.

You must prepare your ER model using some electronic drawing program (there are many programs, like Microsoft Visio, that have ER capabilities built in; but it is also possible to draw a nice ER model using something like PowerPoint or Google drawings). However, you must upload a pdf of your final model to Canvas. You must also submit a matching hard copy of the drawing by noon of the first school day following the assignment due date. The hard copy must match what you submitted online. Drawings can be dropped off at Duncan Hall 2062 (slide under the door if no one is there).

This is a paired assignment. You may fully collaborate with your partner, and both names should be included on the submission. EACH person should submit an electronic copy of the document, but only one hard copy should be submitted. Both people will receive the same grade on the assignment.

You must use the Chen notation given in class, or something very close to it (note any exceptions due to drawing program limitations). Make sure to show the cardinalities, keys for all entities, and everything else we talked about in class.

Take care when building this model, as we will be using it for future assignments.

## What to turn in

You must upload a pdf of your final model to Canvas.

## Grading

The model is worth 80 points. Points will be assigned based on the following guidelines:

- 0 points: Model not attempted.
- 10 points: All entities are present.
- 25 points: All entities and attributes are present and correctly assigned.
- 60 points: All entities and attributes are present, correctly assigned, and most of the relationships are present and correct.
- 80 points: The model is correct and includes all stated elements and relationships.
- Deductions: For missing attributes, incorrect use of notation or errors in, missing relationships, vague relationship names, etc.

The Use Case is worth 15 points. Points will be assigned based on the following guidelines:

- 0 points: Use Case not submitted.
- 5 points: Basic components are present.
- 10 points: The Use Case is mostly complete, but some key steps are missing or only one exception is described.
- 15 points: The Use Case is complete, includes all components and covers at least two exception circumstances.
- Final 5 points: questions submitted for business requirements session.
- Deductions: For missing attributes, incorrect use of notation or errors in, missing relationships, vague relationship names, etc.

The Final 5 points are based on your submission of at least two questions based on the assignment. These are to be submitted on Canvas by 9 AM on the class day when we will have this exercise.

## Academic Honesty

The following level of collaboration is allowed on this assignment: You may discuss the assignment fully with your partner, but only at a high level with your other classmates. What is not allowed is direct examination of anyone else's model (on a computer, email, whiteboard, etc.) or allowing anyone else to see your model.

You may use the search engine of your choice to lookup additional details on the ERD notation, but may not use it to find solutions to the assignment.

## 1 ER Model – Ice Cream Food Truck Business

A local entrepreneur has recently purchased a food truck that serves soft-serve ice cream and related items. Seeing an opportunity, the business owner has decided to focus on selling ice cream to the Rice University community.

The food truck sells products. Products are cups and cones (small, medium, large), sundaes (brownie, hot fudge, etc.) and different flavors of ice cream, to name a few. Products are identified by a one - three letter alphanumeric code and have unique names.

Products have prices. Prices can change over time, but only one price can be in effect at any given time. Prices have an effective start date. The current price is the tuple with the most recent start date. A product's price is computed from the cost of the product's ingredients, along with some level of markup.

Each product is composed of a number of ingredients, some of which require choices. For example, the customer gets to pick the topping on their ice cream (sprinkles!) or the flavor of their slushie (e.g. Bubblegum!) Each ingredient has a name and a category. Together the name and category are unique. For example, there may be Strawberry ice cream and Strawberry fruit. When an ingredient is included in a product as part of a recipe, it has a quantity and a unit of measure (e.g. "cup", "ounce", or "item" for

indivisible ingredients.) We might have ingredients on hand that are not yet part of a product.

Products are sold at events. Each product sale is recorded. In addition, a separate log of all the ingredients, quantities, and unit per product sold is maintained. Each event is identified by a unique name and start date/timestamp. Events also have an end date and time.

Suppliers sell raw ingredients that get turned into products. Suppliers have a unique name and a location, which includes a street address, city, state (or province), postal code, and country. They also have any number of phone numbers. There are two different types of suppliers - Local and National. Local suppliers have a per mileage cost based on distance from their location. National suppliers have a fixed transportation fee. Suppliers provide quotes for ingredients. Each supplier will provide at most one quote each day. Each quote has an issue date, an expiration date, tax amount, fee amount, and a total, which will be computed from the cost of the ingredients on the quote, the taxes and the fees. Included on each quote are any number of ingredients. Each line item on the quote corresponds to one of our ingredients and specifies a quantity, a unit, and a unit cost.

Our ice cream truck gets multiple quotes for ingredients from multiple suppliers in order to compare costs. She chooses to purchase some of the quotes. Each purchase results in a delivery. We will assume that all the items on the quote are delivered at the same time and all ordered items are delivered. Deliveries have an order date, and an arrival date.

Once a delivery is received, we stock the delivered item(s) into our inventory. Inventory is tracked per ingredient and each inventory item has a quantity, a quantity remaining, a unit, and an expiration date (which may be NULL). We may run out of ingredients and we may have inventory items from multiple deliveries.

The ice cream truck has specialized equipment for making the ice cream. Each piece of equipment has an unique name and an install date. Associated with each piece of equipment is a list of required maintenance.

Each required maintenance item has a name, a “before or after” trigger indicator, a trigger quantity, a trigger unit and how long the maintenance takes, in minutes. This is basically a set of routines for maintaining the equipment. For example, the truck must be cleaned **after** every (quantity = 1) **event** (the unit) and the cleaning takes 120 minutes. The generator must be refueled after 40 hours of use. The maintenance name, along with the equipment name, must be unique. Performed maintenance is recorded in a log, where each log entry includes the equipment name, the maintenance name, the date of the maintenance, how many minutes it actually took, and any notes about the maintenance.

## 2 Use Case

Write-up a Use Case for the goal: Ordering an ice cream cone.

Your actors should include the customer, the order taker and the person making the ice cream.

You must include at least two exceptions. For example, what if the truck is out of the ice cream flavor requested?

## 3 Our Food Truck

Our ice cream truck business should be named: