# OPIM 5272 — Business Process Modeling and Data Management
## Fall 2021, University of Connecticut

## Homework 3

For each problem you are required to design one or more data models and draw them in Visio. Additionally, you may include a Word document with your Visio drawing to explain any assumptions you had to make, any attributes that may be unclear, entity definitions that are necessary, and any other information that is necessary to understand your solution. There is a submission link for each question. Your submissions should be a zip file which contains the Visio file for that problem, along with the (optional) Word file. If you have any questions about how to submit a solution, please email your instructor.

According to the conventions discussed in class, you must indicate primary keys, foreign keys, indicate required / optional attributes, simple / composite attributes, multi-valued attributes, regular / derived attributes (if an attribute can be derived from other attributes it must be drawn as such), attribute types, etc. Each entity / relationship / attribute should have a name indicating what it represents and must be easily understood by the name that you assign. Every attribute drawn should have an attribute type which indicates the most restrictive attribute class given the business rules. For example, the NetID at UConn should be specified as a Char(8). A database would be fine if it was specified with Varchar(40), but the most restrictive attribute class given the conventions we discussed in class is Char(8). You will be graded based on all (but not limited to) the following criteria: whether or not the data model that you draw allows the users of the system to save all of the information necessary, if the relationships that you draw are correct, if you follow the conventions discussed in class, if the entities drawn are of the correct type, if your diagram is easy to understand through the names you use, if the business rules outlined in the problem are enforced by your data model, etc. There can be no many-to-many relationships.

You may use any references, websites, or class documents that you would like, but can only discuss the questions with the students that are in your team. This includes emails, text, tweets, message boards, facebook, or any other medium where you can correspond regarding the problems on the homework. Any attempt to cheat will result in the highest degree of sanctions, as outline in the University of Connecticut Student Code and/or other documents regarding academic dishonesty released by the University of Connecticut. Every student must turn in one solution to each problem. The submission links allow you to submit as many solutions as you like, but only the final submission will be graded. Good luck!

As with all course material, the problems appearing in this homework assignment are taken from the instructors real-world experiences, from other courses taught at the University of Connecticut, and from the sources listed in the course syllabus.

For this problem, you are to create a data model from scratch. You must use the entities listed below, and are free to create only associative entities. You do not have to include attribute types in this problem.

You are asked to create a database for organization U to hold data needed for their travel approval system for employees attending conferences. Each employee attends multiple conferences each of which has to be recorded, and at most 3 employees can attend any given conference. Only those conferences for which at least one employee attends is recorded in the database. Conferences are held at locations, which are to be stored in the database. Note that you may have to add additional attributes beyond those listed for each entity. You are to create the ERD using the following entities:

**ENTITIES**:

**EMPLOYEE**: Records information about the employees. You must record each employee's `employee_id`, `first_name`, and `last_name`.

**CONFERENCE**: Records information about the conferences that the employees attend. Each conference has a `conference_id`, which is used at the unique identified. For each conference, you must record the city it is held in, the date it starts, the data it ends, the duration of the conference, and the employees that attended the conference.

**HOTEL**: The hotels that the employees stay at during the conference. Only hotels that employees stay at need to be saved and not every employee stays at a hotel.

Additionally, you must save the total reimbursement that each employee requests for the trip.

For this problem, you are to create a data model from scratch. You must use the entities listed below, and are free to create only associative entities. You do not have to include attribute types in this problem.

You are asked to create a database for a milk tea store chain. The database is to hold information about this company's products and store locations.

Each type of drink is sold in some collection of retail stores, and you need to store information about all drinks, you only have to store information about the drink types that are sold in at least one of the retail stores. Some retail stores are designated as 'Flagship Stores'. Each retail store is associated with one flagship store, which might be the retail store itself. For each type of drink, you have to record the date it was first sold, the number of years since the first time the drink was sold, the category of this drink, and the size of the drink is sold in (e.g. 8 ounces, 12 ounces, 16 ounces etc). There can be many different drinks in a category. For each store, you must record the number of times each drink type was purchased in each type of canister. Note that you may have to add additional attributes beyond those listed for each entity.

**ENTITIES**:

**DRINK**: An entity where information about the drink types that are sold is stored. You must record each drink's `drink_id` and `drink_name`.

**CATEGORY**: An entity where information about the category of the drink is stored. You must record each category's `category_id` and `category_name`.

**RETAIL STORE**: An entity where information about the retail stores that are managed by the company is stored. You must record each store's `store_id`, `store_name`, and `store_city`.

For this problem, you are to create a data model from scratch. The only strong entities that you can use are listed below (you may include weak and/or associative entities, if you need them). You must include attribute types for each attribute which must be defined so that standard values for the attributes can be recorded.

In this problem you are to create an ERD to store data about an online food delivery company. Each customer of this company is specified by a Customer ID, which is a 7-digit alphanumeric character sequence. The company needs to store each customer's first name, last name, email address, phone number, and detailed address information for each customer (including the customers street address, city, state, and zip code). The food delivery company also stores, upon adding someone to their database, the date that the customer first opened an account and will record the most recent date that the customer placed an order. Note that one customer can place many orders and some of the customers haven't placed an order yet.

This company delivers food to customers from different restaurants and it needs to store each restaurant's ID, which is a 6-digit alphanumeric character sequence. The company also needs to store the restaurant's name and detailed address (including the street address, city, state, and zip code). The company has many delivery employees, each of which has an employee ID number (which is a 6-digit integer). The database also needs to store a first name, a middle name, a last name, a phone number, and an email address for each delivery person. Note that not every delivery person has a middle name.

If a customer places an order in this company, the database should store the restaurant's information, the delivery person's information, the date/time the customer placed the order, the date/time when the order has been delivered, and the price of the order. Each order can only contain food from one restaurant.

**ENTITIES**:

**CUSTOMER**: An entity where we store information about every customer of this company.

**RESTAURANT**: An entity where we store information about the restaurants which this company works with.

**DELIVERY EMPLOYEE**: An entity where we store information about this company's delivery employee.

**ORDER**: An entity where we store information about each order.

For this problem, you are to create a data model from scratch. The only strong entities that you can use are listed below (you may include weak and/or associative entities, if you need them). You must include attribute types for each attribute which must be defined so that standard values for the attributes can be recorded. You should use supertype/subtype entities whenever possible.

The MSBAPM program would like to create a database to hold information which will be used for the purpose of helping UConn and potential employers match candidates with positions.

Information for each student needs to be recorded, including the net ID (which is an eigth-character alphanumeric string), first name, last name, email address, and expected graduation date. All of this is required to be saved. In addition, there are various software skills that need to be stored, which are identified by a unique skill ID which is an integer value and each having a name (for example, data modeling would be the name and the ID may be 12). Each student has at least one skill, and each skill is mastered by any number of students.

The MSBAPM program has staff members, each of which has an employee ID number (which is a five-digit integer), a net ID (which is an eigth-character alphanumeric string), a first name, a last name, a phone number, and an email address, all of which has to be stored. Staff members are always either a professor or an administrator, but can be both. Administrators are contacted by potential employers to seek candidates. The database will only have to save information about employers who have at some point contacted an administrator. Each potential employer contacts only one administrator (and this has to be saved), but an administrator can have any number of employers contact her.

**ENTITIES**:

**INDIVIDUAL**: An entity where we store information about every individual associated with UConn (not employers).

**STAFF MEMBER**: An entity where we store information about the staff members of the MS-BAPM program.

**PROFESSOR**: An entity where we store information about each professor.

**ADMINISTRATOR**: An entity where we store information about each administrator of the program.

**EMPLOYER**: An entity where we store information about each employer that has contacted the MSBAPM program.

**STUDENT**: An entity where we store information about each student enrolled in the MSBAPM program.

**SKILL**: An entity where we store information about each skill that the MSBAPM program records information about.