

# Comp115 Spring 2017, HW1 - Due Feb 24th, 2017

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## Exercise 1 - (20%)

Manos wants to host a website where he and his friends can have blogs. He found an amazing deal on a domain name and is ready to get started right away. He needs a database for his website that can do the following:

- Each blogger should be able to create an account with their email address (which can be updated later) and login to their account with a username and password.
- It should also store each bloggers real name, birthdate, and account creation date.
- If a blogger forgets their password, they may request a hint, which needs to be in the database as well.
- Each blog has a short title, description and the date of creation.
- Each blogger can have multiple blogs.
- Each blog can either be active or not, if a blog is not active its data is still stored as it can be reactivated at any time
- There is no limit to the number of entries a blog can have.
- Each entry has a title and description.
- Bloggers can comment on their own entries or other blogger's entries.
- Anonymous posts and comments are not allowed. The dates of comments and posts are always recorded.

## Problem

- i. Draw an ER diagram that captures the preceding information.

## Exercise 2 - (50%)

The EZ grow gardening company is looking to digitize their records. They've offered to help you grow some plants in exchange for designing their database. After talking with them about their business you gather the following information:

- Customers are identified by their customer ID, their names, addresses, and the size of their garden.
- Each seed distributor is identified by distributor ID, name, address and has a phone number.
- Each seed distributor sells several types of seed and has a price for each. Many distributors can sell the same type of seed, each at their own price.
- For each seed, the name and species must be recorded. Each seed is sold by a given seed distributor, and the name identifies a seed uniquely from among the seeds that the distributor carries. If a seed distributor is deleted, you do not need to keep track of its products any longer.
- Each garden store has a name, address, and phone number and is identified by storeID.
- Each garden store has at least one employee and each employee is identified by his/her employee ID. Their name, specialty, and years of experience must be recorded.
- Every customer has a favorite garden store and a preferred employee (called a helper) at their favorite garden store, and every employee must be assigned to at least one contract.
- Employees at garden store work with customers to figure out what seeds will work best with their gardens. An employee can suggest multiple different seeds for a customers garden. One customer can only get suggestions from one employee.
- Garden stores have long term contracts with seed distributors. A garden store can contract with several seed distributors, and seed distributors can contract with multiple different garden stores. For each contract you have to store a start date, and end date, and the text of the contract.
- Garden stores appoint a supervisor for each contract. There must always be a supervisor for each contract, but the contract supervisor can change over the lifetime of the contract.

### Problems

- i. Draw an ER diagram that captures the preceding information. Identify any constraints not captured by the ER diagram.
- ii. Imagine that new laws dictate that all seeds must now be sold at a Manufacturer's Suggested Retail Price. This means that all seeds must be sold at the same price. How does this change the database design?
- iii. How would your design change if the design requirements change as follows: customers visit multiple stores and can have helpers at each of them.

### Exercise 3 - (30%)

Consider the relations Students, Faculty, Courses, Rooms, Enrolled, Teaches, and Meets\_In defined in Section 1.5.2 of the book.

Relations:

Students(student\_id: string, name: string, login: string, age: integer, gpa: real)

Faculty(faculty\_id: string, fname: string, sal: real)

Courses(course\_id: string, cname: string, credits: integer)

Rooms(room\_no: integer, address: string, capacity: integer)

Enrolled(student\_id: string, course\_id: string, grade: string)

Teaches(faculty\_id: string, course\_id: string)

Meets\_In(course\_id: string, room\_no: integer, time: string)

### Problems

- i. List all the foreign key constraints among these relations.
- ii. Give an example of a (plausible) constraint involving one or more of these relations that is not a primary key or foreign key constraint.