# B461 Assignment 1: Conceptual Database Design

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This assignment is a modification from a document written by George Fletcher, Anshul Kaushik, and Catharine Wyss.

**Due date: September 17**

## Question 1

Empress Katerina (who is not herself a pirate) has asked you to design a database to keep track of all the pirate activities in her empire. Pirates go on missions. The booty collected on these missions is given to the Empress. In return, the pirates receive a regular salary, medical benefits for themselves and their dependents, and retirement benefits. The following describes the activities of the pirates.

1. Each pirate has a Pirate Security Number (PSN) which uniquely identifies him or her, a name, skill level (ruthless, expert, novice), salary, and dependents. A dependent has a name and age. There are two classes of pirates: regular and captain.

2. A captain is in charge of a ship. A captain has to be ruthless and may have one parrot. A parrot has a name and color. The name of the parrot and the Pirate Security Number (PSN) of the captain uniquely identifies the parrot. Only captains can have a parrot.

3. A ship has a unique name, mission, capacity, home port, cost, a captain, and at least 40 but no more than 250 pirates (excluding the captain). Each ship is on a particular mission or on 'shore leave' (vacation). If a ship is on vacation, all of the pirates on it and the captain are on vacation as well (but they still get paid).

4. Each mission has a unique mission number, start date, end date, booty, and number of casualties and injured. Every mission has at least one ship associated with it. There can be any number of ships on a mission but a ship can be on at most one mission. As the Empress desires, ships can join or leave missions in progress. So, it is possible that a mission starts with three ships, and then after a week another ship joins the mission, a few weeks later two ships leave the mission and so on. A mission can be successful or unsuccessful. Unsuccessful missions have a booty of zero gold coins.

Given this information, your tasks are the following.

1. Design and draw an ER diagram for the Pirate database. Be sure to indicate the various attributes of each entity and relationship set; also specify a primary key for each entity set and any participation constraints for each relationship set. Make sure you include class hierarchies in your diagram where appropriate. If you make assumptions that are not part of the requirements specification above, state these clearly and briefly justify them.

2. Translate your ER diagram into tables using SQL `CREATE TABLE` statements. When you make a decision concerning tabular representation (such as whether a relationship set should be represented as a separate table or not, and how a class hierarchy should be translated), briefly justify your decision. Make sure you specify primary and foreign key constraints.

# Question 2

Consider the following problem specification:
Papa Pizza Donimoes Hut (PPDH) has experienced tremendous growth in demand for its pizza delivery service and the manager now needs help in modeling the store's delivery activities. The operation of the pizza store is as follows:

1. Customers phone in orders for pizza delivery and are uniquely identified by their phone numbers. Customers also have name, street addresses, and status (frequent or infrequent).

2. Employees of the store are either cooks or drivers. There may be other employees, such as the operator who answers the phone calls. Cooks are identified by cook IDs and drivers by driver IDs. Cooks have a name, address, phone number, are paid a regular salary, and have a proficiency level that is determined by the number of months that they have worked at PPDH. Drivers, on the other hand, have a name, address, phone number, rating, hourly wage, and experience in number of hours worked at PPDH. Other employees have unique ID, name, address and phone and may have a regular salary if they are employed full time or may be paid hourly based on their hourly wage.

3. An order is associated with a particular customer and is handled by a particular driver and a particular cook. An order has a unique ID, cost, time/date of placement, time/date of delivery, and pizza types/quantities.

You are given an ER diagram (see Figure 1) that attempts to model the activities of PPDH. Criticize the ER diagram with respect to the problem statement. Based on your critique, give an ER diagram that better models the problem.

**Note**: in Figure **??**, the notation O:N denotes a participation constraint stating that an employee can handle 0 to N orders, the notations 1:1 denote participation constraints

stating that an order must be handled by exactly 1 employee and must be placed by a unique customer, respectively, and the notation 1:N denotes a participation constraint stating that a customer must place an order, but can multiple orders.

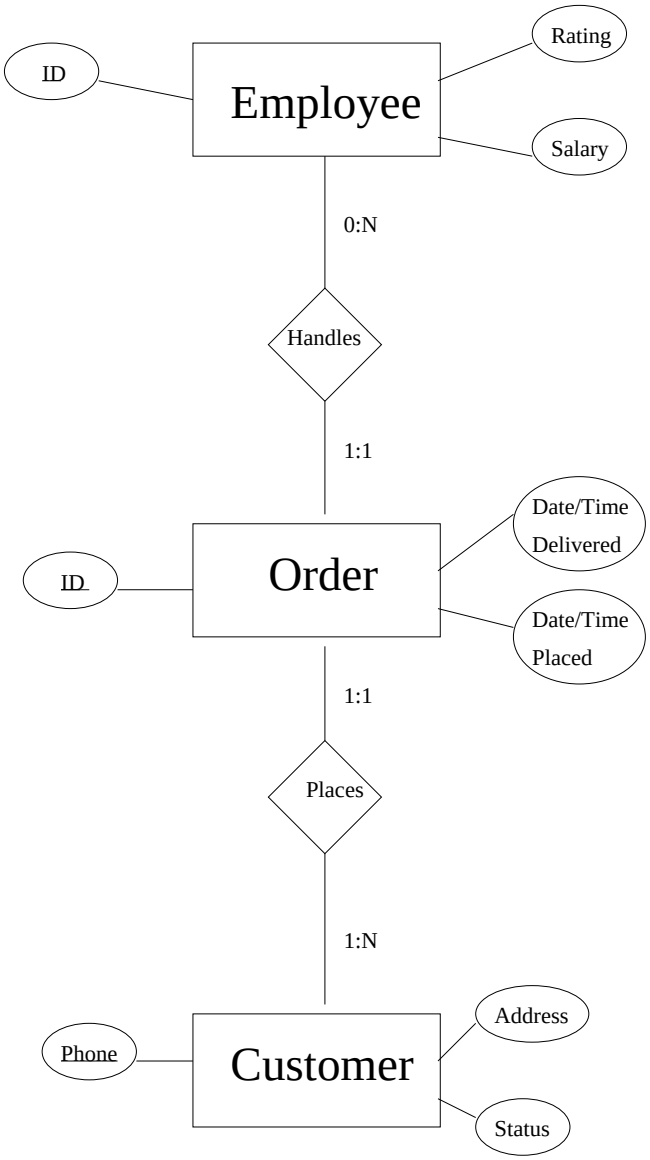


Figure 1: ER diagram for PPDH