CS 457 / 657

Homework 1 Questions

1. **(5pts) Exercise 13.5.1**: Suppose a record has the following fields in this order: A character string of length 15, an integer of 2 bytes, a SQL date, and a SQL time (no decimal point). How many bytes does the record take if:
    a. Fields can start at any byte.
    b. Fields must start at a byte that is a multiple of 4.
    c. Fields must start at a byte that is a multiple of 8.

2. **(10pts) Exercise 2.2.1**: In Fig. 2.6 are instances of two relations that might constitute part of a banking database.

acctNo	*type*	*balance*
12345	savings	12000
23456	checking	1000
34567	savings	25

The relation Accounts

firstName	*lastName*	*idNo*	*account*
Robbie	Banks	901-222	12345
Lena	Hand	805-333	12345
Lena	Hand	805-333	23456

The relation Customers

Figure 2.6: Two relations of a banking database

Indicate the following:
    a. The attributes of each relation.
    b. The tuples of each relation.
    c. The components of one tuple from each relation.
    d. The relation schema for each relation.
    e. The database schema.
    f. A suitable domain for each attribute.
    g. Another equivalent way to present each relation.
    h. Possible key(s) for each relation.

3. **(10pts) Exercise 2.3.1**: In this exercise we introduce one of our running examples of a relational database schema. The database schema consists of four relations, whose schemas are

```
Product(maker, model, type)
PC(model, speed, ram, hd, price)
Laptop(model, speed, ram, hd, screen, price)
Printer(model, color, type, price)
```

   The Product relation gives the manufacturer, model number and type (PC, laptop, or printer) of various products. We assume for convenience that model numbers are unique over all manufacturers and product types; that assumption is not realistic, and a real database would include a code for the manufacturer as part of the model number. The PC relation gives for each model number that is a PC the speed (of the processor, in gigahertz), the amount of RAM (in megabytes), the size of the hard disk (in gigabytes), and the price. The Laptop relation is similar, except that the screen size (in inches) is also included. The Printer relation records for each printer model whether the printer produces color output (true, if so), the process type (laser or ink-jet, typically), and the price. Write the following declarations:

   a. A suitable table for relation **`Product`**.
   b. A suitable table for relation **`PC`**.
   c. A suitable table for relation **`Laptop`**.
   d. A suitable table for relation **`Printer`**.
   e. An alteration to your **`Printer`** table from (d) to delete the attribute color.
   f. An alteration to your **`Laptop`** table from (c) to add the attribute od (optical-disk type, e.g., cd or dvd). Let the default value for this attribute be **`'none'`** if the laptop does not have an optical disk.

4. **(15pts)** Consider the following 3 relations: Student, Course, StudentSchedule.
   a. **(10pts)** Create schemas for each relation.
   b. **(5pts)** Explain your choices.