

Homework 4

Relational Databases

Due Monday, November 27, 2006

Student ID: _____

Lab Section: _____

Name: _____

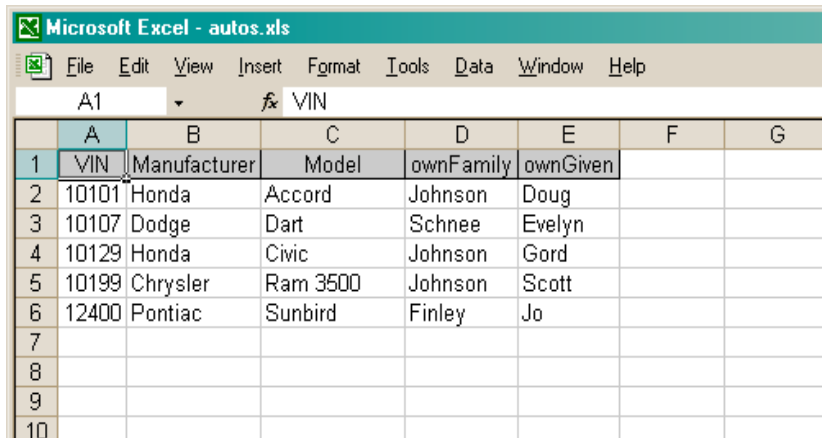
All questions are worth 2 points, unless otherwise specified!

Spreadsheet programs are a very popular tool. They allow us to define formulas and perform arithmetic with the cell contents to automatically calculate tables of values. However, they are also useful for storing lists. In fact, Microsoft was surprised to find out several years ago that many Excel users said that list management was one of the more important features of Excel.

1. Consider this list of cars and their owners. This list is shown as a single 2-dimensional table, stored in the spreadsheet program Excel. Circle the term that best describes this database:

flat file database

relational database



The screenshot shows a Microsoft Excel window titled "Microsoft Excel - autos.xls". The menu bar includes File, Edit, View, Insert, Format, Tools, Data, Window, and Help. The formula bar shows "A1" and "VIN". The spreadsheet contains a table with 7 columns (A-G) and 10 rows (1-10). The first row (row 1) contains the headers: VIN, Manufacturer, Model, ownFamily, ownGiven, and empty cells for F and G. The subsequent rows (2-6) contain data for five cars. Rows 7-10 are empty.

	A	B	C	D	E	F	G
1	VIN	Manufacturer	Model	ownFamily	ownGiven		
2	10101	Honda	Accord	Johnson	Doug		
3	10107	Dodge	Dart	Schnee	Evelyn		
4	10129	Honda	Civic	Johnson	Gord		
5	10199	Chrysler	Ram 3500	Johnson	Scott		
6	12400	Pontiac	Sunbird	Finley	Jo		
7							
8							
9							
10							

2. If we wanted to store more information about each car, we could add more columns, one per additional attribute. For example, we might add year, color, manufacturer's URL, and manufacturer's mailing address. Also, we might add more cars to the list; for example to include all cars registered in Seattle. Describe one redundancy-related problem that would arise as a result of these changes. Identify the redundancy, and then describe why it is a problem.

Consider the database shown below, implemented in Access. It contains data similar to that of the previous problem.

The screenshot shows the Microsoft Access interface for a database named 'autos'. The 'Automobiles' table is open, showing 6 records. The 'Manufacturers' table is also open, showing 5 records.

Automobiles : Table

VIN	Manufacturer	Model	ownFamily	ownGiven	color
10101	Honda	Accord	Johnson	Doug	maroon
10107	Dodge	Dart	Schnee	Evelyn	white
10129	Honda	Civic	Johnson	Gord	white
10199	Chrysler	Ram 3500	Johnson	Scott	red
12400	Pontiac	Sunbird	Finley	Jo	gray

Record: 6 of 6

Manufacturers : Table

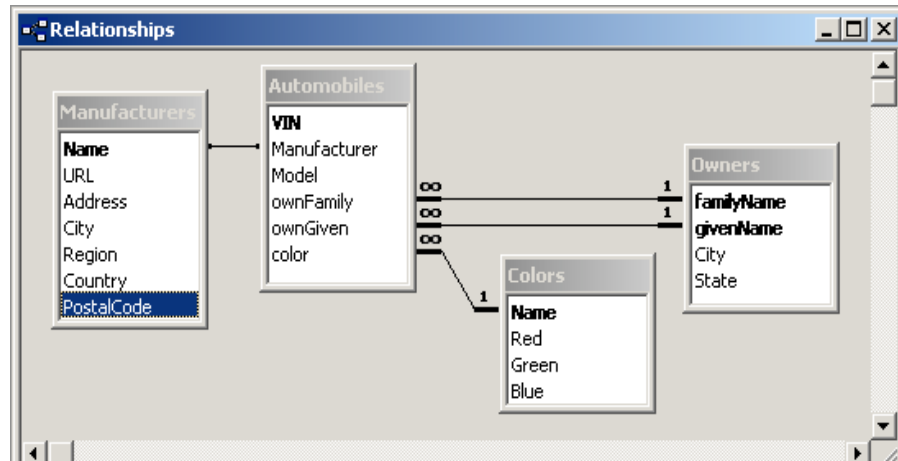
Name	URL	Address	City	Region	Country	PostalCode
Chrysler	www.chrysler.com	P.O. Box 21-8004	Auburn Hills	MI	USA	48321
Dodge	www.dodge.com	P.O. Box 21-8004	Auburn Hills	MI	USA	48321
Honda	automobiles.honda.com	1919 Torrance Boulevard	Torrance	CA	USA	90501
Pontiac	www.pontiac.com	P.O. Box 33172	Detroit	MI	USA	48232

Record: 5 of 5

3. How many tables are defined in this database? _____
4. How many attributes are defined for each entity in the Automobiles table? _____
5. The attributes Automobiles.Manufacturer and Manufacturers.Name refer to values of the same type, that is, the set of manufacturer names. In the Automobiles table, attribute Manufacturer is most likely which of the following? Circle the correct answer.

Primary Key
Foreign Key
6. Given the information shown here, could we merge entities from the Automobiles and Manufacturers tables with an SQL JOIN operation based on the Vehicle Identification Number (VIN)? Briefly describe why or why not.

The relationship between the tables in the autos database from the previous page is shown here.



7. In the Manufacturers table, the attribute Name is the primary key. It is linked to the attribute Manufacturer in the Automobiles table. The most likely labeling for this relationship is (circle the one correct answer):

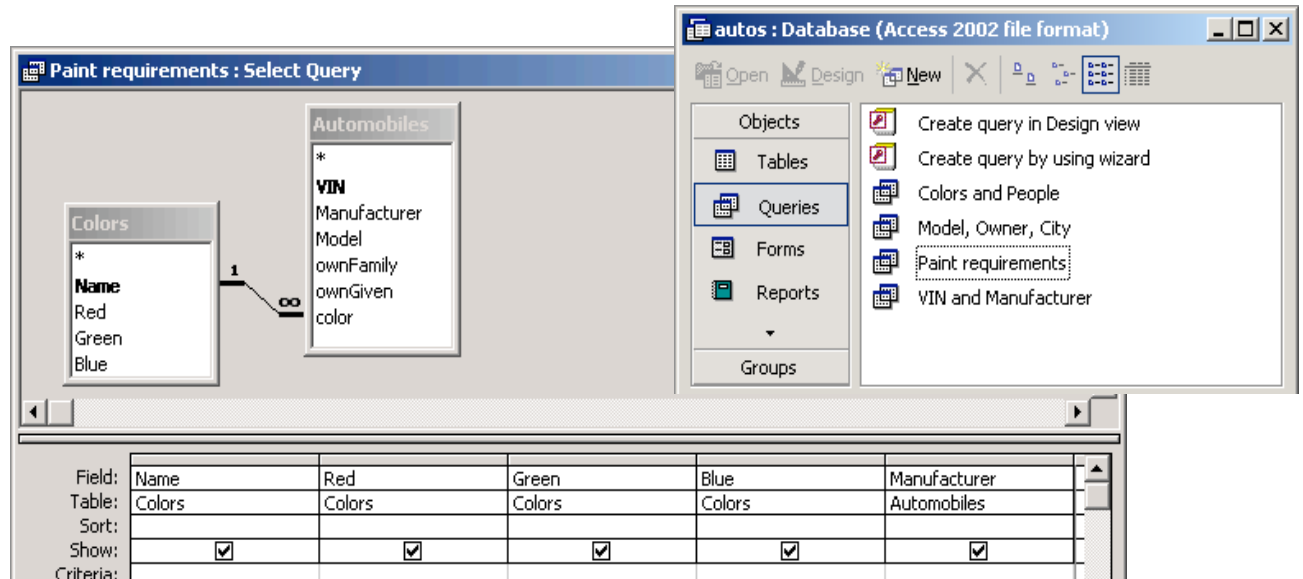
one-to-one
one-to-many
many-to-many

8. What is the primary key for the Colors table?

9. Given the situation shown here, in particular the primary keys and the relationship between the Colors table and the Automobiles table, which of the following situations can be recorded in this database? Circle yes or no as appropriate for each situation. [4 points]

- a. Yes No One car can be recorded as having a different color for the body than for the roof.
 - b. Yes No Several cars can be the same color.
 - c. Yes No Two entities in the Colors table can have different values for Name but have the same values for Red, Green, and Blue.
 - d. Yes No A single person (givenName familyName) can be identified as the owner of more than one car.

The queries associated with this database are shown here. One of the queries is named “Paint requirements” and some information related to that particular query is also shown.



10. How many queries are defined for this database? _____
11. How many tables from the database are used in the “Paint requirements” query?

12. Which of the following SQL statements implements the “Paint requirements” query shown above? *Circle the **one** letter associated with the correct SQL statement.*
 - a. SELECT Colors.Name, Colors.Red, Colors.Green, Colors.Blue
FROM Colors;
 - b. SELECT Colors.Name, Colors.Red, Colors.Green, Colors.Blue,
Automobiles.Manufacturer
FROM Colors INNER JOIN Automobiles ON Colors.Name = Automobiles.color;
 - c. SELECT Colors.Name, Colors.Red, Colors.Green, Colors.Blue,
Manufacturers.Name
FROM Colors, Manufacturers;
13. The “virtual table” that is initially built by this query actually contains 10 columns, but the datasheet view that is displayed only contains 5 columns. In relational algebra, this reduction in the number of columns is best described by which of the following terms? Circle the one correct answer.

projection

union

product