**COP4710 – Theory and Structure of Databases**

**Summer 2016**

**Homework for Week 7**

Due Sunday Night, June 26, 2016

***Eric Adams***

**1.** How is Data Reduncancy related to Modification Anomalies?

Redundancy means that the same fact is located in the table multiple times, so if we fail to update on instance of that fact anytime we do an update it will lead to a modification anomaly.

**2.** Why are Determinants central to the idea of Normalization?

A partial key determinant and a non-key determinant will result in modification anomalies, but are solved with Normalization.

3. Here’s a table that’s not in First Normal Form:

The table:

**Automobile**

|  |  |
| --- | --- |
| **class** | modelName |
| compact | Focus, Fusion, Fit |
| midsize | Edge, Equinox, Flex |
| crossover | Escape, CRV, Pilot |
| suv | Expedition, Excursion, Escalade |

The schema:

**Automobile** ( class, modelName )

**(a)** Normalize the tables by writing two schemas for new tables.

(Remember the Multi-Valued Attribute pattern?)

Don’t show the whole tables, just jot down the schemas; there will be two of them:

Automobile (class, make)

Model (modelName, make)

4. Write a sentence-fragment answer for each question (except e) about this table:

The table:

**IngredientOrder**

|  |  |  |  |
| --- | --- | --- | --- |
| **ingredient** | **vendor** | quantity | vendorPhone |
| 01 | Sysco | 2 | 555-1212 |
| 01 | FoodServ | 4 | 777-8888 |
| 02 | Sysco | 3 | 555-1212 |
| 02 | FoodServ | 6 | 777-8888 |
| 03 | Schwann | 3 | 111-0000 |
| 04 | Sysco | 2 | 555-1212 |
| 04 | FoodServ | 4 | 777-8888 |

The schema:

**IngredientOrder** ( ingredient, vendor, quantity, vendorPhone )

**(a)** There’s a repeated pairing of values that causes a fact to be restated more than once. (This is a data redundancy). What fact is being repeated?

The vendor and their phone #

**(b)** What's the key of the table?

Ingredient and vendor

**(c)** What's the determinant of vendorPhone?

Vendor

**(d)** What normal form is in question for this table?

Second

**(e)** Write the two schamas for the normalized tables. (Don’t show the whole tables, just jot down the schemas; there will be two of them).

IngredientOrder (Ingredient, vendor, quantity)

VendorInfo (vendor, vendorPhone)

5. You're exploring a database and you find some sample data in two tables:

Notice that a particular value of Textbook always seems to point to the same value of Author.

**Course**

|  |  |  |  |
| --- | --- | --- | --- |
| **courseNum** | credits | textbookTitle | author |
| COP4710 | 4 | Database Systems | Jones |
| COP4711 | 4 | Database Systems | Jones |
| COP4720 | 4 | Data Algorithms | Jones |
| MAT1001 | 3 | College Algebra | Watson |
| MAT1002 | 4 | College Algebra | Watson |
| ENG4267 | 4 | Materials | Smith |
| ENG4280 | 3 | Materials | Smith |

**Textbook**

|  |  |  |  |
| --- | --- | --- | --- |
| **title**  Notice that the Textbook table uses a composite primary key.  Notice, too, that, a particular value of title does *not* always point to the same author. | **author** | qty | price |
| Database Systems | Jones | 10 | 125.99 |
| Data Algorithms | Jones | 6 | 75.50 |
| College Algebra | Watson | 21 | 60.00 |
| Materials | Smith | 9 | 74.25 |
| Materials | Edwards | 3 | 99.99 |

The **Textbook** table uses a *natural key*, the combination of title and author.

The same combination of columns is in the **Course** table where it’s a *foreign key*.

**(a)** Since (title, author) is the primary key of Textbook and a foreign key in Course, is the repeated paring of **title** and **author** in the Course table a redundancy?

Yes, it repeats the same fact multiple times.

**(b)** If the Textbook table had a surrogate key instead of a natural one, do you think it would improve the Course table, or would it make no difference?

It would improve the course table because it would remove the data redundancy.