Greg Abbene
Professor Labouseur
CMPT-308-Database Systems
March 25th 2014

Normalization One

Part One: Kramerica CEO Miles Meservy has put together a spreadsheet of all the data he has so far, which he personally collected.

1) As he shows you the spreadsheet, having just signed your consulting agreement, he asks what you think of it. How do you reply?

I look forward to working with you Mr. Meservy, and thank you for choosing to use our services at Kramerica Enterprises. The given spreadsheet has valuable data; however, there are a few optimizations I believe we can further advance the efficiency and effectiveness of the data for the given business function.

2) Put his data in 1NF and display it.

PackID	TagNumber	InstallDate	SoftwareCostUSD
AC01	32808	9/13/1995	$754.95
DB32	32808	12/3/1995	$380.00
DB32	57691	6/15/1995	$380.00
DB33	57772	5/27/1995	$412.77
WP08	32802	1/12/1996	$185.00
WP08	37691	6/15/1995	$227.50
WP08	57222	5/27/1995	$170.24
WP09	59836	10/30/1995	$35.00
WP09	77740	5/27/1995	$35.00

3) What is the primary key?

The primary key is {PackID,TagNumber}

Part Two: Add two columns of new data: one for software package name (e.g., Zork, Portal, Etc.) and one for computer model (e.g., HP, Apple, etc.). Be sure that your new data is consistent with the original data. Don not add any additional columns…?

4) Display the new table.

PackID	TagNumber	PackName	Model	InstallDate	SoftwareCostUSD
AC01	32808	Suzuki	Asus	9/13/1995	$754.95
DB32	32808	Gardner	Asus	12/3/1995	$380.00
DB32	37691	Gardner	Dell	6/15/1995	$380.00
DB33	57772	Sabathia	HP	5/27/1995	$412.77
WP08	32808	Jeter	Asus	1/12/1996	$185.00
WP08	37691	Jeter	Dell	6/15/1995	$227.50
WP08	57222	Jeter	Lenovo	5/27/1995	$170.24
WP09	59836	Teixeira	IBM	10/30/1995	$35.00
WP09	77740	Teixeira	Acer	5/27/1995	$35.00

5) Identify and document all the functional dependencies.

PackageID → PackageName

TagNumber → Model

(PackageID, TagNumber) → InstallDate

(PackageID, TagNumber) → SoftwareCostUSD

6) Explain why the new table is **not** in third normal form.

This table is not in third normal form because there is still room for non-normalized data anomalies in this table. For instance in terms of an insert anomaly, we cannot insert new possible software packages or computer models unless the install date and total cost is known and included. Also, in terms of a delete anomaly, if say we delete the (WP09, 77740, Teixeira, Acer, 5/27/1995, $35) line then we would lose Acer completely as a model. This "one-table-to-rule-them-all" model is indicative of 1NF normalization that lacks referential integrity and it is prone to inconsistency and inaccuracy as extraneous information is stored within a single table.

Part Three: Decompose your 1NF table into a set of tables that are in at lease third normal form. (BCNF would be better). Remember that it's wrong to add artificial keys to associative entities.

7 – 8) Identify primary keys (determinants) for all tables. Identify functional dependencies for all tables.

Software Table:

PackID	PackName
AC01	Suzuki
DB32	Gardner
DB33	Sabathia
WP08	Jeter
WP09	Teixeira

Primary Key = PackID

Functional Dependencies: PackID →PackName

Computer Model Table:

TagNumber	Model
32808	Asus
37691	Dell
57222	Lenovo
57772	HP
59836	IBM
77740	Acer

Primary Key = TagNumber

Functional Dependencies: TagNumber →Model

Installation Table:

PackID	TagNumber	InstallDate	SoftwareCostUSD
AC01	32808	9/13/1995	754.95
DB32	32808	12/3/1995	380
DB32	37691	6/15/1995	380
DB33	57772	5/27/1995	412.77
WP08	32808	1/12/1996	185
WP08	37691	6/15/1995	227.5
WP08	57222	5/27/1995	170.24
WP09	59836	10/30/1995	35
WP09	77740	5/27/1995	35

Primary Key would be a composite key of (PackID,TagNumber). These two components to the primary key are foreign keys with referential integrity to the *Software* and *Computer Model* tables, respectively.

Functional Dependencies:

(PackID,TagNumber) → InstallDate

(PackID,TagNumber) → SoftwareCostUSD

9) Explain why the new tables are in third normal form.

These new tables are in 3NF form because the overall model fits the normalization criteria to eliminate all "anomalies." For instance, one could delete the installation of the TagNumber (59836) yet this will not delete this IBM model computer from the database. In terms of the insert anomaly, new available TagNumbers (with their given Model) can be added to the *Computer Model* table—despite not having any installations yet (no installation date or cost). In terms of the update anomaly, the addition of referential integrity will assure that every installation has a correct corresponding Software package and computer model.

10) My Beautiful ER Diagram: