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11/3/14

Database Management

Lab 7 – Normalization

1) I would reply that the spreadsheet looks organized and effective in storing the necessary information, but that we could make some changes that could improve the layout and organization of the company's information so as to potentially improve the business' effectiveness as a whole. The information in the table should definitely be reorganized and stored more efficiently in a relational database, but you must also consider that you are speaking to the CEO of the company that just hired you as a consultant and you shouldn't make directly negative or non-constructive comments about the work that your current employer/company has done.

2)

PackID	**TagNum**	**InstallDate**	**SoftwareCost**
AC01	32808	09-13-1995	754.95
DB32	32808	12-03-1995	380.00
DB32	37691	06-15-1995	380.00
DB33	57772	05-27-1995	412.77
WP08	32808	01-12-1996	185.00
WP08	37691	06-15-1995	227.50
WP08	57222	05-27-1995	170.24
WP09	59836	10-30-1995	35.00
WP09	77740	05-27-1995	35.00

3) The primary key of this table is the composite key {**PackID, TagNum**}.

4)

PackID	TagNum	InstallDate	SoftwareCost	SoftwarePackName	CompModel
AC01	32808	09-13-1995	754.95	Lotus Notes	HP
DB32	32808	12-03-1995	380.00	Microsoft Word	HP
DB32	37691	06-15-1995	380.00	Microsoft Word	Dell
DB33	57772	05-27-1995	412.77	Microsoft Excel	Lenovo
WP08	32808	01-12-1996	185.00	Notepad	HP
WP08	37691	06-15-1995	227.50	Notepad	Dell
WP08	57222	05-27-1995	170.24	Notepad	Apple
WP09	59836	10-30-1995	35.00	Notepad++	Samsung
WP09	77740	05-27-1995	35.00	Notepad++	Asus

5) Functional Dependencies:

- **CompModel** is functionally dependent upon **TagNum**.
- **SoftwarePackName** is functionally dependent upon **PackID**.
- **SoftwareCost** is functionally dependent upon {**PackID**, **TagNum**}.
- **InstallDate** is functionally dependent upon {**PackID**, **TagNum**}.

6) This table is not in third normal form (3NF). While the primary key is the composite key {**PackID**, **TagNum**}, there are columns of the table that are functionally dependent upon portions of the composite primary key, namely **TagNum** → **CompModel** and **PackID** → **SoftwarePackName**, which violates second normal form and, in turn, violates 3NF.

SoftwareInstallations

PackID	TagNum	InstallDate	SoftwareCost
AC01	32808	09-13-1995	754.95
DB32	32808	12-03-1995	380.00
DB32	37691	06-15-1995	380.00
DB33	57772	05-27-1995	412.77
WP08	32808	01-12-1996	185.00
WP08	37691	06-15-1995	227.50
WP08	57222	05-27-1995	170.24
WP09	59836	10-30-1995	35.00
WP09	77740	05-27-1995	35.00

SoftwarePackages

PackID	SoftwarePackName
AC01	Lotus Notes
DB32	Microsoft Word
DB33	Microsoft Excel
WP08	Notepad
WP09	Notepad++

Computers

TagNum	CompModel
32808	HP
37691	Dell
57222	Apple
57772	Lenovo
59836	Samsung
77740	Asus

7) Primary Keys (by Table):

SoftwareInstallations: {**PackID, TagNum**}

SoftwarePackages: **PackID**

Computers: **TagNum**

8) Functional Dependencies (by Table):

SoftwareInstallations: {**PackID, TagNum**} → **InstallDate**

{**PackID, TagNum**} → **SoftwareCost**

SoftwarePackages: **PackID** → **SoftwarePackName**

Computers: **TagNum** → **CompModel**

9) The new tables in this relational database are in third normal form (3NF) because the only functional dependencies that exist are dependencies in which non-key columns depend upon the primary key of their subsequent tables. Also, these tables are in 3NF because they have no functional dependencies upon portions of composite primary keys (satisfying second normal form) and all elements in the table are atomic in nature (satisfying first normal form).

10) *See above E/R Diagram*