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Database Systems

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28 October 2013

Normalization Homework #1

Part One:

1. The spreadsheet is a good start. There is currently no normalization present in the table, so querying it would be more difficult than if it followed normalization standards. Moreover, the table possesses all 3 of the normalization anomalies (insert, update, delete) and would be difficult to maintain as it grew in size.

2.

PackageID	TagNumber	InstallDate	SoftwareCostUSD
AC01	32808	9/13/2005	754.95
DB32	32808	12/3/2005	380.00
DB32	37691	6/15/2005	380.00
DB33	57772	5/27/2005	412.77
WP08	32808	1/12/2005	185.00
WP08	37691	6/15/2005	227.50
WP08	57222	5/27/2005	170.24
WP09	59836	10/30/2005	35.00
WP09	77740	5/27/2005	35.00

3. The primary key is a composite of {PackageID, TagNumber}

Part Two:

1.

PackageID	PackageName	TagNumber	ComputerModel	InstallDate	SoftwareCostUSD
AC01	Photoshop	32808	Asus	9/13/2005	754.95
DB32	MS Access	32808	Asus	12/3/2005	380.00
DB32	MS Access	37691	Dell	6/15/2005	380.00
DB33	Oracle Server	57772	Lenovo	5/27/2005	412.77
WP08	PowerPoint	32808	Asus	1/12/2005	185.00
WP08	PowerPoint	37691	Dell	6/15/2005	227.50
WP08	PowerPoint	57222	HP	5/27/2005	170.24
WP09	MS Paint	59836	Apple	10/30/2005	35.00
WP09	MS Paint	77740	Acer	5/27/2005	35.00

2. Functional dependencies:
   PackageID → PackageName
   TagNumber→ ComputerModel
   {PackageID, TagNumber} → InstallDate, SoftwareCostUSD

3. The table fails to be 3NF because two of the columns, PackageName and ComputerModel, are dependent upon PackageID and TagNumber, respectively. If we change the name of a software package for an associated PackageID, we may run into update anomalies because we would need to update the PackageName column multiple times.

Part Three:

1. Primary Key for **Computers**: TagNumber
   Primary Key for **Software**: PackageID
   Primary Key for **Installations**: {PackageID, TagNumber}

2. Functional dependencies:
   Software
   PackageID → PackageName
   Computers
   TagNumber → ComputerModel
   Installations
   {PackageID, TagNumber} → InstallDate, SoftwareCostUSD

3. These new tables follow 3NF for several reasons. Now that we have moved partial-key attributes outside of the table (Software, Computers table), we no longer experience insert anomalies. Before the decomposition we faced the issue of inserting new rows into the **Installations** table because we would have at least 2 null fields (InstallDate, SoftwareCostUSD) if we added a new software package or a new computer tag. Moreover, we have now split up our attributes so that they depend on one primary key, thereby adhering to 3NF.

4.

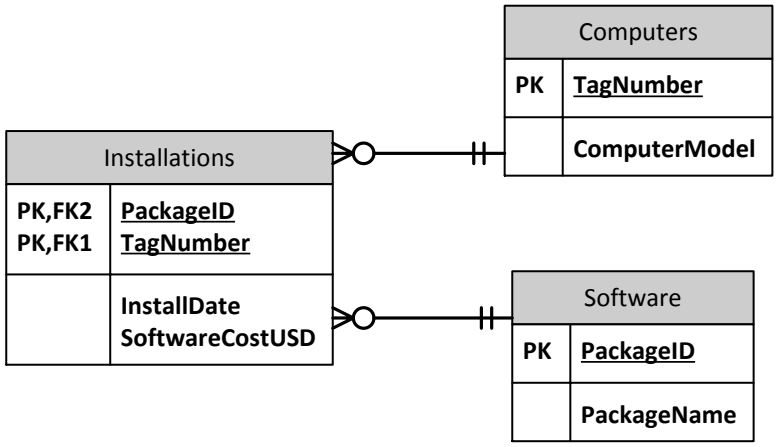

Figure 1: Babby's First Visio ER Diagram