

1. I'd tell Mr. Johnson that, while all the important information is present, the spreadsheet lacks clean, strong structure. As a database consultant, I would recommend putting this data in at least first normal form.

2.

PackageID	TagNumber	InstallDate	SoftwareCostUSD
AC01	32808	09-13-2005	754.95
DB32	32808	12-03-2005	380.00
DB32	37691	06-15-2005	380.00
DB33	57772	05-27-2005	412.77
WP08	32808	01-12-2006	185.00
WP08	37691	06-15-2005	227.50
WP08	57222	05-27-2005	170.24
WP09	59836	10-30-2005	35.00
WP09	77740	05-27-2005	35.00

3. The primary key in this case would be the composite key of PackageID and TagNumber.

4.

PackageID	PackageName	TagNumber	CompModel	InstallDate	SoftwareCostUSD
AC01	Minesweeper	32808	IBM	09-13-2005	754.95
DB32	Microsoft Office	32808	IBM	12-03-2005	380.00
DB32	Microsoft Office	37691	Apple	06-15-2005	380.00
DB33	3D Space Pinball	57772	Compaq	05-27-2005	412.77
WP08	Adobe Photoshop	32808	IBM	01-12-2006	185.00
WP08	Adobe Photoshop	37691	Apple	06-15-2005	227.50
WP08	Adobe Photoshop	57222	HP	05-27-2005	170.24
WP09	Steam	59836	Asus	10-30-2005	35.00
WP09	Steam	77740	Dell	05-27-2005	35.00

5. PackageID → PackageName.

TagNumber → CompModel.

PackageID, TagNumber → PackageName, CompModel, InstallDate, SoftwareCostUSD

6. This table is not in third normal form because it violates the rule that the non-key attributes must be dependent on the key, the whole key, and nothing but the key. The attribute PackageName is solely dependent on PackageID, which is not the whole key. The same can be said for CompModel in relation to TagNumber and its lack of relation to PackageID.

Hardware

TagNumber (pk)	CompModel
32808	IBM
37691	Apple
57222	HP
57772	Compaq
59836	Asus
77740	Dell

Software

PackageID (pk)	PackageName
AC01	Minesweeper
DB32	Microsoft Office
DB33	3D Space Pinball
WP08	Adobe Photoshop
WP09	Steam

Installation

PackageID	TagNumber	InstallDate	SoftwareCostUSD
AC01	32808	09-13-2005	754.95
DB32	32808	12-03-2005	380.00
DB32	37691	06-15-2005	380.00
DB33	57772	05-27-2005	412.77
WP08	32808	01-12-2006	185.00
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WP08	57222	05-27-2005	170.24
WP09	59836	10-30-2005	35.00
WP09	77740	05-27-2005	35.00

7. The primary key of the Hardware table is TagNumber. The primary key of the Software table is PackageID. The primary key of the Installation table is the composite of PackageID and TagNumber.

8. Hardware:

TagNumber → CompModel

Software:

PackageID → PackageName

Installation:

(PackageID, TagNumber) → InstallDate, SoftwareCostUSD

9. The Hardware table is in third normal form because the CompModel is entirely dependent on what the TagNumber is. The Software table is in third normal form because the PackageName is entirely dependent on the PackageID. The Installation table is in third normal form because the InstallDate and

SoftwareCostUSD depend entirely on the PackageID for the software installed, and the TagNumber for the computer it is installed on. Each attribute is atomic and there are no more partial keys like we had in the table in #4.

10.

E/R Diagram

