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Database Systems CMPT 308
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Lab 7: Normalization One

Part One:

1. I would tell Mr. Johnson that his spreadsheet format is good for human understanding, but for database system implementation I will need to mold this data into the first, second, and third normal forms. At this stage, the data is not in the first normal form, and therefore cannot be in second or third normal form. It's a good thing Mr. Johnson hired me to do the work!
2. Data in 1NF:

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	01-12-2005	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. Primary key is PackageID + TagNumber based on the data presented. This combination creates a unique identifier for each row of data present.

Part Two:

4.

PackageID	TagNumber	PackageName	CompModel	InstallDate	SoftwareCostUSD
AC01	32808	RocketLeague	Lenovo	09-13-2005	754.95
DB32	32808	Dota2	Lenovo	12-03-2005	380.00
DB32	37691	Dota2	MicrosoftSurface	06-15-2005	380.00
DB33	57772	GrandTheftAutoV	AppleMacbookPro	05-27-2005	412.77
WP08	32808	WorldOfWarcraft	Lenovo	01-12-2005	185.00
WP08	37691	WorldOfWarcraft	MicrosoftSurface	06-15-2005	227.50
WP08	57222	WorldOfWarcraft	AppleMacbookPro	05-27-2005	170.24
WP09	59836	Minesweeper	HP	10-30-2005	35.00
WP09	77740	Minesweeper	Acer	05-27-2005	35.00

5. Functional dependencies

- a. PackageID \rightarrow PackageName
- b. TagNumber \rightarrow CompModel
- c. PackageID, TagNumber \rightarrow PackageName, CompModel, InstallDate, SoftwareCostUSD

6. This table is not in 3rd normal form because there are multi-key dependencies that exist within the functional dependencies (for the table to be in 3NF, it must be 2NF and there are no transitive dependencies among the non-key attributes – non-key attributes are dependent on the primary key, the whole primary key, and nothing but the primary key). Because PackageName technically only dependent on the PackageID, but the primary key is PackageID + TagNumber, this violates the 3NF rule.

7. Primary Keys:

- a. Packages pkey = PackageID
- b. Installations pkey = PackageID, TagNumber
- c. Devices pkey = TagNumber

8. Functional Dependencies

- a. PackageID \rightarrow PackageName
- b. PackageID, TagNumber \rightarrow InstallDate, SoftwareCostUSD
- c. TagNumber \rightarrow CompModel

9. By using an associative Installations table, these tables are in 3NF because it removes the transitive dependencies among the non-key attributes that were in the original one table to rule them all.

10.

