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CMPT 308
Lab 7-Normalization 1

Part One:
1) This big table is inefficient and unusable since it is subject to insert, update and delete anomalies. We must separate columns into non-ambiguous tables that have functional dependence, aka "normalize."
2) 1NF Table:

PackageID	TagNumber	Installation Date	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 is a composite key with PackageID and TagNumber.

Part Two:
4) With two new columns:

PackageID	TagNumber	InstallDate	SoftwareCostUSD	Software-Package-Name	CompModel
AC01	32808	09-13-2005	754.95	Zork	Apple
DB32	32808	12-03-2005	380.00	Portal	Apple
DB32	37691	06-15-2005	380.00	Portal	IBM
DB33	57772	05-27-2005	412.77	Portal 2	HP
WP08	32808	01-12-2006	185.00	GTA	Apple
WP08	37691	06-15-2005	227.50	Orange Box	IBM
WP08	57222	05-27-2005	170.24	Stanley	Dell
WP09	59836	10-30-2005	35.00	Half-Life	HP
WP09	77740	05-27-2005	35.00	Half-Life	Dell

5) Functional dependencies:
   a-[Package ID, TagNumber] → InstallDate, SoftwareCostUSD, SoftwarePackageName, CompModel
   b-Package ID→ TagNumber
   c- TagNumber→ CompModel
   d-SoftwarePackageName→ SoftwareCostUSD

6) This table is **not** in 3NF because it is not even in 2NF. In order for the table to be in 2NF it needs to have no partial key dependencies. For example, CompModel is dependent on TagNumber, but not PackageID. There is also a transitive dependency between dependencies a-c.

Part Three:

Installations	Computers	Software
PackageID (PK) TagNumber(PK) SoftwareName InstallDate	TagNumber (PK) CompModel	SoftwareName (PK) SoftwareCostUSD

7) Primary key for all tables: PackageID, TagNumber, SoftwarePackageName
8) Functional Dependencies:
   a- [PackageID,TagNumber]→ SoftwarePackageName, InstalDate
   b- TagNumber → CompModel
   c- SoftwarePackageName→SoftwareCostUSD

9) Tables are in the third form because the table is in the second form and there are no multi-key dependencies. Non-key attributes like CompModel only depends on TagNumber. SoftwareCostUSD only depends on SoftwarePackageName. InstalDate depends on the the composite key, of PackageID/TagNumber. This also eliminates the three anomalies. If you add/update/delete TagNumbers to the Computers table with their model, you will not affect the Software tables. The installations table acts as an associative entity that holds foreign keys. Similar with the Software table, if you add/update/delete another package name with its cost, it will have no affect on the already installed packages and the computers recorded.

10) E/R Diagram: