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Database Systems Lab 7

1. This spreadsheet isn't clear at all. Why are there multiple tag numbers, install dates, and software costs for individual package IDs?
2.

PackageID	TagNumber1	TagNumber2	TagNumber3	InstallDate 1	InstallDate 2	InstallDate 3	SoftwareCost USD1	SoftwareCost USD2	SoftwareCost USD3
AC01	32808	NULL	NULL	09-13-2005	NULL	NULL	754.95	NULL	NULL
DB32	32808	37691	NULL	12-03-2005	06-15-2005	NULL	380.00	380.00	NULL
DB33	57772	NULL	NULL	05-27-2005	NULL	NULL	412.77	NULL	NULL
WP08	32808	37691	57222	01-12-2006	06-15-2005	05-27-2005	185.00	227.50	170.24
WP09	59836	77740	NULL	10-30-2005	05-27-2005	NULL	35.00	35.00	NULL

3. The primary key is PackageID.
4.

PackageID	TagNumber1	TagNumber2	TagNumber3	Install Date1	Install Date2	Install Date3	Software CostUSD 1	Software CostUSD 2	Software CostUSD 3	Software Package Name	Computer Model
AC01	32808	NULL	NULL	09-13-2005	NULL	NULL	754.95	NULL	NULL	Portal	Apple
DB32	32808	37691	NULL	12-03-2005	06-15-2005	NULL	380.00	380.00	NULL	Postgres	Dell
DB33	57772	NULL	NULL	05-27-2005	NULL	NULL	412.77	NULL	NULL	Postgres	Dell
WP08	32808	37691	57222	01-12-2006	06-15-2005	05-27-2005	185.00	227.50	170.24	Zork	IBM
WP09	59836	77740	NULL	10-30-2005	05-27-2005	NULL	35.00	35.00	NULL	Zork	IBM

5. According to the above table:

- PackageID → {TagNumber1, TagNumber2, TagNumber3}
- PackageID → {InstallDate1, InstallDate2, InstallDate3}
- PackageID → {SoftwareCostUSD1, SoftwareCostUSD2, SoftwareCostUSD3}
- PackageID → {SoftwarePackageName, ComputerModel}
- {TagNumber1, TagNumber2, TagNumber3} → {InstallDate1, InstallDate2, InstallDate3}
- {TagNumber1, TagNumber2, TagNumber3} → {SoftwareCostUSD1, SoftwareCostUSD2, SoftwareCostUSD3}
- {InstallDate1, InstallDate2, InstallDate3} → {SoftwareCostUSD1, SoftwareCostUSD2, SoftwareCostUSD3}

6. The new table is not in third normal form because it has multiple candidate keys (and therefore is not in second normal form), and because keys like ComputerModel are transitively dependent on non-candidate keys like SoftwarePackageName.

PackageID	TagNumber1	TagNumber2	TagNumber3
AC01	32808	NULL	NULL
DB32	32808	37691	NULL
DB33	57772	NULL	NULL
WP08	32808	37691	57222
WP09	59836	77740	NULL

PackageID	InstallDate1	InstallDate2	InstallDate3
AC01	09-13-2005	NULL	NULL
DB32	12-03-2005	06-15-2005	NULL
DB33	05-27-2005	NULL	NULL
WP08	01-12-2006	06-15-2005	05-27-2005
WP09	10-30-2005	05-27-2005	NULL

PackageID	SoftwareCostUSD1	SoftwareCostUSD2	SoftwareCostUSD3
AC01	754.95	NULL	NULL
DB32	380.00	380.00	NULL
DB33	412.77	NULL	NULL
WP08	185.00	227.50	170.24
WP09	35.00	35.00	NULL

PackageID	SoftwarePackageName	ComputerModel
AC01	Portal	Apple
DB32	Postgres	Dell
DB33	Postgres	Dell
WP08	Zork	IBM
WP09	Zork	IBM

TagNumber1	TagNumber2	TagNumber3	InstallDate1	InstallDate2	InstallDate3
32808	NULL	NULL	09-13-2005	NULL	NULL
32808	37691	NULL	12-03-2005	06-15-2005	NULL
57772	NULL	NULL	05-27-2005	NULL	NULL
32808	37691	57222	01-12-2006	06-15-2005	05-27-2005
59836	77740	NULL	10-30-2005	05-27-2005	NULL

TagNumber1	TagNumber2	TagNumber3	SoftwareCostUSD1	SoftwareCostUSD2	SoftwareCostUSD3
32808	NULL	NULL	754.95	NULL	NULL
32808	37691	NULL	380.00	380.00	NULL
57772	NULL	NULL	412.77	NULL	NULL
32808	37691	57222	185.00	227.50	170.24
59836	77740	NULL	35.00	35.00	NULL

7. The primary key for the first four tables is PackageID. The primary key for table five is InstallDate1. The primary key for table six is SoftwareCostUSD1.

8. According to the above tables:

- PackageID → {TagNumber1, TagNumber2, TagNumber3}
- PackageID → {InstallDate1, InstallDate2, InstallDate3}
- PackageID → {SoftwareCostUSD1, SoftwareCostUSD2, SoftwareCostUSD3}
- PackageID → {SoftwarePackageName, ComputerModel}
- {TagNumber1, TagNumber2, TagNumber3} → {InstallDate1, InstallDate2, InstallDate3}
- {TagNumber1, TagNumber2, TagNumber3} → {SoftwareCostUSD1, SoftwareCostUSD2, SoftwareCostUSD3}

9. The new tables are in third normal form because there is only one candidate key for each table, thus allowing for second normal form, and there are no attributes that are not dependent on the primary keys of each table.

10.