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Database Systems

Lab 7

Part One:

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

1) The spreadsheet needs adjusting due to it failing the normal rules. Normalizing this table would better organize the data and help prevent insert, update, and delete anomalies. The first action needed is to put the data in first normal form, which makes all the intersecting values atomic. 'PackageId' is used as a grouping variable for groups of 'TagNumber', 'InstallDate', and 'SoftwareCostUSD'. This is poor data management and should be modified so that every 'TagNumber', 'InstallDate', and 'SoftwareCostUSD' has its own row and column with its own individual 'PackageId' primary key. This table would also benefit from being put in second normal form, third normal form, and in BCNF.

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 of this table is the “PackageID”.

Part Two:

4)

PackageID	PackageName	TagNumber	ComputerModel	InstallDate	SoftwareCost USD
AC01	Zork	32808	Apple	09-13-2005	754.95
DB32	Portal	32808	Apple	12-03-2005	380.00
DB32	Portal	37691	Lenovo	06-15-2005	380.00
DB33	Access	57772	HP	05-27-2005	412.77
WP08	Word	32808	Apple	01-12-2006	185.00
WP08	Word	37691	Lenovo	06-15-2005	227.50
WP08	Word	57222	Acer	05-27-2005	170.24
WP09	Excel	59836	Asus	10-30-2005	35.00
WP09	Excel	77740	Dell	05-27-2005	35.00

5) The functional dependency that exists is the determinate ‘PackageID’ which has the dependents ‘PackageName’, ‘InstallDate’, and ‘SoftwareCostUSD’. Another functional dependency that exists is the determinate ‘TagNumber’ which has the dependents ‘ComputerModel’, ‘InstallDate’, and ‘SoftwareCostUSD’.

6) This table is in first normal form, as every intersection of a row and column has atomic values.

This table still fails the third normal form, as it still fails the second normal rule due to the

presence of a composite key that results in partial key dependencies. ‘PackageID’ and ‘TagNumber’ both are used to determine ‘InstallDate’ and ‘SoftwareCostUSD’, but ‘PackageName’ is only dependant on ‘PackageID’ and ‘ComputerModel’ is only dependant on ‘TagNumber’, creating this partial dependency.

Part Three:

(a)

PackageID	PackageName
AC01	Zork
DB32	Portal
DB32	Portal
DB33	Access
WP08	Word
WP08	Word
WP08	Word
WP09	Excel
WP09	Excel

(b)

PackageName	ComputerModel	InstallDate	SoftwareCostUSD
Zork	Apple	09-13-2005	754.95
Portal	Apple	12-03-2005	380.00
Portal	Lenovo	06-15-2005	380.00
Access	HP	05-27-2005	412.77
Word	Apple	01-12-2006	185.00
Word	Lenovo	06-15-2005	227.50
Word	Acer	05-27-2005	170.24
Excel	Asus	10-30-2005	35.00
Excel	Dell	05-27-2005	35.00

(c)

TagNumber	ComputerModel
32808	Apple
32808	Apple
37691	Lenovo
57772	HP

32808	Apple
37691	Lenovo
57222	Acer
59836	Asus
77740	Dell

7) The primary key of the first table is the 'PackageId', the primary key for the second table is the composite key of 'PackageName' and 'ComputerModel', and the primary key for the third table is 'TagNumber'.

8) The functional dependency for the first table is 'PackageName', which is dependent on 'PackageID'. The functional dependencies for the second table are 'InstallDate' and 'SoftwareCostUSD', which are dependent on its composite key of 'PackageName' and 'ComputerModel'. The functional dependency for the third table is 'ComputerModel', which is dependent on 'TagNumber'.

9) Decomposing the original table into three separate ones still maintains a composite key to determine 'InstallDate' and 'SoftwareCostUSD', but separates 'PackageID' and 'TagNumber' into separate tables which eliminates the partial dependency experienced by 'ComputerModel' and 'PackageName'. 'PackageName' is now fully dependant on 'PackageId', 'ComputerModel' is fully dependent on 'TagNumber', and 'InstallDate' and 'SoftwareCostUSD' are fully dependent on the composite key of 'PackageName' and 'ComputerModel'.

10)

