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Database Management
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11/3/16

Normalization One

Part 1:

1) “Mr. Johnson, I can tell you have dedicated time and energy into this database and it is a great starting point for me to work with. Although you have collected important data, I believe we should reorganize the format of the database in order to avoid future mistakes and to preserve the integrity of the data. As you can see in your database, there are some inconsistencies throughout. Many fields (intersections between rows and columns) have multiple data entries while others just have one. I believe we can work through some of the issues and create a more efficient and accurate database to help your business thrive.”

2)

PackageID	TagNumber	InstallDate	SoftwarePriceUSD
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 of PackageID and TagNumber

- Primary key (PackageID, TagNumber)

Part 2:

PackageID	TagNumber	InstallDate	SoftwarePrice USD	SoftwarePackageName	ComputerModel
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	Dell
DB33	57772	05-27-2005	412.77	Word	Alienware
WP08	32808	01-12-2006	185.00	Chrome	Apple
WP08	37691	06-15-2005	227.50	Chrome	Dell
WP08	57222	05-27-2005	170.24	Chrome	IBM
WP09	59836	10-30-2005	35.00	Postgres	HP
WP09	77740	05-27-2005	35.00	Postgres	Lenovo

Functional Dependencies:

(PackageID, TagNumber) → InstallDate
(PackageID, TagNumber) → SoftwarePriceUSD
PackageID → SoftwarePackageName
TagNumber → ComputerModel

This table is not in 3NF because non-primary key attributes are dependent of other non-primary key attributes. In this table the primary key is a composite key of PackageID and TagNumber. However, SoftwarePackageName is only dependent of PackageID, not TagNumber. The same issue arises with ComputerModel only being dependent of TagNumber. Another reason this table is not in 3NF is because it is vulnerable to anomalies. If TagNumber or PackageID is changed, the ComputerModel or SoftwarePackageName will be incorrect.

Part 3:

Installation:

PackageID	TagNumber	InstallDate	SoftwarePriceUSD
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

Primary Key: (PackageID, TagNumber)

Functional Dependencies:

(PackageID, TagNumber) → InstallDate
(PackageID, TagNumber) → SoftwarePriceUSD

Software Packages:

PackageID	SoftwarePackageName
AC01	Zork
DB32	Portal
DB33	Portal
WP08	Chrome
WP09	Postrgres

Primary Key: PackageID

Functional Dependencies:

PackageID → SoftwarePackageName

Computer Models:

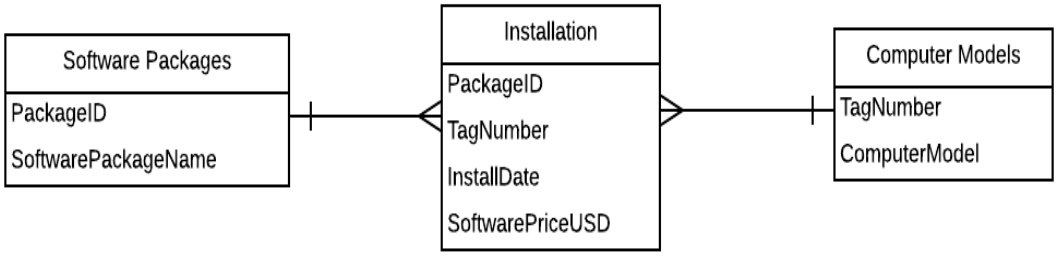
TagNumber	ComputerModel
32808	Apple
37691	Dell
57222	IBM
57772	Alienware
59836	HP
77740	Lenovo

Primary Key: TagNumber

Functional Dependencies:

TagNumber → ComputerModel

The new tables are now in 3NF because all non-primary attributes are now only dependent on primary key attributes from each table. These tables also solve the update and insert anomalies by introducing foreign key relationships between tables. For example, if TagNumber is changed, the ComputerModel in the computer model table will change to reflect the correct TagNumber, and the installation table will be update to correctly reflect the change. Individual rows can now be added or deleted without impacting the integrity of the whole database.


Software Packages
PackageID
SoftwarePackageName
Installation
PackageID
TagNumber
InstallDate
SoftwarePriceUSD
Computer Models
TagNumber
ComputerModel