

**Part 1:**

1. While somewhat helpful, this will take a lot of work to get it into the proper format for building a normalized database. For one, the data is not currently atomic, as it is improperly grouped by PackageID. In addition, this would work better separated into multiple tables.

2.

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

3. The primary key must be TagNumber+PackageID. Though using just TagNumber would be nicer, we cannot use just TagNumber because this is all condensed into one table, and have more than one entry per TagNumber.

**Part 2:**

4.

| TagNumber | Computer Model | PackageID | PackageName       | InstallDate | SoftwareCostUSD |
|-----------|----------------|-----------|-------------------|-------------|-----------------|
| 32808     | Apple          | AC01      | World of Warcraft | 09-13-2005  | 754.95          |
| 32808     | Apple          | DB32      | Excel: Extreme    | 12-03-2005  | 380.00          |
| 37691     | Dell           | DB32      | Excel: Extreme    | 06-15-2005  | 380.00          |
| 57772     | Samsung        | DB33      | PressWorks 2.5    | 05-27-2005  | 412.77          |
| 32808     | Apple          | WP08      | TurboTax Platinum | 01-12-2006  | 185.00          |
| 37691     | Dell           | WP08      | TurboTax Platinum | 06-15-2005  | 227.50          |
| 57222     | Lenovo         | WP08      | TurboTax Platinum | 05-27-2005  | 170.24          |
| 59836     | Cheap-O        | WP09      | Ye Olde Antivirus | 10-30-2005  | 35.00           |
| 77740     | Samsung        | WP09      | Ye Olde Antivirus | 05-27-2005  | 35.00           |

5.     `TagNumber => ComputerModel` -- a TagNumber always will have the same computer model

`PackageID => PackageName` -- A PackageID will always refer to the same PackageName

`TagNumber PackageID => InstallDate SoftwareCostUSD PackageName Computer Model` -- A TagNumber and PackageID together indicate a unique install, meaning the date, cost, package name, and computer model must all be the same.

6. It is not in 3NF because we have functional dependencies on a part of our primary key (PackageID + TagNumber). For example, the PackageName is solely reliant on the PackageID, and not the TagNumber.

7. Computers (Primary Key -- TagNumber)

| <b>TagNumber</b> | <b>Computer Model</b> |
|------------------|-----------------------|
| 32808            | Apple                 |
| 37691            | Dell                  |
| 57772            | Samsung               |
| 57222            | Lenovo                |
| 59836            | Cheap-O               |
| 77740            | Samsung               |

Functional Dependencies

TagNumber => ComputerModel

SoftwarePackages (Primary -- PackageID)

| <b>PackageID</b> | <b>PackageName</b> |
|------------------|--------------------|
| AC01             | World of Warcraft  |
| DB32             | Excel: Extreme     |
| DB33             | PressWorks 2.5     |
| WP08             | TurboTax Platinum  |
| WP09             | Ye Olde Antivirus  |

Functional Dependencies

PackageID => PackageName

PackageInstalls (Primary -- TagNumber + PackageID)

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

Functional Dependencies

TagNumber PackageID => InstallDate SoftwareCostUSD

9. These tables are in 3NF because all functional dependencies rely on the candidate key of each table, and no other functional dependencies exist.

