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### Part One:

1. While the information is consistent and organized, the current system is poorly designed. In order to improve data entry and software package management, the current data will need to be reorganized.

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. As long as packages cannot be reinstalled, the Primary Key can be a composite key of the PackageID and the TagNumber.

### Part Two:

1.

| PackageID | TagNumber | PackageName      | ComputerModel | InstallDate | SoftwareCostUSD |
|-----------|-----------|------------------|---------------|-------------|-----------------|
| AC01      | 32808     | uTorrent.rar     | HP            | 09-13-2005  | 754.95          |
| DB32      | 32808     | CatPix.exe       | HP            | 12-03-2005  | 380.00          |
| DB32      | 37691     | CatPix.exe       | Asus          | 06-15-2005  | 380.00          |
| DB33      | 57772     | not%20trojan.exe | Apple         | 05-27-2005  | 412.77          |
| WP08      | 32808     | Photoshop CC     | HP            | 01-12-2006  | 185.00          |
| WP08      | 37691     | Photoshop CC     | Lemote        | 06-15-2005  | 227.50          |
| WP08      | 57222     | Photoshop CC     | System76      | 05-27-2005  | 170.24          |
| WP09      | 59836     | Blender3D        | Asus          | 10-30-2005  | 35.00           |
| WP09      | 77740     | ftl_game.app     | AlienWare     | 05-27-2005  | 35.00           |

2. Functional Dependencies:

- PackageID → PackageName
- TagNumber → ComputerModel
- PackageID and TagNumber → InstallDate
- PackageID and TagNumber → SoftwareCostUSD

3. This table is not in third normal form because the table contains attributes that related to part of the primary key but not the entire composite key. For example, the Computer Model provides information that related to the TagNumber but not the PackageID. In the same vain, the PackageName relates to the PackageID but not the TagNumber.

### Part 3

1. To put the information in 3<sup>rd</sup> normal form, the tables would be Packages, Computers, and Installations. Primary keys:
  - a. The primary key of Packages = PackageID
  - b. The primary key of Computers = TagNumber
  - c. The primary key of Installations = composite key (PackageID, TagNumber)
2. The functional Dependencies:
  - a. PackageID  $\rightarrow$  PackageName
  - b. TagNumber  $\rightarrow$  ComputerModel
  - c. PackageID and TagNumber  $\rightarrow$  InstallDate
  - d. PackageID and TagNumber  $\rightarrow$  SoftwareCostUSD
3. The new tables are in 3<sup>rd</sup> normal form because each attribute provides information “about the key, the whole key, and nothing but the key” (Bill Kent). All of the issues from the last table have been resolved: the Computer Model relates to the primary key TagNumber and nothing else.
- 4.

