

### Lab 007 – Normalization One

#### Part One

1. My reply: “This is a good start, but it needs some improvement so that we will be able get more information from the database and keep the information consistent.”
2. Table in first normal form:

| 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 is a composite key of the PackageID and TagNumber columns.

#### Part Two

4. Table with two more columns:

| PackageID | TagNumber | ComputerModel | PackageName | InstallDate | SoftwareCostUSD |
|-----------|-----------|---------------|-------------|-------------|-----------------|
| AC01      | 32808     | Lenovo        | Lotus Notes | 09-13-2005  | 754.95          |
| DB32      | 32808     | Dell          | Oracle DB   | 12-03-2005  | 380.00          |
| DB32      | 37691     | Dell          | Oracle DB   | 06-15-2005  | 380.00          |
| DB33      | 57772     | Dell          | SQL Server  | 05-27-2005  | 412.77          |
| WP08      | 32808     | Lenovo        | MS Office   | 01-12-2006  | 185.00          |
| WP08      | 37691     | Lenovo        | MS Office   | 06-15-2005  | 227.50          |
| WP08      | 57222     | Lenovo        | MS Office   | 05-27-2005  | 170.24          |
| WP09      | 59836     | Apple         | MS Word     | 10-30-2005  | 35.00           |
| WP09      | 77740     | Apple         | MS Word     | 05-27-2005  | 35.00           |

5. Functional dependencies:
  - a. (PackageID, TagNumber) → InstallDate
  - b. (PackageID, TagNumber) → SoftwareCostUSD
  - c. PackageID → PackageName
  - d. TagNumber → ComputerModel
6. This table is not in third normal form because it is not in second normal form, since we have partial dependencies on the primary key, as shown above.

Part Three

7. Determinants/primary keys for all tables:
  - a. Computers table: TagNumber
  - b. Installs table: (TagNumber, PackageID)
  - c. Packages table: PackageID
8. Functional dependencies for all tables:
  - a. Computers table: TagNumber  $\rightarrow$  ComputerModel
  - b. Installs table:
    - i. (TagNumber, PackageID)  $\rightarrow$  InstallDate
    - ii. (TagNumber, PackageID)  $\rightarrow$  SoftwareCostUSD
  - c. Packages table: PackageID  $\rightarrow$  PackageName
9. The new tables are in first normal form, and there are no partial dependencies, so it is in second normal form, and the tables have no multiple dependencies, so it is in third normal form as well. This table is in Boyce-Codd normal form as well, since there are no transitive interior dependencies (foreign keys in the same table).
10. Entity relationship (E/R) diagram:

