**Brandon Kline**

**Database Systems Lab 7**

1. This spreadsheet isn’t clear at all. Why are there multiple tag numbers, install dates, and software costs for individual package IDs?

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PackageID** | **TagNumber1** | **TagNumber2** | **TagNumber3** | **InstallDate1** | **InstallDate2** | **InstallDate3** | **SoftwareCostUSD1** | **SoftwareCostUSD2** | **SoftwareCostUSD3** |
| AC01 | 32808 | NULL | NULL | 09-13-2005 | NULL | NULL | 754.95 | NULL | NULL |
| DB32 | 32808 | 37691 | NULL | 12-03-2005 | 06-15-2005 | NULL | 380.00 | 380.00 | NULL |
| DB33 | 57772 | NULL | NULL | 05-27-2005 | NULL | NULL | 412.77 | NULL | NULL |
| WP08 | 32808 | 37691 | 57222 | 01-12-2006 | 06-15-2005 | 05-27-2005 | 185.00 | 227.50 | 170.24 |
| WP09 | 59836 | 77740 | NULL | 10-30-2005 | 05-27-2005 | NULL | 35.00 | 35.00 | NULL |

1. The primary key is PackageID.

4.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PackageID** | **TagNumber1** | **TagNumber2** | **TagNumber3** | **InstallDate1** | **InstallDate2** | **InstallDate3** | **SoftwareCostUSD1** | **SoftwareCostUSD2** | **SoftwareCostUSD3** | **SoftwarePackageName** | **ComputerModel** |
| AC01 | 32808 | NULL | NULL | 09-13-2005 | NULL | NULL | 754.95 | NULL | NULL | Portal | Apple |
| DB32 | 32808 | 37691 | NULL | 12-03-2005 | 06-15-2005 | NULL | 380.00 | 380.00 | NULL | Postgres | Dell |
| DB33 | 57772 | NULL | NULL | 05-27-2005 | NULL | NULL | 412.77 | NULL | NULL | Postgres | Dell |
| WP08 | 32808 | 37691 | 57222 | 01-12-2006 | 06-15-2005 | 05-27-2005 | 185.00 | 227.50 | 170.24 | Zork | IBM |
| WP09 | 59836 | 77740 | NULL | 10-30-2005 | 05-27-2005 | NULL | 35.00 | 35.00 | NULL | Zork | IBM |

5. According to the above table:

* PackageID → {TagNumber1, TagNumber2, TagNumber3}
* PackageID → {InstallDate1, InstallDate2, InstallDate3}
* PackageID → {SoftwareCostUSD1, SoftwareCostUSD2, SoftwareCostUSD3}
* PackageID → {SoftwarePackageName, ComputerModel}
* {TagNumber1, TagNumber2, TagNumber3} → {InstallDate1, InstallDate2, InstallDate3}
* {TagNumber1, TagNumber2, TagNumber3} → {SoftwareCostUSD1, SoftwareCostUSD2, SoftwareCostUSD3}
* {InstallDate1, InstallDate2, InstallDate3} → {SoftwareCostUSD1, SoftwareCostUSD2, SoftwareCostUSD3}

|  |  |  |  |
| --- | --- | --- | --- |
| **PackageID** | **TagNumber1** | **TagNumber2** | **TagNumber3** |
| AC01 | 32808 | NULL | NULL |
| DB32 | 32808 | 37691 | NULL |
| DB33 | 57772 | NULL | NULL |
| WP08 | 32808 | 37691 | 57222 |
| WP09 | 59836 | 77740 | NULL |

6. The new table is not in third normal form because it has multiple candidate keys (and therefore is not in second normal form), and because keys like ComputerModel are transitively dependent on non-candidate keys like SoftwarePackageName.

|  |  |  |  |
| --- | --- | --- | --- |
| **PackageID** | **InstallDate1** | **InstallDate2** | **InstallDate3** |
| AC01 | 09-13-2005 | NULL | NULL |
| DB32 | 12-03-2005 | 06-15-2005 | NULL |
| DB33 | 05-27-2005 | NULL | NULL |
| WP08 | 01-12-2006 | 06-15-2005 | 05-27-2005 |
| WP09 | 10-30-2005 | 05-27-2005 | NULL |

|  |  |  |  |
| --- | --- | --- | --- |
| **PackageID** | **SoftwareCostUSD1** | **SoftwareCostUSD2** | **SoftwareCostUSD3** |
| AC01 | 754.95 | NULL | NULL |
| DB32 | 380.00 | 380.00 | NULL |
| DB33 | 412.77 | NULL | NULL |
| WP08 | 185.00 | 227.50 | 170.24 |
| WP09 | 35.00 | 35.00 | NULL |

|  |  |  |
| --- | --- | --- |
| **PackageID** | **SoftwarePackageName** | **ComputerModel** |
| AC01 | Portal | Apple |
| DB32 | Postgres | Dell |
| DB33 | Postgres | Dell |
| WP08 | Zork | IBM |
| WP09 | Zork | IBM |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **TagNumber1** | **TagNumber2** | **TagNumber3** | **InstallDate1** | **InstallDate2** | **InstallDate3** |
| 32808 | NULL | NULL | 09-13-2005 | NULL | NULL |
| 32808 | 37691 | NULL | 12-03-2005 | 06-15-2005 | NULL |
| 57772 | NULL | NULL | 05-27-2005 | NULL | NULL |
| 32808 | 37691 | 57222 | 01-12-2006 | 06-15-2005 | 05-27-2005 |
| 59836 | 77740 | NULL | 10-30-2005 | 05-27-2005 | NULL |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **TagNumber1** | **TagNumber2** | **TagNumber3** | **SoftwareCostUSD1** | **SoftwareCostUSD2** | **SoftwareCostUSD3** |
| 32808 | NULL | NULL | 754.95 | NULL | NULL |
| 32808 | 37691 | NULL | 380.00 | 380.00 | NULL |
| 57772 | NULL | NULL | 412.77 | NULL | NULL |
| 32808 | 37691 | 57222 | 185.00 | 227.50 | 170.24 |
| 59836 | 77740 | NULL | 35.00 | 35.00 | NULL |

7. The primary key for the first four tables is PackageID. The primary key for table five is InstallDate1. The primary key for table six is SoftwareCostUSD1.

8. According to the above tables:

* PackageID → {TagNumber1, TagNumber2, TagNumber3}
* PackageID → {InstallDate1, InstallDate2, InstallDate3}
* PackageID → {SoftwareCostUSD1, SoftwareCostUSD2, SoftwareCostUSD3}
* PackageID → {SoftwarePackageName, ComputerModel}
* {TagNumber1, TagNumber2, TagNumber3} → {InstallDate1, InstallDate2, InstallDate3}
* {TagNumber1, TagNumber2, TagNumber3} → {SoftwareCostUSD1, SoftwareCostUSD2, SoftwareCostUSD3}

9. The new tables are in third normal form because there is only one candidate key for each table, thus allowing for second normal form, and there are no attributes that are not dependent on the primary keys of each table.

10.

