CSCI 585, Fall 2015, Assignment 3

Due date: 11:59pm 10-16-2015

1 Problem

For each problem, list all functional dependencies for the relation described. State whether or not it satisfies each of the first three normal forms and explains why in each case. Finally, normalize the relation into 3NF.

Note: please refer to the submission instructions in Section 2. Following the submissions instructions is required towards getting full credit.

a. when the grocery store manager buys the products from the suppliers, she records certain information in the table below. The supplier column has both the supplier unique IDs and their names concatenated using “ - ”. The product column has the product unique codes and corresponding names too. The cost is the unit price that the grocery store manager pays to the suppliers. Every product is assigned to only one department. For each product, the grocery store only buys it once per day (it may buy it from multiple suppliers).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Supplier** | **Product** | **ImportDate** | **Quantity** | **Cost** | **Unit of Measure** | **Dept**  **Code** |
| 21 – Very Veggie | 4108 – tomatoes | 2015-10-01 | 100 | 1.89 | lb | 1 |
| 32 – Fab Fruits | 4081 – bananas | 2015-10-01 | 100 | 0.20 | ea | 1 |
| 32 – Fab Fruits | 4027 – grapefruit | 2015-10-01 | 100 | 0.45 | lb | 1 |
| 08 – Meats R Us | 331100 –  chicken wings | 2015-10-01 | 100 | 0.50 | lb | 2 |
| 08 – Meats R Us | 331105 –  lean ground beef | 2015-10-02 | 100 | 0.60 | lb | 2 |
| 08 – Meats R Us | 332110 –  boneless  chicken breasts | 2015-10-02 | 100 | 2.50 |  | 2 |

b. Different departments have different products to sell. The departments have unique codes, which are the same as the “Dept Code” in the first table. Each department has its name in the second column. The products sold in each department are represented using the “ProductCode” that is the same as the produce code in the first table. The “List price” is the unit-selling price for the product for that day. “Quantity” column shows the amounts of different products sold at the end of the day.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Dept** | **DeptName** | **ProductCode** | **List Price** | **Quantity** | **Date** | **Unit of Measure** |
| 1 | Fruit&Vegatables | 4081 | 0.35 | 200 | 2015-10-01 | lb |
| 1 | Fruit&Vegatables | 4027 | 0.90 | 36 | 2015-10-01 | ea |
| 1 | Fruit&Vegatables | 4108 | 1.99 | 300 | 2015-10-01 | lb |
| 2 | Butcher | 331100 | 5.00 | 100 | 2015-10-01 | lb |
| 2 | Butcher | 331105 | 2.40 | 200 | 2015-10-01 | lb |

c. Each transaction at the store has a receipt and each receipt has its unique ID. Each customer has a unique ID. The table also has the customer names and member status. Based on their status, they have different discount rates. The table also has the product code (same as previous tables), quantities of these products and the total payments for each transaction. The table also records the dates and times of these transactions. The final price is calculated using the formula:

actual\_price = quantity\*List\_price\_for\_the\_product\_of\_the\_day\*(1-discount\_in\_decimal\_format)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Receipt ID** | **custID** | **Cust**  **Name** | **Membership**  **Status** | **Discount** | **Quantity** | **DateandTime** | **Product**  **Code** | **ActualPrice** |
| 1 | 101 | Produce | Gold | 10% | 1 | 2015-10-01 11:00 | 4081 | 0.315 |
| 2 | 1 | Produce | Silver | 5% | 1 | 2015-10-01 12:00 | 4027 | 0.855 |
| 3 | 2 | Butcher | Silver | 5% | 1 | 2015-10-01 15:00 | 331100 | 4.75 |
| 3 | 2 | Butcher | Standard | 0% | 1 | 2015-10-01 15:00 | 331105 | 2.4 |

2 Submission Instructions

Submit your solutions as a single PDF file. Your name, ID number, and your solutions to each problem should be included. It is suggested, but not required, that you type your solutions (LATEX and Google Docs are popular ways to do this that include the ability to output your work as a PDF). If you choose to handwrite and scan your work, it must be such that the grader can read what you wrote - illegible submissions aren't distinguishable from missing ones.

Please adhere to the following format to provide an answer for each problem. An answer would explicitly consist of three parts as shown below:

* List of functional dependencies: A -> B, representing B that depends on A
* State whether or not the provided table satisfies each of the first three normal forms. For example, you might write, “This satisfies 1NF but not 2NF or 3NF."
* Normalize the relation into 3NF. You DO NOT need to show what the data for the resulting tables end up being (although you do need to show the final schema). You also are not required to show your work, although you may want to do so if you believe it will help the grader understand your submission.