

INFS 614 – Database Management

Fall 2013

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Homework 2 – Due 10/1

Consider the following schema for a member-only supermarket inventory and check-out system. Note this is a modified version from the one given in HW1.

Product(UPC, brand, product_name, product_description, category, marked_price, quantity)

Sale(sale_ID, sale_start_date, sale_end_date)

Sale_Product(sale_ID, UPC, sale_price)

Foreign Key (sale_ID) references Sale

Foreign Key (UPC) references Product

Customer(customer_ID, first_name, last_name, age, gender, zip_code)

Transaction(transaction_ID, customer_ID, transaction_date, payment_method, total)

Foreign Key (customer_ID) references Customer

Transaction_Contains(transaction_ID, UPC, quantity)

Foreign Key (transaction_ID) references Transaction

Foreign Key (UPC) references Product

For each relation, the attribute(s) of the primary key is(are) underlined. The foreign key constraints are also specified. Some of the attributes may be irrelevant. For example, some fruits may not have a brand. In such cases, the values of these attributes should be Null. Assume the current sale period is 09/23/13 – 09/29/13 (i.e. these are the sale start/end dates, respectively).

Write the following queries in Relational Algebra.

1. Find all “Beverages” on sale during this sale period. Print the product brands, names, descriptions, marked prices and sale prices.
2. Find the list of products on sale during this sale period that needs to be restocked (i.e. quantity < 20).

3. Find customers who purchased bread and diapers in the same transaction. For simplicity, assume all bread products have “bread”, and all diapers have “diaper” for product descriptions, respectively. (Some researchers who did market basket analysis – that is, association rule mining for market basket data in order to find items purchased together frequently – found that bread and diapers are frequently bought together).
4. Find the most expensive transaction made in August, 2013.
5. Check to see if there is anyone under 21 who purchased Alcohol. If so, print the transaction ID and the customer information.
6. Find customers (customer_ID) who never made any purchase (It’s time for the store to send them some incentives!).
7. Find all products on sale during this sale period that are more than 50% off.
8. Find customers who purchased all products (regardless of quantity) that are more than 50% off during this sale period.
9. Find customers (customer_ID) who made more than one purchase on 09/14/13.
10. Print out an inventory of all products in the Beverages category. Print UPC, brand, product name, quantity, marked price, and sale price if applicable (assume current sale period). If a product is not on sale, then its sale price should be Null.