

CSE4110 – Database System

Project2. Normalization and Query Processing



Spring 2022

Electronics Vendor company

“You are a DBA in this company”

Goal : The goal of this project is to provide a realistic experience in the physical design, query processing implementation and maintenance of a small relational database you made in Project 1.

Application description(Same as Project 1) :

The application is an electronics vendor that operates both a Web site and a chain of many physical stores. Examples include Best Buy and Circuit City. To find out more about this application, think about any experiences you may have had making purchases both online and in-store, and browse their Web sites.

In our hypothetical company, it has been decided to redesign a major part of the database that underlies company operations. Unfortunately, the manager assigned to solicit database design proposals is not very computer literate and is unable to provide a very detailed specification at the technical level. Fortunately, you are able to do that.

Here are a few points to consider :

- There are many different products, grouped into a variety of (possibly overlapping) categories. Groupings can be by type of product (cameras, phones, etc.), by manufacturer (Sony, Apple, etc.), or by other means (for example, a Gateway PC might be packaged with a Sony monitor and an HP printer and marketed as a package).
- Some customers have a contract with the company and bill their purchases to an account number. They are billed monthly. Other customers are infrequent customers and pay with a credit or debit card. Card information may be stored for online customers, but not for in-store customers.

- Online sales must be sent to a shipper. The company needs to store the tracking number for the shipping company so it can respond to customer inquiries.
- Inventory must be accurate both in stores and in warehouses used to replenish stores and to ship to online customers. When inventory is low, a reorder should be sent to the manufacturer and listed in the database. When goods arrive, inventory should be updated and reorders marked as having been filled.
- Sales data are important for corporate planning. Marketers may want to look at sales data by time period, product, product grouping, season, region (for stores), etc.

Project Requirements :

1. BCNF Decomposition

- Decompose your Relation Schema into BCNF form if they are not.
- Same process learned in lecture

2. Physical Schema Diagram

- After creating an decomposed logical schema diagram, also creating Physical Schema diagram
- Create the “physical” schema diagram in Erwin Data Modeler
- Be sure to identify data types, domain, constraints, relationship type, allowing nulls.

3. Queries

The queries listed below are those that your client wants turned in. We now called these query category as TYPE. (total 13 difference query types)

- (TYPE 1) Assume the package shipped by USPS with tracking number X is reported to have been destroyed in an accident. Find the contact information for the customer. (1)

- (TYPE 1-1) Then find the contents of that shipment and create a new shipment of replacement items. (2)
 - (TYPE 2) Find the customer who has bought the most (by price) in the past year. (3)
 - (TYPE 2-1) Then find the product that the customer bought the most. (4)
 - (TYPE 3) Find all products sold in the past year. (5)
 - (TYPE 3-1) Then find the top k products by dollar-amount sold. (6)
 - (TYPE 3-2) And then find the top 10% products by dollar-amount sold. (7)
 - (TYPE 4) Find all products by unit sales in the past year. (8)
 - (TYPE 4-1) Then find the top k products by unit sales. (9)
 - (TYPE 4-2) And then find the top 10% products by unit sales. (10)
 - (TYPE 5) Find those products that are out-of-stock at every store in California. (11)
 - (TYPE 6) Find those packages that were not delivered within the promised time. (12)
 - (TYPE 7) Generate the bill for each customer for the past month. (13)
- We should execute these queries within MySQL DBMS what you managed. The customers can check all results from these query execution.
 - We use ODBC with C language API to implement your Database model

4. Code implementation

- We will use Visual Studio 2019 and MySQL connector(ODBC)
- Implement C code to execute your queries in MySQL DBMS you built

- The program must use file input from text file which have CRUD queries as text format

e.g. CREATE, INSERT, UPDATE, DELETE

- The program has a user interface to handle each TYPE. Program runs until put quit instruction.

```
----- SELECT QUERY TYPES -----
1. TYPE 1
2. TYPE 2
3. TYPE 3
4. TYPE 4
5. TYPE 5
6. TYPE 6
7. TYPE 7
0. QUIT
```

- After select one of type in menu, user put values of query as stdin and print result of query execution as stdout.

```
----- TYPE 4-1 -----
** Then find the top k products by unit sales. **
Which K? : 5
```

- TYPE 1 & 2 & 3 & 4 has submenu for subtypes.

```
----- Subtypes in TYPE 3 -----
1. TYPE 3-1
2. TYPE 3-2
```

- Keep running each type of query until put "0" in stdin. (for all types of query)
- After exit from query menu, back to select menu.

What to turn in :

- Decomposed Logical Schema diagram (.png)
 - **student_id.png** (submitted filename) e.g. 20229999.png

- “Physical” Scheme diagram ERwin file (.erwin)
 - `student_id.erwin` (submitted filename) e.g. 20229999.erwin
- C code (.c or .cpp)
 - `student_id.c` (submitted filename) e.g. 20229999.c
 - Describe your code with comment (if necessary)
 - It should be able to build and execute in Visual Studio 2019 with MySQL C APL
 - README File
- Report file (.pdf)
 - `[project2]student_id.pdf` (submitted filename) e.g. [project2]20229999.pdf
 - Describe the detail explanation about your Physical Schema diagram and ODBC implementation within MySQL that you made.
 - MAKE YOUR OWN DESCRIPTION on physical schema and ODBC C language codes.
 - Describe the detail explanation how you decompose each relationship to BCNF, see testing one of your relationship result by simplified test in lecture notes.
 - Feel free to use any template you made.

NOTICE :

- 2022.06.08(Wed) 18:00
- Submit your soft copy with title “[DBproject2]student_id” to kundamjun@naver.com (softcopy includes png, erwin, c code and pdf file you wrote)
- Submit your hardcopy to box in front of AS816 before the deadline. (hardcopy includes one E-R model picture and one report you wrote)
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