

Computer Science 631

Database Management Systems Design

Spring 2016 - Term Project

In this term project, you are asked to design a small database system, create and populate this database using ORACLE, and write a number of application programs to access the database. The topic of the project is to design the database and corresponding applications. In the following, you are given the requirements for the database design (Section 1) and the requirements for application design (Section 2).

1 GENERAL GUIDELINES

The following guidelines apply for the project:

1. The projects will be done in **groups of two**. You should form your own groups and post a message in the 'Term Project' forum.
2. You are required to demonstrate your programs. You should treat these demonstrations as if you were giving them to your customer. So, prepare them professionally. The demonstrations will take place at the end of the term, after classes are over. We will put up a sign-up sheet soon.
3. You are required to submit a typed project report at the end of the process. This report should minimally cover (a) a summary of the system requirements and any additions you may have made, (b) the entity-relationship design, (c) the (relational) logical database design, and (d) the application program design. For each of these, you should identify the major design decisions that you faced and the design decisions that you made with justifications for those decisions. Also include, as an appendix, a list of the relational instances you have used to populate your database.

Please note that you are not required to hand in anything during these times; they are set just to guide you through the project and pace you along.

4. Please note that the end of the term is quite tight in terms of the load on the Oracle machines. In order to avoid problems, start your projects as soon as possible. If you finish each segment before the above milestones, please make an appointment to see me to discuss your designs.

5. Grading will be done as follows: (a) design report: 40%; (b) application programs: 60%. The report has to be typed and should be written clearly. The presentation (language and communication of ideas) of the report is very important. Have it read by someone before you submit if you wish. Later on we will post a recommended outline for the report in the newsgroup .
6. In general, each member of a group will be assigned the same grade. However, if I notice that one member of the group is doing all (or most of) the work, I reserve the right to assign differential grades.

2 DATABASE DESIGN REQUIREMENTS

A requirements analysis that was conducted has identified a number of things about the operations and goals of BEST BANK. You, as the systems analyst/designer, should feel free to add to these requirements in order to achieve a richer design. The following list itemizes the major requirements for the BEST BANK enterprise.

- The bank is organized into branches. Each branch is located in a particular city and is identified by a unique name. The bank monitors the assets of each branch.
- Bank customers are identified by their social security numbers. The bank stores each customer's name and address (apartment number, street number, state, city and zip code). Customers may have accounts and can take out loans. A customer may be associated with a particular banker, who may act as a loan officer or personal banker for that customer.
- Bank employees are also identified by their social security numbers. The bank administration stores the name and telephone number of each employee, the names of the employee's dependents and the social insurance number of the employee's manager. The bank also keeps track of the employee's start date and, thus, length of employment.
- The bank offers two types of accounts, savings and checking accounts. An account can be held by more than one customer, and a customer can have more than one account. Each account is assigned a unique account number. The bank maintains a record of each account balance and the most recent date on which the account was accessed by each customer holding the account. In addition, each savings account has an interest rate, and overdrafts are recorded for each checking account.
- A loan originates at a particular branch and can be held by one or more customers. A loan is identified by a unique loan number. For each loan, the bank keeps track of the loan amount and the loan payments. Although a loan-payment number does not uniquely identify a particular payment among those for all the bank loans, a payment number does identify a particular payment for a specific loan. The date and amount are recorded for each payment.
- The bank keeps track of all the transactions. A transaction is identified by a unique code and has a type name. For example "WD" is the code for withdrawal, "CD" for customer

deposit. When a customer makes a transaction, the transaction record should identify the transaction code, the date, the hour, an amount, and an account. Some transactions are free but the bank charges for most of them. If a customer makes a chargeable transaction, the charge is also registered as a chargeless transaction.

This is the end of the requirements report. You are now expected to work on this report to come up with your database design. This requires the development of (a) an entity relationship model for the conceptual design, and (b) a relational schema design for the logical design. You are also expected to populate this database with some sample data of your own so that you can demonstrate the functionality to your customer.

3 APPLICATION DEVELOPMENT REQUIREMENTS

You are expected to write three application programs (using SQL, JDBC, ...) that will allow the employees of Best Bank to manage customers, keep track of transactions, and print passbooks for customers. You have to make decisions as to the appearance of your forms. There is no standard output format.

3.1 Transaction Application

In fact every transaction in the bank has a counterpart. When an account is debited, another has to be credited. When a customer makes a cheque deposit, this credits his account but the account from which the money is taken has to be debited. To keep things simple, we will allow only cheques within the bank on accounts that are listed in the Best BANK database. When a customer withdraws money, his account is debited and the counterpart is a manual operation (a form to fill out and sign) that is not registered in the database. Same for cash deposit, the customer account is credited and the counterpart transaction is a record of deposit given to the user. The bank has special accounts for management purpose. One of these accounts is CHARGE that collects all the charges on customer's accounts. After a transaction, the balance of the account is updated. For debit transactions, be sure that the balance of the account allows the transaction. Otherwise, the transaction is not allowed and the customer is charged. Each month, a service charge (\$2.00) is performed on all the accounts. You design the interface for insertion of this data into the database. The database should be updated accordingly after each transaction, including all the appropriate account balances.

3.2 Passbook Application

This program is used to print passbooks for customers. The passbook starts by a balance forward, the balance of the account the day of the latest passbook update. Then, it lists all the entries in order since. The program, invoked by a one-word command or a click on the main form, should first issue prompts to obtain the account number and/or the customer's name. Then the inquiry program displays the transaction information resulting from retrieving the data. The program should display the account number and owners and a list of transactions as follow:

Date	Transaction Code	Transaction Name	Debits	Credits	Balance
31 SEP		Balance Forward			1700.00
1 OCT	WD	Withdrawal	800.00		900.00
2 OCT	SC	Service Charge	2.00		898.00
3 OCT	CD	Customer Deposit		200.00	1098.00

3.3 Customer Application

This program helps employees of BEST BANK to create, delete and modify a customer. To be considered as a customer of the bank, you have to open an account. The customer has to make a deposit of at least \$500 to open an account.