

Efficient and
Effectiv

Computer-based Library
Management System

Developed and Implemented at Dentistry College

Dr. Bassim Abdulbaki Jumaa¹
Mrs. Maysoon Allawi Saleem²

¹ Ph.D. Computer Engineering, Computer Engineering and Information,
Technology Dept., University of Technology, Baghdad Iraq.

² MSc. Computer Engineering and Information, Technology, Dentistry College,
Al-mustansirya University, Baghdad Iraq.

Key words: Computer-based Management Systems CMS, database, Visual Basic (VB) programming, Computer-based Library Management Systems CLMS.

Abstract

EECLMS is Efficient and Effective Computer-based Library database Management System that was developed for and Implement at dentistry collage to meet user unique requirements and preoperational of functional Specification for library manumit with new and special fleetest which cannot be found in other systems.

The present of status of requirements is outlined as the basis for describing the problem (Traditional Library Management System) which EECLMS is intended to deal with and solve a database has been design to fit the above requirements using Microsoft/access.

Visual basic programming language has been chosen to be the tool for developing the algorithms to make full control of the database designed.

The result was a complete library management system with state of the art in basic programming and user-friendly system with many unique and new features

which can be represented by (1) flexibility, (2) reliability, (3) multi-language; (4) high security issues (5) attraction graphical user interfaces and other features.

1.0 Introduction

Libraries and underpinned by values of stewardship and accessibility – the "stuff of research and learning " as **Dempsey[1]** describes it. Libraries function both as a place and as entity that offers services and provides access to collections as a place libraries are part of social exchange and learning.

Libraries are important as environments that support learning not just warehouses of print and electronic information but especially places for students (and others) to collaborate / do team work. In this environment incoming students arrive with increased expectations for technology based resources for speed and accuracy, for example, they expect to be able to perform a range of online tasks from the same device (and students are not the only ones!). They may wish to access a bibliographic database in order to download data as well as checking on a streamed video of lectures from previous weeks or skimming previous examination papers **Logan[2]**.

This lead to the rapid need for computer-based library management system which provide a complete solution for the administration of all library's technical functions and services to the public. This ranges from tracking the assets held by the library, managing leading, through to supporting the daily administrative activities of the library.

But, many of these systems dose not succeeded to meet some particular organization requirements or solve all problems defined by the users of particular

library. So, to solve this problems a unique system can be develop to meet all requirements with especial and new features.

2.0 problems to be addressed and benefits to be expected from EECLMS project

The college has in identified the implementation of computer – based library management system as the first priority with respect to the library function. The problems to be addressed and benefits to be expected and formulated as following:

2.1 Problems to be solved [addressed]

- Slow and inefficient tracking of material borrowed from library.
- Slow processes of acquisition, cataloguing and management of library resources.
- Student's dissatisfaction and frustration at insufficiency use of resources including lack of access to online information.
- Problem of pilferage of books.
- Slow processes in searching for literature leading to longer duration especially of postgraduate students.
- Limited access or no external awareness of research carried out at collage. End user skills deficiency in information retrieval techniques.
- Lack of reports on end-users.

2.2 Expected benefits.

- Efficient and rapid access to information.

- Efficient and rapid processes in acquisition, cataloging and management of library resources.
- Shorter duration of postgraduate courses.
- Better references and circulation management.
- Reduced loss of books.
- Better record keeping and more efficient library management functions.
- Enhancement of academic programs and research.
- End user training to gain optional use of an advanced library management system.
- Easier access to online information to which the library will subscribe.

3.0 Objective and scope of the EECLMS project

The main objective of this paper is primarily focused on providing maximum service to the client of the library by improvement of information processing, storage, retrieval, and dissemination.

The EECLMS project does not only entail efforts to implement a collage wide computerized library management system, but it should also contribute to organizational arrangements and staff development, required to assure sustainability and reliability of the information systems in the future.

4.0 Practical work

In building the system (application) structure, we started with the core concepts of the problem. Once they has been tested with users. Additional features to the system has been added (will be describe latter in this paper). Each revision constitutes a new application version. It's a good idea to keep track of the version number.

The two most important aspects in this type of development are (1) getting the overall structure correct up front and (2) using a flexible design that is easy to

modify later. For example data takes must be normalized this will help with the expanding of tables later to provide new features. The real product from EECLMS project is the EECLMS system. This system consists of:

- First part, Design database file (containing the library contains) using Access.
- Second part, Writing Visual Basic algorithms to make full control of the database file.
- Algorithm to connecting the two parts.

4.1 Database Design

The accuracy of the representation depends on the level of detail of the database design. The amount of effort that you put into database design should depend on the type of information you want to get out of the database. Too much detail is a waste of effort, time, and hard drive space. Too little details may render the database worthless. Decide how much detail you need now and how much you may need in the future and then provide exactly that level of detail in your design (no more any less) but don't be surprised if you have to adjust it to meet real-world needs **Elmasri [3]**.

Today's database management system complete with attractive graphical user interfaces and intuitive design tools, can give the world be database designer a false sense of security. These systems make designing a database seem comparable to building a spreadsheet or engaging in some other relatively straightforward task. No such luck, database design is difficult if you do it incorrectly, you get a database that becomes gradually more corrupt as time goes on. Often the problem does not turn up until after you devotes a great deal of

effort to data entry. By the time you know that you have a problem, it's already serious. In many cases, the only solution is to completely redesign the database and reenter all the data. The pride side is that you get better at it. **Rutkosky[4]**.

The system components are stored in the main folder named Library System. There are four components which stored in four sub-folders: System Code, Pictures, Database, and Configure as shown in Figure (1).

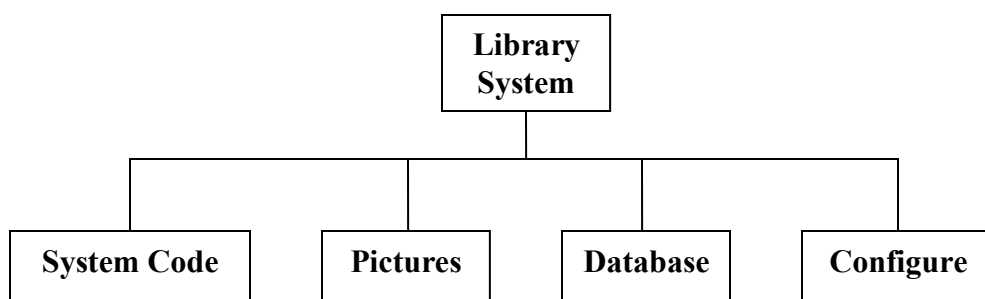


Figure (1): The EECMSL system structure.

The database file was implemented by using Microsoft Access 2003 and it has six tables. The tables were book table, reserve table, borrows table, customer table, employee table, and branch table. The record format of each table is described in the following figure (2).

Book code	Book title	Book class	Edition	Year	Publisher	Language	ISBN	Branch number
-----------	------------	------------	---------	------	-----------	----------	------	---------------

Figure 2-A: The record format of book table.

Book code	Customer code	Employee code
-----------	---------------	---------------

Figure 2-B: The record format of reserve table.

Book code	Customer code	Employee code	Borrow date
-----------	---------------	---------------	-------------

Figure 2-C: The record format of borrow table.

Customer code	Customer name	State	Department	College	University	Picture file path
---------------	---------------	-------	------------	---------	------------	-------------------

Figure 2-D: The record format of customer table.

Employee code	Employee name	Password	Branch number
---------------	---------------	----------	---------------

Figure 2-E: The record format of employee table.

Branch code	Branch name	Branch address	Branch number
-------------	-------------	----------------	---------------

Figure 2-F: The record format of branch table.

4.2 The Visual Basic Algorithms

The algorithms work correct, ease to read and easy to modify. The algorithms are building from several common features: loops, conditions, input, output, and subroutines.

Forms are the foundation for most of the coding. The algorithms can access data on the forms and alter the properties of the controls in response to events or data changes.

We can also retrieve and store data in any of the data tables. The algorithms able to handle a variety of errors. Microsoft access and Visual Basic use a general On Error statement that traps all unexpected errors. **Schneider[5]**.

The important algorithms are shown below:

Move First algorithm:

Set book criteria
Search for the first specific book
IF no matching THEN
Print "Book not found"
ELSE
Display the book information
ENDIF

Move Next algorithm:

IF no end of file THEN
Find the next specific book
IF no matching THEN
Print "Book not found"
ELSE
Display book information
ENDIF
ENDIF

Move Previous algorithm:

IF no begin of file THEN
Find previous specific book
IF no matching THEN
Print "Book not found"
ELSE
Display book information
ENDIF
ENDIF

Borrow Book algorithm:

IF authorized customer THEN
Print "Customer is found"
Display customer information
 IF the number of borrowed books LESS THAN maximum borrowed books
THEN
IF the current book is borrowed THEN
Print "The book is borrowed now"
ELSEIF the current book is reserved THEN


```
Print "The book is reserved now"
ELSE
Make the book borrow
Print "Borrowed is done"
ENDIF
ELSE
Print "The customer has maximum borrowed books"
Print "borrowed is not allowed"
ENDIF
ELSE
Enter customer information
ENDIF
Reserve book algorithm:
Enter customer code
IF authorized customer THEN
Print "Customer is found"
Display customer information
IF borrowed is allowed THEN
IF the current book is borrowed THEN
Print "The book is borrowed now"
ENDIF
IF the current book is reserved THEN
Print "The book is reserved now"
ELSE
Reserve the current book
Print "Reserved is done"
ENDIF
ELSE
Print "The customer has maximum borrowed books"
Print "Reserved not allowed"
ENDIF
ELSE
Enter customer information
ENDIF
```

5.0 special feature of the system

The main form of the system shown in figure A-1. The system has special, new, and very important features. These features can be summarized in the following:

5.1 Data security

Computer security is an issue with every organization today, and any computer application faces security problems. A database collects a large amount of data in one location and makes it easy for people to retrieve and change data. In other words, a database is a critical resource that must be protected. Yet the same factors that make a data base so useful also make it more difficult to secure. In particular, the purpose of a database is to share data. In a security context, you want to control who can share the data and what those users can do with it.

There are two basic categories of computer security: 1) Physical security and 2) logical security. Physical security is concerned with physically protecting the computing resources and preparing for physical disasters that might damage equipment or data. Logical security consists of protecting the data and controlling access to the data represented in EECMLS by four levels security system of control as shown in appendix A:

- Customer (staffs, students, and Gests) level. Figure A-2
- Employee (library staff) level. Figure A-5 and A-6.
- Administrator level. Figure A-7, Figure A-8 and Figure A-9.
- Authorizer level. Figure A-10.

These levels solved the three basic problems that face the system

- Unauthorized disclosure
- Unauthorized modification
- Unauthorized with holding of information (data).

Each level with its unique requirement from the user.

5.2 Multi-language System

The Arabic is the most beautiful and powerful language, but there are times when you need freedom of choice (i.e. another language) so the EECMLS system filled this need by providing the ability to use two different languages, English, and Arabic to meet user requirement this can be easy done by switching between these two different languages. Second language of use, the English language because of its wide of use. This can be shown in appendix A figure A-2.

5.3 Data Integrity

The EECMSL system has feature that encourage people to enter all data to keep the data internally consistent.

The standard features to ensure data integrity are (1) data validation, (2) automatic computations, (3) verification of totals, (4) control of user access, (5) transaction integrity, and (6) backup and recovery.

Basic data validation occurs at the table level, where you enter conditions that use always is greater than 0 will always be enforced by the DBMS. All computation are done be the application never expect users to compute delay charges of borrowing. These business rules are generally written as code within the forms. Whenever, we compute and store totals in a database, an additional code were wrote that verifies and corrects the totals. Appendix A figure A-4.

5.4 multi users and concurrent access

One of the most important features of a database is the ability to share data with many users or different processes. This concept is critical in any modern application many people need to use the application at the same time.

6.0 Conclusion and future work

In summary, the scope of this paper comprises:

- Full scale computerization of the library management system.
- Enrichment of library information resources by digitations of its rare and archival collections.
- The retraining of library staff with skills that enables them to efficiently and effectively manage, maintain, and sustain on integrated library management system.
- Library end user training. To enable them to optimal benefits of library resources.

All expected benefits mentioned in section 2.2 from this system were occur as we see this system provided maximum service to the client of the library by improving information processing between client and library

Backup and Recovery perhaps the most critical database management task. No matter how well we plan, no matter how sophisticated we security system, something will go wrong. Database managers and developers have an obligation to plan for disasters. The most critical aspect of planning is to make sure that a current copy of the database is easily accessible.

With respect to VB programming, programming can be a challenging, experience, but interesting profession. It is a combination of logic, syntax, and creativity. In many ways writing algorithms is an art, but you have to learn the logic components, and have to memorize the required syntax. Creating useful algorithms requires understanding of the application needs and knows how to solve various problems.

7.0 References

- [1] **Dempsey**, Lorcan 2004. Library: service, space, collection. VALA Conference, Melbourne. Available:<http://www.vala.org.au/vala2004pprs/prgm2004.htm>
- [2] **Logan**, JR 2002, Evolution not revolution, McGraw-Hill, New York.
- [3] **Elmasri Ramez** and Shamkant B. Navathe, "Fundamentals of Database systems", Fifth Edition, 2007.
- [4] **Rutkosky**, Nita Hewitt, Microsoft Office Professional 2000, EMCParadigm,USA.
- [5] **Schneider**, David I, An introduction to programming using Visual Basic 4.0, Prentice Hall, New Jersey.
- [6] Internet place www.pscore.com
- [7] Internet place www.vbode.com
- [8] **Date C. J.**, "An Introduction to Database Systems", Addison Wesley, Eight Edition, 2004.
- [9] **Gerald V. Post**, "Database management system: designing and building business applications", McGraw-Hill Irwin, second Edition, 2002.
- [10] **Michael V. Mannino**, "Database Design, Application development and Administration", Second Edition, 2004.

Appendix A:

The following is the system forms implementation.

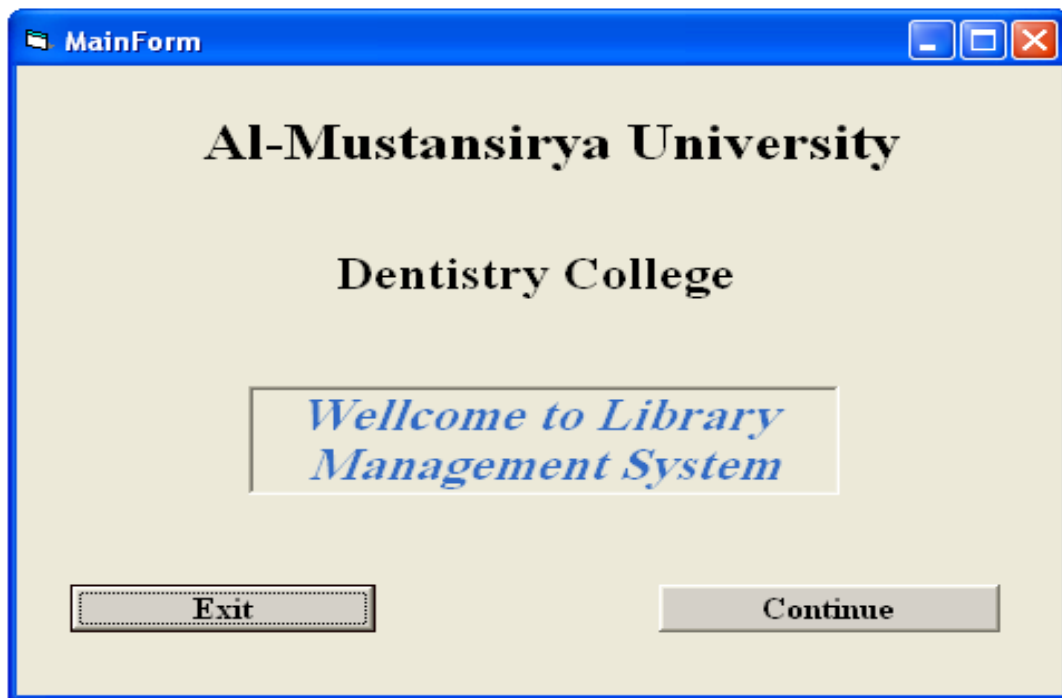


Figure A-1: The main form of the system

The screenshot shows a window titled "LoginForm" with a blue title bar. Inside, there are two dropdown menus. The first is labeled "User Type" and has "Customer" selected. The second is labeled "Language" and has "English" selected. Below these, there are two buttons: "Exit" on the left and "Continue" on the right.

Figure A-2: The login form

The screenshot shows a window titled "Customer Form" with a blue title bar. It contains several input fields arranged in two columns. The left column has: Book Code, Book Title, Book Class, Edition, and Year. The right column has: Publisher, Language, ISBN, Branch Number, and State. Below these fields is a section titled "Search Criteria" with three input elements: a dropdown for "Field", a dropdown for "Operator", and a text box for "Attribute". At the bottom, there are several buttons: "Search", "New", "First", "Next", "Last", "Previous", "Display State Information", and "Logoff".

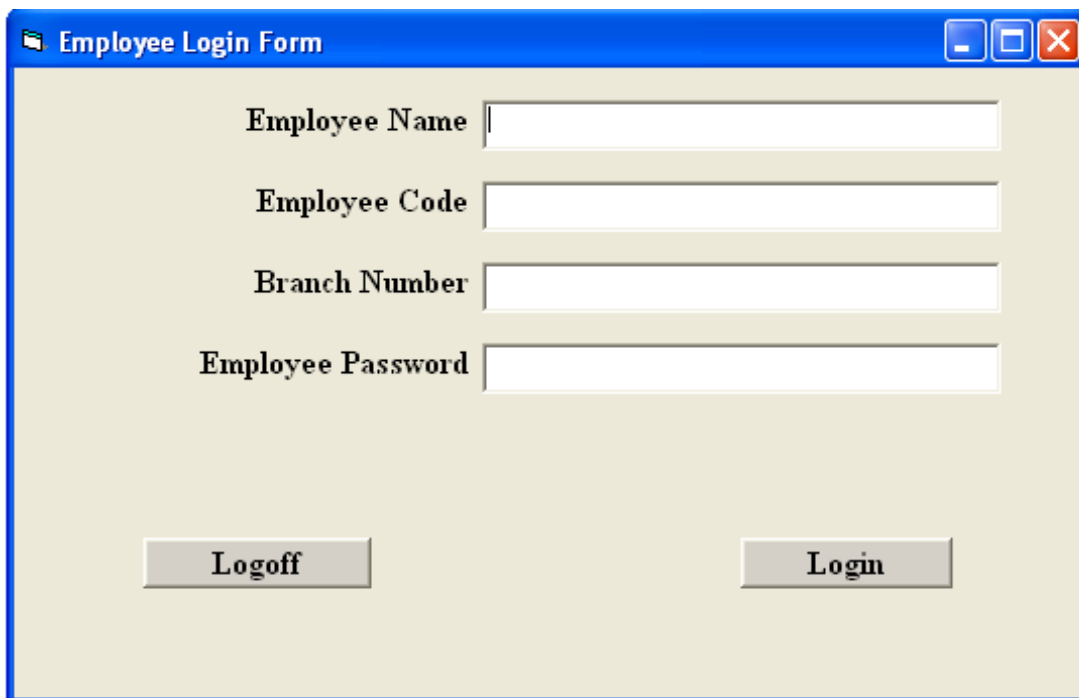
Figure A-3: The customer form

The image shows a software window titled "Book State Information". It contains several input fields for data entry:

- Customer Code
- Customer Name
- State
- Department
- College
- University
- Borrow Date
- Book Title

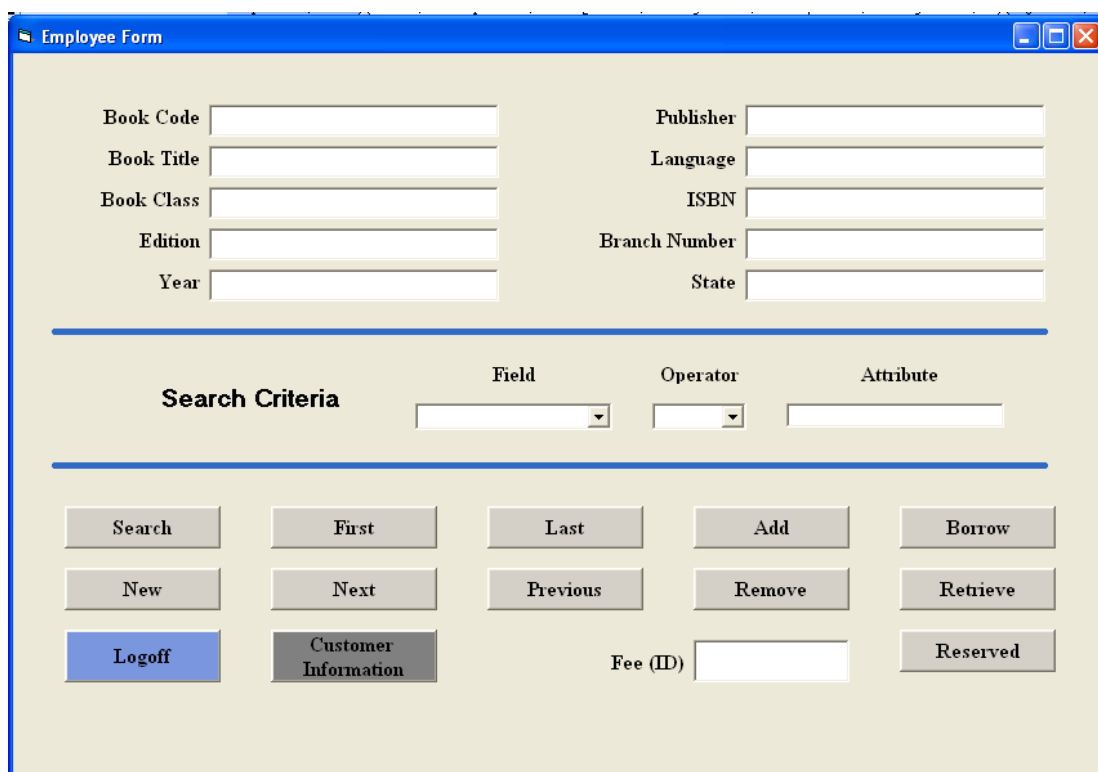
There is a large empty rectangular area on the right side of the form, labeled "Customer Picture" at the bottom. Below the input fields is a "Return" button.

Figure A-4: The book state information.



The image shows a software window titled "Employee Login Form". It contains four text input fields: "Employee Name", "Employee Code", "Branch Number", and "Employee Password". Below these fields are two buttons: "Logoff" on the left and "Login" on the right. The window has a blue title bar with standard minimize, maximize, and close icons.

Figure A-5: The employee login form.



The image shows a software window titled "Employee Form". It contains two columns of text input fields: "Book Code", "Book Title", "Book Class", "Edition", "Year" on the left; and "Publisher", "Language", "ISBN", "Branch Number", "State" on the right. Below these fields is a "Search Criteria" section with a table-like structure:

Search Criteria	Field	Operator	Attribute
	<input type="text"/>	<input type="text"/>	<input type="text"/>

Below the search criteria are several buttons: "Search", "First", "Last", "Add", "Borrow", "New", "Next", "Previous", "Remove", "Retrieve", "Logoff", "Customer Information", "Fee (ID)", and "Reserved". The "Logoff" button is highlighted in blue. The window has a blue title bar with standard minimize, maximize, and close icons.

Figure A-6: The employee form.

Customer Information

Customer Code

Customer Name

State

Department

College

University

Borrow Date

Book Title

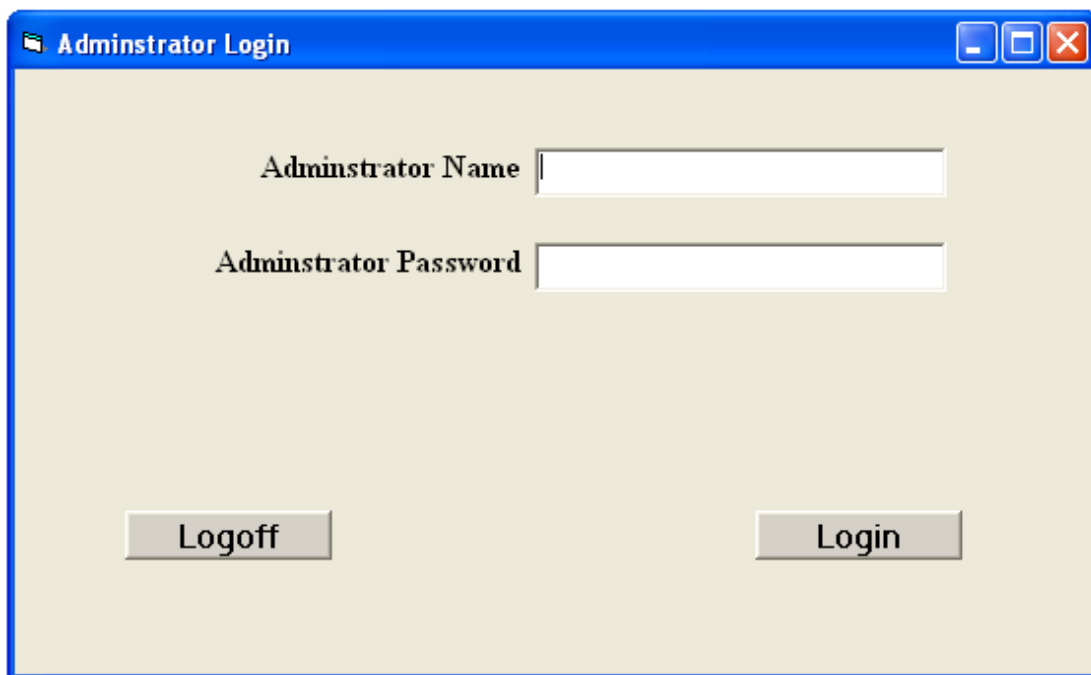
Customer Picture

Load Picture

OK

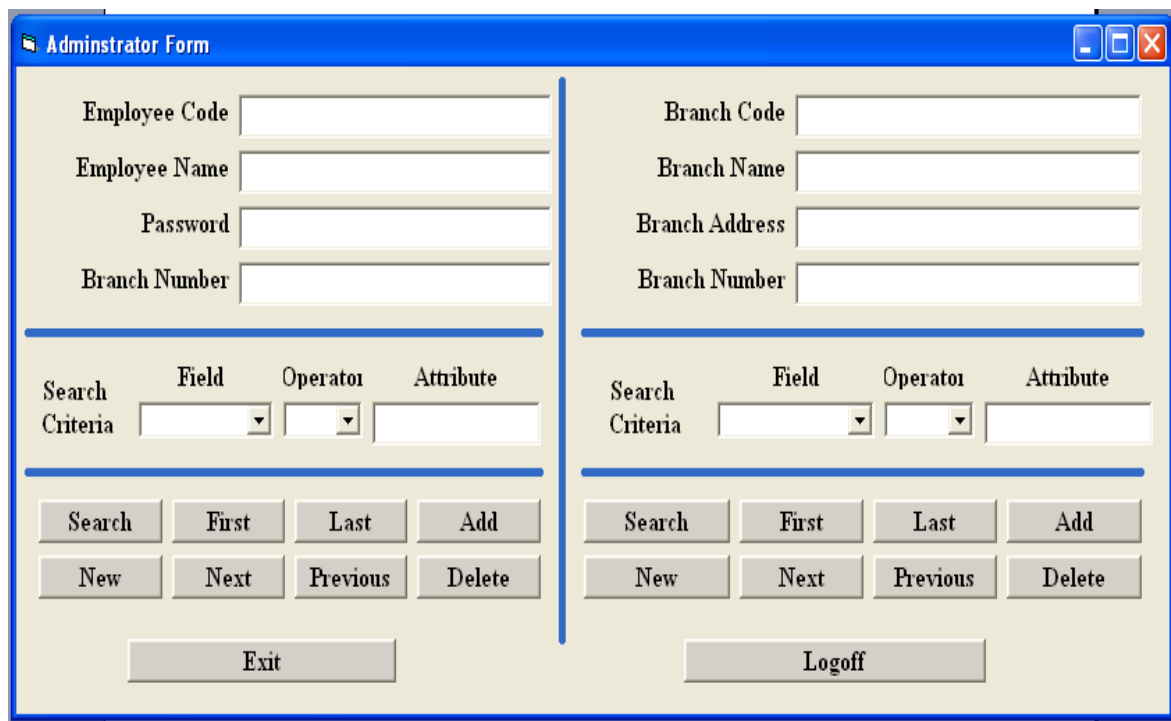
Return

Figure A-7: The customer information form.



The image shows a window titled "Administrator Login". It contains two text input fields: "Administrator Name" and "Administrator Password". Below the fields are two buttons: "Logoff" on the left and "Login" on the right. The window has a blue title bar with standard minimize, maximize, and close buttons.

Figure A-8: The administrator login form.



The image shows a window titled "Administrator Form". It is divided into two main sections. The left section contains four input fields: "Employee Code", "Employee Name", "Password", and "Branch Number". Below these fields is a search criteria section with a table:

Search Criteria	Field	Operator	Attribute
	<input type="text"/>	<input type="text"/>	<input type="text"/>

Below the search criteria are two rows of buttons: "Search", "First", "Last", "Add" and "New", "Next", "Previous", "Delete". At the bottom of the left section is an "Exit" button.

The right section contains four input fields: "Branch Code", "Branch Name", "Branch Address", and "Branch Number". Below these fields is another search criteria section with a table:

Search Criteria	Field	Operator	Attribute
	<input type="text"/>	<input type="text"/>	<input type="text"/>

Below the search criteria are two rows of buttons: "Search", "First", "Last", "Add" and "New", "Next", "Previous", "Delete". At the bottom of the right section is a "Logoff" button.

Figure A-9: The administrator form.

Authorizer Login

Serial Number

Authorizer Password

Logoff Login

Figure A-10: The authorizer login form.

Authorizer Form

Adminstrator Name

Adminstrator Password

Database File Directory

Load Database File Directory

Save Setting

Return

Figure A-11: The authorizer form.