LIBRARY MANAGEMENT SYSTEM
USING RFID TECHNOLOGY
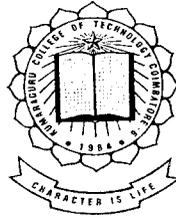
A PROJECT REPORT

Submitted by

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in partial fulfillment for the award of the degree

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BACHELOR OF TECHNOLOGY

IN

INFORMATION TECHNOLOGY

KUMARAGURU COLLEGE OF TECHNOLOGY, COIMBATORE

ANNA UNIVERSITY: CHENNAI   600 025

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BONAFIDE CERTIFICATE

Certified that this project report **"LIBRARY MANAGEMENT SYSTEM USING RFID"** is the bonafide work of **"VIGNESH.S, VINOTHKUMAR.M and VIVEKANANDHAN.S"**, who carried out the project work under my supervision.

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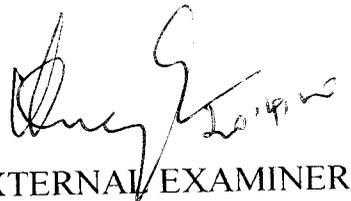**SUPERVISOR,**

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Hereby declare that the project entitled **"LIBRARY MANAGEMENT SYSTEM USING RFID"**, submitted in partial fulfillment to ANNA University as the project work of Bachelor of Technology (Information Technology) degree, is a record of original work done by us under the supervision and guidance of Department of Information Technology, Kumaraguru College of Technology, Coimbatore.
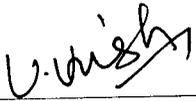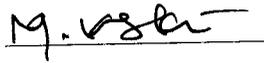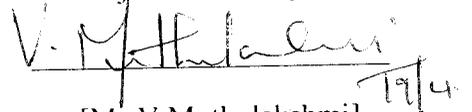
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We would like to thank our guide **Ms.V.Muthulakshmi**, without whose motivation and guidance we would not have been able to embark on a project of this magnitude. We express our sincere thanks for her valuable guidance, benevolent attitude and constant encouragement.

We reciprocate the kindness shown to us by the staff members of our college, people at home and our beloved friends who have contributed in the form of ideas, constructive criticism and encouragements for the successful completion of the project.

ABSTRACT

This project focuses on developing an easy accessible application that assists the user to access the library system through RFID tag and it adds up with advantage for the administrator for modifying the library database .The RFID tag is used as Book id and Member id. Under the library access the split up is maintained in between the administrator and the user system. Proper authentications for prohibiting an external user to use the registration process and also to access the administrator domain are being implemented. In the administrator domain only the required librarian is allowed to access through a specified password. Now in the accessible administrator form, the title bar comprises of file, edit, admin and help.

In the first menu, file has the option of adding of book, members and the close option. In the addition of books we have book id, name, author and category. The category can be added up from the admin menu that has the option, new book category. Next comes the option of addition of member into the database. This menu comprises of member id, member name and the password allotted. It has the entry date that shows the date at which the book is issued and it has the category according to which number of days and books are decided to be registered, after it is registered the message "member registered successfully" is displayed.

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NOMENCLATURE

The various nomenclature used in this project report are

RFID   Radio Frequency Identification

CD   Compact Disc

DVD   Digital Video Display

EAS   Electronic Article Surveillance

DFD   Data Flow Diagram

GUI   Graphical User Interface

ERD   Entity Relationship Diagram

EAS   Electronic Article Surveillance

INTRODUCTION

1. INTRODUCTION

1.1 Overview

Radio frequency identification (RFID) is an automatic identification method, relying on storing and remotely retrieving data using devices called RFID tags or transponders and RFID readers. RFID tag is an object that can be attached to or incorporated into a product, animal or the person for the purpose of identification using radio waves. RFID reader consists of a transceiver and a decoder that read and writes data to the tag. RFID is more advantageous than the existing Bar Code System. It is the advanced technology used in many areas for the identification of products.
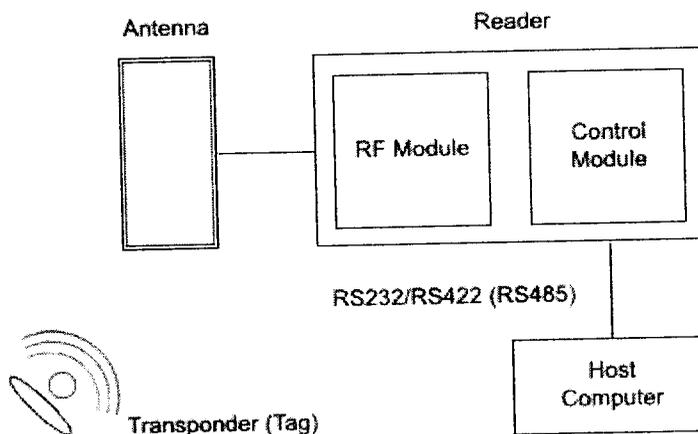
Figure-1.1 Overview RFID Systems

Table 1.1 Benefits of RFID technology over the commonly used Bar code technology

S.No	Features	RFID	Barcode Technology
1	Visibility	Works in any direction, does not require line of sight.	Directional, requires line of sight
2	Read range	Between 4 and 80cm using passive tags, up to 100 meters using active tags	Typically 15-30cm(6-12 inches)
3	Read rate	Up to 200 tags per second	Limited to rate at which objects can be physically located in front of scanner
4	Automation	No human intervention required	Often requires human intervention to ensure correct orientation
5	Data storage	Up to 4 KB using passive tags and 32 KB using active tags.	None
6	Durability	Withstands harsh environments(snow, rain, sunlight)	Prone to scratching and tearing
7	Flexibility	Tags can be packaged for a wide variety of applications	Must be located on outside of package, on a relatively flat surface
8	Environment	Low frequency technology can read tags located underground	Cannot read without the line of sight.
9	Security	Near impossible to replicate	Simple to replicate
10	Maintenance	Can operate for extended periods of time with no maintenance	Lenses must be cleaned periodically

1.2 Objective of the Project :

A library management system is a cumbersome job. Many libraries are starting to tag every item in their collections with radio frequency identification (RFID) tags. . In the existing system, every activity has to be done manually .These processes can be simplified, when it is automated using an RFID system.

The technology works on the principle of exchange of radio signals between the identification medium and a reader .The identification medium can be implanted or attached to anything. The medium is made from plastic or paper. Embedded within this is a microchip with a transponder. This microchip is completely built into the medium and is not exposed on the surface. Also the time taken for checking in and checking out of books is also reduced.

Radio Frequency Identification is a revolutionary new input, identification and process technology which integrates the advantages of all earlier systems and at the same time does not carry any of their risk factors.

1.3 Existing system:

A library stacked with books and other information dissemination processes, has a physical presence. A library is an institution of knowledge acquisition and learning; it provides invaluable service to its members, patrons and to a wider local community.

Current library management systems use barcode technology and security strips. Using barcodes, a library management system can keep records of lending, borrowing and shelving status of items such as books, audio or videotapes, CDs, DVDs, etc. Security strips on library items tag their movements.

But barcodes and security strips (electronic article surveillance or EAS) have their limitations. They are slow to read and are prone to sabotaging by thieves. All these lead to irreparable loss to a library and its valuable inventory stock. This is where RFID technology can come to the aid of library managers and users.

1.4 Advantages of the proposed system:

- Uncompromised security within the library

- Efficient collection management system (can be located suitably and made 24x7)

- Uncompromised collection security

- Flexible staff schedules

- Labor saving methods free the staff to help customers

- Higher customer/patron satisfaction levels

- Improved inter-library cooperation

- Better preservation of inventory because of less handling by staff

- Same security and labeling formats for all items such as books, CDs and DVDs, hence better management of databases

STSTEM FLOW

2. SYSTEM FLOW

A basic RFID system consists of two components:

- RFID reader

- RFID tags

2.1 RFID Readers

The RFID reader consists of two main components

- An antenna or coil

- A transceiver

2.1.1 Antenna or coil:

The antenna emits radio signals to activate the tag and read and write data to it. Antennas are the conduits between the tag and the transceiver, which controls the system's data acquisition and communication. Antennas are available in a variety of shapes and sizes; they can be built into a door frame to receive tag data from persons or things passing through the door. The electromagnetic field produced by an antenna can be constantly present when multiple tags are expected simultaneously.

2.1.2 Transceiver:

The transceivers are used to decode the data that are passed by the antenna. It is used to regulate the frequency between the antenna and the circuit. While transmitting data, it oscillates the data to correct transmitting frequency of the antenna using an LC circuit. It decodes the information and

passes the information to a microprocessor or microcontroller for processing the data. The reader emits radio waves in ranges pf anywhere from one inch to 100 feet or more, depending upon its power output and the radio frequency used.

The interrogator, an antenna packaged with a transceiver and decoder, emits a signal activating the RFID tag so it can read and write data to it. When an RFID tag passes through the electromagnetic zone, it can detect the reader's activation signal. The reader decodes the data encoded in the tag's integrated circuit and data is passed to the host computer. The application software on the host processes the data and may perform various filtering operations to reduce the numerous often redundant reads of the sane tag to a smaller and more useful data set.

2.2 RFID tags

The tag contains a transponder with a digital memory chip that is given a unique electronic product code. RFID tags come in a wide variety shapes and sizes. Tags can be screw-shaped to identify trees or credit cards for use in access applications. The anti-theft hard plastic tags attached to merchandise in stores are RFID tags. In addition Heavy duty 5-by 4-by 2inch rectangular transponders used to track container trucks and railroad cars for maintenance.

2.2.1Active RFID tags:

Active RFID tags are powered by an internal battery and are typically read/write. An active tags memory size varies according to application requirements. In a typical read/write RFID work in process system, a tag might give a machine a set of instructions and the machine would then report its

performance to the tag. This encoded data would then become part of the tagged part's history. The battery supplied power of an active tag generally gives it a longer read range. The trade off is greater size, greater cost and a limited operational life.

2.2.2 Passive RFID tags:

Passive RFID tags operate without a external power source and obtain operating power generated from the reader. Passive tags are consequently much lighter than active tags, less expensive and offer a virtually unlimited operational lifetime. The trade-off is that they have short read ranges than active tags and require a high powered reader. Read-only tags are typically passive and programmed with a unique set of data.

Developments in RFID technology continue to yield large memory capacities, wide reading ranges and faster processing. However, RFID will continue to grow in its established niches where barcode or other optical technologies are not effective.

HEADER	MANUFACTURER CODE	PRODUCT CODE	SERIAL NEMBER

Figure 2.1 RFID TAG DATA FORMAT

2.3 Communication between Tag and Reader:

The Tag-it transponder is half- duplex, the fundamental operation being a transaction which consists of:

- A request sent by the reader to the transponder

- A response sent back by the transponder to the reader

Both the request and the response contain certain Command Code which specifies the operation to be performed by the transponder. The transponder never initiates a response without having been instructed to do so by the reader. The request must have been fully understood by the transponder before it can respond. He presence of the 13.56 MHz carrier frequency will power up the transponder but does not generate a spontaneous emission (response) of any kind by the transponder.

Each Tag-it transponder has a unique address which is factory-programmed and 32 bits long, thus allowing an address range of more than 4 billion individual addresses. If several transponders are expected to be present in the read area, the first step is to inventory them. This is done by the Simultaneous Identification (SID) mechanism which results in the reader storing in its memory the addresses of each transponder present within its range. At this point, the reader may them on to the application processor.

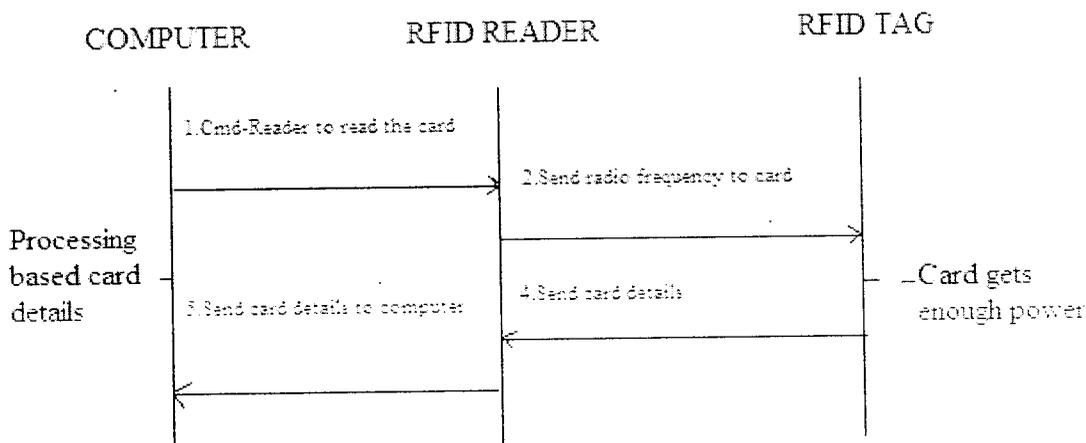COMPUTER   RFID READER   RFID TAG

1.Cmd-Reader to read the card

2.Send radio frequency to card

Processing
based card
details

_Card gets
enough power

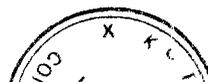3.Send card details to computer

4.Send card details

Figure 2.2 COMPUTER,READER AND TAG COMMUNICATION

2.4 RFID Working Principle:

2.4.1 RFID System:

In typical system tags are attached to objects. Each tag has a certain amount of internal memory (EEPROM) in which it stores information about the object, such as its unique ID, or in some cases more details of bibliographic data and product composition. When these tags pass through a Radio Field generated by a reader, the transponder in the tag transmits the stored information back to the reader, thereby identifying the object.
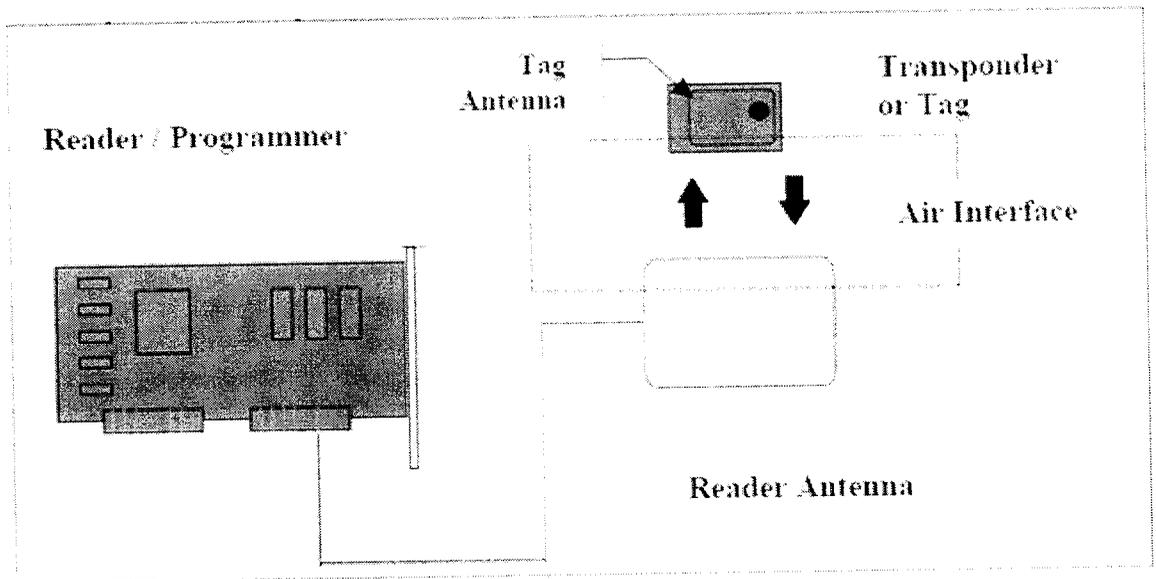

Figure 2.3 RFID SYSTEM COMPONENT

2.4.2 Tag Communication:

The communication process between the reader and the tag is by wireless. The major differences between the different types of waves are the distances covered by one cycle of the wave and the number of waves that pass a certain point during a set time period. The frequency is the number of waves passing a given point in one second. For any electromagnetic wave, the wavelength multiplied by the frequency equals the speed of light. The frequency of an RF signal is usually expressed in units called hertz (Hz). One Hz equals one wave per second. Basically what happens is that when the reader is switched on it starts emitting a signal at the selected frequency band. Any corresponding tag in the vicinity of the reader will detect the signal and use the energy from it, to wake up and supply operating power to its internal circuits. Once the tag has decoded the signal as valid, it replies to the reader and indicates its presence by modulating (affecting) the reader field.
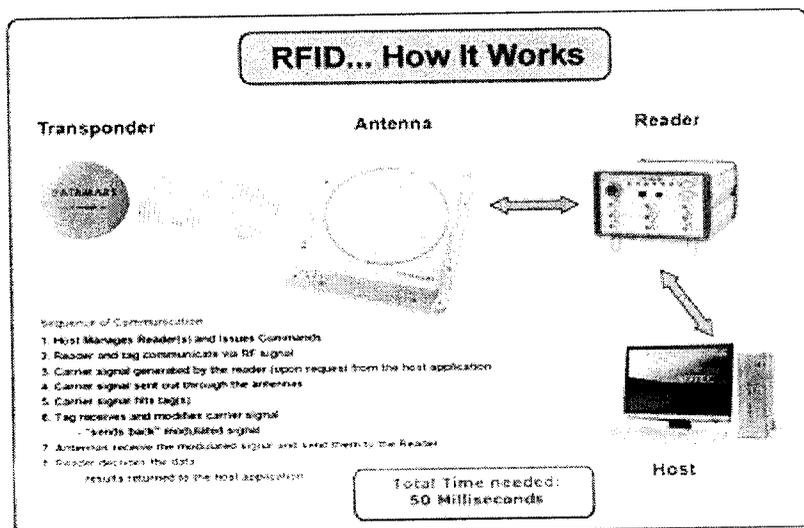

Figure 2.4 RFID TRANSACTION

2.4.3 Tag IC's

A single-chip design led to the RFID tag, a small device composed of a chip, an antenna, and an optional power source, that carries a unique identifier. The 1990s witnessed the use of such tags for card-keys, fuel-station payment systems, and automated toll payment. Such tags were typically specialized for a certain class of applications and cost a few dollars each. The tags typically stored application-specific data and were capable of modest processing on-tag.
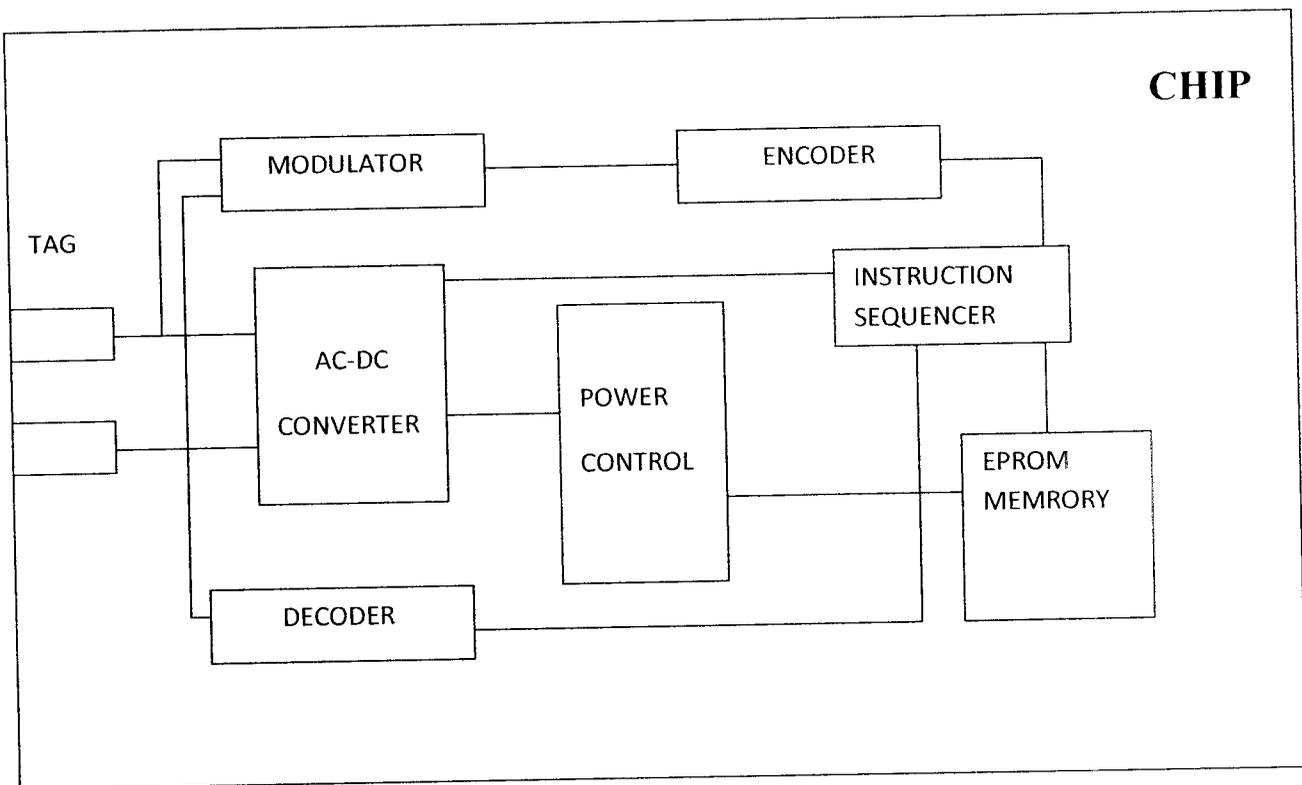

Figure 2.4 Basic Tag IC Architecture

2.5 Advantages of RFID systems:

2.5.1 Rapid charging/discharging:

The use of RFID reduces the amount of time required to perform circulation operations. The most significant time savings are attributable to the facts that information can be read from RFID tags much faster than from barcodes and that several items in a stack can be read at the same time. While initially unreliable, the anti-collision algorithm that allows an entire stack to be charged or discharged now appears to be working well.

2.5.2 Simplified patron self-charging/discharging:

For patrons using self-charging, there is a marked improvement because they do not have to carefully place materials within a designated template and they can charge several items at the same time. Patron self-discharging shifts that work from staff to patrons. Staff is relieved further when readers are installed in book drops.

2.5.3 High reliability:

The readers are highly reliable. Some RFID systems have an interface between the exit sensors and the circulation system to identify the items moving out of the library. Were a patron to run out of the library and not be intercepted, the library would at least know what had been stolen. If the patron card also has an RFID tag, the library will also be able to determine who removed the items without properly charging them. This is done by designating a bit as the "theft" bit and turning it off at time of charge and on at time of discharge.

2.5.4 High-speed inventorying:

Unique advantage of RFID systems is their ability to scan books on the shelves without tipping them out or removing them. A hand-held inventory reader can be moved rapidly across a shelf of books to read all of the unique identification information. Using wireless technology, it is possible not only to update the inventory, but also to identify items which are out of proper order.

2.5.6 Automated materials handling:

Another application of RFID technology is automated materials handling. This includes conveyor and sorting systems that can move library materials and sort them by category into separate bins or onto separate carts.

2.5.7 Long tag life:

Finally, RFID tags last longer than barcodes because nothing comes into contact with them. Most RFID vendors claim a minimum of 100,000 transactions before a tag may need to be replaced.

2.5.8 Fast Track Circulation Operation:

The use of RFID reduces the amount of time required to perform circulation operations. The most significant time savings are attributable to the facts that information can be read from RFID tags much faster than from barcodes and that several items in a stack can be read at the same time. While initially unreliable, the anti-collision algorithm that allows an entire stack to be charged or discharged now appears to be working well.

2.6 RFID Technology in Libraries

The concept of RFID can be simplified to that of an electronic barcode and can be used to identify, track, sort or detect library holdings at the circulation desk and in the daily stock maintenance. This system, consist of smart RFID labels, hardware and software, provides libraries with more effective way of managing their collections while providing greater customer service to their patrons.

The technology works through flexible, paper-thin smart labels, approximately 2"X2" in size, which allows it to be placed inconspicuously on the inside cover of each book in a library's collection. The tag consists of an etched antenna and a tiny chip which stores vital bibliographic data including a unique Accession number to identify each item. This contrasts with a barcode label, which does not store any information, but merely points to a database. These smart labels are applied directly on library books and can be read with an RFID interrogator/scanner. Line of sight is not essential for reading the tags with the scanner, therefore, the books require much less human handling to be read and processed. Middleware or Savant software integrates the reader hardware with the existing Library Automation Software for seamless functioning of circulation.

The information contained on microchips in the tags affixed to library materials is read using radio frequency technology regardless of item orientation or alignment. It provides a contact less data link, without need for line of sight, for example, the documents in the shelves or cardboard boxes can be checked without removing or opening. RFID has no concerns about harsh environments that restrict other auto ID technologies such as bar codes. Tags

have a discrete memory capacity that varies from 96 bits to 2kbytes. In addition to tags, an RFID system requires a means for reading or "interrogating" the tags to obtain the stored data and then some means of communicating this tag data to library information system.

RFID-based systems have been implemented for efficient document tracking purpose throughout the libraries that combine, easier and faster charging and discharging of documents, security of materials, inventorying, stock verification and shelf handling. RFID tag's transponder listens for a radio query from the reader and responds by transmitting their unique ID code. Most RFID tags have no batteries; they use the power from the initial radio signal to transmit their response.

2.7 DETAILS OF METHODOLOGY ADOPTED:

2.7.1 Adding Book Details

Initially the administrator has to enter the book details which are a new arrival to the library. The details to be entered are book ID, book name, author name. After the details are entered, the book details such as book ID, book name, author name are stored in the book details table. Availability of the book is stored as "yes" for all the books that are registered newly.

2.7.2 Modifying Book Details

In this module, changes to the book details can be updated. To modify the details of the book, the administrator has to scan the tag. If the tag is scanned, all the details of the particular book will be shown. The administrator will modify the particular details and update the database.

2.7.3 Adding Student Details

The administrator has to enter the student details that are all not yet registered in the library. The details to be entered are student ID, student name, roll no, department. After the details are entered, the student details such as student ID, student name, roll number and department are stored in the student details table. Number of the books taken will be stored as "0" for the entire student that are registered newly.

2.7.4 Modifying Student details

In this module, changes to the student details can be updated. To modify the details of the book, the administrator has to scan the tag. If the tag is scanned, all the details of the particular student will be shown. The

administrator will modify the particular details of the student and update the database.

2.7.5 Issue and Return of Books

For issue of books student book table will be created. Student Id, book Id, issue date, return date, book name is to be stored in the student book database. Here student Id and book Id are used as primary keys. The administrator must scan the tags of student and book. If se/she scan the book tag, all the book details will be retrieved and the student tag is scanned, student details will be retrieved. After issue of book, Number of books taken will be raised from the already stored value.

2.7.6 Book Search

Book search can be used by both administrator and student. The system asks to enter the book name or author name or book Id. If book name is entered, all the book details will be shown which matches the book name entered. The above is for book Id and author name also.

DESIGN AND DEVELOPMENT

3. DESIGN AND DEVELOPEMENT

3.1 SYSTEM DESIGN

System design is described as a process of planning a new business system or more to replace or to compliment an existing system. The system design states how a system will meet the requirements identified during the system analysis

System design focuses mainly on four distinct attributes. They are data structure, software architecture, interface representation and algorithmic details.

It describes a solution of approaching to the creation of new system. System design is a transmission from a user oriented document to a document oriented to programmers. It goes through a logical and physical design. The key points followed at the times of designing are:

1. Preparing input and output specification

2. Data flows and stores

3. Preparing security and control specification

4. Temporary and permanent collection of data

5. A walk through before implementation

6. Process

Reviewing the study phase activities and making decisions about which function are to be performed by the hardware, software, and human ware, started in the design phase. The output, input and file design for each of the programs was done.

The steps involved in designing phase were:

1. The function to be performed is identified

2. The input, output and file design is performed

3. The system and component cost requirements is specified

4. The design phase report is generated.

3.2 A FLOW DIAGRAM

A data flow diagram also known as "bubble chart" has the purpose of clarifying system requirements and identifying major transformation that will become program in system design. So it is the starting point of the phase that functionally decomposes the requirement specification down to the lowest level of details. A DFD contains series of bubbles joined by lines.

DFD SYMBOLS

1. A square defines a sources or destination of system data

2. An arrow identified data in motion. It is a pipeline. It is a pipeline through which information flows

3. A circle or a bubble represents a process that transforms incoming data flow into outgoing data flow

4. An open rectangle is a data store-data at rest or a temporary repository of data.
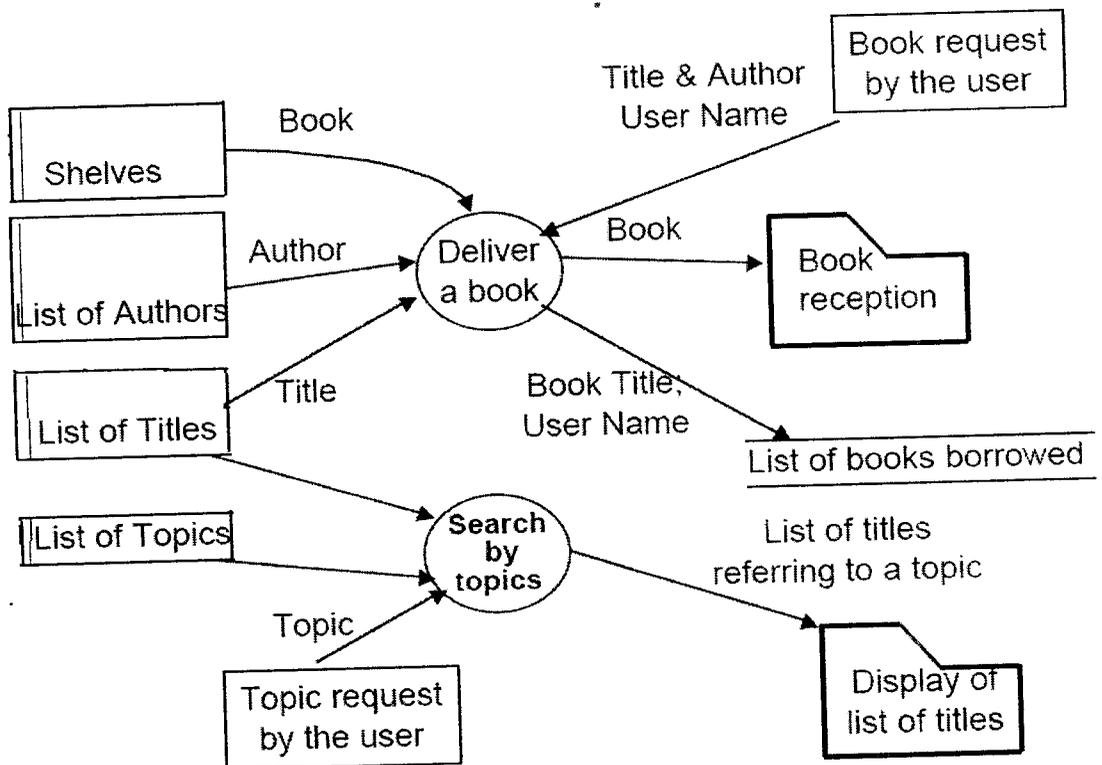
3.1 DATA FLOW DIAGRAM

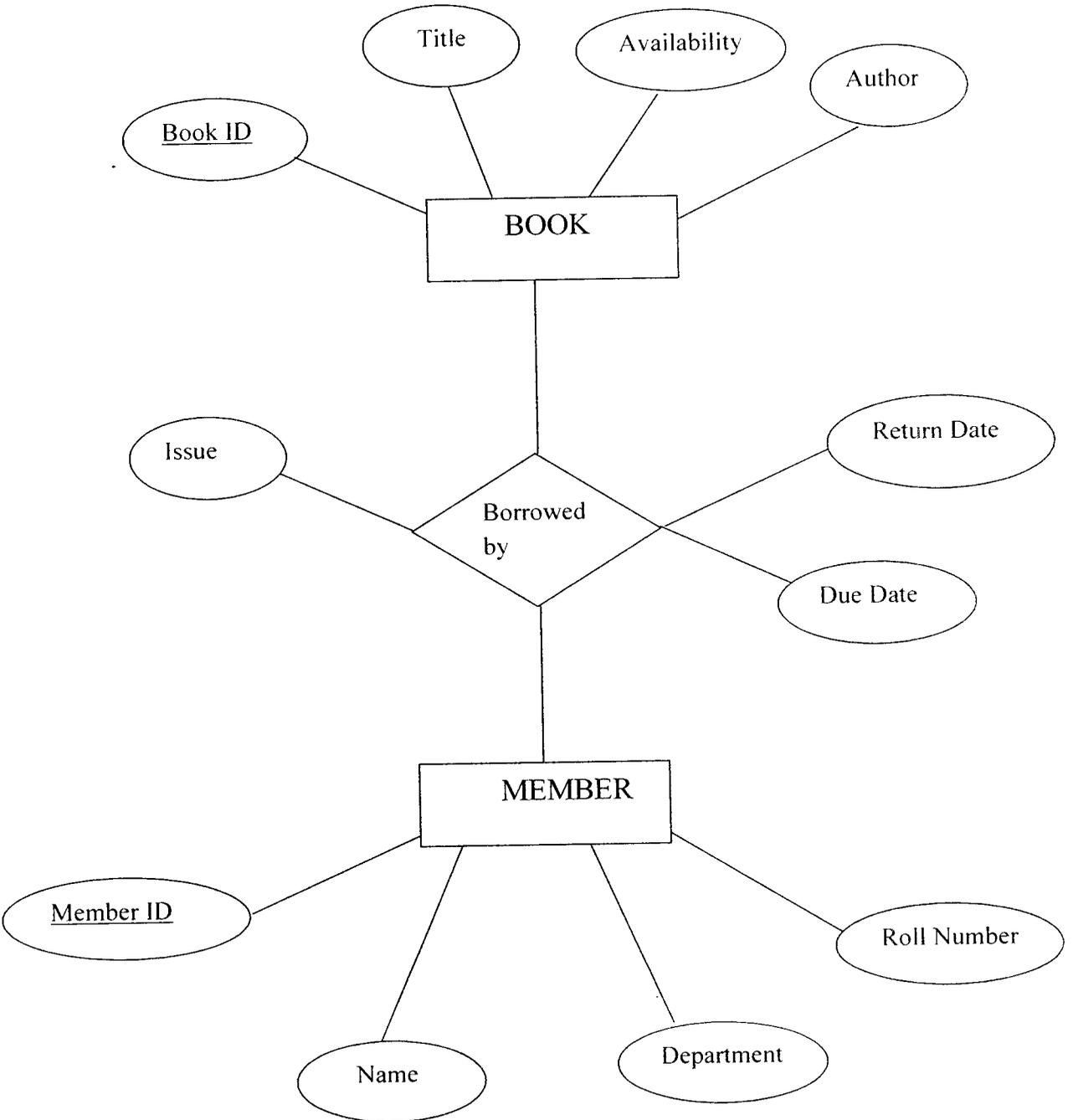Figure 3.2- DFD FOR LIBRARY SYSTEM

3.2 ER-Diagram

Figure 3.2- ER DIAGRAM FOR LIBRARY SYSTEM

3.3 Database design:

A database is designed to add the book information and student information in the book details module and in student module respectively, to store the book information that retrieved by the student, user information in login module. Microsoft access serves as the back-end. Four tables are maintained in the database namely Book Table, issue and return Table, Student Table, and users TABLE. Based on the information stored in the database, required reports are generated. The tables that are used are as follows

3.3.1 Book Details:

This table is used to store the book detail which is new arrival to the library. The fields included are Book ID, Book name, Author name, and Availability.

Table 3.1 Book Table

Book ID	Book Name	Author Name	Availability
10087865	Signals and System	Rathore	Yes
10056231	Data Mining	Vicky	Yes
10045673	DBMS	Hughes	Yes
10023451	TOC	Fabregas	Yes
10089567	Data Structures	Wiillams	Yes

3.3.2   Student Details:

This table is used to store the registered student details. The fields included in this table are Student ID (primary key), Student name, Roll number, Department, Number of books taken.

Table 3.2 Student Table

Student ID	Student Name	Roll Number	Department	No of Books Taken
19987611	Jagadheesh	58	IT	0
19932419	Manohar	36	CSE	0

3.3.3   Book Issue/Return Details:

This table is present in the onboard module and it stores the passenger information. The fields included in this table are tag id (primary key), customer id, source, in time, destination, out time, ticket value, trip date, trip number, out trip, Calculate usage Cheating User.

Table 3.3 Student Book Table

Student ID	Book ID	Book Name	Issue Date	Return Date	Fine
16861832	vinoth	Dsp	9/4/2010	23/4/2010	0
1212567	vignesh	Tcs	1/4/2010	15/4/2010	0

3.3.4   User Details:

This table is used to store the administrators and Student username and password. The fields included in this table are username (primary key), password and user type.

Table 3.4 Users Table

Username	Password	User type
Vivek	59	Admin
Vinod	58	user
Vicky	56	Admin

TESTING AND IMPLEMENTATION

4. TESTING AND IMPLEMENTATION

4.1 TESTING

Testing is a series of different tests that whose primary purpose is to fully exercise the computer based system. Although each test has a different purpose, all work should verify that all system element have been properly integrated and performed allocated function. Testing is the process of checking whether the developed system works according to the actual requirement and objectives of the system.

The philosophy behind testing is to find the errors. A good test is one that has a high probability of finding an undiscovered error. A successful test is one that uncovers the undiscovered error. Test cases are devised with this purpose in mind. A test case is a set of data that the system will process as an input. However the data are created with the intent of determining whether the system will process them correctly without any errors to produce the required output.

4.2 SYSTEM TESTING

It is the stage of implementation, which ensures that system works accurately and effectively before the live operation commences. It is a confirmation that all are correct and opportunity to show users that the system must be tested with text data and show that the system will operate successfully and produce expected results under expected conditions

Software testing is a crucial element of software quality assurance and represents the unlimited review of specification, design and coding. Testing represents an interesting anomaly for the software. During the earlier definition

and development phase, it was attempted to build the software from an abstract concept to tangible implementation.

4.3 TESTING OBJECTIVES:

Testing is the process of analyzing program with the intent of discovering errors. A good test case is one that has high probability of finding undiscovered error.

4.4 TYPES OF TESTING:

- Unit testing

- Integration testing

- Validation testing

- Output testing

- User acceptance testing

4.4.1 Unit Testing

All modules were tested and individually as soon as they were completed and were checked for their correct functionality.

4.4.2 Integration Testing

The entire project was split into small program; each of these single programs gives a frame as an output. These programs were tested individually; at last all these programs where combined together by creating another program where all these constructors were used. It give a lot of problem by not functioning is an integrated manner.

The user interface testing is important since the user has to declare that the arrangements made in frames are convenient and it is satisfied. When the frames where given for the test, the end user gave suggestion. Based on their suggestions the frames where modified and put into practice.

4.4.3 Validation Testing:

At the culmination of the black box testing software is completely assembled as a package. Interfacing errors have been uncovered and corrected and a final series of test i.e., Validation succeeds when the software function in a manner that can be reasonably accepted by the customer.

4.4.4 Output Testing:

After performing the validation testing the next step is output testing of the proposed system. Since the system cannot be useful if it does not produce the required output. Asking the user about the format in which the system is required tests the output displayed or generated by the system under consideration. Here the output format is considered in two ways. One is on screen and another one is printed format. The output format on the screen is found to be corrected as the format was designed in the system phase according to the user needs. And for the hardcopy the output comes according to the specifications requested by the user.

4.5 SYSTEM IMPLEMENTATION

The purpose of System Implementation can be summarized as follows:

It making the new system available to a prepared set of users (the deployment), and positioning on-going support and maintenance of the system within the Performing Organization (the transition).

At a finer level of detail, deploying the system consists of executing all steps necessary to educate the Consumers on the use of the new system, placing the newly developed system into production, confirming that all data required at the start of operations is available and accurate, and validating that business functions that interact with the system are functioning properly.

Transitioning the system support responsibilities involves changing from a system development to a system support and maintenance mode of operation, with ownership of the new system moving from the Project Team to the Performing Organization.

System implementation is the important stage of project when the theoretical design is tuned into practical system. The main stages in the implementation are as follows:

- Planning

- Training

- System testing and

- Changeover Planning

Planning is the first task in the system implementation. Planning means deciding on the method and the time scale to be adopted. At the time of implementation of any system people from different departments and system analysis involve. They are confirmed to practical problem of controlling various activities of people outside their own data processing departments. The line managers controlled through an implementation coordinating committee. The committee considers ideas, problems and complaints of user department, it must also consider;

1. The implication of system environment

2. Self selection and allocation form implementation tasks

3. Consultation with unions and resources available

4. Standby facilities and channels of communication

CONCLUSION

5. CONCLUSION

From a proper analysis of positive points and constraints on the component, it can be safely concluded that the product is a highly efficient GUI based component. Its cost is under the budget and make within given time period. It is desirable to aim for a system with a minimum cost subject to the condition that it must satisfy the entire requirement. This software is extendable in ways that its original developers may not expect.

Though the unique advantages and flexibility of RFID is the good news, the technology is still not yet widely understood or installed in the library environment, and the cost/ROI models far from established. RFID, its application, standardization, and innovation are constantly changing. Its adoption is still relatively new and hence there are many features of the technology that are not well understood by the general populace. Developments in RFID technology continue to yield larger memory capacities, wider reading ranges, and faster processing. The interest in RFID as a solution to optimize further the automation and tracking of documents are gathering momentum at an increasing pace, with more libraries joining the trails.

"RFID is increasing in popularity among libraries, as the early adopters of this technology have shown that, it makes good economic sense, both for large and small libraries.

FUTURE ENHANCEMENT

6. FUTURE ENHANCEMENTS

This application can be easily implemented under various situations. We can add new features as and when we require. The below features can be added for the enhancement of library system in future.

- Encryption of Data.

- Book search using hand-held RFID device

- Self book check-out.

- Self book return.

- Book Theft detection.

SOURCE CODE

APPENDIX-1 SOURCE CODE

BOOK DETAILS:

```
Dim s, f, t As String
Dim pos_tagid As Integer
Dim MSerialno, Serialno As Boolean
Dim tblval_MSerialno, tblval_MBName, tblval_MAName, tblval_MBid As String
Dim tblval_Serialno As String


Private Sub BtnBack1_Click(Index As Integer)
FrmLibrary.Show
Unload Me
End Sub


Private Sub BtnBack2_Click(Index As Integer)
FrmLibrary.Show
End Sub


Private Sub BtnClear_Click()
TxtMSerialno.Text = ""
TxtMBName.Text = ""
TxtMAName.Text = ""
Text1.Text = ""
End Sub


Private Sub BtnDelete_Click()
If TxtMSerialno.Text = "" Or TxtMBName.Text = "" Or TxtMAName.Text = ""
Then
MsgBox "Fill all the fields "
Else
Data1.Recordset.Delete
MsgBox "record deleted"
FrmBookDetailsMclear
End If
End Sub


Private Sub BtnEdit_Click()
If MSerialno = True Then
```

```vb
End If
End Sub

Private Sub a()
On Error GoTo errhandle
  With MSComm1
    'make sure the serial port is not open (by this program)
    If .PortOpen Then .PortOpen = False
    'set the active serial port
    .CommPort = 1
    'set the badurate,parity,databits,stopbits for the Connection
    .Settings = "9600,N,8,1"
    'set the DRT and RTS flags
    .DTREnable = True
    .RTSEnable = True
    'enable the oncomm event for every reveived character
    .RThreshold = 1
    'disable the oncomm event for send characters
    .SThreshold = 0
    'open the serial port
    .PortOpen = True
  'End With 'MSComm1
  'With Text9
  ' 'set the properties for the displaying textbox
  '.BackColor = vbCyan
  ' .Locked = True
   '.Text = ""
  'End With 'Text1
  End With
errhandle:
If Err.Number = 8002 Then
MsgBox "The external devices of this project are not connected properly!!!!" +
vbNewLine + "Hence, the project will not work properly", vbCritical,
FrmCardDetails.Caption
End If
End Sub
```

STUDENT DETAILS:

```
Dim s, t, f As String
Dim pos_tagid As Integer
Dim Id, MSId As Boolean
Dim tblval_MSId, tblval_MName, tblval_MRollno, tblval_dept As String
Dim tblval_Id As String


Private Sub BtnBack_Click()
FrmLibrary.Show
Unload Me
End Sub

Private Sub BtnClear_Click()
FrmBookDetailstxtclear
End Sub

Private Sub BtnDelete_Click()
If TxtMId.Text = "" Or TxtMName.Text = "" Or TxtMRollno.Text = "" Or
CmbMDept.Text = "" Then
MsgBox "Fill all the fields "
Else
Data1.Recordset.Delete
MsgBox "record deleted"
FrmBookDetailsMclear
End If
End Sub

Private Sub BtnMClearall_Click()
FrmBookDetailsMclear
End Sub

Private Sub BtnMBack_Click()
FrmLibrary.Show
Unload Me
End Sub

Private Sub BtnMUpdate_Click()
```

```
If TxtMId.Text = "" Or TxtMName.Text = "" Or TxtMRollno.Text = "" Or
CmbMDept.Text = "" Then
MsgBox "Fill all the fields correctly"
Else
Data1.Recordset.edit
edit
Data1.Recordset.Update
For intloopIndex = 1 To 4
Data2.Recordset.edit
Data2.Recordset("Sid") = TxtMId.Text
Data2.Recordset.Update
Data2.Recordset.MoveNext
Next intloopIndex
Data3.Recordset.edit
Data3.Recordset("sid") = TxtMId.Text
Data3.Recordset("username") = TxtMName.Text
Data3.Recordset("password") = TxtMRollno.Text
Data3.Recordset.Update
FrmBookDetailsMclear
End If
MsgBox "updated"
End Sub

Private Sub BtnSave_Click()
If TxtId.Text = "" Or TxtName.Text = "" Or TxtRollno.Text = "" Or
CmbDept.Text = "" Then
MsgBox "Fill all the fields correctly"

ElseIf Data1.Recordset.RecordCount > 0 Then
    Data1.Recordset.MoveFirst
    Do Until Data1.Recordset.EOF = True
     tblval_Id = Data1.Recordset("SId")
        If TxtId.Text = tblval_Id Then
        f = 0
        Else
        f = 1
      End If
    Data1.Recordset.MoveNext
    Loop
```

```
End If
If f = 0 Then
MsgBox "Record already exists"
FrmBookDetailstxtclear
Else
Data1.Recordset.AddNew
assign
Data1.Recordset.Update
For intloopIndex = 1 To 4
Data2.Recordset.AddNew
Data2.Recordset("sid") = TxtId.Text
Data2.Recordset.Update
Next intloopIndex
Data3.Recordset.AddNew
Data3.Recordset("sid") = TxtId.Text
Data3.Recordset("username") = TxtName.Text
Data3.Recordset("password") = TxtRollno.Text
Data3.Recordset("usertype") = "student"
Data3.Recordset.Update
MsgBox " Updated "
FrmBookDetailstxtclear
End If
End Sub
Private Sub Form_Load()
Data1.DatabaseName = App.Path + "\Library1.mdb"
Data1.RecordSource = "Student Details"
Data2.DatabaseName = App.Path + "\Library1.mdb"
Data2.RecordSource = "student book details"
Data3.DatabaseName = App.Path + "\Library1.mdb"
Data3.RecordSource = "users"
End Sub

Private Sub assign()
Data1.Recordset("SId") = TxtId.Text
Data1.Recordset("SName") = TxtName.Text
Data1.Recordset("Roll No") = TxtRollno.Text
Data1.Recordset("Departmant") = CmbDept.Text
End Sub
```

ISSUE/RETURN OF BOOK:

```vb
Dim q As Integer
Dim MSerialno, Serialno As Boolean
Dim tblval_MSerialno, tblval_MBName, tblval_MAName, tblval_MBid As String
Dim tblval_Serialno, tblval_Sno As String

Private Sub btnclearall_Click()
txtsid.Text = ""
txtbid.Text = ""
txtbn.Text = ""
txtan.Text = ""
txtdor.Text = ""
txtsn.Text = ""
txtd.Text = ""
txtnobi.Text = ""
txtenob.Text = ""
txtfi.Text = ""
End Sub

Private Sub BtnIssue_Click()
Dim a As Integer
a = 0
x = 0
a = txtsid.Text
Data3.Recordset.MoveFirst
While Data3.Recordset.EOF = False

If Data3.Recordset("sid") = a Then
a = Data3.Recordset("sid")
x = x + 1
End If
'Wend
Data3.Recordset.MoveNext
Wend
```

```
Data4.Recordset.AddNew
Data4.Recordset("sid") = txtsid.Text
Data4.Recordset("bid") = txtbid.Text
Data4.Recordset("issue date") = DTPicker1.Value
Data4.Recordset.Update
tt:
Data3.Recordset.MoveFirst
While Data3.Recordset.EOF = False
If Data3.Recordset("sid") = a Then
If Data3.Recordset("bookid") <> 0 Then
p = p + 1
GoTo yy
Else
GoTo ru
End If
End If
ru:
yy:

Data3.Recordset.MoveNext
Wend
Data1.Recordset.MoveFirst
While Data1.Recordset.EOF = False
If txtsid.Text = Data1.Recordset("SId") Then
Data1.Recordset.edit
Data1.Recordset("No of Books") = p
txtnobi.Text = p
txtenob.Text = 4 - p
Data1.Recordset.Update
End If
Data1.Recordset.MoveNext
Wend
Else
MsgBox "You have reached the Maximum limit"
End If
nn:
End Sub
```

```
Data4.DatabaseName = App.Path + "\Library1.mdb"
Data4.RecordSource = "permanent stud book details"
DTPicker1.Value = DTPicker1.Day & "/" & DTPicker1.Month & "/" &
DTPicker1.Year

On Error GoTo errhandle
   With MSComm1
   'make sure the serial port is not open (by this program)
   If .PortOpen Then .PortOpen = False
   'set the active serial port
   .CommPort = 1
   'set the badurate,parity,databits,stopbits for the Connection
   .Settings = "9600,N,8,1"
   'set the DRT and RTS flags
   .DTREnable = True
   .RTSEnable = True
   'enable the oncomm event for every reveived character
   .RThreshold = 1
   'disable the oncomm event for send characters
   .SThreshold = 0
   'open the serial port
   .PortOpen = True
  'End With 'MSComm1
  'With Text9
  ' 'set the properties for the displaying textbox
   '.BackColor = vbCyan
   ' .Locked = True
   '.Text = ""
  'End With 'Text1
  End With
 errhandle:
 If Err.Number = 8002 Then
 MsgBox "The external devices of this project are not connected properly!!!!" +
 vbNewLine + "Hence, the project will not work properly", vbCritical,
 FrmCardDetails.Caption
 End If
 End Sub
```

BOOK SEARCH:

```
Private Sub Form_Load()
Data1.DatabaseName = App.Path + "\Library1.mdb"
Data1.RecordSource = "Book Details"
End Sub

Private Sub radseabknam_Click()
Label1.Visible = True
txtbn.Visible = True
Label4.Visible = False
txtbid.Visible = False
Label3.Visible = False
txtan.Visible = False
End Sub

Private Sub radseabkno_Click()
Label4.Visible = True
txtbid.Visible = True
Label3.Visible = False
txtan.Visible = False
Label1.Visible = False
txtbn.Visible = False
End Sub

Private Sub radseanam_Click()
Label3.Visible = True
txtan.Visible = True
Label4.Visible = False
txtbid.Visible = False
Label1.Visible = False
txtbn.Visible = False
End Sub

Private Sub Btnsearch_Click()
If txtbn.Visible = True Then
Data1.Recordset.MoveFirst
While Data1.Recordset.EOF = False
If Data1.Recordset("book name") = txtbn.Text Then
```

```
MSFlexGrid1.Col = 0
MSFlexGrid1.Row = 0
MSFlexGrid1.Text = "S.No"
MSFlexGrid1.Col = 1
MSFlexGrid1.Row = 0
MSFlexGrid1.Text = "Book ID"
MSFlexGrid1.Col = 2
MSFlexGrid1.Row = 0
MSFlexGrid1.Text = "Book name"
MSFlexGrid1.Col = 3
MSFlexGrid1.Row = 0
MSFlexGrid1.Text = "Author name"
MSFlexGrid1.Col = 4
MSFlexGrid1.Row = 0
MSFlexGrid1.Text = "Availablity"


x = 0
q = 0
q = txtbn.Text
Data1.Recordset.MoveFirst
'For intloopIndex = 1 To 4
While Data1.Recordset.EOF = False
If Data1.Recordset("Book name") = q Then
q = Data1.Recordset("Book name")
x = x + 1
'GoTo rr
End If
Data1.Recordset.MoveNext
Wend
rr:
'Next intloopIndex

For intloopIndex = 1 To x
MSFlexGrid1.Col = 0
MSFlexGrid1.Row = intloopIndex
MSFlexGrid1.Text = Str(intloopIndex)
Next intloopIndex

For intloopIndex = 1 To x
```

```
Data1.Recordset.MoveNext
Wend
For intloopIndex = 1 To x
MSFlexGrid1.Col = 0
MSFlexGrid1.Row = intloopIndex
MSFlexGrid1.Text = Str(intloopIndex)
Next intloopIndex
For intloopIndex = 1 To x
MSFlexGrid1.Col = 3
MSFlexGrid1.Row = intloopIndex
a = txtan.Text
Data1.Recordset.MoveFirst
While Data1.Recordset.EOF = False
If Data1.Recordset("Author name") = a Then
If intloopIndex = 1 Then
o = Data1.Recordset("SerialNo")
c = Data1.Recordset("Author name")
MSFlexGrid1.Text = c
t = c
pp = c
GoTo bb1
Else
If pp = c Then
Data1.Recordset.MoveNext
c = Data1.Recordset("Author name")
t = c
MSFlexGrid1.Text = c
pp = c
GoTo ggg1
End If
End If
End If
Data1.Recordset.MoveNext
Wend
ggg1:
bb1:
End Sub
```

STUDENT FORM:


```
Dim x As Integer
Dim a As Integer

Private Sub btnchange_Click()
     If txtnp <> "" And txtcp.Text <> "" Then
       If txtnp.Text = txtcp.Text Then
       Data4.Recordset.MoveFirst
While Data4.Recordset.EOF = False
       If Data4.Recordset("sid") = Text1.Text Then
       Data4.Recordset.edit
       Data4.Recordset("password") = txtcp.Text
       Data4.Recordset.Update
       GoTo gf
       End If
       Data4.Recordset.MoveNext
 Wend
 gf:
       MsgBox "Password changed"
       Clear
       Else
       MsgBox "Password didn't match"
       clear
     End If
   Else
 MsgBox "Fill the fields correctly"
 End If
 End Sub

 Private Sub Form_Load()
 Data1.DatabaseName = App.Path + "\Library1.mdb"
 Data1.RecordSource = "Book Details"
 Data2.DatabaseName = App.Path + "\Library1.mdb"
 Data2.RecordSource = "Student Details"
 Data3.DatabaseName = App.Path + "\Library1.mdb"
 Data3.RecordSource = "student book details"
 Data4.DatabaseName = App.Path + "\Library1.mdb"
```

```
Data4.RecordSource = "users"
x = FrmLibrary.Text1.Text
Text1.Text = x
End Sub

Private Sub radseabknam_Click()
Label1.Visible = True
txtbn.Visible = True
Label4.Visible = False
txtbid.Visible = False
Label3.Visible = False
txtan.Visible = False
End Sub

Private Sub radseabkno_Click()
Label4.Visible = True
txtbid.Visible = True
Label3.Visible = False
txtan.Visible = False
Label1.Visible = False
txtbn.Visible = False
End Sub

Private Sub radseanam_Click()
Label3.Visible = True
txtan.Visible = True
Label4.Visible = False
txtbid.Visible = False
Label1.Visible = False
txtbn.Visible = False
End Sub


Private Sub clear()
txtnp.Text = ""
txtcp.Text = ""
End sub
```

IMPLEMENTATION RESULTS

APPENDIX-2

A2   IMPLEMENTATION RESULTS
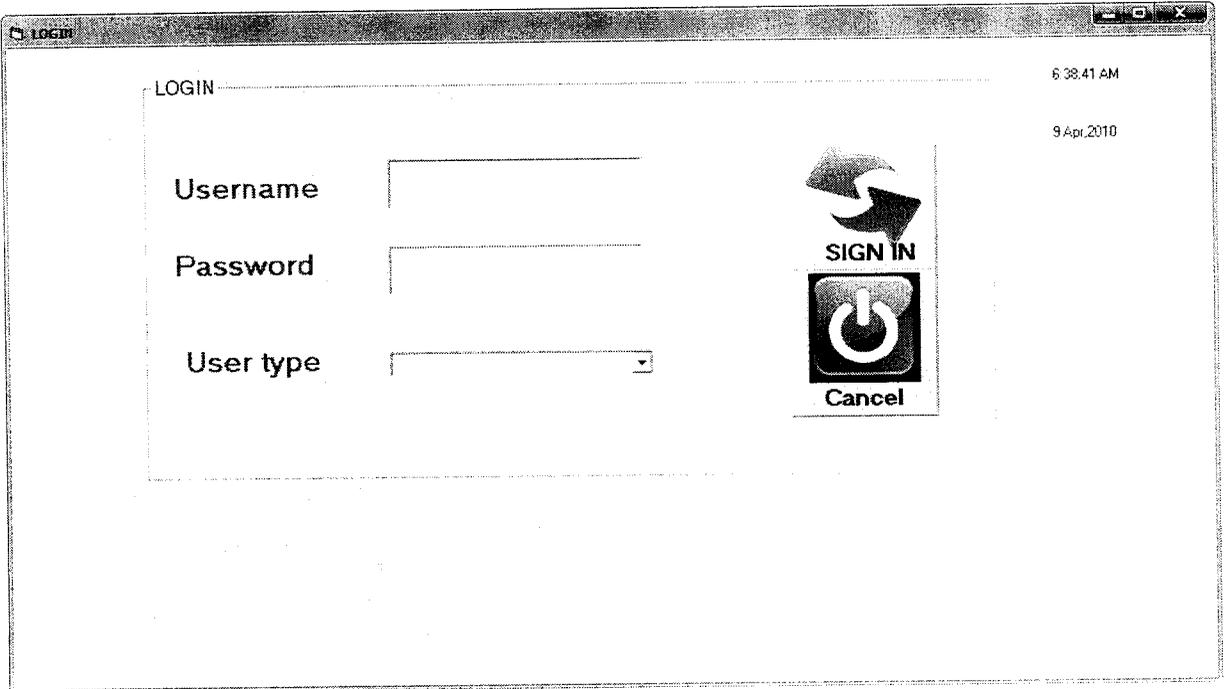
LOGIN

Figure-Login

ADMIN HOME PAGE
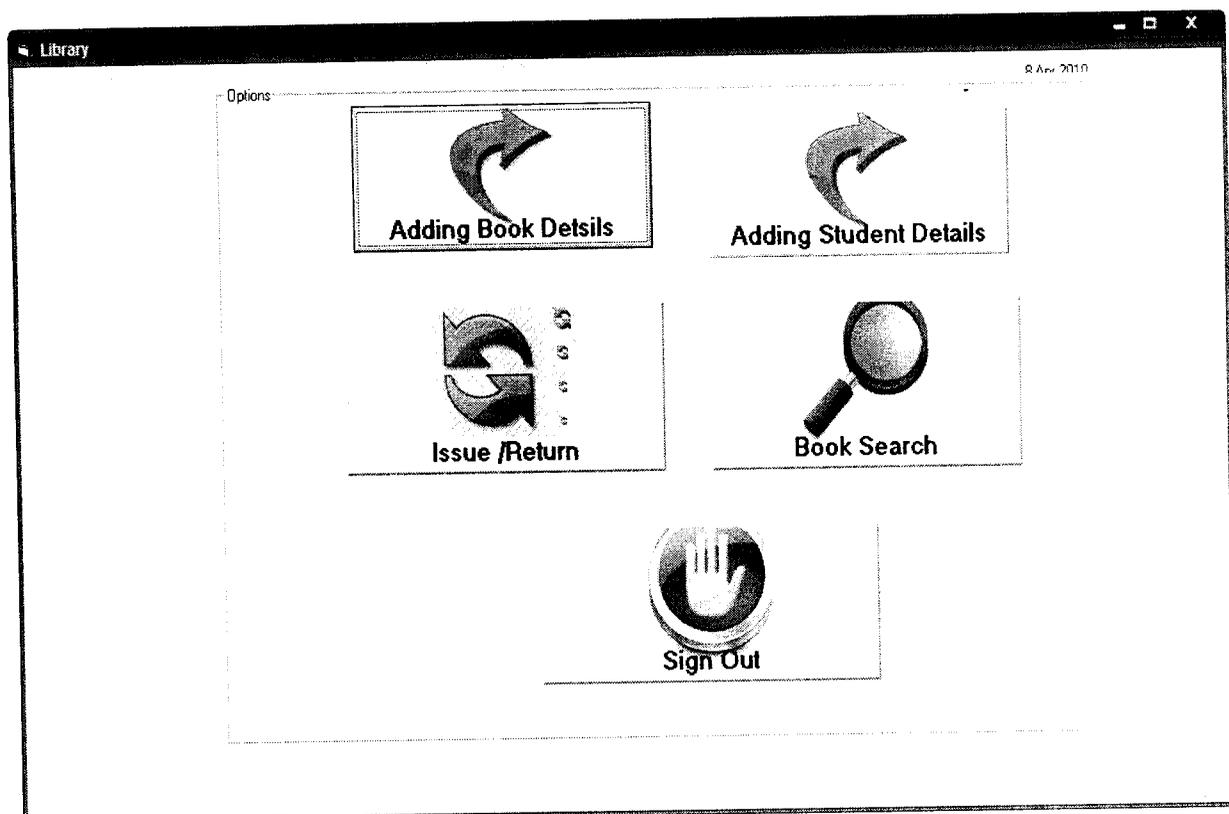
Figure-Admin Page

ADDING BOOK DETAILS

Figure-Adding Book Details

ADDING STUDENT DETAILS

Figure-Adding Student Details

MODIFYING BOOK DETAILS

Figure-Modifying Book Details

MODIFYING STUDENT DETAILS

Figure-Modifying Student Details

BOOK ISSUE

Figure-Book Issue

BOOK RETURN

Figure-Book Return

BOOK SEARCH

Figure-Book Search

STUDENT BOOK SEARCH

Figure-Student Book Search

STUDENT CHANGE PASSWORD

Figure-Student Change Password

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