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BIBLIOTHECA

A PROJECT REPORT

Submitted by

DAYESH RAVAL
(20BAI10189)
SHUBHAM GUPTA
(20BAI10359)
SHIVIKA BANSAL
(20BAI10361)

in partial fulfillment for the award of the degree of

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VIT BHOPAL UNIVERSITY

KOTHRIKALAN, SEHORE

MADHYA PRADESH – 466114

APRIL 2022

BONAFIDE CERTIFICATE

Certified that this project report titled **"Bibliotheca"** is the bonafide work of **DAYESH RAVAL. (20BAI10189), SHUBHAM GUPTA (20BAI10359), SHIVIKA BANSAL (20BAI10361)"** who carried out the project work under my supervision. Certified further that to the best of my knowledge the work reported at this time does not form part of any other project/research work based on which a degree or award was conferred on an earlier occasion on this or any other candidate.

PROGRAM CHAIR

Dr. S Sountharrajan, AI division head

School of Computing Sciences and engineering

VIT Bhopal University

PROJECT GUIDE

Dr. S Suthir, Senior Associate Professor

School of Computing Sciences And Engineering

VIT Bhopal University

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Last, but not least, I am deeply indebted to my parents who have been the greatest support while I worked day and night for the project to make it a success.

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LIST OF ABBREVIATIONS

ABBREVIATIONS	MEANING	PAGE NO.
IDE	Integrated development environment	13
JDK	Java development kit	13
RAM	Random access memory	13
ROM	Read only memory	13
JDBC	Java database connectivity	13
MIS	Management system information	16
GUI	Graphical user interface	18
SQL	Structured query language	20
RFID	Radio Frequency Identification	23

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ABSTRACT

In this modern era of the internet, almost all of us rely on web-based applications from small to big tasks. Well, Library management system is one of the most popular use-cases considered by the professionals while building applications in Java. Our library management system is a project that manages and stores books information electronically according to student's needs. The system helps both students and library manager to keep a constant track of all the books available in the library. It allows both the admin and the student to search for the desired book. Our Library management system, **Bibliotheca** is designed to manage the movement of books and maintain records of the members in a library. The software solution is designed based on the system requirements, the people involved, the content of the operation and the activity to be performed. The students will register them through Online Individually each member will have his account through which he can access the information he needs. The system should provide details on the books held by the members. The system should limit the number of books that can be taken and the number of days that a book can be kept for. The system should generate fines when due from the member. The next step focuses on the functions of the librarian, the member, and the system. Our library management system software**, Bibliotheca** should be user-friendly and cost effective. It should be in tune with the establishment's needs and compatible with the existing technology. A library should use a software system that helps in effectively managing the data in a library. Students need access to authentic information. An advanced organized library is an integral part of any educational institution. In this digital age a web-based library management system would be ideal for students who can access the library's database on their smartphones.

Our library management system software, Bibliotheca should be user-friendly and cost effective. It should be in tune with the establishment's needs and compatible with the existing technology. A library should use a software system that helps in effectively managing the data in a library.

CHAPTER-1:

PROJECT DESCRIPTION AND OUTLINE

1.1) Introduction

A library management system is software that is designed to manage all the functions of a library. It helps librarian to maintain the database of new books and the books that are borrowed by members along with their due dates.

This system completely automates all your library's activities. The best way to maintain, organize, and handle countless books systematically is to implement a library management system software.

A library management system is used to maintain library records. It tracks the records of the number of books in the library, how many books are issued, or how many books have been returned or renewed or late fine charges, etc.

You can find books in an instant, issue/reissue books quickly, and manage all the data efficiently and orderly using this system. The purpose of a library management system is to provide instant and accurate data regarding any type of book, thereby saving a lot of time and effort.

1.2) Motivation for the work

The current Library Management System does not eliminate the process of searching books within the library campus. Students must find books manually. They must wait until they are not provided with their library card and token. For receiving book, they must show their library card and wait in line for their turns. The admin personnel also must look manually on which day which person will take the charge within library to manage the overall work.

To store all the information in the database from where user will place their query and get the results based on their query. Only valid users will be able to access this Library Management System. Through this Library Management System, it will be easy to manage accounts and various details of student and employees working under library along with the records of book.

Students need access to authentic information. An advanced organized library is an integral part of any educational institution. In this digital age a web-based library management system would be ideal for students who can access the library's database on their smartphones.

Managing a library manually is labor intensive and an immense amount of paperwork is involved. An automated system reduces the need for manpower and stationery. This leads to lower operational costs.

1.3) About Introduction to the project including techniques

In today's digital world software solutions have been developed for library management. This system performs all the adequate functions with increased efficiency and accuracy saving time and costs.

Our Library management software system, Bibliotheca makes the primary functions of adding and deleting, issuing, and returning of books very simple.

The processes of book indexing, cataloging, book reservations and overdue notifications are automated. The software system makes the process simpler and more accountable.

These are the basics for operating a library efficiently. In a traditional library all these functions were done manually by people. The process was time consuming and expensive.

1.5) Problem Statement

Libraries are a critical part of an educational institute. Usually, it must roll out fine but complex tasks to maintain records of the books. When the institute is focusing on delivering quality educational services, a well- managed library is part of the service.

The problem faced is that library users require an efficient method to find a specific book or keyword(s) within a book given a continuously expanding library. Efficiency requires that the processing time should stay relatively the same even as the library contents increases.

The problem occurred before having computerized system includes:

- File damaged: When a computerized system is not their file is always lost due to some accident like spilling of water by some member on file accidentally. Besides some natural disaster like floods or fires may also damage the files.

- Difficult to search record: When there is no computerized system there is always a difficulty in searching of records if the records are large in number.

- Space consuming: After the number of records become large the space for physical storage of file and records also increases if no computerized system is implemented.

- Cost consuming: As there is no computerized system the to add each record paper will be needed which will increase the cost for the management of library.

1.6) Objective of the work

- Improvement in control and performance
  The system is developed to cope up with the current issues and problems of library. The system can add user, validate user and is also bug free.

- Save cost
  After computerized system is implemented less human force will be required to maintain the library thus reducing the overall cost.

- Save time
  Librarian can search record by using few clicks of mouse and few search keywords thus saving his valuable time.

- Option of online Notice board
  Librarian will be able to provide a detailed description of workshops going in the college as well as in nearby colleges

- Lecture Notes
  Teacher has a facility to upload lectures notes in a pdf file having size not more than 10mb

1.7) Organization of the project

For your better understanding, we have divided the code into the following functions, and will be explaining function-wise:

- Main class
- Login
- Connect
- Create/ Reset
- User Menu
- Admin Menu

Also, we have solved the recurring problem of catalogue management and book circulation in our library management system, **Bibliotheca**.

All the above modules like login, connect, create, user and admin menu have been incorporated into a single file i.e., **app.java** and the program will have debugged and run through the main class i.e., **main.java**.

1.8) Summary

Library management system is a project which aims in developing a computerized system to maintain all the daily work of a library. The system helps both students and library manager to keep a constant track of all the books available in the library. It allows both the admin and the student to search for the desired book.

The main feature of this system is that all the books available in the library can be displayed in a list so that students need not roam through the entire library to find a book. Additionally, the application effectively maintains the details of users/students to whom books have been issued; it also records the issued date and return date. Maintenance of Library catalogue and arrangement of the books to the catalogue is very complex task.

In addition to its maintenance of member details, issue dates and return dates etc. manually is a complex task. All the operations must be performed in perfect manner for the maintenance of the library without any degradation which may finally result in the failure of the entire system.

CHAPTER-2:

RELATED WORK INVESTIGATION

2.1) Introduction

Early days Libraries are managed manually. It required lot of time to record or to retrieve the details. The employees who must record the details must perform their job very carefully. Even a small mistake would create a lot of problems. Security of information is very less. Report generations of all the information is very tough task. Maintenance of Library catalogue and arrangement of the books to the catalogue is very complex task. In addition to its maintenance of member details, issue dates and return dates etc. manually is a complex task. All the operations must be performed in perfect manner for the maintenance of the library without any degradation which may finally result in the failure of the entire system.

FIGURE-1

2.2) Core Area of the project

In this modern era of the internet, almost all of us rely on web-based applications from small to big tasks. Well, Our Library management system is one of the most popular use-cases considered by the professionals while building applications in Java. A library management is a project that manages and stores books information electronically according to student's needs.

The system helps both students and library manager to keep a constant track of all the books available in the library. It allows both the admin and the student to search for the desired book.

FIGURE-2

2.3) Existing Approaches/ Methods

Library management systems are designed to manage the movement of books and maintain records of the members in a library. The software solution is designed based on the system requirements, the people involved, the content of the operation and the activity to be performed.

The system should provide details on the books held by the members. The system should limit the number of books that can be taken and the number of days that a book can be kept for. The system should generate fines when due from the member. The next step focuses on the functions of the librarian, the member, and the system.

Analysis begins when a user or manager begins a study of the System Analysis is a detailed study of the various operations performed by a program using existing system. During analysis, data collected on the various files, decision points and transactions handled by the present system. The success of the system depends largely on how clearly the problem is defined, thoroughly investigated, and properly carried out through the choice of solution.

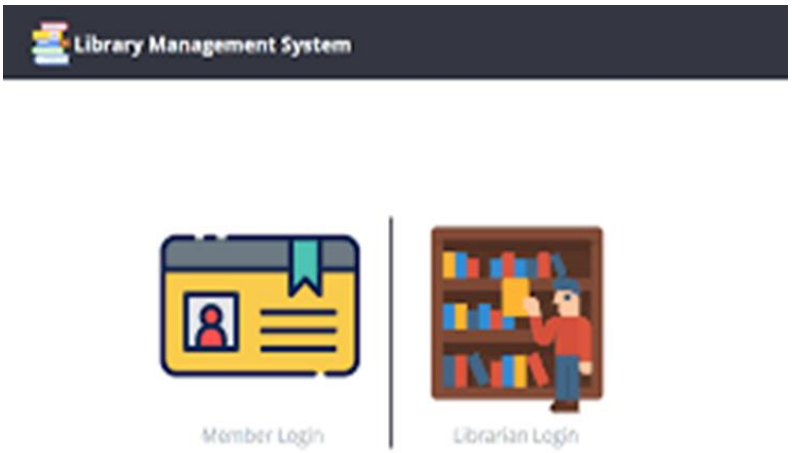


FIGURE-3

2.4) Pros and cons of the stated approaches

The advantage of library management software outweighs the disadvantages. But there are few disadvantages' factors are associated with the system.

- Online stored data is predisposed to cyber hacks. Opting for a reliable online system reduces the risk
- sometimes it is complicated to operate for first-time users
- Requires high-speed internet connectivity for a web-based system
- Risk of computer virus
- Unlike online systems that use cloud computing, Open-source system stocks data on the computer's hard drive. This raises the risk of data loss.

FIGURE-4

2.5) Issues/Observations from investigation

In today's digital world software solutions have been developed for library management. This system performs all the adequate functions with increased efficiency and accuracy saving time and costs. These are the basics for operating a library efficiently. In a traditional library all these functions were done manually by people. The process was time consuming and expensive. The processes of book indexing, cataloging, book reservations and overdue notifications are automated. The software system makes the process simpler and more accountable.

2.6) Summary

A library management software where admin can add/view/delete librarian and librarian can add/view books, issue, view issued books and return books. Managing a library manually is labor intensive and an immense amount of paperwork is involved. An automated system reduces the need for manpower and stationery. This leads to lower operational costs.

CHAPTER-3:
REQUIREMENT ARTIFACTS

3.1) **Introduction**

In this module, we will be covering on how usable is our library management system is, taking a look towards the software and hardware requirements, it's performance, security etc. We will get a better idea on the outlook of our library management system.

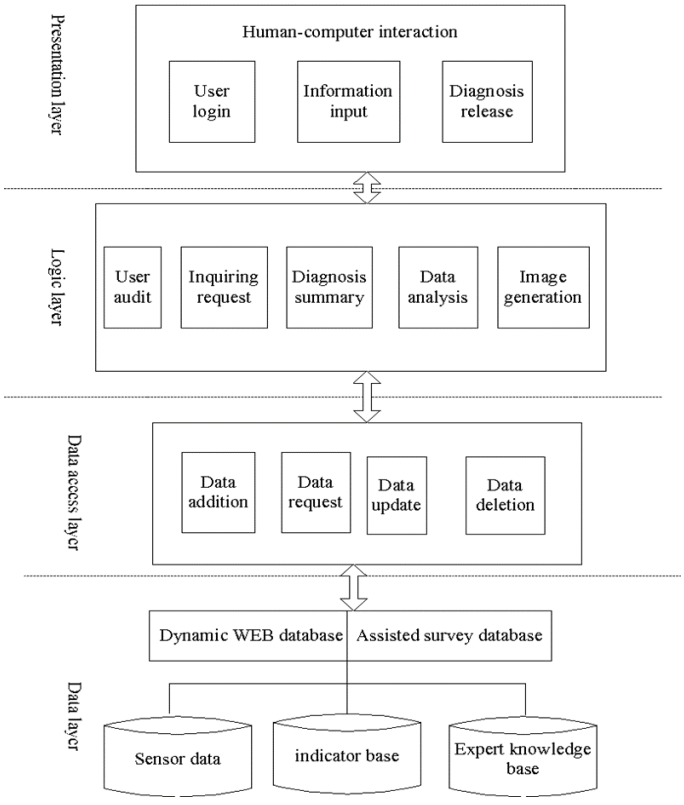


FIGURE-5

3.2) Hardware and Software Requirements

HARDWARE REQUIREMENTS	SOFTWARE REQUIREMENTS
Processors: Intel® core™ i5-8265U is being used (Also work for Intel® core™ i3 models)	MySQL Community Server
RAM: 4Gb, 8Gb	MySQL JDBC Connector
ROM: 476 Gb	Java development Kit (JDK)
No. of cores: 2,4	Eclipse IDE/ Visual studio code
Processor:- 32, 64-bit operating system, x64-based processor	Rs2xml.jar

TABLE-1

3.3.1) Performance and Security

Extensibility: This software is extendable in ways that its original developers may not expect. The following principles enhances extensibility like hide data structure, avoid traversing multiple links or methods, avoid case statements on object type and distinguish public and private operations.

• **Reusability**: Reusability is possible as and when require in this application. We can update it next version. Reusable software reduces design, coding and testing cost by amortizing effort over several designs. Reducing the amount of code also simplifies understanding, which increases the likelihood that the code is correct. We follow up both types of reusability: Sharing of newly written code within a project and reuse of previously written code on new projects.

• **Understandability**: A method is understandable if someone other than the creator of the method can understand the code (as well as the creator after a time lapse). We use the method, which small and coherent helps to accomplish this.

• **Cost-effectiveness**: 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.

3.3.2) Look and Feel requirements

For your better understanding, we have divided the code into the following functions, and will be explaining function-wise:

- Main class
- Login
- Connect
- Create/ Reset
- User Menu
- Admin Menu

The codes have been executed on VS code through app.java and main.java

3.4) Summary

The Library Management System is an application for assisting a librarian in managing a book library. The system would provide basic set of features to add/update members, add/update books, and manage check in specifications for the systems based on the client's statement of need.

Library management system is a typical management Information system (MIS), its Development include the establishment and maintenance of back-end database and front-end application development aspects. For the former require the establishment of data consistency and integrity of the strong data security and good libraries. As for the latter requires the application fully functional, easy to use and so on.

FIGURE-6

CHAPTER-4:

DESIGN METHODOLOGY AND ITS NOVELTY

4.1) Methodology and goal

Library management software system makes the primary functions of adding and deleting, issuing, and returning of books very simple. The processes of book indexing, cataloging, book reservations and overdue notifications are automated. The software system makes the process simpler and more accountable.

Managing a library requires knowledge of library management and skills to perform the activities. The task involves planning, decision making, organizing, collecting, and disbursing information and controlling and monitoring the various functions.

The management should have an objective for running the library. They should have a clear idea of the members they wish to serve. The selection of books in different categories is dependent on the interests of the members.

These are the basics for operating a library efficiently. In a traditional library all these functions were done manually by people. The process was time consuming and expensive. In today's digital world software solutions have been developed for library management. This system performs all the adequate functions with increased efficiency and accuracy saving time and costs.

4.2) **Functional modules design and analysis**

The library management system software is based on the different sections or classes involved in the operation of a library. The functions and attributes of the classes and relationships between them are specified in a Class Diagram. This diagram forms the fundamental step in building the management software. The code for the main class and the libraries to be imported and, to create a GUI, I will be using Swing. Swing is a library, or a set of program components used to create graphical user interface components such as scroll bars, buttons, dialog boxes, etc. The Admin Menu is designed to show details of users, books, all the actions required in issuing a book and access to the database of the library.

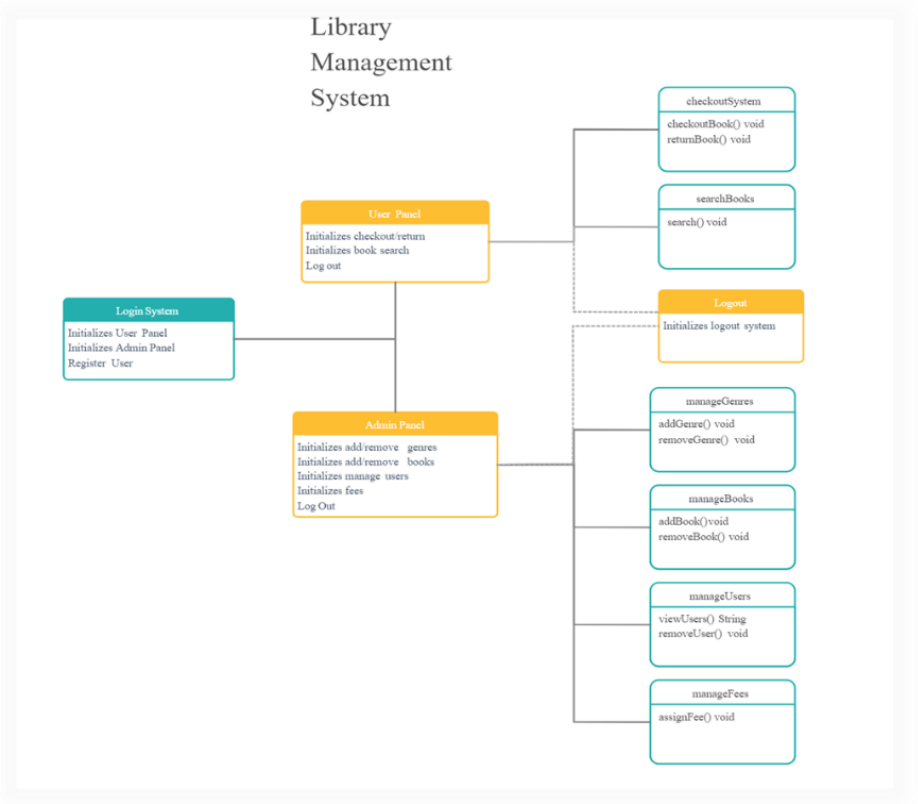


FIGURE-7

4.3) Software Architectural designs

Library automation is the process of automation of the functions of a library using a computer. The best library automation software helps in digitally transforming the library and making it accessible to all. The critical functions of cataloguing and circulation of books is done automatically by the library management system software. Entry of new books, deletion of old books and updating of the member and book database becomes simple. The books borrowed, returned, lost, or misplaced can be tracked by the system. The membership details are recorded in the system. Overdue fines are calculated automatically, and notifications are sent to the defaulters. A web-based library management system enables the librarian and the patrons to access the library from anywhere at one's convenience. The software encompasses a whole gamut of functions which exposes the users to a wider collection of reading material.

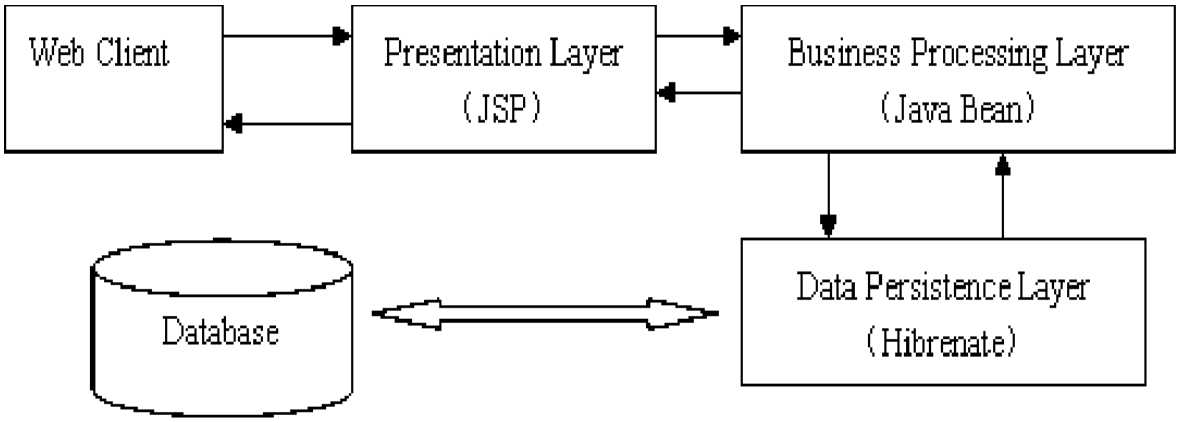


FIGURE-8

4.4) Subsystem services

The code for the main class and the libraries to be imported and, to create a GUI, I will be using Swing. Swing is a library, or a set of program components used to create graphical user interface components such as scroll bars, buttons, dialog boxes, etc. Have created this function to enable the user and the admin login. So, initially when a user logs in for the first time, that user will be an admin by default, and the username and password will be {admin, admin}. The connect function is used to connect the database to the GUI. The create function is used to create the database, tables and add data into these tables. So, to do that, SQL statements will be used as below.

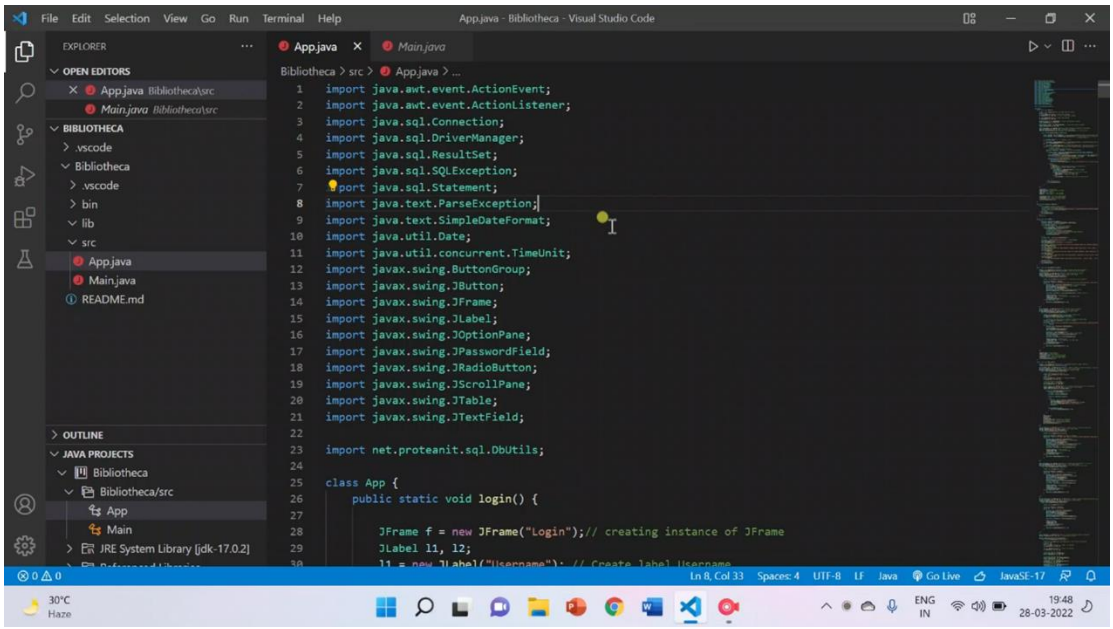


FIGURE-9

4.5) User Interface designs

All these modules have been incorporated together into a single java file i.e., app.java and will be executed on app.java. The Admin Menu is designed to show details of users, books, all the actions required in issuing a book and access to the database of the library. The User Menu is designed to show details of all the books present in the library and the books issued by the user. The customer would have to login as an admin or a user and use the facilities of our library management system, **Bibliotheca**.

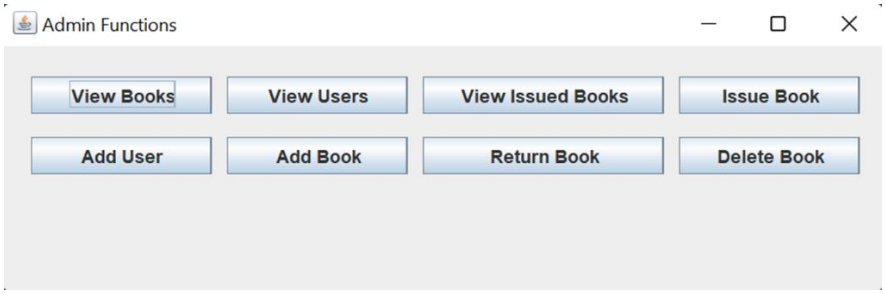


FIGURE-10

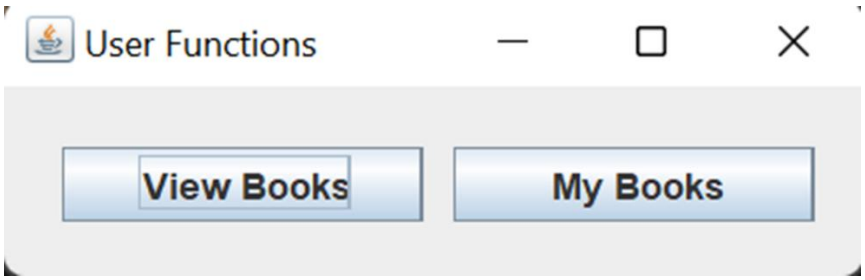


FIGURE-11

4.6) Summary

A web-based library management system enables the librarian and the patrons to access the library from anywhere at one's convenience. The software encompasses a whole gamut of functions which exposes the users to a wider collection of reading material. Library management system software automatically organizes the books by categories, subject, author, topic, and maintains the records with ease. The web-based software enables teachers and pupils to search for books at any time from any place. The library automation system should keep pace with global technological advancements, web design changes, virtual services, and online information. The conventional libraries have shifted from manual operations to automated integrated library management systems to manage the entire gamut of operations.

CHAPTER-5:

TECHNICAL IMPLEMENTATION & ANALYSIS

5.1) Outline

A library should use a software system that helps in effectively managing the data in a library. The library database includes all relevant information regarding assets to membership details. The software records details on all reading and reference material available for reading and lending. Membership information, lending details and renewal dates are managed by the software. A library management system software with capabilities of barcoding and RFID helps in scanning the barcode while lending or returning books. Management of the catalogue and inventory by the system makes the process accountable. The feature of the software assists in inventory and circulation management of the books. Books in stock, on the shelves, in circulation, missing or to be ordered can be tracked by the system. Acquiring new assets becomes easier with the software.

5.2) Technical coding and code solutions

- **Main class**

```
import javax.swing.*;
import net.proteanit.sql.DbUtils;

public class main {

    public static class ex{
        public static int days=0;
            }

    public static void main(String[] args) {

        login();
        //create();
    }
```

FIGURE-12

- **Login**

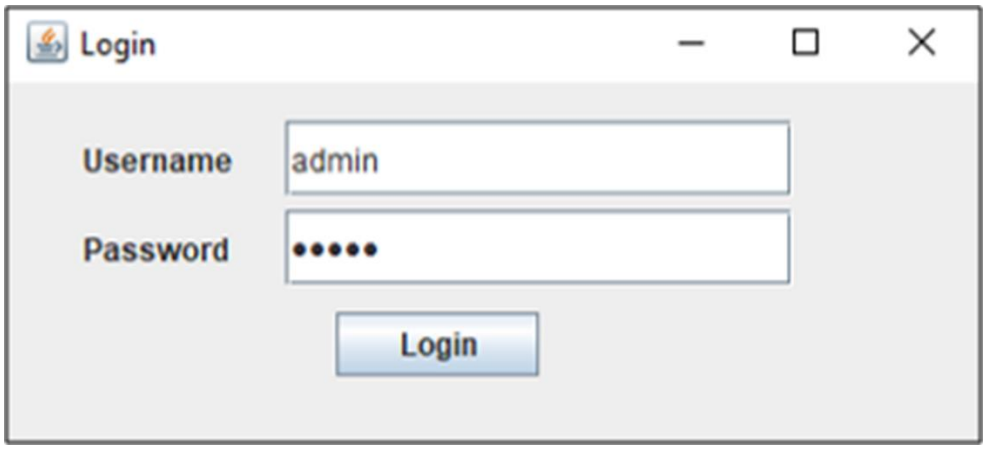


FIGURE-13

- **Connect**

```
public static Connection connect()
{
try {
        Class.forName("com.mysql.cj.jdbc.Driver");
        //System.out.println("Loaded driver");
        Connection con = DriverManager.getConnection("jdbc:mysql://localhost/m
        //System.out.println("Connected to MySQL");
        return con;
 }
 catch (Exception ex) {
        ex.printStackTrace();
 }
return null;
}
```

FIGURE-14

- **Create**

```
public static void create() {
    try {
    Connection connection=connect();
    ResultSet resultSet = connection.getMetaData().getCatalogs();
    //iterate each catalog in the ResultSet
        while (resultSet.next()) {
          // Get the database name, which is at position 1
          String databaseName = resultSet.getString(1);
          if(databaseName.equals("library")) {
              //System.out.print("yes");
              Statement stmt = connection.createStatement();
              //Drop database if it pre-exists to reset the complete database
              String sql = "DROP DATABASE library";
              stmt.executeUpdate(sql);
          }
        }
      }
        Statement stmt = connection.createStatement();

        String sql = "CREATE DATABASE LIBRARY"; //Create Database
        stmt.executeUpdate(sql);
        stmt.executeUpdate("USE LIBRARY"); //Use Database
        //Create Users Table
        String sql1 = "CREATE TABLE USERS(UID INT NOT NULL AUTO_INCREMENT PR
        stmt.executeUpdate(sql1);
        //Insert into users table
        stmt.executeUpdate("INSERT INTO USERS(USERNAME, PASSWORD, ADMIN) VAL
        //Create Books table
        stmt.executeUpdate("CREATE TABLE BOOKS(BID INT NOT NULL AUTO_INCREME
        //Create Issued Table
        stmt.executeUpdate("CREATE TABLE ISSUED(IID INT NOT NULL AUTO_INCREM
        //Insert into books table
        stmt.executeUpdate("INSERT INTO BOOKS(BNAME, GENRE, PRICE) VALUES ('

    resultSet.close();
    }
     catch (Exception ex) {
         ex.printStackTrace();
}
}
```

FIGURE-15

- **Admin Menu**

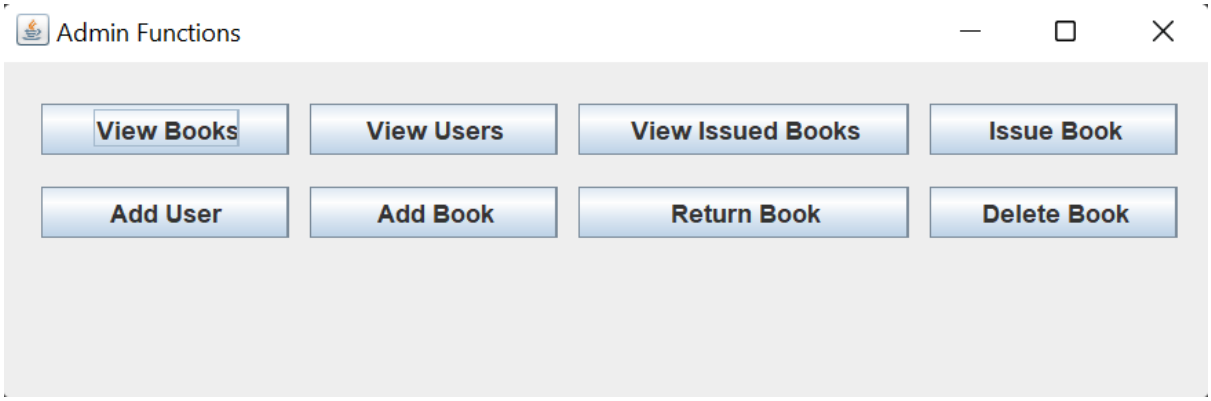


FIGURE-16

- **User Menu**

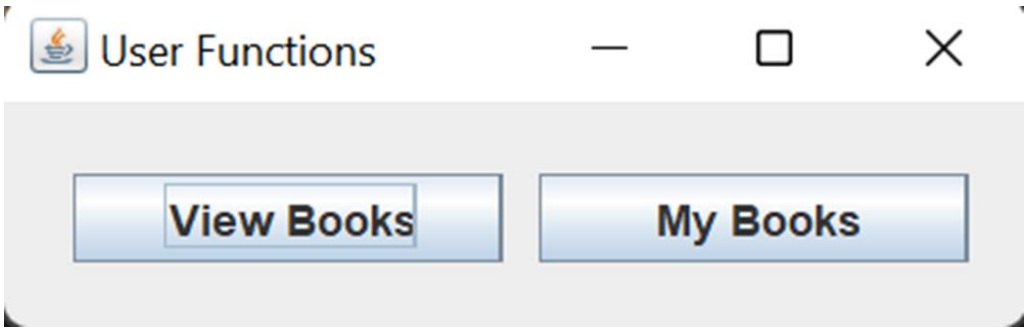


FIGURE-17

5.3) Working layout of the forms

No forms have been used in making of the chatbot. Our library management system, **Bibliotheca** can be executed by using the main.java program on VS code to get the desired output.

5.4) Prototype submission

A prototype of our Library management system model was used to experiment and create analysis for its performance review. The prototype was delivered to a small group of people, in different backgrounds, through the sharing of the **main.java** and **app.java**, on VS code. Success and thus accuracy of the software was calculated on basis on the usage efficiency of the library software.

5.5) Test and validation

This is the list of the sample tests for our chatbot:-

STUDENT NAME	**USER TYPE**
DAYESH RAVAL	USER
SHUBHAM GUPTA	USER
SHIVIKA BANSAL	USER
SUTHIR SIR	ADMIN

TABLE-2

On testing on one of the devices, we got the following output:-

FIGURE-18

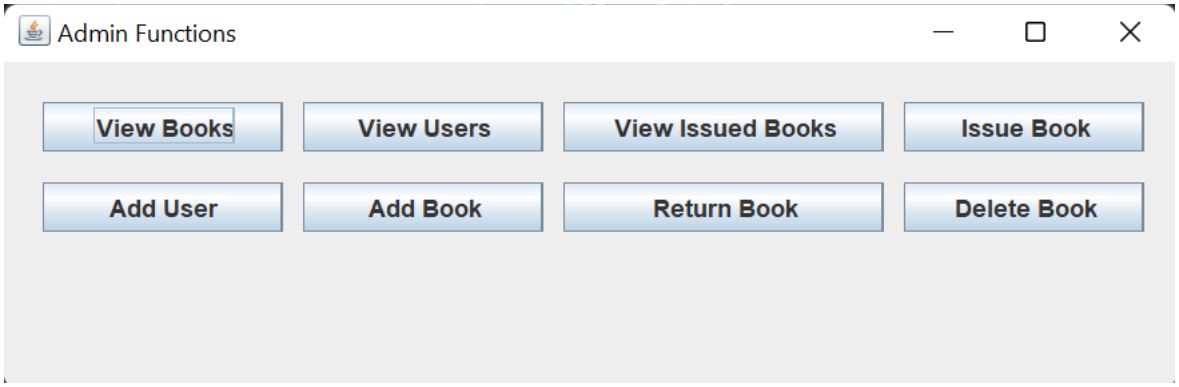
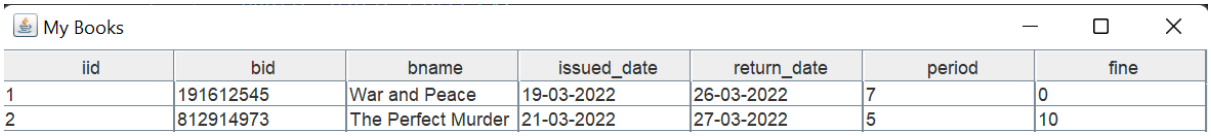


FIGURE-19

As u can see, Suthir sir successfully logged in as an admin and issued book to shivika.



iid	bid	bname	issued_date	return_date	period	fine
1	191612545	War and Peace	19-03-2022	26-03-2022	7	0
2	812914973	The Perfect Murder	21-03-2022	27-03-2022	5	10

FIGURE-20

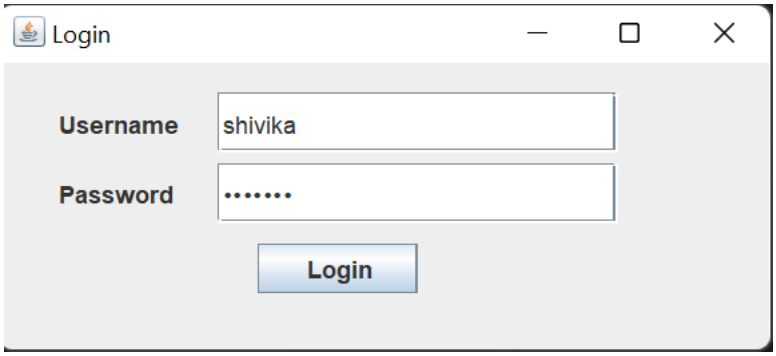
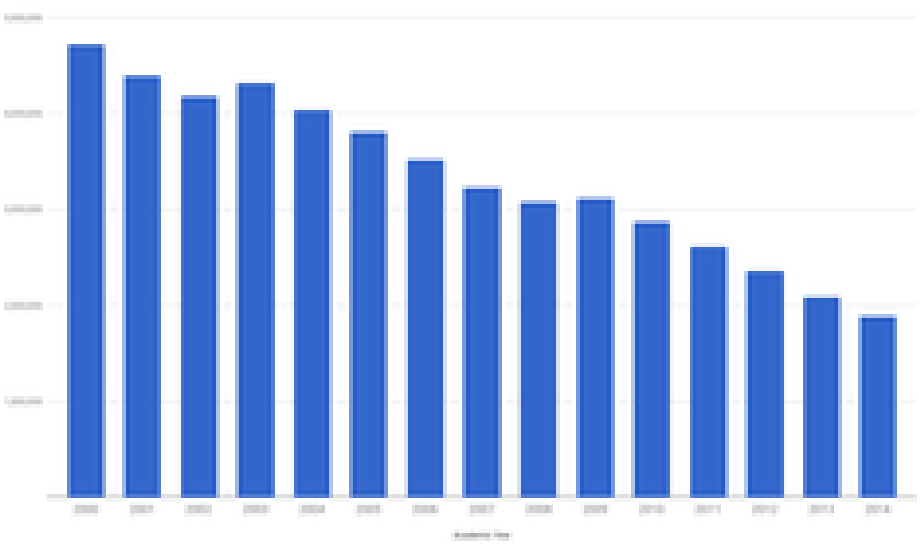


FIGURE-21

This shows us that our software was able to identify the admin and the user. It could also issue the book and perform catalogue management and book circulation operations.

5.6) Performance Analysis

As for **Shivika**, this was her usage of our software after her first experience as compared to a physical library is as follows:-



GRAPH-1

5.7) Summary

The selection of the library management system software depends on the type of library that needs to be automated. Libraries can belong to a school or college, public libraries for the community or specialized libraries for specific industries. Each type of library has different requirements to cater to their patrons.

The size of the collection of books, the type of library, the budget, the staff size and the compatibility of the system with working partners have to be considered when selecting a software system.

CHAPTER-6:

PROJECT OUTCOME AND APPLICABILITY

6.1) Outline

This software provides a computerized version of library management system which will benefit the students as well as the staff of the library. It makes entire process online where student can search books, staff can generate reports and do book transactions. It also has a facility for student login where student can login and can see status of books issued request as well for book or give some suggestions.

6.2) Key implementations outline of the system

The selection of appropriate software is the answer to meet the challenges of newer trends. The software should be web-based with a user-friendly interface for today's computer savvy users.

In schools, the library management system software should be integrated with other school department computers through LAN connectivity. Web has to be enabled on school servers providing internet and email connectivity. Accessibility of the software from outside the school on a 24/7 basis is essential.

High levels of security features are to be integrated into the system to enable users to log into and out of the system using IDs and passwords. The security feature should permit the administrator to restrict access to confidential records.

FIGURE-22 **34**

6.3) Significant project outcomes

Our library automation software, **Bibliotheca** can perform the functions of all the sections of the library. The software should integrate the different modules and permit movement between them. It should have the capacity to handle the records and databases of the library.

The software is flexible and capable of upgrading. The software runs on various platforms like servers, mainframe and personal computers, smart phones and be compatible with the operating system being used.

6.4) Project applicability on Real-world applications

Our library management system software, Bibliotheca should be user-friendly and cost effective. It should be in tune with the establishment's needs and compatible with the existing technology. A library should use a software system that helps in effectively managing the data in a library. The library database includes all relevant information regarding assets to membership details.

6.5) Inference

In today’s digital world software solutions have been developed for library management. This system performs all the adequate functions with increased efficiency and accuracy saving time and costs. Our Library management software system, Bibliotheca makes the primary functions of adding and deleting, issuing, and returning of books very simple.

CHAPTER-7:

CONCLUSIONS AND RECOMMENDATION

7.1) Outline

After months of reviewing our project, assessing it, modifying our goals in general, at the best level. Our team, **Bibliotheca** have collaboratively made this project for empowering user experience for its smooth application and greater benefits.

7.2) Limitations/Constraints of the system

Though, even after months of coding and regressive attempts to be error-free, we do have certain limitations on our project. We must maintain a detailed database of the members. The system records the name, ID, and password of each user. The system helps in ascertaining the track record of the member. We also must enable both the librarian and the members to search the catalog of books in the library. The search functions can be filtered to the need of each user.

7.3) Future Enhancements

As our project has progressed in this past time, we are very much engaged & excited for various future endeavors and enhancements regarding our project. We plan to focus on various updates and integrations in our software. To fully achieve our final goal of a more technical growth, we plan to launch this app for all the users worldwide so as increase reach and technological experience of our users.

7.4) Inferences

At last, we infer that there has been immense research to find various methodologies to bring out the general mass in streamline with the upcoming technological development and ventures. As junior developers, we have the power to develop better technologies to make the world a better and stress-free place.

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