PES University, Bengaluru

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Department of Computer Science & Engineering Session: Jan - May 2022

UE19CS353 – Object Oriented Analysis and Design with Java Theory

ISA (Mini Project)

Report on

Library Management System

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6th Semester 'A'

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ACKNOWLEDGEMENT

We take this occasion to thank God, almighty for blessing us with his grace and taking our endeavor to a successful culmination. We extend our sincere and heartfelt thanks to our esteemed guide, Prof. Kamatchi Priya, for providing us with the right guidance and advice at the crucial junctures and for showing me the right way . We would like to thank the other faculty members also, at this occasion. Last but not the least, we would like to thank our friends and family for the support and encouragement they have given us during the course of our work.

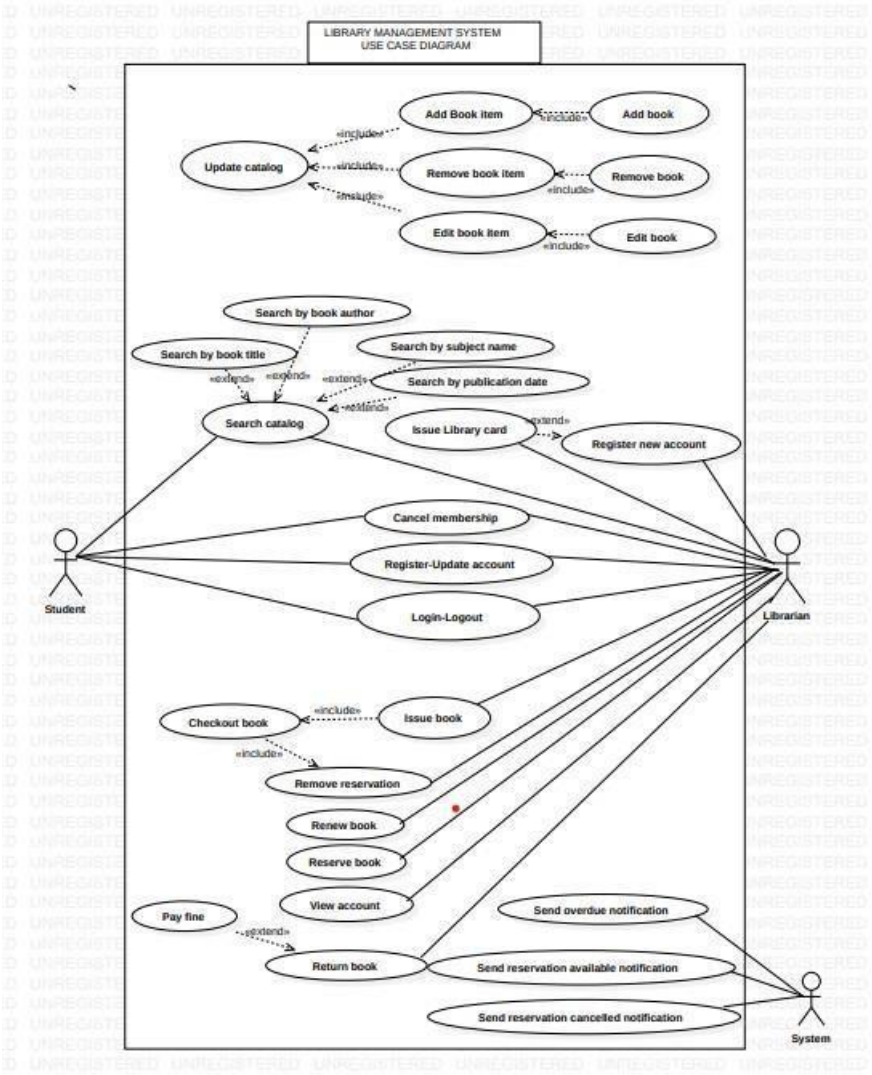
1. Project Description:

Library management system is a project which aims in developing a computerized system to maintain all the daily work of library .This project has many features which are generally not available in normal library management systems like facility of user login and a facility of teachers login .It also has a facility of admin log in through which the admin can monitor the whole system .It also has facility of an online notice board where teachers can student can put up information about workshops or seminars being held in our colleges or nearby colleges and librarian after proper verification from the concerned institution organizing the seminar can add it to the notice board . It has also a facility where student after logging in their accounts can see list of books issued and its issue date and return date and also the students can request the librarian to add new books by filling the book request form.the librarian after logging into his account i.e admin account can generate various reports such as student report , issue report, teacher report and book report Overall this project of ours is being developed to help the students as well as staff of library to maintain the library in the best way possible and also reduce the human efforts.

Link to Github repository: https://github.com/ananyabhatnagar/OOAD_Project

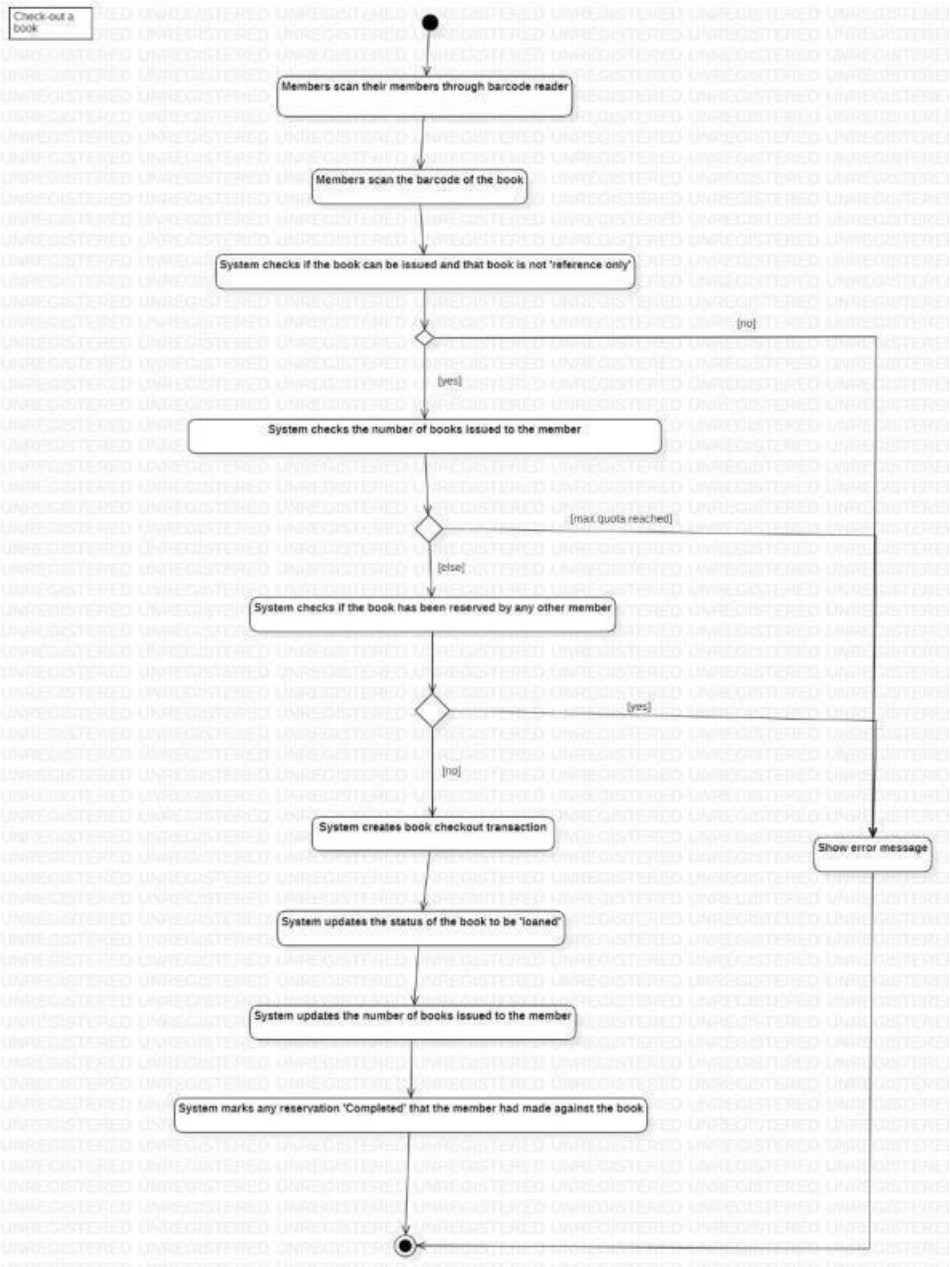
2. Analysis and Design Models

USE CASE:

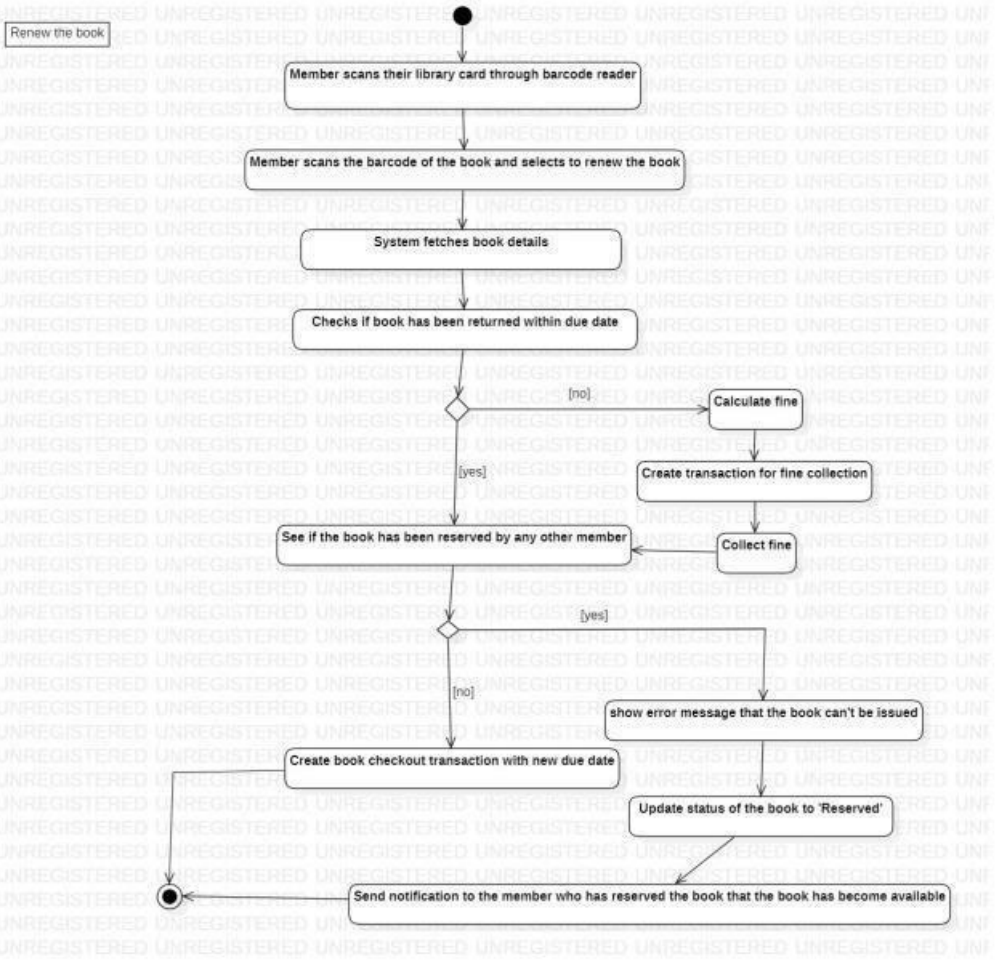


Student can search catalogue for a book by title, author, subject name, etc. Librarian Registers new account, can cancel memberships and handle login-logout. The system provides the implementation to carry out functionality like checkout(Issue, Remove reservation). It also sends overdue notification, so that user has to the pay fine

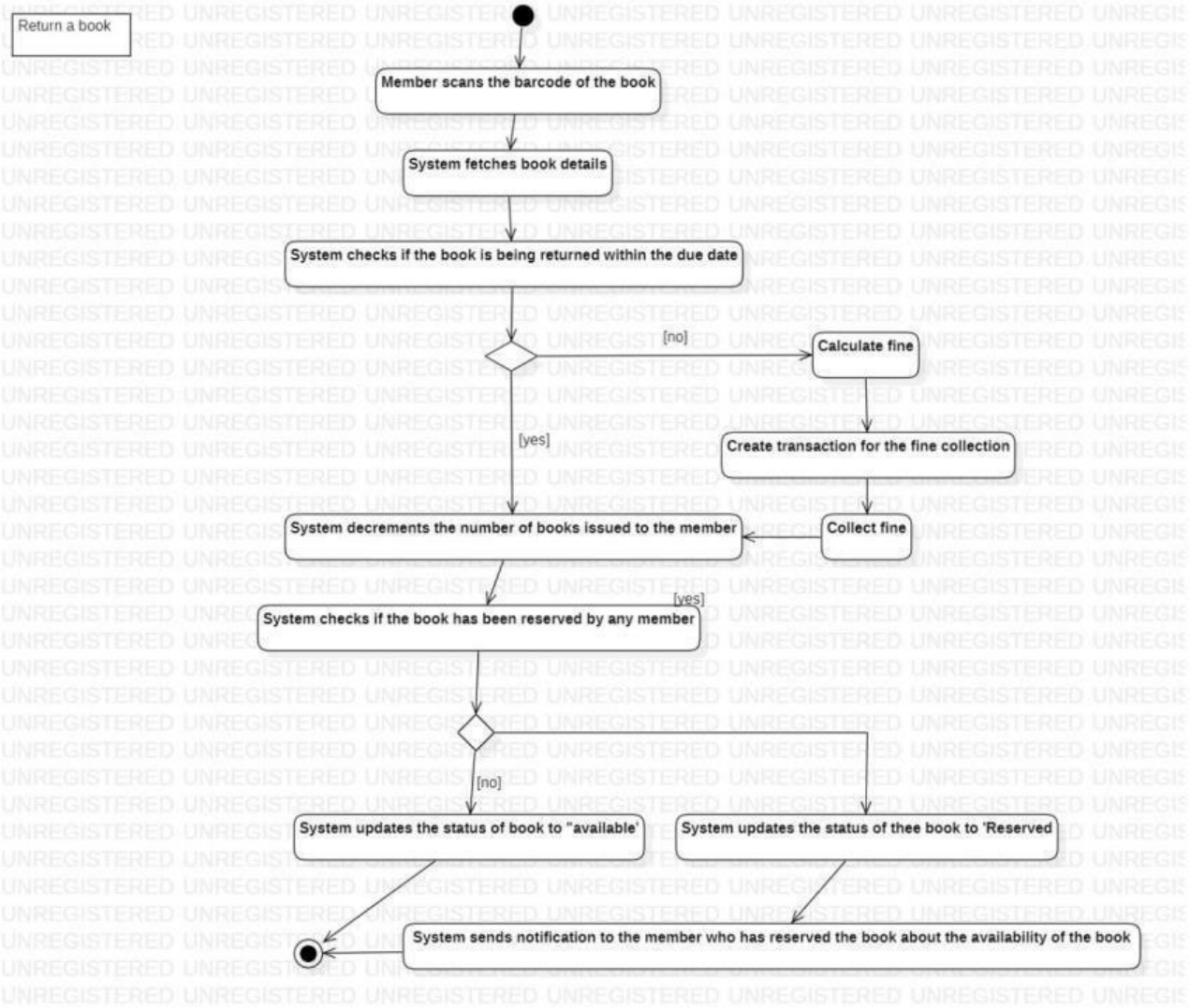
State diagrams:



Checkout of a book involves scan barcode reader of a book, after which system checks if book can be issued and is not reference only. Then checkout transaction created if book not reserved by any other member. Status of book updated as loaned. Transaction marked completed.

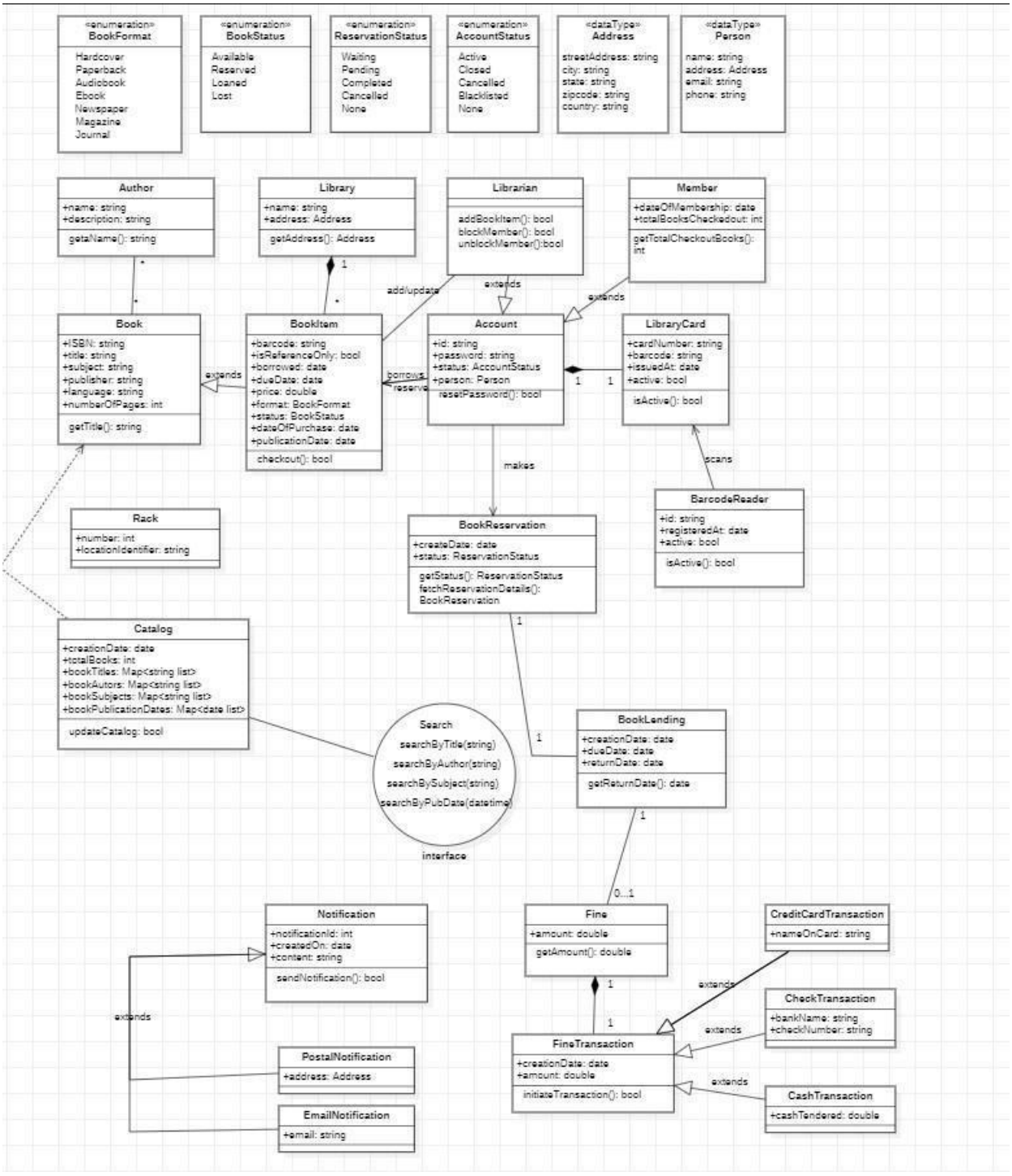


User can renew the book issued to him after scanning the barcode If it is not reserved by another member already. If the user is late in renewing the book then he/she will have to pay the fine then re issue can take place.



The return of a book involves scanning the barcode of a book, If the book return is late then fine is calculated and collected. System checks if book reserved by another member if not status updated as available else status is reserved for another user.

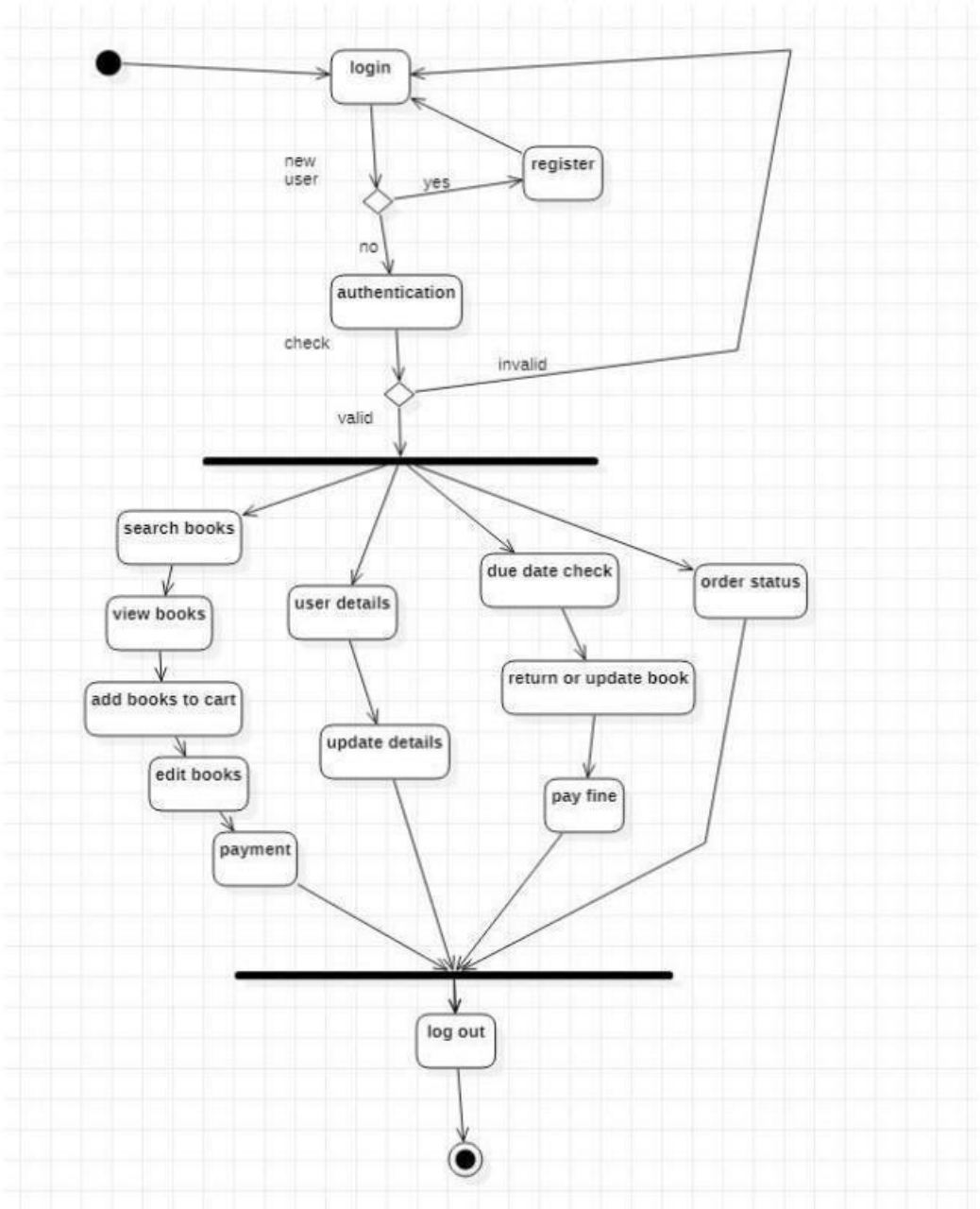
Class diagram:



Enumerated different formats of books, the possible book status, possible reservation status and account status of the user. Created data types of address and person. Authors can different books. Librarian can add Bookitem, block member, unblock member. A member account can borrow/reserve a book. Each user has a library card (an account) . Barcode readers can scan books and library card.

Based on the available books, the catalogue contains the details of all the books. Fine transaction created if user is late in returning/renewing a book.

Activity diagrams:



User can login, if not registered then one can first register. Once user is authenticated, they can search books, add to cart, edit books and make payment. User details can be updated and user may have to pay fine if they are later than the due date. User can view order status.

3. Tools and Frameworks Used

(i)Java Swing:

Java Swing is a GUI Framework that contains a set of classes to provide more powerful and flexible GUI components than AWT. Swing provides the look and feel of modern Java GUI. Swing library is an official Java GUI tool kit released by Sun Microsystems. It is used to create graphical user interface with Java.

Features of Swing

- Platform Independent
- Customizable
- Extensible
- Configurable
- Lightweight
- Rich Controls
- Pluggable Look and Feel

Swing classes used in this project:

- JButton
- Jlabel
- JSwing.buttongroup
- JComboBox
- JScrollpane
- JRadioButton • JFrame • JTextfield

(ii) Netbeans:

NetBeans is an open-source integrated development environment (IDE) for developing with Java, PHP, C++, and other programming languages. NetBeans is also referred to as a platform of modular components used for developing Java desktop applications.

NetBeans is coded in Java and runs on most operating systems with a Java Virtual Machine (JVM), including Solaris, Mac OS, and Linux.

NetBeans manages the following platform features and components:

- User settings
- Windows (placement, appearance, etc.)
- NetBeans Visual Library
- Storage
- Integrated development tools
- Framework wizard

NetBeans uses components, also known as modules, to enable software development. NetBeans dynamically installs modules and allows users to download updated features and digitally authenticated upgrades.

NetBeans IDE modules include NetBeans Profiler, a Graphical User Interface (GUI) design tool, and NetBeans JavaScript Editor.

NetBeans framework reusability simplifies Java Swing desktop application development, which provides platform extension capabilities to third-party developers.

(iii) MySQL:

MySQL is a relational database management system (RDBMS) developed by Oracle that is based on structured query language (SQL).

A database is a structured collection of data. It may be anything from a simple shopping list to a picture gallery or a place to hold the vast amounts of information in a corporate network. In particular, a relational database is a digital store collecting data and organizing it according to the relational model. In this model, tables consist of rows and columns, and relationships between data elements all follow a strict logical structure. An RDBMS is simply the set of software tools used to actually implement, manage, and query such a database.

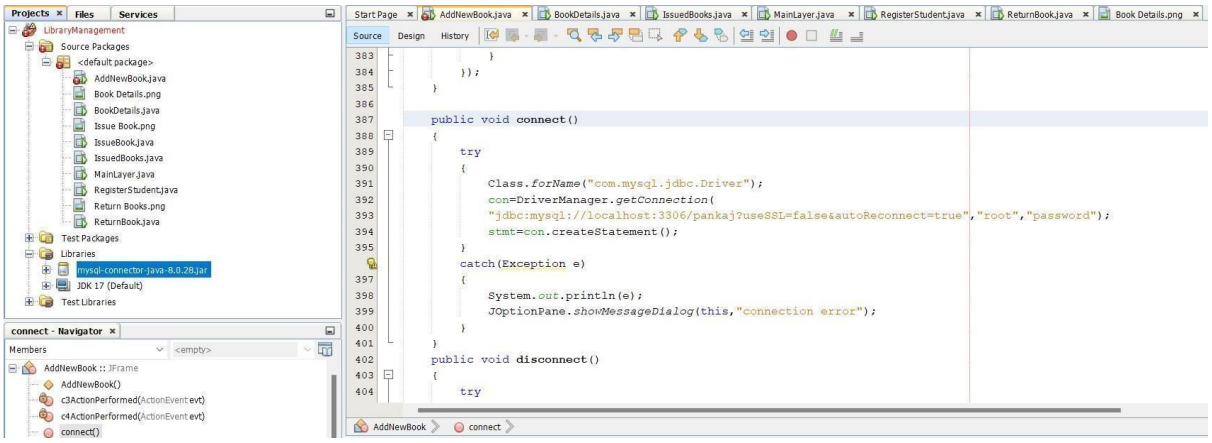
4. Design Principles and Design Patterns Applied

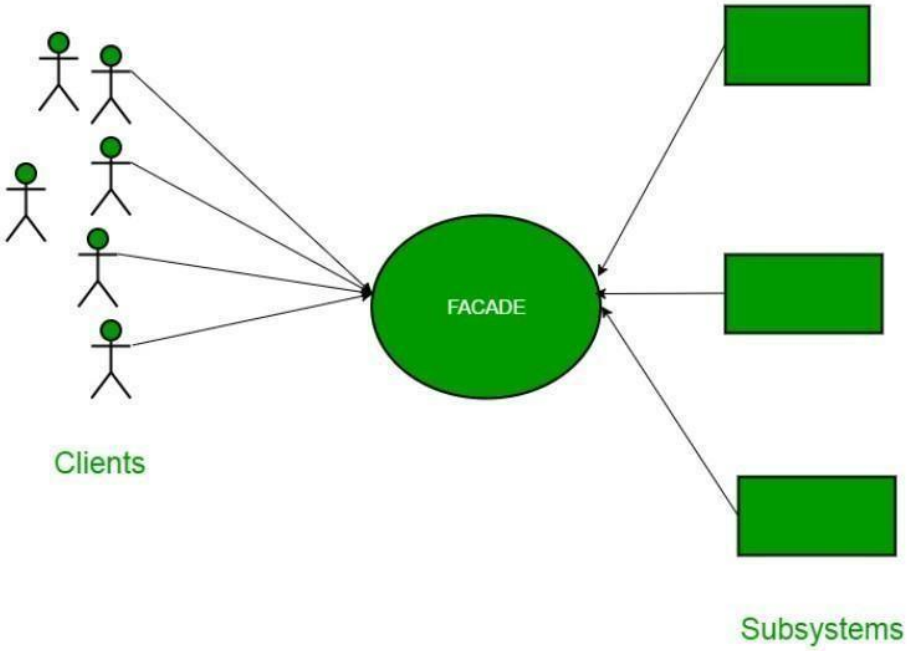
(i) Single Responsibility Principle (SRP) (Design Principle)

Each class only does one thing, and every class or module only has responsibility for one part of the software's functionality. This ensures low coupling of code and easier coding to understand and maintain.

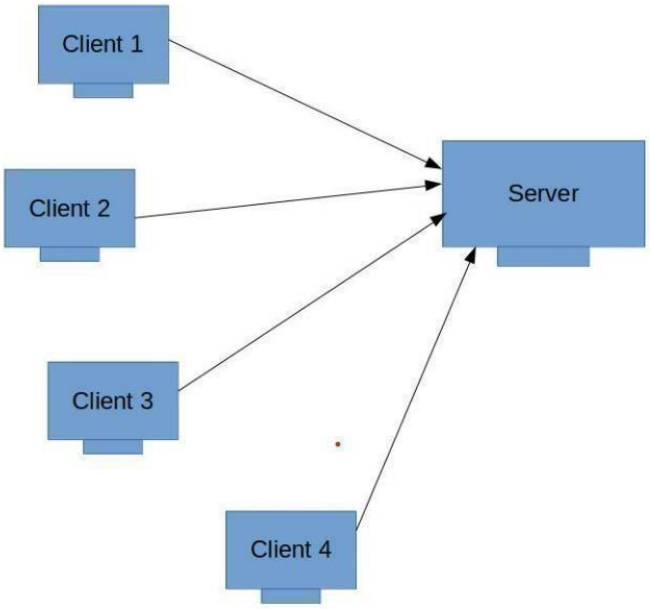
(ii) Façade Design pattern (Structural Design Pattern):

In Java, the interface JDBC can be called a facade because, we as users or clients create connections using the "Java.sql.Connection" interface, the implementation of which we are not concerned about. The implementation is left to the vendor of driver.



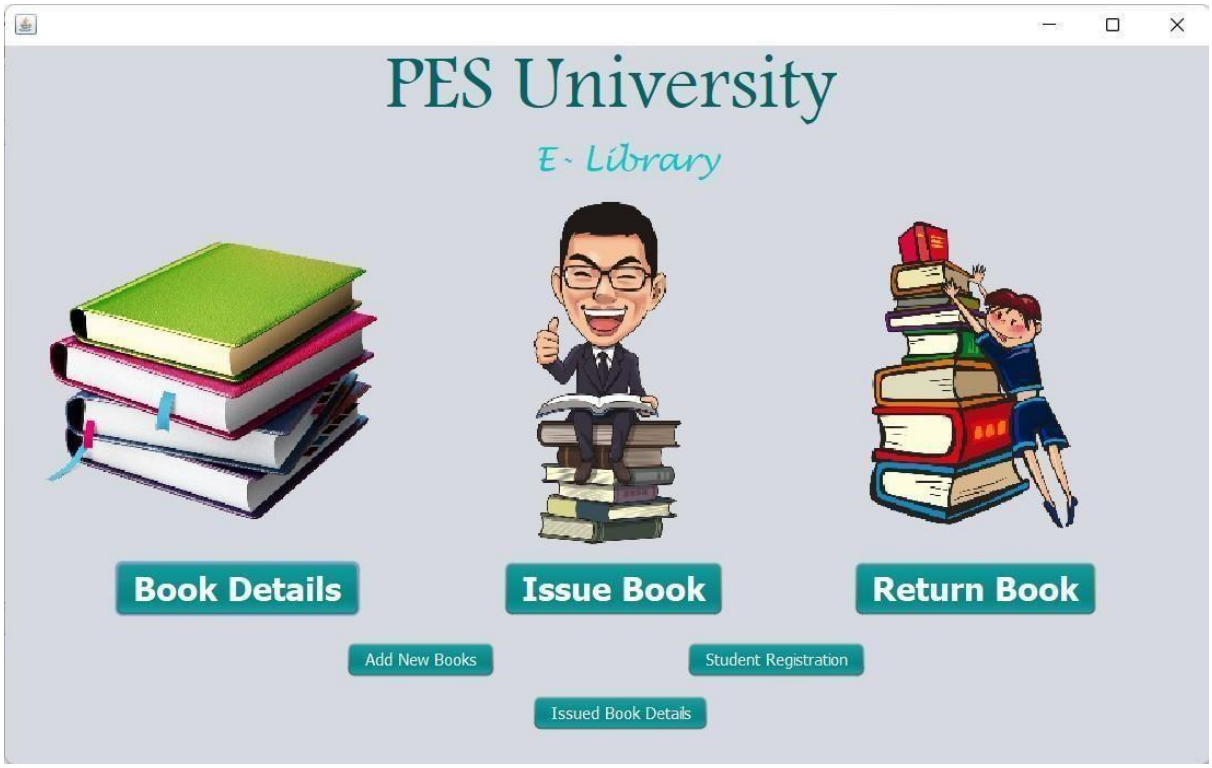


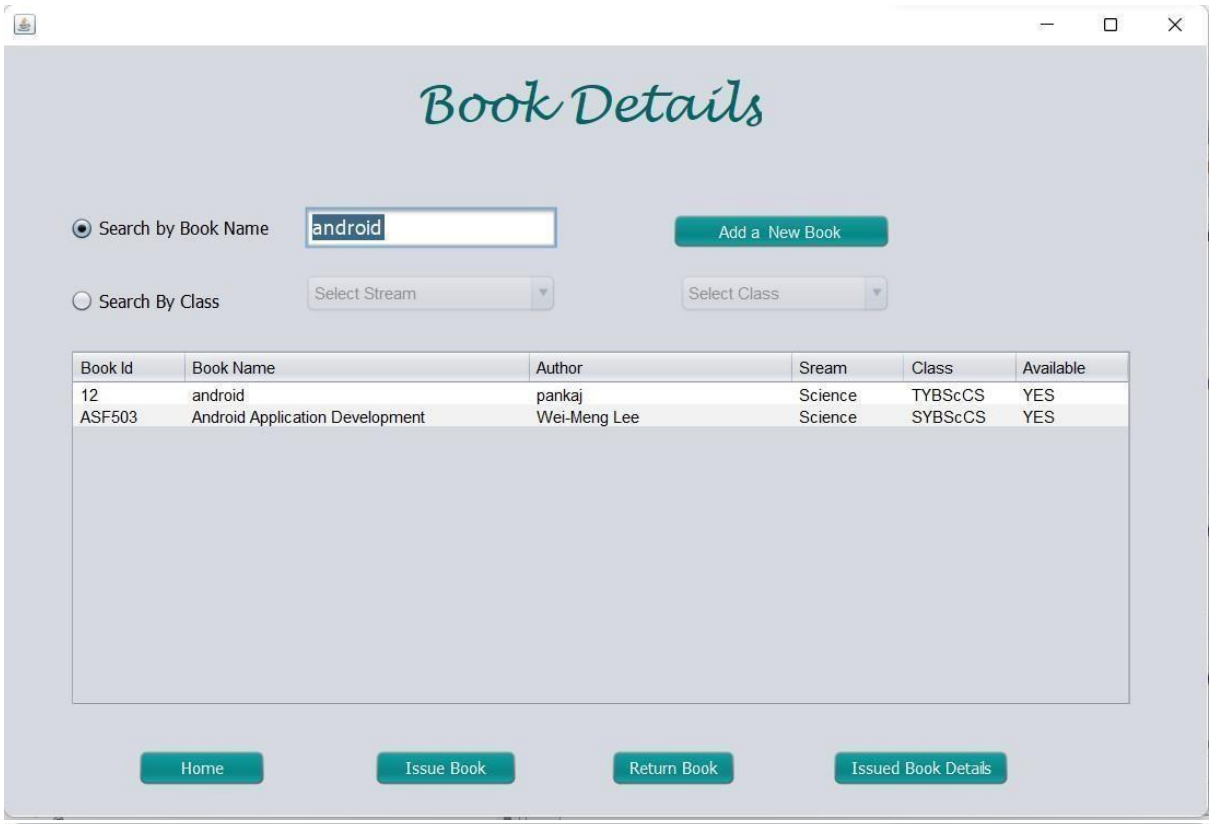
(iii) Client-Server Pattern (Architectural Pattern):



This architecture is used when a server and clients are connected. In here, Server is the service provider. And the client is the service consumer. Normally server is located in a local area network or in the internet. If the server is located in a local area network, outsiders can’t access the server but insiders can.

Application Screenshots (3-4 important pages)

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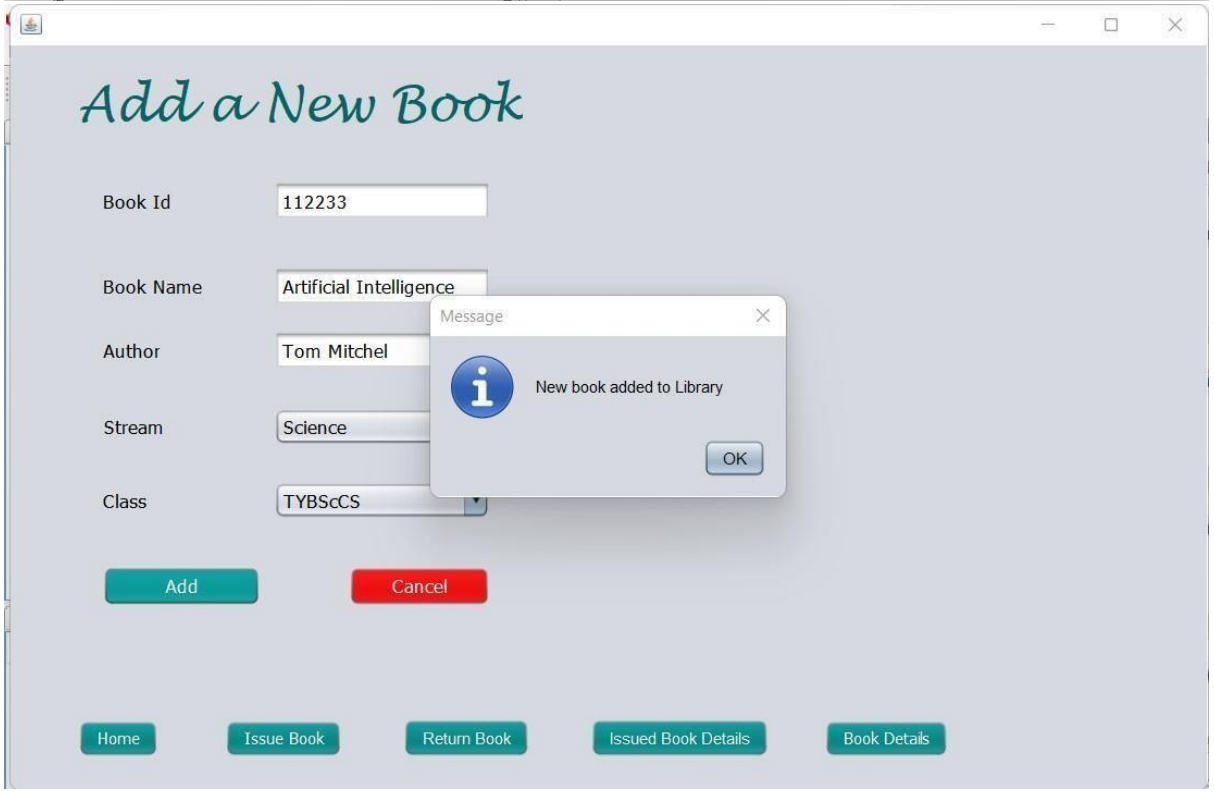
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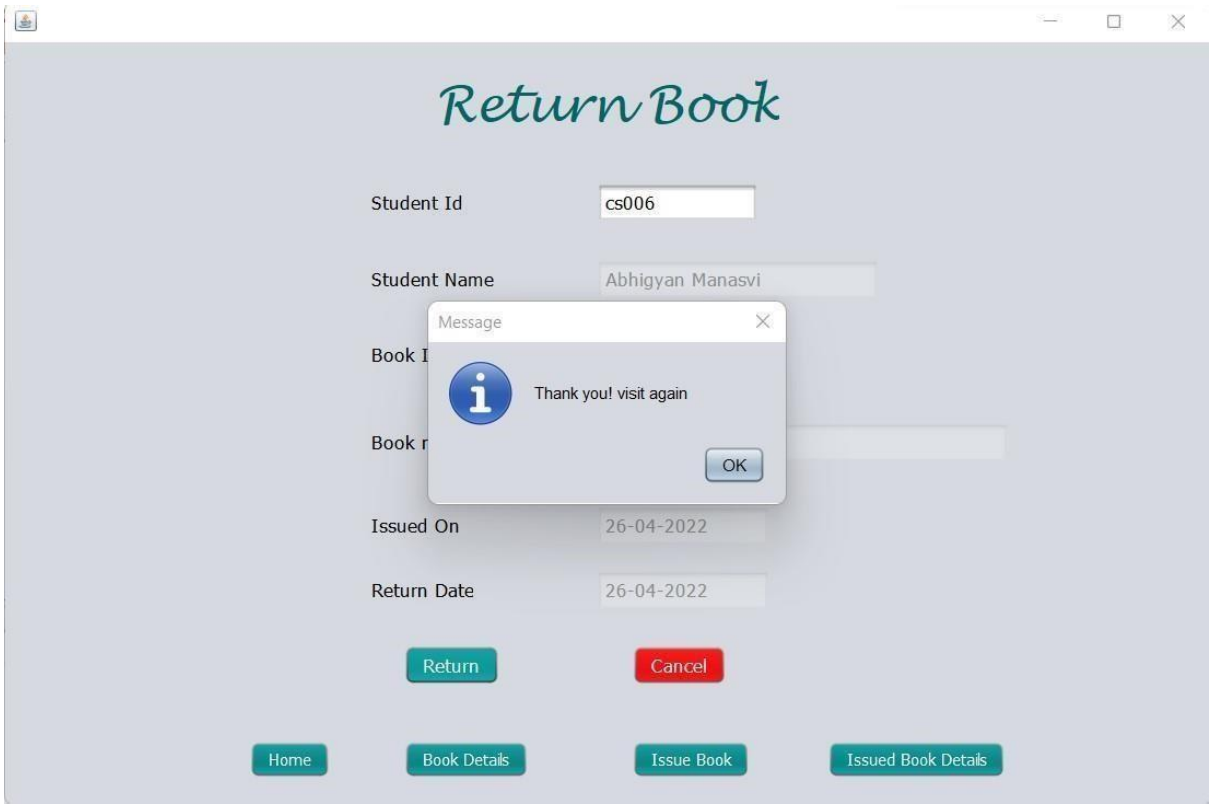
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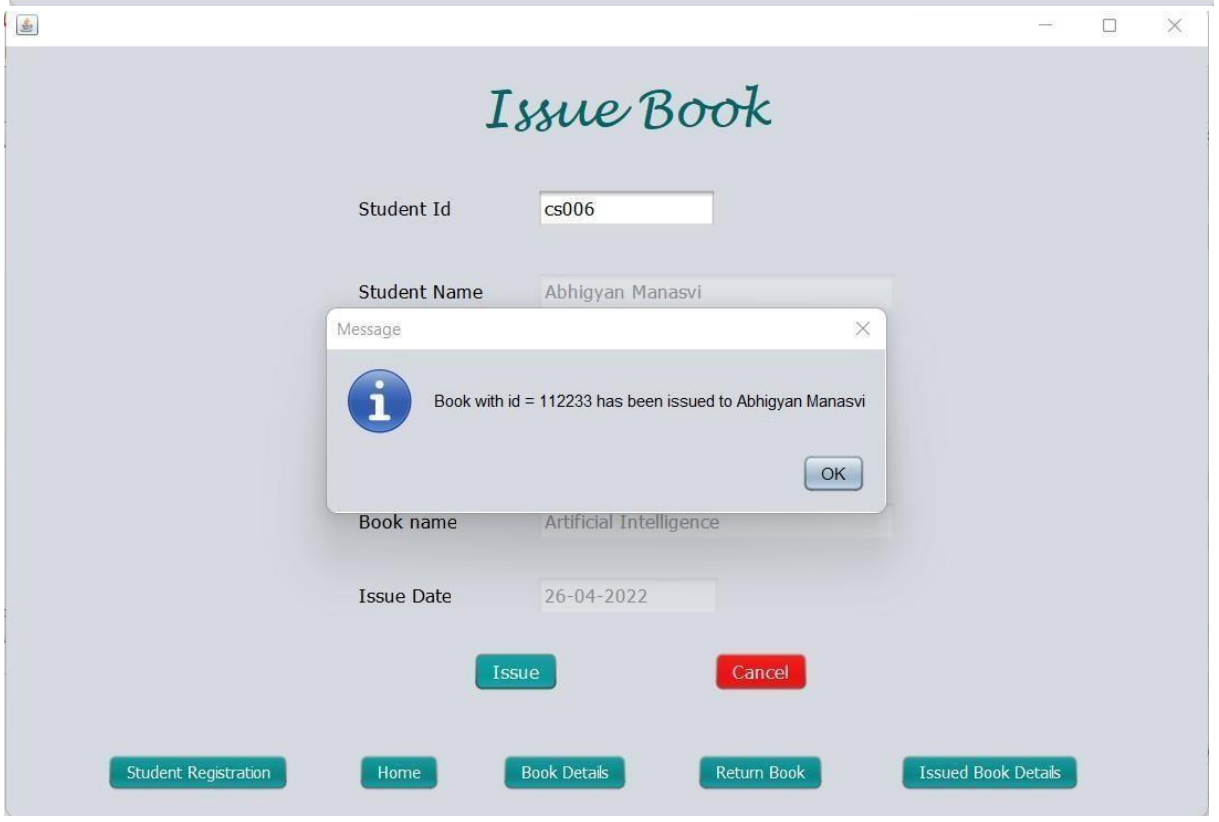
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5. Conclusion:

Library management system is a project which aims in developing a computerized system to maintain all the daily work of library .We used Java Swing for GUI and Apache Netbeans for the development of our project. We used Single Responsibilty Principle as the design principle and Façade as the structural pattern. Overall this project of ours is being developed to help the students as well as staff of library to maintain the library in the best way possible and also reduce the human efforts.

6. References

1. https://www.iitms.co.in/librarymanagementsystem/#:~:text=A%20library%20management%20system%20is,auto mates %20all%20your%20library's%20activities.
2. https://www.geeksforgeeks.org/use-case-diagram-for-library-managementsystem/
3. https://github.com/git-akshat/Library-Management
4. https://github.com/OSSpk/Library-Management-System-JAVA

7. Member Contributions

Abhigyan Manasvi	PES2UG19CS006	33%
Ananya Bhatnagar	PES2UG19CS038	33%
Anshuman Mandal	PES2UG19CS050	33%