A Project Report on

Developing Comprehensive Application for Tracking Library Services

Submitted in partial fulfillment of the requirements for the award
of the degree of

Bachelor of Engineering

in

Information Technology

by

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Declaration

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, We have adequately cited and referenced the original sources. We also declare that We have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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Abstract

Libraries are an essential part of educational organizations, but out-of-date management techniques can cause data loss and reduce the effectiveness of library transactions. One solution to these issues is to develop a smart library management system that automates book circulation process through the application of machine learning techniques. Investigating the usage of text recognition models is one method that might be used to create and retrieve library inventories. To expedite training and produce cutting-edge results on benchmark data-sets, our model includes rich supervision. The suggested method will provide a number of benefits to both library staff and students in addition to addressing the problems of information loss and slow transactions. All of the library's information will be organized and kept up to date by the system, making it simple to find books and other materials on a sizeable number of bookshelves. Through automated library management system designed and development, students and library staff will be able to access the system and quickly look for and obtain books.In conclusion, the suggested library management system will offer an effective and convenient means of handling actual library collections. By reducing manual work and increasing accessibility to library resources, the system will improve the overall user experience and help to maintain the importance and relevance of libraries in the digital age.

Keywords: - Machine Learning, collaborative filtering algorithm,eXtensible Markup Language

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List of Abbreviations

RFID	Radio-Frequency IDentification
XML	Extensible Markup Language
ML	Machine Learning
QR code	Quick Responce Code
CNN	Convolutional neural network
RNN	Recurrent neual network
IDE	Integrated development environment

Chapter 1

Introduction

Any educational institution would be incomplete without a library since it gives teachers and students access to tools for learning and research. However, keeping track of the books' availability and borrowing can be a difficult and time-consuming operation when operating a library. An efficient mobile application has been created to let students, instructors, and librarians access library resources in order to solve this problem.

Students/teachers and librarians/admins are two separate user groups whose demands have been taken into consideration when designing the library monitoring programme. Students and teachers can use the app to look for book availability in the library, view their borrowing history, and search for books. The programme can be used by librarians and admins to manage the library database, add or delete books, change book details, issue books to borrowers, collect fines for late returns, and more.

The Java programming language, the Android Studio integrated development environment, the SQLite database management system, the XML markup language for designing the user interface, and the Git version control system were all used in the development of the application. Users of the programme can quickly navigate through its features and functionalities because to its user-friendly design.

The library tracking programme offers a number of advantages, including a more effective approach to track book availability and lending, a reduction in the time and effort needed for manual bookkeeping, and an improvement to the user experience by making library services easily accessible. Additionally, the application can assist librarians and administrators in better managing the library, freeing them up to concentrate on other crucial activities like upgrading the library collection and enhancing customer services.

By scanning the book's QR code, library patrons will be able to check in and choose available volumes based on their interests. Users must physically visit the library to obtain books; the app is only intended to monitor library services. Books must be returned or renewed by students within 15 days, and by instructional staff members within 30 days. The main difficulty faced by library employees is managing the electronic data on the books that are routinely checked out by teachers and pupils. The current manual book handling system makes it challenging to count the volumes lost by the library with any degree of accuracy.

The manual system the library now uses to keep track of important information about books has shown to be ineffective and inadequate to handle all the problems experienced by the library employees. A new application that can take the place of the existing manual system must be implemented in order to increase the system's effectiveness and efficiency. The purpose of this essay is to examine the specifications for the new system and the procedures required for its effective implementation.

The library's existing approach for tracking books is inefficient, which makes it challenging to manage resources for both staff and students. The system's erratic determination of whether books are issued or in the library, along with the information's frequent repetition, have produced serious issues that will take a lot of time and effort to resolve. It is essential to effectively manage time for staff and patrons when running a library, especially in a general college library with several book divisions. The management of these parts by the library personnel may be difficult if the system is slow. Therefore, providing a prompt and focused answer is essential to resolving this problem.

The goal of this conversation is to examine the difficulties libraries are currently experiencing as a result of the loss of book information, which has caused lengthy transaction times for both staff and students as well as delayed processes for library employees. The use of libraries by teachers and students has been adversely affected by these problems. A fresh and efficient application that caters to the interests of all relevant stakeholders is needed to overcome these obstacles. This discussion intends to examine potential remedies for these problems and to suggest a thorough and workable approach for enhancing library operations.

Although digital books have grown in popularity in the modern world, many people still choose physical books. Managing sizable physical libraries can be a challenge, as not all books have been transferred to digital form. It can take a long time and be ineffective to manually search through millions of books to find a particular item. A solution to the issue can be suggested, which involves utilizing a deep neural network based system to automatically recognize and index the text on bookshelf pictures. This approach can significantly enhance the search process, making it more efficient and effective

Chapter 2

Literature Review

This section includes historical research on library management systems and subjects linked to the latter, as well as a brief description of their research, deployment, and implementation. There are a number of research articles on library management systems that have examined various methods for automating book searching, issuing, and returning. In these publications, new technologies including the Internet of Things (IoT), block chain, AI-ML, and RFID tags are introduced. In this review, we will assess the efficacy of these strategies and investigate the creation of an Android application that automates the process of finding and issuing books, drawing inspiration from the concepts discussed in the earlier research publications.

- The 2017 project by Jitendra Pandey et al. focused on smart library systems employing IoT[2], where the initial cost of an RFID-based library is high but the cost of maintenance and time usage of these libraries is lower. The adoption of RFID technology in libraries is acknowledged to be growing quickly. The power of the RFID [1] tag substance will increase, expenses must decrease, and the tag's proficiency, security, and precision will all be much improved. The proposed research is done to enhance the management of the library systems in various libraries, particularly in Oman. To prevent any problems in the future, all regulations and requirements were taken into consideration when creating the project.

- As per the study made by Ajinkya Badgujar et.al., in 2019 on the topic of library management system where the proposed system simplifies the overall process of Library management system using artificial intelligence which will benefit the students as well as Library staff. It makes entire process online[8] where student can search books, request for book using chat-bot.Chat-bot reduces book transaction time and simplifies book issuing process. Librarian can generate reports and perform book transactions. This will overcome all the existing problems and will provide a more sophisticated user experience with the help of chat-bot . Library automation should provide quality experience for stake holders.

- The topic of Smart Library: Identifying Books on Library Shelves using Supervised Deep Learning by Xiao Yang et.al in 2017 was developed for Scene Text Reading where they achieve [10] state-of-the-art performance for scene text recognition and at the same time reduce training time. Information retrieval experiments were conducted on a large physical library database. Performance on the whole system demonstrates that

text-based retrieval is competitive with image-matching retrieval, and that text-based retrieval reduces the need for storing or matching book spine images.

- According to the study of NAMBURI SAI NAGA LAKSHMI et.al in 2019 on the topic of ONLINE LIBRARY MANAGEMENT SYSTEM Where The "Online Library Management System" was successfully designed and is tested for accuracy and quality. During this project we have accomplished all the objectives and this project meets the needs of the organization. The developed will be used in searching, retrieving and generating information for the concerned requests.

- Information collected from Shanmugam et.al in 2019 on the topic of Library Management System where The hindrance and issues of the traditional library are identified and promote it to easy access for the libraries. In the Library Management system, the librarian can add/update/remove the student and book details into the database. The students have a Unique ID for accessing any book from the library. Through the ID, the librarian can check the user details, fine payment, and book details. The LMS [11] reduces labor work and makes the system efficient. In future work, we planned to enhance the LMS by integrating the LMS with Local area Network (LAN) which increases the efficiency of the system

- As per the study of author jinan et.al.,in 2019 on the topic of A smart book management system based on Blockchain platform where The advantage of a blockchain [3] is that it can be written once and then can be additionally written to multiple distributed ledgers; it can be deployed on different nodes of the network, and each record has its own hash hash, so that It cannot be changed. A distributed ledger based on a blockchain network can provide a more comprehensive and richer transaction history than a partial user can review through an internal system. However, due to the distributed nature of the blockchain, all data must be replicated to all nodes on the chain. If the blockchain user's transaction contains images, the amount of data will grow rapidly as the ever-increasing data store grows larger over time. This paper introduces an application scenario of a blockchain-based smart book management system, introduces its system architecture principle in detail, and uses the blockchain technology to realize the decentralization of the book borrowing status and the number of borrowed books borrowed by the borrower. Synchronization function, hope to provide some theoretical help to blockchain application developers, in the actual development can be used for reference and reference and develop a blockchain application that meets customer needs.

- In accordance with the research conducted by Azhar Ozeer et al. in 2019 on the subject of transforming a traditional library into a smart library, The traditional library, which serves as a medium for sharing information, needs to adapt its procedures in order to keep up with the development of new technology. In order to apply business process re-engineering principles and incorporate smart IoT [12] devices into the activities to transform the library at the University of Mauritius into a smart library system [11], the primary goal of this paper is to perform a thorough analysis of the core processes of the library. With the use of smart gates, material location finders, and smart check-out booths to automate the operations of regulating access, locating goods, as well as issuing/returning materials, this transformation will increase efficiency and eliminate human error in the processes. However, the transition to a smart library

system may encounter a number of difficulties, such as the expense of installing several high-frequency RFID[1] readers in strategic areas of the library. It will be necessary to use very advanced technology, which will significantly raise the price. Also, because of the traditional library layout, which places the shelves near to one another, embedding RFID tags in the items may experience weak signals, diminishing their efficiency in connecting with readers.

- In their 2019 paper, "Library: A Facial Recognition and QR Code Technology Based Smart Library[10] System," Dhaval et al. The system's minimal wear out rate can be attributed to the system's extensive use of software. The system would be self-sufficient and deployable in actual libraries, which would assist lessen the heavy workload on the librarians if face recognition [3] accuracy were to be much improved. All of the library's books can be tracked in real-time using Library. There is no requirement for the librarian to be involved. Self-issue and self-return procedures are encouraged by the system to prevent lengthy lines at the counter. Any orientation of a face can be detected by the system. Additionally, the system can be configured so that even if several faces are seen in the video frame, the book should only be given to the customer holding it rather than the other faces seen. At the exit gate, buzzers can be installed to improve security and notify the responsible party in the event of theft. The system might integrate modules that offer business intelligencec[8] for knowledge extraction.

- According to a 2018 study by Mohit Gupta et al. on the subject of "Library in Everyone's Pocket," library mobile apps are an additional and crucial use of mobile technologies that help make accessing library services easier and better by assisting users in a variety of ways with e-services and connecting. The Bundelkhand University mobile app for Android devices has demonstrated that the nature and accessibility have improved in terms of cost, ease of use, and dependability without any bugs. The number of individuals using the internet through mobile and web applications like Facebook, Whatsapp, and other services[15] is rapidly wear-out. Youths are the primary users of these mobile and web applications.

- Information gathered in 2020 on the subject of RNN-Based [5] Demand Awareness in Smart Libraries from Ruiqin Bai et al. Utilizing CRFID[9] solved a number of issues with the prior study. The experimental situation has a straight for real-time. The recognition range will be expanded, more antennae will be used, and new data encoding methods will be developed in the upcoming development. It is now used to detect books that can be covered by a single reader antenna. Moreover, it is also possible to try using CNN to identify activities based on the use of RNN [5]. The relationship between reader behaviors and reader requests can be investigated in further detail.

- As per the study of Hongqiu Liu et.al.in 2020 where libraries should change their management and service models as early as possible and attach importance to[3] the cultivation of talents so that libraries can continue to "grow". However, due to the differences in technical conditions and skill levels of various libraries, specific and in-depth research is needed on specific analysis and application.At the same time, because the seven elements are dynamic and constantly changing, changes in one element will always have an impact on other elements. This requires continuous review in each area and necessary adjustments made in a timely manner.

- The contribution done by Nyoman Karna et.al.in 2019 where Library includes the self loan system and self-return system. The self loan system should be placed at the circulation table with slider to send the book(s) beyond the security gate where the patron may collect the book(s). The self-return system may be located at any building as long as there is network connectivity through WiFi or Ethernet cable [6] to provide not just self-return service but also to provide book donation service. Based on the system performance measurement, for self loan system, the maximum book thickness that is able to be processed is 50 millimeters with a cover thickness of 4.8 millimeters. The self loan system provides 4.3 times faster processing time when processing 1 book, however, for 3 books, the self loan system provides only 3.5 times faster processing time. For the self-return system to work properly, a book weighing between 200 to 2300 grams is recommended for the reading process to work.

- The Study done by Ranjith Kumar P et.al 2019 on the topic where The concept of IOT helps people to read books at audio outputs in speech translation system and also navigate within the library freely without aids. IOT [15] implemented by the Arduino or Pi board helps interface the text recognition to the speech translation and also interfaces the navigation tool for movement within the library. The design aims at free flow of navigation through the library and read the books by the OCR technology and also translates as needed by the user. This system emphasizes the importance of impaired people to utilize the library in an efficient way. It is economical, user-friend and handy to the impaired people. It helps manage their work efficiently.

- As per the study of Manuel B. Garcia et.al in 2019 where new generation of library management system with the introduction of Human-Library Interaction was developed to renovate the house of dusty books and card files, and transform it into a center of research, collaboration, and creativity through the fusion of traditional librarianship, self-service solutions, and human-computer interaction. By strictly following HCS-DLC [14] as the software methodology and ISO 9241-210 international specification on human-centered design for interactive systems as the main guidelines and foundation all throughout the project life cycle, the final self service library system was created as a system-centered and user-centered information system. Early and continuous feedback to all prototypes created pointed the right direction to a more usable and functional LMS.

- According to a study by Yu et al. from 2020, where a mobile robot for library administration that takes readers' negative borrowing habits into account was shown. A mobile robot [6], can successfully complete autonomous navigation and obstacle avoidance tasks. The mobile robot can also independently identify the desired book and remove it from the bookshelf using a mechanical four-DOF arm. The ability of the mobile robot to ride the elevator on its own, which is essential to expanding the travel area of the mobile robot, is made possible by an effective autonomous elevator button recognition system based on neural networks. The data monitoring center and graphical user interface[14] make it easy for users and administrators to operate the robot while it is working, which not only ensures great work efficiency but also streamlines the process. Experimental and simulation results show that the robot has great fault tolerance and good interactivity. Our robot has greater capabilities than another book scan straight for recalling to finish the shelving process of books without human inter-

vention and traverse barriers between floors. As opposed to auto-borrow libraries, our robot may fully realise its capabilities under the assumption that the current library structure is maintained, resulting in higher adaptability and lower library reformation costs. By utilising our robot, it is simple to implement unmanned administration based on an existing traditional library, offering a fresh approach to creating a contemporary intelligent library.

- According to a study by Sarah Khalid and Vinod Kumar Shukla, whose paper gives a thorough analysis of fingerprint biometric [7] scanners in terms of their operation, varieties, and applications, among other things. The use of fingerprint scanners for authentication has increased as a result of their proven reliability. One example is the deployment of fingerprint scanners in university libraries' library management systems for identity and authorization. As a result, fingerprint technology continues to replace antiquated password and pin systems since it is less expensive and simpler to use in educational institutions, with the potential for future enhancements and increased capabilities.

Objectives

Objectives are precise goals that are intended to be accomplished within a certain time frame. These objectives serve as a map for concentrating efforts and resources in the direction of a desired result and are often specific, measurable, achievable, relevant, and time-bound. They give teams and people direction and a clear sense of purpose, and they are used to assess development and success in reaching goals.

- To create a mobile application for the automatic process of library management system using different features of Android studio IDE.
- To provide dynamic user interface using XML (eXtensible Markup Language).
- To create a book recommendation system using collaborative filtering Machine learning algorithm.
- To store and processed the data using object storage service of Firebase.

Chapter 3

Project Design

The project's key features, structure, criteria for success, and major deliverables are all planned out in this steps. The aim is to develop design in a way so that it can differ from existing system that can be used to achieve the desired project goals.

3.0.1 Existing System

- The current library management system had a number of shortcomings that made it challenging for users to efficiently access and manage the library's collection. For instance, it took time and inconvenience for users to physically visit the library to look up books and view their borrowing history. Additionally lacking were sophisticated search capabilities, which made it difficult for consumers to locate particular publications. Inconveniently, the system did not allow users to renew or reissue books online, which was problematic for people who could not physically visit the library.

- Additionally, the current system's interfaces and navigation were not user-friendly, making it challenging for users to locate the data they required. Users who needed to access the library's resources frequently became frustrated as a result, which diminished their overall user experience.

- The management of the library's collection and user accounts was also difficult with the current system. For instance, updating book information or adding or removing volumes from the database proved to be difficult for librarians, which resulted in errors in the library's catalogue. It was also difficult to enforce borrowing restrictions because the system lacked tools for collecting fines from users who failed to return books on time.

3.0.2 Proposed System

- The initial step is to gather the requirements for the system. This includes determining the specific use cases, the functional and non-functional requirements, and the desired user experience. This information is used to define the scope and specifications of the system.

- In order to solve the shortcomings of the current system and give users better access to the library's resources, the suggested library management system was created. To start, the suggested system has sophisticated search capabilities that make it simple for users to locate particular publications. Additionally, the technology gives users internet access to their borrowing histories, enabling them to renew or reissue books without physically visiting the library. Users now have more freedom and convenience thanks to these capabilities, which was not feasible with the previous system.

- The proposed system also features user-friendly interfaces and obvious navigation, making it simple for users to locate the data they require. Users may browse the library's collection and simply access their accounts thanks to the system's straightforward and user-friendly design. It is anticipated that this enhanced user experience would boost patron interest in the library's resources.

- The system under consideration also includes sophisticated functionality for controlling the library's collection and user accounts. By making it simple for librarians to add, remove, and update book details, the library can maintain an accurate and current catalogue. It is also made simpler to enforce borrowing laws because to the system's functionality for collecting fines from users who don't return books on time.

- The next step is to design the user interface for the system. This involves creating a user-friendly interface that permits employees to check in and out and access their attendance data.

- Once the system has been developed, it needs to be thoroughly tested to ensure that it meets the requirements and works as expected.

- Once the system has been tested and any necessary changes have been made, the system can be deployed. This involves setting up the necessary infrastructure, databases, and cameras, and configuring the system to work in the desired environment.

- The final step is to maintain and support the system over time. This involves fixing any bugs,updating the system as needed, and providing technical support to users[6]

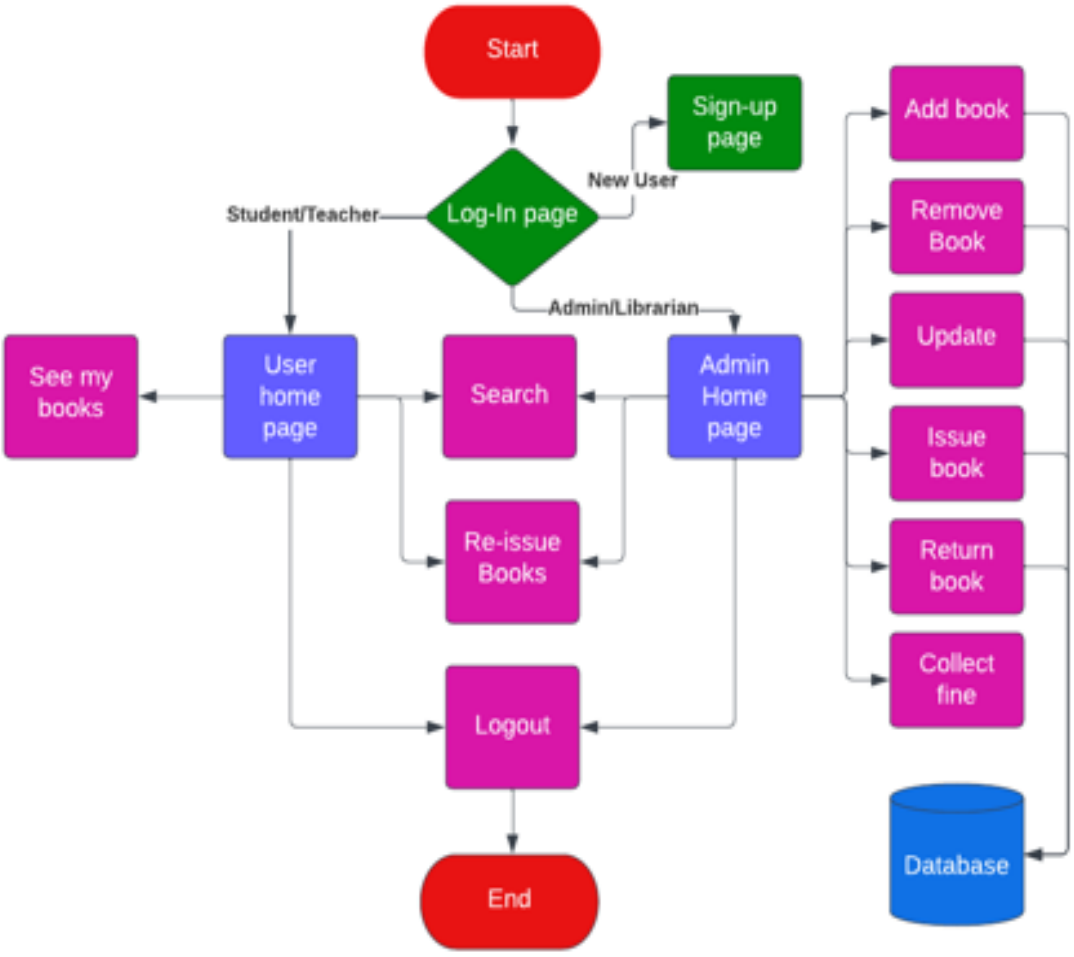

Figure 3.1: System Architecture Diagram

3.0.3 System Diagram

The project report's System Diagram section gives a graphic representation of the various system elements and their relationships to one another. A high-level overview of the system architecture is provided, highlighting the many subsystems, their roles, and the data flows that connect them. The system diagram makes it easier for readers to comprehend the general organisation of the system, as well as how its many parts interact to produce the intended functionality.

- Activity Diagram

  The proposed approach, which is intended to make the process of borrowing books from a library easier, is fully illustrated in the picture. The system is made up of numerous interconnected modules and parts that operate in unison to give users a quick and effective experience.The user must sign in to the programme as the initial step in the procedure. This supports a safe and effective borrowing procedure by ensuring that only authorised users have access to the library's resources. To confirm that the user is authorised to access the library's resources and is registered with the system, the user's credentials are then cross-referenced against the database.

  The user is given access to the system and can begin looking for books based on their interests if their credentials match those in the database. Users may browse the library's collection and quickly find the books they need thanks to the system's robust search capabilities.The user must physically visit the library to make a request for the book from the librarian after having chosen it. The librarian will now confirm the user's identification to make sure they have permission to borrow the book. If the user is approved, the librarian will lend the book to them, and the computer system will update the database to reflect this.

  Numerous features and functionalities that improve user experience and speed up the borrowing process are incorporated into the system architecture. The system, for instance, has a user-friendly interface that enables users to look for books using several criteria, like author, title, and subject. A large database that houses data on the library's inventory, including the status of each book, its location, and the quantity of copies available, is also a part of the system. Additionally, the system's architecture makes sure that the loaning process is quick and simple, saving users time and effort when borrowing books from the library. Developers may fully comprehend the operation of the proposed system by utilising a system diagram to describe it, giving them the knowledge they need to hone and optimise it for optimum efficacy and efficiency.

  In conclusion, the suggested system diagram shows a well-thought-out and cohesive system that streamlines the process of taking out books from a library. While its strong database and security features enable correct management and tracking of the library's inventory, its numerous features and functionalities work together to give a smooth and effective user experience. Overall, system diagrams are a useful tool in software engineering because they offer a visual depiction of intricate systems that may be built and improved for maximum efficacy.

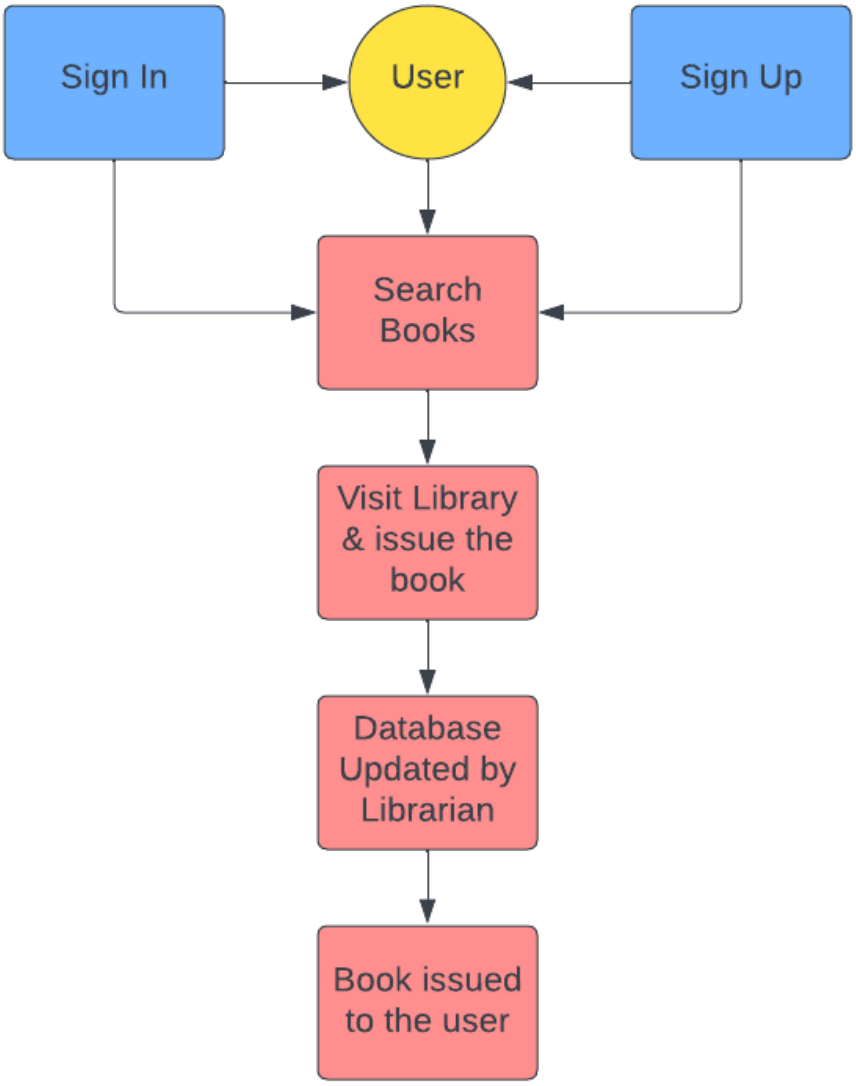

Figure 3.2: Activity Diagram of User

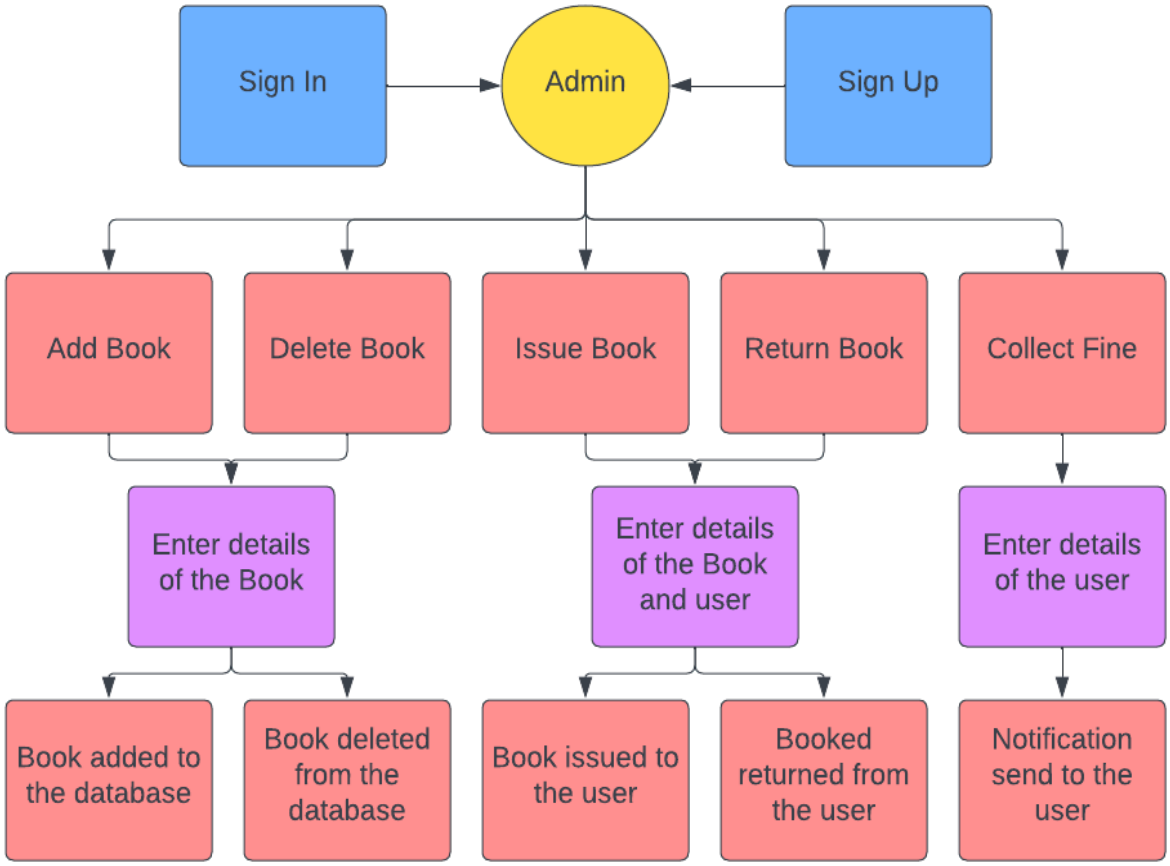

Figure 3.3: Activity Diagram of Admin

- Use Case Diagram

  The actions that are available to both the Admin and the User are shown in the use case diagram. They are able to use their individual credentials to log in and log out utilising the system. After successfully logging in, the User can carry out a number of tasks such book searching, book reissuing, and seeing their own book collection. On the other hand, the Admin is given access to more features, such as the ability to add books, delete books, collect fines, and issue books to users.

  The diagram shows a distinct division of responsibilities between the Admin and User, allowing them to successfully do their respective obligations. Our application is a comprehensive library management system that serves two types of users: students/teachers and admins/librarians.Our application is a comprehensive library management system that serves two types of users: students/teachers and admins/librarians. The system makes it simple for teachers and students to find books that are pertinent to their coursework or personal interests by allowing them to search for books based on a range of criteria, including title, author, or genre. Additionally, individuals have the option of reissuing books if they require more time to finish reading or perform tasks associated with the borrowed books. They can manage their borrowing history and make plans as needed by viewing the list of books they have borrowed and when they are due. When users are done using the system, they can safely log out to ensure the security of their login credentials and personal data.

  The system provides administrators and librarians with extra tools for controlling the library's user base and collection. By adding new books to the database, they can keep the library's collection current and pertinent to the wants and needs of its patrons. In order to keep the library's collection up to date and in good shape, they can also remove books from the collection if they are outdated or damaged. In addition, users can correct any inaccuracies or modifications to book information, such as the title, author, or publishing date.

  Additionally, administrators and librarians can distribute books to authorised users like students and instructors to make sure that the library's collection is being used properly and that only authorised users are borrowing books. To keep the library's collection current and accurate, they can also accept returned books and update the status of the book in the database. As a final measure to ensure that patrons are responsible for their borrowed materials and that the library's resources are being used appropriately, they can charge fines to those who do not return their books on time.

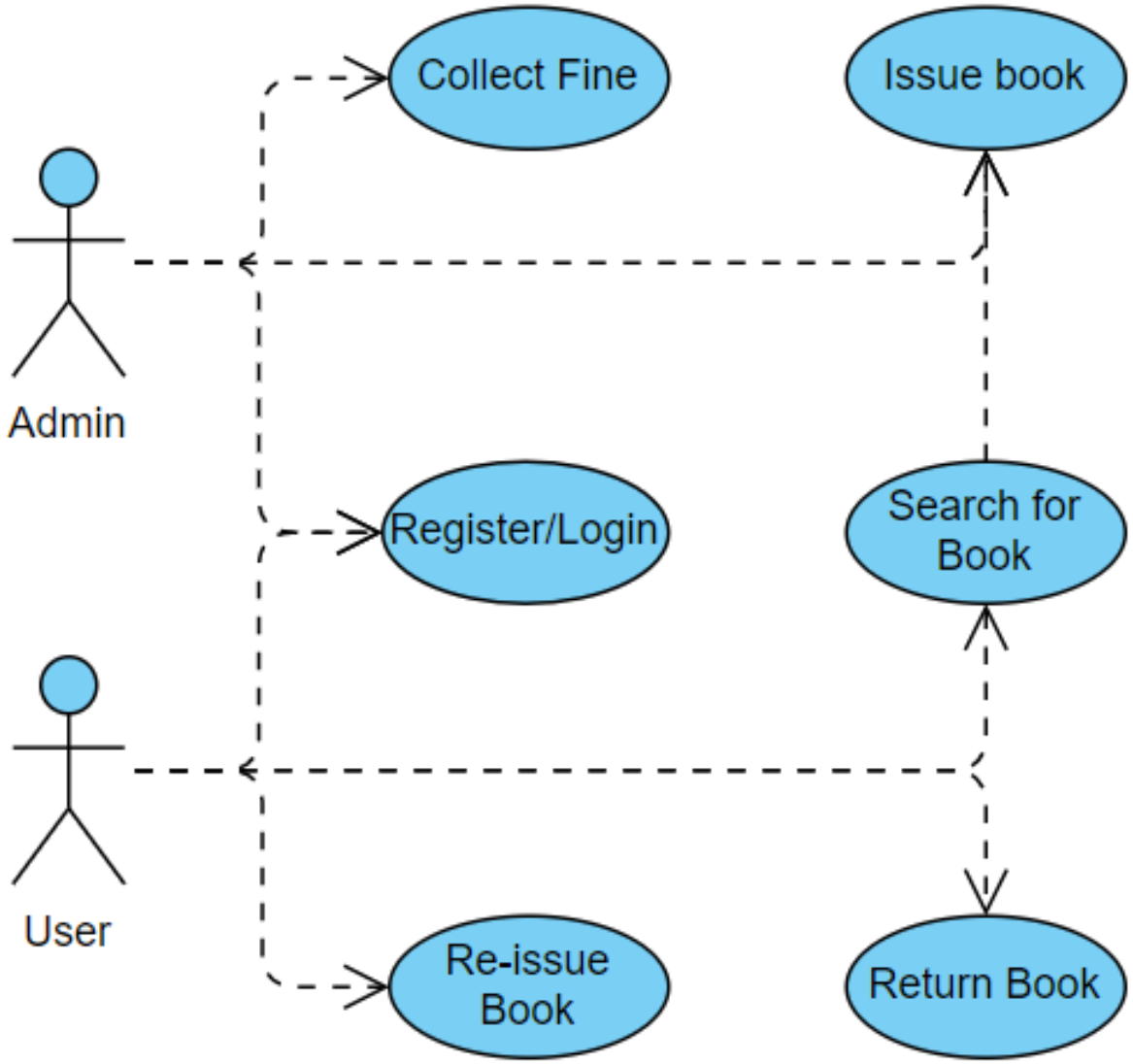

Figure 3.4: Usecase Diagram

- Sequence Diagram

  The sequence diagram shows the entire sequence of flow of the data in the system.By cross-referencing the user's credentials with the database, the application validates their validity. The application enables the user to sign in successfully if the credentials are legitimate. The user then searches for a book, and the application uses the user's search parameters to look for the book in the database. The user can view the search results after the application provides them to them.

  The user must physically go to the library and ask the librarian for the book after choosing one to check out. By cross-referencing the user's credentials with the database, the librarian validates their validity. The librarian gives the user the book if they have permission to borrow it. The status of the book is changed to "issued" by the librarian, who also changes the database to reflect that it has been issued to the user. The user then receives the book after the librarian issues it to them.

  The flow of events in the suggested system is clearly depicted in the sequence diagram, which emphasises the interactions between the user, the application, the database, and the librarian. Developers can use it as a helpful tool to find potential problems with the system and improve its functionality for optimal efficacy and efficiency.

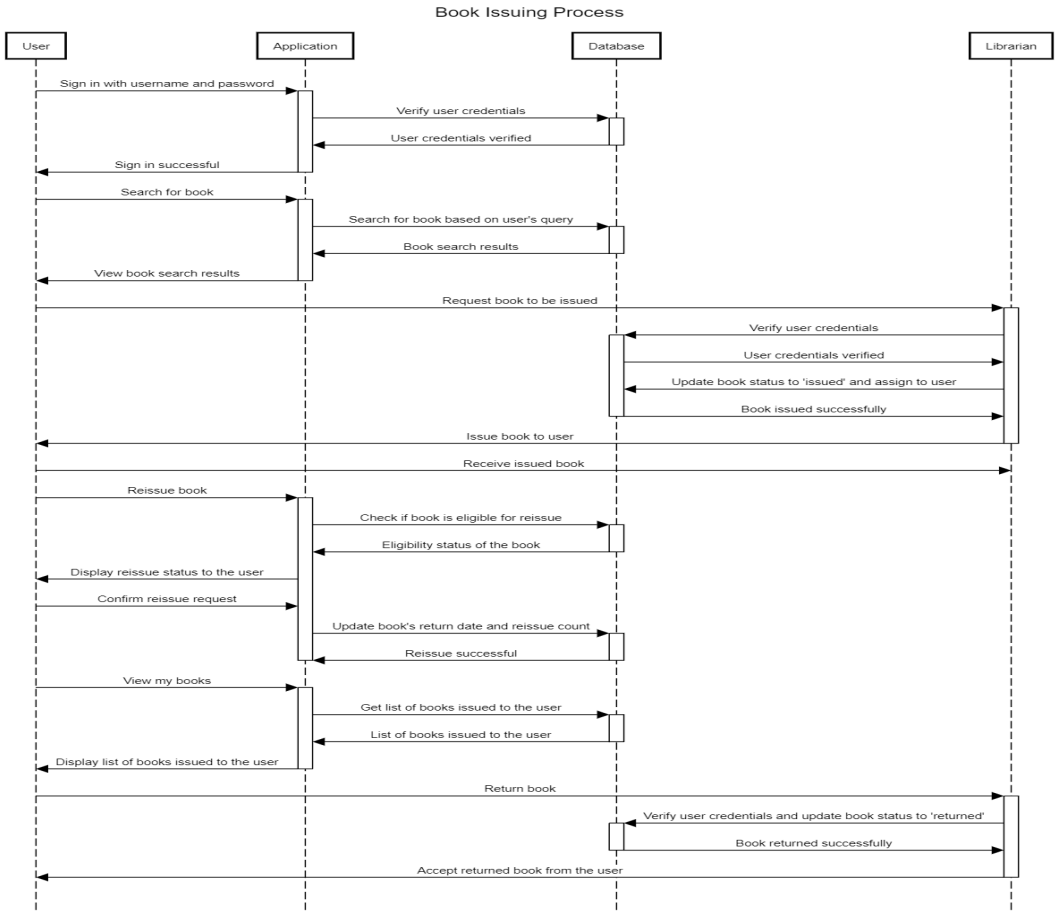

Figure 3.5: Sequence Diagram

Chapter 4

Project Implementation

Project implementation consists of visions and plans with which we are supposed to build the end product. This includes the logical conclusion, after evaluating, deciding, visioning, planning and finding the other resources for the project. Technical implementation is one of the major aspects of executing a project.

4.0.1 Android application development

Many mobile apps in Android Studio depend on the Sign In activity, which enables users to safely access their account data. A login screen containing fields for the user's credentials and a button to start the login process are usually included. The Sign In activity is created by developers using Java code and XML layouts. The Java code verifies user input, communicates with the server to request authentication, and manages the server's response. The sign-in activity securely saves the user's session ID or access token for further usage. It offers a smooth user experience while ensuring the privacy and security of users.
New users can register for an account and access app features via the Sign Up activity in Android Studio. Usually, it comprises of a form that users can fill out to enter their personal information. The Sign Up activity, which handles the logic of validating user input, delivering the request to the server, and securely storing freshly created credentials in the app, is constructed by developers using XML layouts and Java code. Many Android apps depend on the Sign Up activity to deliver a seamless and safe user experience.
Mobile library management apps must have the Android Studio Admin Home Page. It has buttons for adding, removing, updating, issuing, collecting fines, and returning books. The page was made using Java code and XML layouts. The logic of the administrative tasks, including adding new books, updating book details, issuing and returning books, and collecting fines, is handled by the page's Java code. Administrators may effectively manage their collections with its help, while consumers enjoy a smooth user experience.

```java
@Override
protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_admin_home);

    FirebaseApp.initializeApp(this);
    firebaseAuth=FirebaseAuth.getInstance();
    searchBook=(Button)findViewById(R.id.searchBook);
    addBook=(Button)findViewById(R.id.addBook);
    removeBook=(Button)findViewById(R.id.removeBook);
    collect1=(Button)findViewById(R.id.collect1);
    updateBook=(Button)findViewById(R.id.updateBook);
    issueBook=(Button)findViewById(R.id.issueBook);
    returnBook=(Button)findViewById(R.id.returnBook);
    logOut=(Button)findViewById(R.id.logOut);
    reissueButton=(Button)findViewById(R.id.reissueBook);
    db=FirebaseFirestore.getInstance();

    searchBook.setOnClickListener(this);
    addBook.setOnClickListener(this);
    removeBook.setOnClickListener(this);
    updateBook.setOnClickListener(this);
    issueBook.setOnClickListener(this);
    returnBook.setOnClickListener(this);
    logOut.setOnClickListener(this);
    collect1.setOnClickListener(this);
```

Figure 4.1: Admin Home Activity

In Android Studio, the User Home Page is a crucial component of library management mobile apps. There are buttons there for things like See My Books, Book Search, Book Reissue, and Logout. The page was made using Java code and XML layouts. The User Home Page's logic, including the display of the user's book loans, the ability for them to look for new books, and the ability for them to reissue a book, is handled by the Java code. The user interface for managing book loans and other app features is simplified on the user home page.

```java
@Override
protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_user_home);
    FirebaseApp.initializeApp(this);
    firebaseAuth=FirebaseAuth.getInstance();
    title1=(TextView)findViewById(R.id.title1);
    searchBook1=(Button)findViewById(R.id.searchBook1);
    seeBook=(Button)findViewById(R.id.seeBook);
    logOut1=(Button)findViewById(R.id.logOut1);
    buttonReissue=(Button)findViewById(R.id.buttonReissue);

    db=FirebaseFirestore.getInstance();
    searchBook1.setOnClickListener(this);
    seeBook.setOnClickListener(this);
    logOut1.setOnClickListener(this);
    buttonReissue.setOnClickListener(this);
}


private TextView title1;
private Button searchBook1,seeBook,logOut1,buttonReissue;
private FirebaseAuth firebaseAuth;
private FirebaseFirestore db;
```

Figure 4.2: User Home Activity

4.0.2 Developing Machine Learning Model for book recommendation

The project team has produced a Jupyter notebook that imports various helpful libraries including NumPy, Pandas, and Matplotlib in order to build a powerful machine learning book recommendation engine. The machine learning model must work properly, and these libraries make it simple to manipulate and visualise data. Three crucial datasets have also been added by the team: books.csv, users.csv, and ratings.csv, which provide the details required to provide users with reliable book recommendations based on their reading interests and routines. The precision and dependability of the algorithms used, the quality of the data acquired, and the ethical use of user data are all critical components of this machine learning model's success. In order to deliver the most accurate book suggestions, it is essential to make sure that the system is created and used with transparency, honesty, and confidentiality in mind.

```
In [57]: import numpy as np
         import pandas as pd

In [2]:  books = pd.read_csv('books.csv')
         users = pd.read_csv('users.csv')
         ratings = pd.read_csv('ratings.csv')

         C:\Users\JAY\AppData\Local\Temp\ipykernel_41648\3819754567.py:1: DtypeWarning: Columns (3) have mixed types. Specify dtype opti
         on on import or set low_memory=False.
           books = pd.read_csv('books.csv')

In [3]:  books.head()

Out[3]:
```

	ISBN	Book-Title	Book-Author	Year-Of-Publication	Publisher	Image-URL-S	Image-URL-M
0	0195153448	Classical Mythology	Mark P. O. Morford	2002	Oxford University Press	http://images.amazon.com/images/P/0195153448.0...	http://images.amazon.com/images/P/0195153448.0...
1	0002005018	Clara Callan	Richard Bruce Wright	2001	HarperFlamingo Canada	http://images.amazon.com/images/P/0002005018.0...	http://images.amazon.com/images/P/0002005018.0...
2	0060973129	Decision in Normandy	Carlo D'Este	1991	HarperPerennial	http://images.amazon.com/images/P/0060973129.0...	http://images.amazon.com/images/P/0060973129.0...
3	0374157065	Flu: The Story of the Great Influenza Pandemic...	Gina Bari Kolata	1999	Farrar Straus Giroux	http://images.amazon.com/images/P/0374157065.0...	http://images.amazon.com/images/P/0374157065.0...
4	0393045218	The Mummies of Urumchi	E. J. W. Barber	1999	W. W. Norton & Company	http://images.amazon.com/images/P/0393045218.0...	http://images.amazon.com/images/P/0393045218.0...

Figure 4.3: Importing libraries in Jupyter Notebook

```
In [65]: ratings.merge(books,on='ISBN')
```

Out[65]:

	User-ID	ISBN	Book-Rating	Book-Title	Book-Author	Year-Of-Publication	Publisher	Image-URL-S	
0	276725	034545104X	0	Flesh Tones: A Novel	M. J. Rose	2002	Ballantine Books	http://images.amazon.com/images/P/034545104X.0...	http://images.amazon.cor
1	2313	034545104X	5	Flesh Tones: A Novel	M. J. Rose	2002	Ballantine Books	http://images.amazon.com/images/P/034545104X.0...	http://images.amazon.cor
2	6543	034545104X	0	Flesh Tones: A Novel	M. J. Rose	2002	Ballantine Books	http://images.amazon.com/images/P/034545104X.0...	http://images.amazon.cor
3	8680	034545104X	5	Flesh Tones: A Novel	M. J. Rose	2002	Ballantine Books	http://images.amazon.com/images/P/034545104X.0...	http://images.amazon.cor
4	10314	034545104X	9	Flesh Tones: A Novel	M. J. Rose	2002	Ballantine Books	http://images.amazon.com/images/P/034545104X.0...	http://images.amazon.cor
...	...	...	...	...	...	...	...	...	
1031131	276688	0517145553	0	Mostly Harmless	Douglas Adams	1995	Random House Value Pub	http://images.amazon.com/images/P/0517145553.0...	http://images.amazon.cor
1031132	276688	1575660792	7	Gray Matter	Shirley Kennett	1996	Kensington Publishing Corporation	http://images.amazon.com/images/P/1575660792.0...	http://images.amazon.cor
1031133	276690	0590907301	0	Triplet Trouble and the Class Trip (Triplet Tr...	Debbie Dadey	1997	Apple	http://images.amazon.com/images/P/0590907301.0...	http://images.amazon.cor
1031134	276704	0679752714	0	A Desert of Pure Feeling (Vintage Contemporaries)	Judith Freeman	1997	Vintage Books USA	http://images.amazon.com/images/P/0679752714.0...	http://images.amazon.cor
1031135	276704	0806917695	5	Perplexing Lateral Thinking Puzzles: Scholasti...	Paul Sloane	1997	Sterling Publishing	http://images.amazon.com/images/P/0806917695.0...	http://images.amazon.cor

Figure 4.4: Merging rating data set and books data set

When working with huge datasets containing numerous occurrences of the same data, this function is helpful. We can easily determine the number of occurrences of each value in the dataset by grouping the data based on a certain column. This function can be used to find popular books or novels that users score regularly in the context of a book recommendation system. Following that, recommendations to users based on their preferences or past ratings can be made using this information.

```
In [64]: ratings_with_name.groupby('Book-Title').count()
```

Out[64]:

Book-Title	User-ID	ISBN	Book-Rating	Book-Author	Year-Of-Publication	Publisher	Image-URL-S	Image-URL-M	Image-URL-L
A Light in the Storm: The Civil War Diary of Amelia Martin, Fenwick Island, Delaware, 1861 (Dear America)	4	4	4	4	4	4	4	4	4
Always Have Popsicles	1	1	1	1	1	1	1	1	1
Apple Magic (The Collector's series)	1	1	1	1	1	1	1	1	1
Ask Lily (Young Women of Faith: Lily Series, Book 5)	1	1	1	1	1	1	1	1	1
Beyond IBM: Leadership Marketing and Finance for the 1990s	1	1	1	1	1	1	1	1	1
...	...	...	...	...	...	...	...	...	...
Ã?Â?lpiraten.	2	2	2	2	2	2	2	2	2
Ã?Â?rger mit Produkt X. Roman.	4	4	4	4	4	4	4	4	4
Ã?Â?sterlich leben.	1	1	1	1	1	1	1	1	1
Ã?Â?stlich der Berge.	3	3	3	3	3	3	3	3	3
Ã?Â?thique en toc	2	2	2	2	2	2	2	2	2

241071 rows × 9 columns

```
In [18]: ratings_with_name = ratings.merge(books,on='ISBN')
```

```
In [66]: num_rating_df = ratings_with_name.groupby('Book-Title').count()['Book-Rating'].reset_index()
         num_rating_df.rename(columns={'Book-Rating':'num_ratings'},inplace=True)
         num_rating_df
```

Out[66]:

Book-Title	num_ratings

Figure 4.5: Grouping dataset

When the value in the 'book-Title' column appears in the famous_books list, the isin() function creates a boolean mask that returns True for those rows. The filtered_rating dataset is then filtered using this boolean mask to produce just the rows where the book title corresponds to one of the well-known books on the list.
This tool is helpful for locating user reviews for well-known or well-liked books in a dataset. We can learn more about how consumers evaluate these books by filtering the dataset in this way, and we can use this knowledge to suggest books to users based on their preferences or previous ratings.

```
In [20]: x = ratings_with_name.groupby('User-ID').count()['Book-Rating'] > 200
         padhe_likhe_users = x[x].index

In [21]: filtered_rating = ratings_with_name[ratings_with_name['User-ID'].isin(padhe_likhe_users)]

In [22]: y = filtered_rating.groupby('Book-Title').count()['Book-Rating']>=50
         famous_books = y[y].index

In [23]: final_ratings = filtered_rating[filtered_rating['Book-Title'].isin(famous_books)]

In [26]: pt = final_ratings.pivot_table(index='Book-Title',columns='User-ID',values='Book-Rating')

In [27]: pt.fillna(0,inplace=True)

In [29]: pt
```

Out[29]:

User-ID	254	2276	2766	2977	3363	4017	4385	6251	6323	6543	...	271705	273979	274004	274061	274301	274308	275970	277427	277639	2784
Book-Title																					
1984	9.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	...	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1st to Die: A Novel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.0	...	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2nd Chance	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
4 Blondes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
A Bend in the Road	0.0	0.0	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	...	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
Year of Wonders	0.0	0.0	0.0	7.0	0.0	0.0	0.0	0.0	0.0	0.0	...	0.0	9.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Figure 4.6: Creating boolean values

4.0.3 Firebase connectivity with android application

The Firebase Analytics dashboard is a platform that offers users current information about the performance of their app. It enables users to keep track of user engagement, behaviour, and app usage all in one place. on-depth data on user demographics, device kinds, screen views, user retention, and other crucial indicators are provided on the dashboard. Additionally, users can measure the success of their marketing initiatives by setting up bespoke event tracking. Overall, the Firebase Analytics dashboard offers marketers and app developers useful information that they can utilise to enhance user engagement and performance.

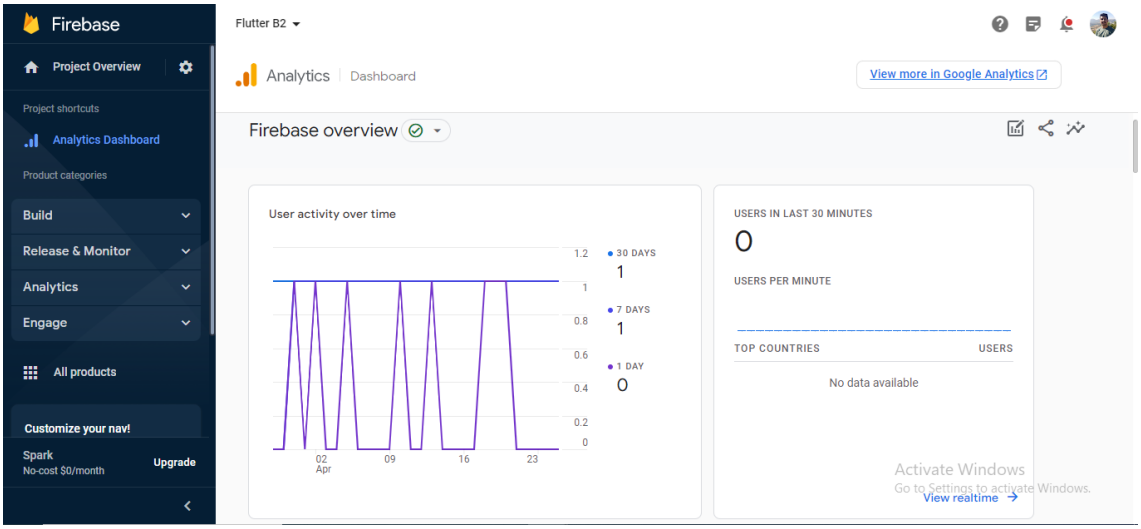

Figure 4.7: Firebase Dashboard 1

The above figure 4.7 shows Firebase dashboard which gives you information about how users are using your app or website. The "User activity over time" feature shows the total number of users who have been active during a given time frame. This might assist you in identifying peak usage periods and tracking user activity trends.

The "Users in last 30 minutes" functionality, on the other hand, shows how many users have been active within the previous 30 minutes. You may use this real-time data to track user activity and decide whether to plan maintenance or updates for your website or app. In general, these features assist you in better understanding user behaviour and in making defensible decisions about how to improve your app or website.

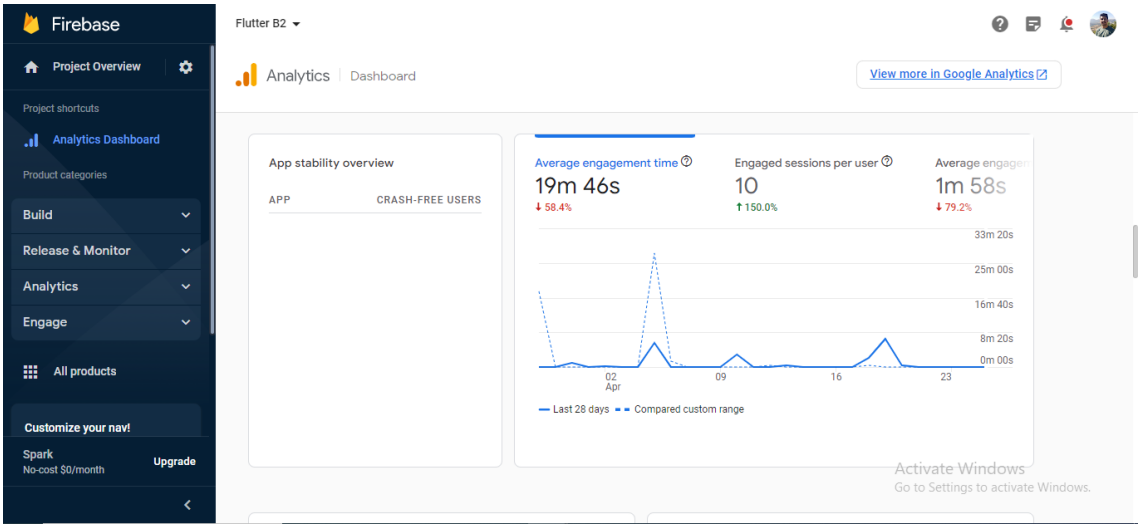

Figure 4.8: Firebase Dashboard 2

The success of the most recent release is demonstrated by the Latest app release overview feature, which shows the percentage of users who have updated to the most recent version of the app. With the use of this information, developers can make sure that the most recent update reaches as many people as possible and spot any problems that might be deterring consumers from updating to the most recent version.
The average length of user sessions in the app is depicted on the average engagement time graph. Understanding how long users spend using their app helps developers figure out how to enhance the user experience and lengthen user sessions. The engaged sessions per user graph displays the typical number of sessions users participate in over the course of a certain period of time. Understanding how frequently users interact with an app and how to improve user engagement is helpful to developers. The graph of average engagement time per user displays the typical length of interaction for each user. Developers can utilise this information to better understand how engaged their customers are and how to make their app more user-friendly.

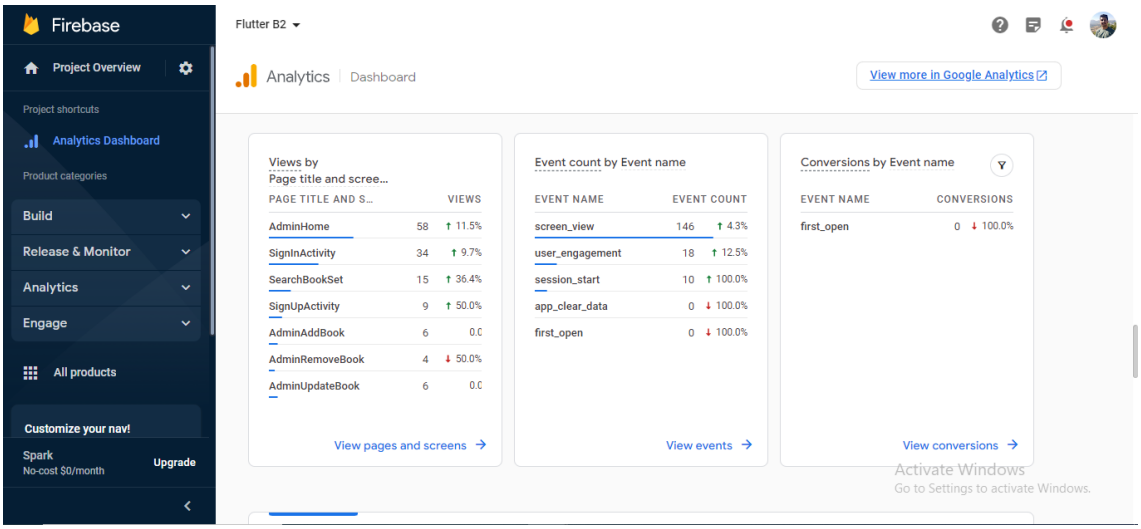

Figure 4.9: Firebase Dashboard 3

App developers can track the amount of views that each page or screen of their app receives as well as the matching class name of each screen using the "Views by page title and screen class" functionality. This information can be helpful for determining which user-favorite screens or pages to include in the app's design and content. Developers may keep track of how frequently each event occurs in the programme by using the "Event count by event name" functionality. This data can be helpful in figuring out how users engage with the app and in locating any potential problems or areas for development.

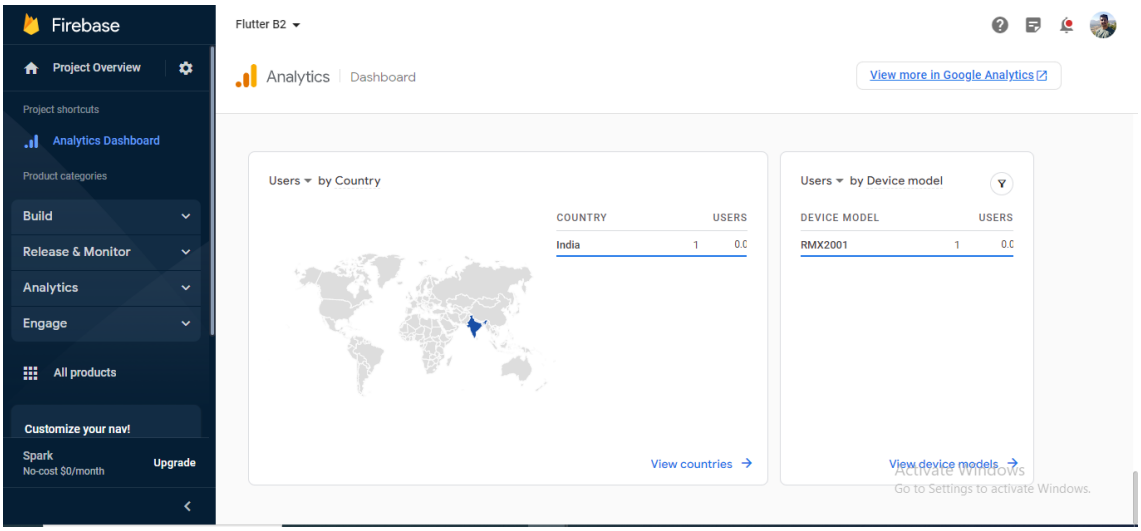

Figure 4.10: Firebase Dashboard 4

Developers can analyse the geographic distribution of their app's user base using the "User by Country" tool, which helps them determine where their app is most popular and where further attention or localization work may be necessary. Additionally, by using this data, marketing campaigns and promotional plans can be tailored to particular geographic areas.
The "User by Device Model" functionality, on the other hand, gives developers knowledge on the different devices that users are using to access their applications. This information can assist developers in detecting compatibility problems, improving the performance of their programme for particular devices, and organising upcoming updates and changes that might be needed to support newer devices. Overall, these features give app developers useful information about their user base that they can use to drive decisions about how to enhance the functionality and user experience of their app.

Chapter 5

Testing

Testing is an organized summary of testing objectives, activities, and results. It is created and used to help stakeholders (product manager, analysts, testing team, and developers) understand product quality and decide whether a product, feature, or a defect resolution is on track for release. Test documentation includes all files that contain information on the testing team's strategy, progress, metrics, and achieved results. The combination of all available data serves to measure the testing effort, control test coverage, and track future project requirements.

5.1 Functional Testing

5.1.1 Unit Testing

Unit testing is the first level of testing, which is typically performed by the developers themselves. It helped us understand the desired output of each module, which we had broken down into separate units and in classifying the faces of users on the basis of algorithm that we have used.

5.1.2 Various Testcases

Test Case	Conditions	Procedure	Data	Expected Result	Pass/Fail
1	Valid user credentials	Sign in with username and password	Valid credentials	Sign in successful	Pass
2	Invalid user credentials	Sign in with username and password	Invalid credentials	Sign in failed	Pass
3	Valid book search query	Search for book	Valid query	Book search results displayed	Pass
4	Invalid book search query	Search for book	Invalid query	No results displayed	Pass
5	Eligible book for reissue	Reissue book	Eligible book	Book reissued successfully	Pass
6	Ineligible book for reissue	Reissue book	Ineligible book	Reissue failed	Pass
7	Valid user issued books	View my books	User issued books	List of books displayed	Pass
8	No user issued books	View my books	No issued books	No list displayed	Pass
9	Valid book return	Return book	Valid return	Book returned successfully	Pass
10	Invalid book return	Return book	Invalid return	Return failed	Pass

Table 5.1: Book Issuing Process Test Cases

Chapter 6

Result

Results of a project are measured by the achievements made towards its objectives and aims. To evaluate a project's success, its outcomes are compared to the original goals. The effectiveness of a system depends on the quality and quantity of data collected, the reliability of employed algorithms, and ethical handling of data. It is important to ensure transparency, integrity, and confidentiality in designing and using the system. An E-learning platform can effectively improve student engagement, promote lifelong learning, and enhance classroom instruction if well-designed.

Over the current library administration systems, the complete library service tracking programme that is being created represents a major improvement. Users can go through their book issuance history, issue and reissue books, and search for books using this android-compatible software. The administrators of the application can also add and remove books from the library, update book information, issue and reissue books, collect fines, and handle returns in their capacity as librarians. Due to the application's user-friendly interface, efficient workflow, and effective search engines, users may find the books they need more easily and complete their intended activities more rapidly.

Additionally, the system's ability to control fines and overdue books guarantees that library resources are better managed and that users are held responsible for their commitments to return books on time. The library service tracking application is, all things considered, a useful, practical, and easy-to-use tool for managing library resources and offering greater service to patrons.

6.0.1 Admin Home

The admin page of the library system gives authorised users, including librarians, a variety of tools to efficiently manage the library's collection. The admin can use these choices to add, remove, and update the information about the books in the library's database, ensuring that the catalogue is correct and up-to-date. The admin page also enables the librarian to charge users who borrowed items for longer than allowed fees. This task makes ensuring the library system runs smoothly and encourages patrons to return materials on time.

The librarian can enter a book's title, author, ISBN, publisher, publication year, genre, and other crucial information to add it to the database. The librarian can also change the pertinent fields, such as the book's availability, status, or location, to update a book's information. The admin can choose the appropriate book from the database and delete it in order to remove a book from the library's collection, ensuring that the database is accurate and up-to-date. The admin page, in general, is a crucial part of the library system that enables authorised staff to efficiently manage the library's collection. By offering these choices, the library is able to keep accurate records and guarantee that the library system runs without a hitch.

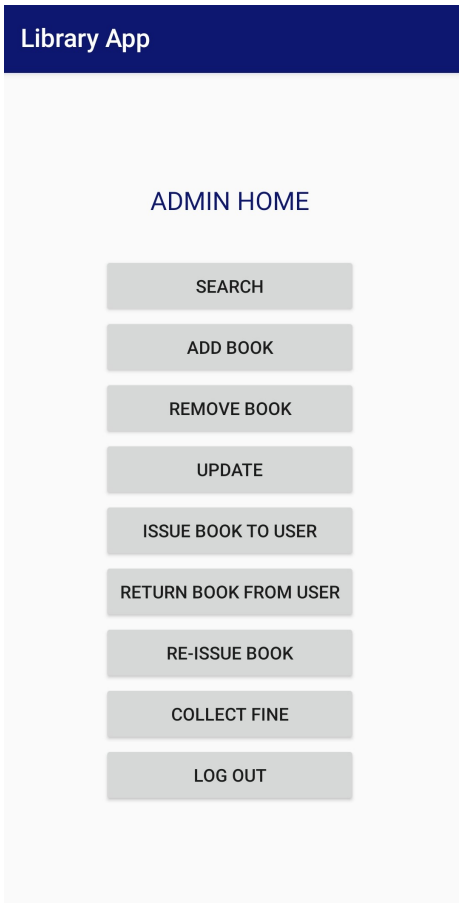

Figure 6.1: Admin Home Page

6.0.2 User Home

For users of the library management system, the user home page serves as a focal point. Search for a book, reissue a book, view books currently issued to the user, and log out are its four key features. By using the search option, users can look up books by their titles, authors, or keywords, and if a book is eligible, they can use the reissue tool to prolong its loan duration. The view books option shows a list of all the books that the user is currently loaned, along with the dates of those loans. To protect their account information, the user can securely log out of the system using the log out option. The user home page offers a user-friendly interface that makes the process of borrowing books easier and encourages effective use of library resources.

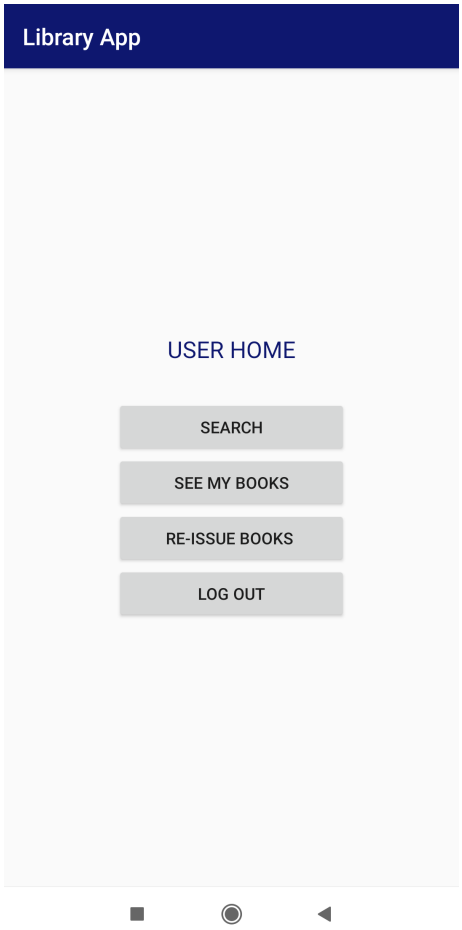

Figure 6.2: User Home Page

6.0.3 Book Search

The user search option gives them access to a search box where they may input a book's ID, title, or category to find a certain book. A search algorithm is used to implement the search functionality, matching user input with database records for books. The user gets shown the search results after the query has been finished. Multiple books that fit the user's search criteria may be included in the search results, along with information about the books' author, category, ISBN, and availability. After choosing a book from the search results, the user can move on to perform other tasks including issuing, reissuing, or reserving the book.

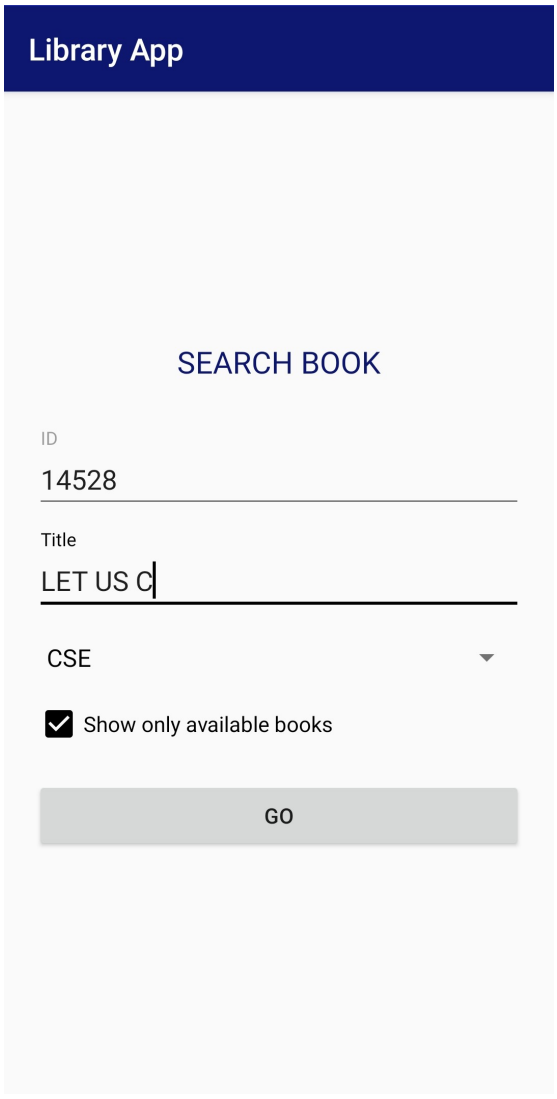

Figure 6.3: Book search

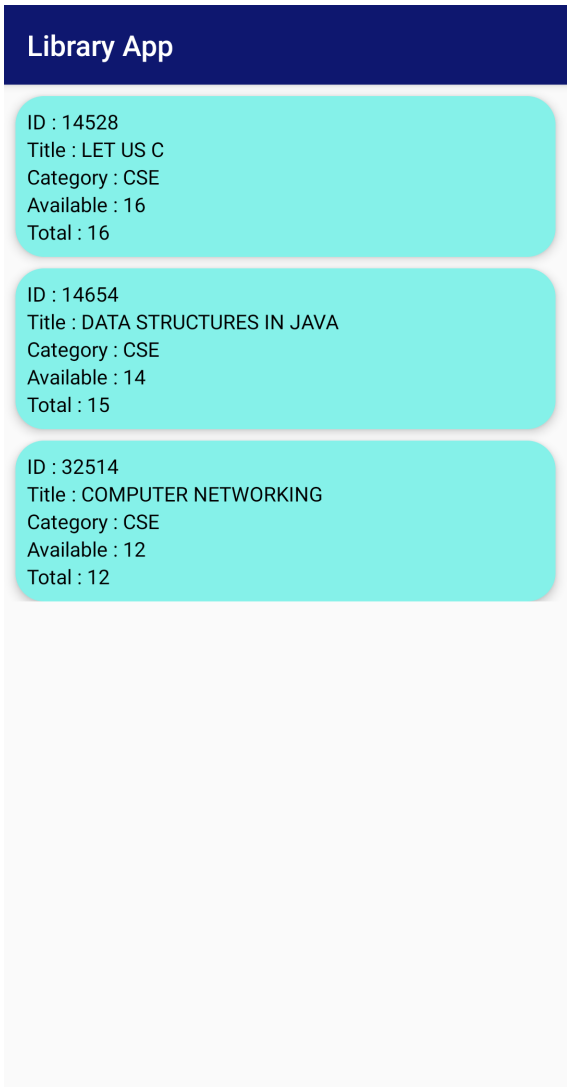

Figure 6.4: Book search result

6.0.4 Add Book

The admin or librarian can add a new book to the library's database using the "Add Book" page. The book's ID, title, genre, and number of available units must all be entered by the user. The information about the book is then kept in the database. The user receives notified of the new addition after adding a book successfully. The title, author, category, and quantity of units available for the book are all listed in the notification. This feature makes it simpler for the user to keep up with new library releases and choose which book to borrow next.

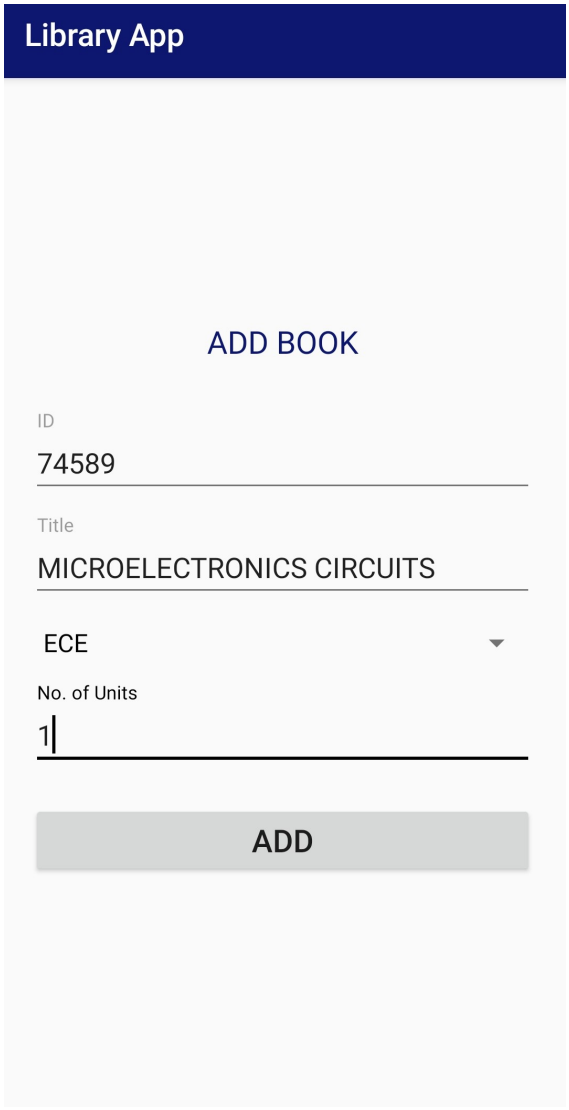

Figure 6.5: New Book Add

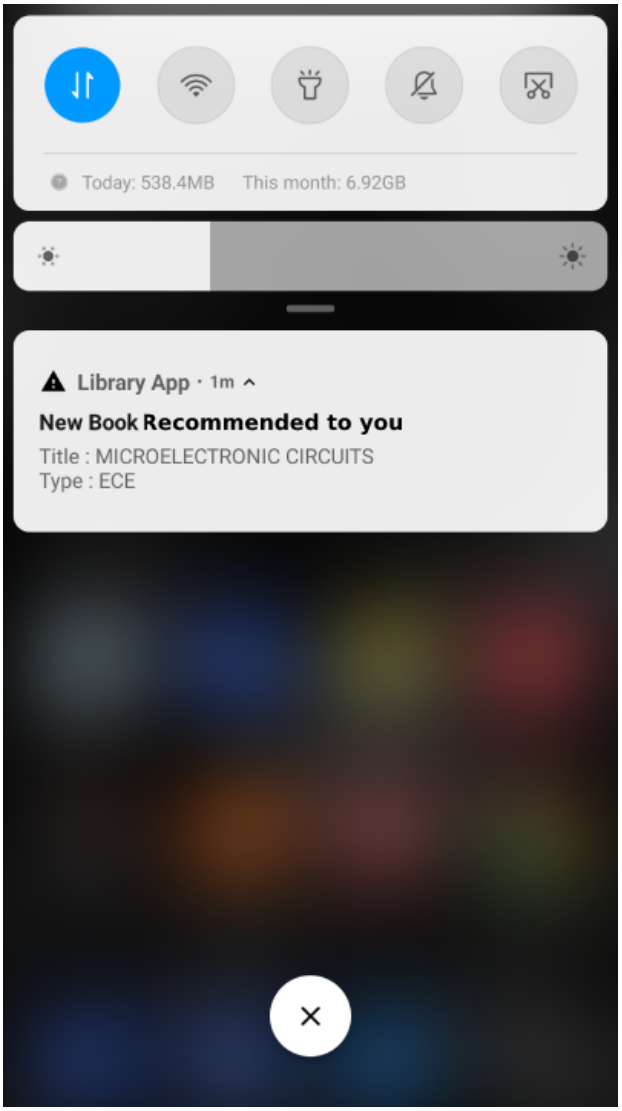

Figure 6.6: Notification of new Book added

6.0.5 Remove Book

The admin/librarian can delete a book from the library's collection using the "Remove Book" page in our library management system. In order to delete a book, the admin or librarian must first go to the "Remove Book" page and enter the book ID. After entering the book ID, the system confirms that the book is present in the database before removing it from the collection. By deleting books that are no longer useful or accessible, this option aids in maintaining the library's collection. Additionally, it guarantees that users looking for books won't be misled into thinking a certain book is available when it isn't.

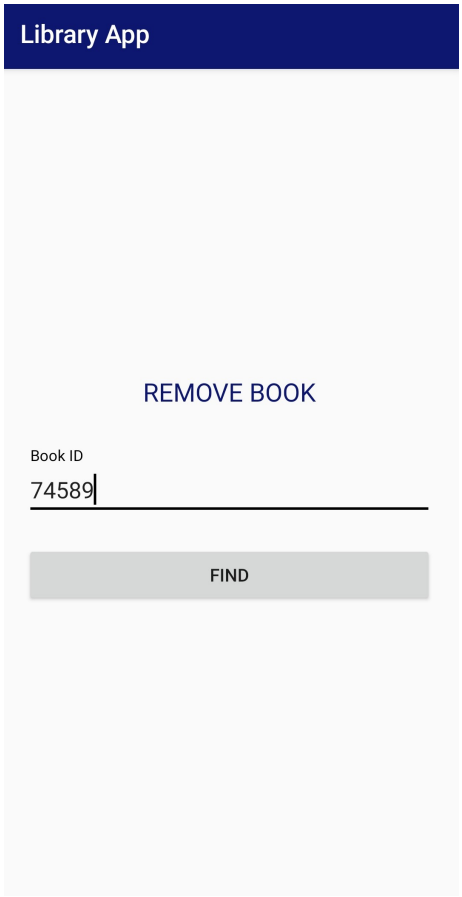

Figure 6.7: Remove book page

6.0.6 Update Book

The library management system's update book page, which is available to administrators and librarians, is a crucial component. They can change the book's information, including the book ID, title, category, and number of available units. When the library buys extra copies of a certain book or when some volumes need to be taken out of circulation, this feature is quite helpful. Librarians and administrators can make sure that the library's inventory is current and accurate by updating the book information. By streamlining the updating of book information, the update book page helps administrators and librarians save time and energy.

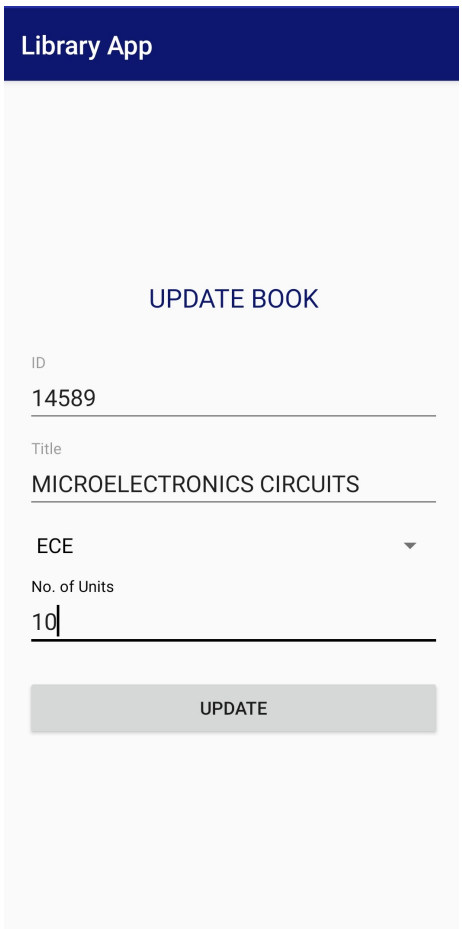

Figure 6.8: Update book page

6.0.7 Issue book to the user

One key component of the library administration system is the issue book to user page. It allows the administrator or librarian to lend a user a book. The administrator or librarian must enter the book ID and user information, including the user's name, ID, and contact information, in order to issue a book. Following the entry of the information, the system determines whether the book is available, and if so, issues it to the user. The system then changes the book's availability status to "issued" and notifies the user that the book has been issued. This feature guarantees that only authorised users are given access to the books and aids the library staff in keeping track of the volumes that have been issued. It also aids users in locating and borrowing the books they require, increasing the library's general effectiveness.

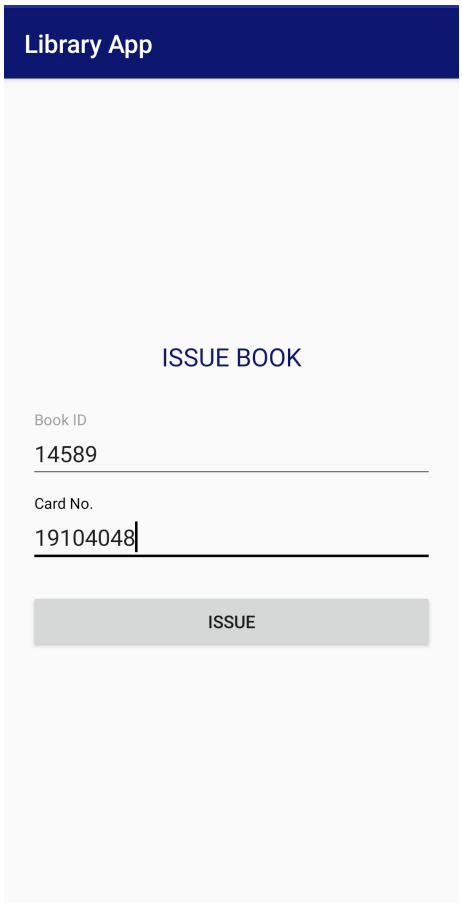

Figure 6.9: Issue book page

6.0.8 Return book from user

The admin/librarian can handle the return of a book from a user on the return book page. They must do this by entering the book ID and the user's information who is returning the book. After entering the information, the system will determine whether the book is overdue or if there are any associated fines. Before the book is added back to the library's collection, the admin or librarian can pay any fines that are displayed. The book will be marked as returned and the user's account will be updated if it is not past due and there are no fines. This makes sure that all of the books are available for other customers to borrow and that the library's collection is up to date.

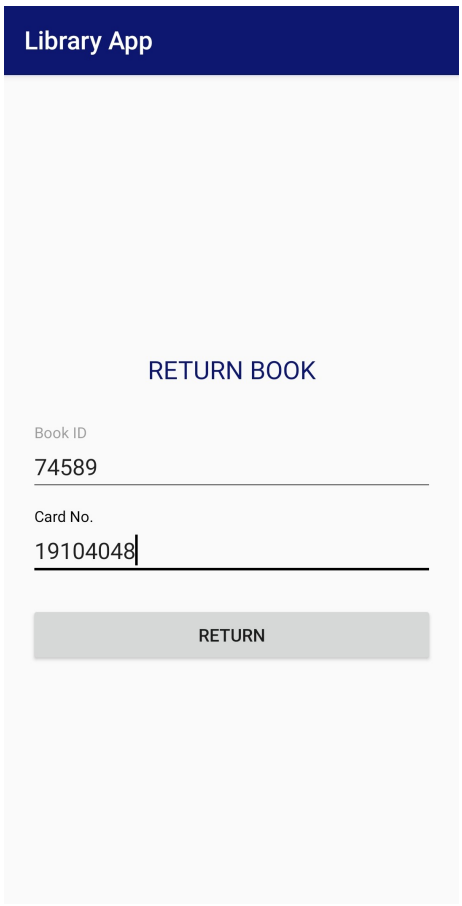

Figure 6.10: Return book page

6.0.9 Re-issue Book

The admin/librarian and the student/teacher can both choose to reissue the book. Selecting the book you want to reissue from your list of issued books will provide students and teachers access to this feature. The user is prompted to confirm the action when the system determines whether the book is eligible for re-issuance. If confirmed, a new due date is added and the book is reissued. On the other hand, by entering the book ID in the search box, the admin or librarian can access the re-issue book option. The system then determines if the book can be reissued and asks the administrator or librarian to confirm the action. After confirmation, a new due date is added and the book is reissued. Users who need to keep a book for a longer time or who haven't finished reading it will find this feature to be especially helpful.

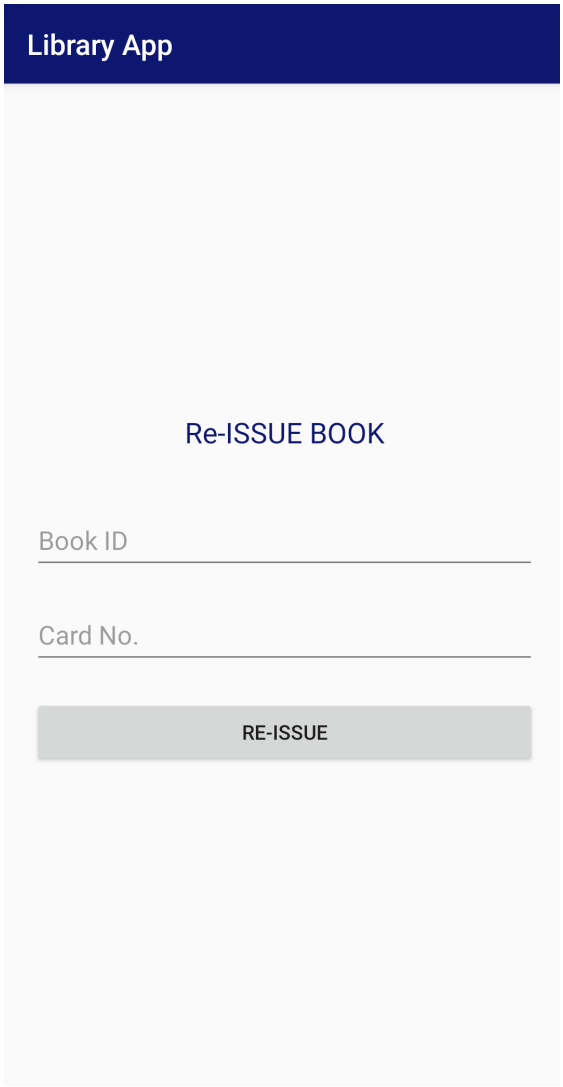

Figure 6.11: Re-issue book page for admin

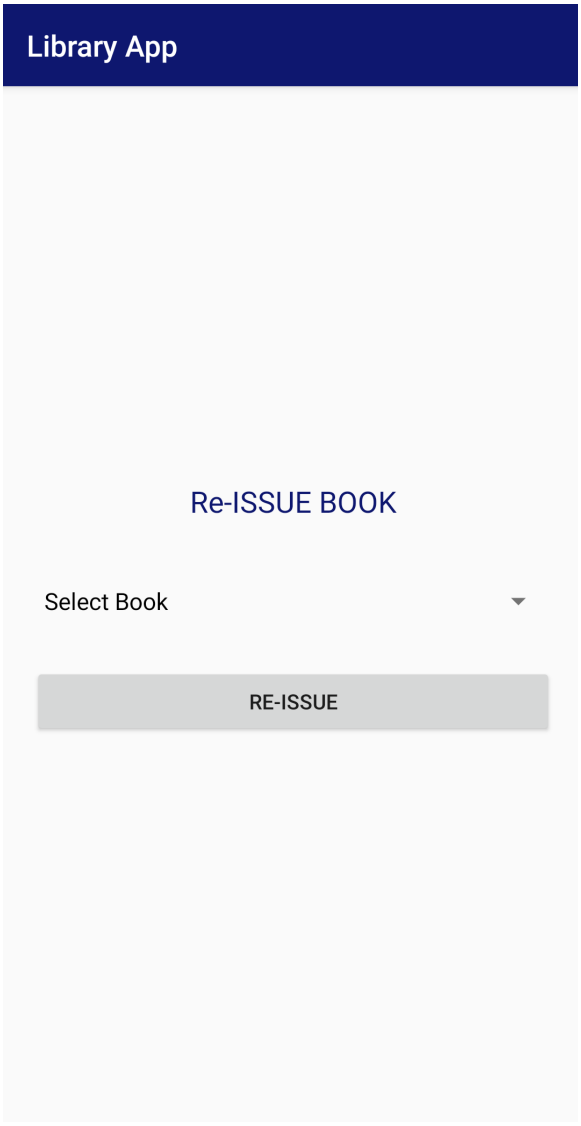

Figure 6.12: Re-issue book page for user

6.0.10 Collect fine

Only administrators have access to the collect fee page, which gives them control over overdue book fines. Administrators must log in and go to the collect fine page in order to utilise this capability. They will be asked to input a card number for the user who has the overdue book(s) on this page. The admin can view the fine amount and designate it as paid once it has been collected once the card number has been input and confirmed. The collect fine page is a crucial tool for making sure that late fees are paid on time and correctly.

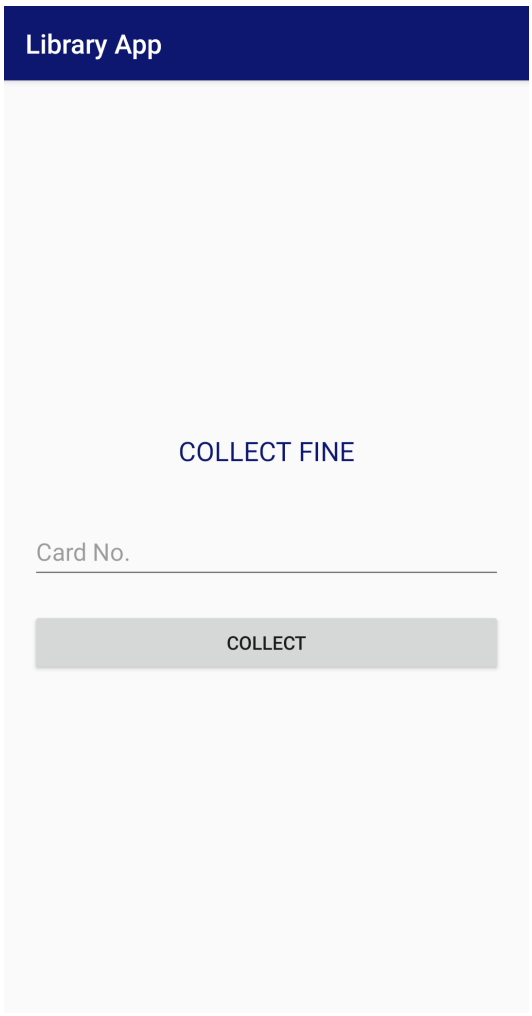

Figure 6.13: collect fine page

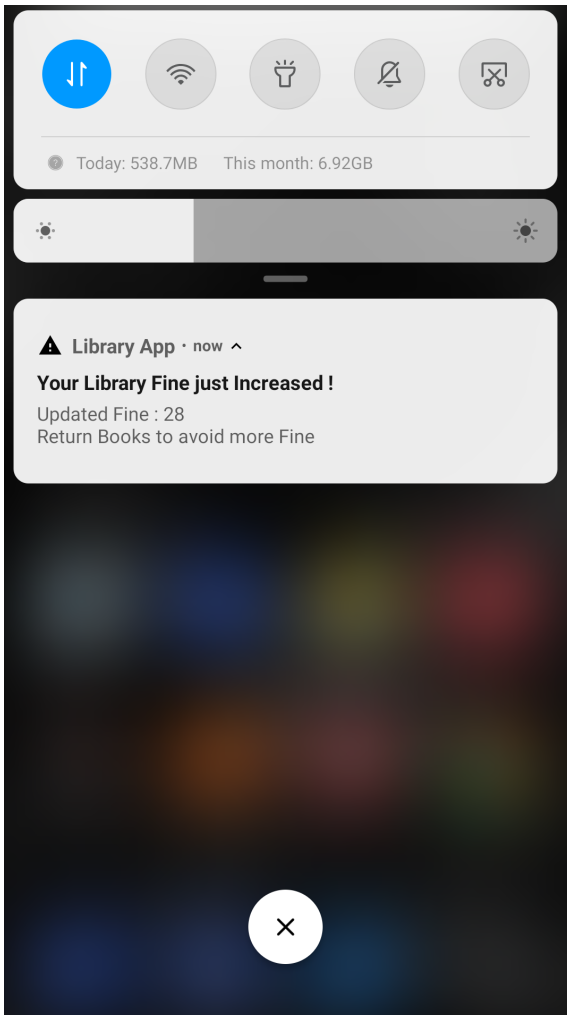

Figure 6.14: Notification of fine increased

Chapter 7

Conclusions and Future Scope

This study largely focuses on how the technique may be improved because the conventional approach to operating a library includes doing everything manually, which is slow, wasteful, less secure, and difficult to maintain. An online library management system, which handles all the manual work by automating and digitizing the entire process, is the answer to this problem. Our Java-based application is connected to a relational database. The library is going to have more things added to it, which will make the application more helpful in the future. This will help the staff keep track of how much time they spend on different tasks, and make things easier and more efficient so that resources can be used more effectively.

The addition of sophisticated search capabilities that enable users to look for books based on more precise criteria, such as publisher, ISBN, or edition, is one potential area for improvement. By offering them more individualised search results that are more in line with their unique requirements and interests, this would improve the user experience. Integration of the system with external information sources, such as online databases or e-book collections, is a further topic for future development. This would give patrons access to a larger variety of information resources and broaden the library's collection beyond physical books. To provide insights into how the library's collection is being used and which books are most popular among users, we could also integrate data analytics and visualisation tools into the system. This would make it possible for the library to allocate resources wisely and make data-driven decisions about which books to add to or delete from the collection.

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Appendices

Appendix-I: Installation of Libraries

1. **conda create –name env dlib python==3.6.13**
2. **conda activate env dlib**
3. **conda activate env dlib**
4. **pip install dlib**
5. **pip install numpy**
6. **pip install os**
7. **pip install imutils**
8. **pip install web3**
9. **pip install pandas**
10. **nvm install 18**
11. **python app.py**
12. **Go to firebase website https://firebase.google.com/**
13. **create one project and add the google-services.json file into the build.gradle file of project**
14. **Then compile the project in Android Studio and choose the device in device manager and run the app**

Publication

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