CHAPTER 1
INTRODUCTION

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. The best way to maintain, organize, and handle countless books systematically is to implement a library management system software. The BBLMS seamlessly integrates with existing library management software, ensuring compatibility with established systems. This integration enhances the overall functionality and usability of the library management process.

The traditional library system has faced challenges in maintaining accurate inventory records, expediting the check-in and check-out processes, and ensuring a seamless patron experience. As libraries continue to adapt to the digital age, it is crucial to embrace technological advancements to address these challenges effectively. The incorporation of barcode technology into library management systems stands out as a viable and promising solution.

Barcode-Based Library Management System, libraries can improve operational efficiency, reduce manual workload, and provide a more streamlined experience for both librarians and patrons. The implementation of modern barcode technology enhances accuracy, saves time, and contributes to the overall effectiveness of library services. The Barcode-Based Library Management System revolves around the utilization of unique barcodes assigned to each library resource, such as books, CDs, and other materials. These barcodes serve as digital fingerprints, enabling swift and accurate tracking throughout the library ecosystem. By leveraging the capabilities of barcode technology, this system not only automates routine tasks but also introduces a host of features that contribute to the overall efficiency and functionality of library operations.

1.2 PROBLEM STATEMENT

Barcodes allow for quick and efficient scanning, reducing the time it takes to check out books. Library staff may face an increased workload when managing transactions and maintaining accurate records without the automation and speed provided by barcode systems.

1.3 OBJECTIVE

This system aims to enhance the overall efficiency of library management, including book tracking, inventory management, and patron services. The integration of barcode technology provides a reliable and quick method for identifying, cataloging, and managing library resources. In this digital world in advances in communication technology data and information is no longer tide to physical location.

The application is reduced as much as possible to avoid errors while entering the data. It also provides error message while entering invalid data. No formal knowledge is needed for the user to use this system. Thus, by this all it proves it is user-friendly. Library Management System, as described above, can lead to error free, secure, reliable and fast management system. It can assist the user to concentrate on their other activities rather to concentrate on the record keeping. Thus, it will help organization in better utilization of resources.

Every organization, whether big or small, has challenges to overcome and managing the information of Books, Student, Librarian, Address, and Member. Every Library Management System has different Student needs; therefore, we design exclusive employee management systems that are adapted to your managerial requirements. This is designed to assist in strategic planning, and will help you ensure that your organization is equipped with the right level of information and details for your future goals. Also, for those busy executive who are always on the go, our systems come with remote access features, which will allow you to manage your workforce anytime, at all times.

Generally small or medium in size. It is used by librarian to manage the library using a computerized system where he/she can add new books, videos and Page sources. Books and student maintenance modules are also included in this system which

would keep track of the students using the library and also a detailed description about the books a library contains. With this computerized system there will be no loss of book record or member record which generally happens when a non computerized system is used. All these modules are able to help librarian to manage the library with more convenience and in a more efficient way as compared to library systems which are not computerized.

1.4 THE APPLICATION INCLUDES:

- Login Form
- Admin Page
- Student Information
- Book Information
- Issuing Books
- Borrowing Books

These systems will ultimately allow you to better manage resources.

CHAPTER 2
LITERATURE SURVEY

2.1 LITERATURE SURVEY

Title: IoT-Based Library Automation and Monitoring system.

Authors: Majid Bayani, Alberto Segura, Marjorie Alvarado, Mayra Loaiza.

Using the mobile applications is a trend. People are spending high percentages of their time using their smart phones and mobile apps, then applying a library mobile application can increase the users' library usage rate. It is very common to use the smart phones to connect to the Internet, to buy a product, to pay a service, to watch a video and to get access to numerous online services. One of the advantages related to the library service management which the IoT can offer is that once the users download and install the library application, they can have access to all online services prepared by the system. It can play a key role in the human's global data accessand knowledge propagation in a fast, more efficient and smart manner.

Title: Enhanced QR-code based application for library management system using android.

Authors: U. Narmadhaa, P. Pavithra, M. Tharuneswari, S. Sowmiya, Nagarajan.

QR code (abbreviated from Quick Response Code) is the trademark for a type of matrix barcode (or two-dimensional barcode) first designed for the automotive industry in Japan. A QR code consists of black squares arranged in a square grid on a white background, which can be read by an imaging device such as a camera, and processed using Reed–Solomon error correction until the image can be appropriately interpreted. The required data is then extracted from patterns that are present in both horizontal and vertical components of the image. QR codes features include high reading speed, data storage and transfer, 360degree readability, resistance to contamination and defects and adding up to 16 symbols to the structure.

Title: Android based mobile application development and its security.

Authors: Suhas Holla, Mahima M Katti.

In this paper we concluded that the mobile application is very important and simplest use and convenient to user because all applications are done by Java Script language A small application that runs on a smartphone and a tablet is called an app. The speed of applications or page loading mustn't keep users waiting. However, issues such as this, are usually checked by quality assurance, which is a part of a smart mobile application or software development. Security is the main concern of any software application. Security related problem faced by the many of the mobile user's this is vital to many apps However, issues such as this, are usually checked by quality assurance, which is a part of a smart mobile application or software development. Security is the main concern of any software application. Security related problem faced by the many of the mobile user's this is vital to many apps. It is one of the first topics of discussion between you and software developers. No leaks of the users' private information are allowed. Support and updates are one of the primary issues. To build a long-standing app, you need to consider support and updates. Maintain the server. Ensure that your content is made up of up-to-date, relevant information. Analytics is essential feature of a software application. As a mobile app developer, one key component is to incorporate analytics into your mobile app.

Title: Open source library management systems.

Author: Mr. Nagesh L. Londhe, Dr. Suresh K. Patil.

A survey and present developmental status" This study covers thirty-one open source library management systems projects, which are developed during 1999 to 2014 and tries to present the state of development. Researcher has also attempted to present historical overview of development and update picture of library management systems. This is one of the comprehensive up-to-date survey. This study reveals that only fifteen LMS projects shown recent activity in community and their releases. Fourteen projects do not show any activity for than four years since their last activity (release and community) upto the date of data collection (Dec. 2014). Two projects developmental status could not be determined due to unavailability of data.

This study reveals that maximum number of active projects is having an institutional support. This study also reveals there are considerable number of weekly downloads for old releases of some inactive state projects.

Title: Use of QR Code in Library.

Authors: Lambodara Parabhoi, Nivedita Bhattacharjya, Rupashree Dhar.

Libraries are now being very challenged by the development of various technologies. In this present era, the new technology like QR code demands the changes of information handling in the library. The user would have easy access to most current and necessary information related to the library by using QR code. So to make the effective use of QR code among the user community, library professionals must organize user awareness program, orientation program, etc.

CHAPTER 3
EXISTING SYSTEM: LIBRARY MANAGEMENT SYTEM USING RASPBERRY PI

3.1 WORKING OF LIBRARY MANAGEMENT SYTEM USING RASPBERRY- PI

In this chapter, we will describe and analyze about the developing process of Library Management System including software requirement specification (SRS) and comparison between existing and proposed system. The functional and non functional requirements are included in SRS part to provide complete description and overview of system requirement before the developing process is carried out. Besides that, existing vs proposed provides a view of how the proposed system will be more efficient than the existing one. In this system first visitor has to scan identity card with the help of barcode scanner. The data from barcode is retrieved and decoded. Python language is used to interface barcode scanner with raspberry pi. Visitors' personal information and entry-exit time is recorded.

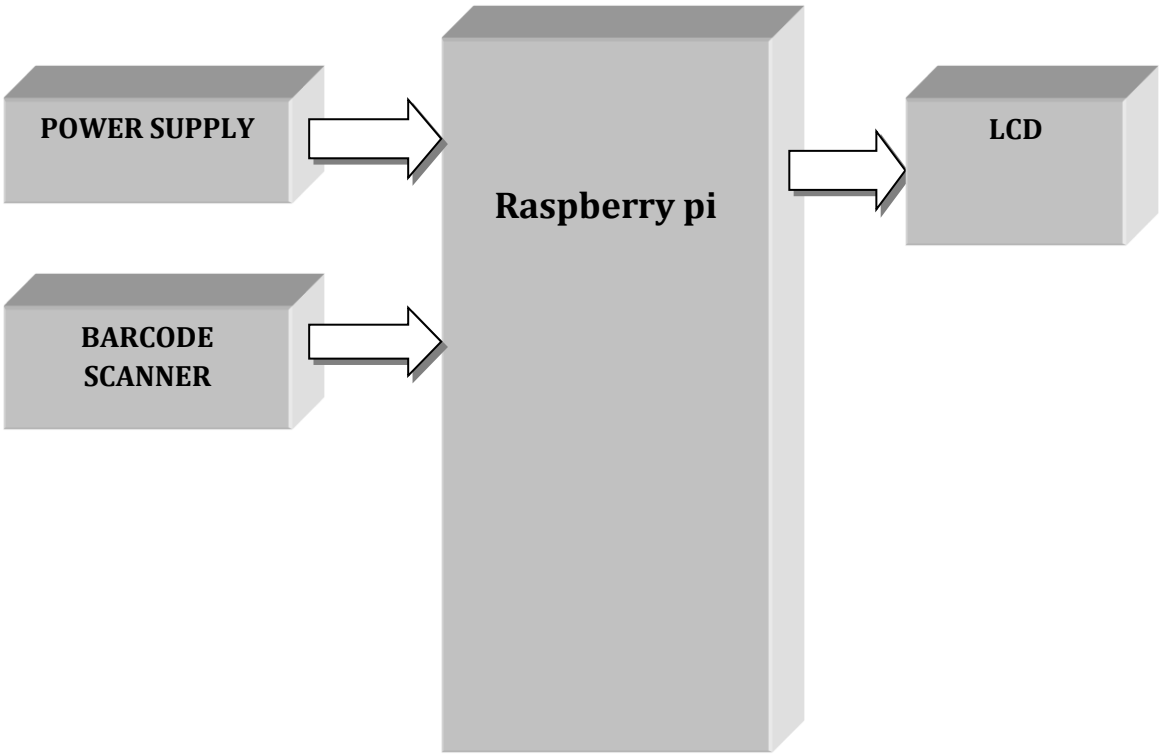

Fig: 3.1 Block Diagram of Existing System

The systems used by libraries nowadays use barcode technology. There is a barcode on every book in the library. The barcode's uniqueness changes according to the line thickness. This kind of library administration necessitates manual management. The library's primary operations, including the lending, renewing, and returning of books, must all be manually monitored and managed. Due to the barcode readers' limited capacity to read more than one code at once, there is typically a long line at the issue and return counters. The barcodes must be encoded during manufacturing, and they can only be programmed once. The attributes of the codes cannot be changed once specified. On a sheet of paper, the codes are printed and adhered to the books. The bar-code reader should be in close proximity to the bar code while both loaning out and returning the books.

The creation of the operating manual is necessary to make this feasible. Even with manual operation, it takes a lot of time and effort since the reader must always be put extremely close to the barcode tag for the book to be correctly read. The read range of the bar-code readers is relatively limited, only a few millimeters or so.

In this USB barcode scanner connected with Raspberry pi is used for registering the entries. Raspbian operating system is used in pi. Raspberry pi is used in headless mode. Python program running in background records the registration number scanned from barcode. Along with this, system time is also recorded.

In order to have a command or program run when the Pi boots, you can add it as a service. Once this is done, you can start/stop enable/disable from the linux prompt systemd is a Linux initialization system and service manager that includes features like on-demand starting of daemons, auto mount and mount point maintenance, snapshot support, and processes tracking using Linux control groups.

3.2 Advantages and Disadvantages:

Advantages:

1. Automation of book borrowing and return processes

2. Increased accuracy in book identification and tracking

3. Efficient inventory management

4. User-friendly interface

5. Data analytics and reporting capabilities

6. Integration with other library systems

Disadvantages:

1. Initial cost of hardware and software

2. Ongoing maintenance requirements

3. Need for technical expertise

4. Potential system downtime

5. Data security concerns

6. Dependence on reliable barcode printing.

CHAPTER 4
PROPOSED SYSTEM: SMART LIBRARY MANAGEMENT SYSTEM USING BARCODE SCANNER

4.1 Introduction to Smart LMS

Library Management System is a computerized system which helps user(librarian) to manage the library daily activity in electronic format. It reduces the risk of paper work such as file lost, file damaged and time consuming. It can help user to manage the transaction or record more effectively and time saving an Online Library is proposed.

The proposed system contains the following features:

- The students will register them through Online.
- Individually each member will have his account through which he can access the information he needs.
- Book details like authors, number of copies totally maintained by library, present available number of books, reference books, non-reference books etc. all this information can be made handy.
- Regarding the members designation, number of books was issued.
- Issue dates and returns of each member is maintained separately and fine charged if there is any delay in returning the book.
- Administrator can add, update the books.
- Time consuming is low, gives accurate results, reliability can be improved with the help of security. Time consuming is low, gives accurate results, reliability can be improved with the help of security.

4.1.1 Smart LMS Flow chart

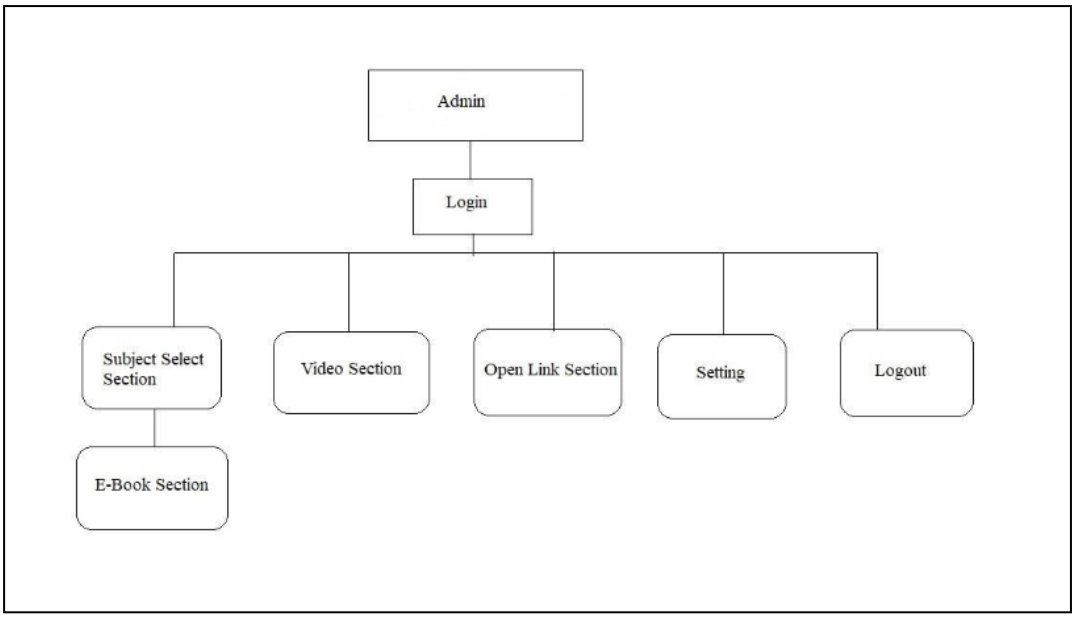

Fig 4.1: Proposed System Flow chart

system provides a logging daemon and other tools and utilities to help with common system administration tasks.

• Create a android script

• Create a unit file

• Configure systemd

• Check status of service

Rc.local

In order to have a command or program run when the Pi boots, you can add commands to the rc.local file. This is useful when you want to plug your Pi in to power headless, and have it run a program without configuration or a manual start.

If script depends on any system features being available at that point in time such as the network being connected and available, the /home/pi directory is mounted and available for use or the System time has been updated by NTP then it would be ideal to use either systemd or init.d methods.

4.2 REPORT GENERATION:

The consumer model for this project receives block of string containing registration number and time. This data is taken as input to generate report as per requirement. The daily records are stored in excel file. For this purpose, openpyxl

module is used which allows python programs to read and modify Excel spreadsheet files. These Excel files are used for analysis and report generation

4.3 SYSTEM REQUIREMENTS:

PROCESSOR	: INTEL CORE PROCESSOR
OPERATING SYSTEM	: Windows Linux Unix
MEMORY	: 1GB RAM OR MORE
HARD DISK SPACE	: MINIMUM 3 GB FOR DATABASE
USAGEDATABASE	: MY SQL

4.4 FEASIBILITY STUDY

During this stage, the project's viability is evaluated, and a business proposal outlining the project's broad strokes and some preliminary cost estimates is presented. The practicality of the proposed model is to be investigated throughout system analysis. This is necessary to guarantee that the suggested solution won't cost the business too much. Understanding your system's primary needs is crucial for conducting a feasible analysis.

There are three main factors to think about while doing a feasibility study:

4.4.1 Economical Feasibility:

The purpose of this analysis is to determine how much money the system will really make for the business. The corporation can only devote so much money to the system's development phase. Spending must be rationalized. This is due to the majority of both the technologies utilized are open source and so cost nothing to implement. It was just necessary to buy the personalized items.

4.4.2 Technical Feasibility:

This research is performed to verify the system's technical viability, or the system's technical needs. Whenever possible, systems should be designed such that they do not place an excessive strain on existing infrastructure. The ensuing strain on our limited technological resources is inevitable. The customer will have to deal with a lot of pressure as a result. The created system should have low requirements, as adopting it will need few or no modifications.

4.4.3 Social Feasibility:

Users' reactions towards the system are being analyzed to see how much they trust it. Training your user to make the most of the technology is part of this procedure. The user should feel safe using the system and should not perceive it as a danger. User adoption is directly proportional to the effort put into familiarising and instructing each individual user on how to best utilize the system. Raising his self-assurance will allow him to provide the positive feedback hat is essential since he is the system's end user.

4.5 SYSTEM DESIGN

4.5.1System Architecture

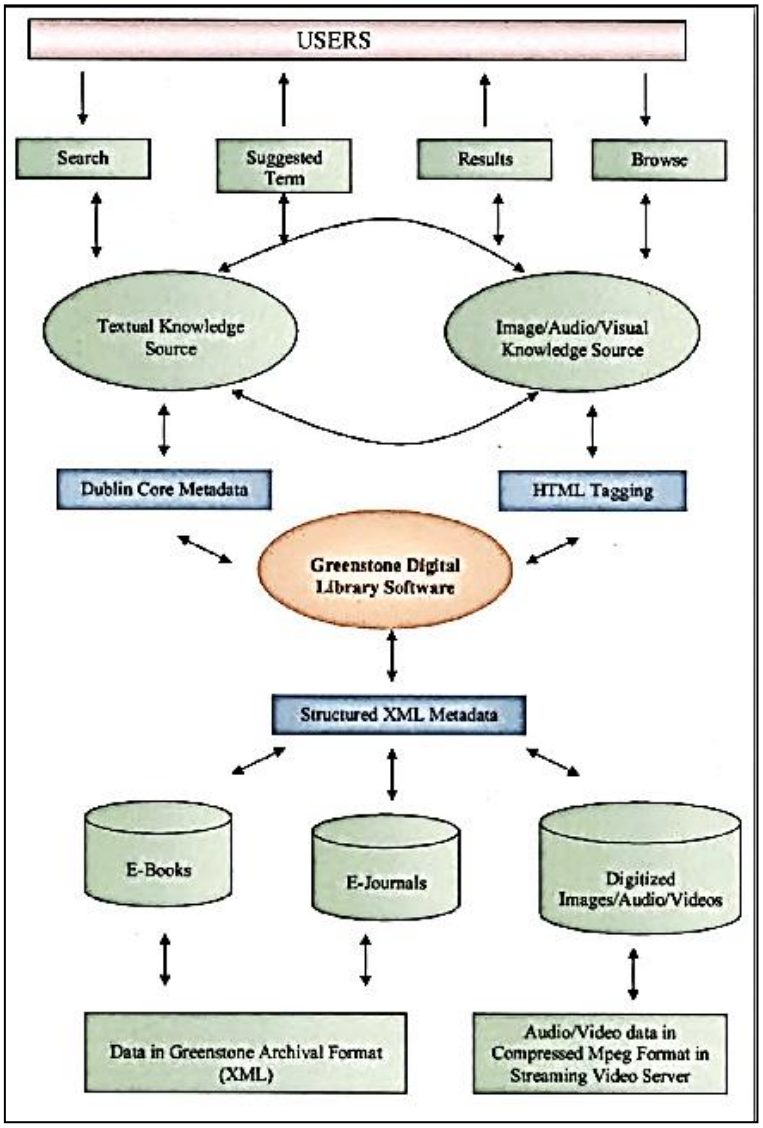

Fig4.2**:** system Architecture

4.6 UML DIAGRAMS

A UML diagram is a partial graphical representation (view) of a model of a system under design, implementation, or already in existence. UML diagram contains graphical elements (symbols) - UML nodes connected with edges (also known as paths or flows) - that represent elements in the UML model of the designed system.

The UML model of the system might also contain other documentation such as use cases written as templated texts. The kind of the diagram is defined by the primary graphical symbols shown on the diagram. For example, a diagram where the primary symbols in the contents area are classes is class diagram. A diagram which shows use cases and actors is use case diagram. A sequence diagram shows sequence of message exchanges between lifelines.

UML specification does not preclude mixing of different kinds of diagrams, e.g. to combine structural and behavioral elements to show a state machine nested inside a use case. Consequently, the boundaries between the various kinds of diagrams are not strictly enforced. At the same time, some UML Tools do restrict set of available graphical elements which could be used when working on specific type of diagram.

UML specification defines two major kinds of UML diagram: structure diagrams and behavior diagrams. Structure diagrams show the static structure of the system and its parts on different abstraction and implementation levels and how they are related to each other. The elements in a structure diagram represent the meaningful concepts of a system, and may include abstract, real world and implementation concepts. Behavior diagrams show the dynamic behavior of the objects in a system, which can be described as a series of changes to the system over time.

4.7 USE CASE DIAGRAM

In the Unified Modelling Language (UML), a use case diagram can summarize the details of your system's users (also known as actors) and their interactions with the system. To build one, you'll use a set of specialized symbols and connectors.

An effective use case diagram can help your team discuss and represent: Scenarios in which your system or application interacts with people, organizations, or external systems. Goals that your system or application helps those entities (known as actors) achieve.

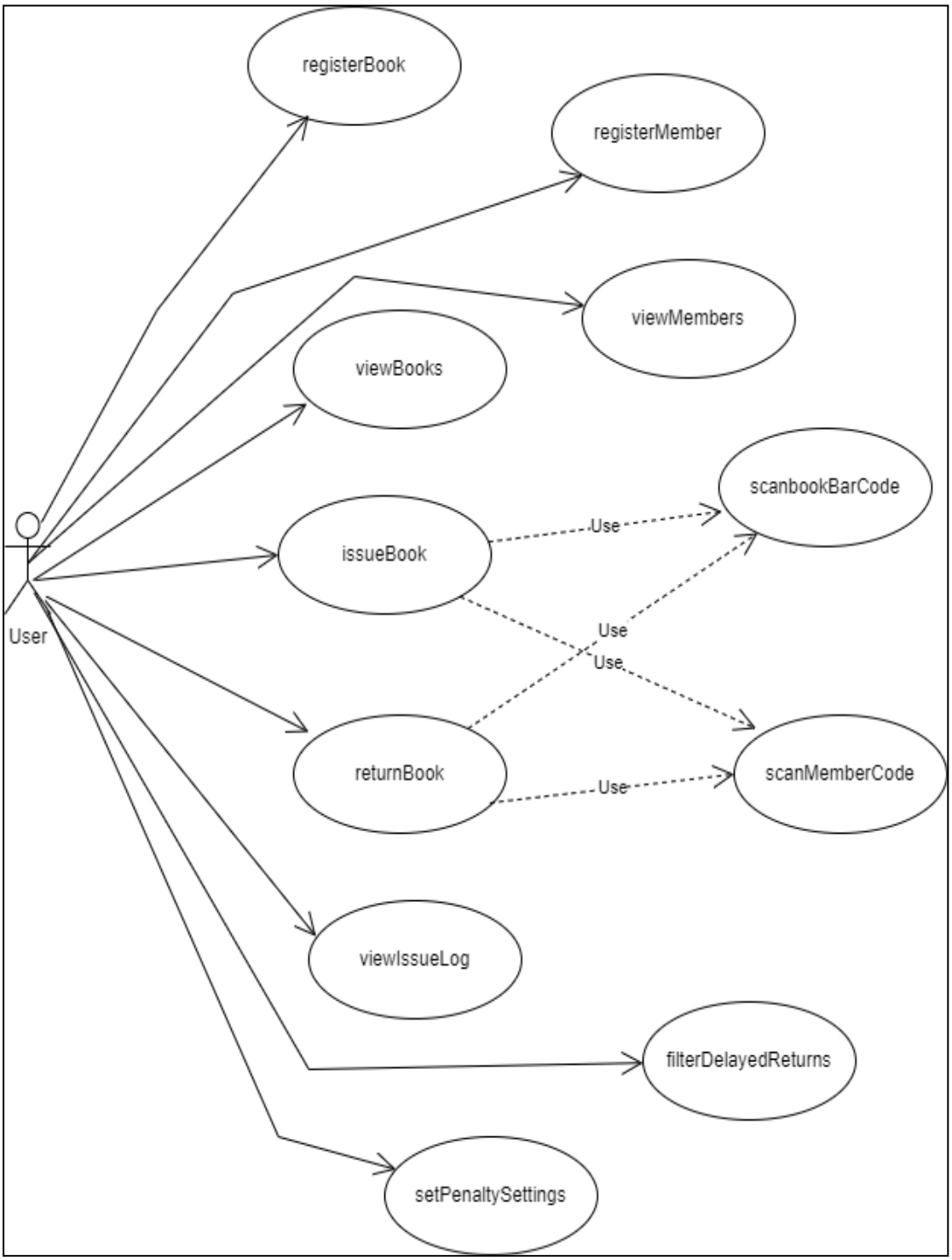

Fig 4.3: Use Case Diagram

4.8 SEQUENCE DIAGRAM

A sequence diagram is a type of interaction diagram because it describes how and in what order a group of objects works together. These diagrams are used by software developers and business professionals to understand requirements for a new system or to document an existing process. Sequence diagrams are sometimes known as event diagrams or event scenarios.

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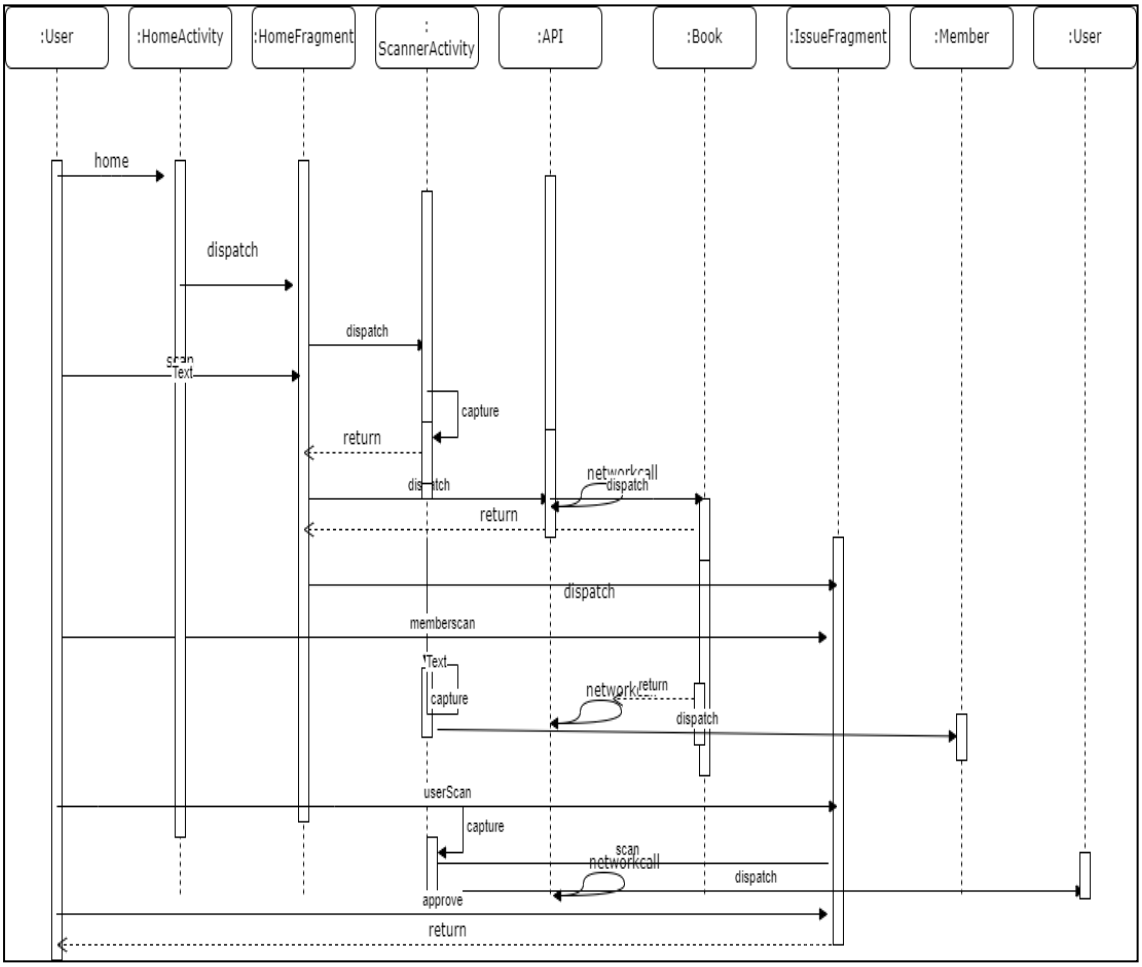


Fig4.4: Sequence Diagram

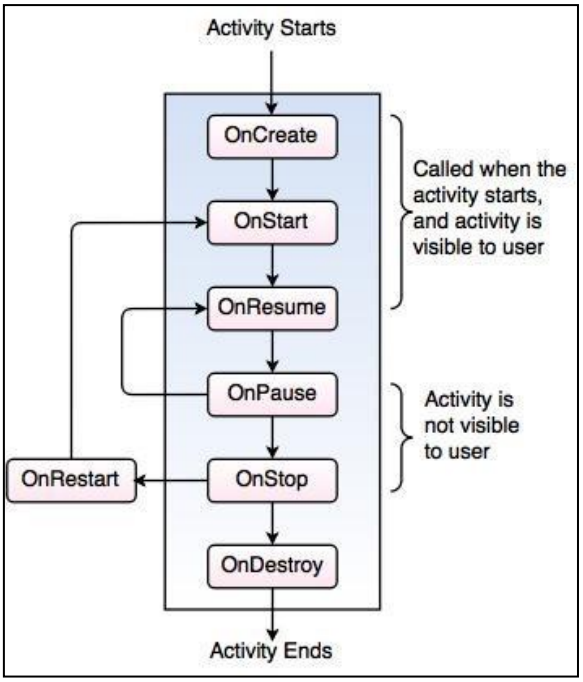


Fig4.5: Activity Diagram

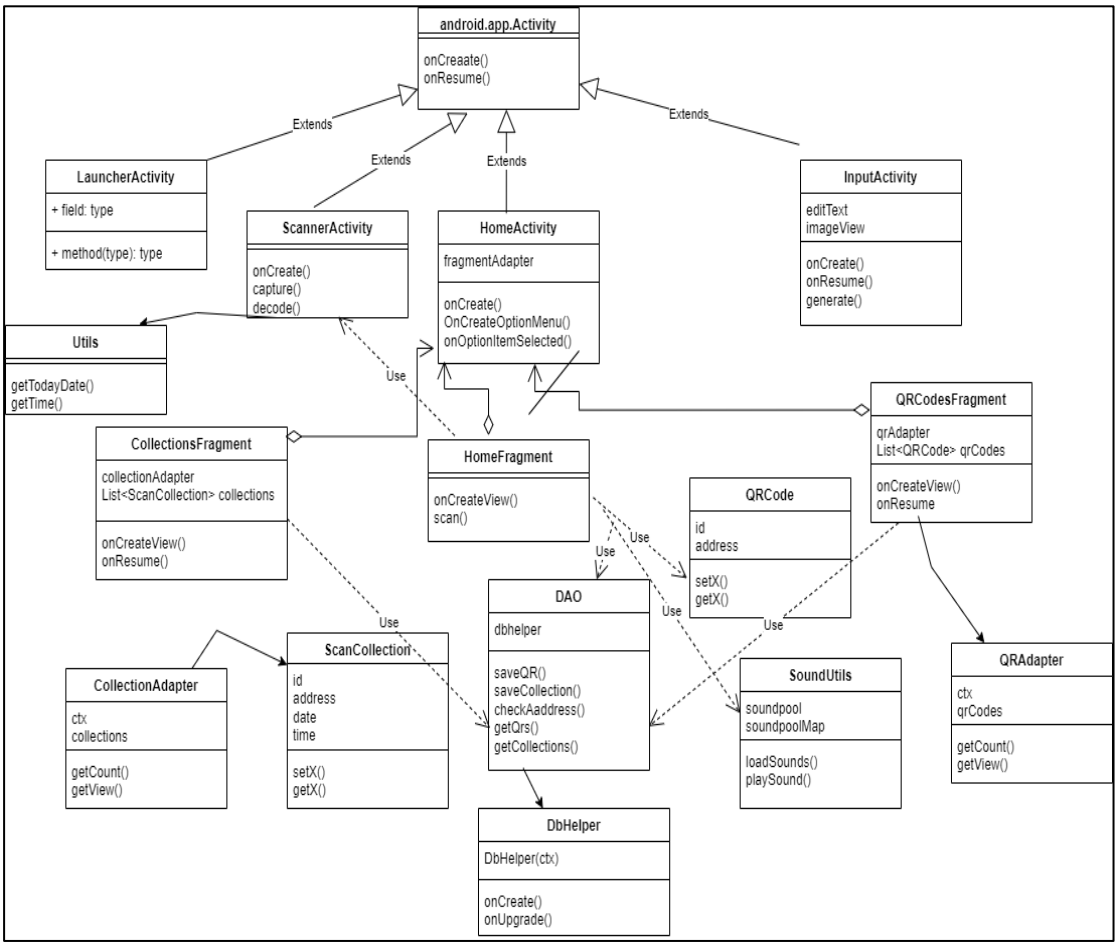


Fig4.6: Class Diagram

4.9 SOFTWARE ENVIRONMENT

4.9.1 Android Studio:

Android Studio is the official integrated development environment (IDE) for Android app development, providing developers with a comprehensive and feature-rich platform. Developed by Google, Android Studio streamlines the entire app development process, offering a robust set of tools for designing, coding, testing, and debugging Android applications.

Its user-friendly interface and powerful functionalities, such as a visual layout editor, code analysis tools, and a versatile emulator for testing, make it an essential tool for developers. Android Studio supports the use of Java, Kotlin, and C++ languages, providing flexibility in choosing the programming language that best suits the developer's preferences and project requirements. With continuous updates and improvements, Android Studio remains at the forefront of Android app development, offering a stable and efficient environment for creating high-quality mobile applications. In addition to its development features, Android Studio seamlessly integrates with the Android Software Development Kit (SDK) and other essential tools, simplifying the process of incorporating APIs, libraries, and third-party dependencies into projects.

The IDE also facilitates collaboration among developers through version control integration and supports the latest Android platform updates, ensuring that developers have access to the latest features and optimizations for their applications. Overall, Android Studio stands as a cornerstone in the Android app development ecosystem, empowering developers to create innovative and reliable mobile experiences for a diverse range of Android devices.

4.9.2 Front end

The front end is designed using of html, Php, CSS, JavaScript

HTML- HTML or Hyper Text Markup Language is the main mark up language for creating web pages and other information that can be displayed in a web browser.HTML is written in the form of HTML elements consisting of tags enclosed in angle brackets (like), within the web page content.

HTML tags most commonly come in pairs like, although some tags represent empty elements and so are unpaired, for example Error! Filename not specified.. The first tag in a pair is the start tag, and the second tag is the end tag (they are also called opening tags and closing tags). In between these tags web designers can add text, further tags, comments and other types of text-based content. The purpose of a web browser is to read HTML documents and compose them into visible or audible web pages. The browser does not display the HTML tags, but uses the tags to interpret the content of the page.HTML elements form the building blocks of all websites. HTML allows images and objects to be embedded and can be used to create interactive forms. It provides a means to create structured documents by denoting structural semantics for text such as headings, paragraphs, lists, links, quotes and other items. It can embed scripts written in languages such as JavaScript which affect the behavior of HTML web pages.

CSS- Cascading Style Sheets (CSS) is a style sheet language used for describing the look and formatting of a document written in a markup language. While most often used to style web pages and interfaces written in HTML and XHTML, the language can be applied to any kind of XML document, including plain XML, SVG and XUL. CSS is a cornerstone specification of the web and almost all web pages use CSS style sheets to describe their presentation.CSS is designed primarily to enable the separation of document content from document presentation, including elements such as the layout, colors, and fonts.

This separation can improve content accessibility, provide more flexibility and control in the specification. of presentation characteristics, enable multiple pages to share formatting, and reduce complexity and repetition in the structural content (such as by allowing for table less web design).CSS can also allow the same markup page to be presented in different styles for different rendering methods, such as on-screen, in print, by voice (when read out by a speech-based browser or screen reader) and on Braille-based, tactile devices. It can also be used to allow the web page to display differently depending on the screen size or device on which it is being viewed. While the author of a document typically links that document to a CSS file, readers can use a different style sheet, perhaps one on their own computer, to override the one the author has specified.

However, if the author or the reader did not link the document to a specific style sheet the default style of the browser will be applied.CSS specifies a priority scheme to determine which style rules apply if more than one rule matches against a particular element. In this so-called cascade, priorities or weights are calculated and assigned to rules, so that the results are predictable.

JAVA SCRIPT- JavaScript (JS) is a dynamic computer programming language. It is most commonly used as part of web browsers, whose implementations allow client-side scripts to interact with the user, control the browser, communicate asynchronously, and alter the document content that is displayed. It is also being used in server-side programming, game development and the creation of desktop and mobile applications. JavaScript is a prototype-based scripting language with dynamic typing and has first-class functions. Its syntax was influenced by C. JavaScript copies many names and naming conventions from Java, but the two languages are otherwise unrelated and have very different semantics.

The key design principles within JavaScript are taken from the Self and Scheme programming languages. It is a multiparadigm language, supporting object-oriented, imperative, and functional programming styles. The application of JavaScript to use outside of web pages—for example, in PDF documents, site-specific browsers, and desktop widgets—is also significant. Newer and faster JavaScript VMs and platforms built upon them (notably Node.js) have also increased the popularity of JavaScript for server-side web applications. On the client side, JavaScript was traditionally implemented as an interpreted language but just-in-time compilation.

4.9.3 Flutter:

Flutter is an open-source UI software development toolkit created by Google for building natively compiled applications for mobile, web, and desktop from a single codebase. Specifically designed for developers to create high-performance applications with a native look and feel, Flutter uses the Dart programming language. One of Flutter's key features is its widget-based architecture, where UI components are customizable and reusable, allowing for a consistent user experience across platforms. Flutter's "hot reload" feature enables developers to quickly experiment, build UIs, add features, and fix bugs in real-time, enhancing the development workflow.

The framework also comes with a rich set of pre-designed widgets, making it easier for developers to create visually appealing and responsive interfaces. One significant advantage of Flutter is its ability to compile to native ARM code, providing near-native performance. This makes Flutter suitable for building high-performance applications, including those for Android. Additionally, Flutter's single codebase approach simplifies maintenance and updates, as changes made to the code are reflected across all supported platforms. Flutter has gained popularity in the Android app development community due to its efficiency, flexibility, and the ability to deliver a consistent user experience across different devices and screen sizes. It has been embraced by developers and organizations for its ease of use, rapid development capabilities, and the potential for cost savings in multi-platform app development.

4.9.4 Dart:

Dart is the programming language at the core of Flutter, the open-source UI toolkit for building natively compiled applications across mobile, web, and desktop platforms. Developed by Google, Dart is designed to be easy to learn and efficient for building high-performance applications. One key feature of Dart is its Just-In-Time (JIT) compilation during development, enabling a faster development cycle with hot reload functionality in Flutter. This allows developers to see the immediate impact of code changes without restarting the entire application. Dart also supports Ahead-Of-Time (AOT) compilation, which results in optimized and fast-running code for production, making it well-suited for mobile app development.

In the context of Android app development using Flutter, Dart serves as the primary language for creating the logic and functionality of the application. Its reactive programming model, coupled with Flutter's declarative UI approach, facilitates the development of visually appealing and highly performant applications. Dart's strong typing system enhances code reliability, and its asynchronous programming capabilities are crucial for handling tasks such as network requests and user input responsiveness in mobile app development. Overall, Dart plays a central role in the success of Flutter, providing a robust foundation for building modern and feature-rich Android applications.

4.9.5 Firebase:

Firebase is a comprehensive mobile and web application development platform powered by Google, offering a suite of tools and services that simplify and accelerate the development process. For Android app development, Firebase provides a real-time NoSQL database that allows developers to store and sync data across multiple clients in real-time. This feature is particularly valuable for applications that require instant updates, such as chat applications or collaborative tools. Additionally, Firebase Authentication streamlines user authentication by providing secure authentication methods, including email/password, social media logins, and more, ensuring a robust and reliable user identity verification system.

Firebase also includes Cloud Functions, enabling developers to run server-side code in response to events triggered by Firebase features and HTTPS requests. This allows for the creation of serverless applications with ease. Furthermore, Firebase Cloud Messaging facilitates reliable and efficient messaging between the server and devices, making it an essential tool for implementing push notifications in Android apps. Overall, Firebase serves as a powerful and integrated backend solution for Android app developers, offering real-time data synchronization, authentication, serverless computing, and cloud messaging to enhance the functionality and user experience of applications.

MYSQL- MySQL("My S-Q-L", officially, but also called "My Sequel") is (as of July 2013) the world's second most widely used open-source relational database management system (RDBMS). It is named after co-founder Michael Widenius daughter, My. The SQL phrase stands for Structured Query Language. The MySQL development project has made its source code available under the terms of the GNU General Public License, as well as under a variety of proprietary agreements. MySQL was owned and sponsored by a single for-profit firm, the Swedish company MySQL AB, now owned by Oracle Corporation.

MySQL is a popular choice of database for use in web applications, and is a central component of the widely used LAMP open-source web application software stack (and other 'AMP' stacks). LAMP is an acronym for "Linux, Apache, MySQL, Perl/PHP/Python." Free-software-open-source projects that require a full-featured

database management system often use MySQL. For commercial use, several paid editions are available, and offer additional functionality. Applications which use MySQL databases.

4.10 IMPLEMENTATION

4.10.1 User Login

This feature used by the user to login into system. They are required to enter user id and password before they are allowed to enter the system. The user id and password will be verified and if invalid id is there user is allowed to not enter the system.

4.10.2 Register New User

This feature can be performed by all users to register new user to create account. user id is provided when they register -The system must only allow user with valid id and password to enter the system -The system performs authorization process which decides what user level can access to. The user must be able to logout after they finished using system.

4.10.3 Register New Book

This feature can be performed by all users to register new user to create account. This feature can be performed by all users to register new user to create account. System must be able to verify information System must be able to enter number of copies into table. System must be able to not allow two books having same book id.

4.10.4 Search Book

This feature is found in book maintenance part. we can search book based on book id , book name , publication or by author name. System must be able to search the database based on select search type - System must be able to filter book based on keyword entered System must be able to show the filtered book in table view

4.10.5 Final window

System should be able to add detailed information about events. System should be able to display information on notice board available in the homepage of site.

4.11 SYSTEM TESTING

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, sub-assemblies, assemblies and/or a finished product It is the process of exercising software with the intent of ensuring that the

Software system meets its requirements and user expectations and does not fail in an unacceptable manner. There are various types of test. Each test type addresses a specific testing requirement.

4.12 TYPES OF TESTS

4.12.1 Unit testing

Unit testing involves the design of test cases that validate that the internal program logic is functioning properly, and that program inputs produce valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application .it is done after the completion of an individual unit before integration. This is a structural testing, that relies on knowledge of its construction and is invasive. Unit tests perform basic tests at component level and test a specific business process, application, and/or system configuration. Unit tests ensure that each unique path of a business process performs accurately to the documented specifications and contains clearly defined inputs and expected results.

4.12.2 Integration testing

Integration tests are designed to test integrated software components to determine if they actually run as one program. Testing is event driven and is more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components were individually satisfaction, as shown by successfully unit testing, the combination of components is correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components.

4.12.3 Functional test

Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation, and user manuals.

Functional testing is centered on the following items:

Valid Input : identified classes of valid input must be accepted.

Invalid Input : identified classes of invalid input must be rejected.

Functions : identified functions must be exercised.

Output : identified classes of application outputs must be exercised.

Systems/Procedures : interfacing systems or procedures must be invoked.

Organization and preparation of functional tests is focused on requirements, key functions, or special test cases. In addition, systematic coverage pertaining to identify Business process flows; data fields, predefined processes, and successive processes must be considered for testing. Before functional testing is complete, additional tests are identified and the effective value of current tests is determined.

4.12.4 System Test

System testing ensures that the entire integrated software system meets requirements. It tests a configuration to ensure known and predictable results. An example of system testing is the configuration oriented system integration test. System testing is based on process descriptions and flows, emphasizing pre-driven process links and integration points.

4.12.5 White Box Testing

White Box Testing is a testing in which in which the software tester has knowledge of the inner workings, structure and language of the software, or at least its purpose. It is purpose. It is used to test areas that cannot be reached from a black box level.

4.12.6 Black Box Testing

Black Box Testing is testing the software without any knowledge of the inner workings, structure or language of the module being tested. Black box tests, as most other kinds of tests, must be written from a definitive source document, such as specification or requirements document, such as specification or requirements document. It is a testing in which the software under test is treated, as a black box .you cannot "see" into it. The test provides inputs and responds to outputs without considering how the software works.

4.12.7 Unit Testing:

Unit testing is usually conducted as part of a combined code and unit test phase of the software lifecycle, although it is not uncommon for coding and unit testing to be conducted as two distinct phases.

4.13 TEST STRATEGY AND APPROACH

Field testing will be performed manually and functional tests will be written in detail.

4.13.1 Test objectives

- All field entries must work properly.
- Pages must be activated from the identified link.
- The entry screen, messages and responses must not be delayed.

4.13.2 Features to be tested

- Verify that the entries are of the correct format
- No duplicate entries should be allowed
- All links should take the user to the correct page.

4.13.3 Integration Testing

Software integration testing is the incremental integration testing of two or more integrated software components on a single platform to produce failures caused by interface defects.

The task of the integration test is to check that components or software applications, e.g. components in a software system or – one step up – software applications at the company level – interact without error.

Test Results: All the test cases mentioned above passed successfully. No defects encountered.

4.13.4 Acceptance Testing

User Acceptance Testing is a critical phase of any project and requires significant participation by the end user. It also ensures that the system meets the functional requirements.

Test Results: All the test cases mentioned above passed successfully. No defects encountered.

4.14 SYSTEM TESTING

The following are the Testing Methodologies:

- Unit Testing.
- Integration Testing.
- User Acceptance Testing.
- Output Testing.
- Validation Testing.

4.14.1 Unit Testing

Unit testing focuses verification effort on the smallest unit of Software design that is the module. Unit testing exercises specific paths in a module's control structure to ensure complete coverage and maximum error detection. This test focuses on each module individually, ensuring that it functions properly as a unit. Hence, the naming is Unit Testing.

During this testing, each module is tested individually and the module interfaces are verified for the consistency with design specification. All important processing path are tested for the expected results. All error handling paths are also tested.

4.14.2 Integration Testing

Integration testing addresses the issues associated with the dual problems of verification and program construction. After the software has been integrated a set of high order tests are conducted. The main objective in this testing process is to take unit tested modules and builds a program structure that has been dictated by design.

The following are the types of Integration Testing:

1.Top Down Integration

This method is an incremental approach to the construction of program structure. Modules are integrated by moving downward through the control hierarchy, beginning with the main program module. The module subordinates to the main program module are incorporated into the structure in either a depth first or breadth first manner.

In this method, the software is tested from main module and individual stubs are replaced when the test proceeds downwards.

2.Bottom-up Integration

This method begins the construction and testing with the modules at the lowest level in the program structure. Since the modules are integrated from the bottom up, processing required for modules subordinate to a given level is always available and the need for stubs is eliminated. The bottom up integration strategy may be implemented with the following steps:

- The low-level modules are combined into clusters into clusters that perform a specific Software sub-function.
- A driver (i.e.) the control program for testing is written to coordinate test case input and output.
- The cluster is tested.
- Drivers are removed and clusters are combined moving upward in the program structure

The bottom up approaches tests each module individually and then each module is module is integrated with a main module and tested for functionality.

4.15 OTHER TESTING METHODOLOGIES

4.15.1 User Acceptance Testing

User Acceptance of a system is the key factor for the success of any system. The system under consideration is tested for user acceptance by constantly keeping in touch with the prospective system users at the time of developing and making changes wherever required. The system developed provides a friendly user interface that can easily be understood even by a person who is new to the system.

4.15.2 Output Testing

After performing the validation testing, the next step is output testing of the proposed system, since no system could be useful if it does not produce the required output in the specified format. Asking the users about the format required by them tests the outputs generated or displayed by the system under consideration. Hence the output format is considered in 2 ways – one is on screen and another in printed format.

4.15.3 Validation Checking

Validation checks are performed on the following fields.

The text field can contain only the number of characters lesser than or equal to its size. The text fields are alphanumeric in some tables and alphabetic in other tables. Incorrect entry always flashes and error message.

The numeric field can contain only numbers from 0 to 9. An entry of any character flashes an error messages. The individual modules are checked for accuracy and what it has to perform. Each module is subjected to test run along with sample data. The individually tested modules are integrated into a single system. Testing involves executing the real data information is used in the program the existence of any program defect is inferred from the output. The testing should be planned so that all the requirements are individually tested.

A successful test is one that gives out the defects for the inappropriate data and produces and output revealing the errors in the system.

4.16 PREPARATION OF TEST DATA

Taking various kinds of test data does the above testing. Preparation of test data plays a vital role in the system testing. After preparing the test data the system under study is tested using that test data. While testing the system by using test data errors are again uncovered and corrected by using above testing steps and corrections are also noted for future use.

4.16.1 Using Live Test Data:

Live test data are those that are actually extracted from organization files. After a system is partially constructed, programmers or analysts often ask users to key in a set of data from their normal activities. Then, the systems person uses this data as a way to partially test the system. In other instances, programmers or analysts extract a set of live data from the files and have them entered themselves.

It is difficult to obtain live data in sufficient amounts to conduct extensive testing. And, although it is realistic data that will show how the system will perform for the typical processing requirement, assuming that the live data entered are in fact typical, such data generally will not test all combinations or formats that can enter the system. This bias toward typical values then does not provide a true systems test and in fact ignores the cases most likely to cause system failure.

4.16.2 Using Artificial Test Data:

Artificial test data are created solely for test purposes, since they can be generated to test all combinations of formats and values. In other words, the artificial data, which can quickly be prepared by a data generating utility program in the information systems department, make possible the testing of all login and control paths through the program. The most effective test programs use artificial test data generated by persons other than those who wrote the programs. Often, an independent team of testers formulates a testing plan, using the systems specifications.

4.17 USER TRAINING

Whenever a new system is developed, user training is required to educate them about the working of the system so that it can be put to efficient use by those for whom

the system has been primarily designed. For this purpose the normal working of the project was demonstrated to the prospective users. Its working is easily understandable and since the expected users are people who have good knowledge of computers, the use of this system is very easy.

4.18 MAINTAINENCE

This covers a wide range of activities including correcting code and design errors. To reduce the need for maintenance in the long run, we have more accurately defined the user's requirements during the process of system development. Depending on the requirements, this system has been developed to satisfy the needs to the largest possible extent. With development in technology, it may be possible to add many more features based on the requirements in future. The coding and designing is simple and easy to understand which will make maintenance easier.

4.19 TESTING STRATEGY

A strategy for system testing integrates system test cases and design techniques into a well-planned series of steps that results in the successful construction of software. The testing strategy must co-operate test planning, test case design, test execution, and the resultant data collection and evaluation. A strategy for software testing must accommodate low-level tests that are necessary to verify that a small source code segment has been correctly implemented as well as high level testsstatvalidatemajor system functions against user requirements. Software testing is a critical element of software quality assurance and represents the ultimate review of specification design and coding. Testing represents an interesting anomaly for the software. Thus, a series of testing are performed for the proposed system before the system is ready for user acceptance testing.

4.19.1 System Testing:

Software once validated must be combined with other system elements (e.g. Hardware, people, database). System testing verifies that all the elements are proper and that overall system function performance is achieved. It also tests to find discrepancies between the system and its original objective, current specifications and system documentation.

4.19.2 Unit Testing:

In unit testing different are modules are tested against the specifications produced during the design for the modules. Unit testing is essential for verification of the code produced during the coding phase, and hence the goals to test the internal logic of the modules. Using the detailed design description as a guide, important Conrail paths are tested to uncover errors within the boundary of the modules. This testing is carried out during the programming stage itself. In this type of testing step, each module was found to be working satisfactorily as regards to the expected output from the module. In Due Course, latest technology advancements will be taken into consideration. As part of technical build-up many components of the networking system will be generic in nature so that future projects can either use or interact with this. The future holds a lot to offer to the development and refinement of this project.

4.20 Source code:

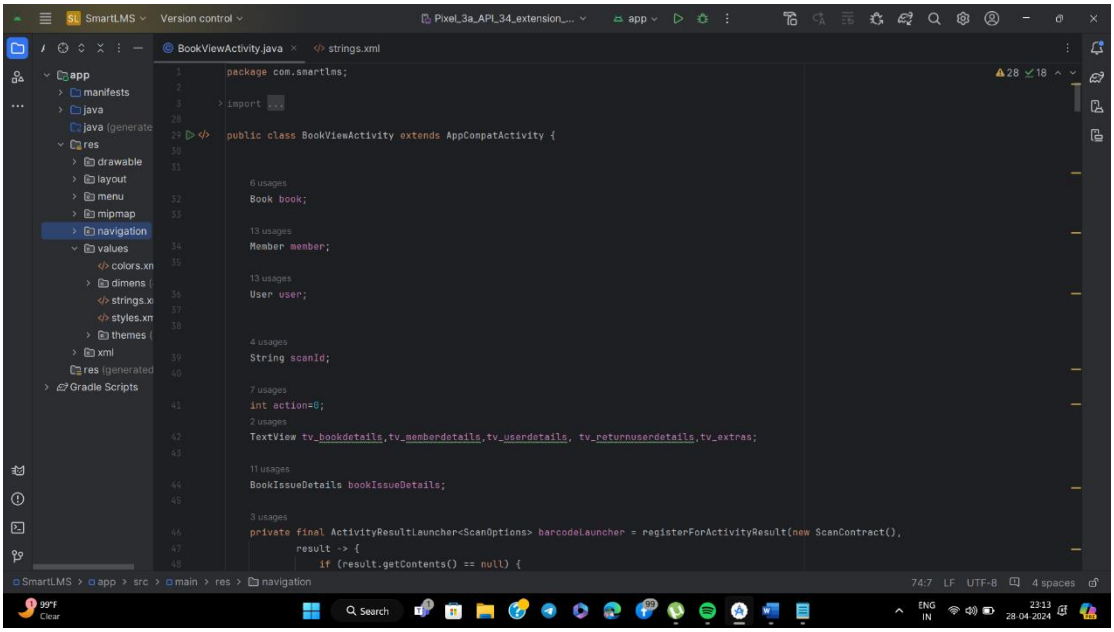
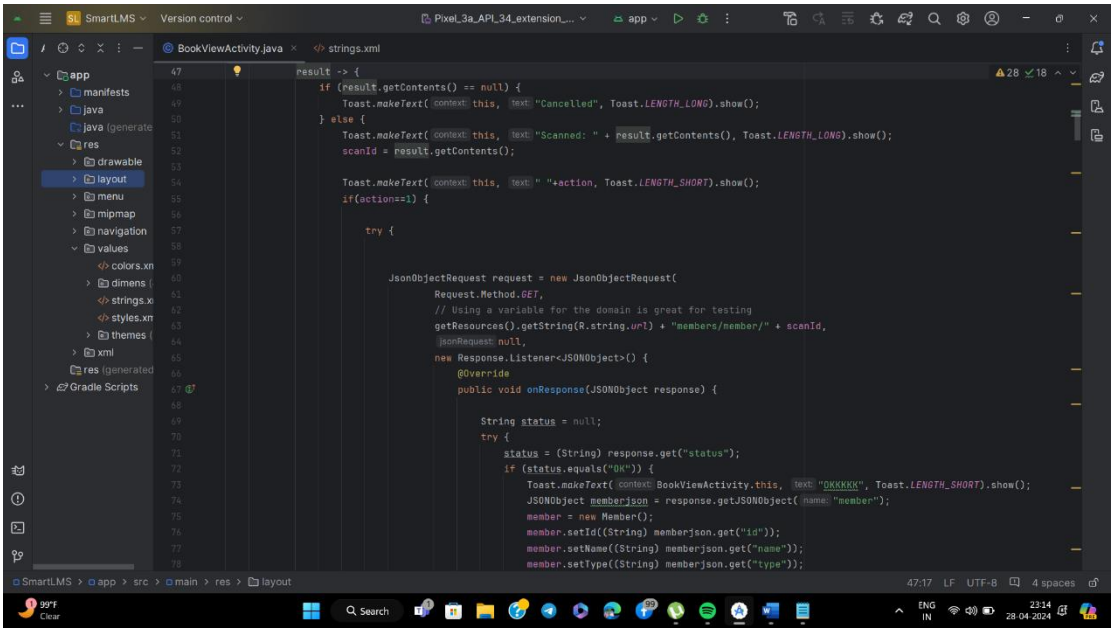
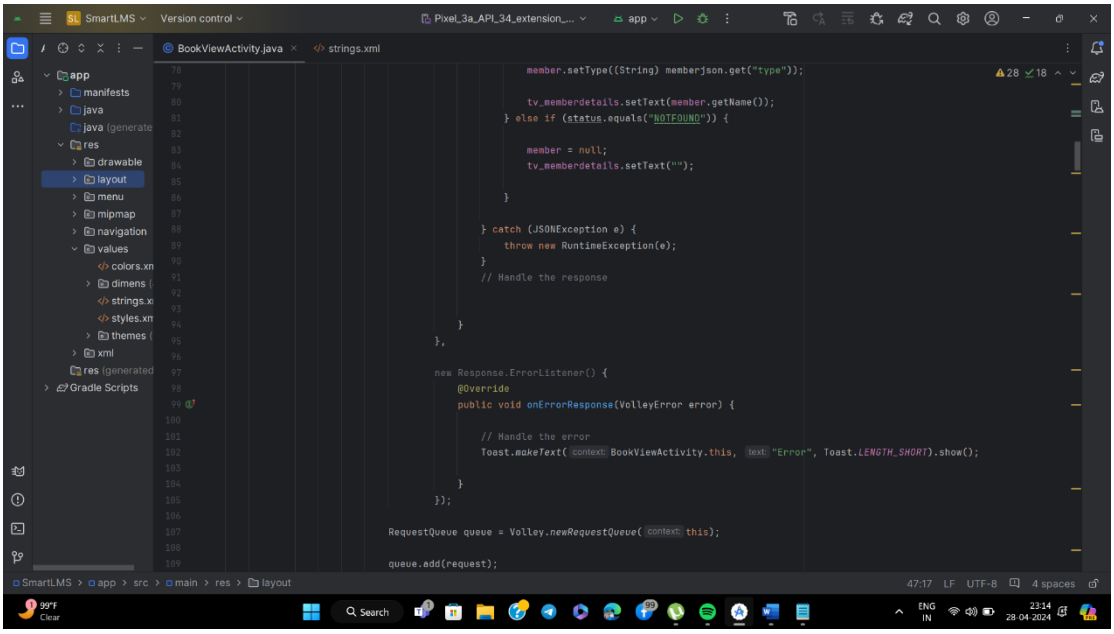


Fig4.7: source code



```
result -> {
    if (result.getContents() == null) {
        Toast.makeText( context: this, text: "Cancelled", Toast.LENGTH_LONG).show();
    } else {
        Toast.makeText( context: this, text: "Scanned: " + result.getContents(), Toast.LENGTH_LONG).show();
        scanId = result.getContents();

        Toast.makeText( context: this, text: " "+action, Toast.LENGTH_SHORT).show();
        if(action==1) {

            try {


                JsonObjectRequest request = new JsonObjectRequest(
                        Request.Method.GET,
                        // Using a variable for the domain is great for testing
                        getResources().getString(R.string.url) + "members/member/" + scanId,
                        jsonRequest: null,
                        new Response.Listener<JSONObject>() {
                            @Override
                            public void onResponse(JSONObject response) {

                                String status = null;
                                try {
                                    status = (String) response.get("status");
                                    if (status.equals("OK")) {
                                        Toast.makeText( context: BookViewActivity.this, text: "OKKKKK", Toast.LENGTH_SHORT).show();
                                        JSONObject memberjson = response.getJSONObject( name: "member");
                                        member = new Member();
                                        member.setId((String) memberjson.get("id"));
                                        member.setName((String) memberjson.get("name"));
                                        member.setType((String) memberjson.get("type"));
```

Fig4.8: Book view activity code



```
                                        member.setType((String) memberjson.get("type"));

                                        tv_memberdetails.setText(member.getName());
                                    } else if (status.equals("NOTFOUND")) {

                                        member = null;
                                        tv_memberdetails.setText("");

                                    }

                                } catch (JSONException e) {
                                    throw new RuntimeException(e);
                                }
                                // Handle the response


                            }
                        },

                        new Response.ErrorListener() {
                            @Override
                            public void onErrorResponse(VolleyError error) {

                                // Handle the error
                                Toast.makeText( context: BookViewActivity.this, text: "Error", Toast.LENGTH_SHORT).show();

                            }
                        });

                RequestQueue queue = Volley.newRequestQueue( context: this);

                queue.add(request);
```

Fig4.9: Activity code

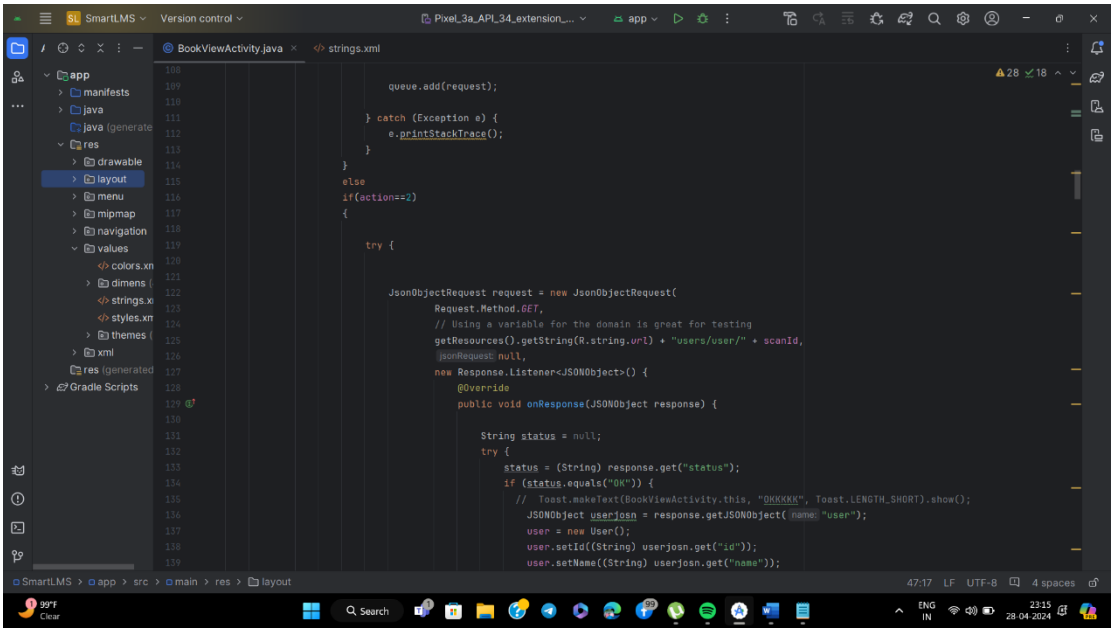


Fig4.10: book activity code

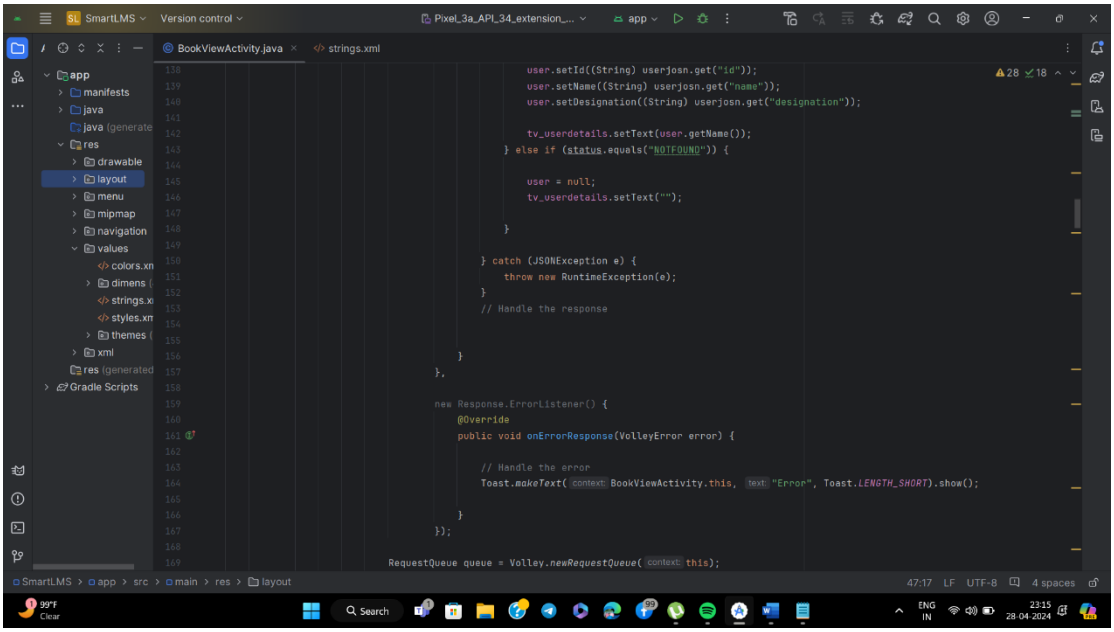


Fig4.11: Layout formation

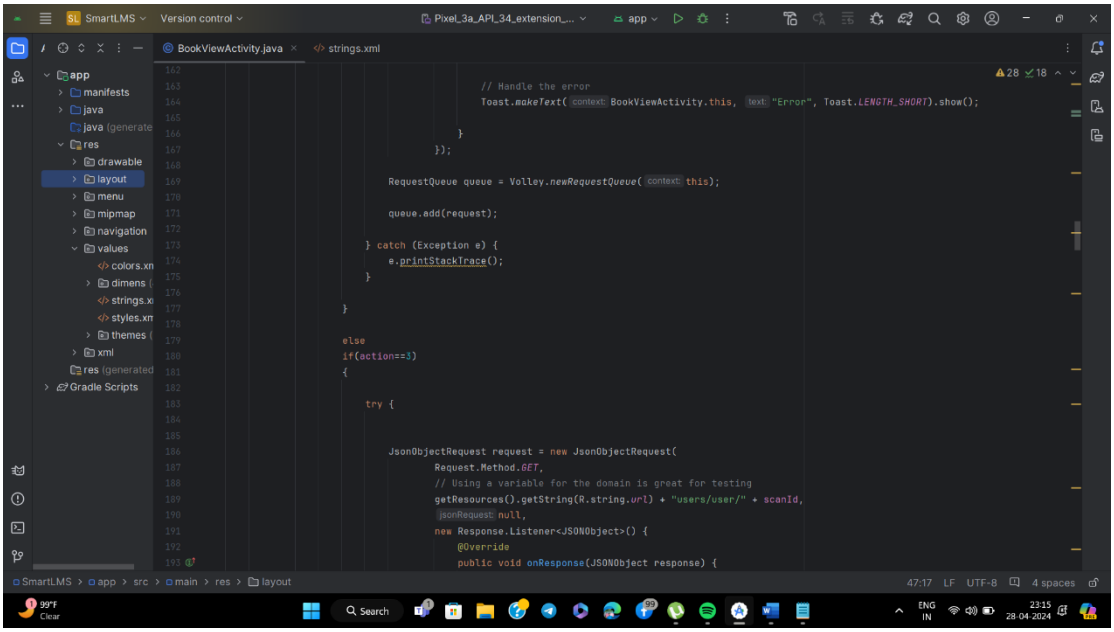


Fig4.12: String view code in java

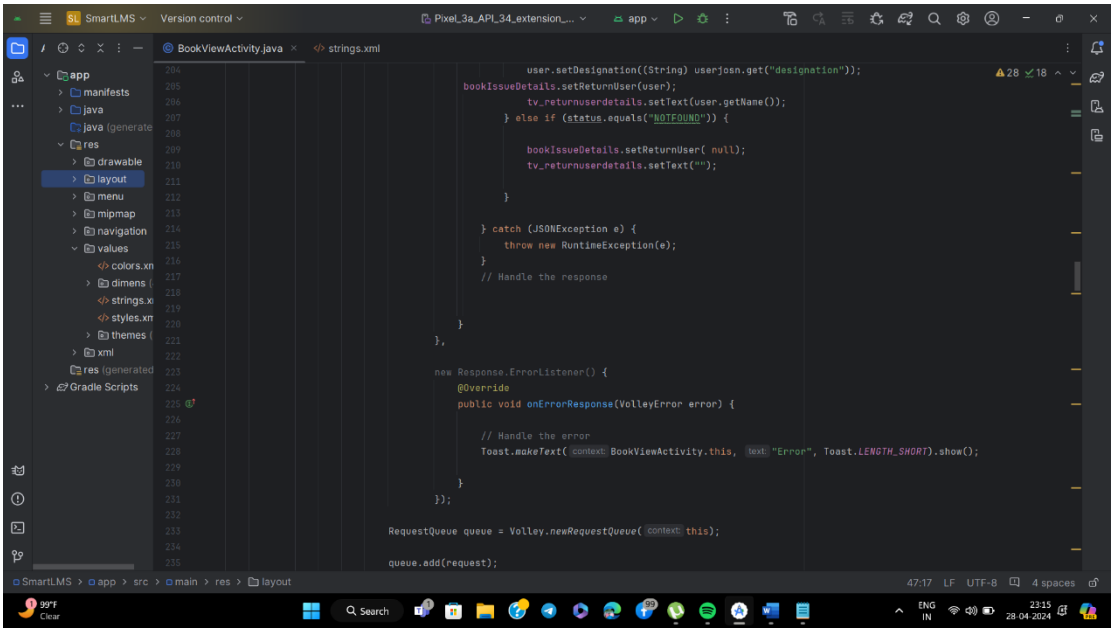


Fig4.13: String view code

CHAPTER 5

RESULTS

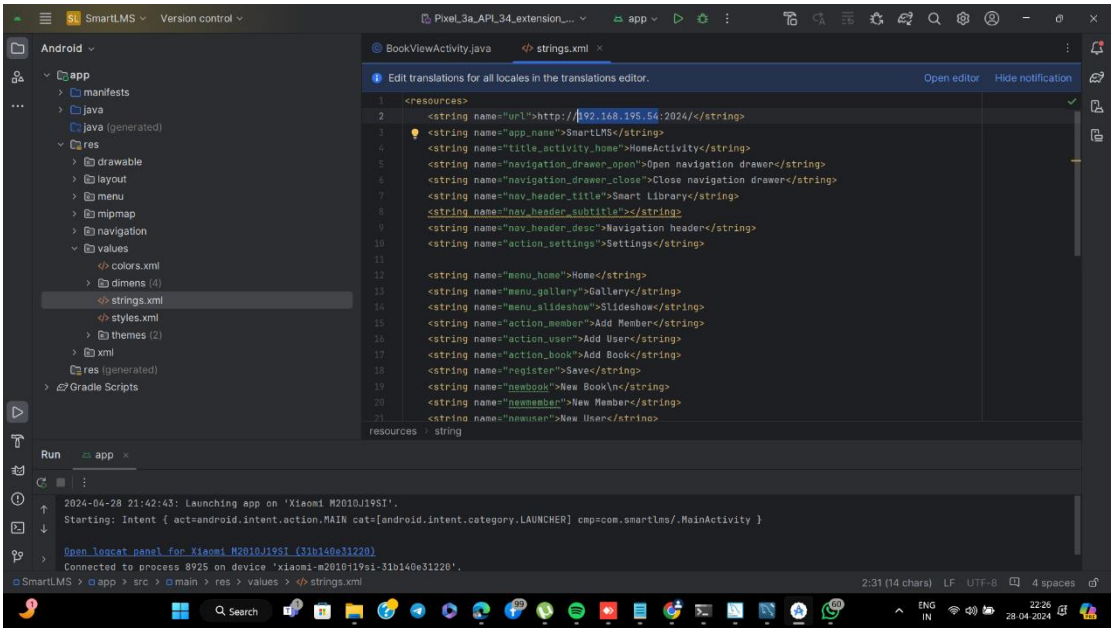


Fig5.1: Srings.xml

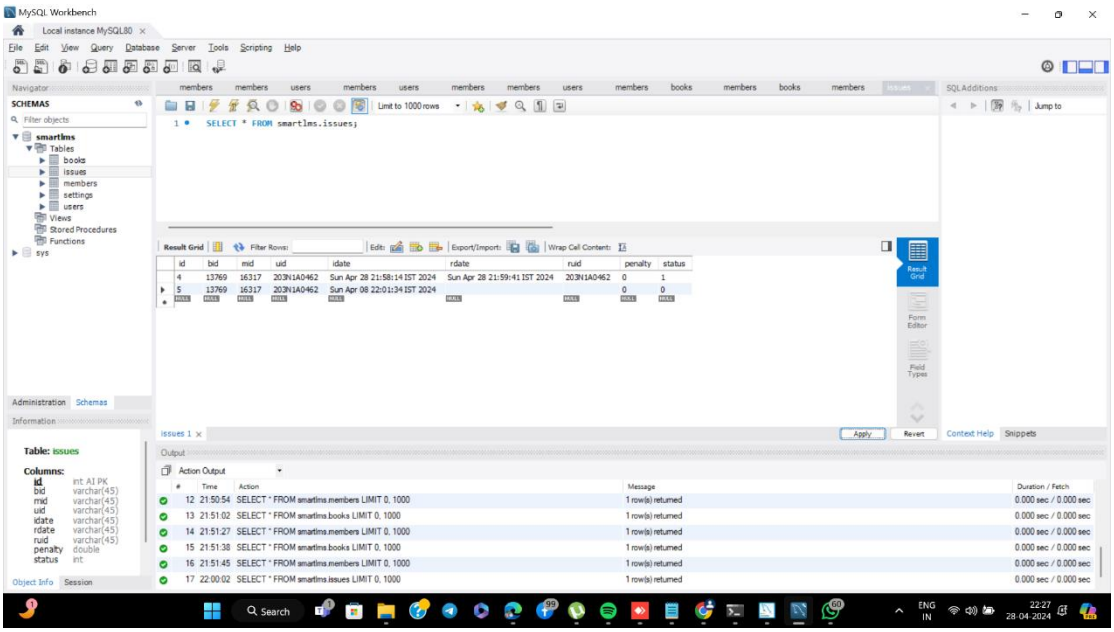


Fig5.2: Database in MySQL server

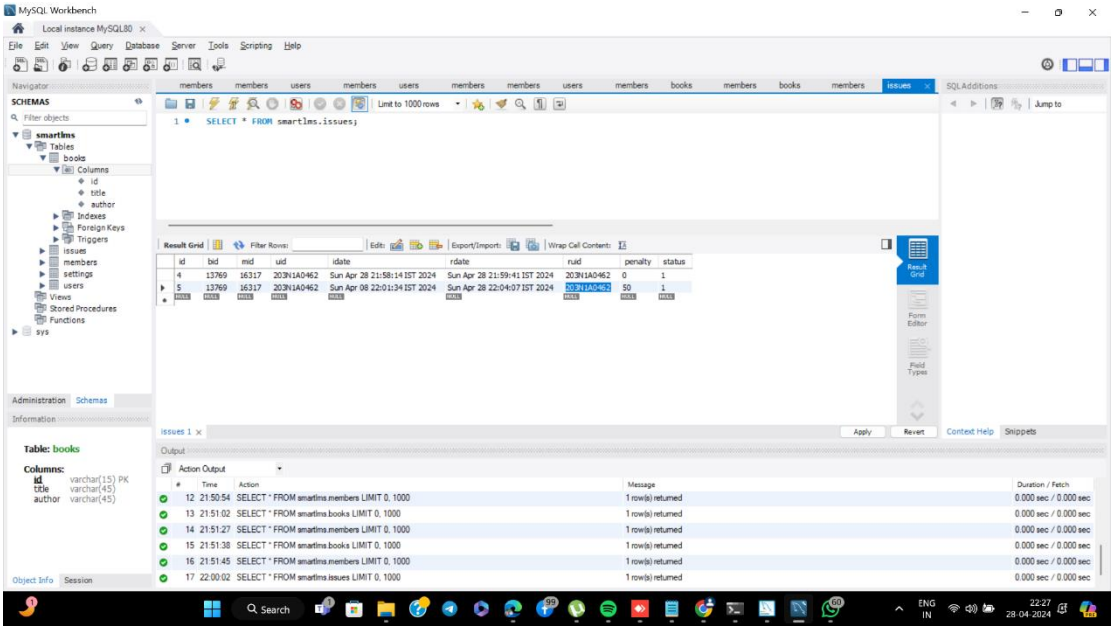


Fig5.3: Issue & Return of books in MySQL

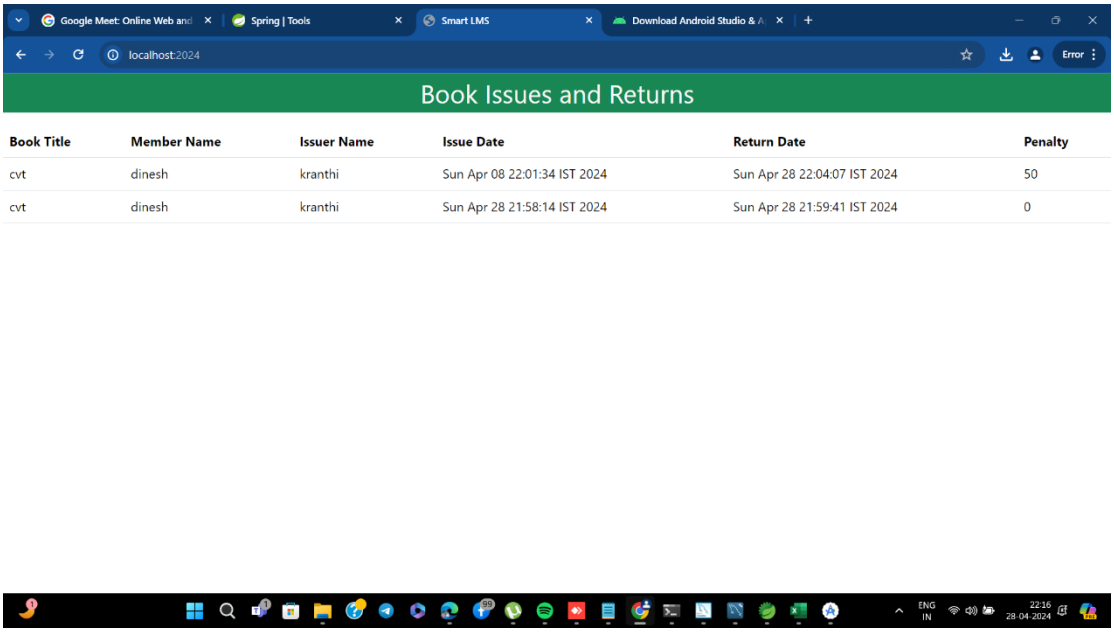
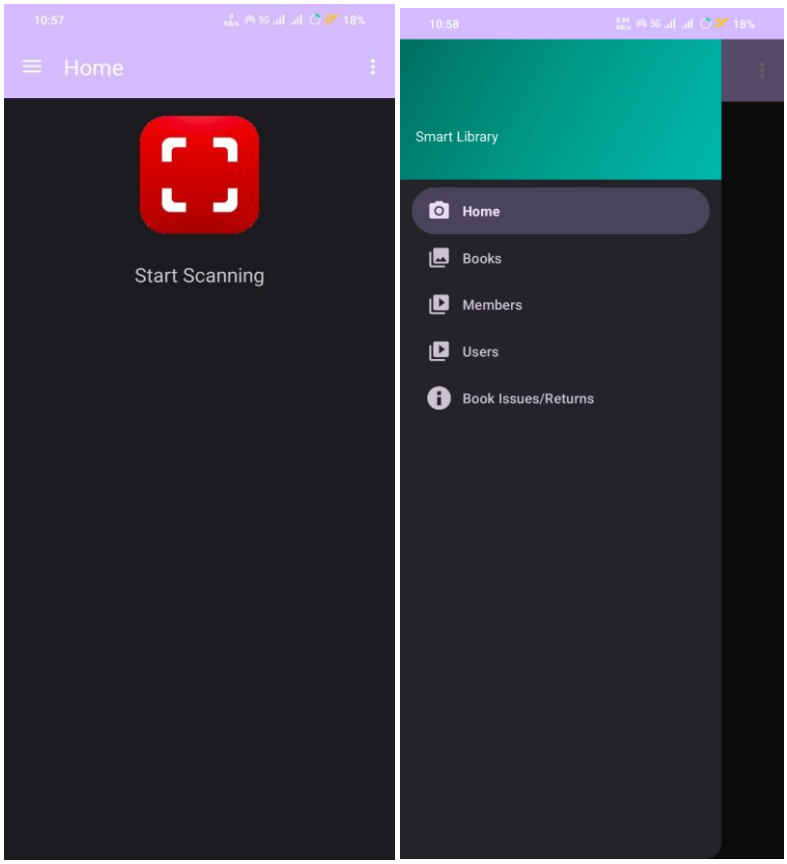


Fig5.4: Issue & Return of books in SmartLMS



Fig(5.5),(5.6): Android app Output

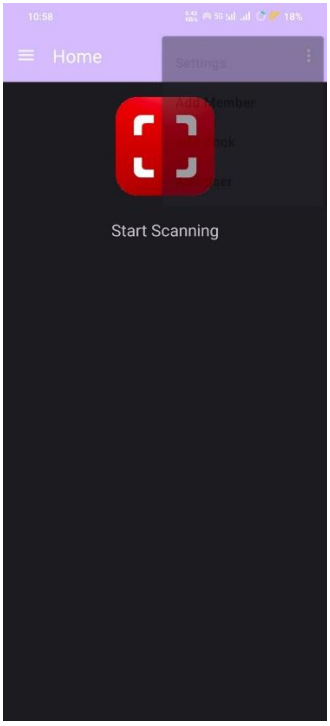


Fig5.7: Additional settings in android app

CHAPTER 6
CONCLUSION

6.1 CONLUSION

This website 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 as well request for book or give some suggestions. It has a facility of teacher's login where teachers can add lectures notes and also give necessary suggestion to library and also add info about workshops or events happening in our college or nearby college in the online notice board.

6.2 FUTURE SCOPE

There is a future scope of this facility that many more features such as online lectures video tutorials can be added by teachers as well as online assignments submission facility, a feature Of group chat where students can discuss various issues of engineering can be added to this project thus making it more interactive more user friendly and project which fulfills each users need in the best way possible.

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