

“BIBLOTECH”

A

Project Report

submitted

in partial fulfillment

for the award of the Degree of

Bachelor of Technology

in Department of Information Technology



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Session 2024-2025**

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This is to certify that Mr. Ram Modi, a student of B.Tech(Information Technology)
8th semester has submitted his Project Report entitled "BIBLOTECH" under my
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DECLARATION

We hereby declare that the report of the project entitled "BIBLOTECH" is a record of an original work done by us at Swami Keshvanand Institute of Technology, Management and Gramothan, Jaipur under the mentorship of "Mrs. Anjali Pandey" (Dept. of Information Technology) and coordination of "Dr. Richa Rawal" (Dept. of Information Technology). This project report has been submitted as the proof of original work for the partial fulfillment of the requirement for the award of the degree of Bachelor of Technology (B.Tech.) in the Department of Information Technology. It has not been submitted anywhere else, under any other program to the best of our knowledge and belief.

Team Members

Pradeep Singh, 21ESKIT081

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Chapter 1

Introduction

1.1 Problem Statement and Objective

Educational institutions often struggle with managing and distributing digital learning resources effectively. Traditional methods lack scalability, centralized access, and collaborative tools. Students face difficulties finding authenticated academic materials, while librarian members lack a streamlined way to distribute and manage resources. The objective of this project is to build an interactive, cloud-based digital library platform – BIBLOTECH – that allows students, librarian and administrators to upload, search, and access educational content in a secure and structured environment.

1.2 Literature Survey

Several platforms such as Google Classroom, Moodle, and other LMS tools offer basic content sharing and classroom management. However, most lack modern cloud-based features like secure storage, role-based dashboards, real-time resource tracking, integrated payments for premium content, or librarian -student interaction beyond file sharing. Additionally, many are either paid or too complex for quick deployment in small and mid-scale institutions. BIBLOTECH addresses these gaps by offering a user-friendly, modular system tailored for Indian educational institutions with scalability, cost-efficiency, and rich features like cloud file storage, access analytics, and integrated payments.

1.3 Introduction to Project

BIBLOTECH is a full-stack web application designed for educational institutions to manage, distribute, and secure digital learning content. It facilitates the upload-

ing, downloading, and searching of academic resources (e.g., PDFs, videos, notes) through authenticated user roles – students, librarian, and administrators. The platform also supports cloud storage via AWS S3, payment gateway integration for premium materials, and real-time analytics. The system promotes collaborative learning, centralized content management, and secure access to educational resources from anywhere and on any device.

1.4 Proposed Logic

The core logic is based on RESTful service interactions and role-based access control. The backend uses Node.js with Express for routing and logic, MongoDB Atlas for storing user profiles and metadata, and AWS S3 for file storage. The frontend is developed using React.js and Tailwind CSS to ensure a responsive UI. Students can browse or purchase content using secure payment APIs (e.g., Stripe or Razorpay), while librarian can upload materials tagged with subject, semester, and type. Admins can manage all roles, approve content, and access analytics dashboards. Secure authentication is handled via JWT tokens.

1.5 Scope of the Project

BIBLOTECH is initially designed for deployment in colleges and universities across India. It can scale horizontally to include more institutions or departments. The platform caters to students seeking accessible learning resources, librarian managing content distribution, and administrators overseeing user activity. Deliverables include a responsive web interface, secure login, resource upload/download modules, real-time notifications, and cloud integration. Future enhancements may include AI-based recommendations, plagiarism detection, and native mobile applications.

Chapter 2

Software Requirement Specification

2.1 Overall Description

BIBLOTECH is a cloud-based platform designed for centralized educational resource management. It offers role-based access to students, librarian, and administrators, enabling them to upload, download, search documents, authenticate users, and process payments for premium content. The system uses cloud hosting, AWS S3 for storage, and MongoDB Atlas as its primary database. This section defines the environment, user interfaces, system interfaces, constraints, and operational expectations.

The platform follows a modular, component-driven architecture. The **Frontend Interface** is built using React.js, operating as a single-page application (SPA) and communicating with backend services over secure REST APIs (HTTPS). The **Backend Services** are implemented using Node.js with Express.js, providing secure, authenticated API endpoints. Data is stored in **MongoDB Atlas**, offering scalable cloud-hosted NoSQL storage. Additionally, third-party services such as **Razorpay** (for payments), **AWS S3** (for file storage), and email notification services are integrated for seamless operations.

The user interface is responsive and role-driven:

- **Students** access dashboards to explore free and premium materials, manage subscriptions, and update profiles.
- **Admins** control the platform through dashboards where they upload content, manage users, and view analytics.
- **Librarian** users can upload learning resources and moderate user interactions.

The system is browser-based and does not require specialized hardware. On the client side, users can access the platform using any modern browser (e.g., Chrome, Firefox). The server side operates on Linux-based cloud hosting solutions like Render or AWS EC2 instances.

Key software technologies and interfaces include:

- **Frontend:** React.js, styled using Tailwind CSS, with Axios for API calls.
- **Backend:** Node.js with Express.js.
- **Database:** MongoDB Atlas managed with Mongoose ODM.
- **Authentication:** JSON Web Token (JWT)-based session control.

All communication between the frontend and backend is encrypted over HTTPS. The platform uses REST APIs for standard data exchange, with provisions to support real-time features (e.g., WebSockets) in future releases.

In terms of system performance, client devices are expected to have at least 4GB of RAM, while servers should be provisioned with 8–16GB RAM and SSD storage to handle operations efficiently.

Operational activities are automated through CI/CD pipelines sourced from GitHub repositories. Data backups are scheduled nightly on MongoDB Atlas, and server logs are monitored using Render's built-in logging system.

The main functional modules of the system are:

- Secure user authentication and role-based access control.
- Upload and download of educational materials with permission checks.
- Payment processing using Razorpay or Stripe gateways.
- Administrative dashboards for user and content management.
- Email and in-app notifications for user engagement.

Users of the system are categorized as:

- **Students:** Consume content, purchase subscriptions, and provide feedback.
- **Librarian:** Upload and manage educational content, and interact with students.
- **Admins:** Monitor the platform, moderate user content, and manage financial operations.

There are some constraints in the current version:

- It is designed as a web-first application; native mobile apps are planned for later phases.
- A stable internet connection is required for platform access.
- Payment processing depends on the availability and uptime of third-party services.
- All user input data must pass validation and be securely stored.

Certain assumptions and dependencies are considered during development:

- Users are expected to be digitally literate and use modern, updated web browsers.
- MongoDB Atlas and AWS S3 services are assumed to be reliably available.
- Stripe APIs should remain stable for payment processing.
- Hosting services (Vercel for frontend, Render for backend) are expected to maintain 99.9% uptime.

Chapter 3

System Design Specification

3.1 System Architecture

The BIBLOTECH platform is designed using a three-tier architecture: **Presentation Layer (Frontend)**, **Application Layer (Backend)**, and **Data Layer (Database and Storage)**. The frontend, built with React.js and styled using Tailwind CSS, provides an intuitive and responsive interface for students, librarian, and admins. The backend is developed using Node.js with Express.js and handles business logic, routing, authentication, and file operations.

MongoDB Atlas is used for persistent NoSQL data storage, while AWS S3 provides scalable and secure file storage. Communication between all layers is conducted over HTTPS with JWT-based token authentication to ensure data integrity and user privacy. The architecture supports modular expansion, making the platform scalable and maintainable for large-scale educational institutions.

3.2 Module Decomposition Description

The platform is divided into the following major functional modules:

- **Authentication Module:** Implements secure login and registration using JWT. Manages role-based access for students, librarian, and administrators.
- **Resource Management Module:** Allows librarian to upload content and students to access materials based on tags such as subject, semester, and type.
- **Search and Filter Module:** Provides search functionality with filtering options (e.g., category, date, file type).
- **Payment Integration Module:** Enables users to make secure transactions via Stripe for accessing premium content.

- **File Storage Module:** Connects to AWS S3 for uploading and retrieving learning materials securely.
- **Admin Dashboard Module:** Allows administrators to monitor user activity, approve or remove uploaded content, and access system analytics.

3.3 High Level Diagram

3.3.1 Use Case Diagram



Figure 3.1: Use Case Diagram

3.3.2 Data-Flow Diagram

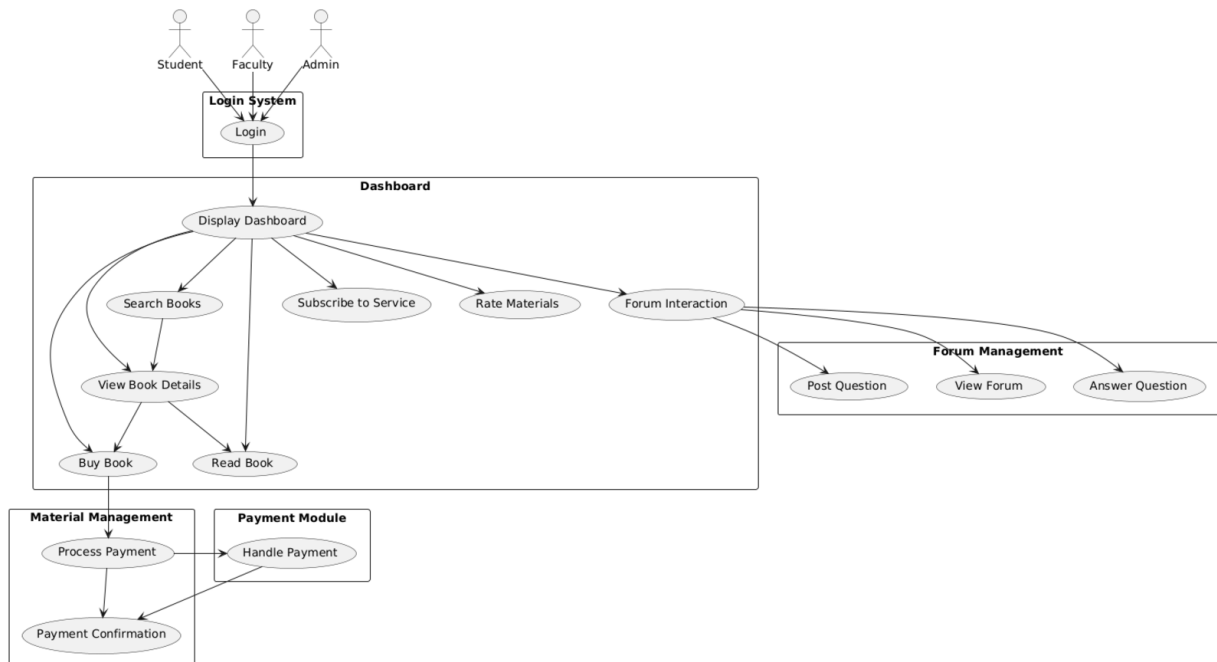


Figure 3.2: Data Flow Diagram

3.3.3 Class Diagram

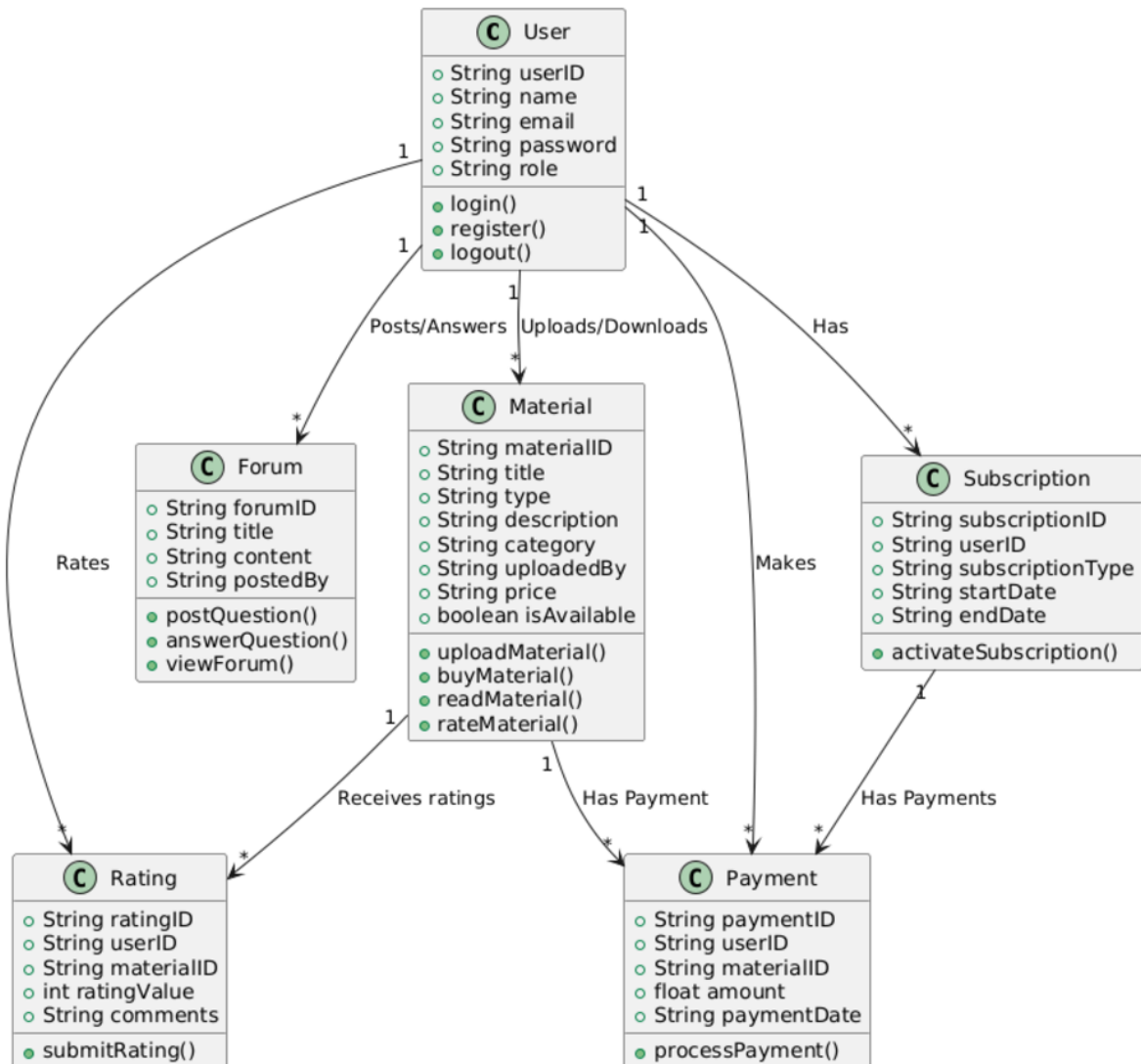


Figure 3.3: Class Diagram

3.3.4 Behavioral Diagram

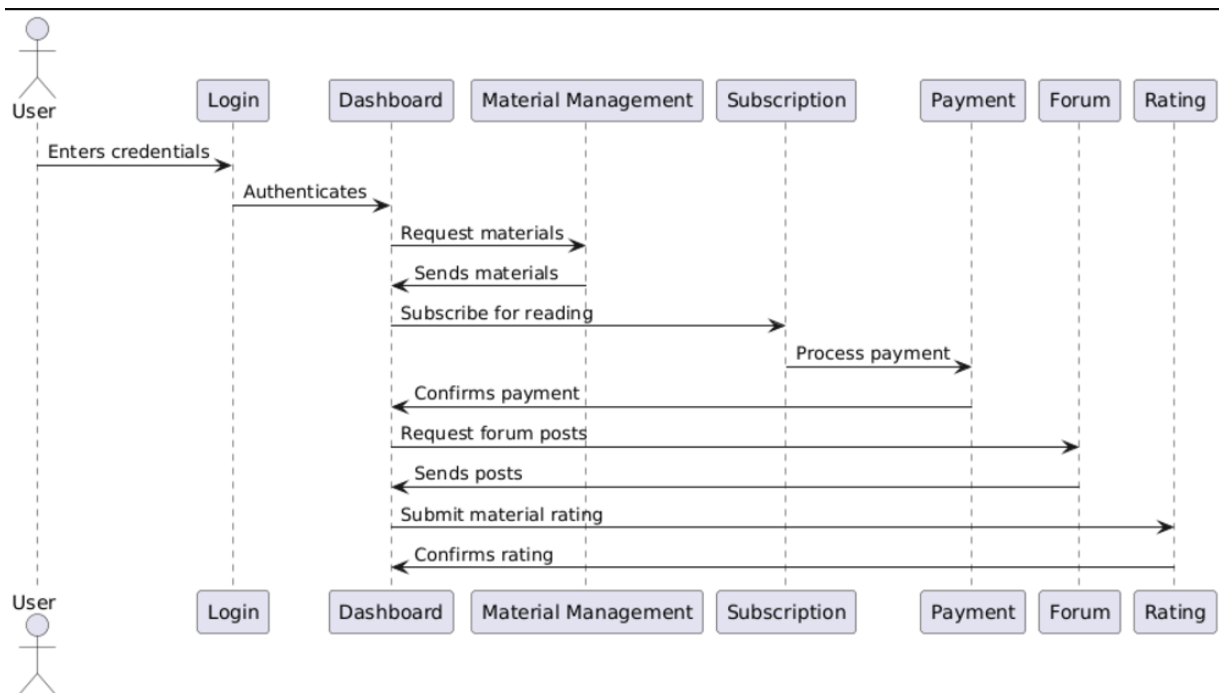


Figure 3.4: Behavioral Diagram

3.3.5 Entity Relationship Diagram

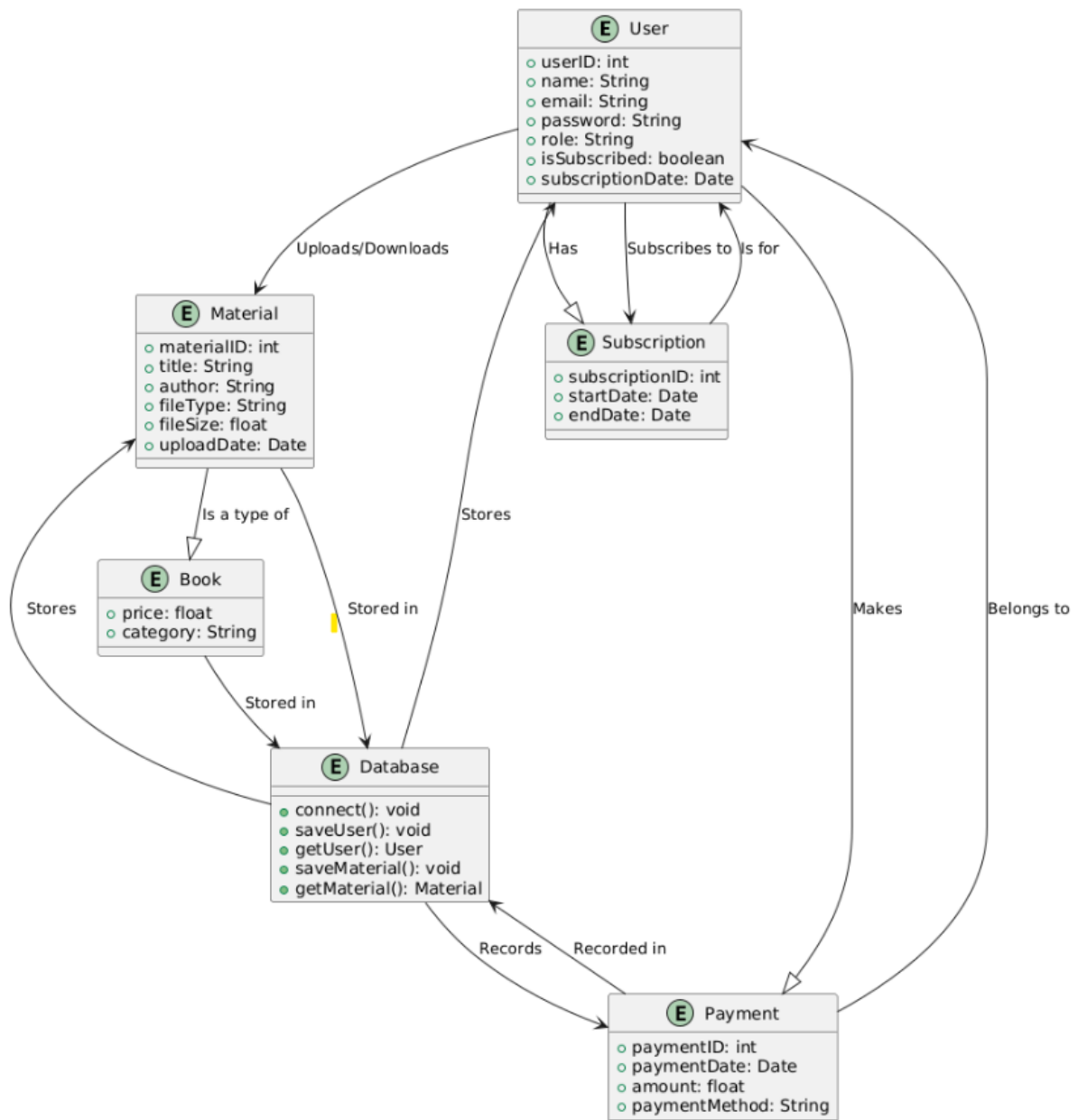


Figure 3.5: Entity Relationship Diagram

3.3.6 Database Diagram

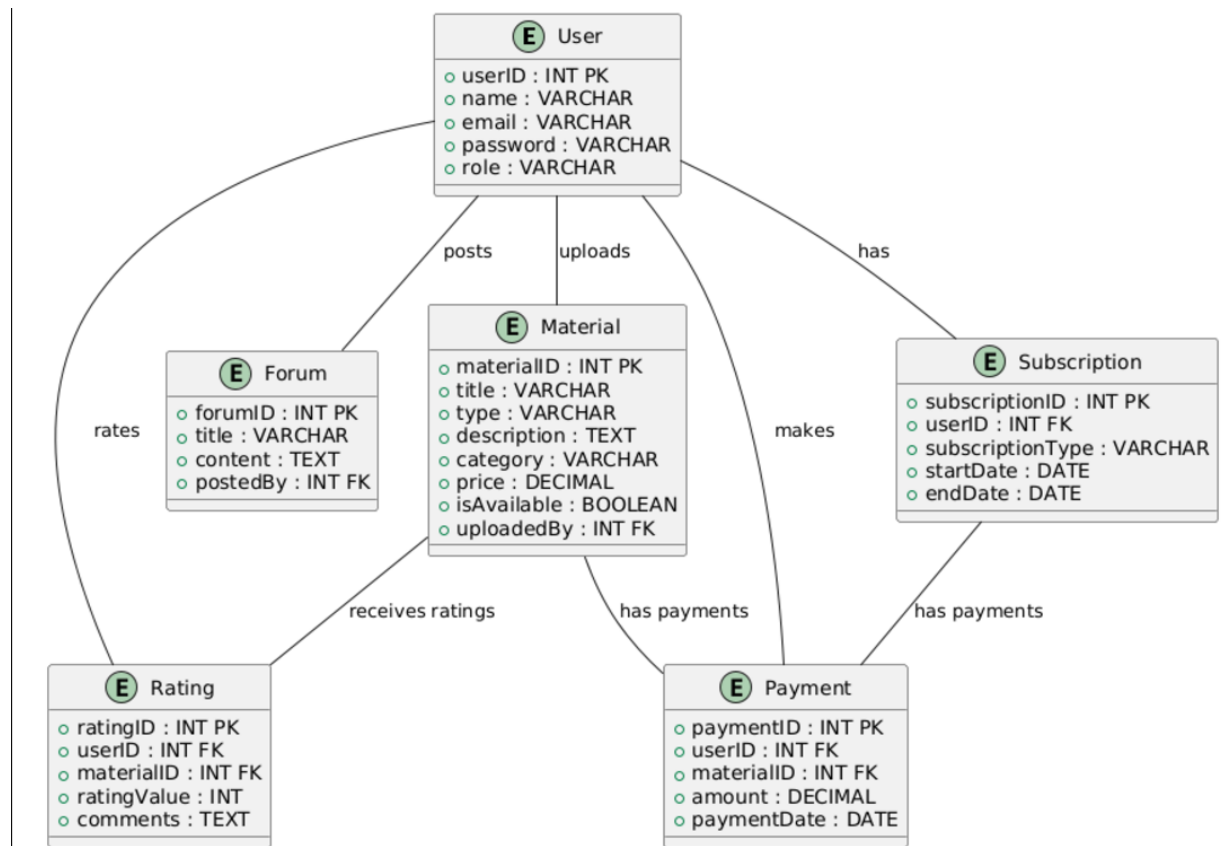


Figure 3.6: Database Diagram

Chapter 4

Methodology and Team

4.1 Introduction to Agile Framework

The Agile Model is an iterative and incremental approach to software development. It emphasizes flexibility, customer collaboration, and rapid delivery of functional software. Unlike the linear Waterfall Model, Agile allows for changes in requirements throughout the development lifecycle and focuses on delivering small, working pieces of the software frequently.

Agile divides the project into smaller iterations called **sprints**, typically lasting 1–4 weeks. At the end of each sprint, a potentially shippable product increment is delivered, reviewed, and improved upon in subsequent iterations. This encourages regular stakeholder feedback, continuous improvement, and adaptive planning.

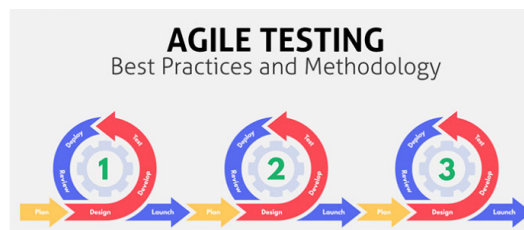


Figure 4.1: Agile Model Lifecycle

The main phases in Agile development include:

1. **Requirement Gathering:** Requirements are gathered in the form of user stories and stored in the product backlog.
2. **Sprint Planning:** The team selects high-priority user stories from the backlog and plans tasks for the upcoming sprint.
3. **Design and Development:** Features are developed incrementally, allowing early delivery of functionality. Development and design are continuous and

evolve sprint-by-sprint.

4. **Testing and Review:** Testing is done continuously. After every sprint, the team reviews what was delivered and discusses improvements.
5. **Sprint Retrospective:** At the end of each sprint, the team reflects on the process and identifies areas of improvement.
6. **Release and Maintenance:** After enough sprints, a version is released. Agile continues to accommodate new features, bug fixes, and user feedback in future sprints.

Advantages of Agile Model:

- Encourages customer and stakeholder feedback throughout the process.
- Adapts quickly to changing requirements.
- Delivers functional features early and often.
- Promotes team collaboration and ownership.

Disadvantages of Agile Model:

- Requires frequent interaction with stakeholders.
- Less documentation compared to traditional models.
- Can become chaotic if not managed well.
- Needs experienced and self-disciplined teams.

4.2 Team Members, Roles & Responsibilities

Team Contributions

- **Ram Modi – 21ESKIT093:** Frontend Developer Designed UI with React.js and Tailwind CSS, ensured responsiveness, integrated stripe payment, deployed frontend on Vercel, deployed backend on render.
- **Pradeep Singh – 21ESKIT081:** Backend Developer Built APIs using Node.js/Express.js, AWS S3 Bucket Integration for Storage.
- **Riya Parakh – 21ESKIT096:** Handled JWT authentication, Testing modules, integrated frontend with backend, managed MongoDB Atlas , fixed bugs, Models and schema declaration for database.

Chapter 5

Centering System Testing

The BIBLOTECH system was thoroughly tested to ensure it meets all functional and non-functional requirements. The testing covered both frontend and backend components, helping to identify bugs, verify stability, and validate user experience across roles (student, faculty, admin).

5.1 Functionality Testing

The following core functionalities were tested on the BIBLOTECH platform:

1. Links

- (a) **Internal Links:** Navigational routes such as Home, Dashboard, Upload Material, and Profile were tested. All links led to the appropriate components and rendered content dynamically based on user roles.
- (b) **External Links:** External links like AWS S3 resource links and payment gateway redirects were tested. Stripe/Razorpay integration successfully redirected users and returned response tokens.
- (c) **Broken Links:** No broken links were found during the test cycles. All pages routed correctly through the React Router system.

2. Forms

- (a) **Error Message for Wrong Input:** Real-time error messages appeared for invalid inputs, including wrong email formats and missing required fields in login, registration, and upload forms.
- (b) **Optional and Mandatory Fields:** All mandatory fields were marked with asterisks and validated before submission. For example, in the file upload form, "Title", "File", and "Category" were required fields.

3. Database

- CRUD operations on MongoDB Atlas were tested, including user creation, login, content upload/download, and order/payment creation.
- Mongoose validation ensured no invalid documents were stored.
- Backend APIs were tested with Postman and returned correct status codes (200, 400, 401, etc.).

5.2 Performance Testing

To ensure responsive and efficient system performance, the following aspects were tested:

- **Page Load Speed:** Key pages like the login, dashboard, and content viewer loaded in under 2 seconds on an average internet connection.
- **Scalability:** Mock data tests with over 500 concurrent users showed no crash or degradation in performance on Render-hosted backend.
- **API Response Time:** RESTful API endpoints for authentication, upload, and payment averaged 150–300 ms response time.
- **Stress Test:** Simulated login requests and file uploads using tools like JMeter indicated acceptable performance under high load.

5.3 Usability Testing

The usability of the system was tested with real users and evaluated based on ease-of-use, clarity, and accessibility:

- **Ease of Navigation:** Users could access any feature (login, browse content, upload) within 2–3 clicks. Dashboard menus were role-based and intuitive.
- **Design Consistency:** UI components built with Tailwind CSS followed a consistent color theme and layout. Navigation, input fields, and buttons maintained uniformity across all pages.

- **Feedback and Error Messaging:** Interactive alerts and form-level validation helped users recover from input errors quickly. Payment status messages and upload confirmations were displayed clearly.
- **Accessibility:** Buttons were keyboard-accessible, and the contrast ratio was maintained for readability. The design worked well on both desktops and smartphones.
- **User Feedback:** Test users (students and faculty) reported that the application was intuitive, fast, and visually clean. Minimal training was needed for new users.

Chapter 6

Test Execution Summary

The Test Execution Summary Report provides a comprehensive overview of the testing activities carried out throughout the development lifecycle of the BIBLOTECH platform. While the test plan was designed early in the development phase, this report compiles the actual test results post-implementation. It helps the development team and stakeholders assess the quality of the system, measure test coverage, and evaluate overall system stability.

The report includes:

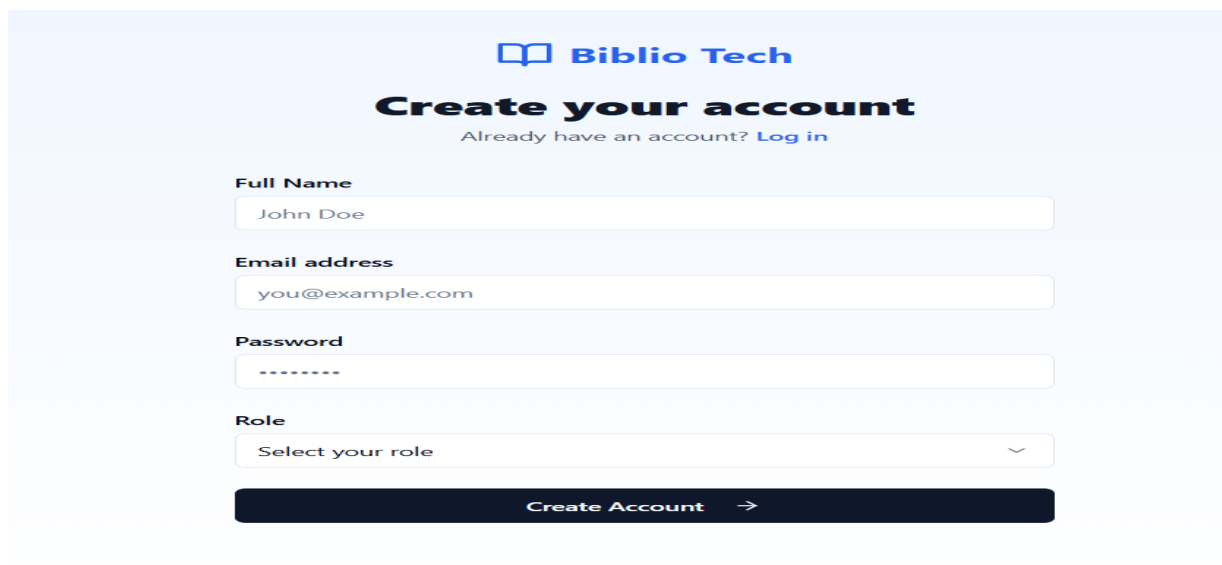
- Test Case IDs generated and tracked using manual test sheets and Postman scripts
- A brief description of each functional test case
- Execution status (Pass/Fail)
- Time and human resources consumed during testing

S.No	Test Case ID	Test Case Description	Status	Resources Used
1	TC001	User Login and Authentication (JWT token validation, role access)	Pass	2 testers, 10 mins
2	TC002	File upload by librarian and AWS S3 integration	Pass	2 testers, 15 mins
3	TC003	Student content download and access history tracking	Pass	1 tester, 12 mins
4	TC004	Payment gateway integration for premium content (Razorpay)	Fail	1 tester, 18 mins
5	TC005	Admin access to analytics and content moderation	Pass	2 testers, 20 mins

Table 6.1: Test Case Execution Summary for BIBLOTECH Core Modules

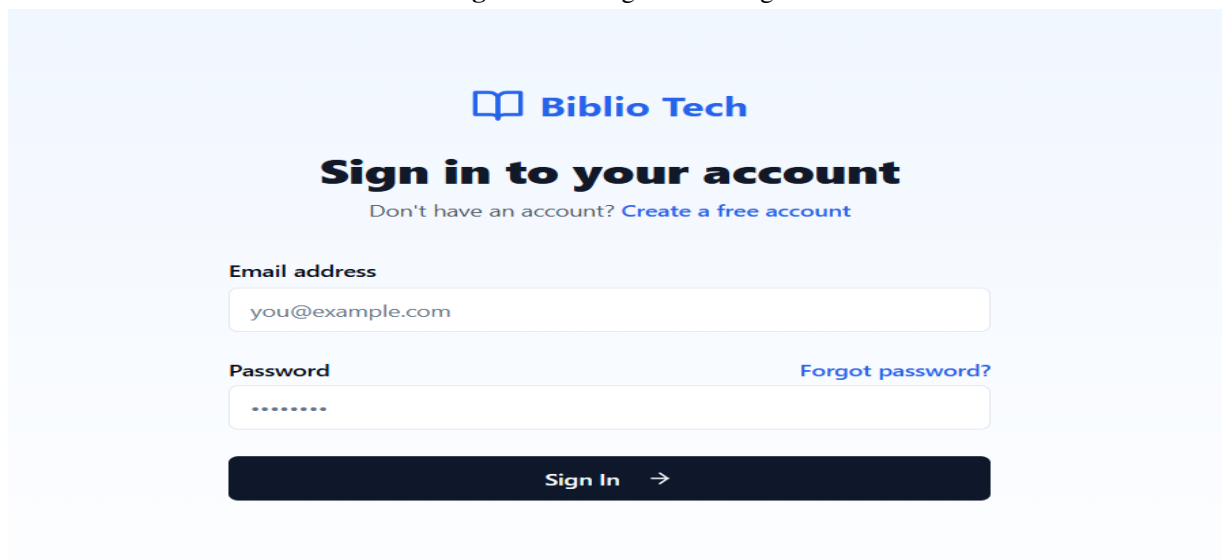
Chapter 7

Project Screenshots



The screenshot shows the 'Create your account' page for Biblio Tech. At the top, there is a logo with a book icon and the text 'Biblio Tech'. Below the logo, the heading 'Create your account' is displayed in bold, followed by a link 'Already have an account? Log in'. The form consists of four input fields: 'Full Name' with the value 'John Doe', 'Email address' with the value 'you@example.com', 'Password' with masked characters '*****', and 'Role' with a dropdown menu showing 'Select your role'. At the bottom of the form is a dark blue button labeled 'Create Account' with a right-pointing arrow.

Figure 7.1: Registration Page



The screenshot shows the 'Sign in to your account' page for Biblio Tech. At the top, there is a logo with a book icon and the text 'Biblio Tech'. Below the logo, the heading 'Sign in to your account' is displayed in bold, followed by a link 'Don't have an account? Create a free account'. The form consists of two input fields: 'Email address' with the value 'you@example.com' and 'Password' with masked characters '*****'. To the right of the password field is a link 'Forgot password?'. At the bottom of the form is a dark blue button labeled 'Sign In' with a right-pointing arrow.

Figure 7.2: Login Page

Digital Learning Resources at Your Fingertips

Access a vast collection of instructional materials, Q&A banks, and educational resources
24/7 from anywhere.



Digital Library

Access thousands of digital resources
anytime, anywhere



Multiple Users

Share resources simultaneously with other
learners



Study Materials

Comprehensive collection of instructional
materials



Q&A Bank

Extensive question and answer bank for
practice

Figure 7.3: Home Page

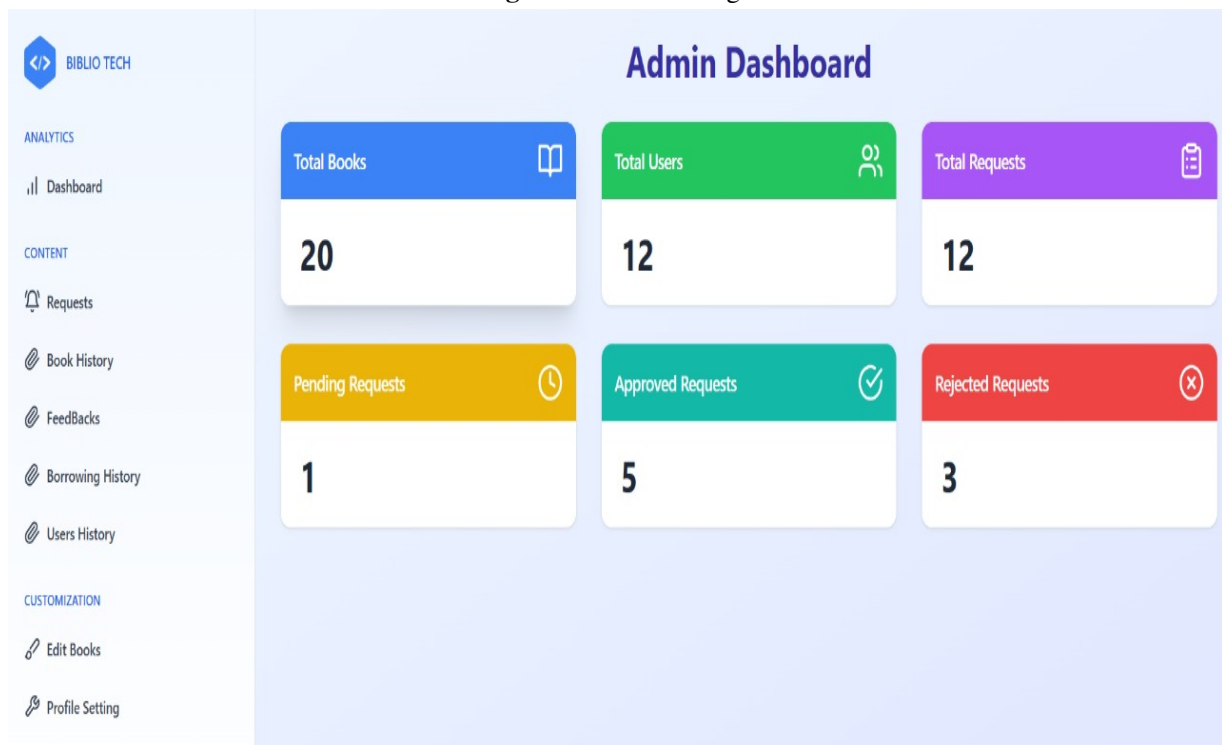


Figure 7.4: Admin Dashboard

ANALYTICS

Dashboard

CONTENT

Requests
Book History
FeedBacks
Borrowing History
Users History

CUSTOMIZATION

Edit Books
Profile Setting

Admin Panel - User Management

USERNAME	EMAIL	ROLE	ACTIONS
Cade Obrien	caxocy@mailinator.com	Student	Save
Venus Gallagher	huziwexuha@mailinator.com	Student	Save
Amber srivastva	amber@gmail.com	Librarian	Save
Ram	ram@gmail.com	Student	Save
shyam modi	shyam@gmail.com	Student	Save
amber	amber@cmentor.com	Librarian	Save
Shreya Parakh	sp13@gmail.com	Student	Save

Figure 7.5: Admin Panel

INDIAN POLITY

Vishal Parmeshwar
Polity
6 available

About this book

This book is provide the basic knowledge of the indian polity.

Borrow This Book

Add to Wishlist

Similar Books

Figure 7.6: Book Panel

The screenshot shows the 'Upload Study Material' form in the BIBLIO TECH application. On the left is a dark sidebar with navigation links: Home, ANALYTICS, Dashboard, CONTENT, Add Books, Add Question, Add Material, Requests, Book History, Users History, Borrowing History, and CUSTOMIZATION. The main form area has a light green background and contains the following fields: Title (text input), Subject (text input), Category (dropdown menu with 'Select a category' selected), Description (text area), and Upload File (file input with 'Choose File' button and 'No file chosen' text). A green 'Upload Material' button is at the bottom right of the form.

Figure 7.7: Study Material Upload

The screenshot shows the 'Study Materials' panel. At the top left is the title 'Study Materials' and at the top right is a 'Show Filters' button. Below the title is a search bar with the placeholder text 'Search for materials...' and a blue 'Search' button. Below the search bar are three material cards. The first card is titled 'Accounts', has a category of 'Accounts', and a description of 'billing docx'. The second and third cards are both titled 'Mathematics Question', have a category of 'Mathematics', and a description of 'Practice questions'. Each card has a blue 'Download' button at the bottom.

Figure 7.8: Study Material Panel

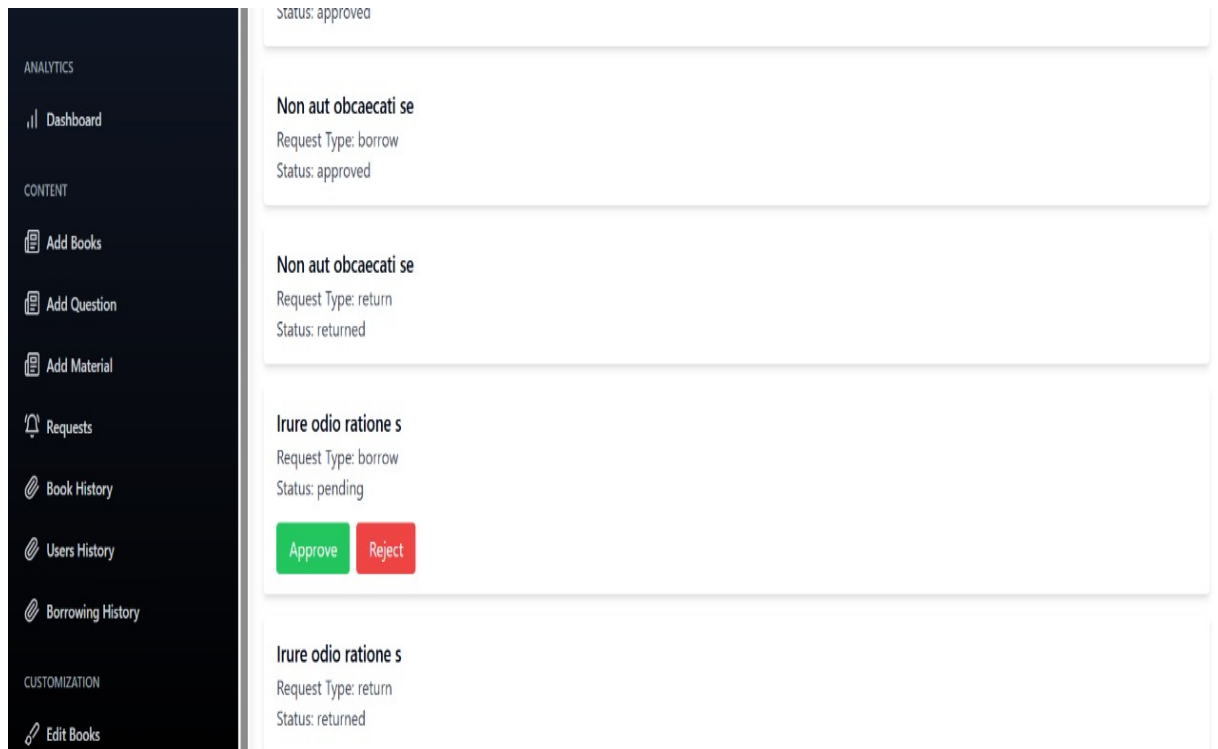


Figure 7.9: Librarian Request Section

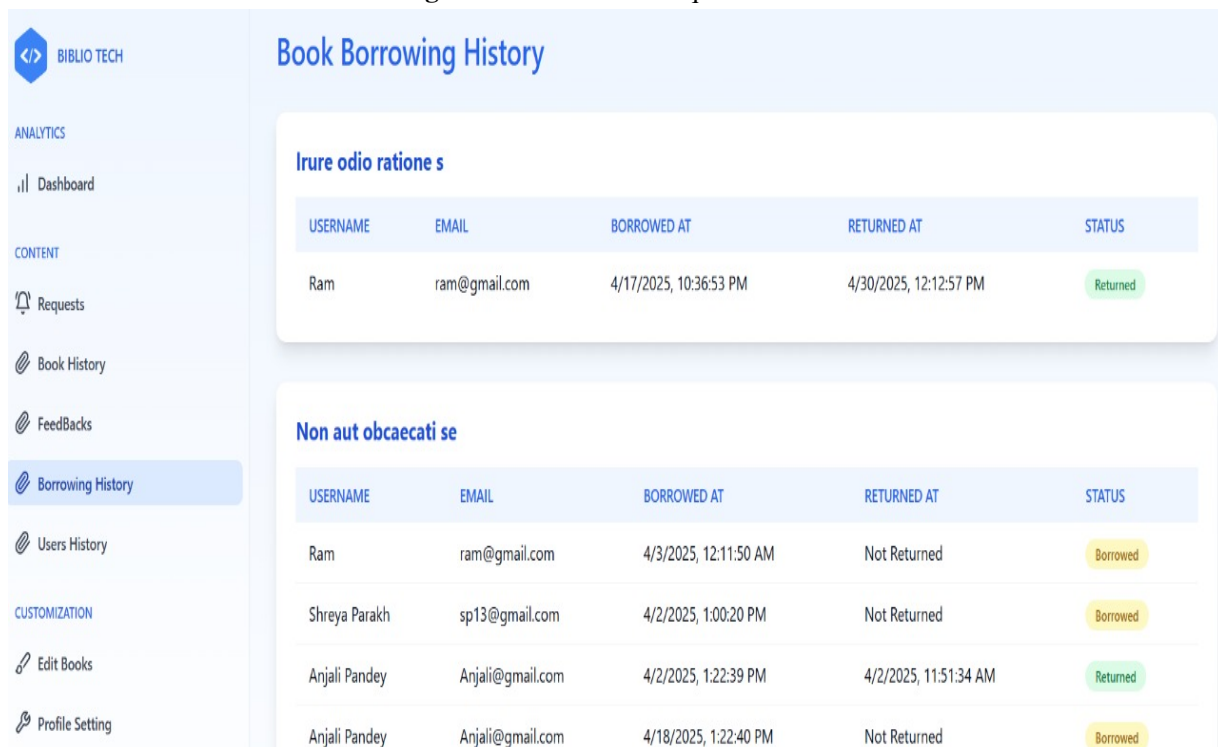


Figure 7.10: Borrowing History

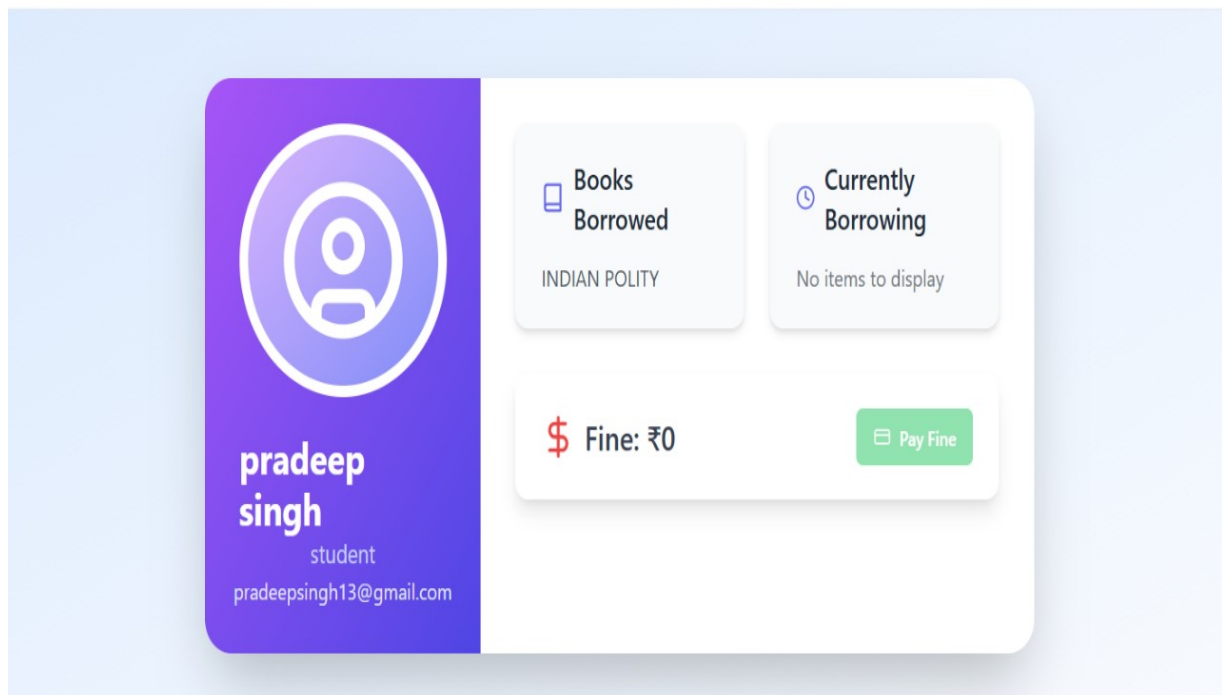


Figure 7.11: Fine Charged

Chapter 8

Project Summary and Conclusions

8.1 Conclusion

The development of the BIBLOTECH platform has successfully addressed a pressing challenge in the academic and institutional landscape — the need for a centralized, scalable, and user-friendly system for managing and accessing educational content. By offering a cloud-based platform that supports role-based access, real-time content sharing, and secure resource delivery, BIBLOTECH enhances the digital learning experience for students and simplifies content distribution for librarian and administrators.

During the course of the project, we successfully implemented all critical modules including secure user authentication, role-based dashboards, file upload/download features with AWS S3 integration, payment processing via Razorpay/Stripe, and content moderation via an admin interface. The frontend, built using React.js and Tailwind CSS, offers a seamless and responsive experience, while the backend, developed using Node.js and Express, ensures robust data management with MongoDB Atlas.

Rigorous functional and usability testing confirmed the platform's stability, responsiveness, and intuitive design. The system performs well under typical institutional loads and can easily scale for future growth.

In conclusion, BIBLOTECH fulfills its core objectives of modernizing resource distribution in educational institutions. It lays a solid foundation for future enhancements like AI-based content recommendations, student-librarian forums, plagiarism detection, and mobile app integration. The platform is poised to make a meaningful impact on the digital education ecosystem.

Chapter 9

Future Scope

The current implementation of the BIBLOTECH Platform provides a robust foundation for managing online book subscriptions, secure payments, and digital reading experiences. However, to make the platform more scalable, user-friendly, and future-proof, several technical and strategic enhancements can be incorporated. These improvements aim to improve user engagement, introduce new revenue models, support a wider audience, and ensure seamless, secure operations.

- **AI-Based Book Recommendation System:** Future versions can include machine learning-based recommendation engines that suggest books based on users' reading history, preferences, and ratings to personalize their experience.
- **Mobile Application Development:** Launching dedicated mobile applications for Android and iOS will allow users to access their book collections and subscriptions on the go, improving accessibility and engagement.
- **Offline Reading Support:** Add functionality for users to download books for offline reading within the app, ensuring uninterrupted access even without internet connectivity.
- **Integration with e-Library Portals:** Integration with national and university digital libraries to provide users with access to academic papers, journals, and rare books.
- **Blockchain-Based Ownership Licensing:** Implement blockchain to track digital ownership, prevent piracy, and ensure transparent licensing agreements between publishers and the platform.

- **Real-Time Analytics Dashboard:** Develop dashboards for users and admins to monitor reading statistics, subscription renewals, payment trends, and popular genres in real-time.
- **Gamification and Reward Points System:** Introduce badges and reward points to encourage users to read more, complete books, provide reviews, and refer others, leading to organic growth.
- **Multilingual and Regional Book Support:** Expand the platform to support books in multiple Indian languages and eventually global languages, promoting regional and international inclusion.
- **Virtual Events and Webinars:** Host author meet-and-greet sessions, webinars on literature, and virtual book launch events directly through the platform to foster interaction.
- **Premium Plans and Monetization Models:** Offer premium subscription plans with exclusive access to bestsellers, early releases, ad-free reading, and priority customer support.

References

- [1] *React.js Documentation*, Available at: <https://react.dev/learn>.
- [2] *Node.js Official Documentation*, Available at: <https://nodejs.org/en/docs>.
- [3] *Express.js Web Framework Documentation*, Available at: <https://expressjs.com/en/starter/installing.html>.
- [4] *MongoDB Atlas Documentation*, Available at: <https://www.mongodb.com/docs/atlas/>.
- [5] *AWS S3 Official Documentation*, Available at: <https://docs.aws.amazon.com/s3/>.
- [6] *Vercel Deployment Guide*, Available at: <https://vercel.com/docs>.
- [7] *Render Deployment Documentation*, Available at: <https://render.com/docs>.
- [8] *JWT.io Introduction to JSON Web Tokens*, Available at: <https://jwt.io/introduction>.
- [9] *Swagger API Documentation Tool*, Available at: <https://swagger.io/docs/>.