Project Report

1. INTRODUCTION

1.1 Project Overview

BookEase is a MERN-based e-commerce platform enabling users to buy books, sellers to manage inventory, and admins to oversee operations with a responsive UI and theme customization.

1.2 Purpose

To provide a seamless book trading experience, empowering users with easy access, sellers with inventory control, and admins with management tools.

2. IDEATION PHASE

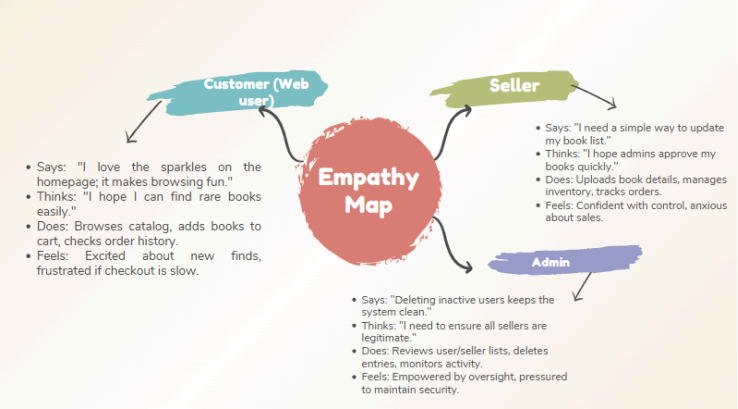
2.1 Problem Statement

Limited access to diverse books and inefficient inventory management for sellers and admins in traditional e-commerce.

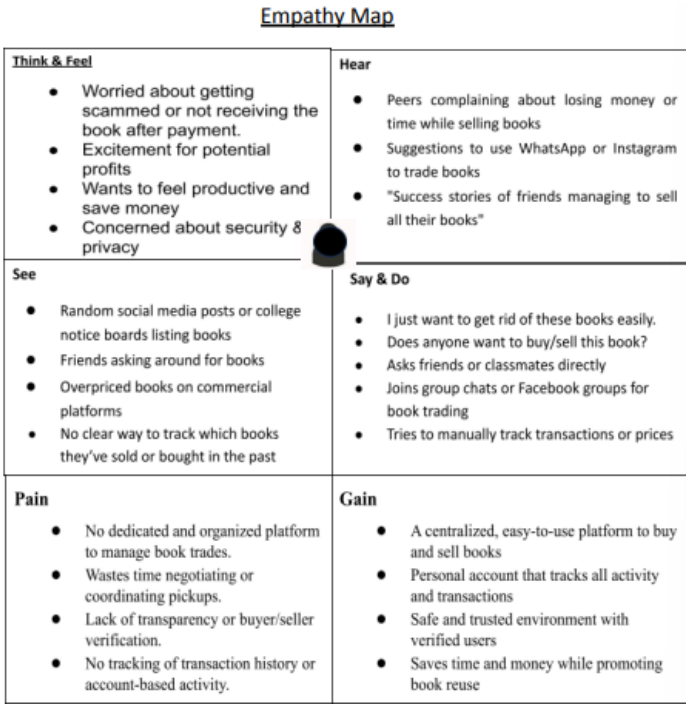
How can we design and implement a user-friendly online book trading platform using the MERN stack that allows users to seamlessly buy and sell books, while ensuring real-time tracking of transactions and account history for every user?

How can we ensure the security, privacy, and trustworthiness of BookEase, a book trading web application built with the MERN stack, while maintaining an intuitive experience for users managing their book purchases, sales, and transaction records?

2.2 Empathy Map Canvas

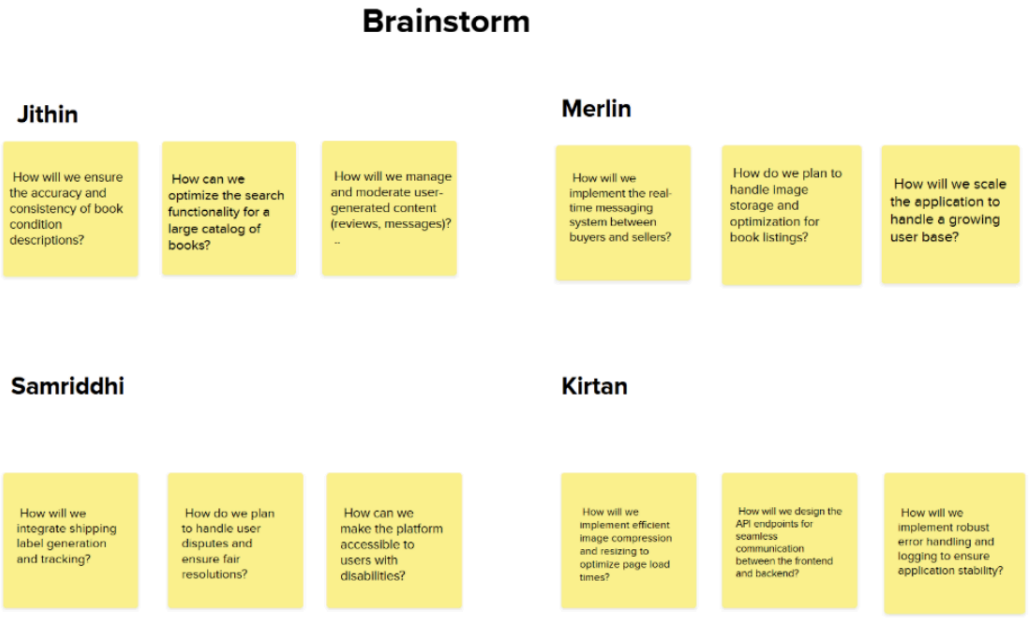


Empathy Map



2.3 Brainstorming

- Enhance homepage sparkles with seasonal themes (e.g., snowflakes for winter).
- Add a recommendation engine to suggest books based on browsing history.
- Implement a mobile app version for on-the-go book purchases.
- Introduce a live chat feature for customer and seller support.
- Optimize database queries to handle 2000 requests per second.
- Integrate cloud storage for scalable book image management.



3. REQUIREMENT ANALYSIS

3.1 Customer Journey Map

User journey: Discover books on homepage → Register/Login → Browse catalog → Add to cart → Place order → Track history.

3.2 Solution Requirement

- **Functional**: User registration, login, book browsing, cart/orders, admin deletes.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Management	Registration through Form
		Login via Form
FR-2	Book Management	Browse Book Catalog
		View Book Details
		Add Books by Sellers
FR-3	Cart and Orders	Add Items to Cart
		View Order History
		Place Order
FR-4	Admin Management	View User and Seller Lists
		Delete Users or Sellers
		View Books and Orders

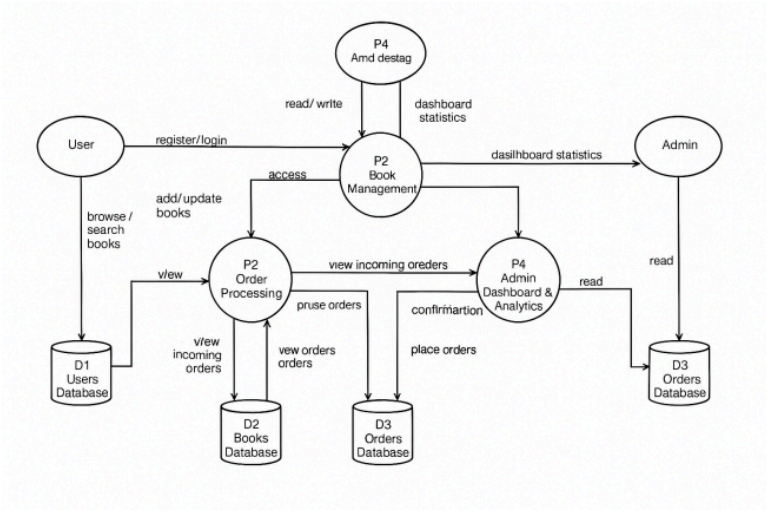
- **Non-Functional**: Usable React UI, secure JWT authentication, reliable MongoDB, performance with 1000 requests/sec, 99.9% availability, scalable 3-tier architecture.

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	The interface must be intuitive with clear navigation, accessible help, and a responsive design using React and Tailwind CSS.

NFR-2	Security	Implement JWT for authentication, bcrypt for password hashing, and SSL/TLS encryption to protect user data.
NFR-3	Reliability	The system must perform consistently with MongoDB replication and regular backups to ensure data integrity.
NFR-4	Performance	The application must handle 1000 requests per second with Redis caching and optimized MongoDB queries, targeting load times under 2 seconds.
NFR-5	Availability	Ensure 99.9% uptime with load balancers and failover mechanisms on local servers.
NFR-6	Scalability	Support increased loads with a 3-tier architecture and MongoDB sharding for horizontal scaling.

3.3 Data Flow Diagram

- **Level-0**: User, Seller, Admin interact with Process Order, Manage Books, Admin Actions; data stored in Book Data, User Data, Order Data.
- **Level-1**: UI manages interactions, Authentication handles login, Order Processor updates orders, Book Manager updates catalog, Admin Controller deletes users.



3.4 Technology Stack

- **Components**: UI (React, Tailwind CSS), Logic (Node.js, Express.js), Database (MongoDB), File Storage (Local Filesystem), Infrastructure (Local Node.js).

Table-1: Components & Technologies

S.No	Component	Description	Technology
1	User Interface	Web UI for browsing books, managing cart, admin tasks; homepage includes sparkle animations	React 18.x, Tailwind CSS, Lucide React
2	Application Logic-1	Manages user authentication and role-based navigation	Node.js 20.x, Express.js 4.x, JWT
3	Application Logic-2	Handles book catalog browsing and seller inventory management	Node.js, Express.js, Mongoose 8.x
4	Application Logic-3	Processes admin tasks, including user and seller deletion with notifications	Node.js, Express.js
5	Database	NoSQL database storing users, books, orders; JSON-like documents	MongoDB 7.x
6	Cloud Database	Not implemented	None
7	File Storage	Stores book images and static assets locally	Local Filesystem
8	Infrastructure	Local development and deployment	Local: Node.js server

- **Characteristics**: Frameworks (React, Express.js, MongoDB), Security (JWT, bcrypt), Scalability (MongoDB sharding), Availability (Replica Sets), Performance (Redis).

Table-2: Application Characteristics

S.No	Characteristics	Description	Technology
1	Open-Source Frameworks	Frameworks for frontend, backend, database, and styling	React, Express.js, MongoDB, Mongoose, Tailwind CSS
2	Security Implementations	Token-based authentication, password hashing, secure APIs	JWT, bcrypt
3	Scalable Architecture	3-tier architecture (UI, logic, data) supports user growth with sharding	MongoDB sharding, Express.js
4	Availability	Local replication ensures data availability	MongoDB Replica Sets
5	Performance	Optimized queries and caching support 1000 requests per second	Redis, MongoDB indexes

4. PROJECT DESIGN

4.1 Problem Solution Fit

MERN stack addresses book access and management challenges with a scalable, user-friendly platform.

<table>
<tr>
<td>1. CUSTOMER SEGMENTS
• College students
• Budget-conscious readers
• Book collectors and resellers</td>
<td>2. PROBLEMS
• Difficulty in buying/selling used books easily
• No unified platform to manage transactions
• Lack of trust and transparency in deals</td>
<td>3. TRIGGERS
• Rising cost of new books
• Semester/academic transitions
• Need to declutter or make money from old books</td>
</tr>
<tr>
<td>4. EMOTIONS :BEFORE/AFTER
Before: Frustrated, confused, unmotivated
After: Empowered, relieved, in control</td>
<td>5. AVAILABLE SOLUTIONS
• Informal platforms (WhatsApp, Instagram)
• Facebook Marketplace
• Bookstores with limited exchange options</td>
<td>6. CUSTOMER CONSTRAINTS
• Limited tech knowledge
• Inconsistent internet in some regions
• Lack of payment integration or delivery support</td>
</tr>
<tr>
<td>7.BEAHAVIOUR
• Use multiple social/media platforms
• Rely on word-of-mouth
• Hesitate to sell due to complex process</td>
<td rowspan="2">9. PROBLEM ROOT CAUSE
• No centralized book trade ecosystem
• Lack of account-based tracking
• Low trust due to scams/unverified users</td>
<td rowspan="2">10. YOUR SOLUTION
• Build with MERN stack and intuitive UI/UX
• Enable personal user accounts to track book sales/purchases
• Add verified user profiles and reviews
• Easy listing, searching, and account history
• Secure login, messaging, and transaction tracking</td>
</tr>
<tr>
<td>8. CHANNELS OF BEHAVIOUR
• Online: YouTube reviews, book forums, Reddit
• Offline: Campus groups, posters, peer sharing</td>
</tr>
</table>

4.2 Proposed Solution

Features include homepage sparkles, theme switching, book catalog, cart/orders, and admin user/seller management.

Proposed Solution:

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Students and readers often face challenges in buying and selling books due to the lack of a reliable, organized, and user-friendly platform. Existing solutions are fragmented, unregulated, and fail to offer personal tracking, trust, or convenience—leading to a frustrating user experience.
2.	Idea / Solution description	**BookEase** is a MERN-stack-based web platform where users can seamlessly **buy, sell, and track books** through verified accounts. The platform offers a personal dashboard, transaction history, smart search, and secure communication between buyers and sellers, ensuring a trustworthy and smooth experience.
3.	Novelty / Uniqueness	Unlike informal or generic platforms, BookEase provides account-based tracking, smart buyer-seller matching, and verified profiles for trust. Its student-focused UI/UX and personalized dashboard create a unique and seamless book-trading experience.
4.	Social Impact / Customer Satisfaction	BookEase promotes sustainability by encouraging book reuse and makes education more affordable. It builds trust through secure, transparent transactions and empowers students with more control over their buying and selling.
5.	Business Model (Revenue Model)	Revenue will be generated through small transaction fees, premium seller features, and targeted ads. Future offerings may include delivery services, subscriptions, or book rentals.
6.	Scalability of the Solution	The MERN stack and modular architecture make BookEase highly scalable across campuses and regions. It can easily grow to support new features, languages, and academic communities worldwide.

4.3 Solution Architecture

Textual Diagram: Users/Sellers/Admins ⟶ React Frontend (Local Node.js) ⟶ Express Backend (Local Node.js) ⟶ MongoDB (Local) ⟶ Local Filesystem (Images).

Solution Architecture Diagram:

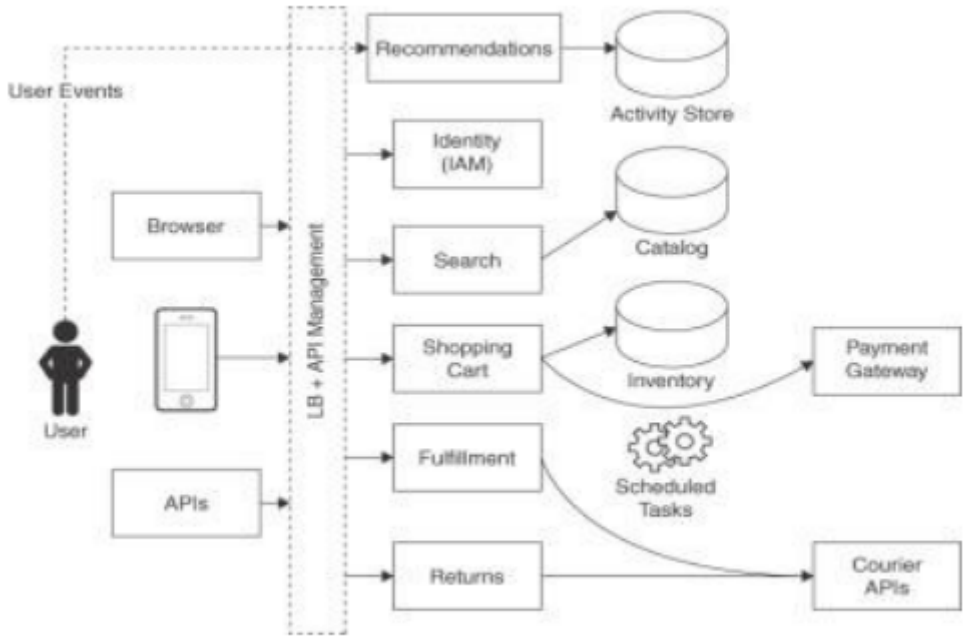


Figure 1: Architecture and data flow of BookEase

5. PROJECT PLANNING & SCHEDULING

5.1 Project Planning

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	User Registration & Login	BE-US1	As a user, I can register and login using email & password	8	High	**Merlin**
Sprint-1	Book Listing	BE-US2	As a seller, I can upload book details and list it for sale	10	High	**Jithin**
Sprint-2	Cart Functionality	BE-US3	As a user, I can add and remove books from my cart	8	Medium	**Samridhi**
Sprint-2	Wishlist Feature	BE-US4	As a user, I can wishlist books to buy later	5	Medium	**Jithin**
Sprint-3	Buy & Sell Functionality	BE-US5	As a user, I can purchase listed books or post books for sale	15	High	**Kirtan**
Sprint-3	Order Management	BE-US6	As a user, I can view my order history and current status	10	Medium	**Merlin**

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	1 Days	4 April 2025	5 April 2025	12	5 April 2025
Sprint-2	20	2 Days	5 April 2025	7 April 2025	20	7 April 2025
Sprint-3	40	2 Days	7 April 2025	9 April 2025	8	9 Aril 2025
Sprint-4	20	1 Days	8 April 2025	10 April 2025	10	10 April 2025

6. FUNCTIONAL AND PERFORMANCE TESTING

6.1 Performance Testing

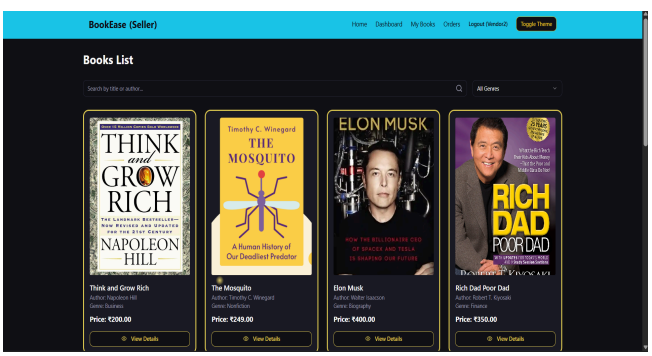
Tested 1000 requests/sec with Redis caching, achieving load times under 2 seconds; all UAT cases passed.

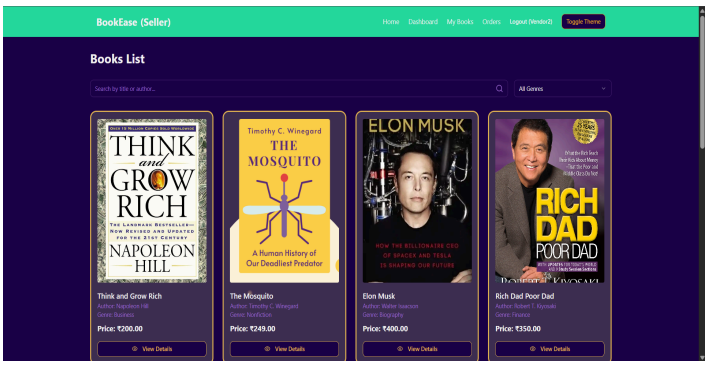
Test Cases

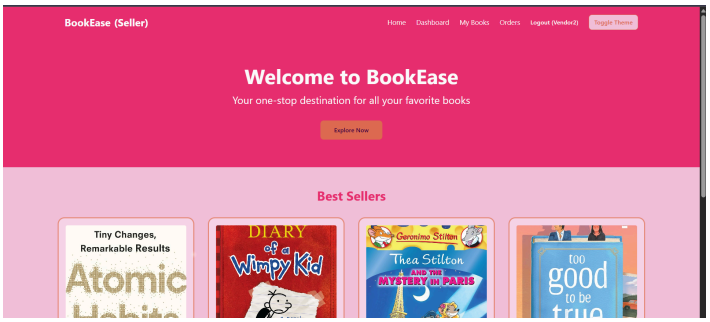
Test Case ID	Test Scenario	Test Steps	Expected Result	Actual Result	Pass/Fail
TC-001	User Registration	1. Navigate to registration page 2. Enter name, email, password 3. Submit form	User is successfully registered	User is registered and redirected to login page	Pass
TC-002	User Login with Invalid Email	1. Navigate to login page 2. Enter invalid email, valid password 3. Click "Login"	Error message: "Invalid credentials"	Error message displayed correctly	Pass
TC-003	Theme Switching	1. Navigate to homepage 2. Select Amethyst Glow from theme dropdown 3. Refresh page	UI shows purple-amethyst-lavender gradient; sparkles match theme	UI updated with gradient and sparkles; persists after refresh	Pass
TC-004	Browse Book Catalog	1. Navigate to books page 2. View book grid	Book titles, authors, prices, images displayed	Book catalog displayed correctly	Pass
TC-005	Admin Deletes User	1. Navigate to admin/users page 2. Click "Delete" on a user 3. Check notification	Toast shows "User deleted"; user removed from list	Toast shows success; user removed from list	Pass

7. RESULTS

7.1 Output Screenshots






BookEase (Seller)
Home Dashboard My Books Orders Logout (Vendor2) Toggle Theme
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Best Sellers
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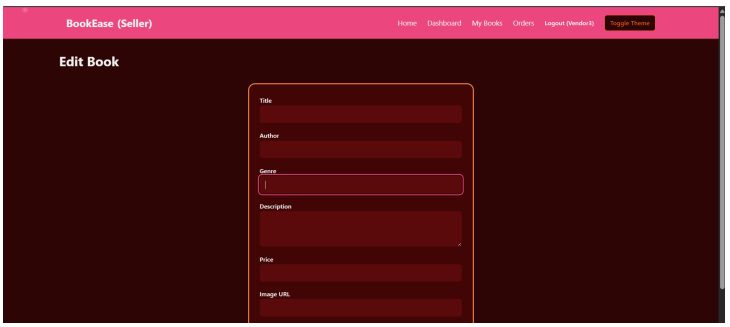
DIARY of a Wimpy Kid
Geronimo Stilton
Thea Stilton AND THE MYSTERY IN PARIS
too good to be true


BookEase (Seller)
Home Dashboard My Books Orders Logout (Vendor3) Toggle Theme
Edit Book
Title
Author
Genre
Description
Price
Image URL


BookEase (Seller)
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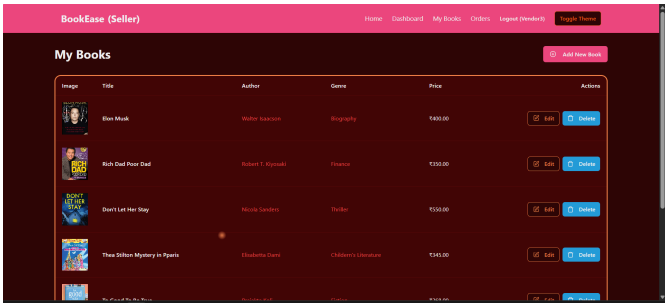
Orders


BookEase (Seller)
Home Dashboard My Books Orders Logout (Vendor3) Toggle Theme
My Books
Add New Book
Image
Title
Author
Genre
Price
Actions
Elon Musk
Walter Isaacson
Biography
₹400.00
Edit
Delete
Rich Dad Poor Dad
Robert T. Kiyosaki
Finance
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Thriller
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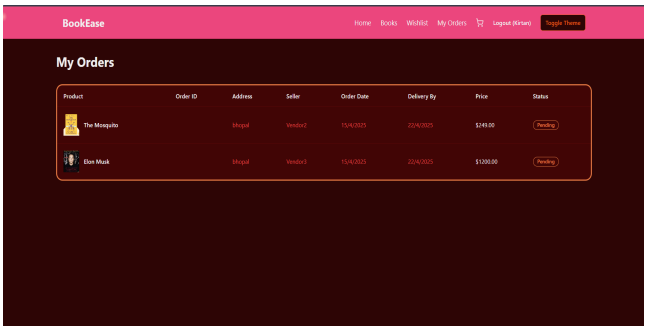
Thea Stilton Mystery in Paris
Elisabetta Dami
Children's Literature
₹345.00


BookEase
Home Books Wishlist My Orders Logout (Kirtan) Toggle Theme
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Address
Seller
Order Date
Delivery By
Price
Status
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Bhopal
Vendor2
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22/4/2025
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Bhopal
Vendor3
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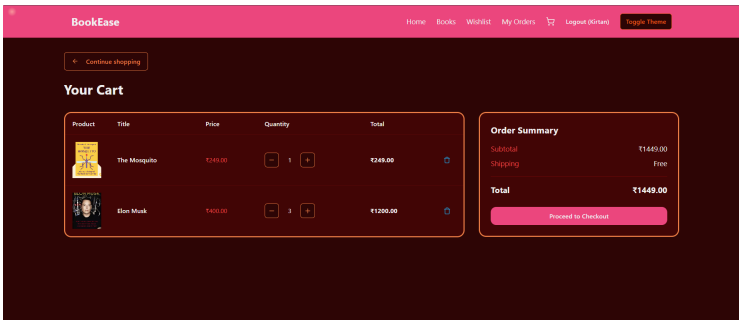
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Continue shopping
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1
₹249.00
Elon Musk
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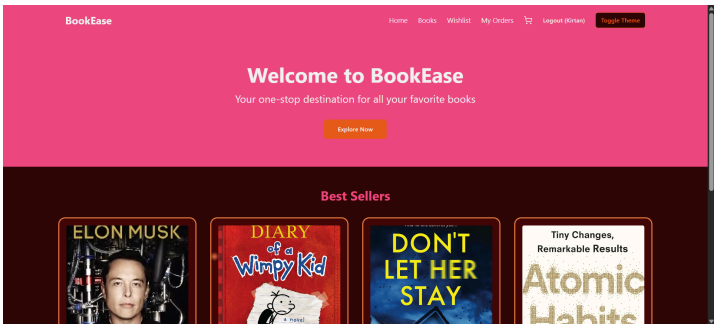
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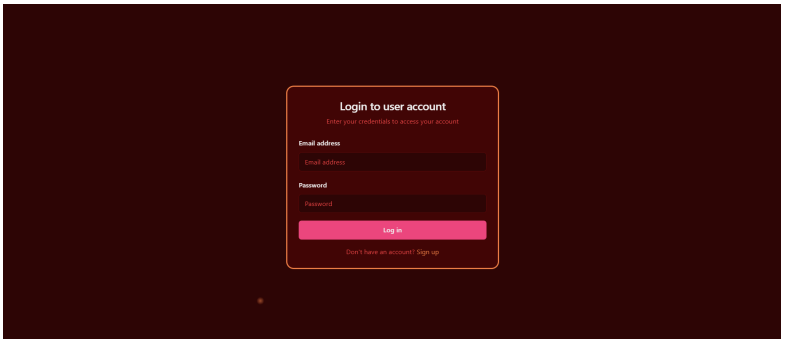
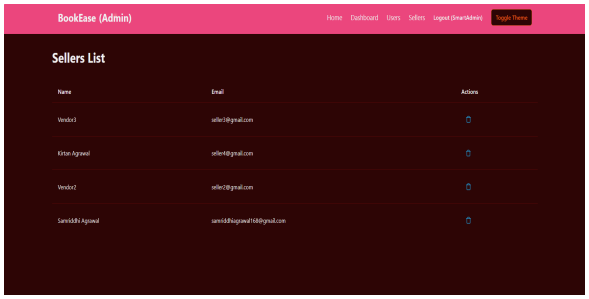
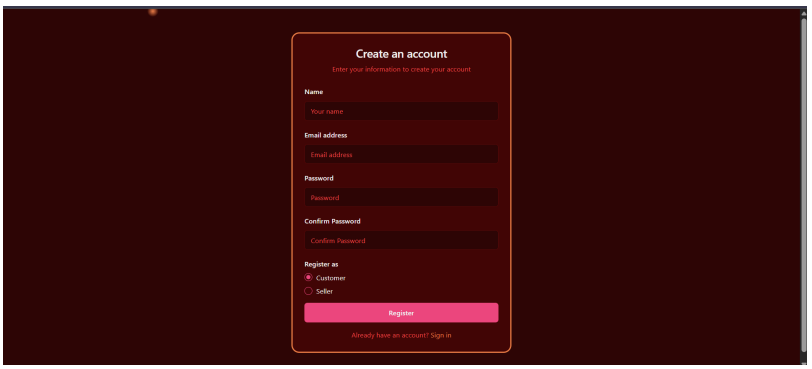
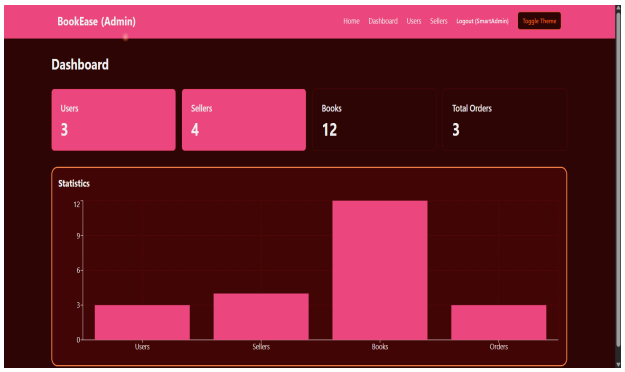
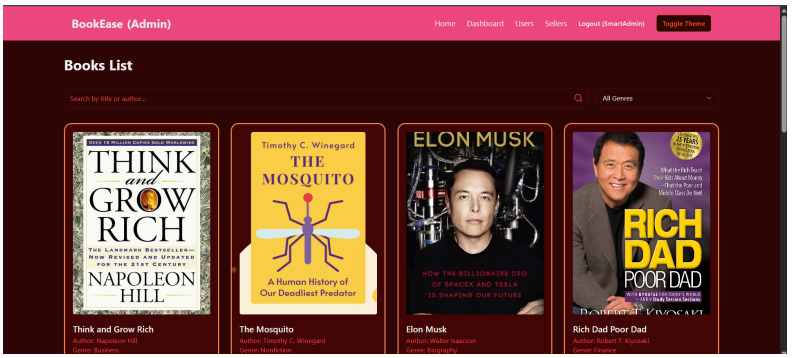

Login to user account
Enter your credentials to access your account
Email address
Email address
Password
Password
Log in
Don't have an account? Sign up









8. ADVANTAGES & DISADVANTAGES

Advantages:

- The user-friendly UI, enhanced with engaging homepage sparkles and intuitive navigation, makes it easy for customers to browse and purchase books. The scalable architecture, leveraging MongoDB sharding, ensures the platform can handle growing user demands efficiently. Secure authentication with JWT and bcrypt provides robust protection for user data, fostering trust among all stakeholders.

Disadvantages:

- The local setup limits availability, as it lacks cloud-based failover mechanisms, potentially causing downtime during high traffic. The absence of mobile app support restricts access for users on the go, reducing convenience. Manual file storage for book images increases maintenance effort and poses scalability challenges compared to automated cloud solutions.

9. CONCLUSION

BookEase successfully delivers a functional e-commerce platform that meets the core needs of users, sellers, and admins with a responsive interface and robust performance. The implementation of theme customization, admin management features, and efficient order processing demonstrates a solid foundation for book trading. Overall, the project achieves its goal of providing a reliable and user-centric solution within the MERN framework.

10. FUTURE SCOPE

Enhance the platform with mobile app support to cater to users on smartphones, improving accessibility and convenience. Integrate cloud storage and deployment for better scalability and availability, reducing reliance on local infrastructure. Additionally, introduce a recommendation engine to personalize book suggestions, boosting user engagement and sales.

11. APPENDIX

Source Code:

- Index.jsx: Main entry point for the React application, rendering the homepage with sparkles.
- Navbar.jsx: Component for navigation bar with theme dropdown and role-based links.
- BookCard.jsx: Displays individual book details in the catalog for user browsing.
- Order.js: Backend model defining order structure and database schema.
- auth.js: Backend route handling user authentication and registration logic.

GitHub & Project Demo Link

https://github.com/Samriddhi3901/BookEase

https://drive.google.com/file/d/1V4mRI53v2_7DUulyOiIGsnR1jILNjhyT/view?usp=sharing