

Online Book Store

Project Report

By

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Acknowledgement

The project “**Online Book Store**” is the Project work carried out by

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We are thankful to my project guide for guiding me to complete the Project.

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Abstract

The **Online Book Store** project is a web-based application developed using **Java** and **MySQL** that provides users with an easy and convenient way to browse, search, and purchase books online while replacing the traditional bookstore system with a digital platform. It enables users to register, log in, explore various book categories, view details, add books to their cart, and place orders securely. The administrator can efficiently manage books, categories, and customer orders through an admin panel. The project utilizes **JSP**, **Servlets**, **HTML**, **CSS**, and **JDBC**, and follows the **MVC architecture** to ensure better structure, scalability, and performance. The main objective of this project is to enhance user experience through a smooth interface, quick search functionality, and accurate book information while automating book inventory management for administrators. The system can be further enhanced by integrating features such as **online payment**, **reviews**, and **personalized recommendations** to make it more interactive, user-friendly, and efficient.

1. Introduction

In today's digital era, technology has transformed traditional business operations, including the way books are bought and sold. The Online Book Store project is developed to create a modern, user-friendly platform that allows users to browse, search, and purchase books online from the comfort of their homes. It replaces the traditional bookstore system with an efficient and automated digital solution that caters to the needs of both customers and administrators. With the growing popularity of e-commerce, users increasingly prefer online platforms that provide a wide variety of books, quick search options, secure payment methods, and doorstep delivery. The Online Book Store application addresses these requirements by offering a centralized system that connects users and administrators in a convenient and secure way. The system is developed using Java (JSP and Servlets) for the backend, HTML, CSS, and JavaScript for the frontend, and MySQL as the database for reliable data management.

1. Background of the Study

In earlier times, book purchasing was limited to physical stores, requiring customers to visit, browse, and manually select books. This process was time-consuming and often restricted by geographical limitations and store inventory. With the evolution of the internet, e-commerce systems have made it possible to purchase books online easily and securely.

However, many existing systems lack efficient search features, inventory updates, and user-friendly interfaces. The Online Book Store system is designed to overcome these limitations by integrating automated management, categorized listings, and database connectivity to provide real-time availability of books. The project aims to bridge the gap between traditional and modern book retailing, ensuring better accessibility and convenience for users.

2. Motivation

The development of this project is inspired by the increasing demand for digital solutions that make book purchasing more convenient. Some key motivations include:

Accessibility – An online platform allows users to browse and purchase books anytime and from anywhere, providing comfort and accessibility through an internet connection.

Automation – This project aims to automate these processes, ensuring accurate stock management, easy updates of book information, and faster transaction processing.

Efficiency – Managing book details manually, such as titles, authors, categories, and prices, can become complex as the number of books increases. The proposed system helps administrators efficiently manage all book-related data in a centralized and organized manner.

Scalability – The system can accommodate more books and users easily.

Security – Secure authentication and database management ensure data safety.

3. Significance of the Study

The Online Book Store is significant for several reasons:

For Users: It provides an easy, quick, and secure way to browse and purchase books online.

For Administrators: It simplifies book inventory management, reduces paperwork, and allows monitoring of sales data.

For Educational Institutions: It serves as an example of an e-commerce-based academic project showcasing Java and database integration.

For Society: It promotes digital transformation in education and retail, encouraging online learning and reading habits.

4. Features of Online Book Store

The key features of the Online Book Store include:

User Registration and Authentication

- a) Users can create an account by registering with basic details such as name, email, and password.
- b) Secure login is provided for registered users to access their personalized dashboard.
- c) Passwords are encrypted before being stored in the database to maintain user privacy and security.

Book Browsing and Search

- a) The system displays a complete list of books with essential details such as title, author, category, price, and description.
- b) Users can search books easily by title, author, ISBN, or category using an advanced search feature.
- c) A filter and sorting option helps users find specific books quickly based on price, popularity, or publication date.
- d) Each book has a detailed page that shows its information, cover image, and availability status.

Shopping Cart Management

- a) Users can add selected books to their shopping cart for purchase.
- b) Books added to the cart are saved temporarily for each user session until checkout.
- c) Users can update the quantity, remove books, or proceed to checkout directly from the cart.
- d) The total amount is automatically calculated based on the books selected, ensuring billing accuracy.

Database Integration

- a) The system uses MySQL as a backend database to store and retrieve information efficiently.
- b) Tables are designed for users, books, categories, and orders with proper relationships and normalization.
- c) The database maintains integrity, ensuring that all records are accurate, consistent, and secure.

Security Features

- a) Implements secure login sessions using Java authentication mechanisms.
- b) Sensitive data such as passwords are encrypted before storage.
- c) Access control ensures that only admins can modify book data or access sensitive information.
- d) Prevents SQL injection and unauthorized access using proper validation and prepared statements.

User-Friendly Interface

- a) The system features a clean and responsive web interface built with HTML, CSS, and JavaScript.
- b) Intuitive navigation allows users to easily move between modules like home, cart, and profile.
- c) Interactive components enhance user experience and encourage regular use.

Future Extension Possibilities

- a) Integration with payment gateways (Razorpay, PayPal, etc.) for online transactions.
- b) Implementation of book recommendation systems using AI and machine learning.
- c) Development of a mobile application version for Android and iOS.
- d) Integration of user reviews and ratings to improve engagement and reliability.

5. Expected Outcomes

The expected outcomes of the project include:

- A fully functional and responsive web-based system for online book sales.
- Simplified book purchasing and management for users and administrators.
- Enhanced user satisfaction through efficient search and order modules.
- Secure and reliable database storage for all transactions.
- A scalable and maintainable platform for future improvements like online payment integration or recommendation systems.

6. Organization of the Report

This project report is structured into the following chapters:

1. Abstract – A brief summary of the project.
2. Introduction – Background, motivation, and significance of the system.
3. Problem Statement & Objectives – Defining the financial challenges and project aims.
4. System Design – Architecture, ER Diagrams, and database schema.
5. Implementation – Description of frontend, backend, and APIs.
6. Results & Discussion – Screenshots, charts, and system performance.
7. Conclusion & Future Scope – Final remarks and scope for enhancement.

2. System Analysis

System analysis is one of the most crucial stages in the Software Development Life Cycle (SDLC). It focuses on identifying existing problems, gathering system requirements, and analyzing the feasibility of the proposed solution. For the Online Book Store, system analysis helps in understanding the needs of users and administrators, identifying system limitations in traditional bookstores, and designing a robust, efficient, and user-friendly platform for online book management and sales.

1. Problem Definition

In the traditional bookstore system, customers are required to physically visit the store to search and purchase books. This process is not only time-consuming but also limited by stock availability and geographical constraints. Manual record-keeping often leads to human errors, data loss, and inefficiency in handling sales or inventory. Additionally, customers have limited access to information about book details, pricing, or availability.

The key challenges of traditional systems include:

- Manual maintenance of inventory records, which is error-prone and inefficient.
- Lack of an easy search option for books by author, title, or category.
- Inability to manage multiple customers simultaneously.
- No option for users to view order history or track previous purchases.
- No real-time updates on book availability or pricing.

2. Objectives of the System

The proposed *Online Book Store* system aims to:

- To provide a centralized platform for online book browsing and purchasing.
- To automate the process of managing books, orders, and customer details.
- To offer an interactive and user-friendly web interface for both customers and admins.
- To enable efficient search and filtering of books by title, author, or category.
- To maintain a secure authentication system for user and admin access.
- To ensure accurate inventory management and automatic updates after every order.
- To generate reports and summaries for sales tracking and business analysis.

3. Feasibility Study

Feasibility analysis evaluates the practicality of developing the proposed system. The following aspects are considered:

a. Technical Feasibility

The system is developed using Java (JSP and Servlets) for backend logic and MySQL for database management, which are stable and reliable technologies.

The frontend uses HTML, CSS, and JavaScript, ensuring a responsive and interactive user experience.

All the necessary development tools (Eclipse/NetBeans, Apache Tomcat, MySQL Workbench) are readily available and easy to integrate.

Conclusion: The required technology stack is robust, widely used, and technically feasible for implementation.

b. Economic Feasibility

The system relies entirely on **open-source technologies**, eliminating the need for paid licenses or costly tools.

Maintenance and hosting costs are minimal since the application can run on standard web servers.

The benefits such as automation, accuracy, and accessibility outweigh the initial development effort

Conclusion: Economically feasible.

c. Operational Feasibility

The system is user-friendly, with an intuitive interface requiring minimal technical knowledge.

It significantly reduces the workload of administrators by automating book inventory, order tracking, and report generation.

Secure authentication ensures that only authorized users can access sensitive modules

. Conclusion: Operationally feasible.

d. Time Feasibility

The project can be completed within the academic timeline using an Agile development approach, where modules such as registration, book management, and order processing are developed iteratively.

The modular design allows independent testing and integration of components.

Conclusion: The system is time-feasible and can be developed efficiently within the given schedule.

4. System Requirements

a. Functional Requirements:

- User registration and login authentication.
- Add, update, view, and delete books (Admin module).
- Search and filter books by category, title, or author.
- Add books to the shopping cart and proceed to checkout.
- Order confirmation and order history viewing.
- Manage book categories and stock availability.
- Generate and view sales reports.

b. Non-Functional Requirements:

- Usability: The interface must be simple, intuitive, and responsive.
- Reliability: The system must ensure consistent performance with no data loss.
- Scalability: It should support a growing number of users and books.
- Security: User data must be protected using authentication and encryption.
- Performance: System response time should remain optimal even under high usage.

c. Hardware Requirements:

- Processor: Intel i5 or higher.
- RAM: 4 GB minimum (8 GB recommended).
- Storage: 500 MB for database and reports.

d. Software Requirements:

- Operating System: Windows/Linux/MacOS.
- Development Tools: Node.js, MySQL, React.
- Browser: Google Chrome / Mozilla Firefox.

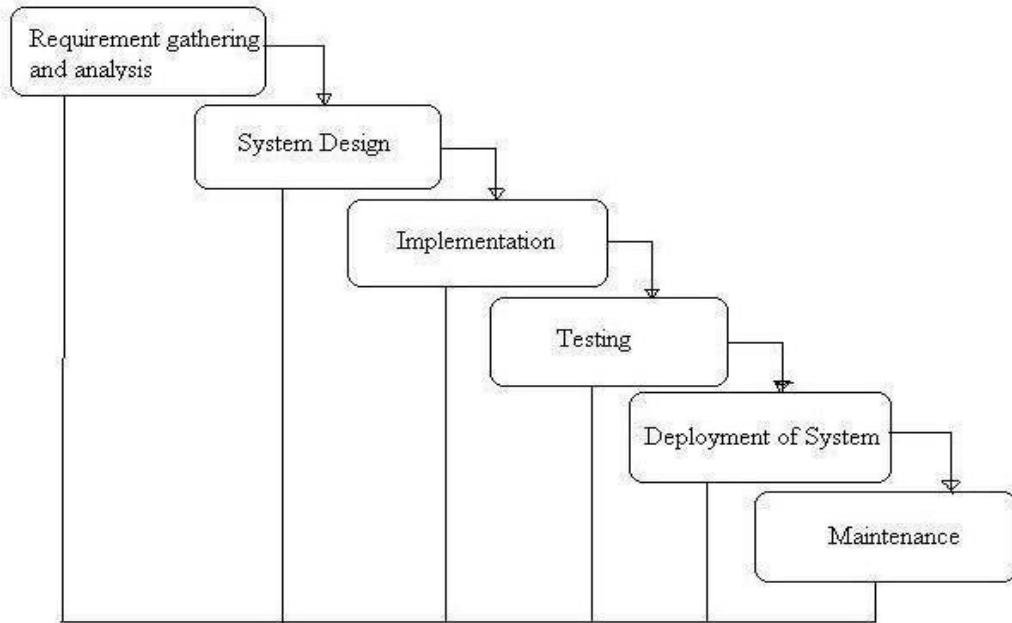
5. Proposed System

The proposed **Online Book Store System** is a **web-based application** designed to digitalize and automate the traditional bookstore process. It allows users to browse, search, and purchase books online while providing administrators with a robust management platform to handle inventory, categories, and orders. The system eliminates the limitations of manual record-keeping, reduces human errors, and enhances efficiency through automation and database integration.

The system is built using **Java technologies** such as **JSP and Servlets** for backend development, with **HTML, CSS, and JavaScript** for the frontend interface. The backend is connected to a **MySQL database**, which securely stores all user, book, and order data. The application is hosted on an **Apache Tomcat server**, ensuring smooth and reliable performance. It provides:

- A convenient platform for users to buy books online.
- A secure system for authentication and data management.
- Real-time updates of book stock and order status.
- Administrative tools to manage books, users, and reports.
- Accurate, automated, and easily maintainable data storage.

Unlike the traditional manual process, this system ensures faster transactions, minimal errors, and improved user satisfaction through a streamlined digital platform.



Phases of Development

1. Requirement Analysis & System Study

- The main goal is to identify system objectives, user expectations, and limitations of existing bookstore systems.
- Detailed study is conducted on how online book purchasing should work, including modules like book cataloging, user registration, shopping cart, and order processing.

2. System Design

- The database schema is created using MySQL to define tables such as users, books, orders, and categories.
- The system architecture (client-server model) and data flow diagrams (DFD) are designed to represent how data moves through the system.

3. Implementation (Coding)

- Backend development using **Java Servlets and JSP**.
- Frontend design using **HTML, CSS, Javascript**.
- Database integration with **MySQL** and connected using **JDBC**.
- Hosted on the **Apache Tomcat Server** for execution and testing.

4. Testing & Debugging

- Unit testing, integration testing, System Testing, Security and Validation Testing and usability checks.
- Debugging for performance improvements.

5. Deployment & Maintenance

- Hosted on Apache Tomcat, where users can access it through a web browser.
- Necessary configurations for admin and user access are finalized.

Data Flow Diagram:

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It can be manual, automated, or a combination of both.

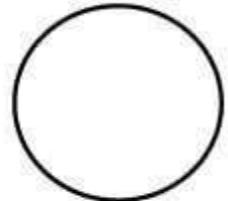
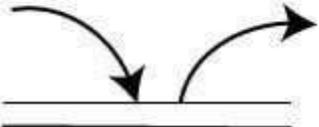
It shows how data enter and leaves the system, what changes the information, and where data is stored.

The objective of a DFD is to show the scope and boundaries of a system as a whole. It may be used as a communication tool between a system analyst and any person who plays a part in the order that acts as a starting point for redesigning a system. The DFD is also called as a data flow graph or bubble chart.

The following observations about DFDs are essential:

1. All names should be unique. This makes it easier to refer to elements in the DFD.
2. Remember that DFD is not a flow chart. Arrows is a flow chart that represents the order of events; arrows in DFD represents flowing data. A DFD does not involve any order of events.
3. Suppress logical decisions. If we ever have the urge to draw a diamond-shaped box in a DFD, suppress that urge! A diamond-shaped box is used in flow charts to represents decision points with multiple exists paths of which the only one is taken. This implies an ordering of events, which makes no sense in a DFD.
4. Do not become bogged down with details. Defer error conditions and error handling until the end of the analysis.

Standard symbols for DFDs are derived from the electric circuit diagram analysis and are shown in fig:

Symbol	Name	Function
	Data flow	Used to Connect Processes to each other , to sources or Sinks; the arrow head indicates direction of data flow.
	Process	Perfroms Some transformation of Input data to yield output data.
	Source of Sink (External Entity)	A Source of System inputs or Sink of System outputs.
	Data Store	A repository of data; the arrow heads indicate net inputs and net outputs to store.

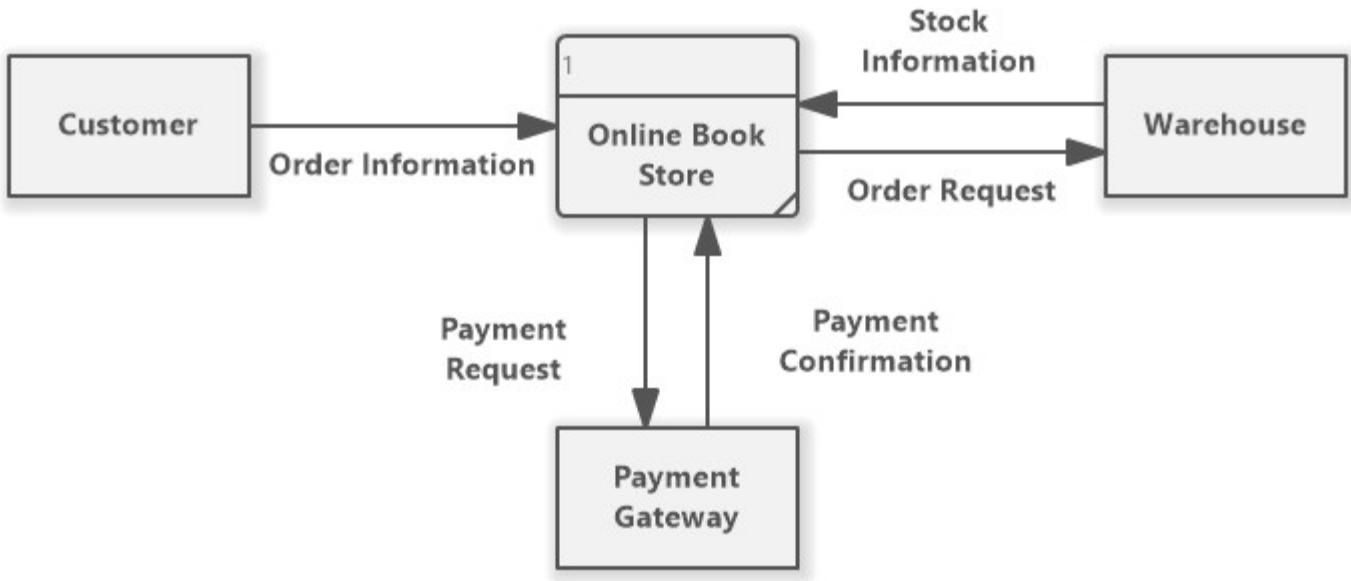
Symbols for Data Flow Diagrams

Circle: A circle (bubble) shows a process that transforms data inputs into data outputs.

Data Flow: A curved line shows the flow of data into or out of a process or data store.

Data Store: A set of parallel lines shows a place for the collection of data items. A data store indicates that the data is stored which can be used at a later stage or by the other processes in a different order. The data store can have an element or group of elements.

Source or Sink: Source or Sink is an external entity and acts as a source of system inputs or sink of system outputs.



Zero-Level DFD (Context Diagram) of Online Book Store

The **Zero-Level Data Flow Diagram**, also known as the **Context Diagram**, represents the entire **Online Book Store System** as a single process. It shows the high-level interaction between the system and its external entities, demonstrating how data flows into and out of the system.

This level provides an overview of the entire system's functionality without going into detailed internal processes. It defines the key data exchanges between the **Customer**, **Warehouse**, **Payment Gateway**, and the **Online Book Store** system.

Entities and Data Flows

1. Customer (External Entity)

- The **Customer** is the main user of the system who interacts with the Online Book Store to browse and purchase books.
- **Input from System:**
 - The customer sends **Order Information**, which includes selected books, quantity, and payment details.
- **Output from System:**
 - The system provides confirmation messages, receipts, and order tracking.

2. Online Book Store

- The **Online Book Store** is the core process that handles all operations — from receiving customer orders to communicating with the warehouse and payment gateway.
- It performs actions like verifying order details, checking stock availability, processing payments, and updating inventory records.

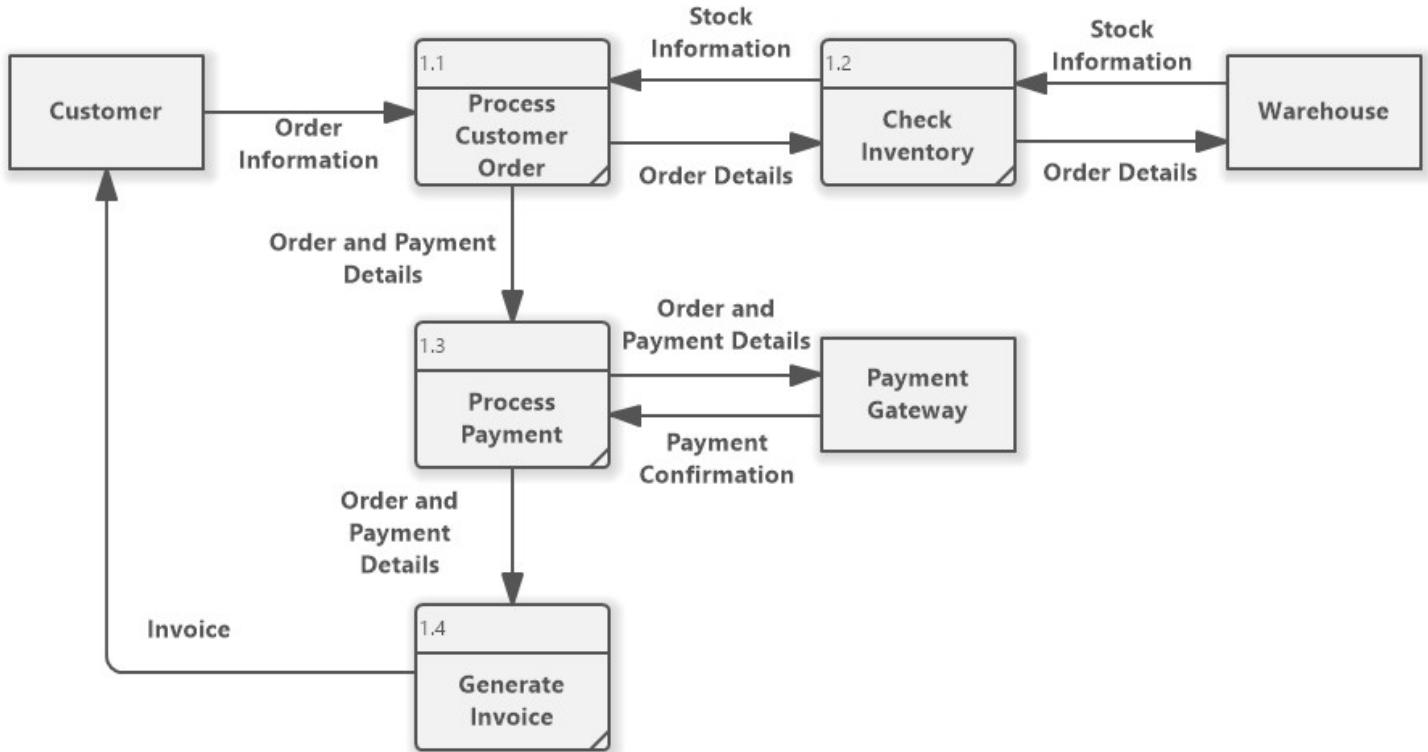
3. Warehouse (External Entity)

- The **Warehouse** manages the physical stock of books available for sale.
- **Input from System:**
 - The Online Book Store sends an Order Request to the warehouse whenever a customer places an order.
- **Output to System:**
 - The warehouse responds with Stock Information, indicating whether the requested books are available, out of stock, or partially available.
 - Based on this information, the system updates the order status accordingly.

Overall Flow

1. The **Customer** provides order details (selected books and payment choice) to the **Online Book Store**.
2. The **Online Book Store** verifies the order and sends an **Order Request** to the **Warehouse** to check stock availability.
3. The **Warehouse** sends back **Stock Information**, confirming whether the requested books are available.
4. Once the stock is verified, the **Online Book Store** sends a **Payment Request** to the **Payment Gateway**.
5. The **Payment Gateway** processes the payment and returns a **Payment Confirmation** message.
6. After receiving the payment confirmation, the **Online Book Store** updates the order status and sends a confirmation message to the **Customer**.

First-Level Data Flow Diagram



The **First-Level Data Flow Diagram** provides a detailed breakdown of the main process (“Online Book Store”) from the **Zero-Level DFD** into several sub-processes. It shows how data moves between these processes, external entities (Customer, Warehouse, Payment Gateway), and the system itself.

1. Process Customer Order

- This process begins when the **Customer** places an order by providing order information such as book title, quantity, and delivery details.
- The system validates the customer’s input and checks whether the requested books are available in the store.
- The process then sends **Order Details** to the **Check Inventory (1.2)** module to verify stock availability in the warehouse.

- Once the availability is confirmed, the order is forwarded to the Process Payment (1.3) module for payment handling.

Data Inputs: Order information from the customer.

Data Outputs: Order details sent to the inventory check process.

2. Check Inventory

- This process is responsible for checking the availability of the ordered books in the Warehouse.
- It sends an Order Request to the warehouse and receives Stock Information in return.
- If the requested books are available, the information is passed back to Process Customer Order (1.1) to continue with order fulfillment.
- If not available, a message is sent to the customer indicating that the book is out of stock.

3. Process Payment

- Once the availability of books is confirmed, the system proceeds to the **payment phase**.
- The process sends **Order and Payment Details** to the **Payment Gateway** for transaction processing.
- The **Payment Gateway** returns a **Payment Confirmation** (success or failure), which the system uses to update the order status.
- Successful transactions are then forwarded to the **Generate Invoice (1.4)** module.
- Data Inputs:** Order and payment details from Process 1.1.
Data Outputs: Payment confirmation from Payment Gateway and payment record stored in the system.
External Entity: Payment Gateway.

4. Generate Invoice

- After successful payment confirmation, this process generates an Invoice for the customer.
- The invoice contains details such as customer name, order ID, date, list of purchased books, total amount, and payment status.
- A digital invoice (PDF or email copy) can be sent to the customer, and a copy is stored in the database for record-keeping.

External Entities

Customer:

- Interacts with the system to place orders and make payments.
- Receives final confirmation and invoice after a successful transaction.

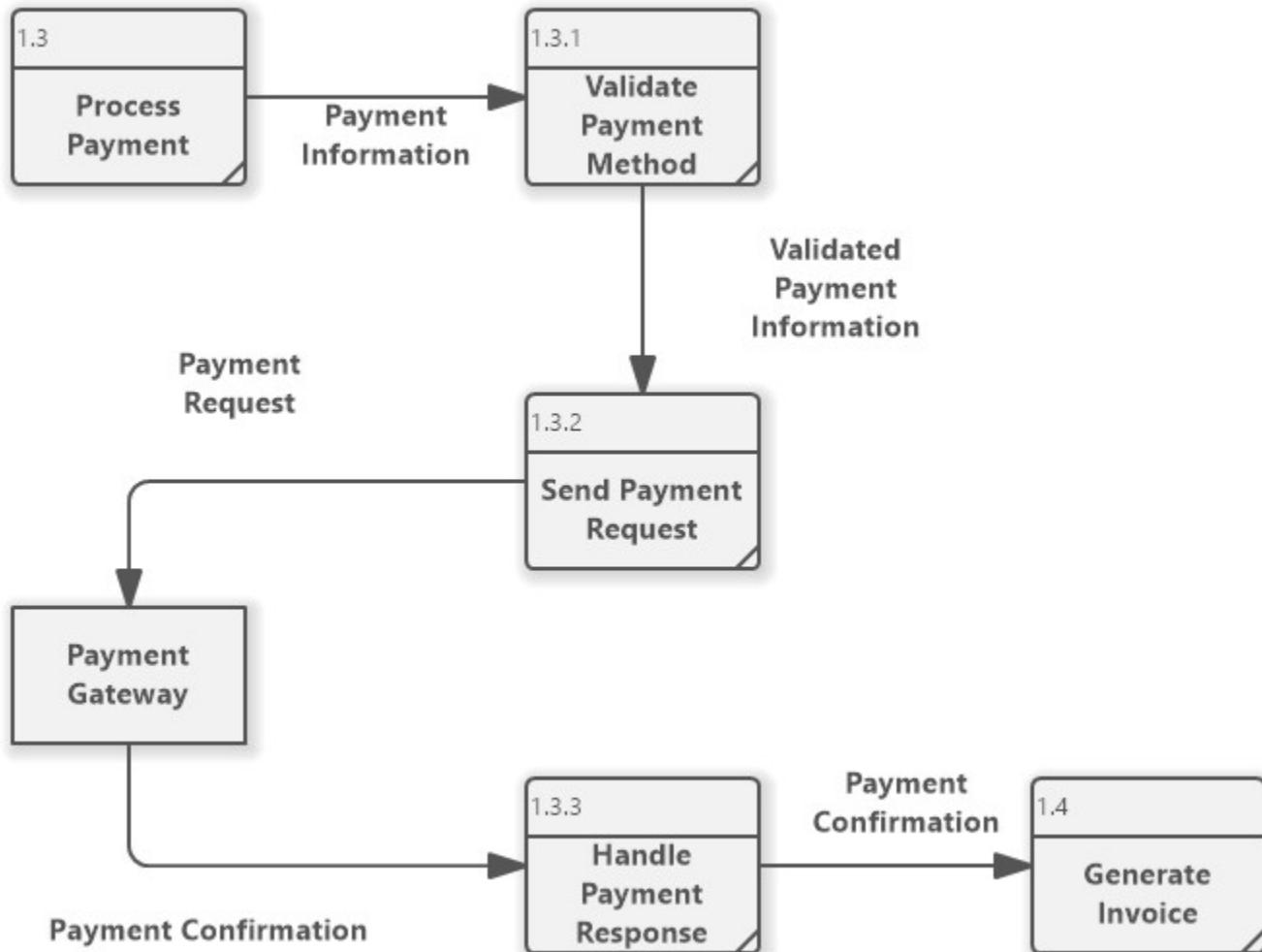
Warehouse:

- Provides **Stock Information** to confirm the availability of ordered books.
- Updates stock quantity after successful order processing.

Payment Gateway:

- Handles secure processing of online payments.
- Sends **Payment Confirmation** (success or failure) back to the system.

Second-Level Data Flow Diagram



Second-Level Data Flow Diagram (DFD)

The **Second-Level Data Flow Diagram (DFD)** provides a detailed view of one of the key subsystems of the **Online Book Store**, specifically the **Payment Processing Module** (Process 1.3). This diagram explains how payment information flows through different sub-processes—from validating the payment method to generating the final invoice.

1. Validate Payment Method

- **Inputs:** Payment information (card/UPI details, amount, order ID).
- **Processes:** This process begins when the system receives Payment Information from the Process Payment module. It also verifies whether the selected payment method (credit card, debit card, wallet, etc.) is supported by the system.
- **Output:** Validated payment information or error message.

2. Send Payment Request

- **Inputs:** Validated payment information.
- **Processes:**
 - Once the payment information is validated, the system prepares and sends a Payment Request to the Payment Gateway for processing.
 - The request includes the order ID, customer details, and total payable amount
 - The Payment Gateway acts as a secure intermediary that communicates with the customer's bank or wallet provider to process the transaction.
- **Outputs:** Payment request sent to Payment Gateway.

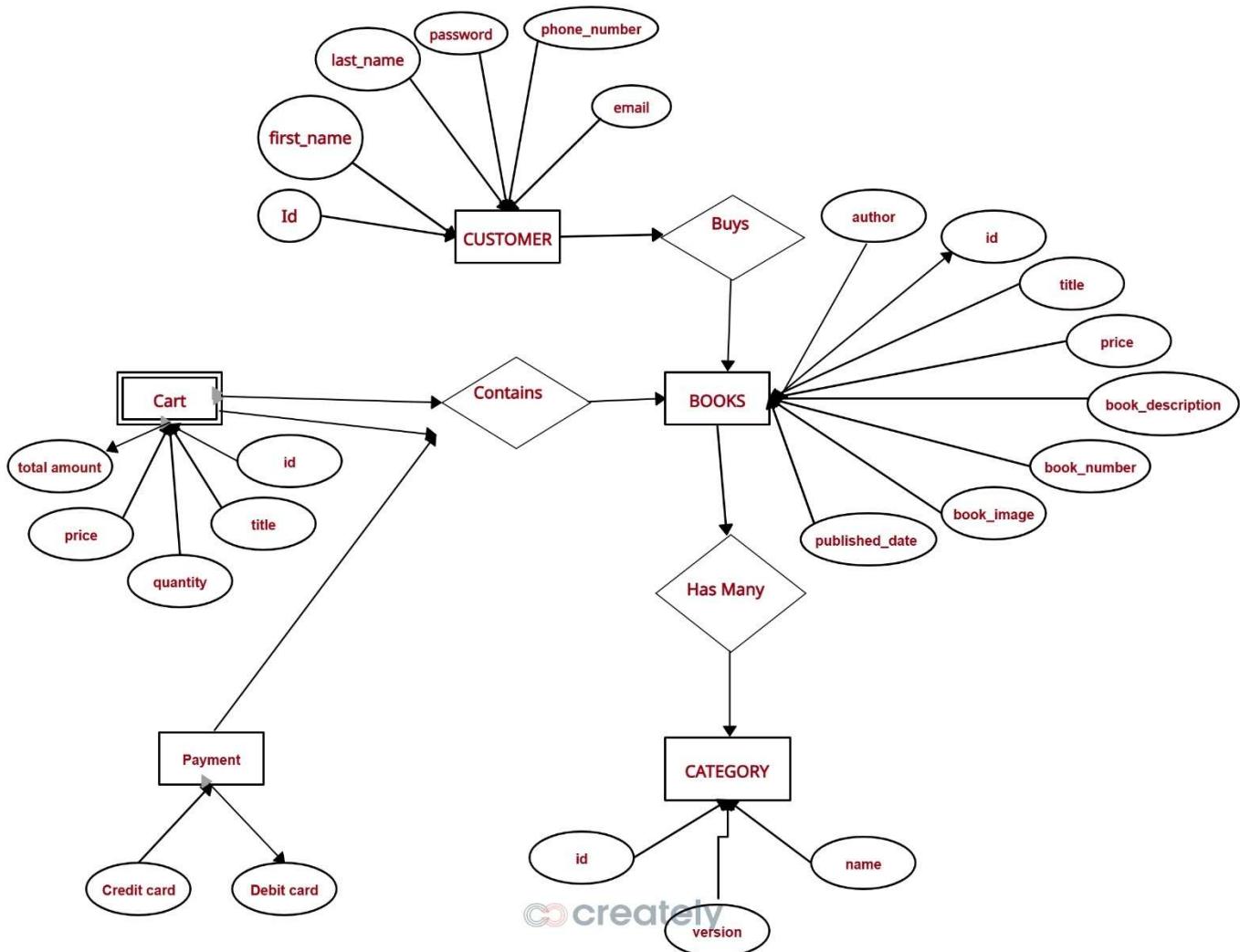
3. Handle Payment Response

- **Inputs:** Payment confirmation from Payment Gateway.
- **Processes:**
 - After receiving the payment request, the Payment Gateway processes the transaction and returns a Payment Confirmation message (success, failure, or pending).
 - This process handles the response, updates the order status in the database, and securely stores the payment record.
 - If the payment is successful, it passes the confirmation details to the Generate Invoice (1.4) process.
- **Outputs:** Transaction status (success/failure), payment confirmation details.

Data Stores in Second-Level DFD

- **Users** (user_id, first_name, last_name, email, password, salary).
- **Transactions** (transaction_id, user_id, category, amount, date, notes, goal_id).
- **Goals** (goal_id, user_id, goal_name, goal_amount, saved_amount, status, end_date).

ER diagram:



The Entity Relationship Diagram (ERD) visually represents the logical structure of the database used in the Online Book Store System. It defines how entities such as Customers, Books, Categories, Carts, and Payments are related to one another.

The main purpose of this diagram is to describe how data is organized, stored, and connected in the database to support the functionalities of the system such as user registration, book management, order processing, and payment handling.

1. Entities and Their Attributes

a) Customer

- The Customer entity represents the users who interact with the Online Book Store to browse, purchase, and make payments for books.
- Each customer record is uniquely identified by an ID and contains details necessary for authentication and communication.

Attributes: **Id:** Unique identification number for each customer.

First_Name: The first name of the customer.

Last_Name: The last name of the customer.

Email: Contact email for login and notifications.

Password: Encrypted password for secure login.

Phone_Number: Customer's contact number for communication.

b) Books

- The Books entity stores detailed information about every book available in the store.
- Each book is linked to a specific Category and can appear in multiple Carts as per user selections.

Attributes: **Id:** Unique identifier for each book.

Title: Name of the book.

Author: Name of the author.

Price: Cost of the book.

Book_Description: Summary or details about the book content.

Book_Number: Unique book reference or ISBN number.

Book_Image: Cover image of the book.

Published_Date: Date when the book was published.

c) Category

- The Category entity classifies books into different genres or subjects, helping users browse and filter them easily.
- Each category can contain multiple books, establishing a one-to-many relationship.

Attributes: **Id:** Unique identifier for each category.

Name: Category name (e.g., Fiction, Science, Programming).

Version: Optional attribute for versioning or category updates.

d) Cart

- The Cart entity represents the temporary storage of books selected by a customer before placing an order.
- A cart can contain multiple books, and each entry in the cart corresponds to a selected item along with its quantity and price.

Attributes: **Id:** Unique identifier for each cart.

Title: The name of the selected book.

Quantity: Number of copies added to the cart.

Price: Price per unit book.

Total_Amount: Total cost of books added to the cart.

e) Payment

- The Payment entity handles the financial transactions made by the customers after order confirmation.
- It is linked to the cart and records payment details such as method and amount.

Attributes:

Payment_Type: Defines the method used (Credit Card, Debit Card, etc.).

Credit_Card / Debit_Card: Card details used for the transaction.

2. Relationships

Customer – Books (Buys):

- A Customer can buy one or more Books, and a Book can be purchased by many Customers.
- This represents a many-to-many (M:N) relationship, usually implemented through an Orders or Cart table.

Books – Category (Has Many):

- A Category can have multiple Books, but each Book belongs to only one Category.
- This forms a one-to-many (1:N) relationship between Category and Books.

Cart – Books (Contains):

- The Cart contains one or more Books added by a Customer before purchase.
- Each book entry in the cart includes its price, quantity, and total value.
- This relationship is one-to-many (1:N) between Cart and Books.

Cart – Payment:

- Each Cart transaction is linked to a Payment process when the order is confirmed.
- This represents a one-to-one (1:1) relationship where a cart results in one payment transaction.

Customer – Cart:

- A Customer can have one active Cart at a time, which may contain multiple books.
- Once the order is placed, the cart converts into an order record and is linked to payment.
- This is a one-to-many (1:N) relationship between Customer and Cart.

3. ER Diagram Summary

- The ER Diagram shows the Customer as the primary entity interacting with the system to select and buy books.
- Books are the central entity connected to Category, Cart, and Customer, making them the most crucial component of the system.
- The Cart acts as a bridge between book selection and payment, while Payment ensures secure financial transactions.
- Relationships between entities are designed to maintain data consistency, referential integrity, and efficient retrieval of information for all operations.

3. System design

A) Modules

1. User Module

Users can:

- User registration and login with authentication.
- Allows users to browse and search books by title, author, or category.
- Enables adding or removing books from the shopping cart.
- Displays order history, profile, and payment details.

Key Components:

Login.jsp, Register.jsp, UserServlet.java, and Customer table in MySQL.

2. Admin Module

Admins have full control over the platform and can:

- Add, edit, or delete book details such as title, author, price, and category.
- Manage book categories (e.g., Fiction, Science, IT, etc.).
- View all registered users and their order records.
- Monitor stock availability and update quantities.

Key Components:

AdminDashboard.jsp, BookManagementServlet.java, Category table, and Book table.

3. System Module (Backend Services)

This module handles the core operations of BudgetMate:

- Authentication (JWT-based).
- CRUD operations for transactions, goals, and salary.
- Linking savings transactions to goals.
- Generating summary analytics (salary vs expenses vs savings).
- Generating Excel reports for download.

B) Data Structure of All Modules

We have organized one database BudgetMate for system design. It is based on MySQL and consists of the following customized tables:

1. Customized Tables
 - Users Table (users)
 - Stores user details: id, first_name, last_name, email, password.
 - Transactions Table (transactions)
 - Stores each transaction: id, user_id, amount, category, date, notes, goal_id.
2. Goals Table (goals)
 - Stores goal details: id, user_id, goal_name, goal_amount, description, end_date, achieved.
3. Salary Table (salary)
 - Stores monthly salary for each user: id, user_id, monthly_salary.

Relationships Between Tables (ER/Class Diagram)

One user → Many transactions.

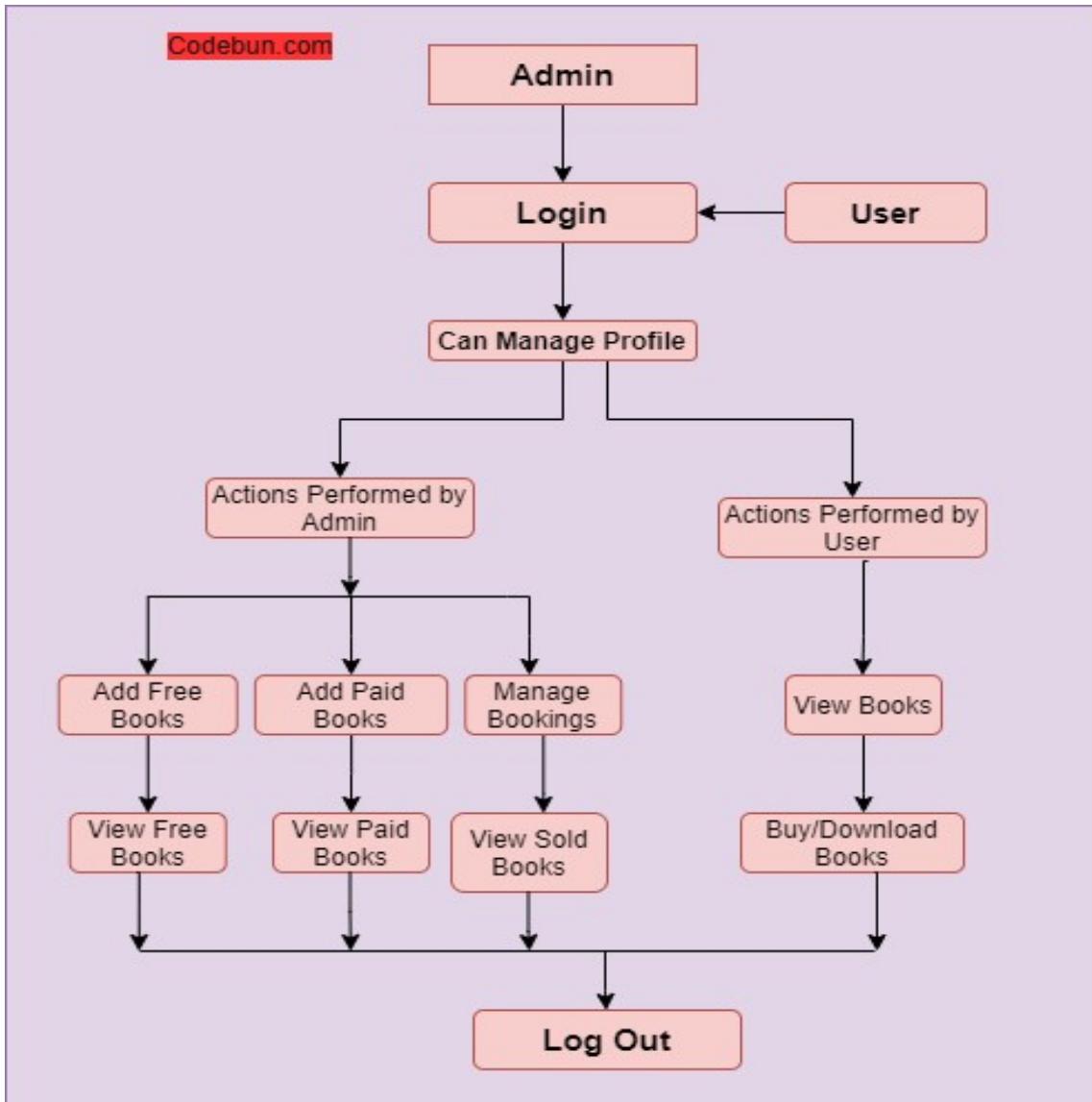
One user → Many goals.

One goal → Many savings transactions (via goal_id).

One user → One salary record.

C) Procedural Design

1. User Panel Design & Admin Panel Design



The **System Flow Diagram** of the **Online Book Store** illustrates how the Admin and User interact with the system from login to logout. It represents the sequence of operations and the flow of control among different modules.

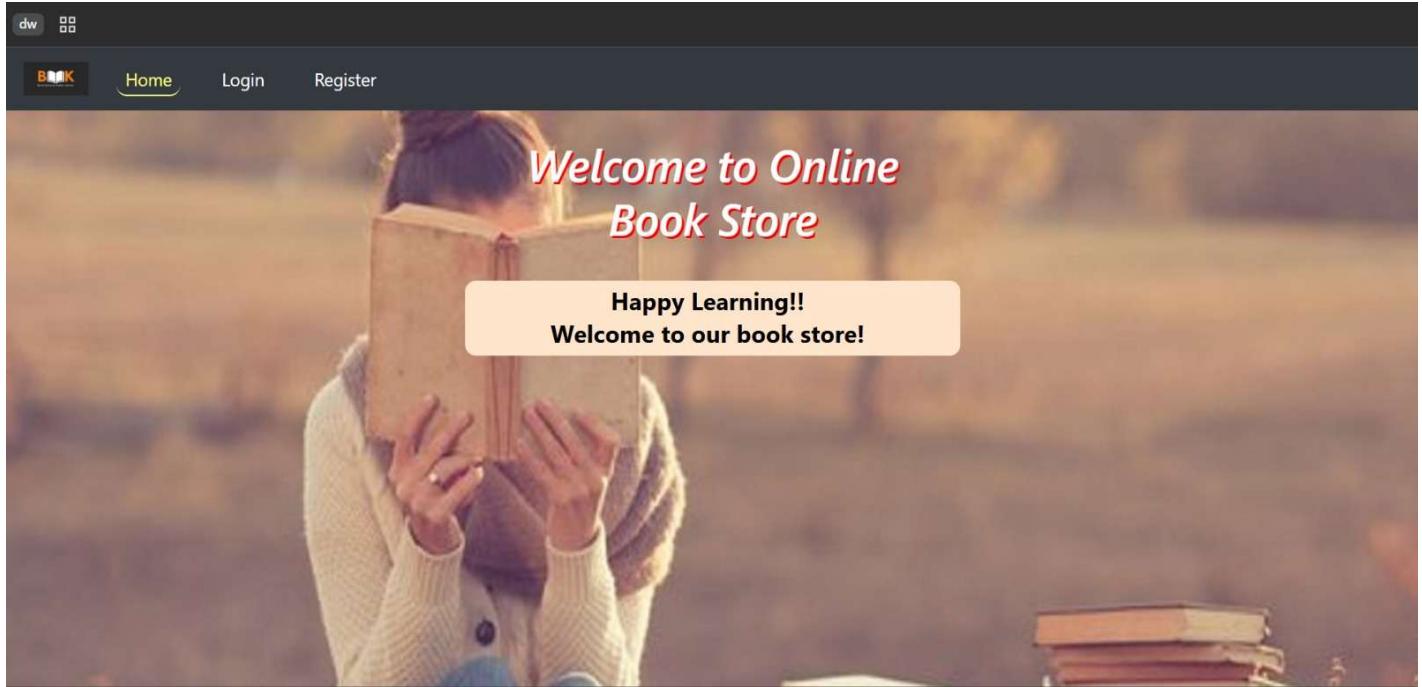
Both **Admin** and **User** start by logging into the system using valid credentials. Once logged in, they can manage their profiles and access features according to their roles.

- The Admin can perform management tasks such as adding free or paid books, viewing uploaded books, managing bookings, and monitoring sold books. These functions help maintain the store's database, track sales, and update inventory.
- The User can view available books, search by title or category, and either buy paid books through the payment gateway or download free books directly. After transactions, users can view their order history and profile details.

Finally, both Admin and User can log out to securely end their sessions.

D. Screenshots (Sample Pages)

- a. Home Page – Simple UI with Register / Login.



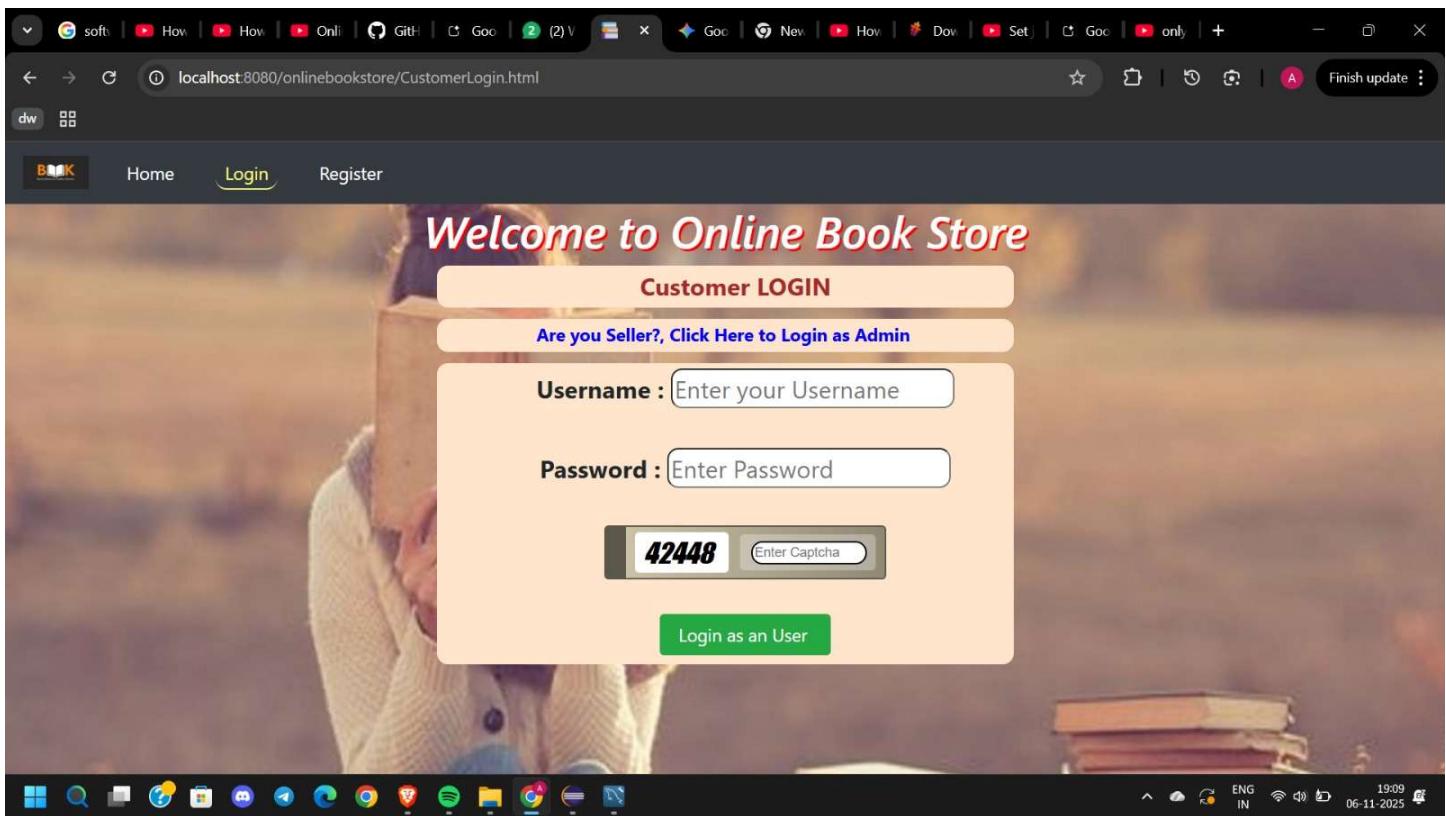
- b. Register Page – Name, Email Id, Password, Address, Mobile No.

The screenshot shows a web browser window with a dark header bar. The address bar displays the URL 'localhost:8080/onlinebookstore/CustomerRegister.html'. The menu bar includes links for 'Home', 'Login', and 'Register'. The main content area features a photograph of a person from behind, holding a book. A central form is overlaid on the image, titled 'Enter the Registration Details' in green. The form contains the following fields:

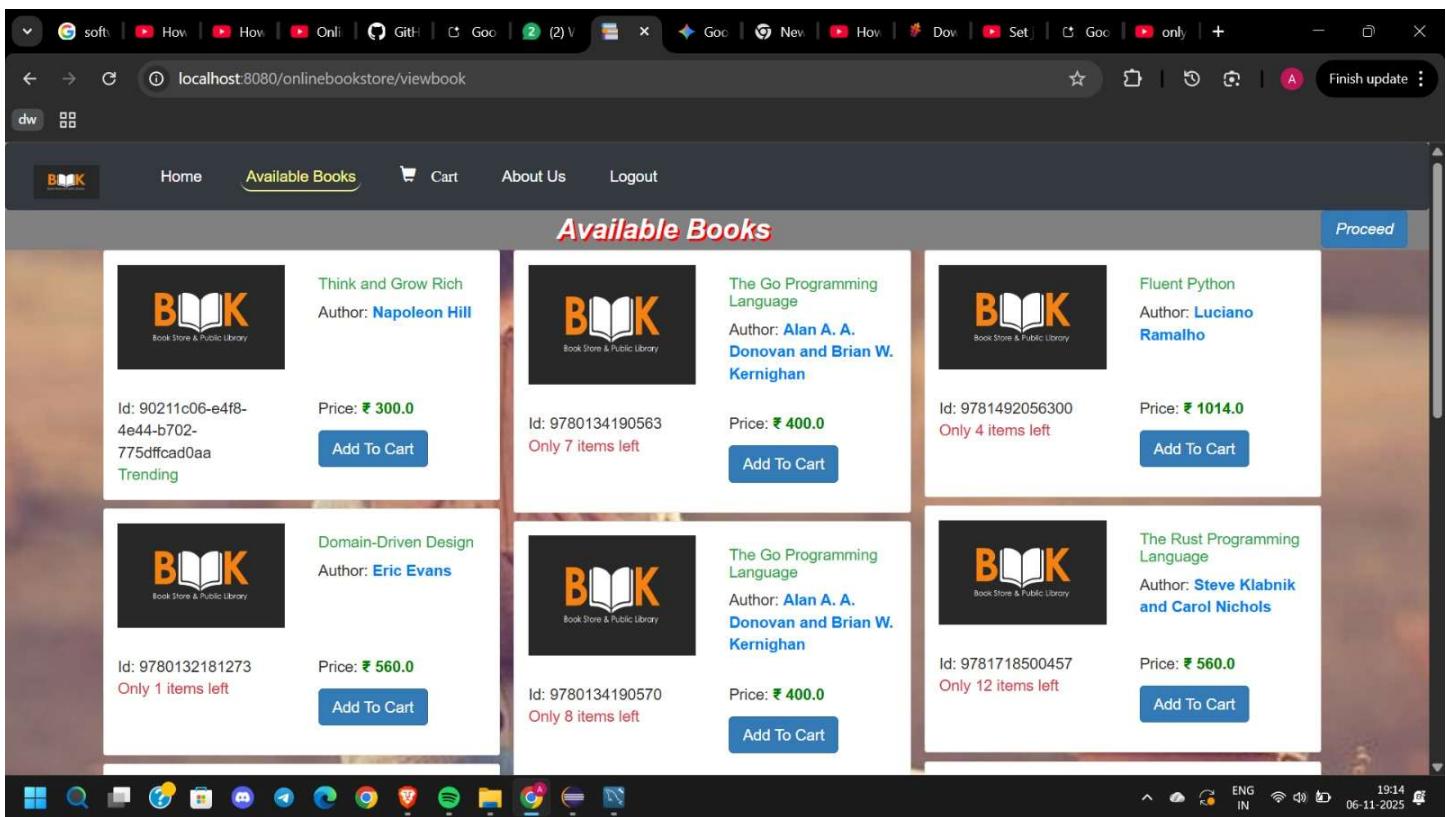
- Email Id :
- Password :
- First Name :
- Last Name :
- Address:
- Mobile No :

Below the form, there is a checkbox labeled 'I ACCEPT ALL TERMS & CONDITIONS' and a green button labeled 'REGISTER ME'.

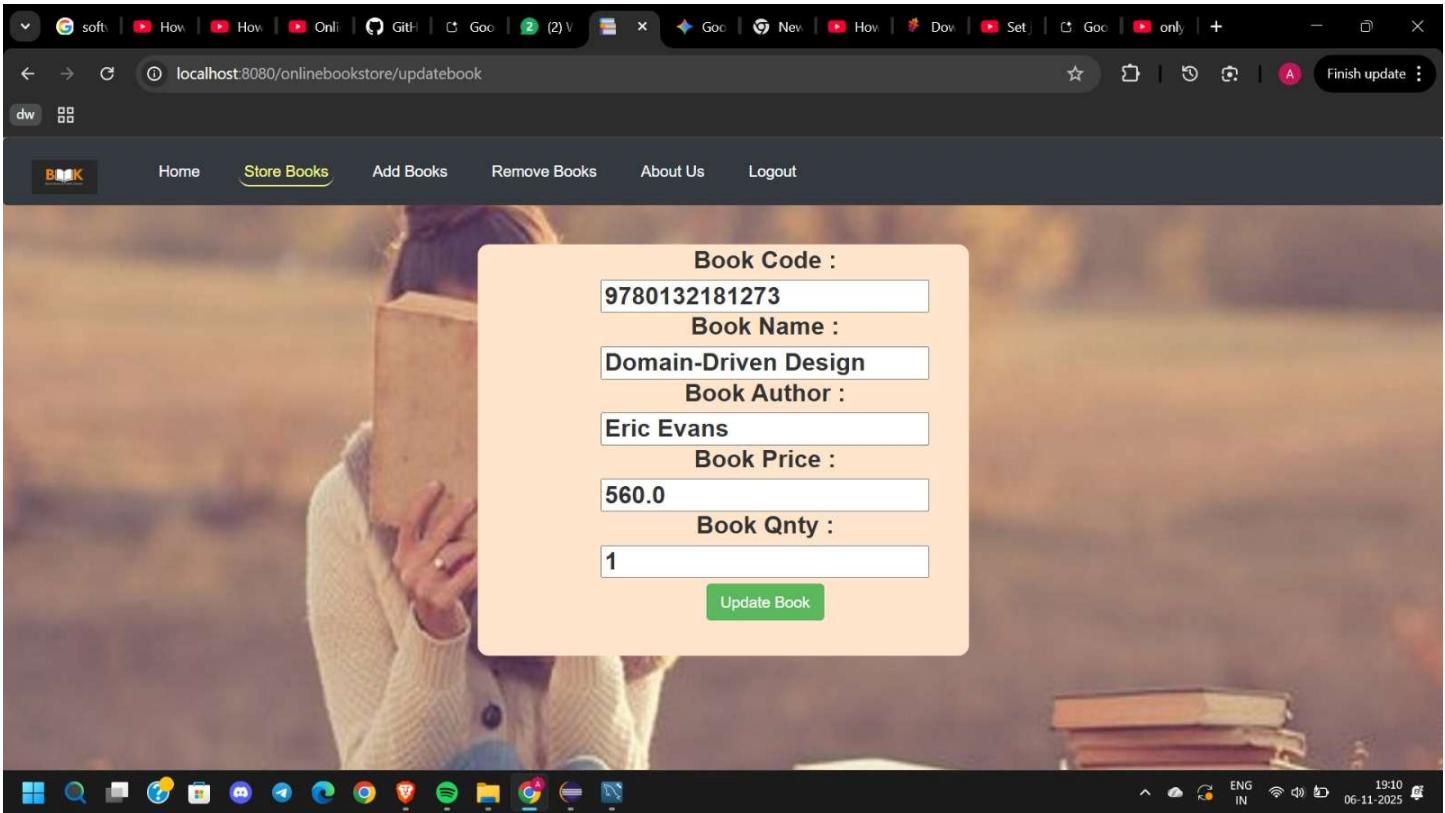
c. Login Page – Username, Password, Enter Captcha



d. Available Books



e. Update Books



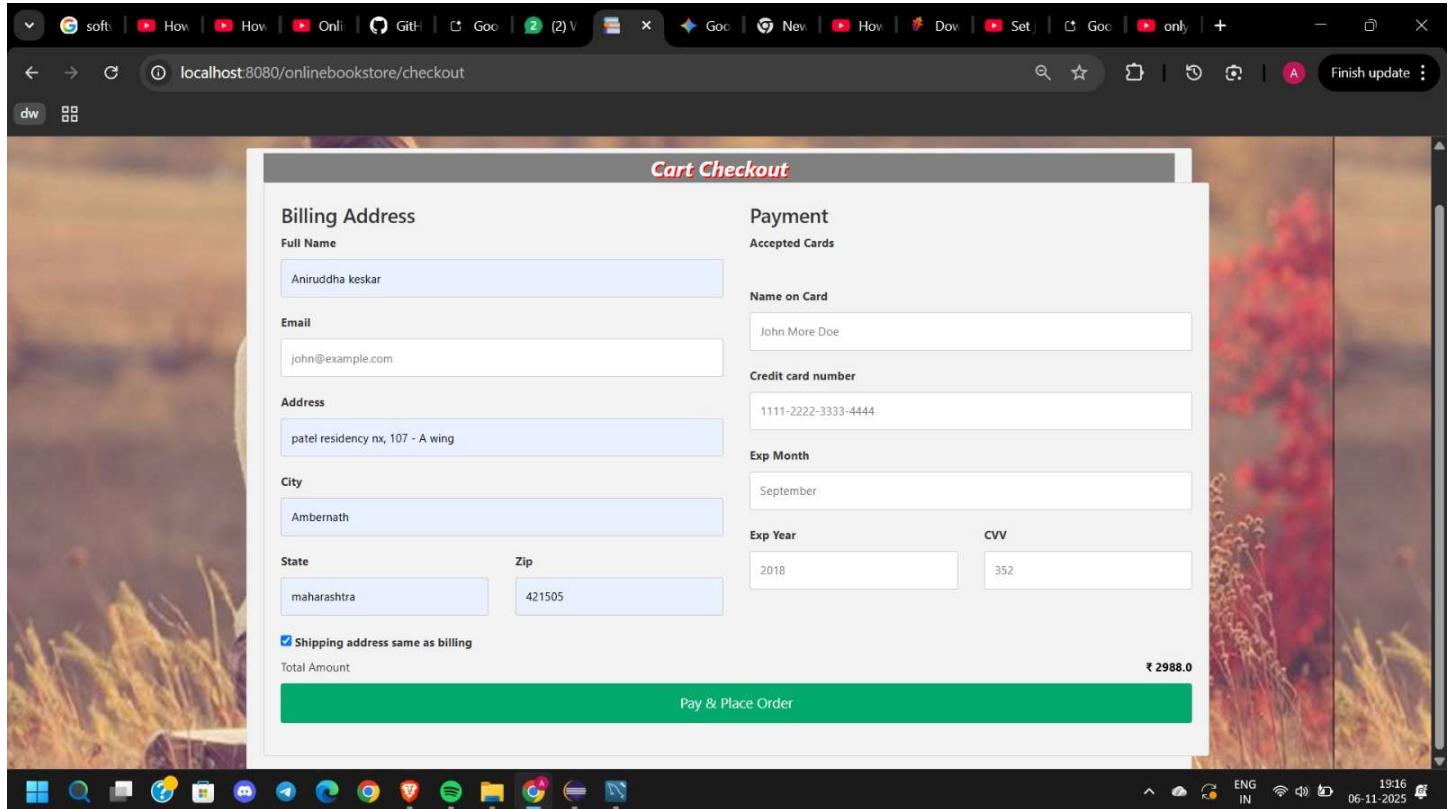
f. Shopping Cart

A screenshot of a web browser showing the 'Shopping Cart' page at localhost:8080/onlinebookstore/cart. The page features a background image of a person holding a book. A table displays the items in the shopping cart:

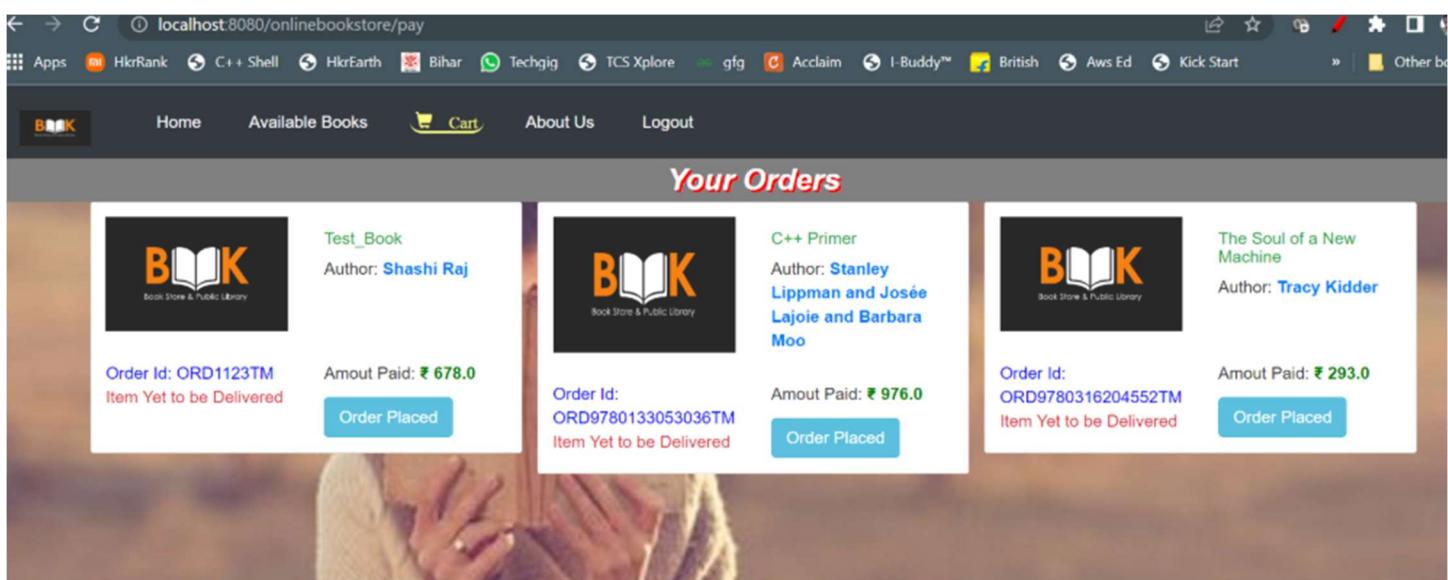
BookId	Name	Author	Price/Item	Quantity	Amount
9780132181273	Domain-Driven Design	Eric Evans	₹ 560.0	- 1 +	₹ 560.0
9780134190563	The Go Programming Language	Alan A. A. Donovan and Brian W. Kernighan	₹ 400.0	- 1 +	₹ 400.0
9781492056300	Fluent Python	Luciano Ramalho	₹ 1014.0	- 2 +	₹ 2028.0

At the bottom, a green bar displays the 'Total Amount To Pay' as ₹ 2988.0, and a blue button says 'Proceed to Pay ₹ 2988.0'.

g. Shopping Cart



h. Your Orders



4. Implementation

The **Implementation phase** is where the system design is transformed into a fully functional application. It involves writing, integrating, and testing code components to ensure that the **Online Book Store** operates as per the specified requirements. This phase includes setting up the environment, developing modules, connecting to the database, and deploying the system on a server.

1. Technology Stack

- **Frontend:** HTML, CSS, JavaScript, JSP (Java Server Pages)
- **Backend:** Java (Servlets and JSP)
- **Database:** MySQL
- **Web Server:** Apache Tomcat
- **Development Tools:** NetBeans / Eclipse IDE
- **Connectivity:** JDBC (Java Database Connectivity) for linking Java and MySQL

2. Steps Involved in Implementation

Database Creation:

- MySQL database is created to store customer, book, category, cart, order, and payment information.
- Tables are normalized to reduce redundancy and maintain data integrity.

Frontend Development:

- JSP and HTML are used to design interactive web pages for login, registration, book browsing, and cart management.
- CSS and JavaScript enhance user experience and responsiveness.

Backend Logic Development:

- Business logic is written in Java Servlets for tasks like user authentication, book management, and payment processing.
- Admin and user functionalities are implemented separately for role-based access.

Database Connectivity:

- JDBC is used to establish a connection between the web application and the MySQL database.
- SQL queries are executed for fetching, inserting, updating, and deleting data.

Testing and Debugging:

- Each module is tested individually (unit testing) and then integrated for system testing.
- Bugs are identified and corrected to ensure smooth functionality.

Deployment:

- The completed application is deployed on the Apache Tomcat Server.
- The system is made accessible via a web browser for both admin and users.

5. Testing

The **Testing phase** ensures that the **Online Book Store System** functions correctly, meets all specified requirements, and provides a smooth user experience. It involves systematically checking each module to detect and correct errors before deployment.

1. Testing Objectives

- To verify that all system functionalities work as intended.
- To identify and fix errors or inconsistencies in the code.
- To ensure data accuracy, reliability, and security.
- To validate that both Admin and User modules perform their tasks properly.

2. Types of Testing

a. Unit Testing

- Each module, such as login, book management, and cart, was tested individually to ensure it performs its intended function correctly.

b. Integration Testing

- Modules were combined and tested together (e.g., book selection → cart → payment) to verify data flow and interaction between components.

c. System Testing

- The complete system was tested to ensure that all components work harmoniously and fulfill functional and non-functional requirements.

d. Security Testing

- Ensured unauthorized users cannot access protected routes without a valid JWT token.
- Password stored in database in encrypted form only.

e. User Acceptance Testing (UAT)

- The system was tested by end-users to confirm that it meets their expectations, providing ease of use, proper navigation, and accurate results.

f. Security Testing

- Authentication, password protection, and database access control were verified to ensure that sensitive information is secure.

3. Test Cases

Test Case ID	Description	Input	Expected Output	Result
TC01	Verify login with valid credentials	Valid credentials	Redirect to user/admin Dashboard	<input checked="" type="checkbox"/> Passed
TC02	Verify login with invalid credentials	Invalid credentials	Displays “Invalid username or password” message	<input checked="" type="checkbox"/> Passed
TC03	Check new user registration	Registration	Account created successfully	<input checked="" type="checkbox"/> Passed
TC04	Check registration & email	Email id	Error message displayed	<input checked="" type="checkbox"/> Passed
TC05	Verify that user can view list of available books	View Books	Displays all books with details	<input checked="" type="checkbox"/> Passed
TC06	Verify book search functionality	Search Books	Displays matching books	<input checked="" type="checkbox"/> Passed
TC07	Verify admin can add new book	Add Book (Admin)	Book added successfully	<input checked="" type="checkbox"/> Passed
TC08	Verify logout functionality	Logout	Redirects to login page	<input checked="" type="checkbox"/> Passed

4. Testing Tools

- **JUnit** – Unit Testing
- **Selenium** – Functional Testing
- **Apache JMeter** – Performance Testing.
- **MySQL Workbench**– Database Testing.
- **Apache Tomcat** –used as web server to run & test the java web application.

5. Test Results

- All individual modules such as **Login**, **Registration**, **Book Management**, and **Payment** were tested successfully with expected outputs.
- **Integration testing** confirmed smooth data flow between modules like Cart → Checkout → Payment → Order History.
- **System testing** verified that the entire system performs correctly and meets all functional requirements.
- **User acceptance testing (UAT)** showed that the application is easy to use and fulfills end-user expectations.
- **Security testing** ensured that sensitive data like passwords and payment details are protected through encryption and access control.
- **Performance testing** indicated fast response times (average below 2 seconds) even under multiple user requests.
- No major defects or critical bugs were found during the final testing phase.
- The system was verified to be stable, reliable, and ready for deployment.

6. Results and Discussion

The implementation and testing of the **Online Book Store System** produced successful results, meeting all the objectives defined in the requirement analysis phase. The system allows users to conveniently browse, search, and purchase books online, while providing administrators with tools to manage books, categories, and user activities efficiently.

1. Results

- The system was successfully developed using **Java, JSP, Servlets, and MySQL**, and deployed on **Apache Tomcat Server**.
- All modules, including **User Registration, Login, Book Management, Shopping Cart, and Payment Processing**, functioned as expected.
- The **Admin module** effectively manages books, categories, and transactions, ensuring complete control over the store.
- The **User module** provides an interactive and responsive interface for easy navigation and secure online purchases.
- The database integration ensures smooth data retrieval, accurate order tracking, and reliable record maintenance.
- The system passed all major test cases, confirming **accuracy, security, and performance efficiency**.

2. Discussion

- The online platform simplifies the process of book purchasing, reducing manual efforts and errors found in traditional bookstores.
- Implementing features like search filters, categorized listings, and cart management enhances user experience and system usability.
- Security mechanisms such as **password encryption, form validation, and role-based access** ensure safe data handling.
- The modular architecture allows for scalability — future enhancements like **online payment gateway integration, book reviews, and recommendation systems** can be easily added.
- Overall, the project demonstrates how e-commerce applications can automate real-world business operations and deliver convenience to both customers and administrators.

7. Conclusion and Future scope

1. Conclusion

The **Online Book Store System** successfully fulfills its main objective of providing a convenient and automated way for users to buy and manage books online. The project eliminates the need for manual processes by offering a fully digital platform where users can search, browse, and purchase books with ease, while administrators can efficiently manage inventory, categories, and transactions.

The system ensures secure data handling, faster access to book information, and smooth online transactions. By using **Java**, **JSP**, **Servlets**, and **MySQL**, the application achieves a robust, scalable, and reliable architecture suitable for real-world deployment.

Overall, the project demonstrates the effectiveness of combining web technologies with database management to create an interactive and user-friendly e-commerce solution for book sales and management.

2. Future Scope

The current version of the Online Book Store can be enhanced in several ways to make it more dynamic and feature-rich in the future. Possible improvements include:

1. Online Payment Gateway Integration:

- Incorporate real-time payment options such as credit/debit cards, UPI, and digital wallets for smoother transactions.

2. Recommendation System:

- Implement a book recommendation feature using **Machine Learning** to suggest books based on user preferences and purchase history.

3. User Reviews and Ratings:

- Allow users to post feedback, rate books, and share experiences to improve customer engagement.

4. E-book Reader Integration:

- Add a feature for users to read e-books directly on the website or through a mobile application.

5. Mobile Application Development:

- Extend the system into a mobile app version for Android and iOS users to improve accessibility.

6. Email and Notification System:

- Send automated emails or notifications for order updates, new arrivals, and promotional offers.

7. Admin Analytics Dashboard:

- Include graphical reports and data analytics for sales trends, most-viewed books, and customer activity.

8. Bibliography and References

The development of the **Online Book Store System** was supported by various learning resources, including textbooks, online tutorials, technical documentation, and reference materials related to Java, MySQL, and web development technologies. These resources provided valuable insights into designing, coding, and testing the system effectively.

Books

1. **Herbert Schildt**, *Java: The Complete Reference*, McGraw-Hill Education.
2. **Kogent Learning Solutions Inc.**, *JSP and Servlets: A Comprehensive Study*, Dreamtech Press.
3. **Ivan Bayross**, *SQL, PL/SQL – The Programming Language of Oracle*, BPB Publications.
4. **Kurose and Ross**, *Computer Networking: A Top-Down Approach*, Pearson Education.
5. **Roger S. Pressman**, *Software Engineering: A Practitioner's Approach*, McGraw-Hill.

Research Papers / Journals

1. E-commerce Website for Books-Store — Kadam, Abhijit; Jadhavm, Ganesh; Parchande, Akshata; Gupta, Dr B. *International Journal of Trend in Scientific Research and Development (IJTSRD)*, Vol. 7 Issue 3 (June 2023), pp. 344-359.
2. Study and Design of Online Bookstore Backend — Ding, Yunzheng. *Scientific Journal of Technology*, Vol. 7 No. 4 (2025), pp. 193-205. DOI: 10.54691/26sjz116.
3. Using OOP Concepts for the Development of a Web-Based Online Bookstore System with a Real-Time Database — Vaidya, Harsh; Nayani, Aravind Reddy; Gupta, Alok; Selvaraj, Prassanna; Singh, Ravi Kumar. *International Journal for Research Publication and Seminar*, Vol. 14, Issue 5 (2025). DOI: 10.36676/jrps.v14.i5.1502.

Websites

1. Oracle Java Documentation – <https://docs.oracle.com/javase>
2. MySQL Official Documentation – <https://dev.mysql.com/doc>
3. W3Schools Tutorials – <https://www.w3schools.com>
4. TutorialsPoint – <https://www.tutorialspoint.com>
5. JavaTpoint – <https://www.javatpoint.com>

Other Resources

The concepts, tools, and implementation techniques used in this project were inspired by the above resources. They played an essential role in helping understand **Java Servlets**, **JSP**, **database connectivity**, and **web application architecture**, ensuring the successful completion of the project.