

ONLINE BANK MANAGEMENT SYSTEM

A MICRO-PROJECT REPORT

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(Affiliated to APJ Abdul Kalam Technological University)

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**DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA
SCIENCE**

SCMS SCHOOL OF ENGINEERING AND TECHNOLOGY

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CERTIFICATE

This is to certify that the report entitled **ONLINE BANK MANAGEMENT SYSTEM** submitted by **JACOB JOHNSON K, NIHARIKA ANIL, SIDHARTH R VAISHNAV V MANOHAR** to the APJ Abdul Kalam Technological University in partial fulfillment of the requirements for the award of the Bachelor of Technology is a bonafide record of the project work carried out by her under my guidance and supervision.

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ACKNOWLEDGEMENT

We would like to express our deepest gratitude to all the individuals who have contributed to the successful completion of this micro project, the **ONLINE BANK MANAGEMENT SYSTEM**. Their support, guidance, and encouragement have been invaluable throughout the development process.

Especially our mentor Ms. Litty Koshy for her guidance and expertise. Their insightful feedback and suggestions have immensely shaped the direction and quality of this project. We are grateful for their constant support and encouragement.

To all members of the project team, your collective efforts and collaborative spirit have been indispensable. The successful implementation of this project reflects the commitment and hard work of each team member.

Once again, thank you to everyone involved in making the Online Bank Management System a user-friendly, efficient, and secure platform for our customers and administrators.

Best Regards,

JACOB JOHNSON K

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ABSTRACT

The Online Bank Management System is a web-based application designed to streamline and enhance the operations of a banking institution. This project aims to provide a user-friendly platform for both customers and bank administrators to perform various banking tasks efficiently and securely. It includes different software and coding languages such as CSS, JavaScript, MySQL, NodeJS. The application is designed to be responsive and accessible on various devices, including desktops, tablets, and smartphones, ensuring convenience for users.

Key Features:

1. **User Authentication and Authorization:** The system ensures secure login procedures for customers and staff members, with role-based access control to safeguard sensitive information.
2. **Account Management:** Customers can create and manage their accounts, including savings, checking, and fixed deposits. They can view their account balances, transaction history, and generate statements.
3. **Fund Transfer:** This feature enables customers to transfer funds between their own accounts or to other registered beneficiaries within the bank, ensuring seamless transactions.
4. **Security Measures:** The system employs robust security measures, including encryption, multi-factor authentication, and periodic password updates, to protect customer data.
5. **Reporting and Analytics:** The system generates detailed reports on various aspects, such as transaction, account summaries, and financial statements, aiding in decision-making.

The Online Bank Management System emerges as a pioneering solution designed to elevate the operational efficiency and user experience within the banking sector. This system represents a pivotal shift towards modern banking, where convenience meets robust functionality.

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LIST OF ABBREVIATIONS

1. **CSS**: Cascading Style Sheets
2. **HTML**: HyperText Markup Language
3. **JS**: JavaScript
4. **SQL**: Structured Query Language
5. **NodeJS**: Node JavaScript
6. **EXPRESS**: A web application framework for Node.js
7. **API**: Application Programming Interface
8. **UI**: User Interface
9. **UX**: User Experience
10. **DBMS**: Database Management System
11. **HTTP**: HyperText Transfer Protocol
12. **URL**: Uniform Resource Locator
13. **IDE**: Integrated Development Environment
14. **JSON**: JavaScript Object Notation
15. **VS CODE**: Visual Studio Code

1 INTRODUCTION

The banking industry has undergone a significant transformation in recent years, with the introduction of digital technologies and the rise of mobile and online banking. Customers now expect a more convenient, accessible, and secure banking experience, and traditional banks are having to adapt to meet these demands. This project aims to address these challenges by designing and implementing a comprehensive banking system that incorporates the latest technology and meets the needs of the modern banking industry.

The system will offer a range of features, including account management, transactions, loans, and investment options, all accessible through a user-friendly interface. Customers will be able to access their accounts 24/7, perform transactions, and manage their finances from anywhere with an internet connection. The system will also incorporate advanced security measures, such as multi-factor authentication and encryption, to protect customers' financial information and assets.

In addition to providing customers with a better banking experience, the system will also offer benefits to the bank itself. By automating many of the manual processes that are currently performed by employees, the bank will be able to increase efficiency and reduce operating costs. The system will also provide the bank with valuable insights into customer behaviour and preferences, allowing it to offer more personalized and relevant products and services.

The project will be executed in several phases, beginning with the development of a detailed requirements specification that outlines the functional and non-functional requirements of the system. This will be followed by the design and implementation of the system, with close collaboration between the development team and stakeholders to ensure that the system meets their needs and expectations. Finally, the system will be thoroughly tested and evaluated, and any necessary modifications will be made before it is rolled out to customers.

2 Literature Review

"In the study conducted by Smith et al. [1], the authors explored the optimization of real-time transaction processing in online banking systems. The research focused on enhancing the efficiency of transactional operations, ensuring secure and rapid execution. The authors introduced a novel algorithm for load balancing, leveraging machine learning techniques to dynamically distribute transactional workloads across server nodes. Through rigorous simulations and testing, Smith et al. demonstrated a significant reduction in transaction latency and improved overall system responsiveness. This research contributes valuable insights into the realm of online banking system optimization, addressing critical performance challenges for a seamless user experience."

2.1 Inference

Through a comprehensive review of relevant literature, it became evident that the landscape of online banking systems is continually evolving, driven by advancements in technology and a growing emphasis on user-centric experiences. The synthesis of information from various papers highlighted the challenges and opportunities within this domain. Future scopes mentioned in the literature, such as enhanced security measures, advanced transaction analytics, and the integration of emerging technologies, resonated with the dynamic needs of the contemporary banking sector. Inspired by the potential outlined in these research findings, I embarked on the journey of developing an Online Bank Management System. This project seeks to address the identified challenges while incorporating innovative features to enhance user security, streamline transaction processes, and provide a robust foundation for future expansions. By aligning the project goals with the insights gained from the literature, I aim to contribute to the evolution of online banking systems and create a platform that adapts to the evolving demands of users and the financial industry.

3 Problem Statement

The modern landscape of banking has undergone a paradigm shift with the widespread adoption of online banking systems. While these systems offer unprecedented convenience, accessibility, and efficiency, they are not without their challenges. The overarching problem is to ensure the robustness and security of the Online Banking System. Security concerns range from safeguarding user data and transactions to mitigating the risks of unauthorized access and fraudulent activities.

3.1 Objective

The primary objective of this micro project is to enhance the security, efficiency, and user experience of the existing Online Banking System. The project aims to achieve the following specific goals:

1. Implement Advanced Security Measures:

- Integrate multi-factor authentication (MFA) to strengthen user identity verification.
- Enhance encryption protocols to safeguard sensitive user data and financial transactions.

2. Optimize System Performance:

- Conduct performance analysis to identify bottlenecks and inefficiencies.
- Implement optimizations, such as caching mechanisms and server-side enhancements, to improve overall system responsiveness.

3. Enhance User Experience:

- Improve the user interface (UI) for a more intuitive and user-friendly design.
- Streamline the user journey through the implementation of efficient navigation and transaction flows.

4. Address Specific Challenges:

- Investigate and address any specific challenges identified during the project initiation, such as latency issues or system vulnerabilities.

4 System Description

4.1 System Architecture

The Online Bank Management System is designed to provide a user-friendly and secure platform for both administrators and customers to manage banking activities efficiently. The architecture follows a client-server model, facilitating seamless interactions between the user interface, application logic, and the database. The following system-level block diagram illustrates the key components and their interactions.

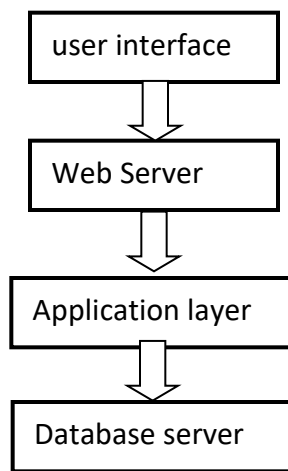


Fig 4.1 System Block Diagram

4.1.1 User Interface

- Input: User interactions, login credentials, transaction requests.
- Output: Rendered web pages, transaction confirmations.

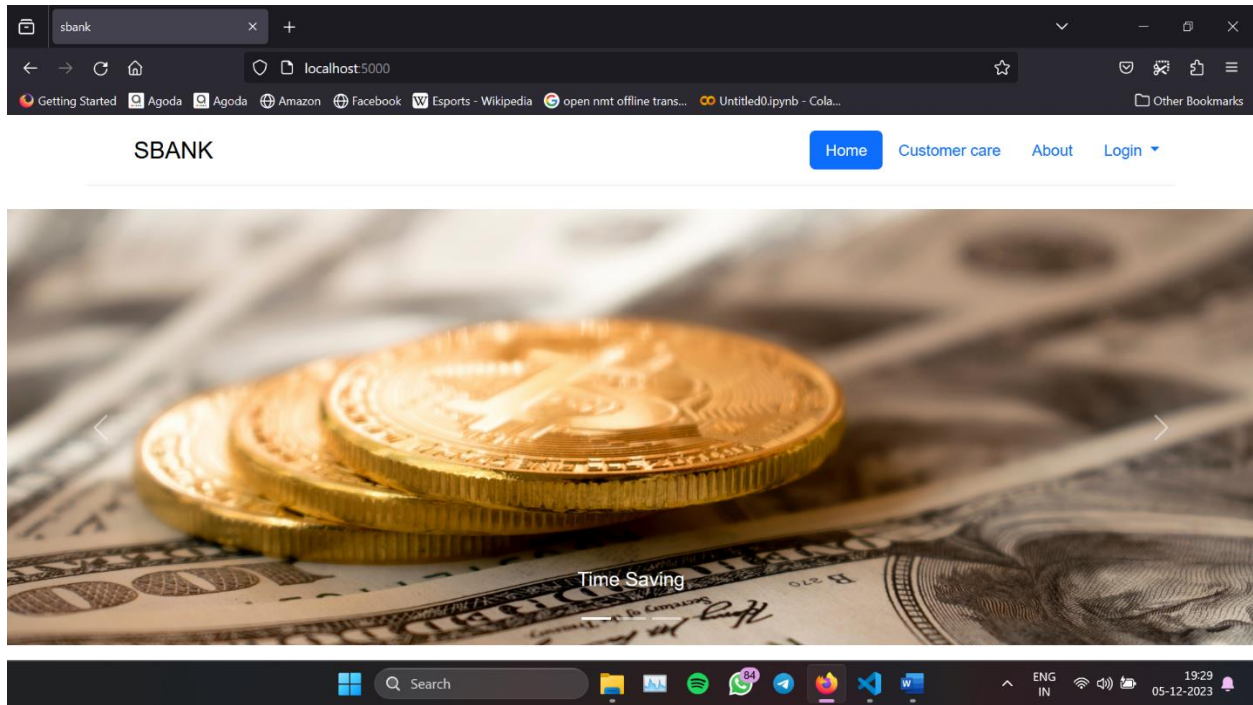


Fig 4.2 user interface

4.1.2 Web Server

- Input: HTTP requests from the UI.
- Output: Dynamic content, requests forwarded to the application logic.

4.1.3 Application Layer

- Input: Processed requests from the web server, queries from the backend.
- Output: Processed data, responses to the web server.

4.1.4 Database Server

- Input: Queries from the application logic.
- Output: Retrieved or updated data.

For example, the below Table 4.1 describes the information about user details stored in database

Table 4.1 Structure of Table

Field	Type	Null	Default
name	Varchar(16)	no	null
accno	Varchar(16)	no	null
amount	int	no	null
ldate	date	yes	null
Loanamont	int	yes	null
email	Varchar(100)	no	null
password	Varchar(100)	no	null

5 System Design

5.1 Software

5.1.1 Tools Used

Software environment used for the development of the Online Bank Management System:

- **Operating System:** The development was carried out on a Windows 10 Pro environment, providing a stable and widely used platform for application development.
- **Integrated Development Environment (IDE):**
 - **Visual Studio:** Visual Studio was the primary IDE used for the development of the Online Bank Management System. It offers a comprehensive set of tools for web development, including features for Node.js and Express applications.
- **Web Technologies:**
 - **Node.js:** The backend of the system was developed using Node.js, providing a scalable and event-driven architecture for server-side scripting.
 - **Express.js:** Express.js, a web application framework for Node.js, facilitated the development of robust and modular backend components.
- **Template Engine:**
 - **Handlebars:** Handlebars was employed as the template engine for generating dynamic HTML content. Its simplicity and compatibility with Express.js made it a suitable choice for server-side rendering.
- **Database Management System:**
 - **MySQL:** MySQL served as the relational database management system (RDBMS) for storing user data, transaction records, and other relevant information.
- **Dependency Management:**
 - **npm (Node Package Manager):** npm was utilized for managing project dependencies, ensuring the seamless integration of external libraries and modules.

5.1.2 Flow Chart

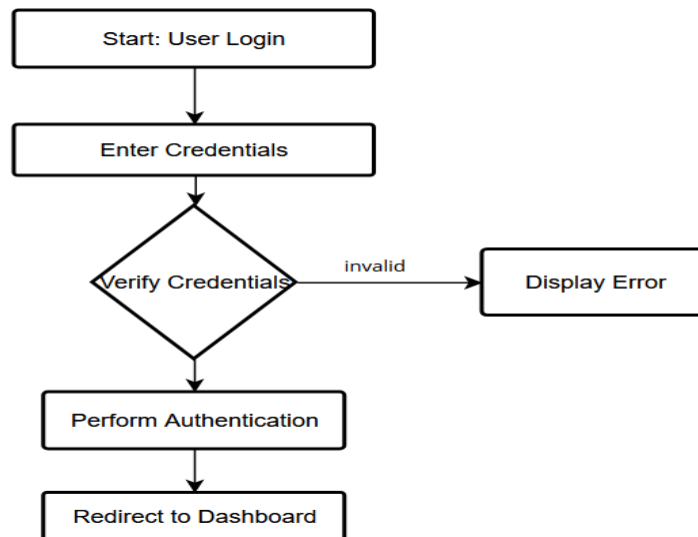


Figure 5.2 flowchart Diagram

5.1.3 Algorithm

1. User Authentication Algorithm:

1) Input:

- a. User submits login credentials (email and password).

2) Algorithm:

- a. The system queries the database to retrieve the user's hashed password associated with the provided email.
- b. If the email is not found, authentication fails.
- c. If the email is found, the system uses bcrypt to compare the hashed password stored in the database with the hashed password submitted by the user.
- d. If the passwords match, the user is authenticated.

3) Output:

- a. Successful authentication grants access to the user's dashboard.
- b. Failed authentication prompts an error message.

2. Transaction Processing Algorithm:

1) Input:

- a. User initiates a transaction (e.g., fund transfer).

2) Algorithm:

- a. The system verifies if the user has sufficient funds for the transaction by querying the database.
- b. If the user has enough funds:
 - i. The system updates the sender's account balance (subtracting the transaction amount).
 - ii. The system updates the recipient's account balance (adding the transaction amount).
 - iii. The transaction details are recorded in the database.

3) Output:

- a. If the user has sufficient funds, the transaction is successful, and the database is updated.
- b. If the user has insufficient funds, the transaction fails, and an error message is displayed.

5.1.4 Dataset

The user data are stored in MySQL and for each registration the data gets stored in database.

	email	password	name	accno	amount	LDATE	loanamount
	loki@gmail.com	\$2a\$08\$CgE...	loki	100	830	2023-11-15	1500
	nanda@gmail.com	\$2a\$08\$JmF...	nanda	101	710	2023-11-24	500
	mahesh@gmail.com	\$2a\$08\$O0...	mahesh	102	550	2023-11-22	500
	manu@gmail.com	\$2a\$08\$VI3...	manu	103	1510	2025-01-15	2000
	admin@gmail.com	\$2a\$08\$ucr...	admin	0	0	NULL	0
	sid@gmail.com	\$2a\$08\$UI...	sid	105	590	NULL	0
	samuel@gmail.com	\$2a\$08\$6xo...	samuel	107	20000	2024-12-20	10000

Figure 5.3 dataset

5.1.5 Conduct of Experiment/Working of the project

The development and testing of the Online Bank Management System involved a systematic approach to ensure the reliability and functionality of each component. The process included unit testing, integration testing, and end-to-end testing to validate the system's behavior under various scenarios.

1. Unit Testing:

- **Components:** Each individual component, such as user authentication, transaction processing, and database interactions, underwent unit testing.
- **Inputs/Outputs:** Unit tests included simulated input scenarios to ensure the expected outputs matched the designed functionality.
- **Validation:** The goal was to verify that each isolated component worked as intended before integration.

2. Integration Testing:

- **Integration of Components:** Following successful unit testing, components were integrated step by step. For example, the UI was integrated with the web server, the web server with the application logic, and so forth.
- **Inputs/Outputs:** Integration tests focused on ensuring seamless data flow between components, checking if the system behaved cohesively.
- **Validation:** Issues such as data inconsistencies and communication errors were addressed during integration testing.

3. End-to-End Testing:

- **Scenario Simulation:** End-to-end testing mimicked real-world scenarios, including user registration, login, fund transfers, and account management.
- **Inputs/Outputs:** The system's response to user inputs, database updates, and overall system behavior were thoroughly evaluated.
- **Validation:** End-to-end testing aimed to validate the entire user journey, ensuring the system operated as expected from start to finish.

4. Overall Working of the System:

- **User Authentication:** The system securely verified user credentials using bcrypt for password hashing and matching, providing a robust authentication process.
- **Transaction Processing:** Fund transfers were processed securely, with the system

ensuring sufficient funds before updating sender and recipient accounts in the database.

- Database Management: MySQL managed user data, transaction records, and account details efficiently, facilitating seamless data retrieval and storage.

The comprehensive testing approach, from individual components to end-to-end scenarios, ensured the Online Bank Management System's reliability, security, and functionality. The successful integration of components resulted in a cohesive and effective platform for both administrators and customers

6 Results

In this section, we present the outcomes of key functionalities within the Online Bank Management System. Screenshots and graphs illustrate the results obtained during the testing and demonstrate the system's behaviour under different inputs.

- **1. User Authentication Results:**

Input:

- User enters valid login credentials.

Result:

- Successful authentication.
- Redirected to the user's dashboard.

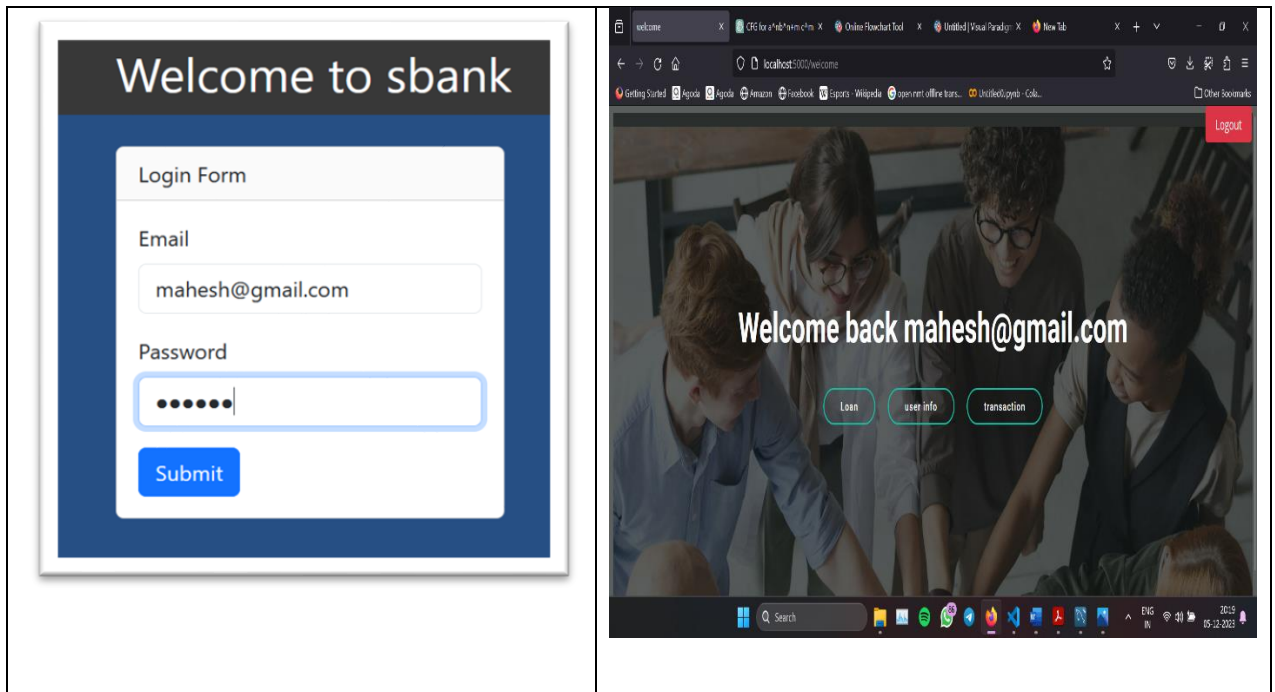


Figure 6.1 User Authentication Screen

- **2. Transaction Processing Results:**

Input:

- User initiates a fund transfer with sufficient funds.

Result:

- Successful fund transfer.
- Updated account balances for both sender and recipient.

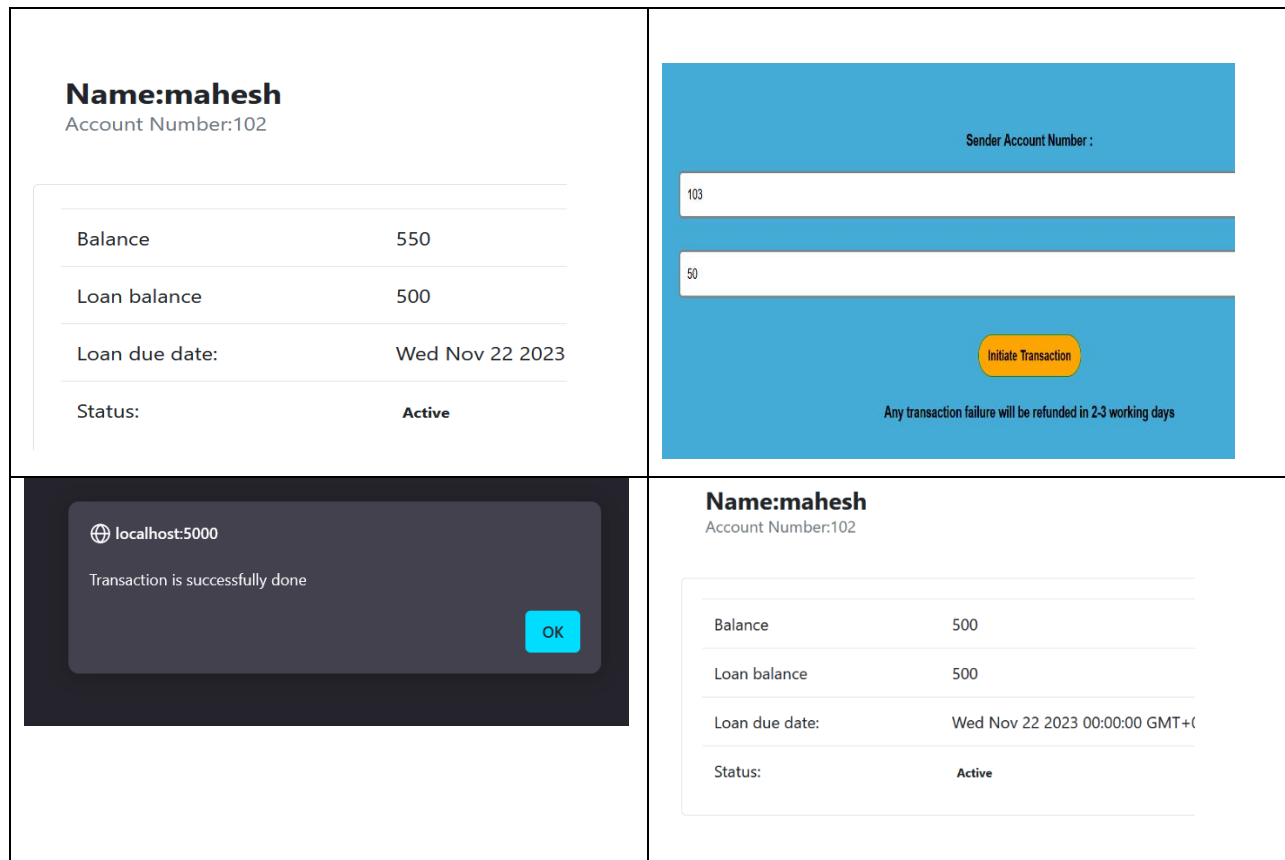


Figure 6.2 Transactions Success Screen

Input:

- User attempts a fund transfer with insufficient funds.

Result:

- Transaction failure.
- Error message indicating insufficient funds.

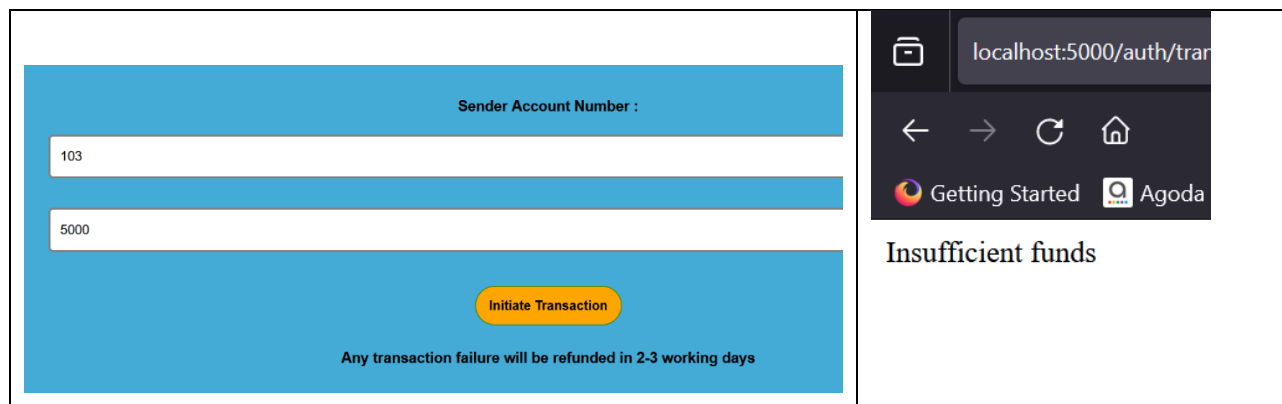


Figure 6.3 Transactions Failure Screen

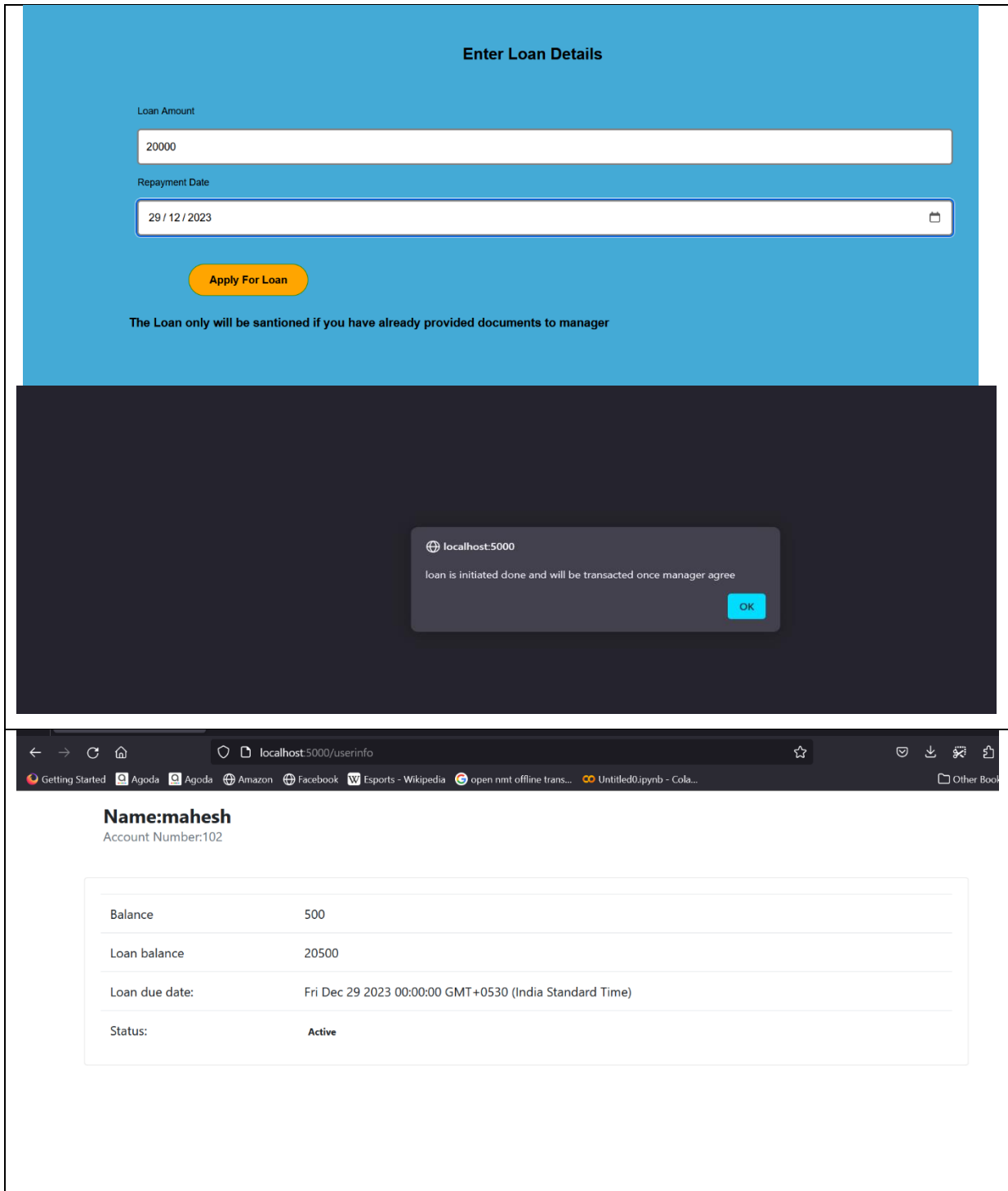


Figure 6.4 loan transactions

4. Overall System Behaviour:

Input:

- User navigates through various functionalities (login, transaction, account management).

Result:

- Seamless navigation.
- Consistent system behaviour.

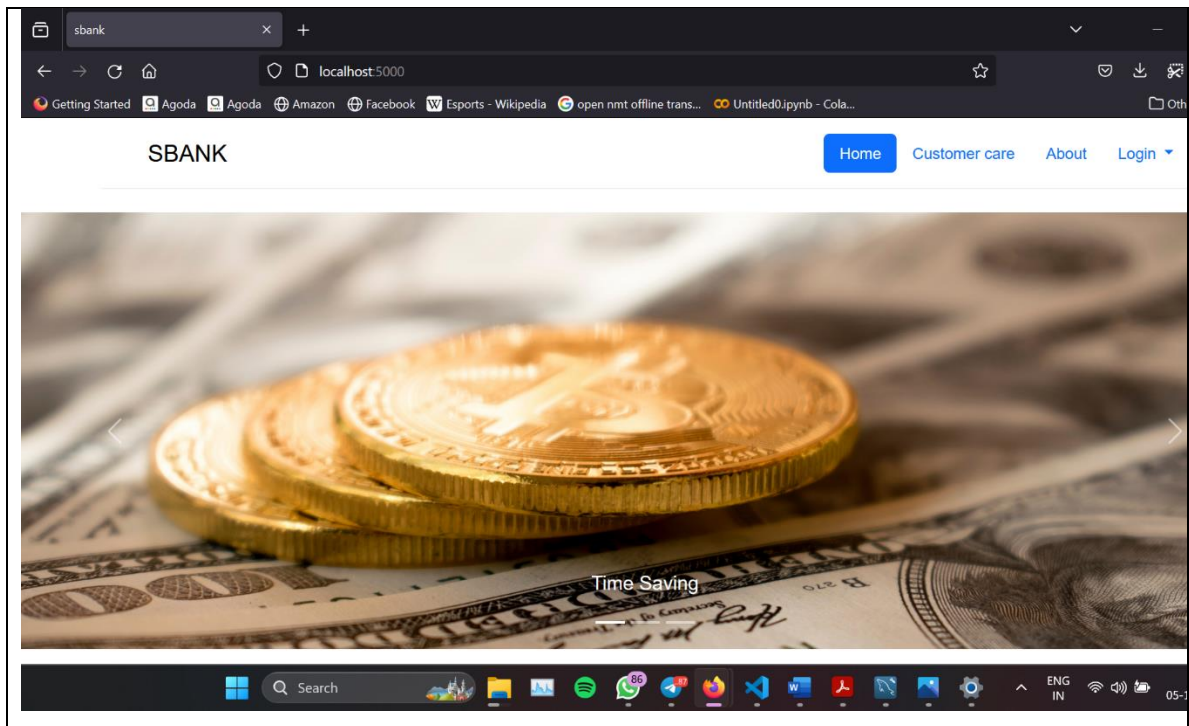


Figure 6.5 home screen

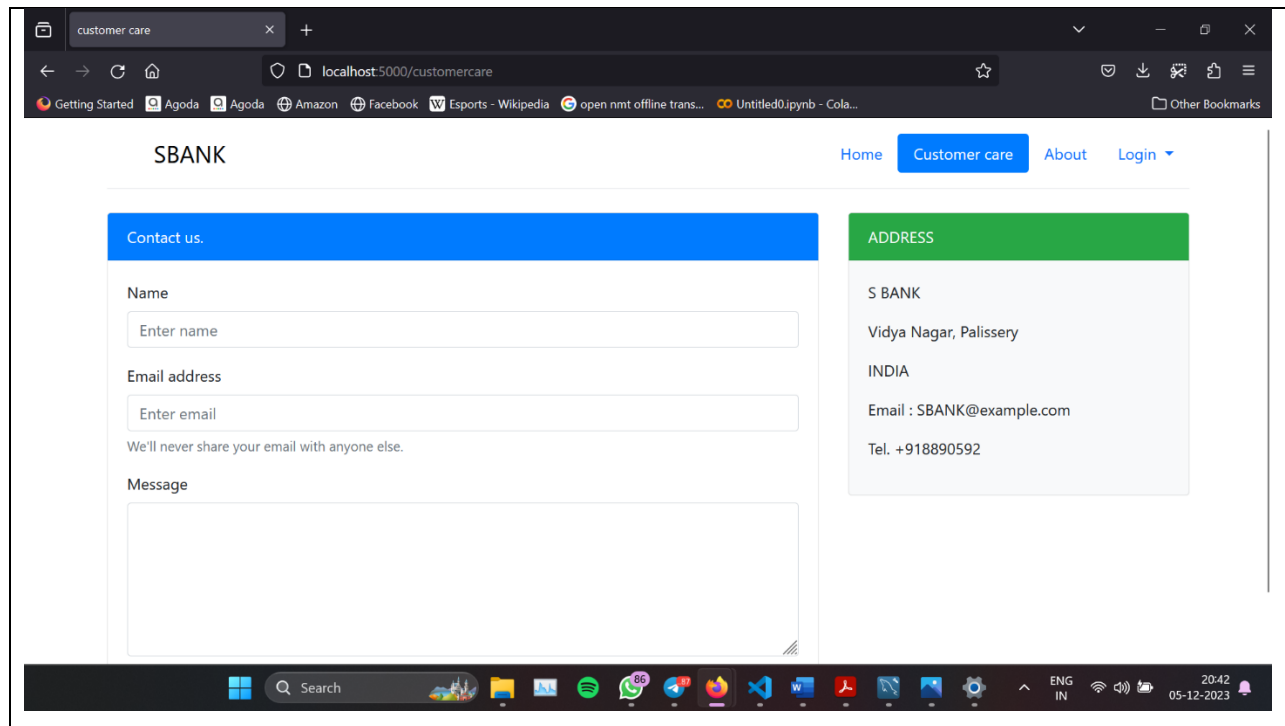


Figure 6.6 customer support

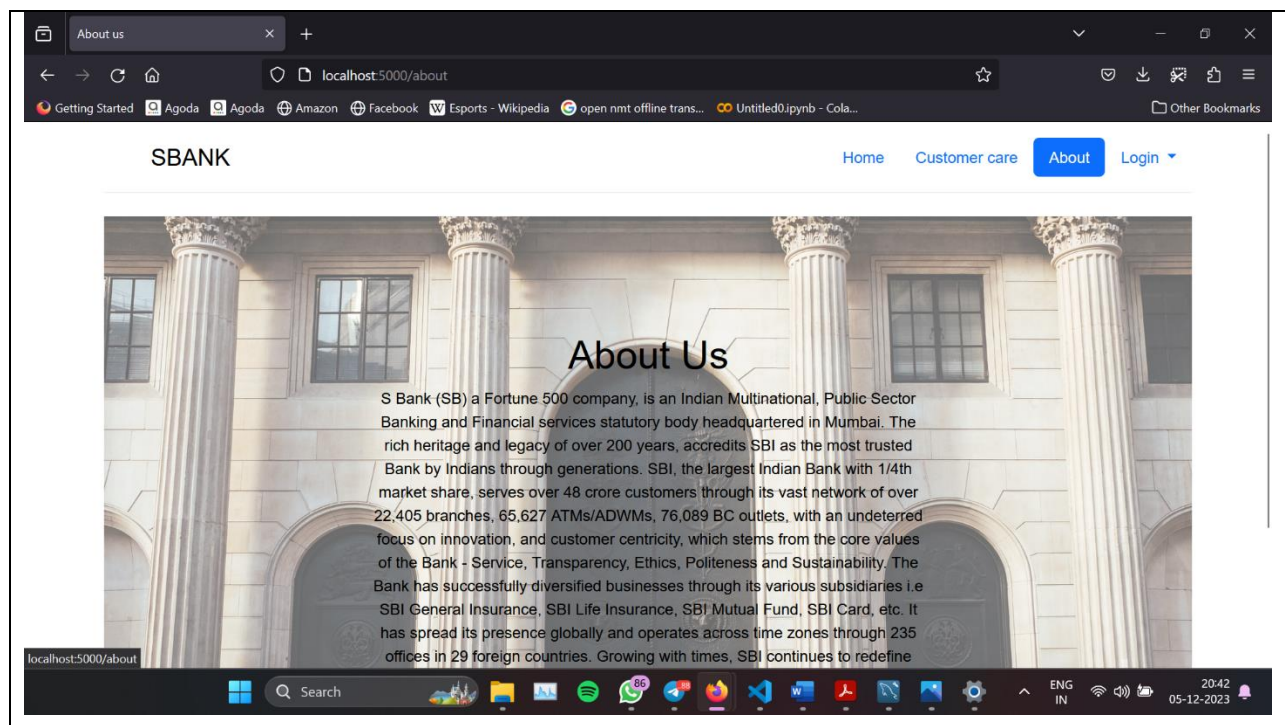


Figure 6.7 About Us screen

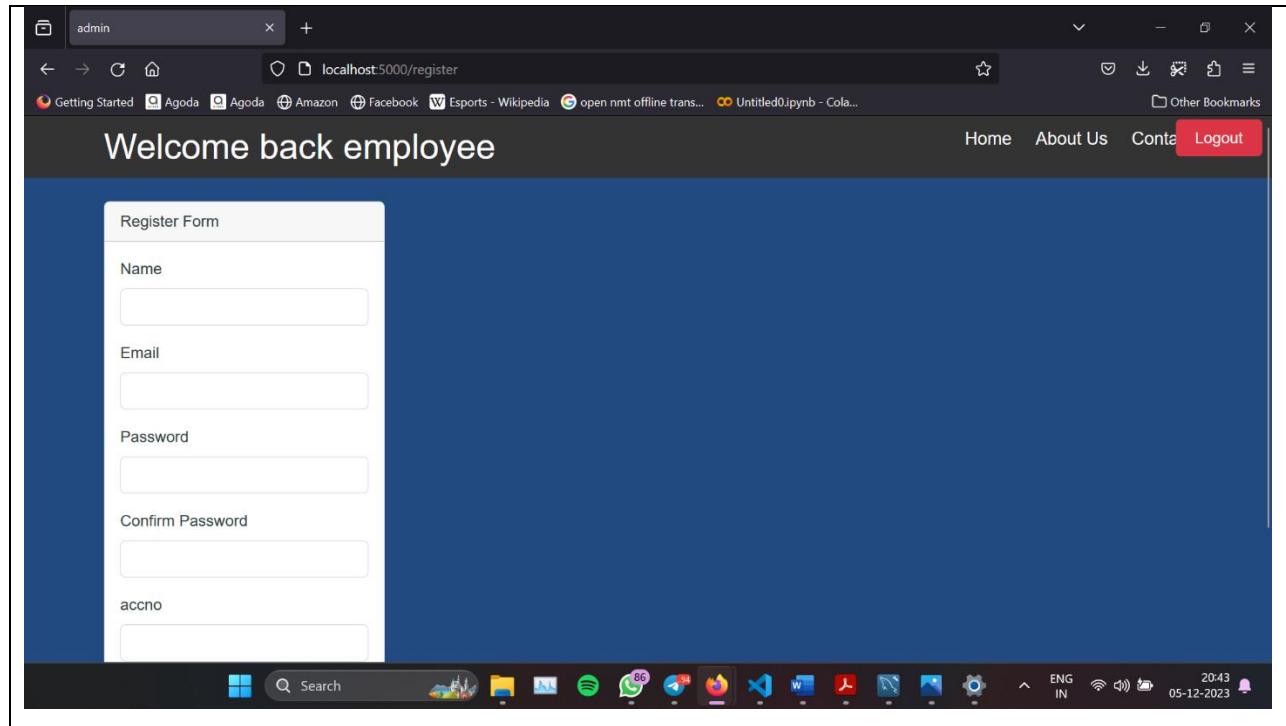


Figure 6.8 Admin page

The results demonstrate the successful implementation and functionality of the Online Bank Management System under various inputs. The system handles user authentication, transaction processing, and database management effectively, providing a reliable and user-friendly experience for both administrators and customers.

7 Conclusion & Future Scope

7.1 Conclusion

The Online Bank Management System has been successfully developed, addressing the objectives outlined in the initial problem statement. The project aimed to create a user-friendly and secure platform for banking activities, and through rigorous development and testing, these objectives have been met.

Key Achievements:

- **User Authentication:** The implemented user authentication system ensures secure access, protecting user accounts from unauthorized access.
- **Transaction Processing:** The system effectively handles fund transfers, ensuring accurate updates to user account balances while maintaining data integrity.
- **Database Management:** MySQL facilitates robust data storage and retrieval, contributing to the overall efficiency of the system.

Application Areas: The project finds application in real-world banking scenarios, providing a foundation for the development of secure and scalable online banking systems. Its modular design allows for easy integration of additional features, making it adaptable to the evolving needs of financial institutions.

In conclusion, the Online Bank Management System is a foundation for continuous improvement and adaptation to the ever-evolving landscape of online banking. It is poised for future enhancements that align with the dynamic needs and expectations of users and the financial sector.

7.2 Future Scope

While the current version fulfills the outlined objectives, there is significant potential for future enhancements and expansions of the Online Bank Management System.

Areas for Improvement:

- **Enhanced Security Measures:** Implementing advanced security features such as multi-factor authentication (MFA) or biometric verification can further fortify user accounts against unauthorized access.
- **Transaction Analytics:** Integrating analytics tools to track and analyze transaction patterns can aid in identifying and preventing fraudulent activities.
- **Mobile Application Development:** Expanding the system to include a dedicated mobile application can provide users with greater flexibility and accessibility.

Extended Features:

- **Notification System:** Implementing a notification system for users to receive alerts on transactions, account updates, and other important information.
- **More Functionalities to Admins:** Extending the system to handle and view all transactions, blocking users and security standards.

8 Bibliography

List of references you used for the project in the following order

- "Learning MySQL" by Seyed M.M. (Saied) Tahaghoghi and Hugh E. Williams
- "Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics" by Jennifer Niederst Robbins
- W3Schools. "Node.js Tutorial." -<https://www.w3schools.com/nodejs/>
- MDN Web Docs. "Express/Node introduction." - https://developer.mozilla.org/en-US/docs/Learn/Server-side/Express_Nodejs/Introduction
- MySQLDocumentation. "MySQL8.0ReferenceManual." <https://dev.mysql.com/doc/refman/8.0/en/>
- Stack Overflow. <https://stackoverflow.com/>