



**THE CATHOLIC UNIVERSITY OF EASTERN AFRICA**

**FALCUTY OF SCIENCE**

**DEPARTMENT OF COMPUTER AND INFORMATION SCIENCE**

**ONLINE BUS TICKET RESERVATION SYSTEM**

**(CASE OF EASY COACH)**

**BY**

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**A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILMENT OF  
REQUIREMENT FOR AWARD OF THE DEGREE BACHELOR OF SCIENCE IN  
COMPUTER SCIENCE**

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## DECLARATION

I, Peter Sila Kioko, declare that this research is my original work and it has never been submitted to any other institution for academic purposes. I also confirm that all the sources of information used in this work are acknowledged.

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## DEDICATION

I dedicate this research project to my parents, colleagues, my supervisor Mr. Chris, Easy Coach members and the CUEA family who have supported me and helped me in the research. This research aims to shed light on the significant impact of these transport sectors on economic development, and social well-being.

## ACKNOWLEDGEMENT

First, I would like to thank God for giving strength and knowledge to undertake this research project.

I would like to express my gratitude to my supervisor Mr. Chris, for guiding me throughout the project to make it a success.

I would like to express my heartfelt gratitude to my parents, family, friends and colleagues who gave me support and have contributed to the successful completion of this research project. Special thanks to my parents for the financial support and words of encouragement.

I extend my appreciation to the members of Easy Coach who willingly participated in interviews, and provided valuable data and information. Without the cooperation, this research would not have been possible.

## ABSTRACT

*An online bus ticket booking system is a web application that works in one centralized network. This project presents a review of the software "Bus Ticket Reservation System" as it should be used in the bus transport system, a system used for reservations, cancellations, and different types of route requests is used for guaranteed Quick booking. The bus ticket management system is designed to manage and computerize traditional databases, book tickets and track buses and trips made. It keeps all the customer details, bus details, and Booking Details.*

*To carry out the design, Easy Coach Transport Company was chosen as the unit of a case study due to its strategic importance to the transport sector. Analyze structured systems and the design method was adopted. The software produced can improve hand and customer relationships Manage activities. We recommend that, although the current functionality of the Designed software, additional functions such as using email to send tickets, notify customers, and pay online by credit/debit card must be deployed in the system. Furthermore, other activities performed by ITC like mailing Services also need to be integrated to improve the system.*

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## TERMS AND ABBREVIATIONS

CSS – Cascadian Styling Sheet

FAQs – Frequently Asked Questions

FK – Foreign Key

HTML – Hyper Text Markup Language

ID – Identification Document Number

PHP – Hypertext Preprocessor

PK – Primary Key

## CHAPTER ONE

### 1.0 INTRODUCTION

In this chapter, we have an introduction to the study of bus reservation and ticketing. The background presents the basis on which the problem statement is derived from. The objective and research questions are presented. The chapter also provides the justification, scope, and research organization.

### 1.1 BACKGROUND

The transportation industry plays an important role in modern society, ensuring the efficient movement of people and goods. Within this sector, the bus transport system serves as a crucial means of public and private transportation, connecting people across various destinations. In recent years, the integration of technology into this system has revolutionized the way travelers plan and book their journeys.

Traditionally, bus ticket reservations were primarily managed through manual processes, necessitating travelers to physically visit ticket counters or rely on agents to secure their seats. This approach posed numerous challenges, including limited accessibility, long queues, and a lack of real-time information. The demand for a more convenient, efficient, and user-friendly system gave rise to the concept of online bus ticket booking.

The "Bus Ticket Reservation System" is an innovative web application designed to address these challenges. It offers a centralized network that enables passengers to browse bus schedules, select preferred routes and seats, and make reservations online. Additionally, it streamlines booking processes, offering features for cancellations, modifications, and providing up-to-the-minute information on bus availability and schedules. This system not only enhances the experience for passengers but also facilitates the operational aspects for bus companies.

As part of this research, Easy Coach Transport Company was selected as a case study to assess the practical implementation of the software and its impact on the transport sector. The project adopts structured systems analysis and design methodologies to ensure the software aligns with industry requirements.

While the current functionality of the system represents a significant advancement in bus ticket booking, this research also highlights the potential for further enhancements.

Recommendations include integrating email ticketing, online payment options, and mailing services to improve the overall system.

The "Bus Ticket Reservation System" represents a transformative approach to modernize and optimize bus ticket booking in the transportation sector. It aims to enhance the experience for passengers, streamline operations for bus companies, and improve overall efficiency and accessibility within the bus transport system.

## 1.2 PROBLEM STATEMENT

In the context of the contemporary transportation industry, the traditional methods of bus ticket reservation and management present a series of challenges and inefficiencies. The reliance on manual processes, paper-based tickets, and in-person transactions has limited accessibility, created congestion at ticket counters, and impeded real-time communication of information. These issues have hindered the overall quality of service in the bus transport system.

The key problems that this research aims to address include:

**Inefficient Booking Processes:** Traditional ticket booking processes often lead to long queues and delays at ticket counters, inconveniencing passengers and negatively impacting the customer experience.

**Lack of Real-Time Information:** Passengers often face difficulties obtaining real-time information on bus schedules, availability, and seat selection, leading to uncertainty and inconveniences. Since a customer has to travel to the booking offices in order to get information on any changes on bus schedules.

**Operational Challenges:** For bus operators, manual ticketing processes are labor-intensive and prone to human errors, impacting operational efficiency. This causes delay and may lead to late travels which may affect customer plans.

**Opportunities for Improvement:** While online bus ticket booking systems have made significant improvements, there are still opportunities for enhancement and further integration with modern technologies to enhance the passenger experience and streamline bus operations.

### 1.3 OBJECTIVES

#### Main Objective

- To provide flexibility to customers since booking can be done without travelling to the booking office.
- Provide a user-friendly bus ticket booking facility on the web so customers can get bus tickets through the online system without having to queue at the offices.

#### Specific Objectives

1. Design and implement a secure, user-friendly, and efficient web-based platform.
2. Streamline the ticket booking process for users.
3. Provide real-time information on bus schedules and seat availability.
4. Enhance security measures to prevent fraud.

### 1.4 JUSTIFICATION OF RESEARCH

The research on the implementation and optimization of an online bus ticket reservation system is motivated by the pressing need to address the long-standing challenges and inefficiencies in the traditional bus ticket booking processes. The reliance on manual, in-person transactions and paper-based ticketing methods has resulted in operational difficulties, inconvenient customer experiences, and limited accessibility.

By examining the "Bus Ticket Reservation System" and its impact on the bus transport sector, this research not only aims to contribute to the modernization and optimization of the industry but also to improve the overall quality of service for passengers. Moreover, the potential for further enhancements, such as email ticketing and online payment options, suggests the system's transformative potential for the entire sector. This research serves as a proactive step toward a more efficient, accessible, and customer-centric bus transportation system and aligns with the broader global trends of digitalization and improved service delivery.

### 1.5 SCOPE

This research project will primarily focus on the evaluation and analysis of the "Bus Ticket Reservation System" as implemented in the context of Easy Coach Transport Company, chosen as a representative case study. The scope encompasses an in-depth examination of the system's design, functionality, and its impact on both passengers and bus operators. The research will



assess the system's ability to address challenges in traditional ticket booking processes, enhance passenger experiences, and streamline operational aspects for bus companies.

Specific aspects to be investigated include the online booking process, accessibility for passengers, real-time information provision, and operational efficiencies. While the project is centered on the case study, the findings and recommendations are expected to hold relevance for the broader bus transport sector, offering insights into the potential for the wider adoption of online bus ticket reservation systems. However, it's important to note that this research does not include the actual development or modification of the software but rather focuses on evaluating its current functionality and suggesting areas for potential improvement.

## 1.6 RESEARCH ORGANIZATION

The research proposal is divided into three chapters:

*Chapter 1, Introduction* - Covers the background, problem statement, objectives, scope, and justification of the research.

*Chapter 2, Review of literature* - Will cover the various methodologies that will be used in literature review, requirement specification, data collection and analysis techniques, system analysis, system design, system implementation, system testing and system development.

*Chapter 3, Research Methodology* - Will be coverage of the history of research area and gaps our research will fill.

*Chapter 4, System Analysis* - Description of the current systems, requirement analysis, feasibility study and its conclusions.

*Chapter 5, System Design* - Description of the proposed system its weaknesses and strengths, conceptual architecture of the proposed system input/output of the proposed system.

*Chapter 6, Implementation and Testing* - Implementing the system, testing plan, evaluation plan and system screenshots.

*Chapter 7, Conclusions and Recommendations* - Conclusions, findings, problems encountered and future recommendations.

## CHAPTER TWO

### 2.0 REVIEW OF RELATED WORK

The transformation of the transportation industry through digital technologies has been a point of research in recent years. Traditional bus ticket reservation systems have long struggled with inefficiencies and inconveniences. Conventional processes, entailing physical visits to ticket counters and reliance on intermediaries, have led to long queues, delays, and customer dissatisfaction. These challenges have been consistently documented in the literature, underscoring the necessity for a more efficient and accessible solution.

In response, online bus ticket reservation systems have emerged as an important innovation, bringing a new era of convenience and transparency. The ability for passengers to browse routes, select preferred seats, and complete reservations online has dramatically improved the booking process. Furthermore, the real-time information provided by these systems, including updates on bus schedules, seat availability, and tracking of buses in real-time, has reduced the uncertainties that often-accompanied traditional ticketing.

Research findings, including case studies and empirical evidence, illuminate the profound impact of these systems on passenger experiences, revealing higher levels of satisfaction and convenience. They have revolutionized the accessibility of bus transportation services, particularly in remote or underserved areas, thereby expanding the market reach of bus operators. This literature review underscores the transformational power of online bus ticket reservation systems, setting the stage for further investigation into their practical implementation and the potential for system enhancements.

### 2.1 HISTORY OF RESEARCH TOPIC

The history of research on the topic of online bus ticket reservation systems is rooted in the broader evolution of transportation and information technology. The need for efficient and accessible methods of booking bus tickets has been a concern for decades. Traditional ticket reservation processes, characterized by manual transactions at ticket counters and reliance on physical intermediaries, created persistent challenges. The growth of the internet and e-commerce, beginning in the late 20th century, marked a significant turning point.

Early online booking platforms emerged as airlines and railway services transitioned towards digitized ticketing. The transportation sector realized the transformative potential of these systems and began to explore their application in the bus transport industry. With the

widespread availability of the internet and the increment of mobile devices, online bus ticket reservation systems gained traction. The early systems offered basic functionalities, such as schedule information and online payment options.

As technology continued to advance, so did the sophistication of these systems. Real-time tracking of buses, seat selection, and automated ticket cancellation and modification options were integrated. With each iteration, these systems not only addressed historical limitations but also gives a way for further enhancements, such as email ticketing and improved accessibility for passengers. The history of research on this topic mirrors the broader shift towards digitalization in the transportation industry, underscoring the dynamic interplay between technology and convenience in the domain of bus ticketing.

## 2.2 REVIEW OF RELATED PROTOTYPES, SYSTEMS

### 2.2.1 Booking.com

While primarily known for hotel bookings, Booking.com has expanded its services to include bus ticket booking, offering a global platform for passengers to reserve bus seats. It provides a user-friendly interface and a wide network of partners.

### 2.2.2 Busbud

Busbud is a global bus travel booking platform that allows users to search for and book bus tickets worldwide. It offers an extensive database of bus routes and operators, making it a convenient choice for international travelers.

### 2.2.3 RedBus (India)

RedBus is a widely recognized online bus ticket booking platform in India. It offers comprehensive services for passengers to book tickets, check schedules, and track buses. It also includes features like seat selection and real-time tracking.

### 2.2.4 Easy Coach (Kenya)

Easy Coach, as the case study for this research, has its own online bus ticket reservation system. Passengers can book tickets, check bus schedules, and select seats through their website and mobile app. It serves as a prominent example of a local system.

### 2.2.5 MyBusTickets (Nigeria)

MyBusTickets is a Nigerian-based online platform that allows passengers to book bus tickets, check routes, and view available seats. It primarily caters to the Nigerian market, offering regional bus services.

## 2.3 EMERGING TRENDS AND PATTERNS

Emerging trends and patterns in the field of online bus ticket reservation systems include the adoption of new technologies and evolving customer preferences. Here are some key trends and patterns:

### 2.3.1 Mobile-First Booking:

With the proliferation of smartphones, passengers are increasingly using mobile apps for booking bus tickets. Mobile-first design and features like mobile payments and e-tickets are becoming standard.

### 2.3.2 Contactless Payments:

Contactless payment methods, including mobile wallets and contactless cards, are gaining popularity. Passengers prefer touchless transactions for safety and convenience.

### 2.3.3 Real-Time Updates:

Passengers expect real-time updates on bus locations, schedules, and delays. GPS tracking and live alerts are becoming essential features.

### 2.3.4 Integration with Other Modes of Transport:

Comprehensive travel planning apps are integrating bus booking with other transportation modes like trains, subways, and ride-sharing services to provide seamless end-to-end journeys.

### 2.3.5 Personalization:

Systems are increasingly using AI and data analytics to personalize the booking experience. Passengers receive recommendations based on their travel history and preferences.

## 2.4 RESEARCH GAP

While online bus ticket reservation systems have made significant strides in revolutionizing the way passengers' book and manage their bus journeys, there exists a noticeable research gap in the comprehensive evaluation of the practical implementation and impact of such systems within the local and regional context, particularly in Kenya. The majority of existing research predominantly focuses on global or national systems or general trends in the field, neglecting in-depth examinations of the functionality and effectiveness of systems implemented by local bus companies.

This research project seeks to address this critical gap by conducting a case study of the "Bus Ticket Reservation System" within the context of Easy Coach Transport Company, a key player in Kenya's transportation sector. The emphasis on this specific local implementation is aimed at providing insights into the unique challenges and opportunities faced by local bus operators and passengers, which may differ significantly from global or national counterparts. By delving into the intricacies of a local system, this research aims to fill a critical gap in understanding how online bus ticket reservation systems can be optimized to cater to the specific needs and expectations of passengers and operators in a localized setting.

## CHAPTER SUMMARY

This chapter outlines the historical context, emphasizing the transformation brought by digital technologies. The review introduces key global and local systems and prototypes. Emerging trends, such as mobile-first booking and contactless payments, are identified, indicating the dynamic nature of the field. The chapter reveals the research gap. This sets the stage for a case study within Kenya's transportation sector, aiming to address this critical gap and optimize online bus ticket reservation systems for local needs.

## CHAPTER THREE

### 3.1 RESEARCH METHODOLOGY

In this chapter, we will delve into the research methodology adopted for this study, which is aimed at evaluating and improving the "Bus Ticket Reservation System" within the context of Easy Coach Transport Company. We will discuss the research design, data collection methods, data analysis techniques, and ethical considerations. Additionally, we will provide insights into the case study approach and the criteria for selecting Easy Coach as the unit of analysis.

### 3.2 METHODOLOGY OF REQUIREMENT SPECIFICATION, DATA COLLECTION

#### 3.2.1. Requirement Specification:

##### *3.2.1.1 Literature Review:*

The transformation of the transport industry through digital technology has been a focus of research in recent years. Traditional bus ticket booking systems have long suffered from inefficiencies and inconveniences, leading to a shift towards digitalization. This review highlights key aspects of this development, with case studies and empirical evidence illustrating the transformative power of online bus booking systems.

##### *3.2.1.2 Stakeholder Interviews:*

I engage with key stakeholders, including passengers, bus operators, and system administrators. Conduct interviews to gather insights into their specific requirements and expectations. Then I document their feedback on the current system's strengths and weaknesses.

##### *3.2.1.3 Surveys:*

I develop and distribute surveys to a sample of passengers who have used the "Bus Ticket Reservation System." The survey should include questions about their experiences, preferences, and suggestions for system improvements.

##### *3.2.1.4 System Analysis:*

Analyze the existing "Bus Ticket Reservation System" to extract requirements from the system itself. Review its features, workflows, and limitations. Identify areas where enhancements or modifications are needed.

### 3.2.2. Data Collection:

#### *3.2.2.1 Data Sources:*

Collect primary data from surveys, interviews, and direct observations of system usage. Collect secondary data from existing reports, documents, and databases related to the "Bus Ticket Reservation System."

#### *3.2.2.2 Surveys:*

Design and distribute surveys to passengers who have used the system. The surveys should collect quantitative and qualitative data on user experiences and expectations.

#### *3.2.2.3 Interviews:*

Conduct structured interviews with key stakeholders, including passengers, bus operators, and system administrators. Record their responses and insights regarding system requirements.

#### *3.2.2.4 Observations:*

Observe real-time interactions with the system, either through usability testing or by monitoring system usage data. Note any pain points, user behavior, and opportunities for improvement.

#### *3.2.2.5 Document Analysis:*

Review existing documents, reports, and system specifications related to the "Bus Ticket Reservation System." Extract relevant information about system requirements and performance.

#### *3.2.2.6 Data Validation:*

Ensure data validation and reliability through methods such as cross-referencing survey responses, comparing interview data, and conducting follow-up interviews for clarification.

### 3.2.3. Data Analysis:

#### *3.2.3.1 Data Compilation:*

Compile and organize the collected data into a structured format, making it ready for analysis.

#### *3.2.3.2 Data Coding and Categorization:*

Code and categorize the qualitative data obtained from interviews and open-ended survey questions. This process will help in identifying recurring themes and requirements.

#### *3.2.3.3 Quantitative Analysis:*

Analyze quantitative data, such as survey responses, using statistical techniques to identify patterns and correlations.

#### *3.2.3.4 Requirement Elicitation:*

Synthesize the information gathered from requirement specification and data collection to define specific system requirements and enhancements. Prioritize these requirements based on stakeholder feedback and the research findings.

This methodology will guide the systematic collection of data and requirement specifications, ensuring that the research objectives of evaluating and improving the "Bus Ticket Reservation System" are met effectively and rigorously. It combines multiple data sources and analytical techniques to generate comprehensive insights for system enhancement.

### **3.3 METHODOLOGY FOR SYSTEM ANALYSIS**

The systems analysis method in this research project uses a structured approach to comprehensively evaluate a “bus ticket booking system”. The analysis covers several key aspects of the system, including functionality, technical components, user experience, performance, and security. This process begins with a systematic review of system requirements, gathered through document reviews, stakeholder interviews, and data collection methods. These requirements form the basis for the analysis. Functional analysis involves analyzing a system's core functions, including use cases and workflows, to understand how it operates and how users interact with it.

Technical analysis digs deeper into the system architecture, database structure, and technology stack to evaluate its underlying infrastructure. Usability and user experience analysis evaluates the effectiveness of the user interface, while performance analysis evaluates system responsiveness, load management, and response time. Security analytics is essential to verify data protection measures, access controls, and vulnerability assessments. Results from each analysis perspective are compiled and compared to the identified requirements.

This comprehensive assessment serves as the basis for subsequent design and optimization efforts. This method ensures that the research project rigorously evaluates the “bus booking system” and identifies opportunities to improve the system, aligning it with the research objectives.



### 3.4 METHODOLOGY FOR SYSTEM DESIGN

The system design methodology in this study includes a structured approach to optimize the “bus ticket booking system” to improve user experience. This starts with a careful review of the requirements gathered from stakeholders and detailed data collected. The first step is to develop a high-level conceptual design that describes the overall system architecture, database schema, and user interface. Detailed design specifications are then followed, comprehensively defining system functionality, data management processes and user interfaces. Prototypes and simulation models are created to visualize the design and validate it with stakeholders.

Choosing the right technology and complying with industry standards is indispensable. The system design is carefully documented, ensuring transparency and clarity. Finally, a comprehensive review of the design will ensure that it is consistent with the identified requirements and stakeholder feedback, leading to a series of recommendations for system implementation and improvement. success. This approach provides a systematic framework to transform existing systems, meet passenger needs and improve operational efficiency.

### 3.5 METHODOLOGY FOR SYSTEM IMPLEMENTATION

The system implementation phase involves converting the detailed system design into a functional system. This important step requires a systematic approach to ensure smooth and effective system implementation.

#### 3.5.1. Set up the development environment:

Implementation begins with setting up the necessary development environment. This includes setting up development servers, databases, and software tools necessary for system development.

#### 3.5.2. Coding and programming:

Skilled developers and programmers begin the coding phase, where they write the actual code of the system based on detailed design specifications. They adhere to coding standards and best practices to ensure code quality and maintainability.

##### 3.5.2.1 Front End:

This will involve the user interface part which the user will be interacting with when using the system.

**HTML 5** – (Hyper Text Markup Language) is a standard way of creating webpages. It contains element that will tell the browser how to display the content on a webpage.

**CSS** – (Cascadian Style Sheet) is used to describe a document written in HTML. It will be used to enable good presentation of content including layout, colors and fonts.

#### *3.5.2.2 Back End:*

This will involve implementing the part that the user cannot see and it will run on the web server each time a page is accessed.

**PHP** – is a well-suited open source language well suited for web development and can be easily embedded into HTML. Its code is executed from the server and is best suited to develop backend of systems.

**MySQLi** – this is on oracle based open source relational database management system based on a structured query language.

### **3.6 METHODOLOGY FOR SYSTEM TESTING**

System testing is an important stage in the development of a “Bus Ticket Reservation System” and involves ensuring that the system functions as expected, meets user requirements, and operates correctly. System testing methods are designed to comprehensively evaluate system performance and functionality.

#### **1. Test planning:**

The testing process begins with developing a detailed test plan. This plan describes the testing goals, scope, and approach. It defines specific test scenarios, test cases, and test environments to use.

#### **2. Scenarios and test cases:**

Scenarios and test cases are systematically designed to cover different aspects of the system. These include the booking process, payment transactions, seat assignments, user account management, and real-time tracking. Each test case is meticulously documented with inputs, expected results, and pass/fail criteria.

#### **3. Prepare test data:**

Test data, including passenger simulation information, route and payment details, is prepared to run test scenarios. Actual data ensures the system operates correctly under real conditions.

#### 4. Test execution:

Test cases are executed in a controlled test environment. This process involves performing positive and negative tests to evaluate how the system handles different situations. Positive testing validates expected behavior, while negative testing evaluates error handling and fault tolerance.

#### 5. Performance Testing:

Performance testing is performed to evaluate system response time and resource usage. Load testing, stress testing, and scalability testing are performed to determine system performance under different loads and conditions.

#### 6. Security testing:

Security testing involves evaluating system security measures, including data protection, access controls, and encryption. Vulnerability assessments are performed to identify potential risks and weaknesses.

#### 7. Compatibility Testing:

Compatibility testing is performed to ensure the system operates correctly across a variety of devices and browsers, catering to a diverse user base.

#### 8. User Acceptance Testing (UAT):

UAT involves the participation of actual users to validate the functionality and usability of the system. User feedback is considered for final adjustments and improvements.

System testing methodology ensures that the “Bus Ticket Reservation System” is thoroughly and systematically evaluated, including functionality, performance, security, and user experience.

### 3.7 METHODOLOGY FOR SYSTEM DEPLOYMENT

System deployment is an important phase in the development process of the enhanced "Bus Ticket Reservation System." This phase involves taking the designed system and making it operational for end-users.

Before initiating deployment, a thorough assessment of the system and infrastructure is conducted. This step includes evaluating the compatibility of the designed system with the

existing technology stack, network capabilities, and hardware requirements. Any necessary upgrades or adjustments are identified and addressed.

Comprehensive testing and quality assurance processes are carried out to ensure that the system functions as intended. This includes functional testing, performance testing, security testing, and user acceptance testing.

The necessary infrastructure, including servers, databases, and network configurations, is set up to support the system. Deployment environments, such as development, staging, and production, are established, each serving a specific purpose in the deployment process.

If applicable, data from the existing system is migrated to the new system. This includes customer information, booking records, and other relevant data. Data population may involve bulk imports and data transformation to align with the new system's structure.

Training sessions are conducted for system users, including passengers, bus operators, and system administrators. Training materials and user guides are provided to ensure a smooth transition. A dedicated support team is established to address user queries and issues during the initial deployment phase.

After the initial deployment, a post-deployment evaluation is performed to assess the system's performance, user satisfaction, and any unforeseen issues. This evaluation informs continuous improvements and maintenance.

## CHAPTER SUMMARY

The chapter contains the detailed processes of system analysis, design, and deployment, highlighting the importance of addressing user needs and the system's technical aspects. Each methodology phase is described in a sequence, ensuring that the enhanced "Bus Ticket Reservation System" is developed, deployed, and maintained in a way that aligns with industry standards, emerging trends, and the unique context of the local transportation sector in Kenya.

## CHAPTER FOUR

### 4.0 SYSTEM ANALYSIS

System analysis is an exciting, active field where analysts continually learn new techniques and approaches to develop systems more efficiently and effectively. This is according to Durnums, Wixom, and Roth (2008). In this chapter, we will be discussing the system analysis of the current bus booking system. This will involve a complete description of the system, use cases that describe different interactions of the system and the users.

This chapter will elaborate on how the existing systems work and also the flow of information through the systems. We shall use data flow diagrams, flowcharts, and also a context diagram of the system. We will also describe the strengths and weaknesses of the current system and with this regard, see the need to develop a new system to book bus tickets online.

#### 4.1 Description of the Current System (Its Strengths and Weaknesses)

With the current bus booking system, they have some limited methods of payment which are most local methods thus affecting foreigner who want to travel and make payments online.

In some travel companies once, a potential passenger identifies the bus they want to travel on, they must visit the bus station or a booking office in person to check the availability of seats and book their ticket. This process often involves standing in long queues, which can be time-consuming and inconvenient, especially during peak travel times.

Results of seat availability and ticket booking are presented by the booking clerk, who provides details of the bus, including departure and arrival times, seat availability, fare, and payment options. The passenger pays for the ticket in cash or through a point-of-sale system at the counter.

The booking clerk then issues a paper ticket, which the passenger must keep safe until the journey date. In case of any changes or cancellations, the passenger must revisit the booking office to make amendments, which can further add to the inconvenience.

The current system also involves multiple manual checks and updates to the booking records, which can lead to errors and delays in updating seat availability in real time.

## System Users

The current users of the system are as follows:

1. System Administrators:

Responsible for maintaining the booking records and updating seat availability.

Overseeing the overall functioning and performance of the booking system.

Implementing and managing security measures to protect user data and financial transactions.

Monitoring system performance and handling any technical issues that arise.

2. Booking Clerks:

Interact with customers to provide information about bus schedules, seat availability, and fares.

Process ticket bookings and issue paper tickets to passengers.

Handle cash transactions and manage the daily sales records.

Assist passengers with any changes or cancellations to their bookings.

3. Passengers/Users:

Seek information about bus schedules, seat availability, and fares.

Visit the booking office to purchase tickets and make payments.

Manage their travel plans, including any changes or cancellations to their bookings.

4. Technicians:

Handle installation and maintenance of hardware and software of the computer systems.

Troubleshoot network issues for system availability.

## Strengths of the Current System:

i. Personal Interaction: Direct interaction with booking clerks can be helpful for passengers who need assistance or have specific queries.

ii. Immediate Confirmation: Passengers receive their tickets immediately upon payment.

## Weaknesses of the Current System:

i. Inconvenience in Changes/Cancellations: Passengers find it difficult to do any modifications, adding to their inconvenience.

- ii. Manual Processes: High potential for errors and delays in updating seat availability due to use of manual processes at the booking offices.
- iii. Time-Consuming: Some services like parcel and goods requires physical presence at the booking office, which can be inconvenient and time-consuming.
- iv. Limited Accessibility: Passengers must visit during office hours, limiting flexibility.
- v. Lack of Real-Time Information: Delay in travel time not communicated in real-time.

## 4.2 Feasibility Study

A feasibility study is an evaluation and analysis that takes all of projects relevant factors into account including economic, technical, operational, and schedule factors to ascertain the likelihood of completing the project successfully.

### 4.2.1 Economic Feasibility

This involves the assessment of the cost benefits the proposed system. The development and implementation of a system comes with need in hardware and software upgrades. The overall costs of implementation per month were as follows;

<b>Development costs</b>			
<b>Items</b>	<b>Quantity</b>	<b>@item</b>	<b>Total Cost</b>
Servers	2	Kshs 15,000	Kshs 30,000
Software license	5	Kshs 1,000	Kshs 5,000
			<b>Kshs 35,000</b>
<b>Total Development Costs</b>			
<b>Operational Costs</b>			
<b>Item</b>	<b>Quantity</b>	<b>@item</b>	<b>Total Cost</b>
Hardware	1	Kshs 30,000	Kshs 30,000
Software	2	Kshs 2,500	Kshs 5,000
<b>Total Operational Costs</b>			<b>Kshs 30,000</b>
<b>Benefits</b>	<b>Quantity</b>	<b>@item</b>	
Reduced printing saving			Kshs 20,000
Savings from reduced staff	2	Kshs 60,000	Kshs 120,000
Income from service payments			

		Kshs 100,000
<b>Total Benefits</b>		
		<b>Kshs 240,000</b>
<b>Return of investment =</b>	<b>Total benefits-total development costs</b>	<b>240,000-65,000</b>
		<b>= Kshs 175,000</b>

*Table 1 Economic feasibility*

#### 4.2.2 Technical Feasibility

The main aim of this study was to examine whether the organization has the technologies required to develop and use the system. This study also examined whether the technologies are available for use or they can easily be accessed from the market.

The organization required tools and development tools and programming tools such as PHP, CSS3, HTML5, which are readily available for free to use to implement a system. The study also examined the availability of people with the knowledge and expertise to use these technologies to develop the system.

It was also noted that the organization required necessary technology such as computer systems, internet services, and mobile devices which are readily available at a small cost in Kenya's capital city. The system required setting up its own server host and database server or using a hosting provider, and being in Kenya's capital, there are many available hosting services to choose from. Hence the system implementation is feasible.

#### 4.2.3 Operational Feasibility

Operational feasibility is a measure of how well a proposed system solves the problems (Jaelson, 2011). The system should have a user-friendly interface and not be complicated to use for first-time users to be able to complete the transaction of booking bus tickets.

It was found that the organization being in the country's capital city, most of the potential users are computer literate, and hence using the system will not be difficult due to their computer literacy. With the user manual, new and first-time users will be directed step-by-step on how to use the system to book their bus tickets.



A survey was also carried out of the current work practices and procedures, assessing if the organization structure would be affected by the proposed system and how the potential users felt about the implementation of the proposed system. It was discovered that with the user manual, first-time users would be able to use the system following the instructions. Additionally, being technologically averse, it was observed that the majority of people have interacted with basic functioning and operations of a computer, therefore only minimal introduction on the use of the system is needed.

#### 4.2.4 Schedule Feasibility

This study involved the assessment of the timeframe and system completion dates with respect to organization constraints for affecting the changes. The system implementation should be completed in two semesters, that is a period of at most eight months. The system implementation will be able to be completed by the end of September 2021, hence the system implementation is time feasible.

#### 4.3 Feasibility Summary

Since the project is technically, operationally, and schedule feasible, the project as a whole is feasible. Despite the economic feasibility not being cost-feasible at the moment, the other points indicate that the project is feasible to develop.

#### 4.4 Process Logic Design of the Current System

##### 4.4.1 Flowcharts

These are the flowcharts that show the flow of processes taking place in the current system that is in place.

## Login

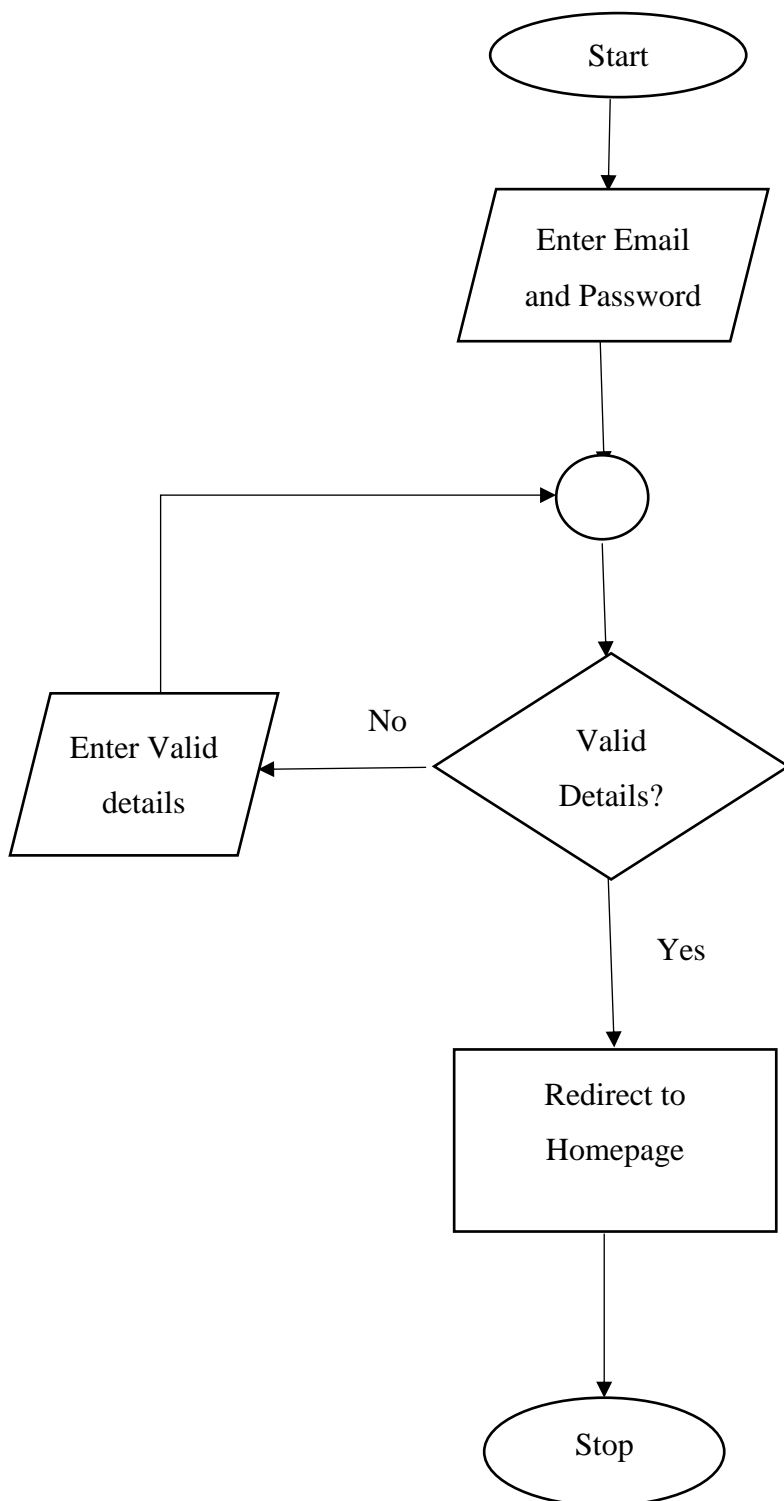


Figure 1 Current system login flowchart

## Log Out Flowchart

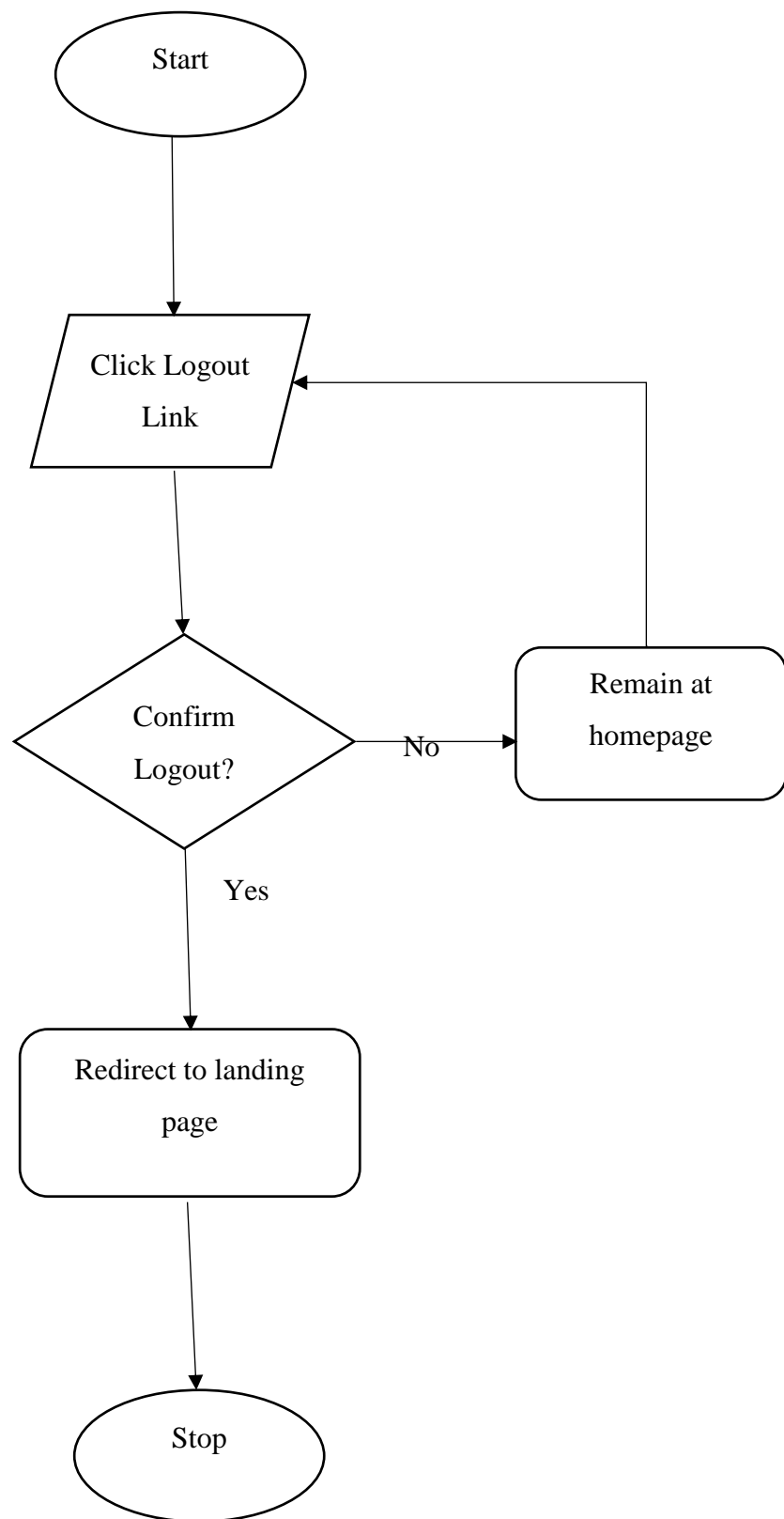


Figure 2 Current system logout flowchart

### Context Diagram

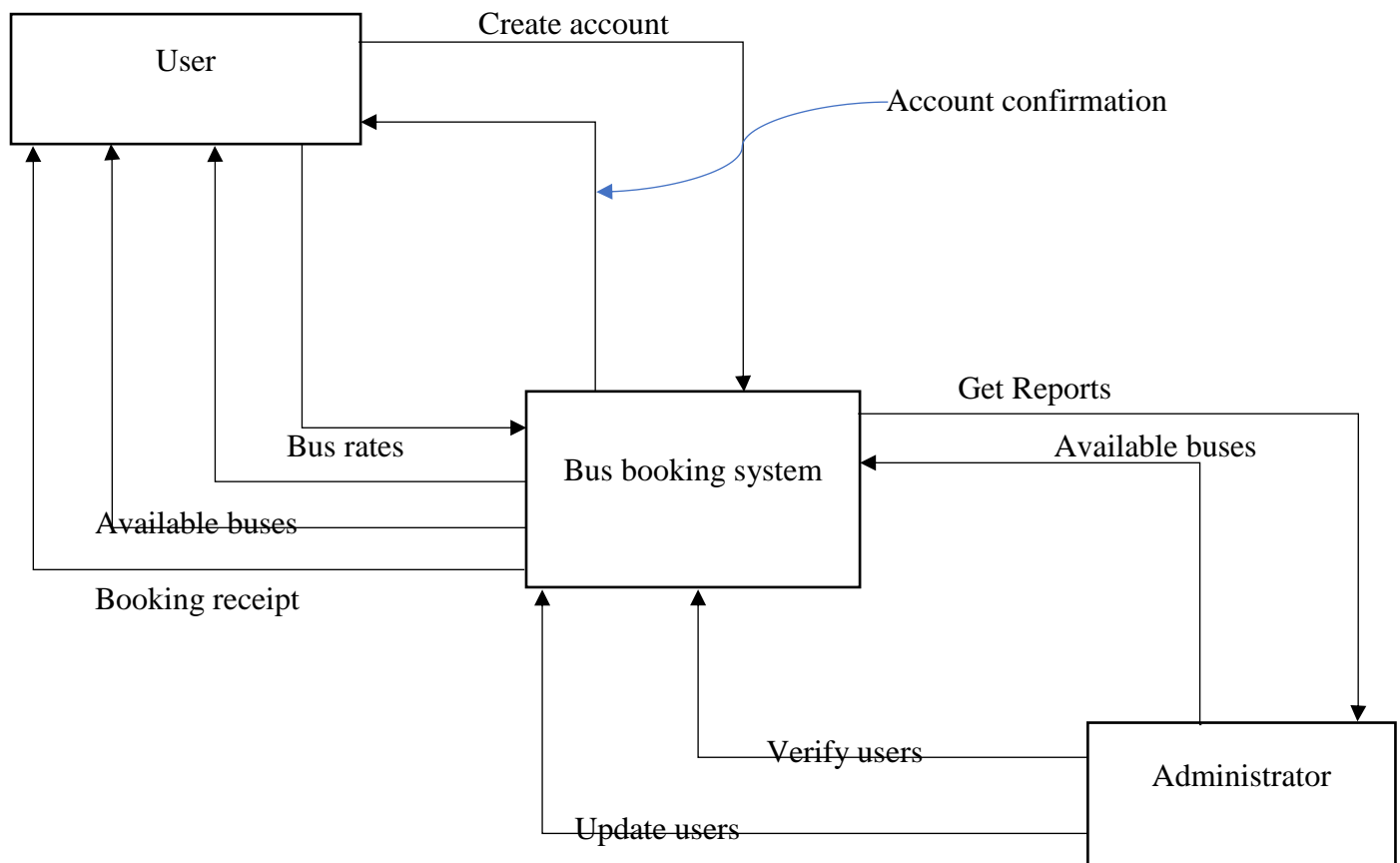


Figure 3 Context diagram of the current system

### 4.5 Data I/O Analysis

The data input/output analysis showed the input data the current system receives and the output information the system produces for the users. The current system receives login details of the users as the input where the users are first registered by entering their first name, last name, username, email, phone number, and password. These details are then stored in the system and username/email and password are required when the user logs into the system.

For the process of booking a bus ticket, the passenger enters the login details, searches for a bus that meets their travel requirements (specific route, date, and time), and proceeds with the booking process by selecting a seat and making payment. The system then generates an e-ticket which is sent to the passenger's email or can be printed out.

The system also has outputs of reports of tickets that have been booked via the system and feedback ratings from previous users. These reports include details such as bus schedules, booking trends, and user satisfaction metrics.

When the user logs into the system and the username/email and password are verified, the system gives the output information of available bus schedules, seat availability, and fares. These output details include; bus departure and arrival times, seat numbers, and ticket prices.

#### 4.6 Chapter Summary

In this chapter, we have reviewed and described the current system, the current system users, and also the different weaknesses and strengths of using the current system. It was also noted that the weaknesses outweigh the strengths of the current system, hence the need to develop a new improved system that will solve the problems with the current system. In addition, we have also conducted a feasibility study of the system and concluded that it is feasible to develop.

## CHAPTER FIVE

### 5.0 SYSTEM DESIGN OF THE PROPOSED SYSTEM

#### 5.1 Introduction

System design focuses on the evaluation of alternative solutions and the specification of a detailed computer-based system. This chapter will consider the design of the proposed bus booking system, including the user interface components, the inputs of the system, and the database design. We will elaborate on how the proposed system will work and the flow of information through the system. This chapter will describe the proposed system and review some of its strengths and weaknesses. We will use data flow diagrams, flowcharts, use case diagrams, conceptual diagrams, class diagrams, activity diagrams, and sequence diagrams.

#### 5.2 Description of the Proposed System (Strengths and Weaknesses)

The proposed system will be a web-based platform that allows users to search for available bus routes, book tickets, and manage their bookings. The system will store information about buses, routes, schedules, and user bookings. It will feature a user-friendly interface that facilitates easy interaction for users to search for bus routes, book tickets, and manage their bookings.

The system will have a front end for user interactions and a back end for storing bus details, user information, and booking records. The front end and back end will communicate seamlessly to fulfill the system's functionalities.

##### Strengths of the Proposed System:

- i. Security and Integrity: The system will enhance the security of user and booking information through secure passwords and user authentication.
- ii. Convenience: Users can search for bus routes, book tickets, and manage their bookings online, eliminating the need to visit a bus terminal.
- iii. User-Friendly Interface: The system will offer an interactive user interface, providing feedback for incorrect entries and confirming successful data entries.

##### Weaknesses of the Proposed System:

**Physical Ticket Collection:** In some cases, users may still need to collect physical tickets at the bus terminal, which can be an inconvenience.

## 5.3 Requirement Analysis

In this section, we will analyze the requirements for the system in order for it to be more user friendly. There are several types of requirements which include; functional and non-functional requirements as discussed below.

### 5.3.1 Functional Requirements

The system will perform the following functions:

- Capture user details during registration.
- Enable users and admins to log in.
- Allow users to search for available bus routes.
- Enable users to book tickets.
- Generate reports of bookings and transactions for the admin.
- Allow the admin to edit and delete bus information.
- Allow the admin to create, edit, or delete user accounts.
- Enable users to manage their bookings (view, edit).

### 5.3.2 Non-Functional Requirements

These requirements portray the goals the system aims to achieve.

#### 5.3.2.1 Security

The system will ensure secure access to confidential data by restricting access to unauthorized personnel. Different levels of access will be provided for admins and super-admins. Users will need valid usernames or emails and passwords to log in.

#### 5.3.2.2 Portability

The system will use standard programming languages to ensure it can run on new platforms without requiring code changes.

#### 5.3.2.3 Reliability and Dependability

The system will undergo rigorous testing to ensure it can perform its tasks without failures in the appropriate environment.

#### 5.3.2.4 Fault Tolerance

The system will resist and recover from failures, with regular backups to prevent data loss.

#### 5.3.2.5 User-Friendliness

The system will feature visible text and graphics, good color contrast, readable fonts, and easy navigation to accommodate first-time users.

#### 5.3.2.6 Scalability

The system will be designed to accommodate changing user requirements and accept modifications without failure.

### 5.4 System Users

The system will be used by individuals who are computer literate and have valid identification, typically those aged 18 and above. The users will include:

a) System Administrators:

These are people who will be responsible for:

- ✓ Add, edit, or delete user accounts.
- ✓ Add, edit, or delete bus routes and schedules.
- ✓ Monitor system logs and generate reports.

b) Users:

This are people who will be interacting with the system, that is, create accounts, search for bus routes, book tickets, and manage bookings. They can also edit or delete their booking information.

### 5.5 Usability

The system will be designed to provide an overall positive user experience, performing tasks as expected and informing users of any errors. It will guide users on how to use the system and include a FAQ section for additional support.

### 5.6 Conceptual Architecture of the Proposed System

The conceptual architecture of the proposed system will include the following components:

- i. User Interface: A web-based front end with forms and interactive elements for users to input and view data.
- ii. Database: A back end that stores user information, bus details, routes, schedules, and booking records.



- iii. Middleware: Logic that handles communication between the front end and the back end, ensuring data integrity and security.
- iv. Security Modules: Authentication and authorization mechanisms to protect user data and ensure secure access.

## 5.7 Process logic design of the proposed system. (data flow diagrams, use case diagrams, class diagrams, activity diagrams, and sequence diagrams)

Diagrams such as data flow diagrams, use case diagrams, class diagrams, activity diagrams, and sequence diagrams will be used to illustrate the system's design and functionality. This comprehensive design ensures the system meets user needs while being secure, scalable, and user-friendly.

### 5.7.1 System use case

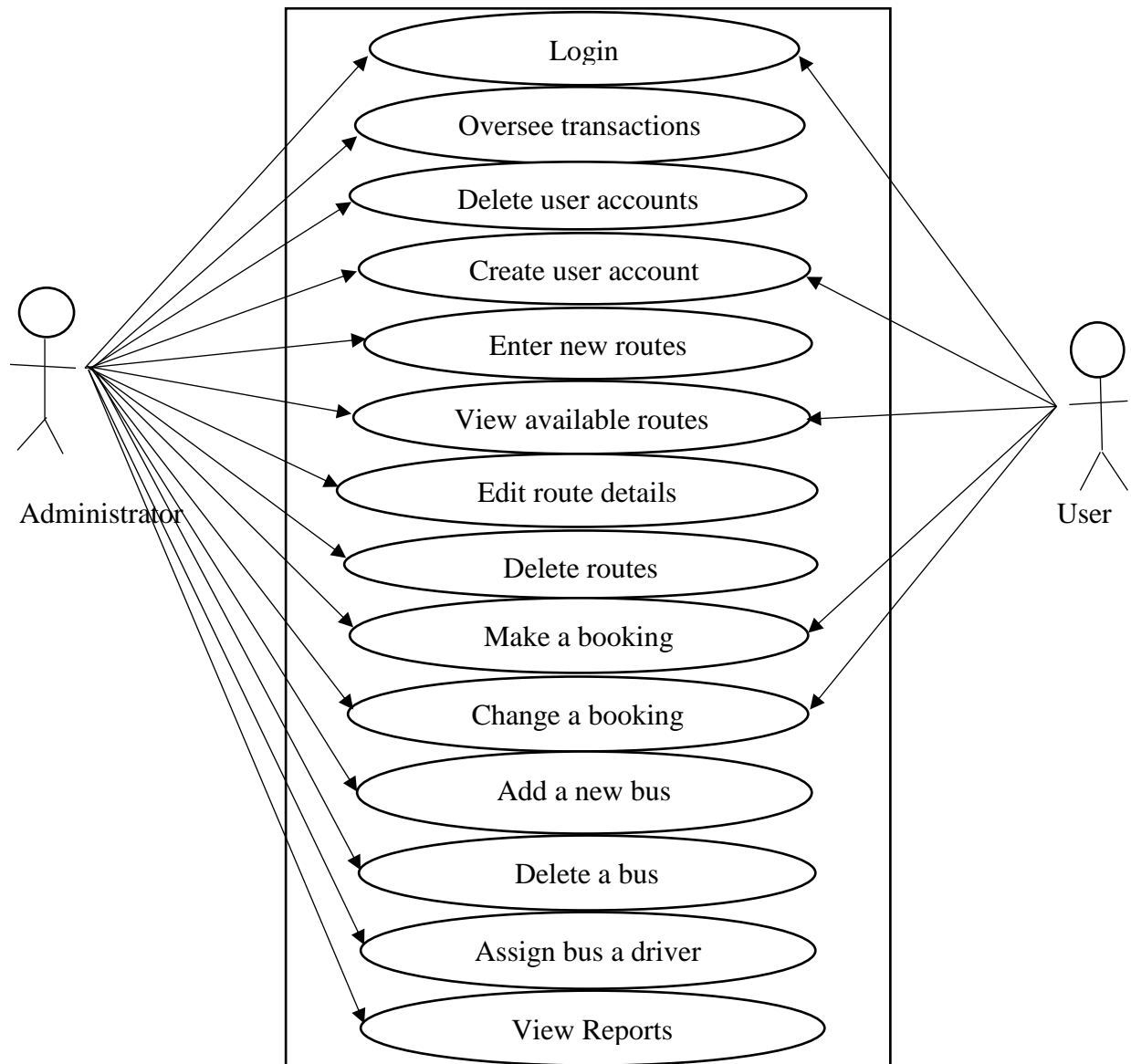


Figure 4 Use case Diagram of the system

### 5.7.2 System Activity Diagram

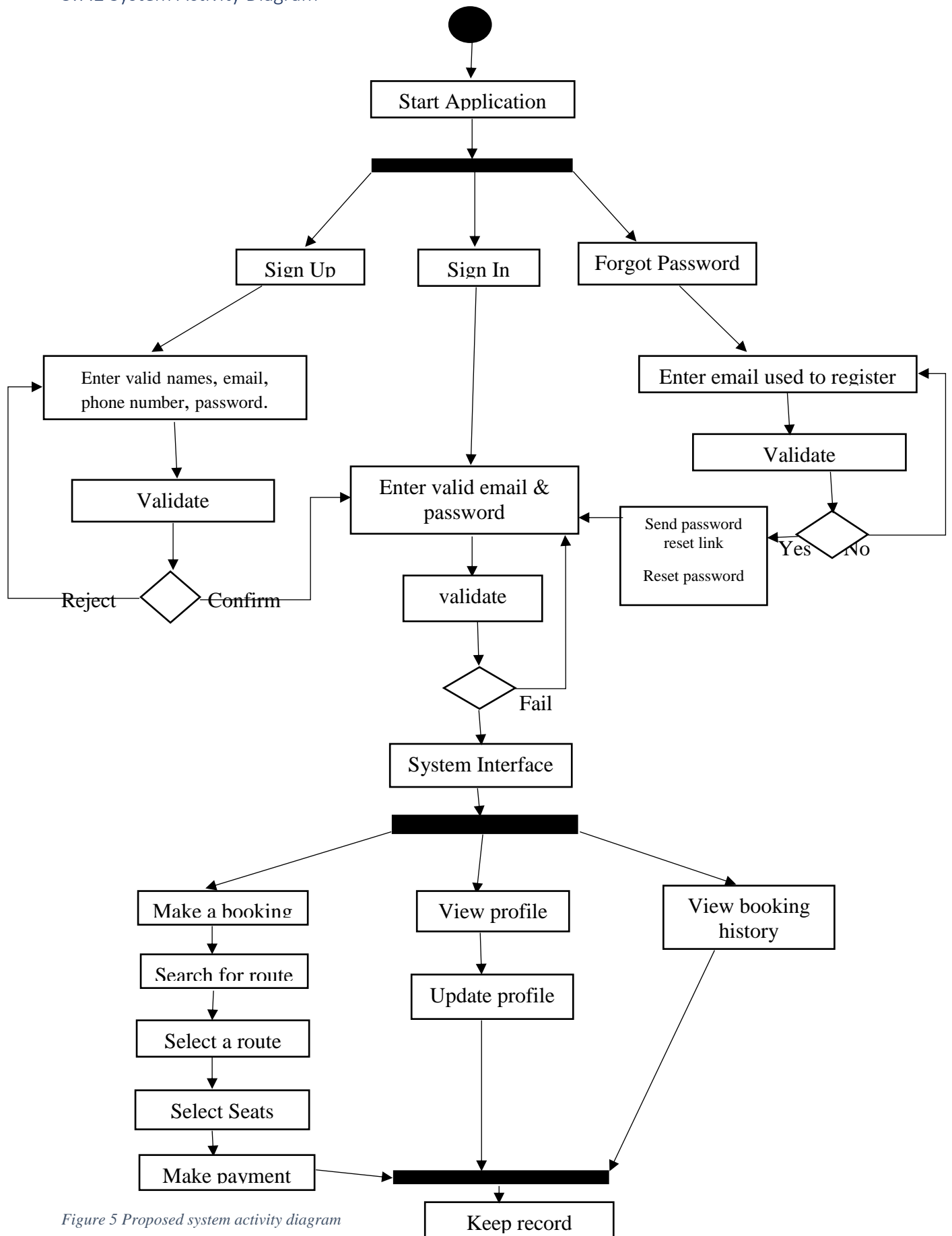


Figure 5 Proposed system activity diagram

### 5.7.3 System sequence diagram

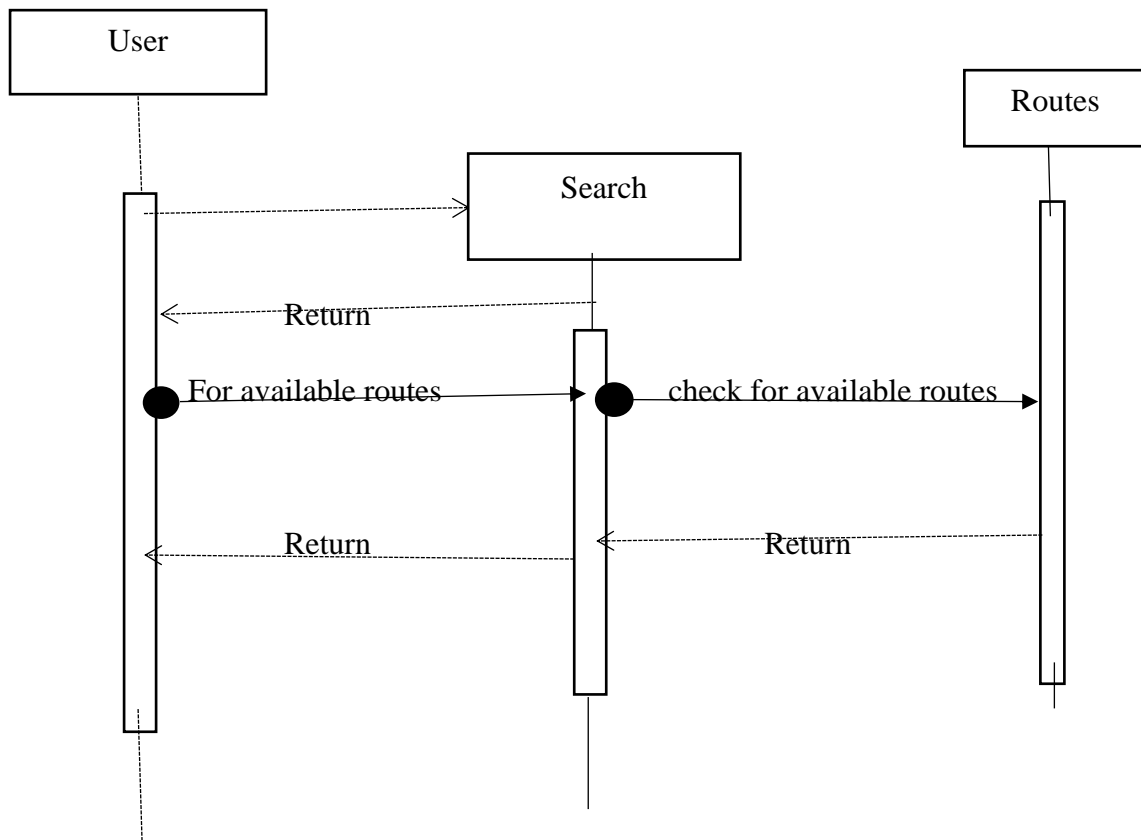


Figure 6 Proposed Sequence Diagram

#### 5.7.4 System flowcharts

This shows the flow of processes in the system.

##### 5.7.4.1 Register user flow chart

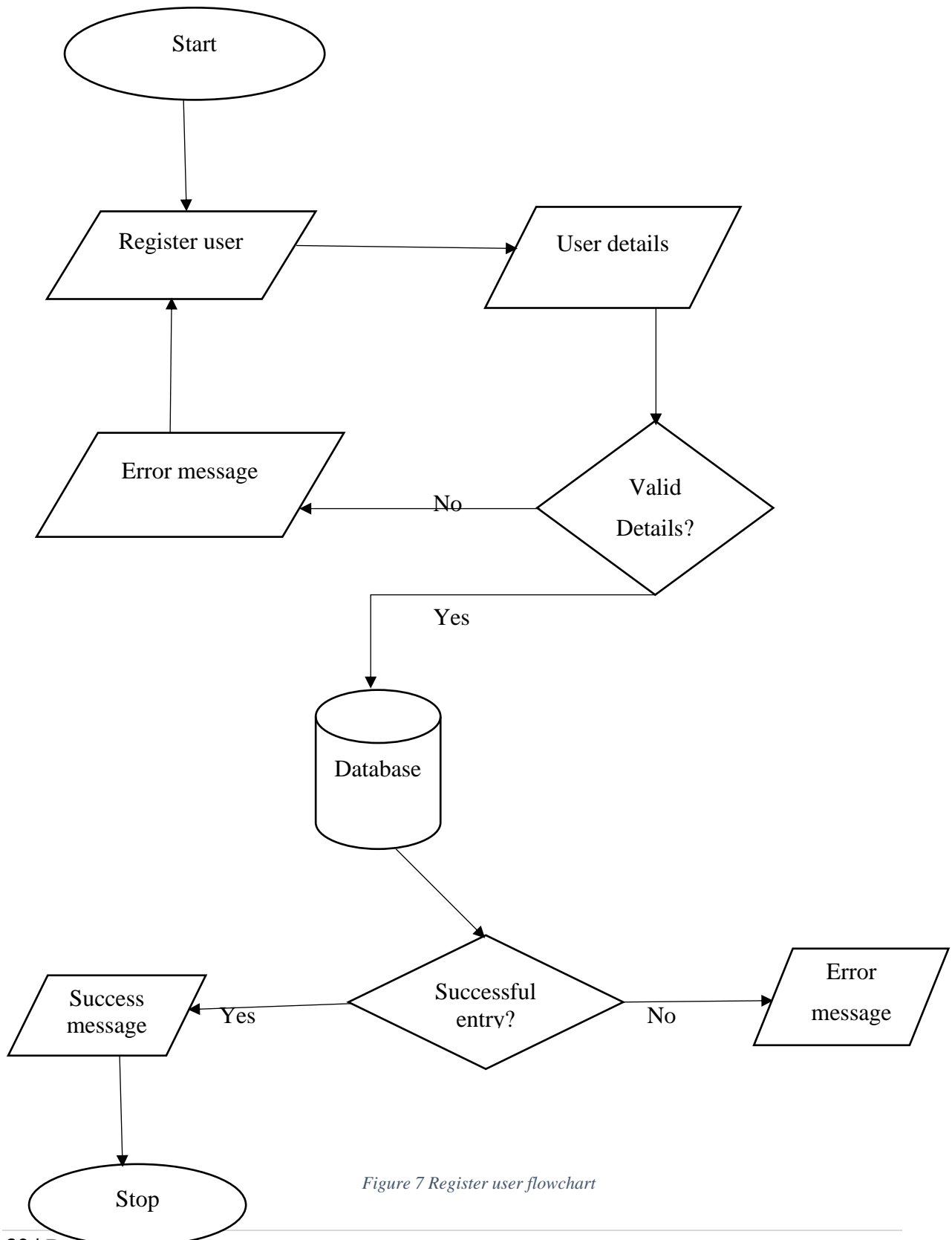


Figure 7 Register user flowchart

#### 5.7.4.2 Login Flowchart

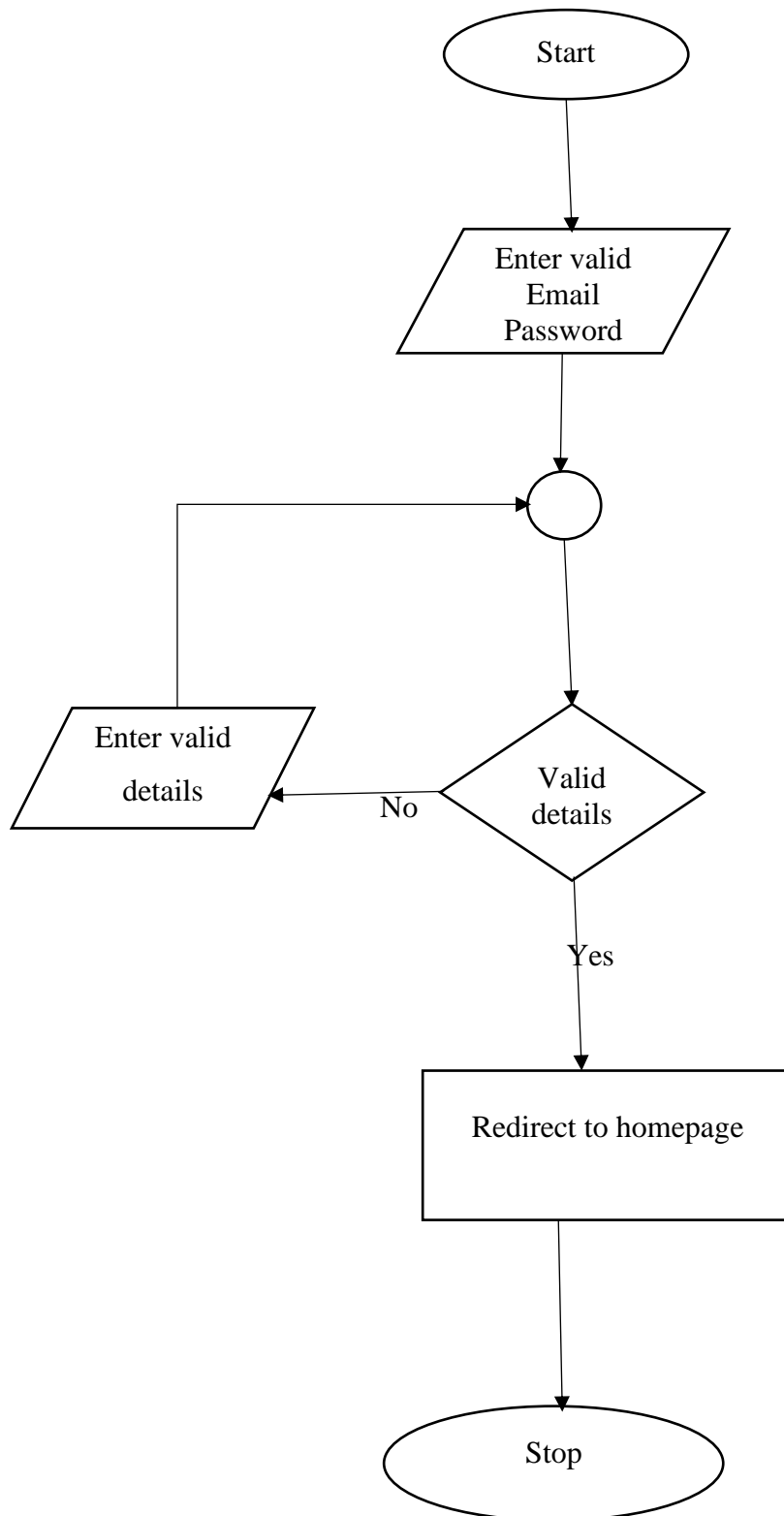


Figure 8 Login Flowchart

#### 5.7.4.3 Logout Flowchart

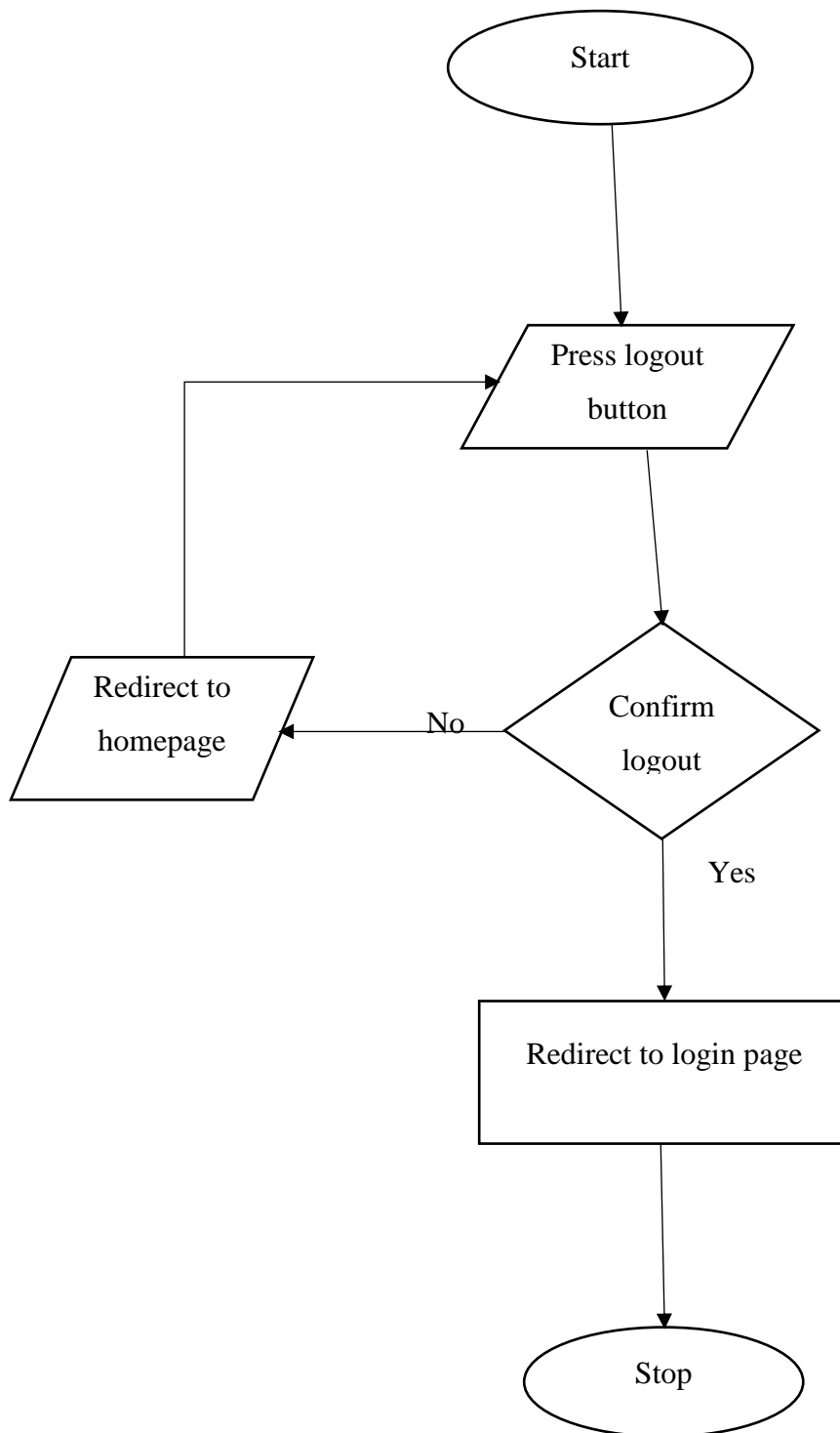


Figure 9 Logout Flowchart

### 5.7.5 System Context Diagram

#### Context Diagram

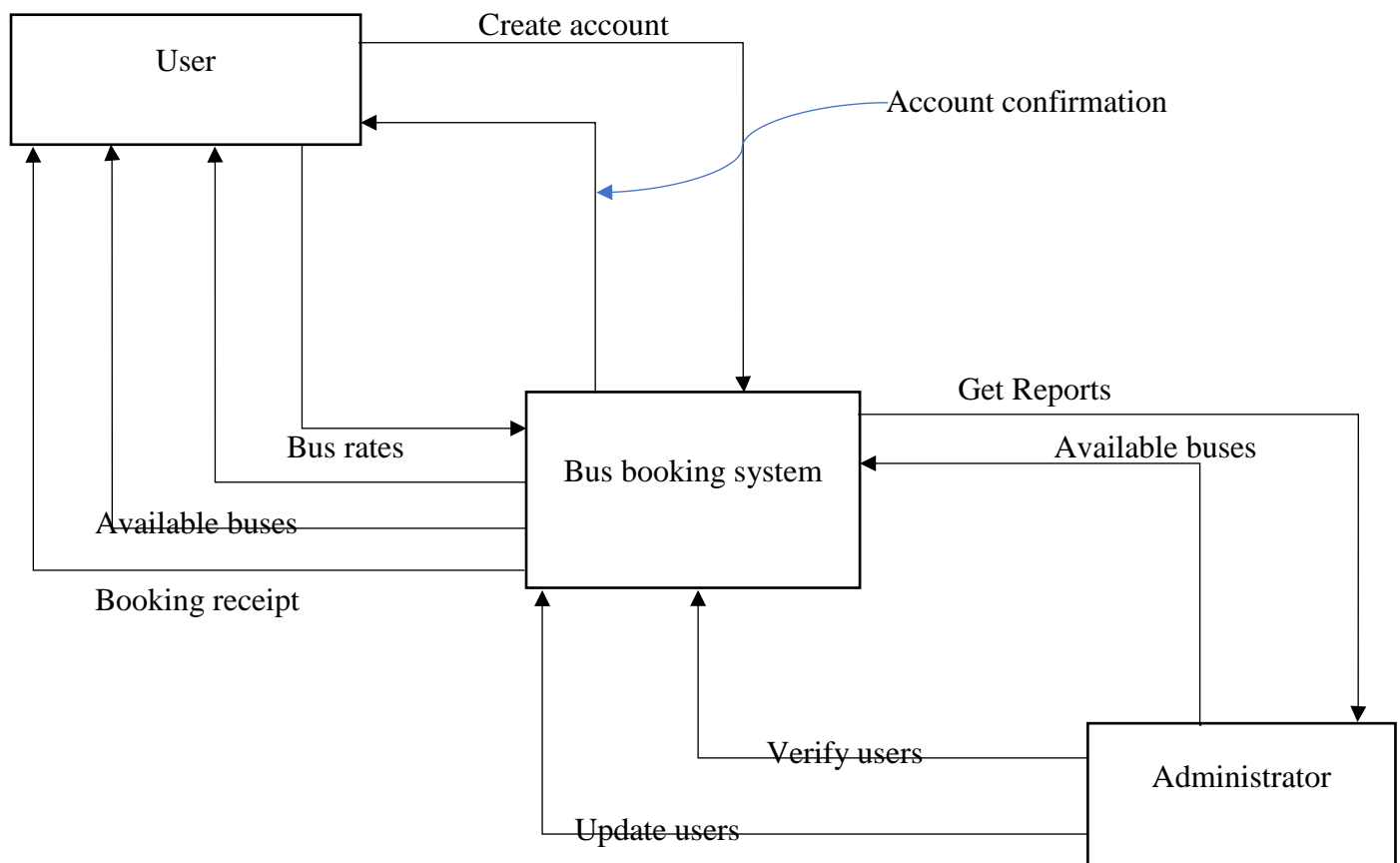


Figure 10 System context diagram

### 5.8 Database Design. (ER, Normalization and Data Dictionary)

Database design is the organization of data according to the database model. During database design the designer determines what data must be stored and how the data elements interrelate.



### 5.8.1 ER

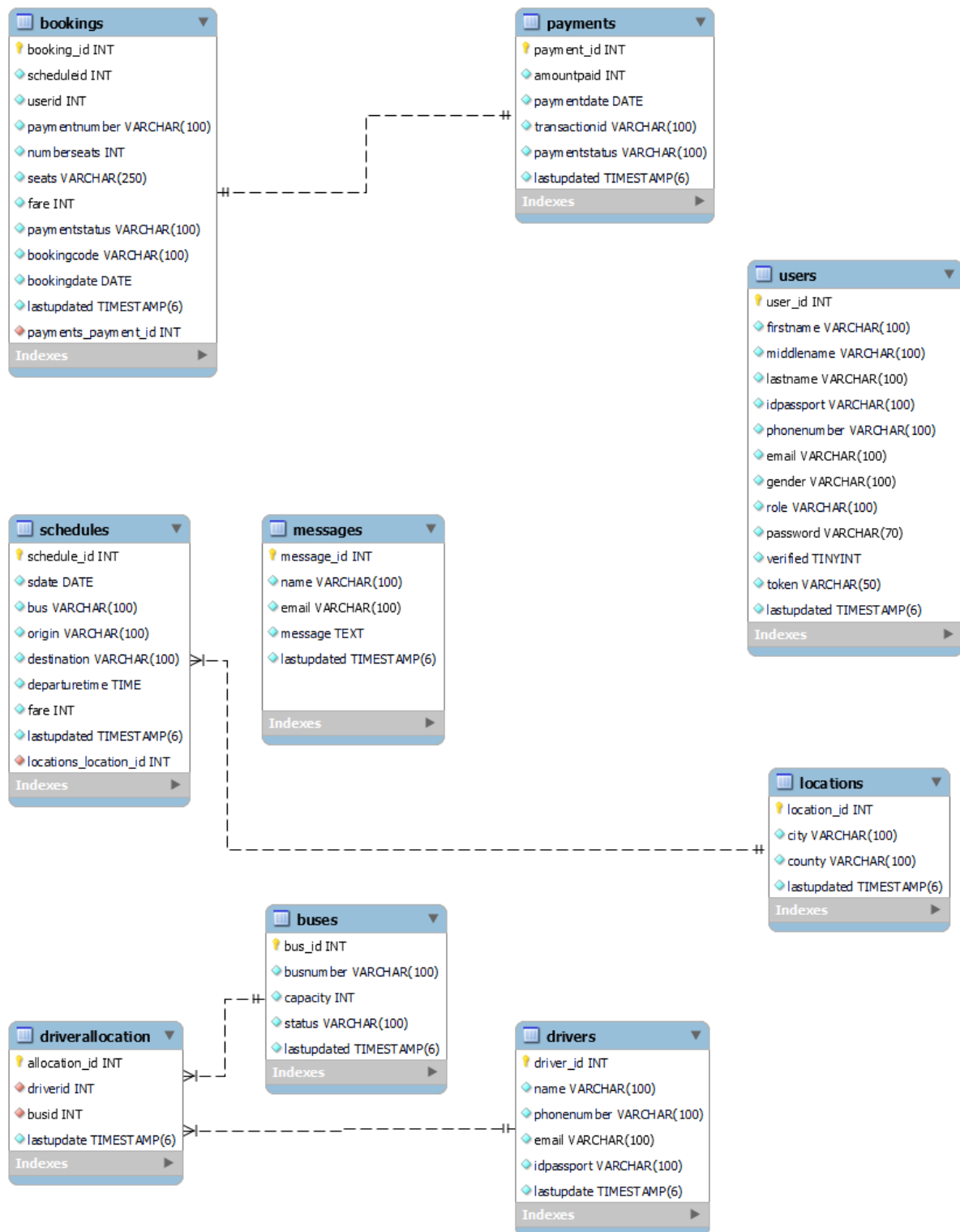


Figure 11 ER DIAGRAM

### 5.8.2 Data Dictionary

A data dictionary is a file or set of files that contain databases metadata. It contains records about other objects in the database, such as data ownership, data relations to other objects, and other data.

*Table 1: Users Table*

Attribute	Key	Data type	Size	Constraint	Description
id	pk	int	250	Not Null	User id
First name		varchar	100	Not Null	User first name
Middle name		varchar	100	Not Null	User middle name
Last name		varchar	100	Not Null	User last name
Idpassport		varchar	20	Not Null	User id no or passport
Phonenumber		varchar	20	Not Null	User phone number
email		varchar	100	Not Null	User email
role		char	100	Not Null	Clarify user role
verified		tinyint		Not Null	Check if user is verified
password		varchar	100	Not Null	User password
token		varchar	100	Not Null	User token
lastupdated		date	6	Not Null	Last date and time it was updated

*Table 2 User table*

*Table 2: Buses Table*

Attributes	Key	Data type	Size	Constraint	Description
id	pk	int	250	Not Null	Bus id
busnumber		varchar	20	Not Null	Bus plate number
capacity		int	50	Not Null	Total bus capacity
amenities		varchar	100	Not Null	Extra services in the bus
lastupdated		date	6	Not Null	Last date it was updated

*Table 3 Buses table data dictionary*

Table 3: Messages

Attributes	Key	Data type	Size	Constraint	Description
id	pk	int	250	Not Null	Message id
name		varchar	50	Not Null	Sender name
email		varchar	50	Not Null	Sender email
message		text	500	Not Null	The message received
lastupdated		date	6	Not Null	The time the message was send.

Table 4 Messages table data dictionary

## 5.9 I/O of the proposed system (mock up screens)

### 5.9.1 Proposed log-in page

**Login Form**

Hello! Welcome back

**Email:**

**Password:**

[Login](#)

Don't have an account? [Sign Up](#)

[Forgotten Password?](#)

Figure 12 Proposed system login page

### 5.9.2 proposed signup page

## Registration Form

Hello! Welcome to young travel community

First Name:

Middle Name:

Last Name:

Phone Number:

Email:

Password:

Register

Already have an account? [Log In](#)

Figure 12 Proposed system signup page

### 5.9.3 Proposed landing page

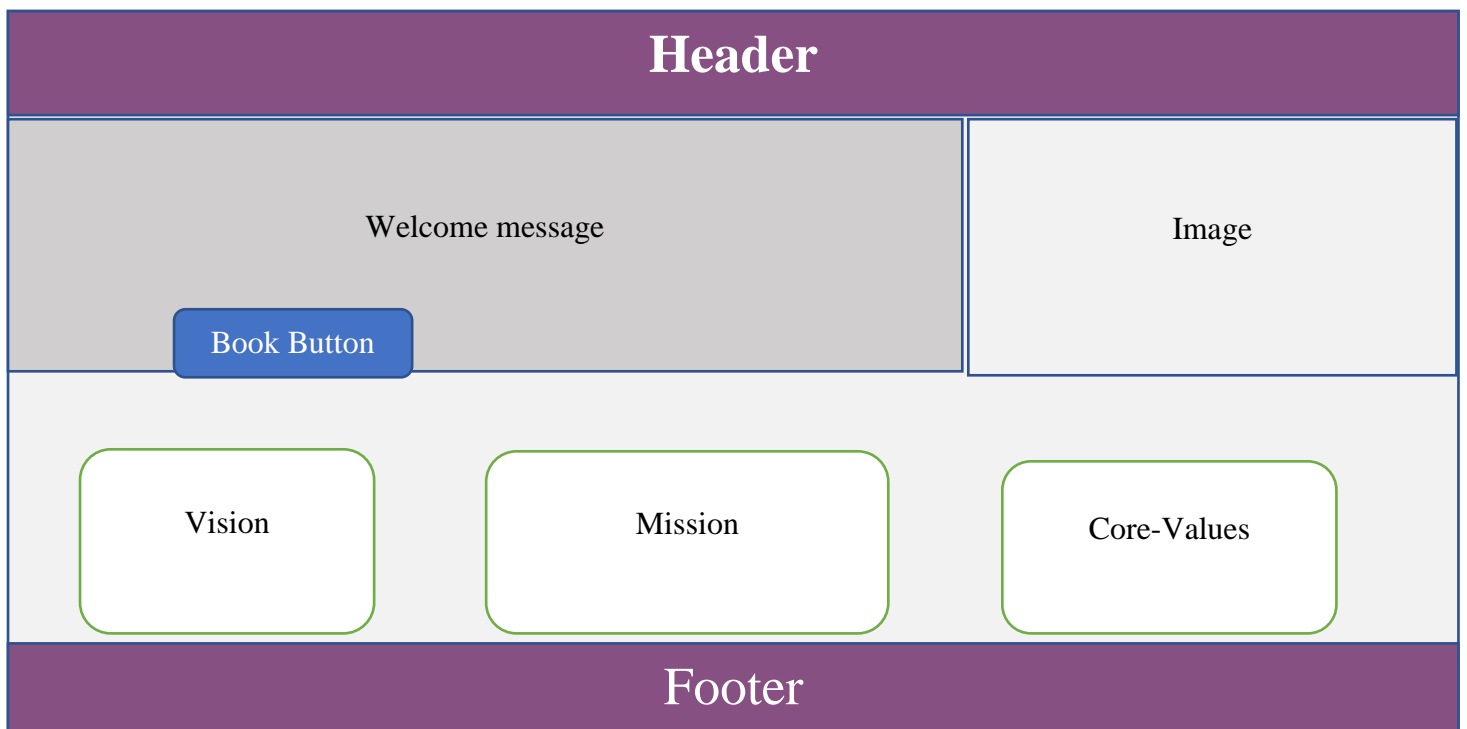
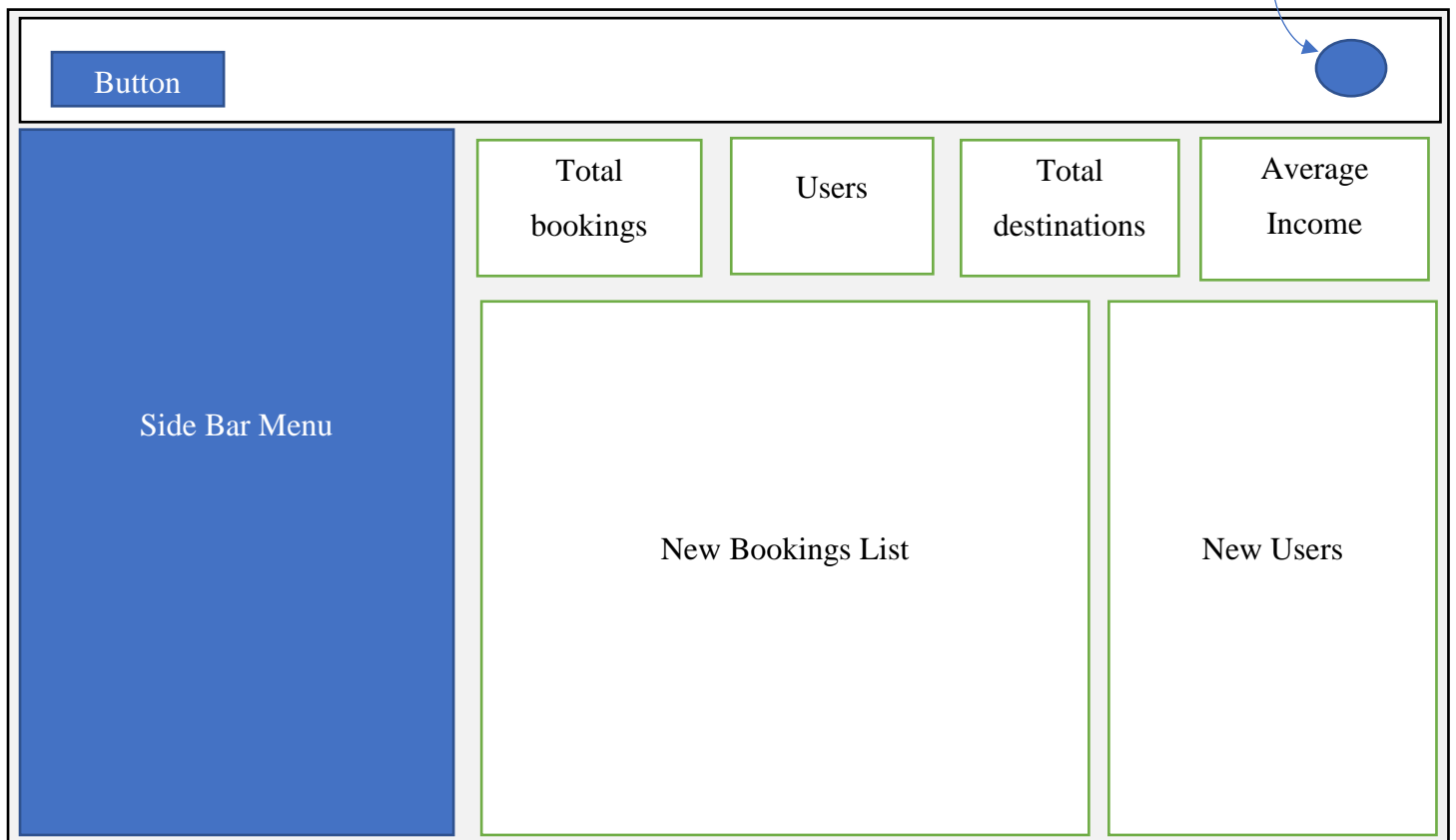


Figure 13 Proposed system homepage

### 5.9.4 Proposed Admin Dashboard landing page



## 5.10 Chapter Summary

This chapter was about the description of the proposed system. We have described the proposed system features and also the strengths of the proposed system and the weaknesses. We have also described the proposed system users and the usability of the system.

## CHAPTER SIX

### 6.0 SYSTEM IMPLEMENTATION AND TESTING

#### 6.1 Introduction

System implementation and testing chapter focuses on the implementation of the system, emphasizing on the testing and the main components of the systems Graphical User Interface. In this chapter we shall define how the system has been built, ensuring that it is operational and it meets quality standards and satisfies the user requirements.

#### 6.2 System Screenshots

The system screenshots will show the actual webpages of the system being implemented.

##### 6.2.1 Login page

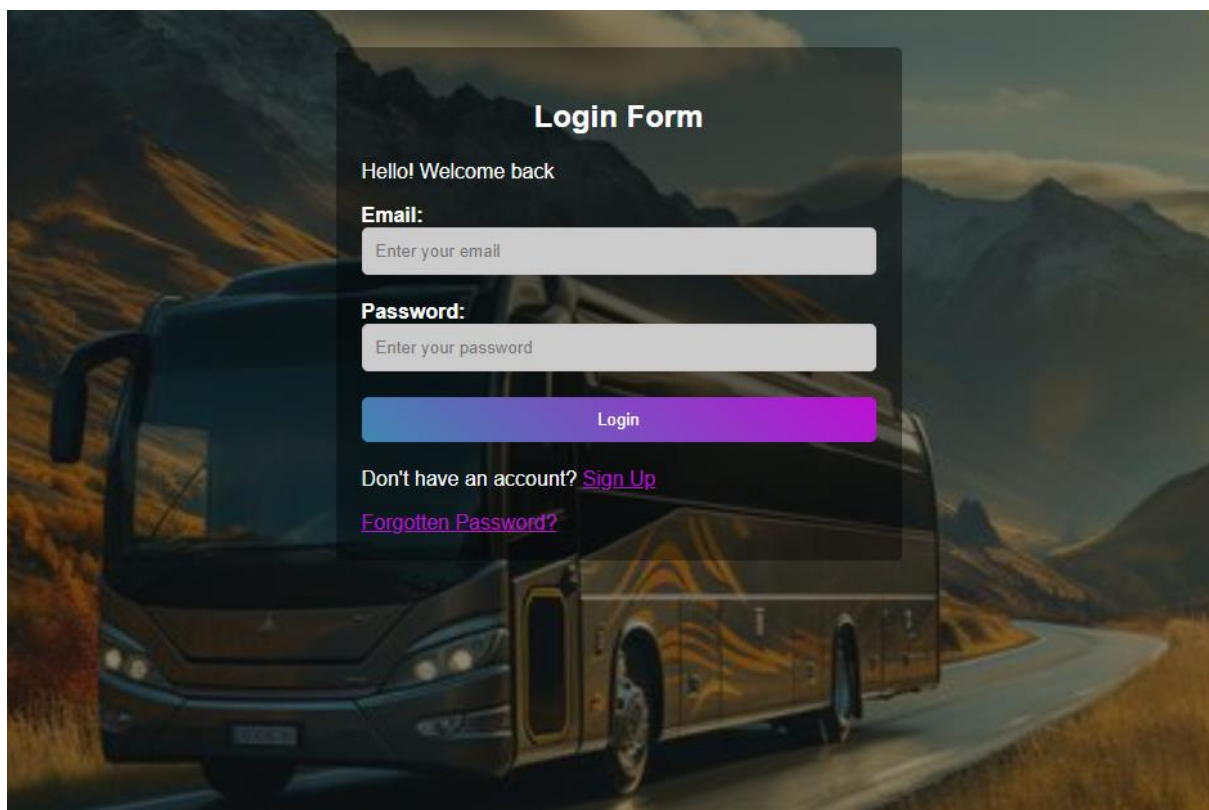
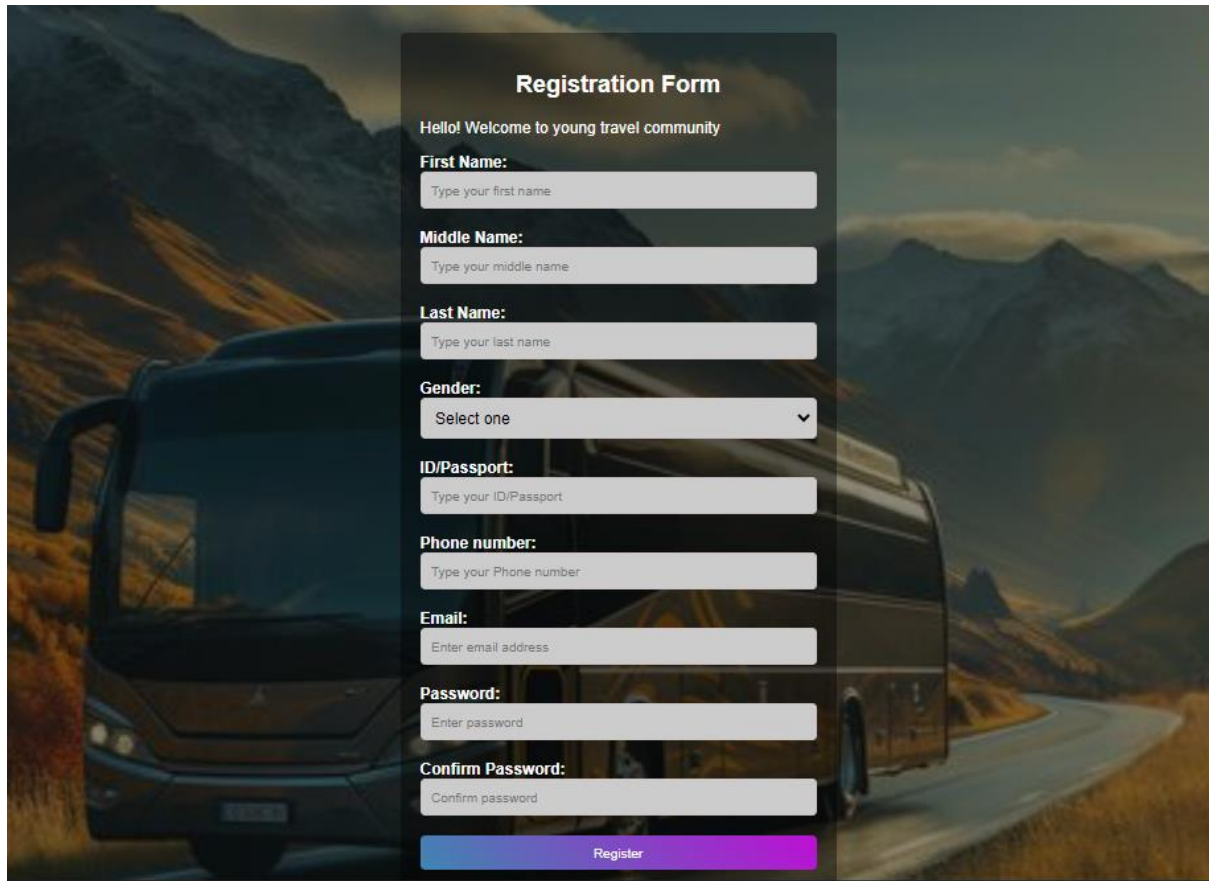


Figure 15 System login page

Figure 15 shows the login page where the user will be required to enter their email and password and then press the login button to access the system.

### 6.2.2 Registration form

The image shows a registration form overlay on a background image of a bus on a mountain road. The form is titled "Registration Form" and includes a welcome message. It contains input fields for First Name, Middle Name, Last Name, Gender (a dropdown menu), ID/Passport, Phone number, Email, Password, and Confirm Password. A "Register" button is at the bottom.

**Registration Form**

Hello! Welcome to young travel community

**First Name:**  
Type your first name

**Middle Name:**  
Type your middle name

**Last Name:**  
Type your last name

**Gender:**  
Select one

**ID/Passport:**  
Type your ID/Passport

**Phone number:**  
Type your Phone number

**Email:**  
Enter email address

**Password:**  
Enter password

**Confirm Password:**  
Confirm password

Register

*Figure 16 System registration page*

Figure 16 shows the registration page which has some input fields for a user to enter their information in order to be registered in the system.



### 6.2.3 System homepage

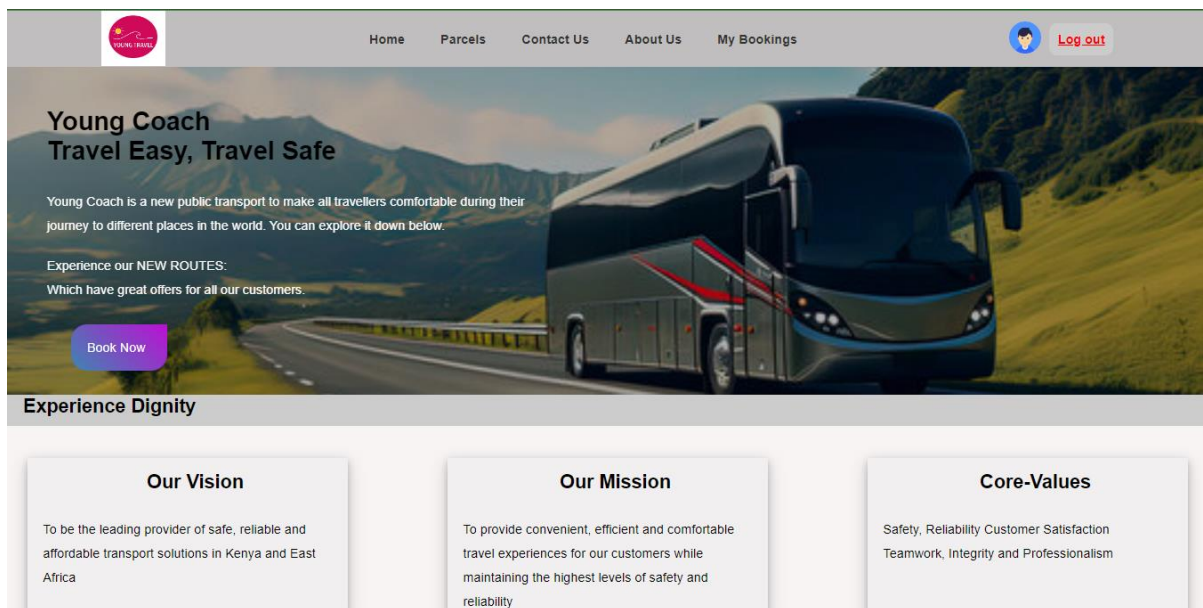


Figure 17 System homepage

Figure 17 shows the homepage which has some good image of our buses and a good and simple navigation bar. It also has some quick links in the footer section for quick navigation.

### 6.2.4 Admin dashboard page

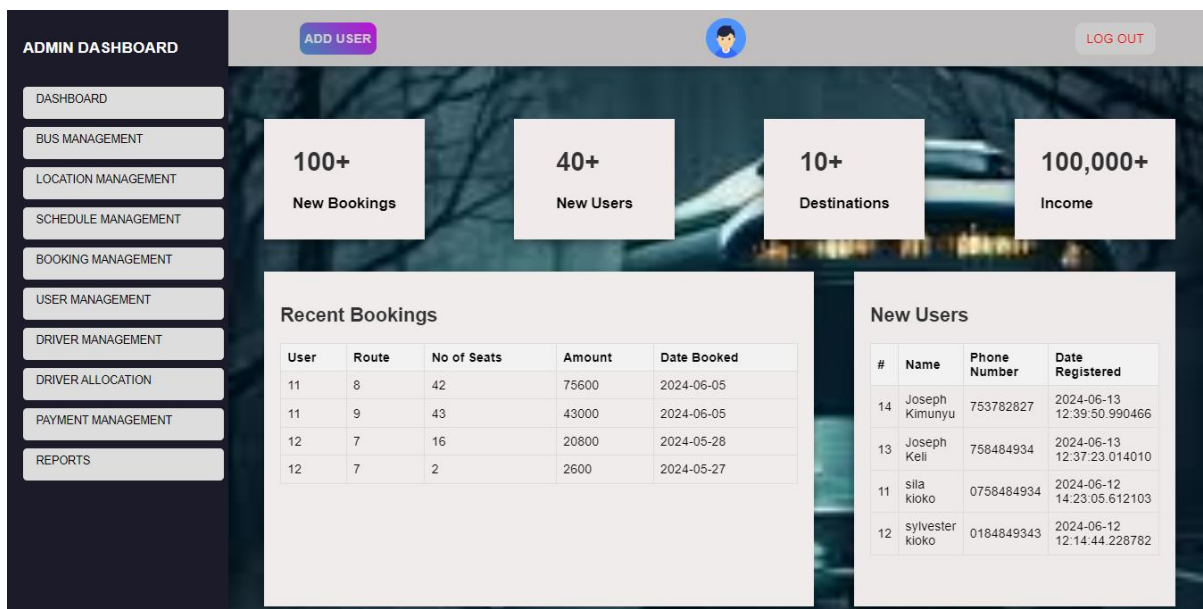


Figure 18 System admin dashboard

Figure 18 shows the admin dashboard with the count of new bookings, new users and total income in the past one month. Also displays a table of recent bookings and new users.

### 6.3 Testing Plan

The software development process involves a series of production activities, and errors can occur at any stage of development (Alper A.P., 2015). Therefore, the entire system was evaluated against user requirements and specifications to ensure it met its requirements and user satisfaction.

For the system testing, the following strategies were followed:

A group of people aged 18 years and above was randomly selected, focusing on those who frequently use bus services. From the selected group, 10 individuals were chosen, ensuring a mix of both frequent and infrequent bus users. Of these 10 people, 5 were computer literate. These individuals were brought to a controlled environment where they were shown a demo of how to use the bus booking system.

The participants were then given access to the system to interact with it, provide their views, and compare the use of the system to traditional methods of booking bus tickets. The testing included various phases such as unit testing, integration testing, system testing, and user acceptance testing to ensure the system's reliability and usability.

### 6.4 Evaluation Plan

The evaluation aimed to determine whether the bus booking system effectively addressed the problems associated with traditional bus ticket booking methods in Kenya. Feedback was collected through interviews, questionnaires, and direct observations from those who participated in the system testing.

The evaluation focused on:

User satisfaction with the system's interface and functionality.

The ease of booking tickets compared to traditional methods.

The efficiency and accuracy of the system in handling bookings and transactions.

Overall user experience, including any difficulties encountered and suggestions for improvement.

The results from the evaluation indicated that respondents were satisfied with the implementation of the web-based bus booking system. The system was found to be user-friendly, efficient, and a significant improvement over traditional booking method.

## 6.5 Chapter Summary

In this chapter, we discussed the testing plan for the bus booking system, including the selection of participants, the testing strategies employed, and the evaluation plan. The testing process ensured that the system met user requirements and provided a satisfactory user experience. The feedback collected during the evaluation phase confirmed the system's effectiveness and highlighted its advantages over traditional booking methods.

## CHAPTER SEVEN

### 7.0 CONCLUSION, FINDINGS, AND RECOMMENDATIONS

#### 7.1 Introduction

Many people have faced significant challenges when booking bus tickets, including difficulty finding available seats, lack of transparency in pricing, and inefficiencies in the booking process. With the online bus booking system, 99.9% of these issues can be addressed. Users will have easy access to the system from their internet-enabled devices, allowing them to search for and book bus tickets conveniently from any location. This system will streamline the booking process, making it easier for users to find available buses, compare prices, and complete their bookings efficiently.

#### 7.2 Conclusion

During the background research on the problems facing bus ticket booking in Kenya, it was found that many travelers experienced difficulties such as long queues, unreliable booking information, and sometimes fraudulent activities. This highlighted the need for a web-based system that would simplify and secure the process of booking bus tickets.

In the modern world, technology has greatly advanced, making it possible to interact and perform transactions quickly and efficiently through digital networks. Despite the daily challenges of life, technological tools provide advanced ways of living and interacting. Hence, a web-based system for bus booking is a practical solution to address the challenges faced by travelers in Kenya.

When developing research methodologies, it was essential to create methods that would collect comprehensive and accurate data. This data was crucial for understanding user needs and designing a system that meets those needs. A thorough system analysis revealed security risks and inefficiencies in existing systems, which informed the design of a more secure and user-friendly bus booking system.

The proposed system ensures that all transactions and communications between users and service providers are recorded, enhancing security and transparency. This guarantees that the bus booking process is genuine, secure, and efficient, providing users with a reliable service they can trust.

### 7.3 Challenges Encountered

**Time Management:** Balancing the time required to work on the project with other commitments, such as professional work and industrial attachment, was challenging.

**Input Validation:** Ensuring the system requirements, particularly input validations for user details and payment information, were robust was challenging but provided valuable learning experiences.

### 7.4 Future Recommendations

**Artificial Intelligence Integration:**

The system can be enhanced with AI to verify user identities through profile pictures and scanned IDs, ensuring that the user is genuine.

**Geolocation Feature:**

The system can be improved to allow users to view the real-time location of the bus and track its progress using Google Maps.

**Messaging Platform:**

Integrating a messaging platform within the system will enable users to communicate with bus operators directly, allowing for real-time negotiation and assistance. These communications can be recorded and used as evidence in case of disputes.

**Secure Payment Options:**

The system can be upgraded to include multiple secure payment options, such as mobile money, credit/debit card payments, and secure online payment gateways, to enhance user trust and convenience.

**Mobile Application:**

Developing a mobile application version of the system will provide users with even greater convenience, allowing them to book tickets and receive notifications on the go.

By implementing these recommendations, the bus booking system can further enhance its functionality, security, and user experience, making it an indispensable tool for travelers in Kenya.

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## APPENDIX 1;

### Appendix 1.1 Budget

The following shows the estimated financial costs required, it includes the expenses that would be incurred and the implementation costs.

Item	Quantity	Cost (Kshs)
Stationaries		5,000
Servers	2	30,000
Software license	1	5,000
laptop	1	35,000
Travelling and Data Collection		15,000
Internet		2,500
Miscellaneous cost		3,000
<b>Total Cost</b>		<b>95,500</b>

Table 5 Budget table

### Appendix 1.2 Time Schedule

#	Activity	Time Period	Deliverable
1	Project Proposal	10 <sup>th</sup> October 2023 – 1 <sup>st</sup> December 2023	Acceptance proposal.
2	System Analysis	18 <sup>th</sup> January 2024 – 5 <sup>th</sup> February 2024	System specifications.
3	System Design	6 <sup>th</sup> February 2024 – 28 <sup>th</sup> March 2024	System design of the proposed system. User interface sketches and database design.
4	Implementation and System Testing	29 <sup>th</sup> March 2024 – 18 <sup>th</sup> May 2024	Implementation, testing plan and evaluation plan.
5	Deployment	19 <sup>th</sup> May 2024 – 27 <sup>th</sup> May 2024	Executable system, user manual and documentation.

Table 6 Time Schedule

## APPENDIX 2

### Appendix 2.1 Sample Questionnaire

Dear respondent, this is a research designed to evaluate the current system of bus booking in Kenya. Fill the spaces below with honest answers in order to identify current problems encountered when booking a bus and hence enable to come up with a system with no minimized difficulties to perform the above task.

Date: ...../...../.....

Have you ever booked a bus before?.....

Did you use an automated system when booking?.....

If YES above, how was your experience compared to old booking methods?

.....  
.....  
.....  
.....

Do you think automated systems would help facilitate smooth bookings in Kenya? (YES or NO) Give a reason for your answer

.....  
.....

If you have any concerns you can indicate below.

.....  
.....  
.....

What are some of the issues you might have encountered?

1. ....
2. ....
3. ....



## Appendix 2.2 Sample Interview

What is your name?

Have you ever booked a bus before?

Can you describe your usual process for booking a bus ticket?

What challenges have you faced when booking bus tickets through traditional methods?

Have you ever used an online platform to book bus tickets? If so, what was your experience like?

What are the most significant problems you encounter with the current bus booking methods?

How do you typically find information about bus schedules and seat availability?

Have you ever experienced issues with ticket authenticity or fraud?

What features would you expect from an online bus booking system?

How important is the ease of use for you when using an online platform for booking tickets?

What security features would make you feel safe using an online bus booking system?

What payment methods do you prefer when booking bus tickets online?

How do you feel about providing personal and payment information online? What would assure you of its security?

What are your thoughts on integrating secure payment gateways and digital wallets into the system?

How important is customer support to you when booking bus tickets online?

Would you prefer an integrated messaging system within the platform to communicate with bus operators?

## Appendix 2.3 Sample Code

### 2.3.1 Register Code

```
<?php

session_start();

require 'connect/db_connect.php';

$errors = array();

// if user click on register button
if (isset($_POST['register-btn'])) {

    $firstname = $_POST['firstname'];

    $middlename = $_POST['middlename'];

    $lastname = $_POST['lastname'];

    $idpassport = $_POST['idpassport'];

    $gender = $_POST['gender'];

    $phonenummer = $_POST['phonenummer'];

    $email = $_POST['email'];

    $password = $_POST['password'];

    $confpassword = $_POST['confpassword'];

    //validating entered details in the form

    if (empty($firstname)) {

        $errors['firstname'] = "First name required";

    }

    if (empty($lastname)) {

        $errors['lastname'] = "Last name required";

    }

}
```

```

if (empty($idpassport)) {

    $errors['idpassport'] = "ID/Passport required";

}

if (empty($phonenumber)) {

    $errors['phonenumber'] = "Phone number required";

}

if (!filter_var($email, FILTER_VALIDATE_EMAIL)) {

    $errors['email'] = "Invalid email address";

}

if (empty($email)) {

    $errors['email'] = "Email required";

}

if (empty($password)) {

    $errors['password'] = "Password required";

}

if ($password !== $confpassword) {

    $errors['password'] = "The two passwords do not match";

}

$query_email = "SELECT * FROM users WHERE email=? LIMIT 1";

$user_st = $conn->prepare($query_email);

$user_st->bind_param('s', $email);

$user_st->execute();

$result = $user_st->get_result();

$userCount = $result->num_rows;

```

```

$user_st->close();

if ($userCount > 0) {
    $errors['email'] = "Email address already exists";
}

if (count($errors) === 0) {
    $password = password_hash($password,PASSWORD_DEFAULT);
    $role = 'user';
    $token = bin2hex(random_bytes(20));
    $verified = false;

    $sql = "INSERT INTO users (firstname, middlename, lastname, gender, phonenumber,
idpassport, email, role, password, verified, token) VALUES (?,?,?,?,?,?,?,?,?,?)";

    $stmt = $conn->prepare($sql);

    $stmt->bind_param('sssiisssis', $firstname, $middlename, $lastname, $gender,
$phonenumber, $idpassport, $email, $role, $password, $verified, $token);

    if ($stmt->execute()) {
        //if executed success fully login user
        header('location: home.php');
        exit();
    } else {
        $errors['db_error'] = "Database error: failed to register";
    }
}
}

```