

**TICKETING MANAGEMENT SYSTEM FOR BENIN CITY.**

**BY**

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**A PROJECT SUBMITTED IN PARTIAL FULFILMENT  
OF THE REQUIREMENTS FOR THE AWARD OF THE  
DEGREE OF BACHELOR OF SCIENCE (B.Sc.) IN  
COMPUTER SCIENCE, UNIVERSITY OF BENIN, EDO  
STATE, NIGERIA.**

**SEPTEMBER, 2023.**

## ATTESTATION

We hereby declare that this project **E-TICKETING MANAGEMENT SYSTEM FOR BENIN CITY** was carried out by Omoaka Jeremiah Osemudiamen (PSC18089832) and it is a record of our project work in the Department of Computer Sciences, Faculty of Physical Science, University of Benin City, Benin City, in partial fulfillment of a Bachelor of Science in Computer Science degree. It has not been presented before in any previous application for a bachelor's degree. References made to published literature have been duly acknowledged.

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Omoaka Jeremiah Osemudiamen

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Date

## **CERTIFICATION**

We hereby certify that this project **E-TICKETING MANAGEMENT SYSTEM FOR BENIN CITY** for the award of B.Sc. was conducted and duly presented by Omoaka Jeremiah Osemudiamen of the Department of Computer Science; Faculty of Physical Science, University of Benin, Benin City has been accepted for defense.

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**Miss L.O Usiosefe**  
**(Project Supervisor)**

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**Signature/ Date**

## **APPROVAL**

This research project was prepared by **Omoaka Jeremiah Osemudiamen**, an undergraduate student in the Department of computer Science, Faculty of Physical Sciences, University of Benin, Edo State, with matriculation number PSC1808932 in partial fulfillment of the requirements for the award of the degree of Bachelor of Science (B.Sc.) in Computer Science, is both satisfactory in content and scope. Therefore, it is hereby approved for presentation.

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**Prof. (Mrs.) A.O. Egwali**  
**(Head of Department)**

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**Signature/Date**

## **DEDICATION**

I dedicate this project to GOD Almighty my creator, my source of inspiration, wisdom, knowledge and understanding. He has been the source of strength throughout this project.

I also dedicate this to my parent Mr. and Mrs. Omoaka and siblings who encouraged me all the way and whose encouragement have made sure that I give it all it takes to finish that which I have started. May the blessing of God be with them now and always 'amen'.

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For their relentless service to the students of the Department.

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## ABSTRACT

The advent of digital technology has catalysed the transformation of various industries, including public transportation, through the implementation of electronic ticketing (e-ticketing) management systems. This study delves into the historical evolution, motivations, challenges, and benefits that underlie the development and adoption of e-ticketing systems.

The historical context reveals a departure from traditional paper-based ticketing towards the digital realm, driven by technological advancements and the need for enhanced efficiency, accuracy, and convenience. Motivations for e-ticketing encompass the desire to provide drivers with a seamless and user-friendly ticketing experience while optimizing operational processes for transportation authorities.

However, challenges arise in bridging the digital divide, ensuring data security, establishing robust technological infrastructure, promoting user adoption, and facilitating integration with existing systems.

Through an in-depth analysis of the historical context, motivations, challenges, and benefits, this study offers a comprehensive understanding of the role that e-ticketing management systems play in reshaping modern transportation landscapes.

The implementation of this system was carried out using HTML, CSS and BOOTSTRAP to design the system. JavaScript and JQUERY to implement the functionalities on the system like buy, fund, viewing details of transactions from the database. Php and its framework, Laravel were used for storing of user details like name and images and for authentication and authorization. The database was implemented using Phpmysql for proper record management.

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authorization. The database was implemented using Phpmyadmin for proper record management.

## CHAPTER ONE

### 1.1 INTRODUCTION

Benin City is the capital city of Edo State, known as one of the Metropolitan areas with considerable urban activities; this causes Benin City to be one of the business centres, education centres, or tourist destinations in Nigeria. Viewed from the aspect of the population, the population in Benin City increases every year due to the birth and displacement of the people with the aim of education, trade, and improving the family economy. From these aspects, it can be illustrated that Benin City has an activity with high immensity, which also encourages the high movement and mobility of people to travel both in the context of business activities, family needs, recreation or social activities. Benin, as a big city in Nigeria, has a high demand for transportation in line with the overcrowding of the population, causing an increase in vehicle use. Bus is one of the modes of public transportation based on mass transportation that has the characteristic of transporting as many passengers as possible by promoting safe, fast, cheap and convenient services; therefore buses are quite popular with the people of Benin City in carrying out their daily activities.

A Bus ticket is a piece of paper that serves as proof of purchase, giving the holder (public transport driver) the right to travel on public roads (Oxford, 2005). Generally, a bus ticketing system consists of all the activities involved in producing a ticket, including producing tickets, booking tickets, selling tickets, rejecting the tickets, total tickets produced for a day, total tickets sold, and income gained through ticket selling. A bus ticketing system is a complex system that is difficult to be managed by humans, so as a result, software systems can be used instead of humans, which will help to avoid a large percentage of mistakes. Online Bus ticketing systems make the process of purchasing tickets easier and prevent conflicts in time. Also, it helps public transport drivers to book their tickets from their homes and check the pricing system of the

routes; the price of a ticket may increase or decrease depending on the season, availability, time of booking, and also depending on the class that customer select and all these factors will be calculated automatically and instantly.

As a prelude to other parts of this study, this chapter will discuss the background upon which this study was initiated, the statement of problems that led to this study, and the Aim and Objectives of the study. Others are the Significance of the study, Scope of work, Limitation of the study and Definition of technical terms.

## **1.2 Background of Study**

The concept of electronic ticketing has evolved from traditional paper-based ticketing systems used in various industries, including transportation, entertainment, and events. The shift from physical tickets to electronic ones was driven by the need for greater convenience, reduced administrative overhead, and improved security.

With the rapid advancements in technology and the growing popularity of digital solutions, the public transport industry is increasingly exploring the implementation of electronic ticketing (e-ticket) systems. These systems offer numerous benefits, such as improved convenience, enhanced operational efficiency, reduced costs, and increased passenger satisfaction. However, the successful transition from traditional ticketing methods to an e-ticket system requires a comprehensive understanding of public transport drivers' ticket purchasing behavior.

By investigating the behavior and challenges faced by drivers during the ticket purchase process, this study aims to provide valuable insights that can inform the implementation of an e-ticket system. Understanding drivers' preferences, concerns, and technological readiness is essential for designing an e-ticketing solution that aligns with their needs and addresses potential barriers to adoption.

The findings of this research will serve as a foundation for developing guidelines and recommendations for implementing an e-ticket system in public transport. By understanding drivers' needs and addressing their concerns, the study aims to facilitate a successful and seamless transition to e-ticketing, ultimately improving the ticket purchase process for both drivers and passengers.

The successful implementation of an e-ticket system holds great potential for transforming the public transport sector in Benin City. It will simplify the ticketing process, reduce manual tasks, enhance data accuracy, and provide passengers with a more convenient and efficient travel experience. Additionally, it will enable operators to gain valuable insights through data analytics, leading to better resource allocation, improved service planning, and increased overall customer satisfaction.

### **1.3 Statement of the Problem**

Investigation revealed the following problem of the existing Vehicle Ticketing Management Information System for Public Buses, which entails:

- i. The existing system is time-consuming, stressful and more prone to errors in purchasing a ticket, storing data, and accessing data.
- ii. A lot of drivers sometimes queue in lines to buy tickets, which leads to a hold-up on the road and a waste of precious and productive time for the drivers.
- iii. The manual method of keeping records and accessing data or information becomes very tedious because all the files that contain information are not well arranged in a way that can be accessed in an appropriate and accurate manner; this will lead to losses of stored information.
- iv. Plate numbers are not recorded during the purchase of tickets which can lead to multiple use of tickets by drivers.

- v. More workforce is required as there is a need for vehicles to be checked if they have purchased their ticket while selling tickets concurrently.

#### **1.4 Aim and Objectives of the Study**

The main aim of this study is to design and implement an E-Ticketing Management System for Public Buses in Benin City. In achieving this aim, the following specific objectives were laid out as follows to design and implement a website that will:

- i. **Streamline Ticketing Process:** The primary aim of the e-ticketing management system is to streamline the ticketing process for public transport vehicles. It seeks to replace or minimize manual ticket sales and inspections with a digital and automated system, making ticket purchase and validation more efficient.
- ii. **Enhance Revenue Management and Fare Collection:** An important aim of the e-ticketing system is to improve revenue management and fare collection for transport operators. The system should provide accurate data on ticket sales, fare collection, and passenger demand, enabling operators to optimize pricing strategies, detect fare evasion, and enhance financial sustainability.
- iii. **Improve Reporting and Accountability:** An e-ticketing management system aims to enhance reporting and accountability.
- iv. **To reduce backyard sales:** During our investigations, we found out that some drivers who don't purchase tickets settle the ticket seller by tipping some amount into his hands.
- v. **Reduce Cash Handling and Transactional Risks:** An important objective of an e-ticketing system is to reduce or eliminate the need for cash transactions. By promoting digital payment methods, the system aims to minimize the risks associated with cash handling, such as theft, counterfeit currency, and human error during transactions.

## **1.5 Significance of Study**

The Significance of the study is as follows:

- i. The study will help serve as a source of reference to all other local governments or states who are interested in such system.
- ii. The study will help both Ovia's northeast local government and Egor local government to understand the importance of an E-ticketing management system for public transport.
- iii. It will also help to increase service effectiveness
- iv. **Cost Savings and Sustainability:** Shifting from traditional ticketing methods to an e-ticketing system can result in cost savings for transport operators. It reduces the reliance on physical ticket printing, distribution, and stock management, leading to reduced operational expenses and improved environmental sustainability by minimizing paper usage.

## **1.6 Scope of Study**

The Scope of this research is focused on the Design and Implementation of an E-Ticketing Management System for Public Buses using Benin City, Edo State, as a case study.

## **1.7 Limitations of the Study**

During the course of this study, many things militated against its completion, some of which are:

- i. **Time Constraint:** The time frame given to accomplish this project was very short due to the school academic calendar, and it was carried out under pressure which made the researcher not to implement some necessary features.
- ii. **Establishment Policies:** Establishment policies posed a serious limitation as most staffs are not ready to release information needed for this project work. There was a lot of

information needed from the staff to enhance the study, which took them time to release, or they did not release at all for security purposes; hence the Scope was reduced.

- iii. Research material: availability of research material is a major setback to the Scope of the study.
- iv. Financial Constraint: Insufficient fund tends to impede the efficiency of the researcher in sourcing the relevant materials, literature or information and in the process of data collection (internet).

### **1.8 Definition of Terms**

**E-TICKETING:** The use of a computer or electronic means to process, manage and issue tickets to drivers.

**AUTOMATION:** The replacement of workers by technology.

**WEB:** A designed computer-based network of information resources that combines text and multimedia.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

The digital era has ushered in significant advancements across industries, fundamentally altering how businesses operate, and individuals engage with various services. One such transformative innovation is the electronic ticketing management system, known as the "e-ticketing" system. E-ticketing has emerged as a cornerstone technology, revolutionizing the process of ticket purchase, distribution, and management across diverse domains such as transportation, entertainment, sports, and events. This introduction explores the pivotal role of e-ticketing systems, their historical context, and their fundamental importance in modern-day transactions.

The rapid advancement of digital technology has led to the transformation of various industries, and the field of ticketing management is no exception. Electronic ticketing systems, often called e-ticketing systems, have emerged as a pivotal solution in streamlining ticketing processes across different domains, enhancing user experience, and optimizing event management.

The shift from traditional paper-based to electronic ticketing marks a significant advancement in managing ticketed events and services. E-ticketing encompasses the digitalization of the entire ticketing lifecycle, from initial booking to eventual attendance at an event. This digital transformation has brought numerous benefits, including enhanced user convenience, streamlined event organization, reduced operational costs, and improved data management for users and event organizers.

According to Smith, adopting e-ticketing systems has become a strategic imperative for businesses aiming to stay competitive in the digital age. As consumers increasingly seek streamlined and convenient experiences, e-ticketing has become an essential component of service offerings in various sectors.

## **2.1 HISTORICAL EVOLUTION:**

The historical evolution of e-ticketing management systems reflects a remarkable journey of technological innovation, transforming the way ticketing processes are conducted across diverse industries. This evolution has been propelled by advancements in digital technology, changing consumer behaviours, and the persistent quest for more efficient and user-friendly ticketing solutions.

**Early Concepts and Manual Systems:** The concept of e-ticketing has its roots in the mid-20th century, particularly within the airline industry. Early electronic ticketing systems were rudimentary, requiring travelers to collect physical tickets at airport counters. This marked a nascent step toward replacing traditional paper-based tickets with digital alternatives.

**Computerized Reservation Systems and Airline Pioneers:** The 1970s and 1980s witnessed the emergence of computerized reservation systems, enabling airlines to manage bookings electronically. Notably, American Airlines introduced the first electronic ticketing system, Sabre, in the 1970s. This marked a pivotal advancement as it laid the foundation for comprehensive electronic ticketing solutions.

**Internet Era and Online Booking Revolution:** With the widespread adoption of the Internet in the 1990s, the landscape of ticketing underwent a transformative shift. Online booking platforms emerged, granting users the ability to browse, select, and purchase tickets remotely. This period saw the convergence of e-commerce practices and secure online payment gateways, making digital transactions more accessible and convenient.

**Expanding Beyond Airlines:** While initially prominent in the airline sector, e-ticketing systems diversified into other industries. The entertainment sector, including cinemas, theatres, and live events, began adopting e-ticketing to streamline ticket sales and enhance user experiences. This expansion showcased the adaptability of e-ticketing solutions across a variety of events and venues.

**Mobile Ticketing and Connectivity:** The advent of smartphones in the early 2000s ushered in the era of mobile ticketing. Mobile apps allowed users to store tickets digitally on their devices, eliminating the need for paper tickets and enabling seamless access to events. This transition not only increased convenience but also aligned with the growing trend of mobile connectivity.

**Integration and Personalization:** As e-ticketing systems evolved, integration with other technologies became paramount. Integrating customer relationship management (CRM) systems enabled event organizers to tailor marketing efforts based on user preferences and attendance history. This integration marked a strategic move towards providing personalized experiences.

**Blockchain and Security Enhancement:** In recent years, the exploration of blockchain technology has introduced novel possibilities for e-ticketing security and fraud prevention. The decentralized nature and cryptographic foundations of blockchain have the potential to enhance the authenticity and security of e-tickets.

**Anticipating the Future:** The future trajectory of e-ticketing management systems holds promise. As technology continues to advance, possibilities such as augmented reality integration, enhanced data analytics, and even greater user personalization are on the horizon.

## **2.2 EXISTING TICKETING MANAGEMENT SYSTEMS**

The existing Ticketing management system in Benin City (Egor, Oredo and Ovia North-east) is the manual ticketing system. Based on the study of the current system, weaknesses have been found about the manual system of the ticketing system. Before a driver can purchase a ticket, he has to ensure he drives through the route of where tickets are sold in his local government before 12noon. If he doesn't drive through that route, on or before 12noon, he will be fined (His vehicle will be seized and he will be driven to their office to face the music).

## **2.3 E-TICKETING MANAGEMENT SYSTEM**

An e-ticketing management system is a digital platform or software solution that facilitates the electronic issuance, distribution, validation, and management of tickets for various services, events, or transportation. It replaces traditional paper-based tickets with electronic counterparts, offering customers a more efficient, convenient, and user-friendly way to access and utilize services. E-ticketing management systems are widely used in industries such as transportation, entertainment, sports, and more. Here's a breakdown of its components and functionalities:

### **1. Electronic Ticket Issuance:**

- i. E-ticketing systems enable the creation of electronic tickets through digital platforms or applications.
- ii. Tickets can be generated for various services, including flights, trains, buses, concerts, movies, and more.

### **2. Digital Distribution:**

- i. E-tickets are distributed electronically through various channels, such as websites, mobile apps, email, and SMS.
- ii. Customers can purchase tickets remotely and receive them instantly, eliminating the need for physical tickets or collection points.

### **3. Access Control and Validation:**

- i. E-ticketing systems use technology like QR codes, barcodes, or NFC (Near Field Communication) to facilitate seamless access control.
- ii. Scanning these codes at entry points validates the ticket and grants access to the service or event.

#### 4. Payment Integration:

- i. E-ticketing systems often integrate with electronic payment methods, allowing customers to make secure payments online.
- ii. Payment options may include credit/debit cards, digital wallets, mobile money, and more.

#### 5. Customer Management:

- i. E-ticketing platforms manage customer profiles, allowing users to create accounts, store payment details, and track their ticket history.
- ii. Personalized features and recommendations can enhance the customer experience.

#### 6. Reporting and Analytics:

- i. E-ticketing management systems generate data and insights about ticket sales, customer behavior, demand patterns, and more.
- ii. This data can inform decision-making, marketing strategies, and resource allocation.

#### 7. Flexibility and Scalability:

- i. E-ticketing systems are adaptable to various industries and can be customized to meet specific requirements.
- ii. They can handle high transaction volumes and can be scaled as needed.

#### 8. Real-Time Updates and Alerts:

- i. E-ticketing systems can provide real-time updates to customers about changes in schedules, cancellations, delays, and other relevant information.

#### 9. Environmental Sustainability:

- i. E-ticketing contributes to environmental sustainability by reducing the need for printed paper tickets.
- ii. This aligns with efforts to reduce paper waste and embrace digital solutions.

10. Contactless Solutions: - E-ticketing systems are particularly relevant in the post-pandemic era, providing contactless solutions that prioritize hygiene and safety.

## **2.4 Benefits of E-Ticketing Management System**

- i. **Convenience and Accessibility:** E-ticketing systems offer unparalleled convenience, enabling users to browse, select, and purchase tickets from anywhere with Internet access. This eliminates the need for physical visits to ticket counters, enhancing user accessibility.
- ii. **Real-Time Booking and Confirmation:** E-ticketing allows for instant bookings and immediate confirmation, providing users with real-time updates on ticket availability and seat selections. This speed enhances the overall ticketing experience.
- iii. **Reduced Environmental Impact:** E-ticketing significantly reduces paper waste associated with traditional ticketing systems, contributing to environmental sustainability. This aligns with modern efforts toward eco-friendly practices.
- iv. **Enhanced Data Management:** E-ticketing systems enable event organizers to gather valuable customer data, enabling targeted marketing and personalized experiences. This data-driven approach improves customer engagement.
- v. **Streamlined Event Organization:** For event organizers, e-ticketing systems simplify ticket management, reduce administrative overhead, and improve operational efficiency. This leads to smoother event execution.

- vi. **Improved Security Measures:** Secure payment gateways and encryption techniques utilized in e-ticketing systems enhance transaction security and safeguard user data. This fosters user trust and minimizes fraud risks.

## **2.5 Challenges of E-Ticketing Management System**

- i. **Technological Barriers:** While e-ticketing offers convenience, technological barriers such as limited internet access and digital literacy can exclude specific demographics. Bridging this digital divide is crucial for inclusive access.
- ii. **Data Privacy Concerns:** The collection of user data in e-ticketing systems raises privacy concerns, necessitating strict compliance with data protection regulations. Balancing personalized experiences with data privacy is a challenge.
- iii. **System Downtime and Glitches:** E-ticketing systems are reliant on technology, making them susceptible to technical issues and downtime. These disruptions can frustrate users and impact sales.
- iv. **Fraud and Cybersecurity Risks:** Despite security measures, e-ticketing systems are vulnerable to cyberattacks and fraudulent activities. Maintaining robust security protocols is an ongoing challenge.
- v. **User Experience Variability:** The quality of user experience in e-ticketing can vary widely based on the platform's design and functionality. Ensuring a consistently positive user experience is essential.
- vi. **Resistance to Change:** Some users may be resistant to adopting e-ticketing due to familiarity with traditional paper-based systems. Educating and encouraging users to embrace the digital shift can be challenging.

## CHAPTER THREE

### SYSTEM ANALYSIS AND DESIGN

This chapter delves into the design and architecture of the eTicketing Management System, outlining the structural components and mechanisms that enable the seamless management of electronic tickets and event-related processes. The design considerations, system architecture, and underlying technologies are explored to provide a comprehensive understanding of how the system functions.

#### 3.1 METHODOLOGY

In this project, the OOD was used, Object-Oriented Data Modeling (OODM) is a methodology for designing databases and information systems using object-oriented principles. It extends traditional relational database modeling by incorporating concepts such as classes, objects, inheritance, encapsulation, and methods. In OODM, data entities are represented as objects with attributes and behaviors, making it suitable for modeling complex, real-world scenarios.

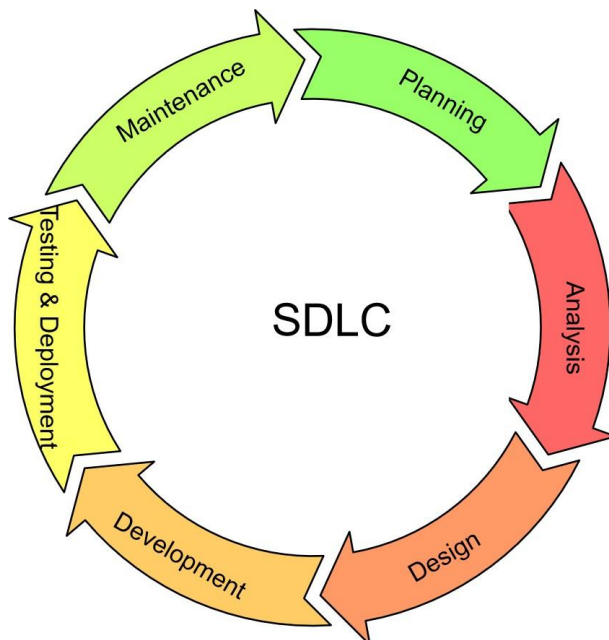


Figure 3.1 SDLC

## Key Concepts of OODM:

**Classes:** Data entities are represented as classes, defining attributes (data fields) and methods (functions) associated with those entities.

**Objects:** Instances of classes are objects, carrying specific attribute values and executing methods.

**Inheritance:** Objects can inherit attributes and behaviors from parent classes, allowing for hierarchical organization and code reusability.

**Encapsulation:** Data and methods are encapsulated within objects, ensuring data integrity and controlling access.

**Associations:** Relationships between objects are defined through associations, often using cardinality and multiplicity to specify connections.



*Figure 3.2 Iterative Model*

### **3.1.1 Planning Phase**

This is the first phase of the iterative model. In this phase, the requirements of the project are identified. This phase involves a detailed overview of the project requirements. This requirement can be a new requirement or an extension to the already built requirement.

### **3.1.2 Analysis and Design Phase**

This is the next phase after the planning. The project's requirements were analyzed to set a full understanding of the problems and an effective design was decided to implement the requirement. Based on analysis, potential solutions were established and diagrams like data flow diagram, class diagram, activity diagram, UML diagram, use case diagram e.t.c were drawn to get a clear understanding of the software design and help proceed with the development. The size and criticality of the project is also an important factor in determining the level and complexity of design for the project.

### **3.1.3 Implementation or Development Phase**

The implementation phase started after the analysis and design phase was completed. This phase is where the system becomes real, the actual development of the system begins at this point. All the requirements and design plans were implemented.

### **3.1.4 Testing Phase**

When the development of the project was completed, tests were performed to find and fix all the bugs and errors so that the system meets the specified requirements.

### **3.1.5 Deployment Phase**

After completing all the development and testing phases, the project was deployed to the production environment.

### **3.1.6 Evaluation Phase**

This is the last stage of the iterative model. After all the processes are complete, The system is examined thoroughly by the entire team to check if it meets the requirements. If anything is missing, the whole process is repeated again.

### **3.2 Analysis of Existing System**

The existing e ticketing landscape often suffers from cumbersome processes, including physical ticket distribution, limited payment options, and a lack of real-time data synchronization. These challenges result in inefficiencies for event organizers, inconvenience for Bus Drivers, and missed opportunities for data-driven decision-making. Therefore, there is a pressing need for a robust eTicketing management system that addresses these issues and provides a streamlined solution.

The existing ticketing systems are plagued with several issues that hinder efficient management. **These issues include:**

**Loss of Tradition and Sentiment:** In some cases, the shift from traditional paper tickets to e-tickets may lead to a loss of sentimental value associated with physical tickets. Collectors and enthusiasts who enjoy keeping mementos might be disappointed.

**Limited Payment Options:** Traditional systems usually offer limited payment methods, causing inconvenience for Bus Drivers who prefer diverse payment options.

**Lack of Anonymity:** E-ticketing systems usually require customers to provide personal information during the purchase. This can raise privacy concerns if the data is misused or if customers prefer to remain anonymous.

### **3.3 OVERVIEW OF THE PROPOSED SYSTEM**

The proposed eTicketing Management System introduces several key features designed to improve user experience, increase efficiency, and ensure data security:

#### **Enhanced User Interfaces**

The user interfaces for both event organizers and Bus Drivers have been redesigned with a focus on intuitive navigation, clean layouts, and user-friendly interactions. The new interfaces aim to provide a seamless and visually appealing experience.

#### **Secure Payment Processing**

The proposed system will incorporate robust encryption mechanisms to ensure the security of payment transactions. It will also integrate with a variety of payment gateways to provide users with multiple secure payment options.

#### **Real-time Notifications and Alerts**

The real-time notification system will be further optimized to provide instant updates to Bus Drivers about price changes, discounts etc. Users will receive notifications through various channels, including email and bulk sms.

#### **Efficient QR Code Ticket Validation System**

The proposed system will utilize advanced QR code scanning technology to expedite the process of checking tickets purchased by Bus Drivers. This technology ensures accurate and real-time tracking, enhancing security and efficiency.

#### **Data Analytics and Insights**

Incorporating data analytics and insights into the process of drivers purchasing tickets and plying routes creates a dynamic and adaptive transportation system. It helps optimize operations, enhance customer experiences, and streamline the entire journey for drivers.

### **3.4 REQUIREMENT ANALYSIS**

#### **3.4.1 Product requirement**

The functional requirements for this system are:

1. A smartphone
2. Computer literate personel
3. Internet connection

The non-functional requirements include:

1. Responsive and user friendly UI
2. Speed
3. Reliability

### **3.4.2 Software requirement**

1. **Text Editor:** A text editor is a computer program that enables users to create, change, edit, open and view plain text files. It enables programmers to write codes, examples are: Notepad++, Sublime Text, Visual Studio Code (VSCode) etc.
2. **Web Browser:** This is an application used to access web pages, examples are: Mozilla Firefox, Google Chrome, Opera Mini, Safari etc.

### **3.4.3 Hardware requirement**

1. Operating system: Windows 8 or later, linux or unix, Android
2. Processor: Intel Pentium 4 or later.
3. RAM: 2 GB minimum.
4. Hard disk: 256GB or above.

## 3.5 System Design

System design is the process of defining the architecture, product design, modules, interfaces and data for a system to satisfy specified requirements. Systems design could be seen as the application of systems theory to product development. A designer uses the design tools to express the information and knowledge in the structure of a system that is defined by a consistent set of rules and definitions.

### 3.5.1 System Design Tools

System design tools play an important role in system development. A few design tools used by software designers include:

1. **Data Flow Diagram (DFD):** a data flow diagram is a graphical representation of flow of data in an information system. It is often used as a preliminary step to create an overview of the system, which can later be elaborated. The DFD is capable of depicting incoming data flow, outgoing data flow and stored data. It mentions nothing as to how data flows in a system.
2. **Unified Modelling Language (UML):** is a general-purpose modeling language for systems engineering applications. It was designed to provide a standard way to visualize the design of a system. UML offers a way to visualize a systems architectural blueprint in a diagram including elements such as: activities, individual components of the system and how they interact with other software components, how entities interact with others, how the system will run, external user interface.
3. **Systems Modelling Language (SysML):** is a general-purpose modeling language for systems engineering applications. SysML is an extension of a subset of UML using UML's profile mechanism.

### **3.5.2 System Design Tool: UML**

The Unified Modelling Language was chosen as the tool for modeling the designs for the software application. To properly design the system for implementation, selected components of UML were used: class diagrams, activity diagrams and use case diagrams. These components were selected due to the fact that it is self-illustrative if properly designed, it is simple and suits the nature of the system. It is also easy for end users to understand the model for the software system.

### **3.5.3 UML – Use Case Diagram**

Use cases are a means of specifying required usage of a system. A use case is a list of actions or event steps typically defining the interactions between a role (an actor) and a system, to achieve a goal. Simply put, it is a description of the system's behavior from the user's point of view with measurable result or value.

#### **Table 3.1 Use Case diagram notations and descriptions**

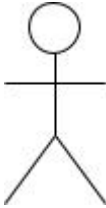


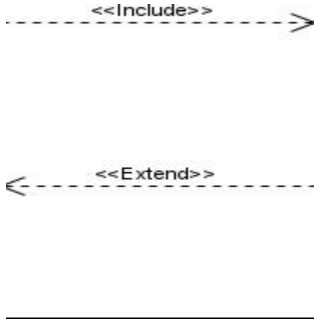
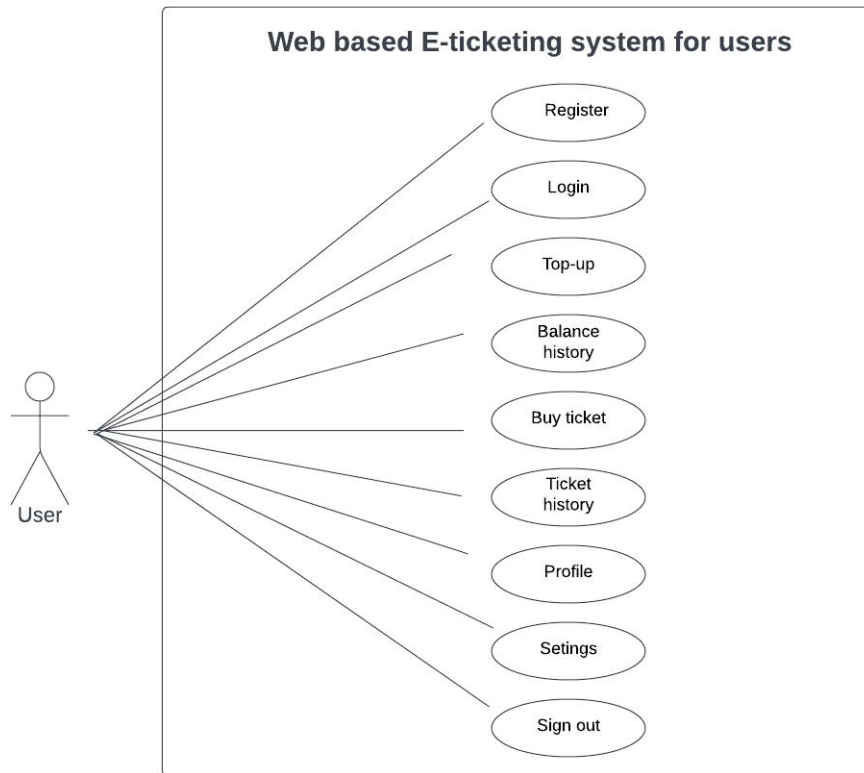
Objects	Symbol	Description
User		They are the system's users. The actor could be a person, organization or external system. They perform a role in the system.
Use Case		Use case is a list of steps, typically defining interactions between an actor and a system to achieve a goal.
System		A system is a rectangle spanning all the use cases in the system that defines the scope of your system. Anything within the box represents a functionality that is in scope and anything outside is not
Relationship		Illustrates the relationship between a user and a use case with a simple line. It also illustrates the relationship between use cases (include and extend)

Figure 3.2 depicts the use case diagram of the Web-Based E-ticketing System for the users built on the proposed architecture. It describes the static behavior of the solution showing its basic

functionalities as use cases. As shown, a driver can register or login to the system, top up their balance, view their balance history, buy ticket, view ticket history, view their profile, settings which entails password reset, and log out of the system.



*Figure 3.3 Use Case Diagram for e ticketing management system for users*

Figure 3.4 depicts the use case diagram of the Web-Based E-ticketing System for the administrator user built on the proposed architecture. As shown, an administrator can login to the system, view users, view tickets, view transactions, view vehicles, view routes, view prices, settings which entails password reset, and logout of the system.

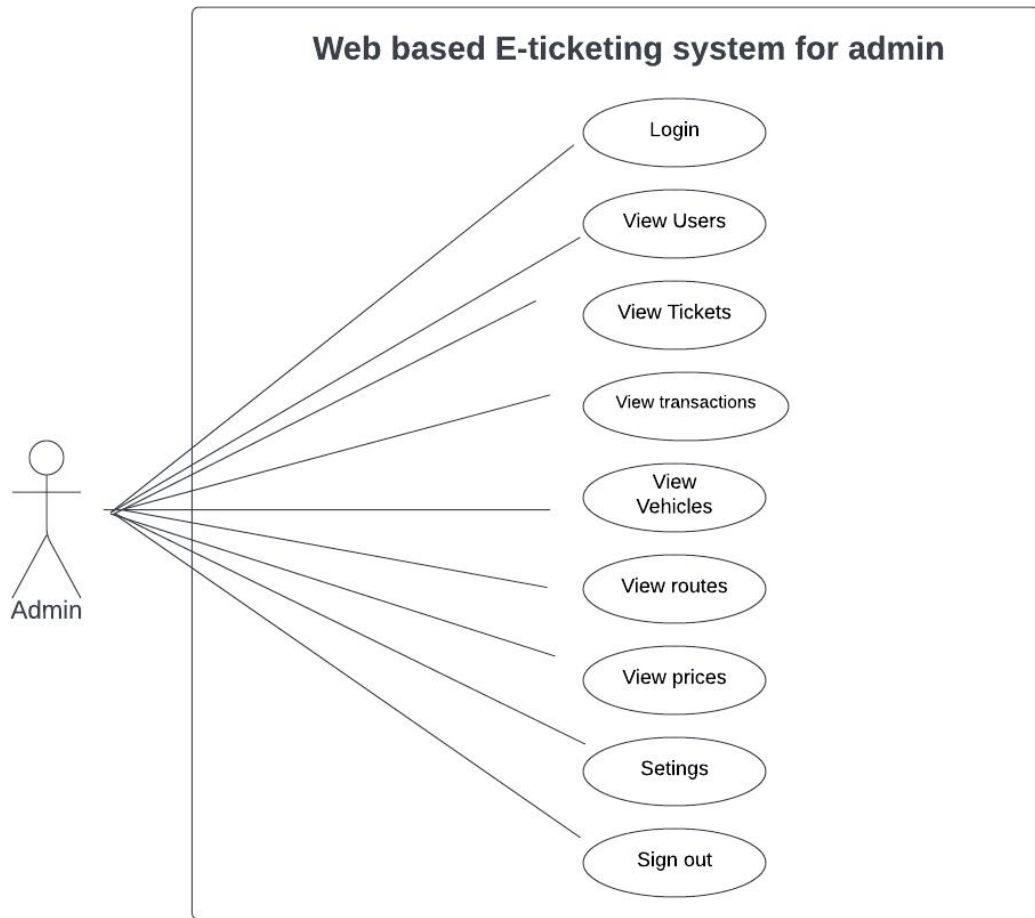






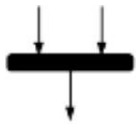


Figure 3.4 Use Case Diagram for e ticketing management system for Admin.

### 3.5.4 UML – Activity Diagram

Activity diagram is used to show the flow from one operation to another. The operation is called an activity. An activity diagram is a UML diagram that focuses on execution and flow more than implementation. The flow between them can either be sequential, branched or concurrent.

**Table 3.2 Activity Diagram Notation**

Objects	Symbols	Description
Start/Initial Node		Represents the starting or initial point/state of an activity.
Final Node		Marks the end of all control flows within the activity diagram.
Activity/Action State		Represents the activities of the process.
Decision Node		Represents a conditional branch point with one input and multiple outputs.
Control Flow		Represents the flow of control from one action/activity to another
Fork		Represents a flow that may branch into two or more parallel flows.
Merge/Join		Represents two or more parallel flows that may merge into one flow

*Figure 3.5 Activity Diagram for e ticketing management system*

### **3.6 DATABASE**

A database is a structured collection of data that is organized and stored in a way that allows for efficient retrieval, management, and manipulation of information. It serves as a central repository for storing data that can be accessed and used by applications, users, and other systems. Database Design refers to the process of creating a blueprint for how data will be organized, stored, and managed within a database system. It involves making decisions about the structure of the database, the types of data to be stored, the relationships between different pieces of data, and the methods for accessing and manipulating the data.

**Table 3.3 Driver's Data Table**

NAME	DATA TYPE	ATTRIBUTE
------	-----------	-----------

Driver ID	Integer	Primary key; Not null
Driver Email	String	Not null
Driver Phone	String	null
Vehicle name	String	Not null
Balance	Integer	Not null
Plate number	String	Not null
Color	String	Not null

**Table 3.4 Admin Data Table**

NAME	DATA TYPE	ATTRIBUTE
Admin ID	Integer	Not null
Admin Email	String	Not null

## CHAPTER FOUR

### SYSTEM DEVELOPMENT

System development refers to the process of creating, designing, implementing, and maintaining a computer-based information system.

#### 4.1 Tools Used

The software tools used in the development of this project are discussed below:

##### 4.1.1 HTML

HTML (Hypertext Markup Language) is a text-based markup language used for creating the structure and content of web pages. It employs elements or tags to define various components on a webpage, like headings, paragraphs, links, and images. HTML files are plain text and can be edited in text editors. Web browsers, such as Chrome and Firefox, render HTML files as web pages. While HTML primarily focuses on structuring content, it can be combined with CSS for styling and JavaScript for interactivity, forming the core technologies of web development.

##### 4.1.2 CSS

CSS (Cascading Style Sheets) is a stylesheet language used for controlling the visual presentation and layout of web pages. It complements HTML by defining styles such as colors, fonts, spacing, and positioning for HTML elements. CSS allows for consistent and attractive webpage design across different devices and screen sizes. It operates using selectors that target specific HTML elements and rule sets that specify styling properties. By separating content (HTML) from presentation (CSS), web developers can create visually appealing and responsive websites.

### **4.1.3 Bootstrap**

Bootstrap is a popular open-source front-end framework for web development. It provides a collection of pre-designed HTML, CSS, and JavaScript components and templates that can be used to build responsive and visually appealing websites and web applications. Bootstrap simplifies web development by offering a consistent and flexible set of tools for layout, typography, forms, buttons, navigation, and more. It also supports responsive design, making it easy to create web applications that adapt to different screen sizes and devices. Bootstrap is widely used in web development for its efficiency and ability to streamline the design and development process.

### **4.1.4 Javascript**

JavaScript is a versatile programming language used for adding interactivity and dynamic behavior to web pages. It allows web developers to create features like form validation, animations, and real-time updates. JavaScript code is executed by web browsers, enabling client-side scripting, but it can also be used on the server-side with Node.js. JavaScript interacts with HTML and CSS to enhance the user experience and make web applications more interactive and responsive. Its widespread use in web development makes it an essential language for building modern websites and web applications.

### **4.1.5 PHP**

PHP is a widely-used server-side scripting language for web development. It is embedded within HTML code and executed on the web server to generate dynamic web pages. PHP enables the creation of interactive and data-driven websites by allowing developers to mix PHP logic with HTML seamlessly. It's known for its database integration capabilities and cross-platform

compatibility. PHP is open-source and widely adopted for building websites, web applications, and content management systems.

#### **4.1.6 PHPMYADMIN**

phpMyAdmin is a web-based, open-source application designed to streamline the management of MySQL and MariaDB databases. It offers a user-friendly graphical interface, making it accessible to both beginners and experienced users. With phpMyAdmin, you can create, modify, and delete databases and tables effortlessly. Its SQL query editor enables you to interact with your database by writing and executing SQL queries directly within the interface.

The application provides essential features for database administrators, such as data import/export capabilities in various formats, user and privilege management, and server status monitoring. Database relationships can be defined and managed within phpMyAdmin, a critical aspect of relational database design.

For developers, phpMyAdmin is a valuable tool during the development and testing of web applications, allowing easy interaction with databases. It also serves educational purposes, aiding students and learners in understanding database concepts and SQL queries.

Being open-source, phpMyAdmin benefits from continuous updates and improvements by a dedicated community of developers. Its multi-language support ensures accessibility for users around the world. Whether you're a developer or a database administrator, phpMyAdmin simplifies database administration tasks and enhances your ability to work with MySQL and MariaDB databases efficiently.

## 4.2 System Testing

System testing is a level of testing which validates the complete and fully integrated software product. The test carried out was an internal acceptance test which is based on alpha testing in which the system developer used the system as if it was being used in the intended work environment. The testing done involved:

- The registration interface for the drivers
- The login interface for both the admin, and drivers.
- Viewing the total revenue for the day
- Viewing drivers from the admin view
- Viewing and editing of routes for Admin
- Viewing the total number of users
- Topping up of balance for users
- Viewing of balance history
- Viewing of ticket history
- Settings for both users and admin.

logging out from the admin, user dashboard

## 4.3 Screenshots of the Running System

### 4.3.1 Home Page

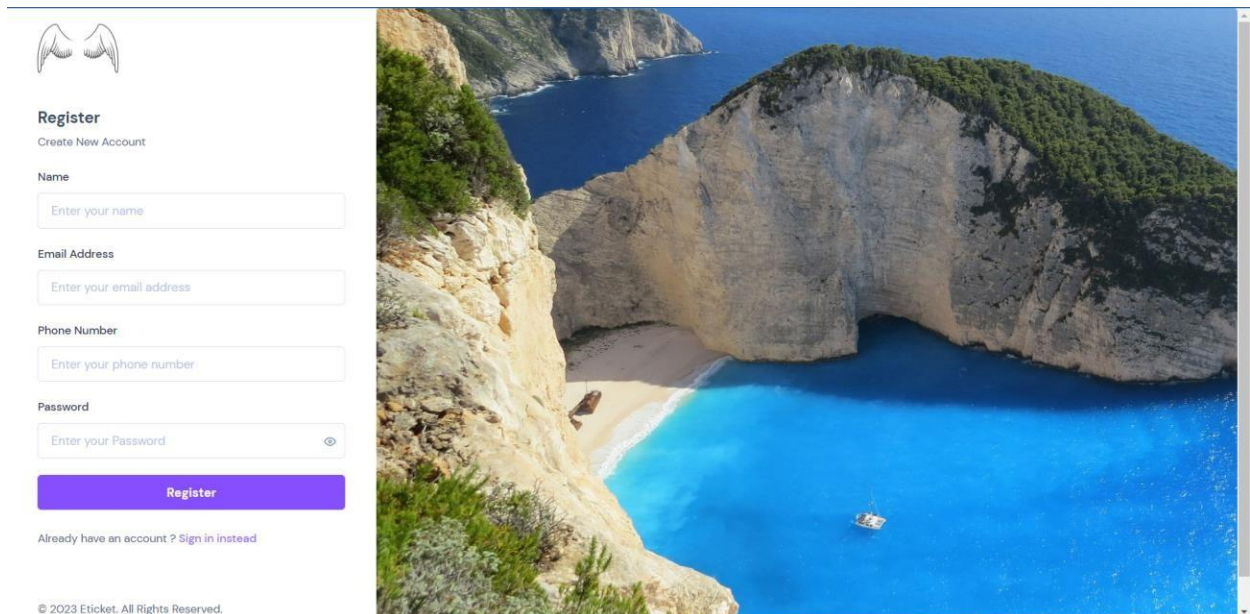
Figure 4.1 shows an overview of the E-Ticketing system. It is the homepage of the website.



*Figure 4.1 Home Page*

### 4.3.2 Registration Page

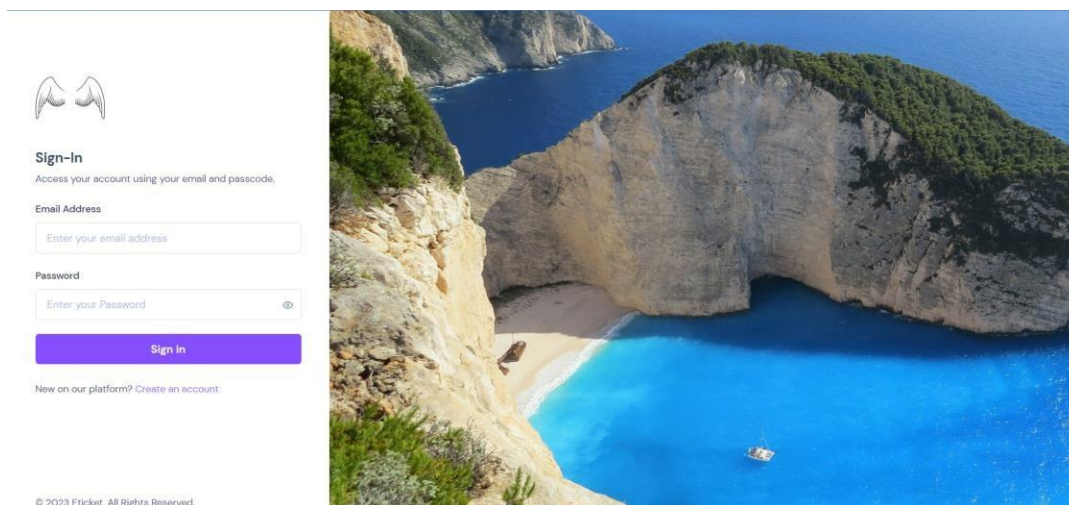
Figure 4.2 shows the registration page where drivers can register to purchase ticket on the system using their respective names, email address, phone number and password. Only a user can register on the system.



*Figure 4.2, User Registration Page.*

### 4.3.3 Login Page

Figure 4.3 shows the login page where an admin, or a user can login to the system using their respective email address and passwords.



*Figure 4.3, User Login Page*

### 4.3.4 Dashboard - Users

Figure 4.4 shows the dashboard where users can have an overview of the full system.

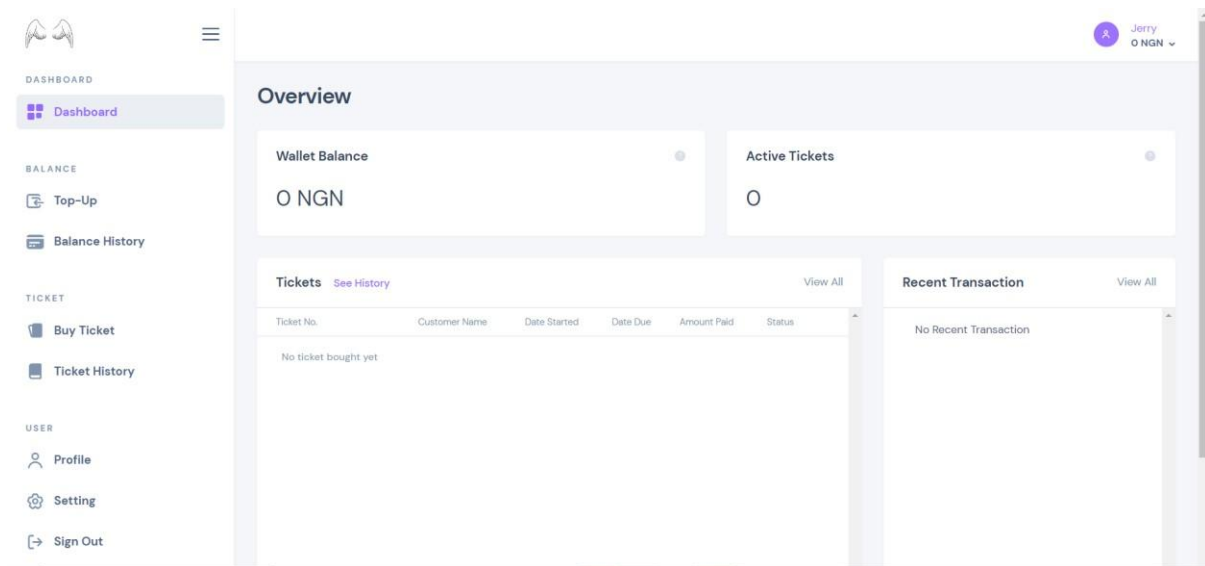


Figure 4.4, User Dashboard.

### 4.3.5 Top-Up – User

Figure 4.5 shows the Top-up page, where users can fund their wallet to purchase tickets.

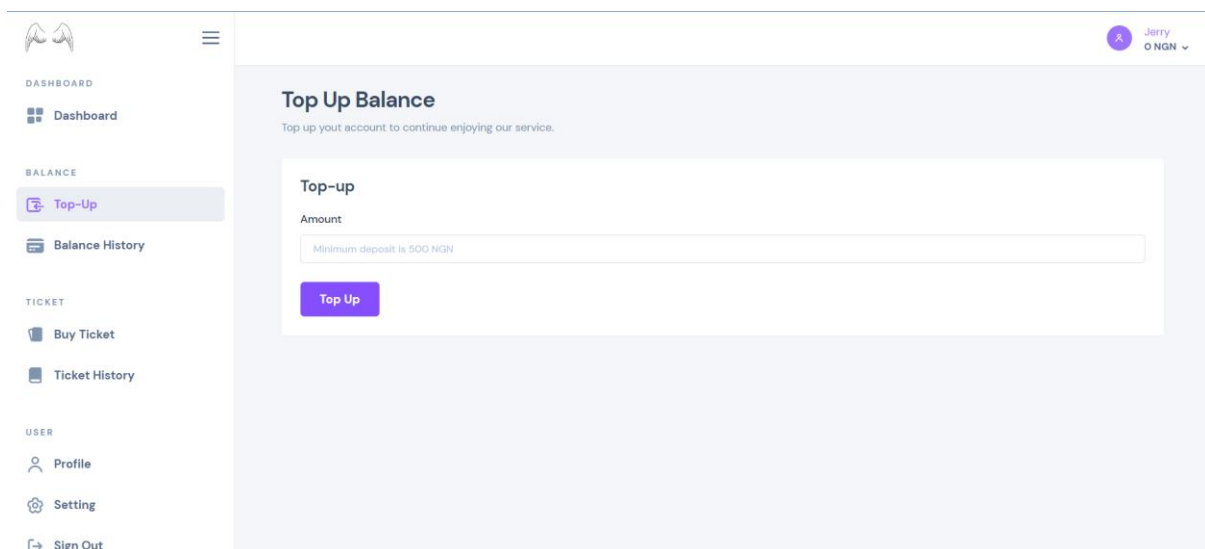


Figure 4.5, User Top-Up

### 4.3.6 Balance History – User

Figure 4.6 shows the balance history, where users can view their top-up history for transparency.

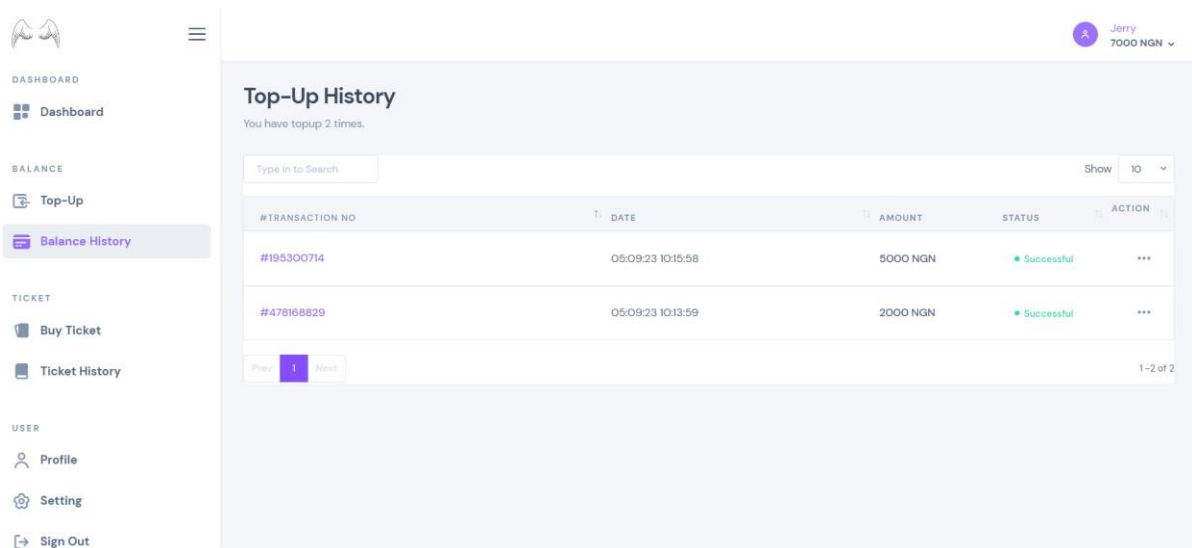


Figure 4.6, User Balance History

### 4.3.7 Ticket Purchase - User

Figure 4.7 shows the page where users can purchase tickets. On this page, they have to provide some informations like; car type, car color, route they choose to ply, plate number, and duration of the ticket.

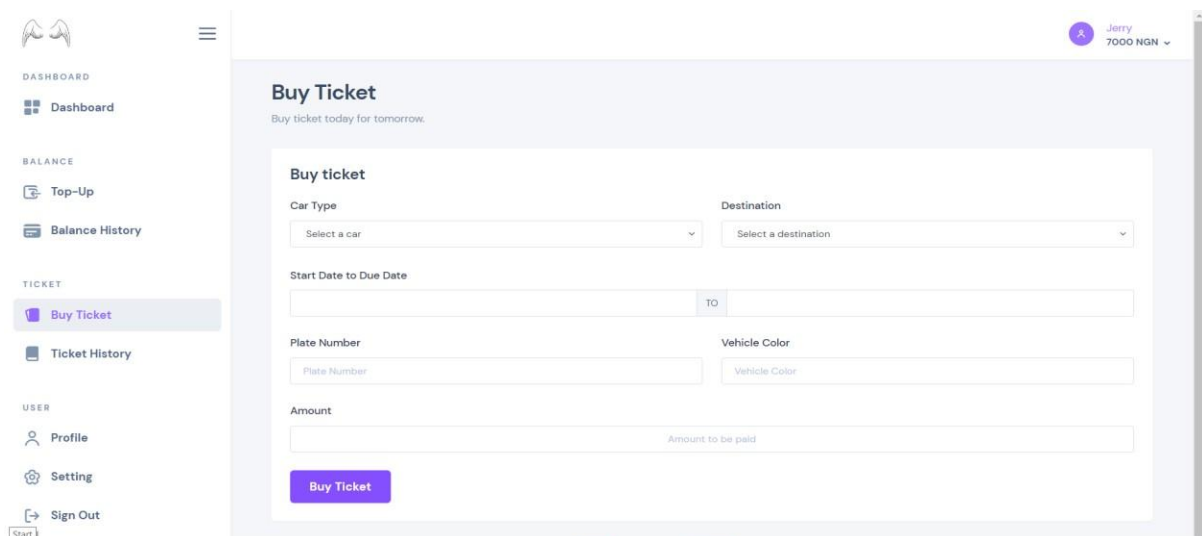


Figure 4.7, User Ticket Purchase

### 4.3.8 Ticket History - User

Figure 4.8 shows the page where users can see their purchased ticket peradventure they need to reprint it for verification. It also have a status indication which shows if the ticket date has expired or not.

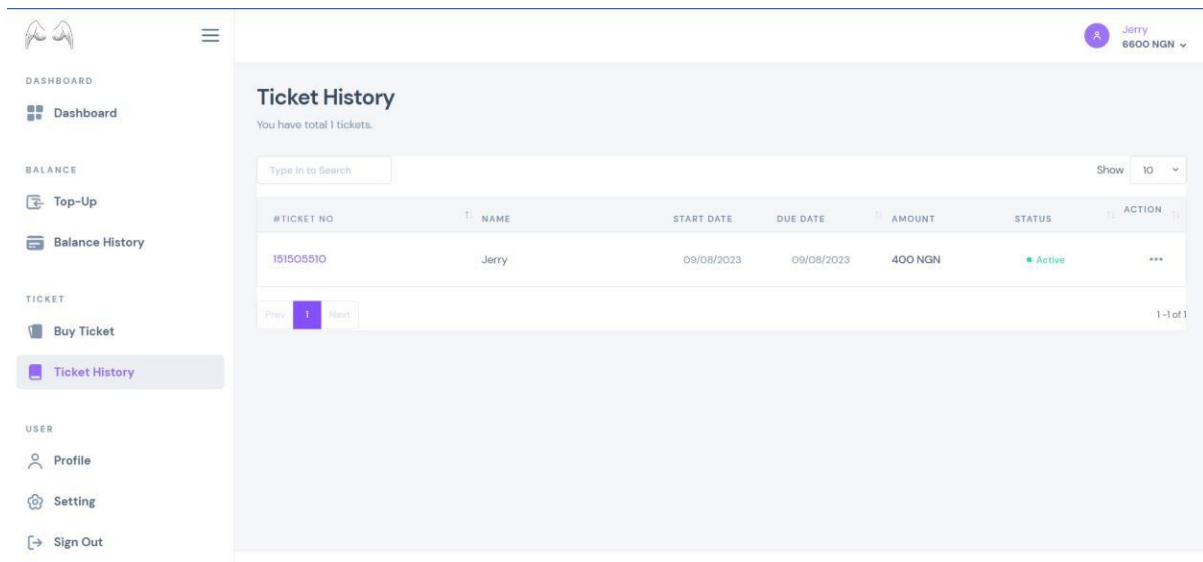


Figure 4.8, User Ticket History

### 4.3.9 Profile

Figure 4.9 shows the page where users and admin can edit their profiles and also change their passwords

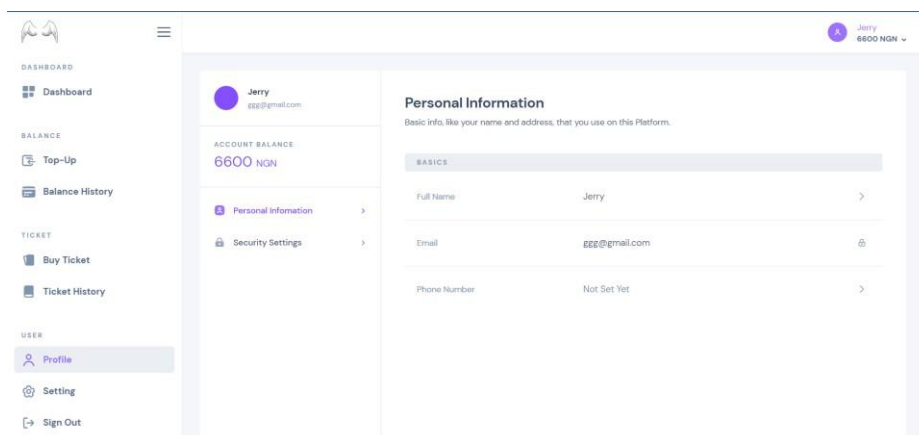


Figure 4.9, Profile for both admin and users

### 4.3.10 Dashboard – Admin

Figure 4.10 shows the dashboard of the administrator. This page shows an overview of the system.

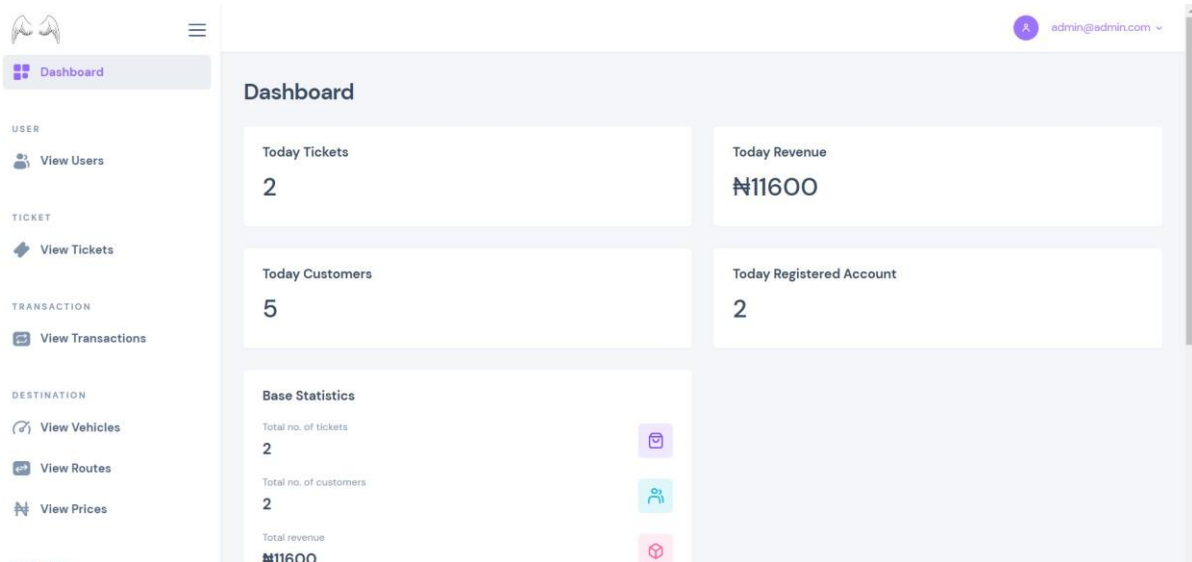


Figure 4.10, Admin Dashboard

### 4.3.11 View Users – Admin

Figure 4.11 shows the page where the administrator can see the total number of users along with their details.

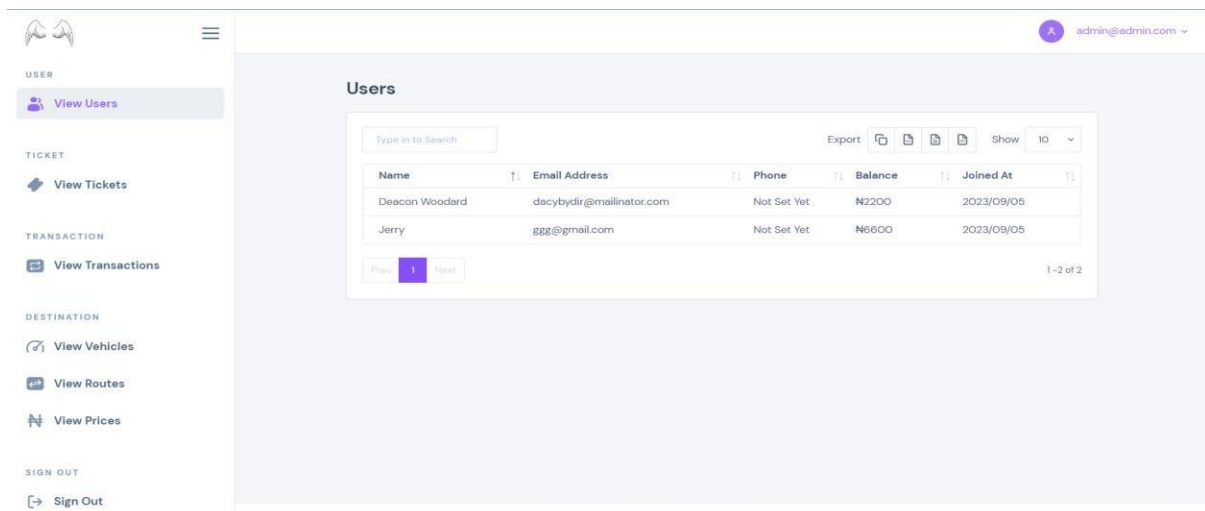


Figure 4.11, Admin page for viewing users

### 4.3.12 View Tickets – Admin

Figure 4.12 shows the page where the administrator can view each tickets purchased and also search for tickets with some details like plate number, color vehicle etc.

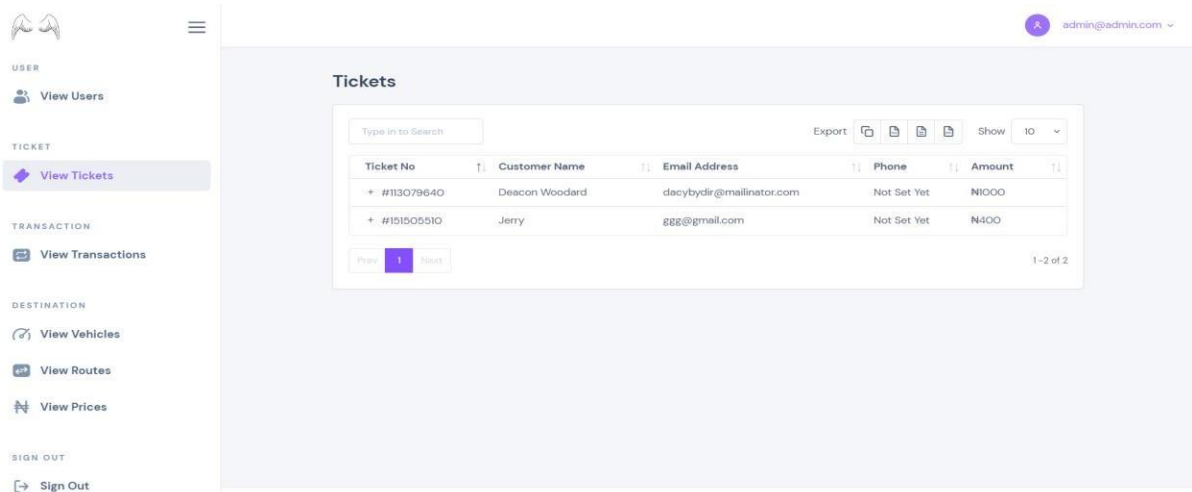


Figure 4.12, Admin page to view purchased tickets.

### 4.3.13 View Transactions – Admin

Figure 4.13 shows the page where the administrator can view users transactions such as topping up of wallets.

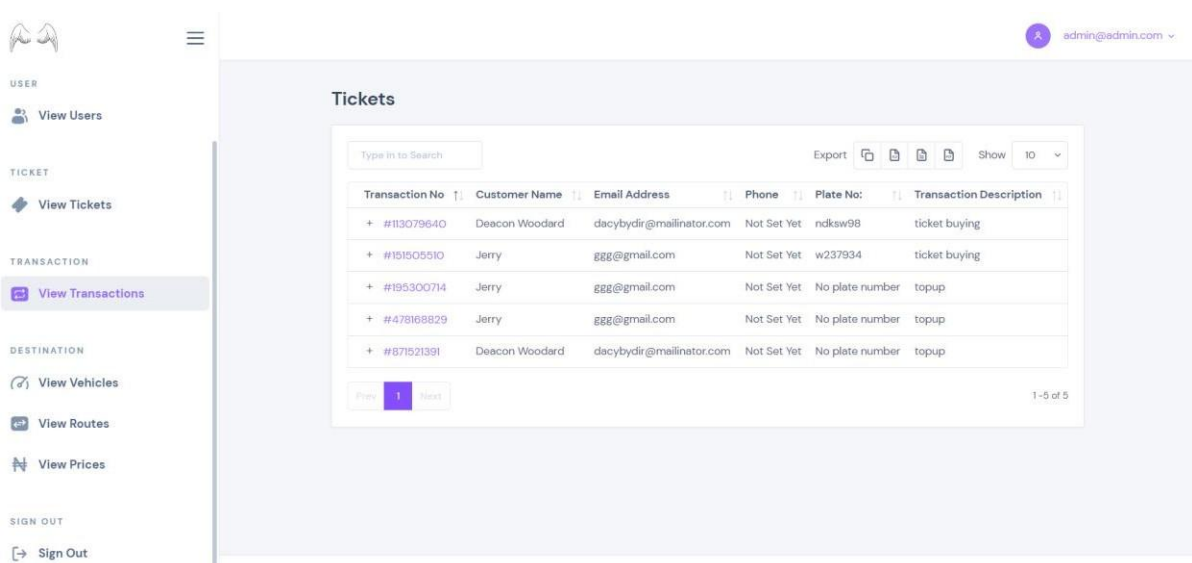


Figure 4.13, Admin page for viewing transactions.

### 4.3.14 View Vehicles – Admin

Figure 4.14 shows the page where administrators can view vehicles that has purchased ticket before. The advantage of this is that it helps the administrator to know the total number of vehicles within a local government.

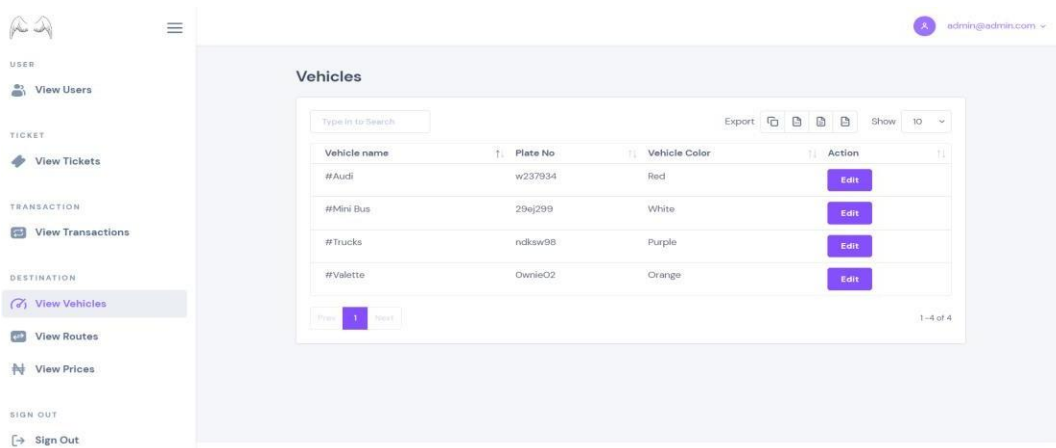


Figure 4.14, Admin page for viewing vehicles who have purchased tickets

### 4.3.15 View Routes – Admin

Figure 4.15 shows the page where the administrator can edit the routes and also add more routes to the system.

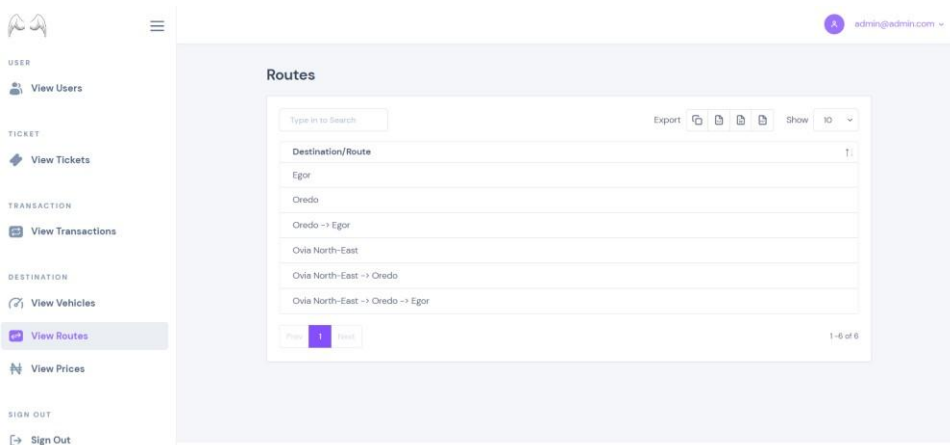
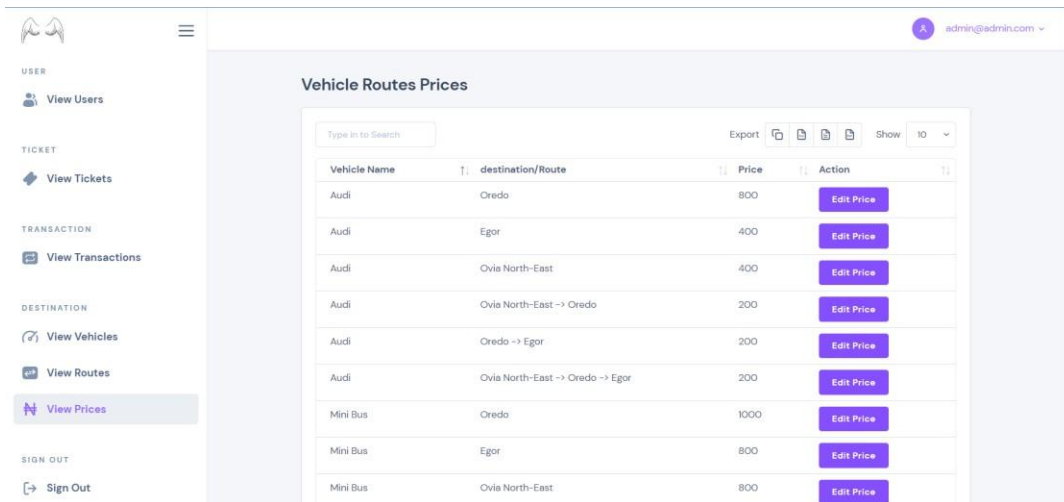


Figure 4.15, Admin page to view routes

### 4.3.16 View Prices -Admin

Figure 4.16 shows the page where the administrator can edit prices for each vehicle per routes, and also add more vehicles to a particular routes.



Vehicle Name	destination/Route	Price	Action
Audi	Oredo	800	<a href="#">Edit Price</a>
Audi	Egor	400	<a href="#">Edit Price</a>
Audi	Ovia North-East	400	<a href="#">Edit Price</a>
Audi	Ovia North-East -> Oredo	200	<a href="#">Edit Price</a>
Audi	Oredo -> Egor	200	<a href="#">Edit Price</a>
Audi	Ovia North-East -> Oredo -> Egor	200	<a href="#">Edit Price</a>
Mini Bus	Oredo	1000	<a href="#">Edit Price</a>
Mini Bus	Egor	800	<a href="#">Edit Price</a>
Mini Bus	Ovia North-East	800	<a href="#">Edit Price</a>

Figure 4.16, Admin page to edit the prices of each route.