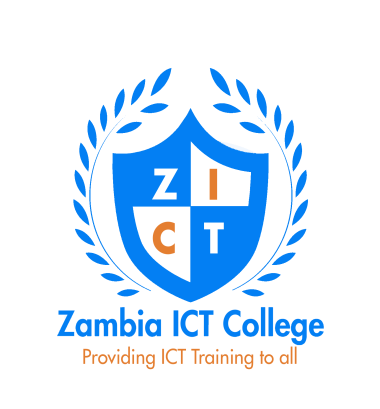
****

**DESIGNING AND DEVELOPING A CROSS PLATFORM ONLINE BUS BOOKING TICKET SYSTEM**

(A case study of Ndola bus terminus)

**Online Bus Booking Ticket System**

2021

BACHELORS OF INFORMATION TECHNOLOGY

GROUP FINAL YEAR PROJECT PROPOSAL

**BY**

**NAME COMPUTER No.**

1. Geoffrey Zimba 1913622

2. Chilufya chimfwembe 1913606

3. David nsofwa 1913669

4.Patricia chewe 1913636

5. Ndashe mwansa 1914070

*Supervisor: Ms Mushikwa*

# Declaration

We do hereby declare that this document is ours, and that, to the best of our knowledge and belief, it contains no previously published or written material by another person. Except where due acknowledgement has been made, all concepts used in this document are our own work, and this work has not previously been presented in this or any other university for similar purposes.

Signature: ……………………………….. Date: ………………………………………

**Your name (Author)**

Signature: ……………………………….. Date: ………………………………………

# Dedication

This project is dedicated to all the members of the group for their sacrifice and cooperation in researching this paper. Our appreciation goes to Ms. Mushikwa, Mr koloko, Mr chazanga and Mrs Mbambo for their continues guidance in the management of the project and preparation of the paper and to our colleagues for their support.

# Acknowledgment

We would like to express our special thanks of gratitude to our course lecturer, Ms Mushikwa, for her dedication to the course and the invaluable advice she has given us as well as our course coordinator who gave us the golden opportunity to do this wonderful project on cross platform bus seat booking, which also helped us in doing a lot of Research and we came to know about so many new things we are really thankful to them.

Secondly, we also want to thank our families for their unwavering support throughout our academic careers. Above all, we are thankful to God for providing us with the opportunity to study this program.

Certification of approval

The thesis Designing and developing a cross platform online bus booking ticket system for Ndola terminus of Copper belt province is submitted in partial fulfilment for the award of bachelor of Information Communication Technology

Examiner Names

Mr J. Koloko Date

…………………………………………………………………………

Mis C. Mwape Date

………………………………………………………………………….

Chairperson of Board of Examiners Date

………………………………………………………………………….

# Abstraction

Bus tickets have traditionally been purchased in person at bus terminals, but this has changed with the explosive growth of e-commerce. In the modern day and age, internet has become an essential for everyone. This project focuses on the analysis and creation of a mobile applications for online bus ticket sales and purchases, ticket cancellations, postponements, report generation, and other functions for customers (passengers) and staff. Online Bus Booking System is a mobile application based Online Bus Booking System. This is a user friendly online bus ticket booking system for both clients and service provider. Which also serve as a management tool for bus ticketing firms to successfully run their business. Our regular tasks need us to spend a significant amount of time traveling because of the heavy traffic in our cities. Many people migrate from city to city for both personal and professional reasons. Providing comfort and convenience,

Bus transit is a popular form of mass communication. This endeavor is just the physical processes involved in purchasing, paying for, and collecting bus tickets by use of an online application. Using this mobile application, getting a bus is simple. During a very short period of time, ticket booking-purchase gather from his or her location, and technical capability.

The study will employ a mixed research design, which will include both quantitative and qualitative research methods. As a result, survey and case study methods will be used to collect quantitative and qualitative data. This information will be gathered using questionnaires and semi-structured interview guides. The data will be statistically analyzed using SPSS and Microsoft Excel, and thematically analyzed in the case of qualitative data.

This project includes the development of a prototype Online Bus Booking Ticketing System mobile application portal to support the research objective.

The specific objectives are: To develop a system that will eliminate the manual process of physically booking tickets at bus terminus in Zambia, to develop a cross platform bus ticket booking system, to integrate multiple payment methods in the cross platform bus ticket booking system.

This mobile application will assist in future development that would support a fully integrated system that links staff of the bus company to customers, staff to staff, staff to other mode of transport providers, staff to businesses and staff to government agencies.

Table of Contents

[Declaration ii](#_Toc29862)

[Dedication iii](#_Toc22115)

[Acknowledgment iv](#_Toc27459)

[Abstraction vi](#_Toc14096)

[CHAPTER ONE 1](#_Toc19026)

[1.0 Introduction 1](#_Toc10942)

[1.1 Background of the Study 1](#_Toc83)

[1.3 Problem Statement 2](#_Toc2747)

[1.3 Objectives 2](#_Toc15101)

[1.4 Research Questions 3](#_Toc10488)

[1.5 Significance of the Study 3](#_Toc23341)

[1.6 Conceptual Framework 3](#_Toc9933)

[1.7 Purpose of the Study 3](#_Toc22818)

[1.8 Scope of the Study 4](#_Toc3765)

[Key words 5](#_Toc9147)

[CHAPTER TWO 5](#_Toc12570)

[Literature Review 5](#_Toc6810)

[2.0 Introduction 5](#_Toc1137)

[2.1 Study on Electronic Ticketing in Public Transport 5](#_Toc594)

[2.3 European metropolitan transport authorities BudapestGO 6](#_Toc2863)

[2.4 BUDAPESTGO in-line with PAJANE booking 8](#_Toc2824)

[2.5 Reserve a seat! Intelligent transportation booking system for tourists 8](#_Toc5724)

[2.6 Online Transport Booking System 9](#_Toc1335)

[2.7 Design and implementation of an online bus ticketing system 10](#_Toc12753)

[2.8 Smart E-Ticketing System for Public Transport Bus 10](#_Toc32116)

[CHAPTER THREE 11](#_Toc12136)

[RESEARCH METHODOLOGY 11](#_Toc32610)

[3.0 Introduction 11](#_Toc12454)

[3.1 Choice of methodology: 11](#_Toc310)

[3.2 Development Tools 11](#_Toc19104)

[3.3 Layout 12](#_Toc17537)

[3.4 Features 12](#_Toc32305)

[3.4 Requirement Specification 12](#_Toc7702)

[3.5 Functional Requirements 12](#_Toc20155)

[3.6 Non-Functional Requirement 13](#_Toc26176)

[CHAPTER FOUR 14](#_Toc21508)

[RESEARCH RESULTS AND ANALYSIS 14](#_Toc7089)

[4.0 introduction 14](#_Toc18417)

[4.1 How the system meets objectives 14](#_Toc22216)

[4.3 Implementation of the design 17](#_Toc22320)

[Payment Screen Implementation 17](#_Toc22559)

[LiveMap Implementation 18](#_Toc29709)

[System Json SnapShot 19](#_Toc5253)

[4.4 Database Design 20](#_Toc9473)

[CHAPTER FIVE 21](#_Toc29138)

[CONCLUSION AND RECOMMENDATION 21](#_Toc21700)

[5.0 Conclusion 21](#_Toc17197)

[5.1 Recommendation 21](#_Toc6120)

[operator Login Screen Operator Home Screen Seat Listing 22](#_Toc18625)

[Scan Ticket Other Operator Screens 22](#_Toc15429)

[References 23](#_Toc22014)

[APPENDIX I 26](#_Toc22713)

[Snap shots of the Login Panel 26](#_Toc6854)

[Snap shots of the Login Panel 26](#_Toc2065)

[APPENDIX II 26](#_Toc12103)

[Search Filtering Screen 26](#_Toc4118)

[Payment screen 30](#_Toc16197)

[LiveMaps Screen 43](#_Toc32269)

[Back end Implementaton code 47](#_Toc22825)

[Searching Buses 47](#_Toc19499)

[FetchingQuick Bookings 48](#_Toc17935)

[Fetch Tickets 49](#_Toc32725)

[APPENDIX III 51](#_Toc15263)

[PROPOSAL ATTACHMENT 51](#_Toc28317)

**List of Figures**

**Figure 1: Physical Design**

**Figure 2: use case**

**Figure 3: database design**

# CHAPTER ONE

## 1.0 Introduction

1. Overview

Bus ticket booking during the off-line era posed various difficulties to the customers as well as the bus operators. Offline ticket booking reduced the scope of customers to choose different options based on their travel criterion. It also increased the franchising cost for the bus operators. At the same time, the bus operators were also finding it difficult to monitor their bus seat filling information. Many small and medium bus service organizations do not have their own online bus ticket booking system. Online Bus Booking Ticket System is a total internet ticketing operations offering the benefit of total in-house management of bus schedules, ticket bookings, ticket sales, seat booking, and other business functions associated with ticket sales. It also offers the power of decision making to customers to make a ticket booking through bus operators’ popularity, performance and ranking. This powerful Internet based ticket booking system that allows a full control of not only on the ticketing inventory, but also the mobile content [1].

## 1.1 Background of the Study

The widely held belief in various global circles is that man is currently living in the information age, which is defined by the rapid rise of information gathering, processing, and dissemination. As a result, managers and other information users, particularly in the transportation industry, are requesting more types of data to assist management and operations. As a result, they must adapt to the growing demand for information and data management.

Electronic tickets, often known as e-tickets, are proof that its owners have permission to enter a venue, utilize a mode of transportation, or use certain Internet services. Because it has never been done before, the creation of this online system will be helpful to the companies. To achieve this element, the usage of a Decision Support System (DSS) and Management Information System (MIS) as a tool to develop a system that will finally benefits the user to maximize their rights to make decision based on merit and also the bus company to meet their organization financial objective [2].

1.2 Aim

This study aims at designing and developing an effective Cross Platform Online Bus Booking Ticket System that will help people to book bus ticket very easily anywhere by using internet.

## 1.3 Problem Statement

The system that is used by the diversity at the counter currently is a manual system and is just used to sell bus tickets at the counter. A customer should go to the counter to buy a bus ticket or ask for the bus schedule. Furthermore, customers need to pay cash when they buy the bus ticket and sometimes need to queue up for a long period of time in order to get a bus ticket. Inflexibility in comparing prices between bus logistics at a particular bus terminal inaccurate timing between bus arrival and departure. Besides that, passengers are also not allowed to buy bus tickets through an online system

Research Goal

To implement a mobile application to support this research that will be used by both the Customers and Bus operators in Ndola, Zambia.

## 1.3 Objectives

The main objective of this research was to identify the importance of adopting a comprehensive Online Bus Booking Ticket System mobile application by inviting all bus operators to utilize the mobile application and to provide various options for a customer to purchase bus tickets.

In addition, it will benefit both passengers as well as the bus travel companies have a chance to improve their business performance by adopting on-line bus ticket booking.

Below are the specific objectives to the study

1. To develop a cross platform bus booking Ticket system.
2. To integrate Google maps APIs to reduce the time complexity of booking a bus ticket at bus terminus in zambia.
3. To integrate multiple payment methods in the cross platform bus booking ticket system.

## 1.4 Research Questions

While the research was being undertaken, a mirror of research questions has been identified using the objectives specified in the proposal.

1. How a cross platform system can enhance booking seats of local buses in Zambia?
2. How can Google maps APIs help reduce the time complexity of the manual processes of booking tickets at bus terminus in Zambia?
3. What payment options are suitable to provide flexibility to bus ticket booking to customers in Zambia?

## 1.5 Significance of the Study

This study will help bus service companies formulate ways on how to improve customer services, in terms of eliminating the physical stress of booking a ticket physically

Here all the information about customer that made booking can be gotten just by clicking a button with this proposed system. It will also reduce the workload of the staff, reduce the time used for making booking at the bus terminal and also increase efficiency. The application also has the ability to update records in various files automatically thereby relieving the company’s staff the stress of working from file security of data. We saw to it that with the development of the system, customer satisfaction is likely to upsurge due to the convenient, quick and efficient procedure of reserving a seat and booking a ticket at the comfort of their homes on-line, on their desirable electronic devices with a variety of payment options.

## 1.6 Conceptual Framework

Confirmation

Update

Customer/Passenger

Admin

BUS BOOKING TICKET SYSTEM

Login

Confirmation

## 1.7 Purpose of the Study

We intend to create a reliable and efficient and cost-effective software that can help increase customer satisfaction and profitable for bus transport and logistic companies like the identified target sample Ndola bus terminus. This project, as a whole, will give a new way in bus bookings and ticketing processes. The automation and management of tickets and bookings will be done online. However, this project does not limit the walk-in passengers that is passengers who visit the company’s counter because it also caters for them. This also lessens the use of papers like in the traditional way of ticketing.

## 1.8 Scope of the Study

This research focuses on two parties which are the bus operators and the customers on which the study was conducted at Ndola bus terminus. After all data was collected and analyzed, it was seen that the system can be adopted by a number of transport and logistic companies operating around the provinces of Zambia, from Lusaka to Copper belt and other provinces. Its scope can be designed to facilitate the local companies and travellers of Zambia.

The system will be equipped with components to login/register, search, view, and book and make payment on the mobile application while providing a custom user-friendly interface on both platforms (android and iOS application). , below is an algorithm explaining the involved steps.

Admin/user login on mobile application portal

1. User login/registration on mobile application
2. Search component (search by bus name, time, destination and current location)
3. Support viewing a live location of buses registered on the platform through the use of Google maps APIs.
4. Issue tickets and provide or code for each ticket number
5. Alerting and Notification for booked and next departures.
6. Booking and cancellation of advance tickets
7. Online payment visa/ MasterCard gateways including Mobile money services.

Key words: Electronic Ticketing, ITC, Booking, Transportation, MySQL, Database management system, Payment Gateway, React, PHP, Mobile Money services, QR code and API

# CHAPTER TWO

# Literature Review

## 2.0 Introduction

According to Kevin, the Online-based Bus booking and Ticketing System is a general web portal program that allows bus customers to reserve a seat in a specific bus business at any time and from any location, and provides a range of buses to meet the customer's needs5. The project, on the bus company’s side, serves as a marketing strategy and aids an efficient processing and final delivery of itinerary receipts.

## 2.1 Study on Electronic Ticketing in Public Transport

[4] A consultant with European Metropolitan Transport Authority **(EMTA),** Mohamed Mezghani stated that EMTA has established a working group to work on the issue of electronic ticketing. This group is mandated to generate knowledge, exchange/compile information and learn from the experience of its members in the field of electronic ticketing. In his framework, EMTA has launched a study on electronic ticketing in public transport under the supervision of the working group and they designed certain concepts such as the public transport pricing, public transport ticketing and electronic ticketing in public transport. On the contrary, his research which discussed certain concepts in relation to electronic ticketing in public transport was a one-directional article which didn’t relate the idea about customer reserving seats and for their journey at a date chosen by them. Nevertheless, this project will be designed to encapsulate these areas mentioned as well as display certain screenshots of the customers’ bookings system

“**Pinoy Travel Online Bus Booking System in the Philippines**”

According to Canlas, Katrina (2014), Pinoy travel is an android app offers to the commuters an online ticket booking that travel to Bicol, Palawan, Baguio, Tuguegarao, Aurora, Manaog and Dagupan. The commuters can book bus ticket through online as long as they are connected to the Internet using their android phone (www.pinoytravel.com.ph).

“Online Bus Booking System with Mobile Notification”

As cited online bus booking system with mobile notification uc.edu.ph (2016) the features of this system provide “electronic mail and mobile phone notification” which is the passenger can receive a notification regarding their status of ticket reservation if confirm from the system or administrator and generate up to date report. To avoid

Inconvenience from the management, can also print the schedule and route. The system can produce or provide booking status, driver’s info, location, trips schedules and tariffs to make their operation run smoothly (uc.edu.ph).

**“E-Ticket Reservation System”**

As cited in “E-ticket Reservation System” website in [www.iiste.org](http://www.iiste.org/" \t "https://www.inettutor.com/source-code/bus-seat-booking-system-related-literature/_blank)(2014), is an electronic ticketing technology that is reliable for the end users for it provides them a transport operator that is no longer paper based but an electronic system. The main feature for this was the electronic storage of tickets sold and the uniform, accurate and centralized bus fare collection prizes (www.iiste.org).

## 2.3 European metropolitan transport authorities BudapestGO

On 14 February 2022 Budapest replaced its former journey planner (FUTÁR) by the BudapestGO application, where journey planning, ticket and pass sales are integrated with real-time information on the actual transport situations [7] .

BKK Centre for Budapest Transport fundamentally renewed its journey planner app by introducing and integrating several functions: from then customers can plan their journey, receive real time information about changes and buy their ticket or pass in one application.

The above-mentioned functions were formerly available in separate applications: journey planning and real-time public transport information were offered by applications of BKK, while mobile tickets and passes, in line with the national rules, were available in separate third-party applications (banks and National Mobile Payment System, as the integrator of mobile payments in Hungary). The new integrated application is more comfortable for customers, and transport authority BKK can also benefit from the user database that helps providing self-tailored services – this is an important step towards realization of Mass Budapest.

**Advanced functions of BudapestGO**

To get around the Hungarian capital, BudapestGO provides a simple and easy solution, with the following advanced functions, that provide much more than an average journey planner.

**BKK tickets and passes in one app**

Parallel to the options of purchasing tickets in vending machines or customer centers, tickets and passes in digital form are now easily available in BudapestGO. As a new product, long-time awaited time-based tickets (for a 30-minute and a 90-minute ride) will be available in the app from March 2022.

**Tickets and passes not only for Budapest**

As the ticket and pass purchase in the integrated app of BKK is cooperating with the National Mobile Payment System, mobile tickets and passes are available not only for mobility services in Budapest, but also for regional buses and local public transport lines of every major urban settlement in Hungary.

**Improved user experience**

The BudapestGO app introduces new functions that improve user experience: the app allows BKK’s customers to automatically purchase their monthly passes each month, timetables can be used more simply and journey planning is more transparent. Customers can select whether the app should plan their trip with fewer transfers or less walk, and saved information can be managed more easily. The functions of former BKK Info app are integrated into the BudapestGO app, which indicates real-time traffic-related changes during journey planning. By using the widget function, the purchased ticket can be kept on the mobile home screen, meaning that the ticket can be available, validated or presented with one click.

**Further development of BudapestGO**

Budapest believes that Mobility as a Service (MaaS) is the right direction for digital developments in urban mobility. The BudapestGO app will be continuously developed, with the introduction of time-based tickets as the next step, and integration of further transportation services and further development of user experience during 2022. Later releases will introduce a reliable bicycle journey planning (that takes topography into account), and include Demand Responsive Transport (DRT) bus lines.

BudapestGO app is available in Google Play store and Apple App Store, former FUTÁR app is automatically updating to BudapestGO.

## 2.4 BUDAPESTGO in-line with PAJANE booking

The ButapestGo app in Europe has influential credibility to customer satisfaction and ease of providing and getting services between the company and the customers at large. As of the articale in EMTA article dated 25th February, 2022, it is proven that Mobility as a Service (MaaS) is the right direction for digital development in urban mobility1. For that matter, the proposed system PAJANE BOOKING can bring on board digitalization on the bus transport agencies in Zambia and analogous to the options of purchasing tickets in vending machines or customer centers that is the traditional and most adopted system, tickets and passes in digital form can be easily booked and accesses on the go with so much ease and efficiency.

With the intentions of ticket and seat purchase in the integrated app of PAJANE BOOKING heading to cooperate with the National Mobile Payment System, mobile tickets and passes will be available not only for mobility services in small local settings, but also for regional buses and local public transport lines of every major urban settlement in Zambia.

## 2.5 Reserve a seat! Intelligent transportation booking system for tourists

According to the conference held in campaign of the intelligent transport booking system for tourists in the United States, their proposed tourist booking system was feasible and would provide tourists with an efficient method for scheduling their activities during their dream vacations12. In addition to providing an efficient method of transportation for tourists, some other benefits included the following:

When tourists realize the convenience of using the booking system, fewer personal cars will be used, which implies less congestion and less pollution. Pollution from auto-mobile exhaust is a very important issue for many of our national parks.

Because of customer convenience, especially for persons with disabling conditions, people will want to visit and revisit sites with the efficient transportation system.

Use of a booking system will reduce the operating expenses for any existing transit system on the site because of the more efficient use of buses.

After a few weeks of operation, the log books and other records maintained by the system will help site operators with planning and scheduling. In addition, on a daily basis, if it is known how many passengers are dropped off at a particular venue, then how many must be brought back from that venue is also known. This could be a useful security measure.

The "Reserve a Seat!" system has multiple benefits. Greater comfort (less frustration), greater safety (because of the rapidity of dispatching emergency vehicles), and better information exchange lead to happier travellers. Satisfied travellers spend more money on mementoes at the tourist sites. Finally, the environment benefits when buses replace personal cars as a mode of transit with the attraction. The traveller, the tourist site, the environment -- the "Reserve a Seat!" system has a special attraction for them all [8].

The gap between the above mentioned system and our system is typically on the restricted functionalities oriented towards tourists only, but our proposed system is aimed at reaching largely every person with access to the system via the internet to book tickets and schedule bookings for later travels within the country.

## 2.6 Online Transport Booking System

Badariah, emphasized that the Online Transport Booking System established at Politeknik Kota Kuala Terengganu (PKKT) would ensure that users could book online or book their desired travel companies with the services offered by the new system. He pointed out that the method and technology used in the new transport system could also be applied to other workplaces2. A user who wants to use transport must apply for a booking of transport before boarding. Similarly, after considering the type of plan adopted by Badariah, the project was be built with the same purpose of introducing customers to Imo Transport Company and the opportunity to make bookings in their homes or offices without having to face the challenges of the calculation line before taking any trip [10]. This project will also enlighten potential buyers and users of the system with the need to protect the system as it shows many advantages over the old system by providing easy-to-use Graphic User interface (GUI), pre-board access, etc.

# 2.7 Design and implementation of an online bus ticketing system

According to Yari, Imrana Abdullahi, generally a bus ticketing system consists of all the activities involved in producing a ticket, which includes, producing tickets, booking ticket, selling tickets, rejection of the tickets, total tickets produced for a trip, total tickets sold and income gained through the ticket selling. A bus ticketing system can let customer to know the information about the bus schedule and ticket. Nowadays, online are very common issues to every one so that checking information using online can save allot of time to the customer, so that customer no need to go to the counter to ask of bus and schedule. Bus ticketing system is a complex system that is difficult to be managed by human, so as a result software system can be used instead of human, which will help to avoid a big percent of mistakes. Online Bus ticketing system make process of scheduling trips more easier and prevent conflicting in time, also it help customers to book their tickets from their homes and checks the pricing system of the routes, the price of 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. Online ticketing system is a system that assist not only the passengers but also the bus staff position as an efficient service provider, gaining competitive advantages and also lead to superior control over the reservation process and operation, compared to conventional manual processing [9].

## **2.8 Smart E-Ticketing System for Public Transport Bus**

[10] According to Sanam Kazi Assistant Professor, Murtuza Bagasrawala, Farheen Shaikh and Anamta Sayyed the application will then provide the user with a list of buses for their route from that bus-stop. The list will also contain the information about seat availability and the expected time for the bus to reach that particular bus stop. Based on the information the user has to decide the bus he/she wishes to travel with. The expected time of the bus will be calculated by using the GPS enabled device which will be with the bus conductor.

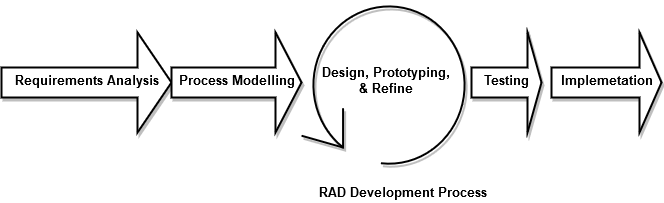
# CHAPTER THREE

# **RESEARCH METHODOLOGY**

## 3.0 Introduction

Research methodology is the way of gathering data for a research endeavor. Data can be collected for theoretical or practical study, such as management research, operational planning methods, and change management. Oral interviews were employed to gather the information for this investigation.

## **3.1 Choice of methodology:**



## **3.2 Development Tools**

Our project was built at 98% JavaScript (React) and 2% PHP and the choice of this technology was based not only on team strength but on the pros that the framework has on creating a professional, efficient and robust user experience on front end designing which fits on cross platforms (android /IOS) The following tabulation shows software tools and hardware tools used during the implementation of the system.

Software tools includes React Native, PHP, Node.js, Express (languages), MYSQL (Database System), Xampp server (Server), VS Code (IDE) and Collaboration/Repo (GitHub).

Hardware tools includes Dell Latitude Laptop (core i7, 7th gen, ram 8 GB, 2.9 GHz) and Hp ProBook Laptop (core i5, 5th gen, ram 8 GB, 2.3 GHz).

Aside from the mentioned development tools mentioned: VISUAL PARADIGMS PRO was used for modelling and database designing, Adobe XD was used for prototyping.

## 3.3 Layout

The system contains admin panel and mobile applications. On app a user is able to find all the desired information about routes with starting point and dropping destination with their minimal fair. Using this system, a user will be able to search by bus name and see the availability of seats and time. And not only that the admin panel will be able to handle user orders and all the bookings, send email to the user about their ticket conformation.

## 3.4 Features

This system will have the payment methods which will enable the customer to pay in both way cash and mobile banking payment channels (Visa card, mobile money (MTN, Airtel)). It will also include email notifications, google live map and bus tickets and seats booking.

## 3.4 Requirement Specification

A complete description of the behavior of a system to be developed and may include a set of use cases that describe interactions the user will have with the software , in addition it also contains non-functional requirements . Nonfunctional requirements impose constraints on the design or implementation (such as performance engineering requirements, quality standards or design constraints).

## 3.5 Functional Requirements

Functional requirements define the specific functions that the system performs, along with the data operated on by the functions. The functional requirements are presented in scenarios that depict an operational system from the perspective of its end users. Included are one or more examples of all system features and an enumeration of all the specific requirements associated with these features.

1) The system incorporate mechanism to authenticate its users

2) The system verify and validate all user input and should notify in case of error detection and should help the user in error correction

3) The system allow sharing of files in the system

4) The system allow quick messages to be exchanged without face to face interaction

## 3.6 Non-Functional Requirement

Non-functional requirements address aspects of the system other than the specific functions it performs. These aspects include system performance, costs, and such general system characteristics as reliability, security, and portability. The non-functional requirements also address aspects of the system development process and operational personnel. It includes the following:

1. The system is user friendly and consistent
2. The system provide attractive graphical interface for the user
3. The system allow developer access to installed environment.
4. The system is made available 24/7

# 

# CHAPTER FOUR

# RESEARCH RESULTS AND ANALYSIS

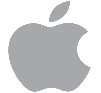
## 4.0 introduction

This chapter is on system design which is completed before the development of the Online Bus Booking Ticket System. System design is defined as those tasks that focus on the specification of the detailed computer-based solution. The purpose of the design phase is to transform the system requirements statement from the requirements analysis phase into design specifications for construction.

## 4.1 How the system meets objectives

To develop a system that will eliminate the manual process of physically booking tickets at bus terminus in Zambia.

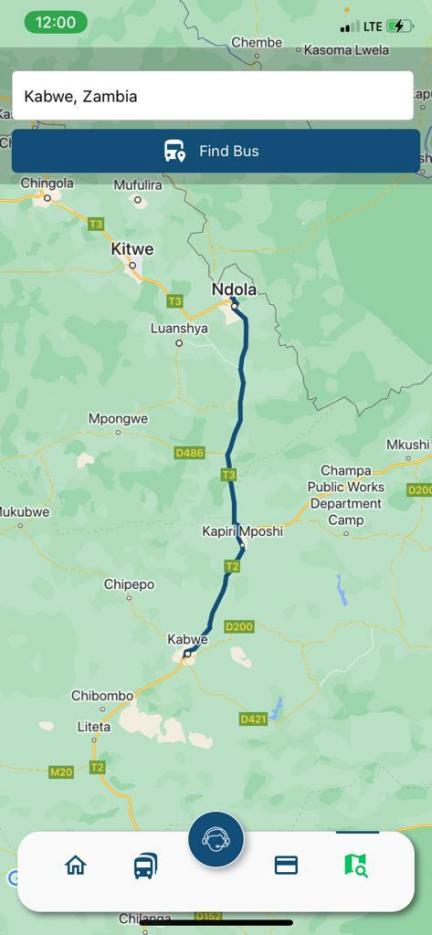
Objective 1: To develop a cross platform bus booking Ticket system.

**The system is operating on different platforms such as Android, iOS, etc.**



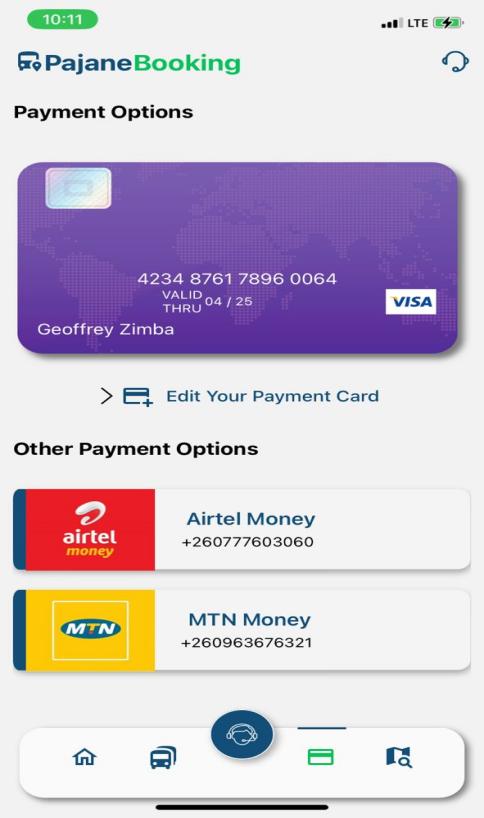
Objective 2: To integrate Google maps APIs to reduce the time complexity of booking a bus ticket at bus terminus in zambia.

**The system is integrated with Various Map SDKs that can enhance the searching and visualization of routes and city artifacts**



Objective 3: To integrate multiple payment methods in the cross platform bus booking ticket system.

**The system supports various gateway platforms such as MTN, Airtel, and Zamtel.**



## 4.3 Implementation of the design

### Payment Screen Implementation

<*PayWithFlutterwave*

                  onRedirect={(*data*: RedirectParams) *=>* {

                    console.log(*data*);

                    setisVisible(true);

                  }}

                  options={{

                    tx\_ref: *Date*.now().toString(),

                    authorization: "FLWPUBK-aa9cc71e514393d4bfc408610089dcf2-X",

                    customer: {

                      email: "customer@pajane.com",

                      phone\_number: phone,

                      name: "JayJay Code",

                    },

                    amount: 2,

                    currency: "ZMW",

                    payment\_options: "ussd, card",

                  }}

                  customButton={(*props*) *=>* (

                    <*TouchableOpacity*

                      style={styles.payButtton}

                      onPress={*props*.onPress}

                      isBusy={*props*.isInitializing}

                      disabled={false}

                    >

                      <*Ionicons* name="cash" size={24} color="white" />

                      <*Text*

                        style={{

                          color: "white",

                          fontSize: 22,

                          fontWeight: "700",

                          marginLeft: 10,

                        }}

                      >

                        Pay Now

                      </*Text*>

                    </*TouchableOpacity*>

                  )}

                />

### LiveMap Implementation

 <*View* style={styles.container}>

      <*MapView*

        ref={mapRef}

        style={styles.map}

        provider={PROVIDER\_GOOGLE}

        initialRegion={INITIAL\_POSITION}

      >

        {destinationCords.latitude == 0 ||

        destinationCords.longitude == 0 ? null : (

          <*MapViewDirections*

            origin={INITIAL\_POSITION}

            destination={destinationCords}

            apikey={GOOGLE\_API\_KEY}

            strokeWidth={4}

            strokeColor="#124e78"

            optimizeWaypoints={true}

            onReady={(*result*) *=>* {

              // alert(address);

              mapRef.current.fitToCoordinates(*result*.coordinates, {

                edgePadding: {

                  right: 30,

                  bottom: 250,

                  left: 30,

                  top: 250,

                },

              });

            }}

          />

        )}

      </*MapView*>

      <*View* style={styles.searchContainer}>

        <*View* style={{ marginBottom: 10 }} />

        <*AddressPicker*

          fetchAddress={fetchDestinationCoords}

          placeholdeText="where are you going?"

          label="Drop point"

          onPlaceSelected={(*data*) *=>* {

            alert(*data*.toString());

          }}

          getAddressDetails={(*data*) *=>* {

            console.log(*data*);

          }}

        />

        <*TouchableOpacity*

          style={{

            justifyContent: "center",

            marginTop: 2,

          }}

        >

          <*CustomBtn* onPress={handleModal} />

        </*TouchableOpacity*>

      </*View*>

      {ResultIsVisible && (

        <*Results*

          visible={ResultIsVisible}

          closeModal={handleModal}

          bookingdetails={bookingdetails}

          to={toAddress}

          from={address}

          date={dateOfdeparture}

          //from and to props

        />

      )}

    </*View*>

### System Json SnapShot

{

*"expo"*: {

*"name"*: "pajane\_app",

*"slug"*: "pajane\_app",

*"version"*: "1.0.0",

*"orientation"*: "portrait",

*"icon"*: "./assets/icon.png",

*"userInterfaceStyle"*: "light",

*"splash"*: {

*"image"*: "./assets/splash.png",

*"resizeMode"*: "contain",

*"backgroundColor"*: "#ffffff"

    },

*"updates"*: {

*"fallbackToCacheTimeout"*: 0

    },

*"assetBundlePatterns"*: [

      "\*\*/\*"

    ],

*"ios"*: {

*"supportsTablet"*: true

    },

*"android"*: {

*"adaptiveIcon"*: {

*"foregroundImage"*: "./assets/adaptive-icon.png",

*"backgroundColor"*: "#FFFFFF"

      }

    },

*"web"*: {

*"favicon"*: "./assets/favicon.png"

    }

  }

}

## 4.4 Database Design

The process of database design is divided into different parts. It consists of a series of steps. They are Conceptual Database Design (ER diagram), Logical Database Design (Tables, Normalization etc.), Physical Database Design (Table indexing, Clustering, etc.)

# **CHAPTER FIVE**

# **CONCLUSION AND RECOMMENDATION**

## 5.0 Conclusion

The development of a mobile application for bus booking ticket systems is a major advantage and indeed a helpful technology tool to help in the transport industry, particularly the bus transport sector, which is very important in Zambia, thus the Pajane mobile application is a must do and is the solution to the physical challenges encountered at bus-stations by clients, e.g., physically moving just to secure and reserve a seat;

# 5.1 Recommendation

For the system developed a number of components will be recommended for future works including maintenance to ensure that customer satisfaction and management of the system is prioritized and maintained.

The system lucks an operator end Application each will be used to scan for bus tickets and schedule buses as well as creating of routes for easy operations and privilege granting.

The designs where made but limited to be implemented by the three constraints cost, time and scope.

Below are the designs of the recommended operator end application.

The System Carries a lot of components that my be of great complexity and need enough human and financial resources such hence the team failing to implement the other side of the application

## operator Login Screen Operator Home Screen Seat Listing

## Scan Ticket Other Operator Screens

# References

[1] S. Olusegun Ganiyu, I. Olawale Mustapha, S. Ajiboye Salawu, and A. Sulaiman Aliyu, “Implementation of Secure User-Centred Architecture for Bus Booking System Integrated With Unstructured Supplementary Service Data and Web Platforms,” *Technol. Math. Educ.*, vol. 16, no. 2, pp. 104–114, 2020.

[2] E. S. Soegoto, R. Setiawan, and R. Jumansyah, “Impact of E-Ticketing Application on Bus Transportation in Bandung,” *Proc. Int. Conf. Business, Econ. Soc. Sci. Humanit. – Econ. Bus. Manag. Track (ICOBEST-EBM 2019)*, vol. 112, pp. 25–28, 2020, doi: 10.2991/aebmr.k.200108.008.

[3] K. Oloyede, M., Alaya , S., & Adewole, “Development of an Online Bus Ticket Reservation System for a. Computer Engineering and Intelligent Systems,” vol. 5, no. 12, pp. 9–18, 2014.

|  |  |
| --- | --- |
| [4] | . M. Mezghani, "Study on electronic ticketing in public transport," *European Metropolitan Transport Authorities (EMTA),* 2012. |
| [5] | . O. D. Adekola, "An Online Road Transport Booking System," *Asian Journal of Computer Science and Technology,* 2021. |
| [6] | . A. Ibrahim and . B. Azman , "Mobile–based bus ticketing system in Iraq," *European Journal of Computer Science and Information Technology,* 2015. |
| [7] | . S. Hill, "BUSINESS AT THE INTERSECTION OF TOURISM AND CULTURE," *AN ETHNOGRAPHY OF ALTERNATIVE TOURISM COMPANIES IN BUDAPEST, HUNGARY.,* 2022. |
| [8] | . L. F. Truett, B. Tonn and T. Conley, "Reserve a seat! Intelligent transportation reservation system for tourists," *Oak Ridge National Lab,* 2016. |
| [9] | O. Adekola and . S. YawMensah, "An Online Road Transport Booking System," *Asian Journal of Computer Science and Technology,* 2021. |
| [10] | . I. A. YARI, "Design and implementation of an online bus ticketing system," 2014. |
| [11] | . S. Kazi, "Smart E-Ticketing System for Public Transport Bus," *International Conference on Smart City and Emerging Technology,* 2018. |

[12] A. R. Chrismanto, R. Delima, H. B. Santoso, A. Wibowo, and R. A. Kristiawan, “Developing agriculture land mapping using Rapid Application Development (RAD): A case study from Indonesia,” *Int. J. Adv. Comput. Sci. Appl.*, vol. 10, no. 10, pp. 232–241, 2019, doi: 10.14569/ijacsa.2019.0101033.

[13] M. K. A. N. SINGH, “a Study and Development of an Online Bus Ticketing System Melisa Kaur a/P Narjan Singh,” 2007.

[15] ButapestGo, 2022, : ‘*BudapestGO : Integrated mobility app launched in Budapest’*, url: <https://www.emta.com/spip.php?article1444>.

[16] Badre, A. (2013): Shaping Web Usability. Boston: Pearson Education, Inc.

[17] Eckermann, E. (2015): *World History of the Automobile*, SAE, pp. 67–68,

ISBN 9780768008005, retrieved October 6, 2013).

[18] ]Fernando Pedone (2016): Optimistic Validation of Electronic Tickets.20th IEEE

Symposium on Reliable Distributed Systems (SRDS'202016) [BibTeX]

[19] Flick, U. (2017): *An Introduction to Qualitative Research.* London: SAGE

[20] Hevner A., March S., Park J., and Ram, S. (2016): *Design Science in Information*

*Systems Research. MIS Quarterly.*

[21] Kevin O. C., (2012): Web-Based Bus booking and Ticketing System: College of Computer Studies, Ateneo de Naga University, Naga City, Philippines February 26, 2012.

[22] Laweb,(2014): "Central booking System | Online Hotel Marketing Services,

Hong Kong and Philippines Hotel, Spa and Restaurant Software". Iaweb.net.

[23] 2010. Retrieved 2015-11-08. *Information Technology, Decision Support Systems.* pp 251-266.

[24] Madden A .D., (2013): "A definition of information", Aslib Proceedings, Vol. 52

Iss: 9, pp.343 – 349

[25] Rainer, R., Roberts, T., Gibson, M., Fields, K., and (2014): *Factors that Impact*

*Implementing a System Development Methodology. IEEE Transactions on*

*Software*. vol. 24. SAGE Publications.

[26] Truett, L F, Tonn, B, and Conley, T. 2015. "Reserve a seat! Intelligent transportation booking system for tourists". United States. <https://www.osti.gov/servlets/purl/656859>.

[27] Wee K. L. (2007): Bus booking System: Faculty of Information and Communications Technology, Universitiy teknikal Malaysia Melaka

[28] M. S. Khaitan, S. Sisodia, S. Jaiswal, and A. Kaaba, “ONLINE BUS RESERVATION SYSTEM,” *Annals of the Romanian Society for Cell Biology*, vol. 25, no. 7, pp. 60–65, Jul. 2021 [Online]. Available: https://annalsofrscb.ro/index.php/journal/article/view/9103

[29]. Chendra Wibawa *et al.*, “International journal of science, engineering, and information technology BUS TICKET BOOKING INFORMATION SYSTEM.”

[30] P. Nicole Ramos, J. Ocampo, P. M. Matthew Fornal, and M. Nayat Young, “Impact of Implementing Online Bus Seat Reservation on Provincial Bus Trips in the Philippines,” *2020 The 6th International Conference on Industrial and Business Engineering*, Sep. 2020, doi: 10.1145/3429551.3429575.

[32] S. Sandiwarno, “Design Model of Information System for Booking Seat on Conference\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*-\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*” [Online]. Available: http://www.ijctjournal.org/Volume6/Issue1/IJCT-V6I1P8.pdf. [Accessed: Dec. 03, 2022]

[33] Z.-S. Chen, X.-L. Liu, K.-S. Chin, W. Pedrycz, K.-L. Tsui, and M. J. Skibniewski, “Online-review analysis based large-scale group decision-making for determining passenger demands and evaluating passenger satisfaction: Case study of high-speed rail system in China,” *Information Fusion*, vol. 69, pp. 22–39, May 2021, doi: 10.1016/j.inffus.2020.11.010. [Online]. Available: https://www.sciencedirect.com/science/article/abs/pii/S1566253520304164. [Accessed: Dec. 03, 2022]

[34] H. Mohammad and S. Alateyah, “Creative Commons Attribution (CC-BY) 3.0 license,” *Journal of Computer Science*, doi: 10.3844/jcssp.2020.825.837. [Online]. Available: <https://pdfs.semanticscholar.org/165d/446bcbe9a1ebeb09f65782fe8aa322c2d3f1.pdf>

[35] M. Oloyede, S. Alaya, and K. S. Adewole, “Development of an Online Bus Ticket Reservation System for a Transportation Service in Nigeria,” *undefined*, 2014. [Online]. Available: https://www.semanticscholar.org/paper/Development-of-an-Online-Bus-Ticket-Reservation-for-Oloyede-Alaya/67c3f2737f689f800b81ea5fc816332395a0289f

[36] A. Al-Ani and A. Taa, “MOBILE -BASED BUS TICKETING SYSTEM IN IRAQ Machine learning-based approach for detecting DDoS/Dos attacks against NDP protocol View project Data warehouse model for monitoring key performance indicators (KPIs) using goal oriented approach View project,” 2015.

# **APPENDIX I**

## Snap shots of the Login Panel

## Snap shots of the Sign up Panel

# **APPENDIX II**

## Search Filtering Screen

export *class* Results extends Component {

*constructor*(*props*) {

    super(*props*);

  }

  state = {

    trips: [],

    isLoading: false,

    to: this.props.to,

    from: this.props.from,

    date: this.props.date,

  };

  fetchData = async () *=>* {

*var* formdata = new *FormData*();

    formdata.append("from", this.state.from);

    formdata.append("to", this.state.to);

    formdata.append("date", this.state.date);

*var* requestOptions = {

      method: "POST",

      body: formdata,

      redirect: "follow",

    };

    fetch("http://172.20.10.4/pajane/searchBus.php", requestOptions)

      .then((*response*) *=>* *response*.json())

      .then((*result*) *=>* {

        if (*result* == "No trip found") {

          this.setState({ trips: [] });

        } else {

          this.setState({ trips: *result* });

          console.log(*result*);

        }

      })

      .catch((*error*) *=>* console.log("error", *error*))

      .finally(() *=>* this.setState({ isLoading: false }));

  };

  componentDidMount() {

    this.setState({ isLoading: true }, this.\_getData);

  }

  \_getData = () *=>* {

    setTimeout(() *=>* {

      // this.setState({ isLoading: false });

      this.fetchData();

    }, 2000);

  };

  render() {

*let* { items, isLoading } = this.state;

    return (

      <*Modal*

        visible={this.props.ResultIsVisible}

        animationType="slide"

        hasBackdrop={true}

        backdropOpacity={0.6}

        backdropColor="#000000"

        hideModalContentWhileAnimating={true}

        useNativeDriverForBackdrop={true}

        useNativeDriver={true}

        animationInTiming={1}

        animationOutTiming={1}

        backdropTransitionInTiming={1}

        backdropTransitionOutTiming={1}

      >

        <*SafeAreaView* style={styles.mainContainer}>

          <*View*

            style={{

              flexDirection: "row",

              alignItems: "center",

              paddingVertical: 10,

              justifyContent: "space-between",

              marginEnd: 40,

              marginHorizontal: 20,

            }}

          >

            <*View*

              style={{

                flexDirection: "row",

                alignItems: "center",

              }}

            >

              <*TouchableOpacity*

                onPress={this.props.closeModal}

                style={{ marginRight: 10 }}

              >

                <*Ionicons* name="chevron-back" size={24} color="black" />

              </*TouchableOpacity*>

              <*Text* style={{ fontSize: 18, fontWeight: "700", color: "#000" }}>

                {this.props.from}

              </*Text*>

              <*SimpleLineIcons*

                name="direction"

                size={20}

                color="black"

                style={{ marginHorizontal: 15 }}

              />

              <*Text* style={{ fontSize: 18, fontWeight: "700", color: "#000" }}>

                {this.props.to}

              </*Text*>

            </*View*>

            <*TouchableOpacity* onPress={() *=>* Alert.alert("Filter Clicked")}>

              <*MaterialIcons*

                style={{}}

                name="filter-list"

                size={24}

                color="black"

              />

            </*TouchableOpacity*>

          </*View*>

          <*View* style={{ paddingTop: 5, height: "100%" }}>

            {this.state.isLoading ? (

              // <ActivityIndicator

              //   size="large"

              //   color="#05C25D"

              //   animating

              //   style={{

              //     marginVertical: "70%",

              //     justifyContent: "center",

              //     alignItems: "center",

              //   }}

              // />

              <*View* style={{marginLeft: 20}}>

                <*FadeLoader* />

                <*FadeLoader* />

                <*FadeLoader* />

                <*FadeLoader* />

                <*FadeLoader* />

                <*FadeLoader* />

                <*FadeLoader* />

              </*View*>

            ) : (

              <*FlatList*

                // bounces={false}

                data={this.state.trips}

                keyExtractor={(*item*, *index*) *=>* item.TripID}

                ListEmptyComponent={() *=>* {

                  return (

                    <*View*

                      style={{

                        marginVertical: "70%",

                        justifyContent: "center",

                        alignItems: "center",

                      }}

                    >

                      <*AntDesign* name="frowno" size={50} color="black" />

                      <*Text*

                        style={{

                          color: "black",

                          fontSize: 20,

                          fontWeight: "500",

                          textAlign: "center",

                          marginHorizontal: 50,

                          marginTop: 10,

                        }}

                      >

                        No bus was found, please try again

                      </*Text*>

                    </*View*>

                  );

                }}

                renderItem={({ *item*, *index* }) *=>* (

                  <*TouchableOpacity*

                    onPress={(*item*) *=>* this.props.bookingdetails(item) }

                  >

                    <*Bus*

                      busName={item.OperatorName}

                      from={item.From}

                      to={item.To}

                      date={item.date}

                      station={item.station}

                      seats={item.seats - item.seatsBooked}

                      price={item.price}

                    />

                  </*TouchableOpacity*>

                )}

                // keyExtractor={(item) => item.id}

                refreshing={isLoading}

                onRefresh={this.\_getData}

              />

            )}

          </*View*>

        </*SafeAreaView*>

      </*Modal*>

    );

  }

}

## Payment screen

  return (

    <*SafeAreaView* style={styles.container}>

      <*View* style={{ marginHorizontal: 10 }}>

        <*Header* />

      </*View*>

      <*View*

        style={{

          flexDirection: "row",

          alignItems: "center",

          width: "100%",

        }}

      >

        <*TouchableOpacity* onPress={() *=>* navigation.goBack()}>

          <*Ionicons* name="chevron-back" size={24} color="black" />

        </*TouchableOpacity*>

        <*View* style={{ width: "85%" }}>

          <*Text*

            style={{

              fontSize: 18,

              fontWeight: "bold",

              color: "#000",

              textAlign: "center",

            }}

          >

            Payment Options

          </*Text*>

        </*View*>

      </*View*>

      <*ScrollView* showsVerticalScrollIndicator={false} bounces={false}>

        <*View*

          style={{

            width: "100%",

            alignItems: "center",

          }}

        >

          <*Text*

            style={{

              fontSize: 16,

              fontWeight: "500",

              marginTop: 30,

              color: "#124e78",

            }}

          >

            Total amount to pay

          </*Text*>

          <*View*

            style={{

              paddingVertical: 10,

              paddingHorizontal: 40,

              borderRadius: 7,

              elevation: 7,

              shadowColor: "#000",

              shadowOffset: {

                width: 0.3,

                height: 1,

              },

              shadowOpacity: 0.2,

              backgroundColor: "#fff",

              justifyContent: "center",

              alignContent: "center",

              marginVertical: 20,

            }}

          >

            <*Text*

              style={{

                fontSize: 22,

                fontWeight: "700",

                color: "#124e78",

                letterSpacing: 1.5,

              }}

            >

              K {route.params.price}

            </*Text*>

          </*View*>

          <*View*

            style={{

              height: 45,

              width: "70%",

              justifyContent: "space-between",

              flexDirection: "row",

              borderRadius: 50,

              elevation: 7,

              shadowColor: "#000",

              shadowOffset: {

                width: 0.3,

                height: 1,

              },

              shadowOpacity: 0.2,

              backgroundColor: "#fff",

              alignItems: "center",

              marginVertical: 10,

              paddingStart: 10,

            }}

          >

            <*TextInput*

              placeholder="pajane gift code?"

              maxLength={6}

              style={{

                fontSize: 16,

                fontWeight: "500",

                color: "#a8a8a8",

                fontStyle: "italic",

              }}

            />

            <*TouchableOpacity*

              style={{

                borderRadius: 50,

                height: "100%",

                width: 100,

                backgroundColor: "#05C25D",

                justifyContent: "center",

                alignItems: "center",

              }}

            >

              <*Text*

                style={{

                  fontSize: 16,

                  fontWeight: "500",

                  color: "#a8a8a8",

                  color: "#fff",

                }}

              >

                Apply

              </*Text*>

            </*TouchableOpacity*>

          </*View*>

        </*View*>

        <*CollapsibleView*

          title={

            <*TouchableOpacity*

              style={{

                flexDirection: "row",

                justifyContent: "center",

                alignItems: "center",

              }}

            >

              <*Text*>Pay using your Visa or Master card</*Text*>

            </*TouchableOpacity*>

          }

          style={{ borderWidth: 0, widt: "100%" }}

        >

          <*View* style={{ paddingVertical: 10 }}>

            <*Text*>Card Holder</*Text*>

            <*View*

              style={{

                height: 40,

                width: "90%",

                justifyContent: "space-between",

                flexDirection: "row",

                borderRadius: 5,

                elevation: 7,

                shadowColor: "#000",

                shadowOffset: {

                  width: 0.3,

                  height: 1,

                },

                shadowOpacity: 0.2,

                backgroundColor: "#fff",

                alignItems: "center",

                marginVertical: 10,

                marginHorizontal: 2,

                paddingStart: 10,

              }}

            >

              <*TextInput*

                placeholder="card holder name"

                style={{

                  fontSize: 16,

                  fontWeight: "500",

                  color: "#a8a8a8",

                }}

              />

            </*View*>

            <*Text*>Card Number</*Text*>

            <*View*

              style={{

                height: 40,

                width: "90%",

                justifyContent: "space-between",

                flexDirection: "row",

                borderRadius: 5,

                elevation: 7,

                shadowColor: "#000",

                shadowOffset: {

                  width: 0.3,

                  height: 1,

                },

                shadowOpacity: 0.2,

                backgroundColor: "#fff",

                alignItems: "center",

                marginVertical: 10,

                marginHorizontal: 2,

                paddingStart: 10,

              }}

            >

              <*TextInput*

                placeholder="card number"

                maxLength={15}

                keyboardType="numbers-and-punctuation"

                style={{

                  fontSize: 16,

                  fontWeight: "500",

                  color: "#a8a8a8",

                }}

              />

            </*View*>

            <*View*

              style={{ flexDirection: "row", justifyContent: "flex-start" }}

            >

              <*View* style={{ flexDirection: "column", marginEnd: 30 }}>

                <*Text*>Expire</*Text*>

                <*View*

                  style={{

                    height: 40,

                    width: 100,

                    justifyContent: "space-between",

                    flexDirection: "row",

                    borderRadius: 5,

                    elevation: 7,

                    shadowColor: "#000",

                    shadowOffset: {

                      width: 0.3,

                      height: 1,

                    },

                    shadowOpacity: 0.2,

                    backgroundColor: "#fff",

                    alignItems: "center",

                    marginVertical: 10,

                    marginHorizontal: 2,

                    paddingStart: 10,

                  }}

                >

                  <*TextInput*

                    placeholder="Exp-date"

                    maxLength={5}

                    keyboardType="numbers-and-punctuation"

                    style={{

                      fontSize: 16,

                      fontWeight: "500",

                      color: "#a8a8a8",

                    }}

                  />

                </*View*>

              </*View*>

              <*View* style={{ flexDirection: "column" }}>

                <*Text*>CVC</*Text*>

                <*View*

                  style={{

                    height: 40,

                    width: 70,

                    justifyContent: "space-between",

                    flexDirection: "row",

                    borderRadius: 5,

                    elevation: 7,

                    shadowColor: "#000",

                    shadowOffset: {

                      width: 0.3,

                      height: 1,

                    },

                    shadowOpacity: 0.2,

                    backgroundColor: "#fff",

                    alignItems: "center",

                    marginVertical: 10,

                    marginHorizontal: 2,

                    paddingStart: 10,

                  }}

                >

                  <*TextInput*

                    placeholder="CVC"

                    maxLength={3}

                    keyboardType="numbers-and-punctuation"

                    style={{

                      fontSize: 16,

                      fontWeight: "500",

                      color: "#a8a8a8",

                    }}

                  />

                </*View*>

              </*View*>

            </*View*>

            <*View*>

              <*TouchableOpacity*

                title="Click To Close Modal"

                onPress={() *=>* {

                  setVisible(true);

                  setViewTicket(true);

                }}

                style={styles.payButtton}

              >

                <*Ionicons* name="cash" size={24} color="white" />

                <*Text*

                  style={{

                    color: "white",

                    fontSize: 22,

                    fontWeight: "700",

                    marginLeft: 10,

                  }}

                >

                  Pay With Card

                </*Text*>

              </*TouchableOpacity*>

            </*View*>

          </*View*>

        </*CollapsibleView*>

        <*Text*

          style={{

            fontWeight: "bold",

            color: "#000",

            fontSize: 18,

            marginVertical: 20,

          }}

        >

          Pay using

        </*Text*>

        <*Modal*

          animationType={"slide"}

          transparent={false}

          visible={isVisible}

          onRequestClose={() *=>* {

            console.log("Modal has been closed.");

          }}

        >

          <*SafeAreaView*>

            <*EvilIcons*

              name="arrow-left"

              size={35}

              color="black"

              onPress={() *=>* {

                setisVisible(!isVisible);

                setVisible(true);

                setViewTicket(true);

              }}

              style={{

                margin: 10,

              }}

            />

            {/\*All views of Modal\*/}

            <*SafeAreaView* style={styles.modal}>

              <*Text* style={styles.text}>

                Enter Your {mobileMoneyOption} Number

              </*Text*>

              <*Animatable.View*

                animation="fadeInUp"

                duration={1000}

                style={{ width: "100%" }}

              >

                <*View*

                  style={{

                    flexDirection: "row",

                    alignItems: "center",

                    justifyContent: "center",

                    marginBottom: 20,

                  }}

                >

                  <*View* style={styles.line}></*View*>

                  <*Entypo*

                    name="phone"

                    size={20}

                    color="black"

                    style={{ marginHorizontal: 5 }}

                  />

                  <*Text* style={{ marginLeft: 5, fontSize: 18 }}>+260</*Text*>

                  <*TextInput*

                    placeholder="Enter your mobile number"

                    fontSize={16}

                    maxLength={9}

                    marginHorizontal={10}

                    returnKeyType="done"

                    keyboardType="phone-pad"

                    onChangeText={(*phone*) *=>* {

                      if (mobileMoneyOption == "Airtel Money") {

                        setMobileMoneyAirtel("+260 " + *phone*.toString());

                        setAirtelSelectedOption(true);

                        setMTNSelectedOption(!AirtelSelectedOption);

                        setMobileMoneyMTN("");

                        setPhone(mobileMoneyAirtel);

                      } else if (mobileMoneyOption == "MTN Money") {

                        setMobileMoneyMTN("+260 " + *phone*.toString());

                        setMobileMoneyAirtel("");

                        setMTNSelectedOption(true);

                        setAirtelSelectedOption(!MTNSelectedOption);

                        setPhone(mobileMoneyMTN);

                      }

                    }}

                  />

                </*View*>

                {/\* <TouchableOpacity

                  title="Click To Close Modal"

                  onPress={() => {

                    setisVisible(!isVisible);

                    setVisible(true);

                    setViewTicket(true);

                  }}

                  style={styles.payButtton}

                >

                  <Ionicons name="cash" size={24} color="white" />

                  <Text

                    style={{

                      color: "white",

                      fontSize: 22,

                      fontWeight: "700",

                      marginLeft: 10,

                    }}

                  >

                    Pay Now

                  </Text>

                </TouchableOpacity> \*/}

                <*PayWithFlutterwave*

                  onRedirect={(*data*: RedirectParams) *=>* {

                    console.log(*data*);

                    setisVisible(true);

                  }}

                  options={{

                    tx\_ref: *Date*.now().toString(),

                    authorization: "FLWPUBK-aa9cc71e514393d4bfc408610089dcf2-X",

                    customer: {

                      email: "customer@pajane.com",

                      phone\_number: phone,

                      name: "JayJay Code",

                    },

                    amount: 2,

                    currency: "ZMW",

                    payment\_options: "ussd, card",

                  }}

                  customButton={(*props*) *=>* (

                    <*TouchableOpacity*

                      style={styles.payButtton}

                      onPress={*props*.onPress}

                      isBusy={*props*.isInitializing}

                      disabled={false}

                    >

                      <*Ionicons* name="cash" size={24} color="white" />

                      <*Text*

                        style={{

                          color: "white",

                          fontSize: 22,

                          fontWeight: "700",

                          marginLeft: 10,

                        }}

                      >

                        Pay Now

                      </*Text*>

                    </*TouchableOpacity*>

                  )}

                />

              </*Animatable.View*>

            </*SafeAreaView*>

          </*SafeAreaView*>

        </*Modal*>

        <*TouchableOpacity*

          onPress={() *=>* {

            setisVisible(!isVisible);

            setMobileMoneyOption("Airtel Money");

          }}

        >

          <*Mobile*

            imageUri={slides.airtel}

            headingPayment="Airtel Money"

            number={mobileMoneyAirtel}

            selected={AirtelSelectedOption}

          />

        </*TouchableOpacity*>

        <*TouchableOpacity*

          onPress={() *=>* {

            setisVisible(!isVisible);

            setMobileMoneyOption("MTN Money");

          }}

        >

          <*Mobile*

            imageUri={slides.mtn}

            headingPayment="MTN Money"

            number={mobileMoneyMTN}

            selected={MTNSelectedOption}

          />

        </*TouchableOpacity*>

        <*TouchableOpacity*

          style={viewTicket ? styles.payButtton : styles.DisabledpayButtton}

          onPress={() *=>* {

            setResultIsVisible(true);

          }}

          disabled={!viewTicket}

        >

          <*Ionicons* name="receipt" size={24} color="white" />

          <*Text*

            style={{

              color: "white",

              fontSize: 22,

              fontWeight: "700",

              marginLeft: 10,

            }}

          >

            View Ticket

          </*Text*>

        </*TouchableOpacity*>

        {ResultIsVisible && (

          <*BookingDone*

            visible={ResultIsVisible}

            closeModal={() *=>* {

              setResultIsVisible(false);

*navigation*.navigate("Booking");

            }}

            busTracking={goToTracking}

          />

        )}

      </*ScrollView*>

      <*ModalPoup* visible={visible}>

        <*View* style={{ alignItems: "center" }}>

          <*View* style={styles.header}>

            <*TouchableOpacity*

              onPress={() *=>* {

                setResultIsVisible(false);

                setVisible(false);

              }}

            >

              <*Image*

                source={require("../assets/x.png")}

                style={{ height: 30, width: 30 }}

              />

            </*TouchableOpacity*>

          </*View*>

        </*View*>

        <*View* style={{ alignItems: "center" }}>

          <*Animatable.View* duration={3000} animation="bounceIn">

            <*Image*

              source={require("../assets/success.png")}

              style={{ height: 150, width: 150, marginVertical: 10 }}

            />

          </*Animatable.View*>

        </*View*>

        <*Text* style={{ marginVertical: 30, fontSize: 20, textAlign: "center" }}>

          Payment Made successfully

        </*Text*>

      </*ModalPoup*>

    </*SafeAreaView*>

  );

};

export default PaymentScreen;

## LiveMaps Screen

*const* LiveMap = ({ *navigation* }) *=>* {

*const* [dateOfdeparture, setDateOfDeparture] = useState(getFormatedDate(getToday(), "YYYY-MM-DD"))

*const* [data, setData] = useState([]);

*const* [time, setTime] = useState(0);

*const* [distance, setTDistance] = useState(0);

*const* fetchData = async () *=>* {

*const* response = await fetch("http://192.168.8.102:1345/quick\_booking");

*const* quick\_booking = await response.json();

    setData({ quick\_booking });

  };

*const* [ResultIsVisible, setResultIsVisible] = useState(false);

*const* handleModal = async () *=>* {

*const* toAddrressHolder = await Location.reverseGeocodeAsync(

      destinationCords

    );

    setToAddress(toAddrressHolder[0].city);

    setResultIsVisible(!ResultIsVisible);

  };

  // ref

*const* bottomSheetRef = useRef < BottomSheet > null;

*const* [isOpen, setIsOpen] = useState(true); // callbacks

  // variables

*const* snapPoints = useMemo(() *=>* ["25%", "50%"], []);

*const* setRef = (*element*) *=>* {

    bottomSheetRef = *element*;

  };

*const* handleSnapPress = useCallback((*index*) *=>* {

    bottomSheetRef.current?.snapToIndex(*index*);

    setIsOpen(true);

  }, []);

  // const handleOpenPress = useCallback((index) => {

  //   bottomSheetRef.current?.snapToIndex(index);

  //   setIsOpen(true);

  // }, []);

*const* { width, height } = Dimensions.get("window");

*const* [location, setLocation] = useState(null);

*const* ASPECT\_RATIO = width / height;

*const* LATITUDE\_DELTA = 0.04;

*const* LONGITUDE\_DELTA = LATITUDE\_DELTA \* ASPECT\_RATIO;

*const* [INITIAL\_POSITION, SetINITIAL\_POSITION] = useState(null);

*const* [address, setAddress] = useState("");

*const* [toAddress, setToAddress] = useState("");

  useEffect(() *=>* {

    (async () *=>* {

*let* { status } = await Location.requestForegroundPermissionsAsync();

      if (status !== "granted") {

        setErrorMsg("Permission to access location was denied");

        return;

      }

*let* location = await Location.getCurrentPositionAsync({});

      setLocation(location);

*const* address = await Location.reverseGeocodeAsync(location.coords);

      setAddress(address[0].city);

      SetINITIAL\_POSITION({

        longitude: location.coords.longitude,

        latitude: location.coords.latitude,

        latitudeDelta: LATITUDE\_DELTA,

        longitudeDelta: LONGITUDE\_DELTA,

      });

    })();

  }, []);

*const* mapRef = useRef();

*const* start = { latitude: -15.2424, longitude: 28.1713 };

*const* destination = {};

*const* [state, setState] = useState({

    pickUpCords: { latitude: 0, longitude: 0 },

    destinationCords: { latitude: 0, longitude: 0 },

  });

*const* { pickUpCords, destinationCords } = state;

*const* dataSet = state;

*const* onPressLocation = () *=>* {

    fetchValues(state);

    fetchDestinationCoords(state);

  };

*const* onDone = () *=>* {

    fetchValues(state);

    fetchDestinationCoords(state);

  };

*const* fetchAddressCoords = async (*lat*, *lng*) *=>* {

    // console.log("latitude: ", lat);

    // console.log("longitude: ", lng);

    setState({

      ...state,

      pickUpCords: {

        latitude: *lat*,

        longitude: *lng*,

      },

    });

  };

*const* fetchDestinationCoords = async (*lat*, *lng*) *=>* {

    // console.log("latitude: ", lat);

    // console.log("longitude: ", lng);

    setState({

      ...state,

      destinationCords: {

        latitude: *lat*,

        longitude: *lng*,

      },

    });

  };

*const* fetchValues = async (*data*) *=>* {

    setState({

      pickUpCords: {

        latitude: *data*.pickUpCords.latitude,

        longitude: *data*.pickUpCords.longitude,

      },

      destinationCords: {

        latitude: *data*.destinationCords.latitude,

        longitude: *data*.destinationCords.longitude,

      },

    });

  };

*const* bookingdetails = () *=>* {

*navigation*.navigate("MoreDetails");

    setResultIsVisible(false);

  };

  return (

    <*View* style={styles.container}>

      <*MapView*

        ref={mapRef}

        style={styles.map}

        provider={PROVIDER\_GOOGLE}

        initialRegion={INITIAL\_POSITION}

      >

        {destinationCords.latitude == 0 ||

        destinationCords.longitude == 0 ? null : (

          <*MapViewDirections*

            origin={INITIAL\_POSITION}

            destination={destinationCords}

            apikey={GOOGLE\_API\_KEY}

            strokeWidth={4}

            strokeColor="#124e78"

            optimizeWaypoints={true}

            onReady={(*result*) *=>* {

              // alert(address);

              mapRef.current.fitToCoordinates(*result*.coordinates, {

                edgePadding: {

                  right: 30,

                  bottom: 250,

                  left: 30,

                  top: 250,

                },

              });

            }}

          />

        )}

      </*MapView*>

      <*View* style={styles.searchContainer}>

        <*View* style={{ marginBottom: 10 }} />

        <*AddressPicker*

          fetchAddress={fetchDestinationCoords}

          placeholdeText="where are you going?"

          label="Drop point"

          onPlaceSelected={(*data*) *=>* {

            alert(*data*.toString());

          }}

          getAddressDetails={(*data*) *=>* {

            console.log(*data*);

          }}

        />

        <*TouchableOpacity*

          style={{

            justifyContent: "center",

            marginTop: 2,

          }}

        >

          <*CustomBtn* onPress={handleModal} />

        </*TouchableOpacity*>

      </*View*>

      {ResultIsVisible && (

        <*Results*

          visible={ResultIsVisible}

          closeModal={handleModal}

          bookingdetails={bookingdetails}

          to={toAddress}

          from={address}

          date={dateOfdeparture}

          //from and to props

        />

      )}

    </*View*>

  );

};

export default LiveMap;

## Back end Implementaton code

### Searching Buses

<?php

    $CN =  mysqli\_connect("localhost", "root", "");

    $DB = mysqli\_select\_db($CN, "paj\_db");

    $from = $\_POST["from"];

    $to = $\_POST["to"];

    $date = $\_POST["date"];

    $current\_date = date('Y-m-d');

    if($date == null  || $date == "")

    {

        $date = $current\_date;

    }

    $SQ = "SELECT \* FROM trip t, bus b, operator o

    WHERE (t.BusBusId = b.BusId AND b.OperatorOperatorID = o.OperatorID)

    AND ((t.From = '$from' AND t.To = '$to') AND (t.date = '$date')) ORDER BY t.Price";

    $Table = mysqli\_query($CN, $SQ);

    $json;

    if(mysqli\_num\_rows($Table) > 0){

            while($Row = mysqli\_fetch\_assoc($Table))

            {

                $json[] = $Row;

            }

           mysqli\_fetch\_all($Table, MYSQLI\_ASSOC);

            echo json\_encode($json);

    }

    else{

        echo "No trip found ";

    }

?>

### FetchingQuick Bookings

<?php

    $CN =  mysqli\_connect("localhost", "root", "");

    $DB = mysqli\_select\_db($CN, "paj\_db");

    $from = $\_POST["from"];

    $date = $\_POST["date"];

    $current\_date = date('Y-m-d');

    if($date == null)

    {

        $date = $current\_date;

    }

    $SQ = "SELECT \* FROM trip t, bus b, operator o

    WHERE (t.BusBusId = b.BusId AND b.OperatorOperatorID = o.OperatorID)

    AND (t.From = '$from')";

    $Table = mysqli\_query($CN, $SQ);

    $json;

    if(mysqli\_num\_rows($Table) > 0){

            while($Row = mysqli\_fetch\_assoc($Table))

            {

                $json[] = $Row;

            }

           mysqli\_fetch\_all($Table, MYSQLI\_ASSOC);

            echo json\_encode($json);

    }

    else{

        echo "No trip found ";

    }

?>

### Fetch Tickets

<?php

    $CN =  mysqli\_connect("localhost", "root", "");

    $DB = mysqli\_select\_db($CN, "paj\_db");

    $userID = $\_POST["userID"];

    $SQ = "SELECT \*, o.OperatorName, ts.STATUS FROM booking b, operator o, bus bu, trip t, ticket ti,customer c, ticket\_status ts WHERE (b.TripTripID = t.TripID AND b.CustomerCustomerID = c.CustomerID  AND bu.BusId = t.BusBusId AND bu.OperatorOperatorID = o.OperatorID AND ti.BookingBookingID = b.BookingID AND ti.Ticket\_StatusStatusID = ts.StatusID)

           AND (b.CustomerCustomerID = '$userID')";

    $Table = mysqli\_query($CN, $SQ);

    $json;

    if(mysqli\_num\_rows($Table) > 0){

            while($Row = mysqli\_fetch\_assoc($Table))

            {

                $json[] = $Row;

            }

           mysqli\_fetch\_all($Table, MYSQLI\_ASSOC);

           echo json\_encode($json);

    }

    else{

        echo "No ticket found";

    }

?>

# **APPENDIX III**

## PROPOSAL ATTACHMENT