

**RAILWAY ONLINE RESERVATION SYSTEM**

**BY**

**OLOYEDE RAYMOND-REX IFE**

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**THE AWARD OF DEGREE OF BACHELOR OF SCIENCE**

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## CERTIFICATION

This is to certify that the Project Report entitled “**RAILWAY ONLINE RESERVATION SYSTEM**” was carried out by **OLOYEDE RAYMOND-REX IFEOLUWA** with matric no. **CSC/11/0281**, under my guidance and supervision in partial fulfillment of the requirements for award of the degree of Bachelor of Science in **Computer Science** year 2015.



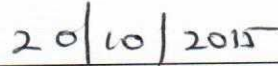
**Mr. Folorunsho Olaiya**

**Supervisor**

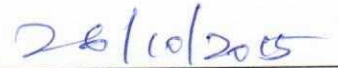


**Dr.S.A. Oluwadare**

**A.G. Head of Department**



**Date**



**Date**

**DEDICATION**

**DEDICATED TO: ALMIGHTY GOD;**

**THE GIVER OF WISDOM, UNDERSTANDING, KNOWLEDGE AND PROVIDER.**

**ALSO;**

**Mrs. OLOYEDE, MARVEL-JOY OLOYEDE, CHRISTABEL-GLORY OLOYEDE.**

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## ABSTRACT

The online reservation system is basically derived from the GDS (Global Distribution System) also known as CRS (Computer Reservation System). The online reservation system has its database centrally located which is accessed through an Application Programming Interface (API). With the advent of online reservation system, the traveller and the railway got the freedom to book a seat anywhere at any time at their convenience. The traveller can book a ticket at a click of a mouse saving the time and money for the travelling. It has also become a hassle free transaction for both the railway and the traveller. The online reservation system involves three main actors the database, online operator and a database scheduler. The database scheduler updates the database, the online operator accepts and confirms the booking and updates the database.

The Major objective of this project was to design and develop an Online Railway Reservation System that would computerized the existing records management and give direct benefit for the travellers and the administrator in terms of fast information retrieval, enhanced decision-making whilst avoiding any confusion that would jeopardize the quality of the travellers. The Railway Reservation System was designed as a web application and implemented using open source solutions that include MYSQL as the database, and PHP as the programming language. The system was developed using V-model software development approach. An extensive evaluation of the project determined that the project achieved many of its predefined objectives however, the major limitation of the project was the scope covered. From a proper analysis and assessment of the designed system, it can be concluded that the system developed is an efficient, usable and reliable.

# CHAPTER ONE

## 1.0

## INTRODUCTION

### 1.1 Background of study

Transport or transportation is the movement of people and goods from one location to another. A transport is the solution of displacements of individuals and goods in both time and space. Transports create time utility as well as place utility. Transport is performed by modes, such as air, rail, road, water, cable, pipeline and space. The field can be divided into infrastructure, vehicles, and operations. Transportation as a public service has an important role in the people's society; but in fact most of public transport companies in Nigeria only care about the service as an output. It means that the purpose of their activities are simply transporting somebody or providing transportation capacities. The customer only like the recipient of the service, they do not care about the customer needs (Api and Järnvägar,2010.).

Railway is the new phase of transportation in the country, to be the backbone of the transport and traffic system in Nigeria for both freight and passenger transportation. Railway service was the major means of transportation in Nigeria since the country's independence in 1960 to the 1980s. It was much more convenient and cheaper for commuters and haulage purposes. There were so many rail lines linking big cities across the country with commercial activities in its major routes. It was in the military era that the railways lost its glorious past as Nigerians took to other means of transportation through road, sky and water in the riverine areas.

The recent determination of the federal government's towards the revitalization of the railway was a welcome development. President Olusegun Obasanjo not only came up with the idea of a modernized train but has since signed a \$8.3billion agreement contract for the construction of railway line with the Chinese government. The planned project of railway

modernization was signed in two tranches which includes the main contract covering the first rail that would connect the nation's economic capital Lagos to the largest commercial city in the north, Kano which would be concluded in five years by a Chinese firm and an Italian consultancy outfit. (According to Mercy)

Technology has transformed many aspects of life in the 21<sup>st</sup> century, e-commerce, e-marketing, online shopping, including the way many will make use of online train reservation in ticket booking just right from the comfort of their homes or offices, making things easier. In Nigeria the online reservation system is not available so the passengers have to fill all their necessary details using pen and paper which involves manual working. If the main counter is not open due to late arrival or due to some reasons then in this case, passengers have to wait and in certain cases they have to wait in line, waiting for their chance to come. After wasting so much time, customers are able to get their answers and sometimes they do not get positive response.

Nigeria has 19 train stations (Lagos, Abeokuta, Ibadan, Iwo, Ede, Osogbo, Ikirun, Inisha, Offa, Ilorin, Jebba, Mokwa, Zungeru, Minna, Gwada, Kaduna, Zaria, Kano). The Nigerian railway services moves over 30,000 passengers in eight weeks. (National Railway Corporation.) Although the number of tickets sold in Nigeria is very low, the method of ticketing and reservation is quite traditional and manual, with slow speed of operation. While people are trying to get along with the use of train and railway services, the government should employ new means of attracting citizens and the general populace to the benefits of railway usage. Peoples complain about difficulty in buying tickets, bad train seats, bad coach most out of lack of maintenance, some still find some train seats unused and the transport capacity is wasted.

Using an automated ticket reservation will ease the problem of manual ticket purchase at the train station giving convenience to the less disabled persons, old ones and the sick. The Nigeria government around 2011 started e-government, the provision of service over the internet for the use of citizens. With lots of upcoming services and business within the last couple of years, e-government service has been widely accepted in the country. Effect use of IT service in government administration has greatly enhanced existing efficiencies, driven down communication cost; convenience is shopping, recruitment programs, and increased transparency in the functioning of all government departments. Around August 2014, the federal government of Nigeria commenced remodelling of existing railway stations across the country through public private partnership 'PPP' initiative. (Nigeria Railway Corporation, 1990).

## **1.2 Statement of Problem**

In today's fast paced society, it is very hard to be competitive without using cutting edge technology available in market. The Nigerian railway system has over the years suffered low patronage due to manual means of operation in delivering its services to commuters. The manual method of ticket reservation leads to a wide range of problem. Ticket reservation is a vital task in our society and transportation sector of the economy today. The project will be aimed to solve problems facing ticket booking for railway transportation, giving users to chance of knowing time of departure, time of arrival, seat allocation. There is little or no security control system where the customers' goods, document and classified information of the customer could be safe guarded from unauthorized access.



### **1.3 Aim and Objectives**

The aim of the project is to develop an online ticket reservation platform for train users, which will thus provide convenience for its users by giving best value for money with less stress.

The objectives are as follows:

1. To create a database of available trains and stations within the system.
2. To accept the user information and issue Transaction number.
3. To develop and implement the system.

### **1.4 Purpose of Study**

The purpose of this project is aimed at developing an application that will help manage a railway transportation system. Railway ticket reservation (Booking of tickets, cancelling and checking of time of arrival and departure of the train) will be entailed in the system. It is projected at enhancing the relationship between customers and railway service providers, thereby easing railway ticketing and selling process.

### **1.5 Significance of Study**

The significance of railway reservation system is the computerization of the activities of the organization; this will help to facilitate the diary operation of the organization. The economy of the organization is affected positively because of the computerization of their operation. The findings of this research will help the Nigeria Railway Corporation increase the income generation and smooth running of the everyday activities. It will contribute to the service provision, thus making ticket reservation faster and stress free.

This presentation will be beneficial to all those who make use of train/railway information system, railway travelling operators, travel agents and train ticket sales outlet.

## 1.7 Scope of Study

This project will focus on an integrated ticket reservation system which may include the following module:

1. Ticket Reservation
2. Ticket Cancellation
3. Status checking

## 1.8 Definition of Terms

**Advance Warning Signals:** A sign used along a roadway to warn that a roadway-rail grade crossing is ahead.

**At-Grade Crossing:** The surface where the rail and roadway (or pathway) cross at the same level.

**Bypass:** A track that goes around other rail facilities (bypassing repairs or congestion). A bypass may be as simple as a track that goes around a rail yard, or may be as significant as a complete route revision.

**Chokepoint:** An area along the railroad track that is often congested, making it difficult for trains to pass uninterrupted.

**Consist:** The number of cars or coaches forming a train.

**Deficiencies:** Areas along the track that cannot handle expected increased train frequencies..

**Double Track:** Two sets of main line track located side by side, most often used for travel in opposite directions, like roadways.

**Exclusive Right-of-Way:** A right-of-way that is to be used only for the rail line (either freight or passenger or both). It is usually completely grade-separated from other types of vehicles.

**Geometrics:** An engineering term that refers to the design of the tracks.

**Locomotive:** A powered piece of equipment that travels on rails and moves railroad cars.

**Main line (Main Line):** A railroad's primary track that usually extends great distances. It usually carries both freight and passenger trains.

**Passive Warning Device:** Signs or markers used at all grade crossings.

**Pavement Markings:** Painted on the pavement in advance of a railroad highway crossing, to warn the motorist or pedestrian of the rail crossing.

**Switch:** A set of levers and gears that guides a train over a turnout or crossover. The levers and gears are moved manually or electronically.

**Travel Time:** The elapsed time between a trip's beginning and end. It includes travel, transfers, and waiting time.

## CHAPTER TWO

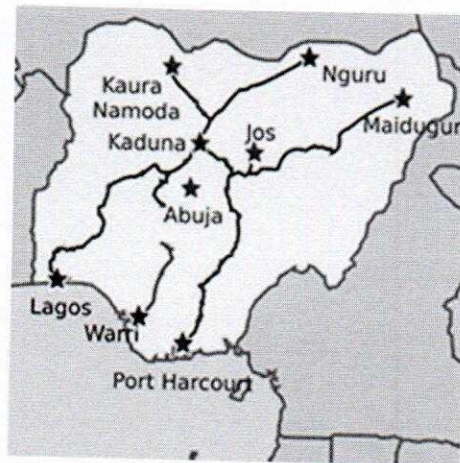
### 2.0 LITERATURE REVIEW

#### 2.1 Railway Transportation in Nigeria

The railway transportation system in Nigeria has been considered as the oldest and perhaps has the greatest carrying capacity in overland transport modes in Nigeria according to Nigeria Railway Corporation 2015. The first railway construction in Nigeria began in 1898 with the Lagos – Ibadan line that was completed in 1901. Its original conception by the colonial authorities was to open up the country to trade with England as well as an instrument of administrative control, regional growth and development, politics and military control (Ademiluyi, 2014). Generally, rail transport is the most suitable and cheapest mode of transportation for heavy traffic flow in Nigeria. Nigeria's single-narrow-gauge railway line constructed in the colonial period was for many years the only mode of freight movement between the northern and southern parts of the country.

The Lagos – Ibadan line was extended to Jebba in 1909, and later joined the Kano – Baro line in 1915. In the eastern part of Nigeria, the port- Harcourt line reached Enugu in 1916, between 1916 and 1966, the railway line was connected to towns and cities like Jos, Kaduna, Zaria, Narmoda, Nigwu, Ifo, Maiduguri and Gombe. Alesa Eleme oil refinery to Eleheruwa in PortHarcourt was connected to Enugu line in 1966 (Ademiluyi and Dina 2013). After independence in 1960, the state of Nigeria railways have decreased, there were no major track extension made by the government in the past five decades. Basically, the existing network is the colonial relics Nigeria inherited from the colonial administration. The total abandonment of the railway system by successive governments had plunged the railway system in Nigeria into a state of comatose.

After twelve years of independence, the Nigerian Railway Corporation began recording financial losses, a trend that has not only continued but has increased in enormity. In 1981 alone, the corporation recorded a loss of more than N83million and since then the loss has been continuous Ademiluyi and Dina (2011). Studies had revealed that there has been a persistent downward trend in Nigeria Railway's fortunes Solarin (2000); Abubakar (2002); Ademiluyi (2006a). The rapid increase in the use of motorized transport has led to precipitous decline in railway patronage both in passengers and freights. Transportation is an essential part of economic development. It is one of the indices for measuring the development of a country.



**Figure 2.1: Nigeria Railway Map**

“Nigeria’s rural transport infrastructure has been identified as a crucial component for the economic development of the country by linking the rural communities to the urban areas” stated by the federal government of Nigeria (2007). A good transportation network expands economic activities by improving accessibility and facilitates movement of goods including agricultural commodities in all the nooks and crannies of the country. As the society and economic organizations become complex, the relevance of transport grows. Transport infrastructural development remains a major tool for achieving meaningful development. Transport system is classified into four basic categories, namely, Rail, Road, Water and Air

Transport. The share of transport in the Gross Domestic Product (GDP) is in the neighbourhood of 3 per cent.

Economic transformation, and indeed, the development of any country are hardly possible without an efficient transport system Salim,(2003) and Lingaitiene, (2006). According to Transport Statistics Report, transportation is an essential part of human activity and in many ways forms the basis of all socio-economic interactions. Indeed, no two locations will interact effectively without a viable means of movement. In many developing countries, inadequate transport facilities are often the norm rather than the exception. Thus, a good transport system is essential to support economic growth and development.

Since the attainment of independence in 1960, the problems of Nigerian transport system include bad roads; inadequate fleets of buses or trucks; irregular, inadequate and overcrowded trains and airplanes and congested ports. These are common features of the developing world. In line with these are physical problems such as dearth of suitably-trained transport managers and planners, capital restructuring bottlenecks, serious issues of institutional reforms and ineffective traffic regulations.

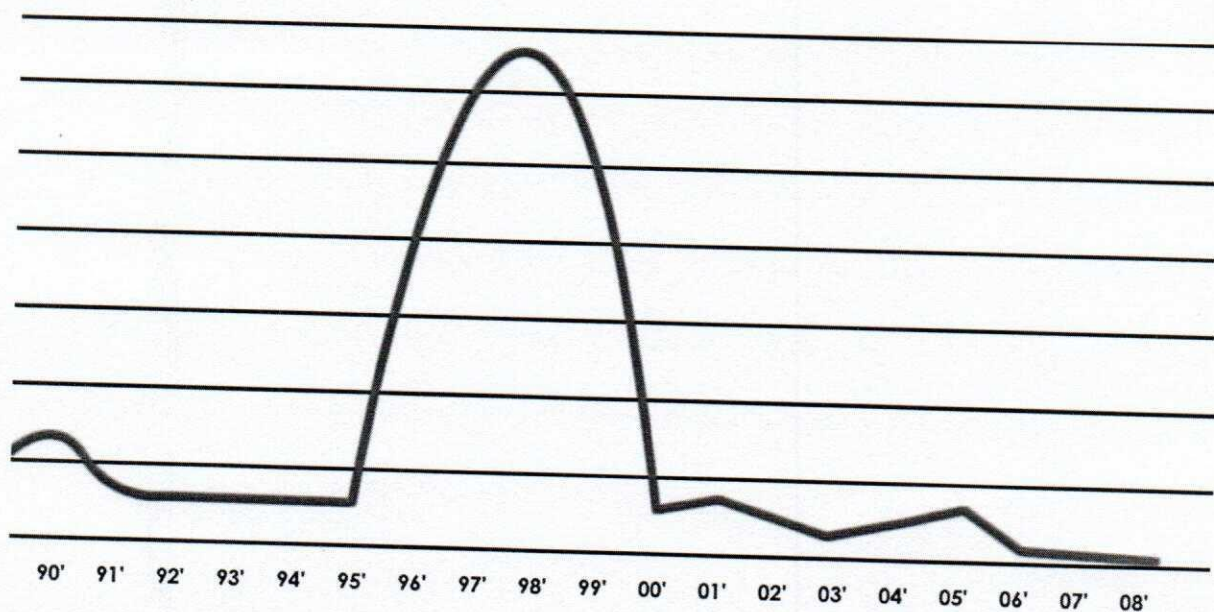
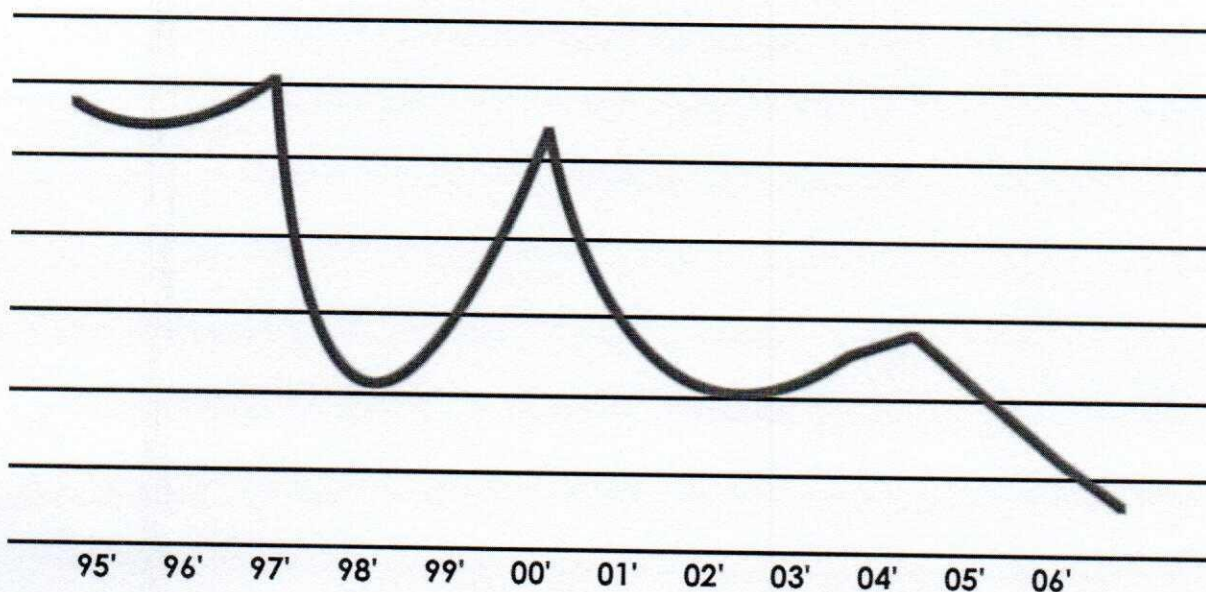


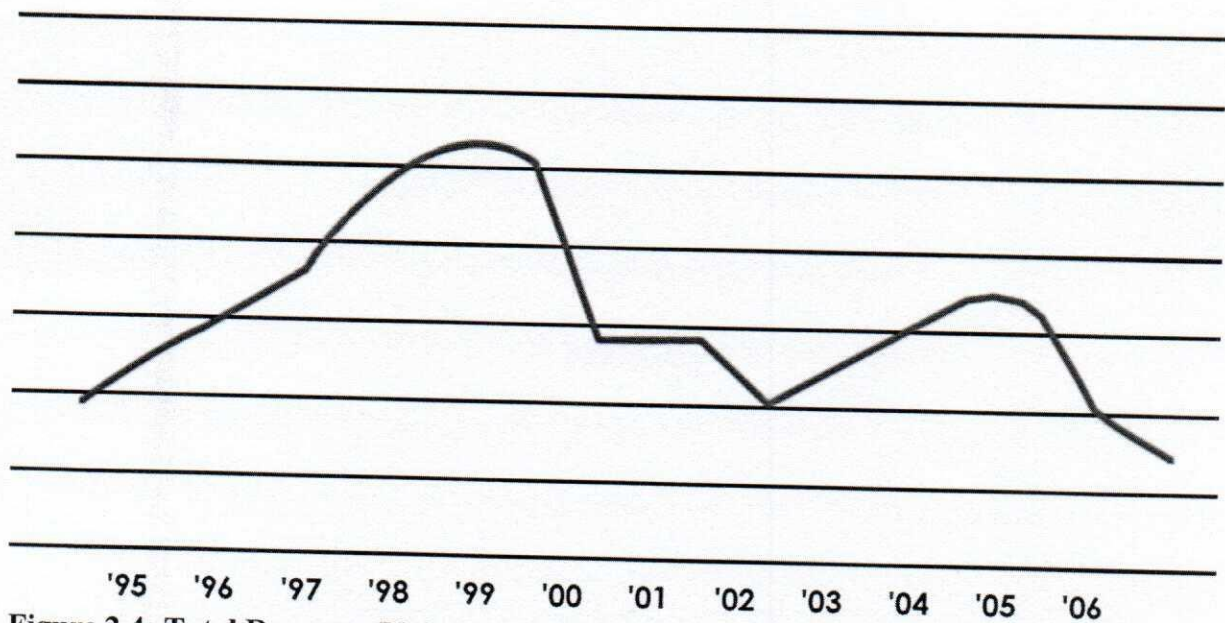
Figure 2.2: Freight Carried (Metric Tons) (1990 - 2008)

In the same light, the number of passengers fluctuated in downward trajectory with sharp decline in 1998 as against the peak recorded in the freight carried under the same period. This implies therefore, that when the demand for railway services by passengers dropped, trains resulted in carrying more freight to compensate for the loss. In another development, the number of passengers rose sharply in 2000 as against the precipitous drop in the freight carried in 2000. By implication, it means a rise in the number of passengers led to a fall in the freight carried.



**Figure 2.3: Number of Passengers (1995 - 2006)**

Figure 2.4 below is a reflection of figure 2.2 and 2.3 in monetary term. It is the total revenue generated from the number of passengers and freight carried in 1996 to 2006. The revenue generated rose to a peak in 1998; in the same year the freight carried was at highest level while the number of passengers dropped drastically under the same period. This means that the railway system makes more money in carrying freight than passengers. In 2000, railway revenue began to dwindle in a consistent manner with a spiral downward movement due to the near zero activity in the railway system.



**Figure 2.4: Total Revenue (Naira) by Passengers and Freight Carried (1995 - 2006)**

The motorized system of transportation has taken over the carrying of passengers and freight in Nigeria. Ubogu (2008) conducted a survey on number of trucks that loaded per day at Lagos and Rivers complex; discovered that 2063 trucks loaded daily from Apapa Wharf, Tin Can, Port Harcourt and Onne seaports in 2008. This account for the pressure exerts on road transport by heavy duties with attendant deplorable state of roads in Nigeria. The railway system has been identified as the easiest and cheapest means of transportation for both freight and passengers in Nigeria. In contrast, though investment in railway is capital intensive, government commitment in revamping the railway system has been quite discouraging. The government has failed to develop a strategic plan on railway development and implement it with all the seriousness it deserved.



**Table 2.1: The Sample Population of Truck Drivers Lagos (Source: Field Survey Results, in Ubogu (2008) )**

Port complex	Location of seaport	Estimated number of trucks loaded per day
Lagos	Apapa Wharf	1300
	Tin Can	350
Rivers	Port Harcourt	271
	Onne	142
Total		2063

The problems confronting the Nigerian railway system are numerous. Some of these problems includes: poor track structure consisting of single track narrow gauge, steep gradients and sharp curves, poor maintenance, and poor track equipment limiting maximum permissible speed to 65 km/h. Others include shortage of locomotives and rolling stocks, corruption and bad management, poor equipment/state of technology, neglect of rail system for road transport development by government, frequent interference with NRC management, myriads of pensioners, and a volatile labour union (Abubakar, 2002). Also, of all transport modes commonly used in Nigeria, the rail sub-sector remains the relatively most neglected in terms of investment and transformation Jakpa (1981); Adesanya (1998); Elechi (1998); Ademiluyi (2006b).

#### **Cities to be served by New Railways**

- i. Abuja
- ii. Asaba
- iii. Calabar
- iv. Sokoto

- v. Akure
- vi. Benin
- vii. Katsina
  
- viii. Warri

However, the Nigerian government has made several attempts in the past to develop the Nigeria railway corporation (NRC) by entering into bilateral agreement with Chinese firm for the 1st and 2nd phase of the project which was estimated to gulp about \$17billion. This was to be financed with a credit support from the Chinese government. However, recent policy pronouncements from the central government indicated that the policy may have ran into constitutional hitches. The inability of the government to go ahead with the execution of this project will spell serious doom for the Nigerian economy, (Gbenga, 2007).

## **2.2 Interventions in Railway Development in Nigeria**

The government interventions in railway development in Nigeria dated back to the early part of the 20th Century. Notably, the existing Nigerian Railway structure was constituted, through the amalgamation of the Southern Nigeria Lagos Government Railway and the Northern Nigeria Baro-Kano Railway, by the British colonial administration in October 3, 1912. Since then it has been operated as a civil service department designated the Nigerian Government Railway. The Nigeria colonial administration intervention in the railway then is attributable to the understanding of the governments across the world of the need for economic efficiency, and railways being a tool for economic and political integration of regions. It has been recognised that a malfunctioning transport system can affect adversely national and international trade, and consequently retard spatial economic development. (Odeleye, 2012)

While the monopoly of the railways in most developed economies has been broken, through policy reforms such as railway market deregulation, most railways in most developing economies are still being own, operate, manage, fund and control by government. This is considered an aberration, as it does not engender efficiency and production. The monopolistic structure of the existing railway in Nigeria is responsible for the series of political interferences in terms of railway funding, investment and reforms by successive administrations in Nigeria. There have been varieties of government interventions, but as good as they are they have been unable to solve the problem facing the railway infrastructure decay and maladministration in Nigeria.

In the last thirty-five years, the profile of the NRC Nigeria railway corporation has continuously revolved around negative attributes such as obsolescent technology, snail-like train speed, derailment, maladministration, corruption, workers unrest, abandon projects. Due to these problems, the corporation runs erratic services that rarely meet the customers satisfaction and needs. Making the patronage of railway by prospective customers fluctuates steadily.

### **2.3 Recent Development in the Railway Sector**

In recent time, there has been refurbishing in the railway transport sector of the economy. With the presence of freshly painted train coaches, modern train engine, additional and repaired railway tracks. With the help of the government investing in the crumbling colonial infrastructure will be the key to boosting the economy. With this development there has been a rise in the passenger using the railway system at 68,000 using the weekly service in the first six month of operation in the year 2014. Following the completion of the Lagos - Kano project by China Civil Engineering Construction (CCECC), which was responsible for the 486km section between Lagos and Jebba, and Contain West Africa which rehabilitated

the 640km Jebba - Kano section, the emphasis has shifted to the 1657km eastern portion of the 1067mm-gauge network from Port Harcourt to Maiduguri.

The government has also continued to rehabilitate tracks, bridges and culverts is now being revitalized by contracted companies in Nigeria and china. Public-private partnership (PPP) structures have been adopted in many parts of Africa to deliver new or rehabilitated infrastructure. Supported by bodies such as the world bank and the OECD, PPPs involve long-term contractual arrangements under which private sector investment and expertise is enlisted to finance, build and operate a project.

#### **2.4 Policy in the Nigeria Railway Corporation**

The Nigeria railway corporation traces its history to the year 1898, when the first railroad in Nigeria was constructed by the British colonial government. The policies made by the federal government of Nigeria from 1960 till date on railways affect the Nigeria technological development in general. Lack of implementations on the policies affects the technological development of the country negatively, while those which are implemented accordingly have contributed to the technological advancement of the country in one way or the other. Hence the effects of the policies and their implementations on the technological development are explained in the subsequent paragraphs.

Signing of contracts with construction companies on the reconstruction and organizing of many railways in Nigeria has led to training of Nigerians in technological skill that will encourage technological growth in the country. Issue to be considered in such contracts is involvement of Nigerians in construction, machine use and maintenance, employment of youth into the railway services. Implementation of railway policy in Nigeria will go a long way in attracting foreign investors in Nigeria.

As transportation through trains is well modernized, investors will like to invest in the country because of a better mean of transportation that saves cost of transportation. Compared to transportation by road, there is always a traffic jinx in many parts of the country like Lagos and Kaduna, but these traffics will be minimized with the help of railways. This will also make producers to easily distribute their products to different parts of the country at ease.

#### **2.4.1 Joint Participation in Nigeria Railway Business**

Because railways are very capital intensive, the Nigerian government should encourage competition by allowing private sector participation in ownership, funding and operations. This will help intensify the effort to modernize railway infrastructure and services as we focus on vision 2020 to join world developed countries. Railway investment opportunities in Nigeria will help the government encourage private participation in railway development and expansion in these areas:

- i. Opening access from onne to Port Harcourt, only two sea ports (apapa and port Harcourt) out of seven are linked to the railway network at present.
- ii. Solving Abuja-Kaduna gridlock.
- iii. Linking Minna-abuja-lagos.
- iv. Serving emerging industrial/commercial zones in suburban area and urban centers by rail.
- v. Building air-rail links, none of the more than 20 airports are served by railways.

Creating favorable environment through national transport policy, the existing national transport policy was signed into law in 1993 but has since remained almost secret document that is poorly circulated. This dysfunctional policy framework has gravely incapacitated development in the transport sector of the Nigeria economy. The adhoc

approach to addressing vital and urgent transport issues has not contributed to positive railway development in view of foregoing. Nigeria need a functional transport policy to guide investment and involvement of public and private entrepreneurs.

## 2.5 Challenges Facing the Nigeria Railway System

There are critical challenges confronting the Nigerian railways some of which include the following:

- i. **High cost of operation and maintenance:** the sustenance, operation and maintenance of the railways are often highly capital intensive. The cost of maintenance of rail tracks, train is usually a real challenge. This reason has made past government in Nigeria to have abandon most projects in the railway sector.
- ii. **Inadequate funding and huge operating losses:** A large part of the deterioration witnessed in these sectors is due to insufficient budgetary provision by the Federal Government coupled with poor management of the sectors. The federal government has, to a large extent, given some reasonable degree of concentration to road transportation. This has been obvious in the enormous contracts given out for the construction rehabilitation and maintenance of roads. According to Adesanya (2010), the rail transport subsector hardly gets up to one-fifth of the allocation to the transport sector. Indeed, the lack of necessary resources to keep tracks, rolling stocks and maintenance facility in reasonable working condition is said to have produced a serious deterioration of the railway system. In spite of generating relatively small revenue annum, its pension bills alone, which rose from N577 million in 1991 to N2.4 billion in 2009, has eroded into what is generated. Between 1995

and 2001 alone, its average operating loss was 13 per cent (and as high as 52 per cent in 1995). This proportion rose to 34.2 per cent between 2004 and 2008

- iii. **Poor track structure:** Consisting of single track narrow gauge, steep gradients and sharp curves.
- iv. **Poor maintenance:** Bad maintenance leaving damaged rail and train to total Detroit. Poor track equipment limiting maximum permissible speed to 65 km/h.
- v. **Lack of government support:** Neglect of rail system for road transport development by government, frequent interference with NRC management. The government should be the main funder of rail building and maintenance, increasing the growth of economy but instead the governments are focusing more on the road transport, then water transport.
- vi. Government interference with management structure
- vii. Volatile and militant labour union
- viii. Plummeting traffic levels (freight and passenger)

## 2.6 Railway Online Booking System Design in China

Railway transport as one of the most important means of transport has played an important role in the transport industry in China. With Chinese rapid economic development, the railway lines and passengers have been increasing year by year in the country. With such a huge customer base, buying train tickets problem has been very prominent. Using e-commerce could solve the problem of railway ticketing. (Wang, 2012). Introducing online ticketing system is not only technological innovation, but also will improve the railway service, solving the problem of railway ticketing.

### 2.6.1 System architecture and function

A typical three-layer structure is used in the system: the database layer, the application service layer, the user interface.

**The database layer:** It is used to hold data, including user registration, ticket ordering information, ticket information and all of the other information.

**The application service layer:** It is the core of this three-layer structure, the system functions and business logic are handled in this layer. In this layer, the systems business logic is encapsulated, the application service interfaces is provided for the user interface layer and the system modules between thee function calls. It also updates data on the database.

**The user interface layer:** The user interface layer is a program that runs on a remote user computer. It displays the provided services by the server to the user. When the user selects a service, this program sends request to the server. After processing, this program shows it to the user. The system functions are as follow: customer register, customer cancellation function, searching function, booking function, refunding function.

### 2.6.2 System design

The system design includes business process design and database design. The business process design is made up of detailed analysis of business's function about railway online booking system.

- i. Customer registers personal information
- ii. Customers search train information through the system and see whether they have appropriate tickets
- iii. Customers order ticket on the user interface
- iv. The system returns the result of ordering tickets information.



- v. Customers can select to cancel reservation for any reason.

The database conceptual design, the entity-relationship diagram can be used to establish the data model to form a ER graph model independent of the machine and DBMS.

## **2.7 Related Works**

### **2.7.1 Online Hotel Reservation System**

The application of the internet in the business world has become a major trend in practice and generated a hot stream of research in the recent literature. Over 400 millions of computers or more than 400,000 networks worldwide today are communicating with each other. (Napier, Judd, Rivers, & Wanger, 2012). The importance of internet in aspect of commerce can't be over emphasized; as such, the internet has been becoming a powerful channel for business marketing and communication (palmer, 199). The hotel industry is certainly fully aware of this trend and fully willing to contribute its share in this effort. The hotel industry has realized that during those early forays into cyberspace, the industry didn't view e-booking strategically, and handed over too much control of inventory and pricing to those third party online travel agencies.

This industry is now following the online shopping patterns, by creating an online reservation system. (<http://www.iima.org/CIIMA/CIIMA%20V3%20N1%201%20Yang.pdf>). Online hotel reservations are becoming very popular method for booking hotel rooms. Travellers can book rooms from home by using online security to protect their privacy and financial information and by using several online travel agents to compare prices and facilities at different hotels. People can book directly on a n individual hotels website. Increasing number of hotels require a "booking engine" application to be attached to their website to permit people book rooms in real time.

(<http://en.wikipedia.org/wiki/Onlinehotelreservations>).

Online hotel reservation software is an easy to use arrangement that enables agents and guest to reserve rooms directly via the internet once they have confirmed availability of rooms in accordance with the itinerary. (gleda & mischellek, 2013) People can book directly on an individual hotels website. An increasing number of hotels are building their website to allow them to market their hotels directly to consumer. (gleda & mischelle, 2013)

### **2.7.1.1 Determinants of online hotel reservation**

There are various determinants identified in hotel reservations. The determinants of online hotel reservation intention used in this study are based from Salisbury et. al (2001) study. It is based on the notion that perception is an important determinant of individual behaviour and that it is. In a study to examine the users of online hotel reservation; Convenience, price comparison, and lower prices were identified as the three main reasons why Internet users buy travel products online (Starkov & Price, 2003). Because online consumers enjoy convenience and more control through making transactions online, online travel agencies should compete for customers through enhanced websites equipped with more convenient and ease of use features. Price is stated as the key motivator for consumers to purchase online (Santoma & O'Connor, 2006).

Low prices has been found to be a major driver of online travel purchasing (Starkov & Price, 2003; PhocusWright Report, 2000). According to the 2001 Annual PhoCusWright Travel Consumer Trends Survey (PhoCusWright, 2001), almost 60% of online consumers cited price as the top reason to purchase travel-related products online and 53% of respondents believed that they get their best deals through online. Haussman (2002) elaborated that online travellers are much more likely to make a reservation if they are offered the lowest price. Emmer et al. (1993) stated that most of Internet users are searching over the web checking the price of tourism products before taking purchasing decision.

Hence, online travellers would normally surf multiple web sites to research and compare prices before making their bookings.

Meanwhile, Szymanski and Hise (2000) elaborated that consumer's perceptions of convenience; product information, site design, and financial security were the dominant factors in consumer assessments of online satisfaction. (Technowledge's, 1999) findings stated that the top reasons given for shopping online were convenience, unique merchandise and competitive prices. Another factor that influences consumers to do online reservation is the flexibility and user friendliness of the system. With traditional reservation method, customers can easily change their particulars while talking to the hotel staff. They can effortlessly make any changes. However, when customers utilize hotel online reservation, such alterations are entirely the customers' responsibility.

### **2.7.2 Online Ticket sales**

There are currently a number of different websites offering online ticket sales. Some of the best known sites are:

- i. [www.ariyatickets.com](http://www.ariyatickets.com)
- ii. [www.ticketmaster.co.uk](http://www.ticketmaster.co.uk)
- iii. [www.aloud.com](http://www.aloud.com)

This site offers similar service to customer but different navigation system and search techniques. The aloud website has a basic search comprising of artist/band or town. The advanced search allows users to search by artist or event, a set of dates, a venue name and a town. This site offers customer an email list facility where users can enter their email address to be kept up to date with coming events.

The ticket master website offers account to customers so that their details are stored so that process of purchasing tickets is quicker and customers do not have to fill in forms.

Customers who have accounts receive emails periodically from the site promoting upcoming events.

## **2.8 Factors Affecting Online Reservation**

Kim and kim (2004) conducted a study to find if online reservation by users were affected by purchasers demographic location. The study however concluded that those who chose to use internet in making reservation were affected by six factors, which was why they chose to continue to use the internet for booking reservations.

- i. Convenience.
- ii. Ease of information search.
- iii. Ease of transaction.
- iv. Information credibility.
- v. Price.
- vi. Safety (ease of cancelling and security of sensitive information).

## **2.9 Security Issues Concerning Online Ticket Ordering**

Programming for the internet requires programmers to consider different security issues that may not necessarily be a problem when programming for single machine programs. Problems can occur when an innocent user types in some invalid content into a form of website or a malicious user of the site takes advantage of the holes in the security to gain access to sensitive data or delete/edit your database. Problems of high profile websites is denial of service (DoS) and Disrupted Denial of Service (DDoS) attacks. This attack is made by virus programmers and hackers to bring down the servers running web services by making larger numbers of request on the server. This sort of attack needs to be dealt with by the server when the attacks start.

### **2.9.1 Structured Query Language (SQL) Injection**

A malicious user of the website may attempt to replace the SQL query with their own by entering their own statement in to the form filed on the website. This could allow the malicious user to add, edit or delete data in the database when they should not be able to.

#### **2.9.1.1 Blocking SQL Injection**

Preventing SQL injection is to ensure that SQL statements are constructed carefully when the variables are received from the users. This can be done by removing any characters that can be used by malicious users to construct their own SQL statement to be queried on the website database.

### **2.9.2 Cross Site Scripting (XSS)**

For this method of hacking, a hacker uses forms on your website to introduce malicious mark-up or client side script (i.e. Java Script or VB Script) then relies on other users of the site activating the code. A cross site can be used for session hijacking and stealing users account details. There are two types of Cross Site Scripting (XSS). The first is remote site to Application site. This type of attack is not initiated on your site but from a link on another website or in an email. A user is convinced to fill in a form or follow a link which contains the malicious code. This code now has its affect on the page the user is forwarded to.

The second type of XSS attack is application site to same or remote site. This method relies on what the malicious user enter into a form on your website being displayed to other users of your site. The malicious user enters the markup or script into a form and that information is subsequently displayed elsewhere. The malicious user then waits for another user of the site to activate the script by following a link or with extra coding even just hovering over a link.

### 2.9.2.1 Preventing XSS

The use of POST requests makes a site more secure from XSS attack than using GET requests. So web site developers should use POST requests as much as possible to strengthen their websites against XSS attacks. Another method of protecting against XSS attacks is to not allow any HTML markup to be entered into forms on a website unless it is absolutely necessary. Any HTML markup can simply be removed by the program processing the incoming data. If HTML input is required then rather than allowing all tags to be used filter, input and remove certain tags, for instance:

- i. <applet>
- ii. <embed>
- iii. <script>
- iv. <object>

Scripts should also remove attributes from the tags as these can contain Java Script. Programs should allow filter and URLs that are inputted. Normal procedure for many web applications is to remove any GET variables from the end of the URL.

### 2.9.3 Session Hijacking

Session hijacking is when a malicious user of a site sets up valid sessions on that site to gain access to the site without having to give a username or password to login. The idea of a session was devised to allow for variables to be held in between communications with the servers and clients. Before sessions HTTP was a completely stateless protocol, meaning there was no way for the server to remember what clients it has been communicating with and what it has sent to the server and the client has no memory of which server it has been communicating with and what it has sent. Sessions were introduced to allow information to be remembered between communications. The session data is held on the server and given a

unique session ID which is sent to the client, then the client references this session ID when it communicates with the servers.

Anything saved as a session variable is stored in a temporary file on the server named with the session ID. The session ID can be stored by the client in two ways. The first is to store it in a cookie if they are enabled. If cookies are disabled then the session ID can be appended onto the end of the URL as a \$\_GET variable. There are a number of different ways for hackers to intercept the session ID. They are:

### **2.9.3.1 Listening to network traffic**

This is the simplest way for a hacker to collect valid session IDs with simple software that is freely available on the Internet used by network administrators for legitimate reasons that allow users of the program to intercept and read all network traffic.

### **2.9.3.2 Phishing, forwarding and proxies**

These forms of session hijacking convince the user's browsers it is connecting to one server when it is actually connecting to another. Hackers using these methods can often get users to click on a seemingly innocent link for the website they wish to hijack sessions on, but the link does not go to the site it link claim to instead it forwards the user onto the hacker's server which then forwards the user on to the site they thought they were going to. Now the hacker's server is setup as a proxy in-between the client browser and real website's server and is able to collect all session ID and any other information sent between the client and the server including user names, password or credit card details.

However many users of the Internet are now wary of the long URLs that are used by hacker for such methods. Hackers are also making use of the ever-increasing number of available Wi-Fi connections in public places such as pubs, station, cafes and airports. There

are two methods hackers use to intercept session ID and user information on such networks. The first is to set the network up so that all Internet connection goes via a proxy server on the network that collects all the data being transmitted over the network. The second method is a little more complicated to set up and involves the network vender configuring the networks Domain Name Server (DNS) by hand so that when a user enters a URL in their web browser, they believe they are being sent to the real website when actually they are not and again a proxy is being set up and the data being recorded at the proxy.

#### **2.9.3.3 Session Fixation**

A hacker can make use of the facility for allowing session ID to be passed as \$\_GET variable and create a link with a falsified session ID in the URL. When a user of the site uses the link to get to the website and logs in the session ID that the hacker made up will know be a valid session ID that the hacker can use.

#### **2.9.3.4 Preventing Session Hijacking**

There are number of different ways to prevent session hijacking and abuse, including the following;

##### **Secure Socket Layer (SSL)**

The use of SSL is the most highly recommended method for preventing session hijacking. This is because any data being sent between the client and the server and vice versa is encrypted so users are protected against hackers that are listening in on the network traffic.



## **Disabling the use of session IDs as \$\_GET Variables**

As one of the big security holes in the passing of session IDs is that they can be sent via \$\_GET variables programmers may decide to disable the ability to pass session ID as \$\_GET variables. This can be done with some simple programming.

## **Session Timeout**

Session cookies (cookies used to hold the session ID) are by default set to exist up until the browser using them is closed. It is possible for a programmer to override this so that a session will only last for a set amount of time, which is set in seconds. This method makes it difficult for a hacker to hijack sessions if they are using proxy or forwarding methods to collect session ID, as by the time they have analysed the data the session could have become invalid. However there are programs that allow hackers to do real time hijacking meaning that the session ID are found faster and may still be used. This method does not protect against this type of attack.

## **Regenerating Session IDs**

When a user logs in or logs out of a website the session ID they are using should be changed. This makes the session ID used from one state invalid and the new state has a completely new session ID. This method of protection stops hackers using session fixation.

### **2.9.4 Password Encryption**

All of the passwords for both staff and client sides of the site will be stored in the database. In case a hacker manages to gain access to the database or a malicious employee gains access to the database, all the passwords need to be encrypted so that they cannot be read or used. This is particularly important as many people that use the Internet only use one or two different passwords enabling any hacker to make use of this information to gain access

to a user's email account or another Internet service. There are a number of different types of encryption available with PHP including:

- i. MD5
- ii. Sha1
- iii. CRC32
- iv. Blowfish

Passwords should never be encrypted with a reversible encryption and you should only use known encryption like the method listed previously rather than making up your own encryption algorithm.

### **2.9.5 Secure Socket Layer (SSL)**

Normally any webpage served up by a HTTP server is not encrypted so any content can be simply read if any transmissions are intercepted. Many websites that deal with sending and receiving of data including address, credit card and other personal data between clients and servers. Do not want this information easily intercepted. So they want to implement some kind of security of the connection between the server and the client machine or encrypt any data being sent between them. SSL requires the web server hosting the website being set up to use SSL; it also requires a third party to sign the certificate to certify the web server is who it says it is. Finally the programmer of the website has to implement a website that sends the data via the SSL connection

### **2.9.6 Allowing only human users**

This is a very popular new idea for websites and has only been seen in extensive use in the last two years. Websites use Text Image CAPTCHAs (Completely Automated Public Turing test to tell Computers and Humans Apart), Audio CAPTCHAs and Cognitive

CAPTCHAs. These are used on signup forms to test that the form has been filled in by a human sitting at a computer rather than an artificially intelligent program. The CAPTCHA test was invented by a British mathematician called Alan Turing in 1950 when the scientist started to conceive the possibility of artificially intelligent computers.

### **2.9.7 Text Image CAPTCHAs**

A Text Image CAPTCHA uses an image of text that has been distorted in some way to ensure that a computer program cannot recognise text. The user enters the characters into a text field and the backend program ensures that both of the strings match before the program continues to execute. These strings are randomly picked and an image dynamically created by the underlying program each time the page is loaded. It is done this way to ensure that there is a low change of repetition of the string and make the program secure.

If the program was to randomly select an already created image from a file it could be possible a malicious user gains access to the folder and uses the knowledge to break the security of the program. The images are not just made up of plain text string. The program also distorts the text and adds random line and pattern to help distort the image so that it is difficult to use an Optical Character Recognition (OCR) program to recognise the text and then input its attempt to the text field.

### **2.9.8 Online Finance Systems (E-PAYMENT)**

As the system needs to deal with financial transactions when customers buy tickets, research was needed into online banking and payment systems and how the online ticket sales system could interact with the different systems available. Many banks on their website recommend using a third party payment solution such as PayPal or World Pay. It is possible to become a credit card vendor that allows you to accept payment from credit cards that you are a vendor of.

## CHAPTER THREE

### 3.0 SYSTEM ANALYSIS AND DESIGN

#### 3.1 Methodology

Research methodology has many research methods and dimensional view. The scope of research methodology is wider than research method. Research methodology is a way to systematically solve a research problem, it allows to study various step adopted by the researcher in studying a research problem along with the logic behind (Karl 1999). Methodology is the underlying principle and rule that governs a system method; on the other hand it is a systematic procedure for a set of activities. Thus, from these definitions a methodology encompasses the methods used within a study. Spiral development model under the system development life cycle is the method used in developing the railway online reservation system. It combines key aspect of waterfall model and rapid prototyping methodologies; combining the advantages of top-down and bottom-up concepts.

It lays emphasis on key area which are neglected by other methodologies, deliberate iterative risk analysis, particularly suited to large-scale complex system. With its principle focusing on risk assessment, progression through same step sequence, each step is divided into the spiral transverse (determine objectives, evaluate alternatives and resolve risk, develop and verify deliverables, plan next iteration)

#### 3.2 Information on Case Study

Nigeria Railway Corporation traces its history to the year 1898, when the first railroad in Nigeria was constructed by the British colonial government. Nigeria railway way corporation was established in the year 1955 by the act of the parliament with the main purpose of carrying passenger and freight. . It aims also is to manage and operate the railway,

control railway expenditure, to direct and control the expansion of the railway system. The corporation has the problem of keeping adequate record of passenger record, ticket booking, train availability, schedule train movement, just because service are done manually, associated problems of insecurity, high cost of operation, passenger usability, passenger reliability.

Ticket ordering has been manual, with the use of pens, people and paper in taking train reservation. The design and development of an online ticket reservation will no doubt bring immeasurable relief from the problems associated with the manual system and increase the use of the railway transport sector.

### **3.3 Data Collection and Facts Finding**

There are various methods of data collection; I have chosen the two main sources of data collection in carrying out this study. Which are:

1. Primary data source
2. Secondary data source

The primary data source refers to the sources of collecting original data using empirical approach such as interviews, questionnaire to achieve best result in knowing user experience of the current ordering system. The secondary data sources are obtained from magazines, journals, newspaper, article review and library source.

#### **3.3.1 Interview and Questionnaire**

An oral interview will be conducted by me as the researcher and passenger using the train service by the Nigeria Railway Corporation, (Ibadan, lagos, or osogbo station). The interview method of data collection can be defined as a systematic way of collecting data or information from a respondent through asking questions directly from the respondent and also collecting information through the use of questionnaire with the aim of facilitating

understanding. Reliable facts will be gotten based on the questions posed to staff and customers to help in starting work and help in the area of solution presentation of the new design.

### **3.3.2 Study of Manuals and Journals**

Manuals and journal report based on the company's services will be obtained and studied and a lot of information concerning the system to be produced will be obtained.

### **3.3.3 Document Review**

Some important documents and forms relating to this research will be accessed. These include the train station list, average passenger list, users of freight and cargo etc. These forms will help in the design of the new system.

## **3.4 Analysis of Existing System**

Throughout the system analysis, an in-depth, study of end user information is conducted, for producing functional requirement of the proposed system. Data about the existing ticket reservation method is collected through several fact-finding techniques such as website visit and document review at the beginning of this research stage. The data acquired will help facilitate information required during detailed analysis. A study on the current system will be worked out using a interview. At the end of the analysis, requirement and specification will be produced and will support system design.

## **3.5 Problems of Existing System**

The existing system is a non-computerized operating system were all operations are done manually by the ticket officer carrying paper to take down payment, and giving paper ticket. This leads to mistakes because the ticket officer might make mistake in giving change

of money tendered, giving wrong ticket to customer in times of rush, wrong seat allocation to passenger. Due to manual means being employed by Nigeria Railway Corporation, it is very difficult to satisfy the wants and needs of the passengers. Most of the problems include:

- i. Mistake when booking from customers.
- ii. It causes lack of understanding between the customers and the staff.
- iii. Record keeping system is poor. Losses of vital records are reported.
- iv. Protecting the file system from unauthorized access is a problem.

These are the major problems facing the existing system and would be corrected with the help of the new computerised proposed system.

### **3.6 Objectives of the Proposed System**

The proposed system is developed to manage ticket ordering activities in Nigeria Railway Corporation. It helps to record customer submitted ticket details. The system should cover functions such as:

The main objectives are:

1. To create a Proper data record for file keeping on stock and ordered goods.
2. An access to easy retrieval of ticket purchased by the passenger. .
3. To promote interface that allows promotion and discount on ticket reservation and purchase.

### **3.7 Importance of the New System**

It is the purpose of the new system to address all the problems plaguing the present system concerning ticket purchase and ticket reservation. This system will do the analyzing and storing of information either automatically or interactively. It will make use of php-mysql. This helps in handling of particular information needed by the management viewing

via the monitor or can be accessed by printing. The handling of information by the management is the result of input data and record of passenger, total ticket bought, reserved seat, train trips e.t.c that will serve as report.

The proposed system will have features such as:

- i. Handling of data (passenger, train departure and arrival).
- ii. The new system will reduce volume of paper work.
- iii. Fast rate of operation, delivery of passenger ticket within seconds of payment.
- iv. Flexibility, increasing the usability. The website is open when the office is close offering a 24hours a day service.
- v. It gives better means of data storage using the system as backup or duplicating CD.
- vi. Error in order handling will be greatly minimized as full book details, specification, category, price are attached to a particular book in the catalogue.

### **3.8 System Design**

#### **3.8.1 Accessing the System**

The administrator starts the process by logging into the system by means of a valid username and password combination which is been set in the database. A default administrative account has been provided in the development of the system in order to enable the administrator to access exclusive privileges such as registering new commuters or delete an existing commuter with either limited (normal user) or unlimited (administrative) privileges. The administrator gains access to the system resources after a username password combination has been verified as accurate after which they are redirected to the homepage. The system homepage serves as the gateway to the entire online railway reservation system. Therefore, once the admin is logged into the system, he/she can access all system resources available. Once logged into the system, the admin can create, manipulate and truncate



records. However, the amount of manipulation that a user can perform with regards to the records is dependent on user privilege levels as explained below.

### **3.8.2 User Privileges**

The system maintains two levels of users:-

- i. Administrator Level-Database administrator
- ii. User Level-Data Entry Operator

#### **Administrator Level**

The administrator level is reserved for the database administrator. The administrator maintains the exclusive privilege to access ALL system resources and therefore has unlimited access to the system. In the designed system, the administrator has the following exclusive privileges;

- i. Granting and revoking access to system resources to users. This involves registering and de-registering users
- ii. Maintaining all tables with fixed data values.
- iii. Truncating Obsolete Records

#### **User Level**

The user level is reserved for the user of the system which allows them to perform the following function on the webpage;

- i. Select appropriate route and time
- ii. Register necessary details into the system through a form page

### **3.8.3 Algorithm**

#### **Log in to System**

Startup system

Enter login name and password

On clicking the login button

Verify to know whether user credentials are correct

If not

Deny access and return login page with an error message

If correct

Check if credentials are for administrator

If yes

Allow login

Set admin session

Re-direct administrator to admin home page

If no

Allow login

Set user session

Re-direct user to user home page

### **Add New Entry**

Check if administrator is logged in

If correct

Check if all fields entered are correct

If correct

Check if unique field value entered already exists

If correct

System message: user already exists

If not

Registration of user successful



### **Adding Record**

Enter Record Details

If record exists

Return record already exists

If not

Registration of Record successful

### **Editing Record**

Click on edit button


Query the database to retrieve details

If record exists

Return record details

Check if all fields entered are correct

If not



System message: fields incorrect

If correct

System message: record successfully edited

### **Deleting a Record**

Check if administrator is logged in

If not

System message: no sufficient rights to perform this operation


If correct

enter recordID

If record ID exists

Delete record from table

If record ID does not exist



System message: sorry! record does not exist

### 3.9 Systems Architecture

The system is designed in the following manner. The Online Railway Reservation System has a backend engine that consists of a MYSQL database, Hypertext Pre-Processor (PHP) as the programming language, HTML for hand coding, CSS as the presentation layout of the web application and the user interface modules. The system architecture is illustrated in Figure 3.1

Diagram Showing the System Architecture

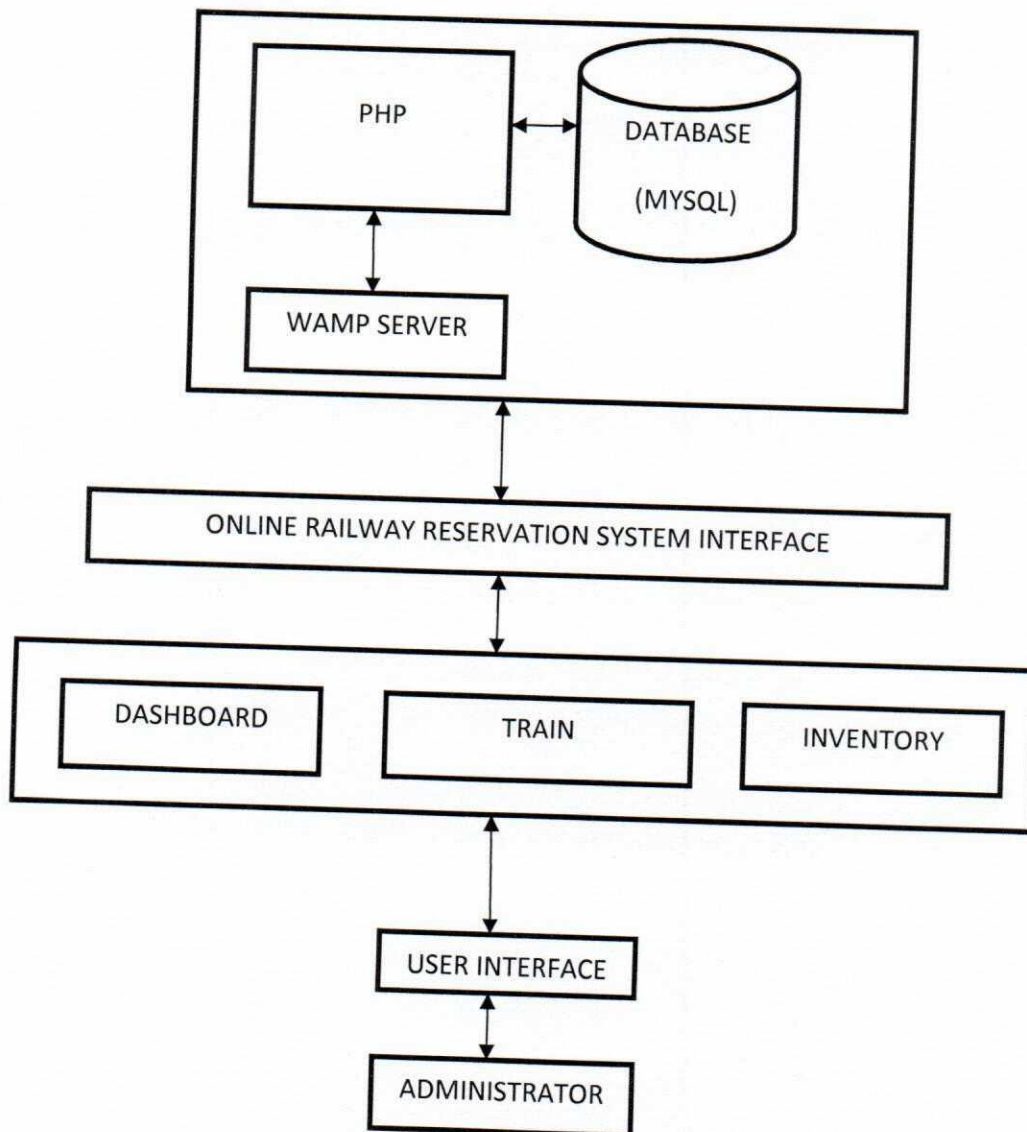


Figure 3.1: System Architecture

The details of the user interfaces are displayed in the high level architectural diagram in Figure 3.2 below. After the user login, the appropriate access rights, the user may access the system

### High-Level Architecture Diagram of the Main Components

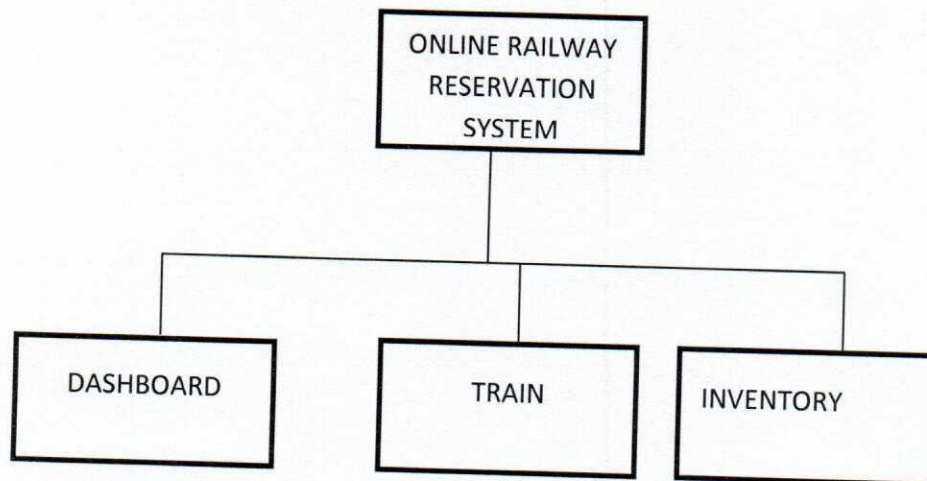


Figure 3.2: High level architectural diagram of main components

#### 3.9.1 Logical Database Design

The logical database design is meant to describe the representation of the database in terms of its entities in form of tables and the existing relationships.

#### 3.10 Database (Physical Design)

##### 3.10.1 Physical Database Design

As one of the core elements of a hospital management system, the database had to be designed in a meticulous systematic manner. This process started at the analysis phase of the project. From the analysis, I was able to identify the necessary tables required for the database and the associated field names, format and length of each table. After careful analysis of the user requirements, it was identified that the online railway reservation system needed four main tables i.e. admin, customer, reserve and route table. However, after the

process of normalization a few sub-tables emerged from the main tables. Below is a list of these tables.

### 3.10.2 Database Tables

**Table 3.1: Admin table**

Field Name	Type	Constraint
Id	int (11)	Primary key
Username	varchar(30)	Not Null
Password	varchar(30)	Not Null

**Table 3.2: Customer table**

Field Name	Type	Constraint
Id	Int(11)	Primary Key
Fname	varchar(30)	Not null
Lname	varchar(30)	Not null
Contact	varchar(30)	Not null
Address	varchar(300)	Not null
Train	varchar(30)	Not null
Transactionnum	varchar(10)	Not null

Payable	varchar(11)	Not null
Status	varchar(100)	Not null
Seatnumber	varchar(100)	Not null

**Table 3.3 Reserve Table**

Field Name	Type	Constraint
Id	Int(11)	Primary Key
Date	varchar(11)	Not null
Train	varchar(11)	Not null
Seat_reserve	varchar(11)	Not null
Transactionnum	varchar(10)	Not null
Seat	varchar(100)	Not null

**Table 3.4 Route Table**

Field Name	Type	Constraint
Id	Int(11)	Primary Key
Route	varchar(300)	Not null
Price	varchar(30)	Not null

Numseats	varchar(30)	Not null
Type	varchar(300)	Not null
Time	varchar(100)	Not null

Based on the tables displayed above, the main/core tables are linked together by one Unique key which is id. This key serves as the primary key for the whole system implementation and helps distinguish information related to each user's request.

### 3.10.3 Data Relationships

Data relationships show how the information or records are related between each other. For the tables to work together, relationships have to be established in the design of the Online Railway Reservation System, the data relationships were established during the process of the logical data design.

There are mainly four kinds of relationships

- i. One to One
- ii. One to Many
- iii. Many to Many
- iv. Many to One

These relationships are represented in the entity relationship diagram (ERD) in the next section.



### 3.10 ER Diagrams and DFDS

#### 3.10.1 ERD (Entity Relationship Diagram)

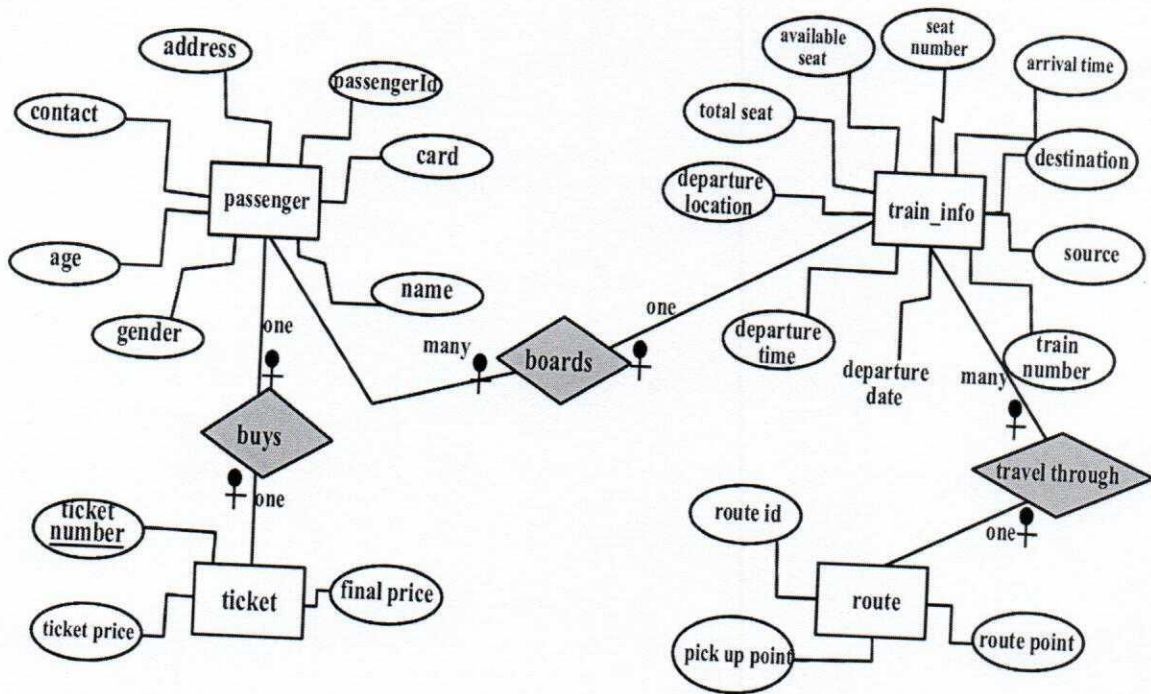


Figure 3.3: Entity Relationship Diagram

#### 3.10.4 DFD (Data Flow Diagram)

The Data flow diagram (DFD) in figure 3.4 is used to reveal relationships among and between the various components in the online railway reservation system. It also illustrates the operational context of the system. The data flow diagram is an important technique for modelling a system's high-level detail showing the system boundaries laid out.

## Context level or 0-level DFD:

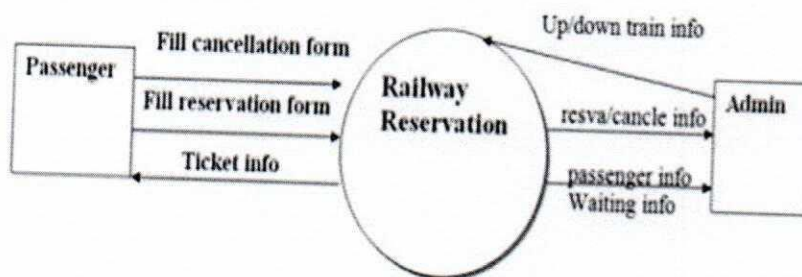


Figure 3.4: 0-level Dataflow Diagram for railway reservation System

# 1 LEVEL DFD DIAGRAM:

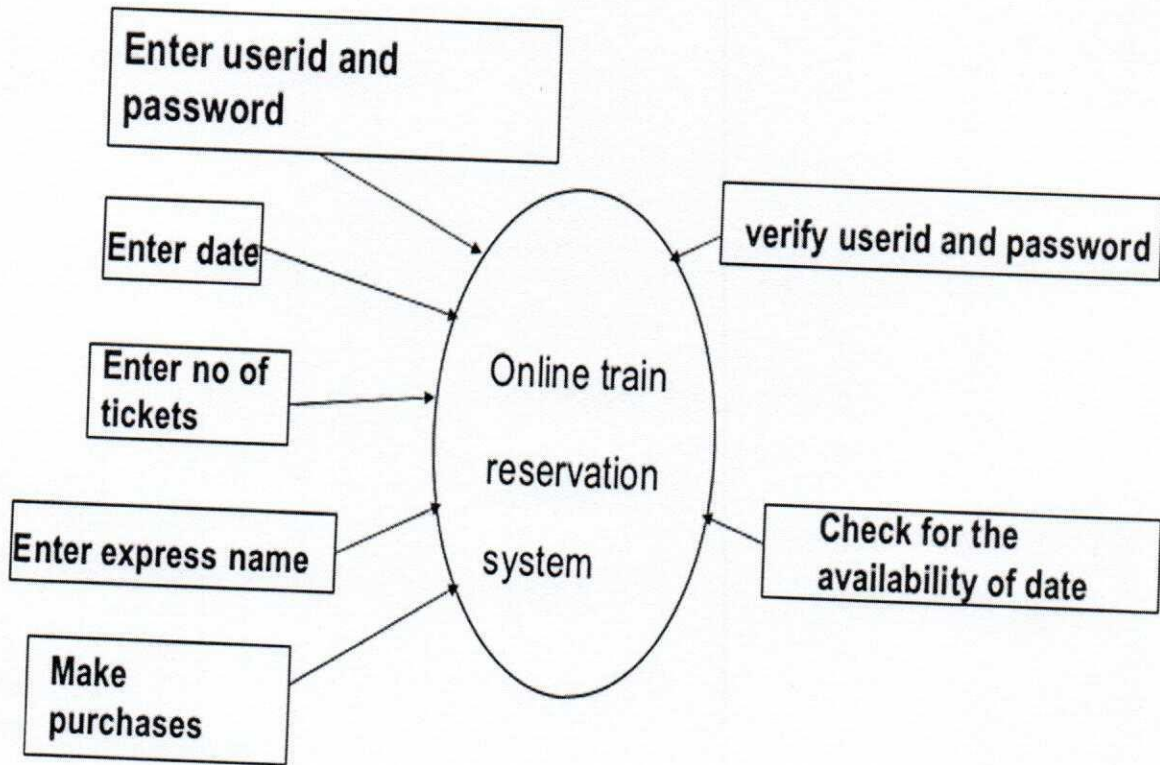


Figure 3.5: 1-level Dataflow Diagram for railway reservation System

### 3.11 System Flowchart:

The Flowchart in Figure 3.6 below describes the overview of the online railway reservation system process in which an administrator login with his/her valid username and password before allowing access to the System and prompt to enter a valid username and password in form of dialog box if the credentials supplied to the system is incorrect.

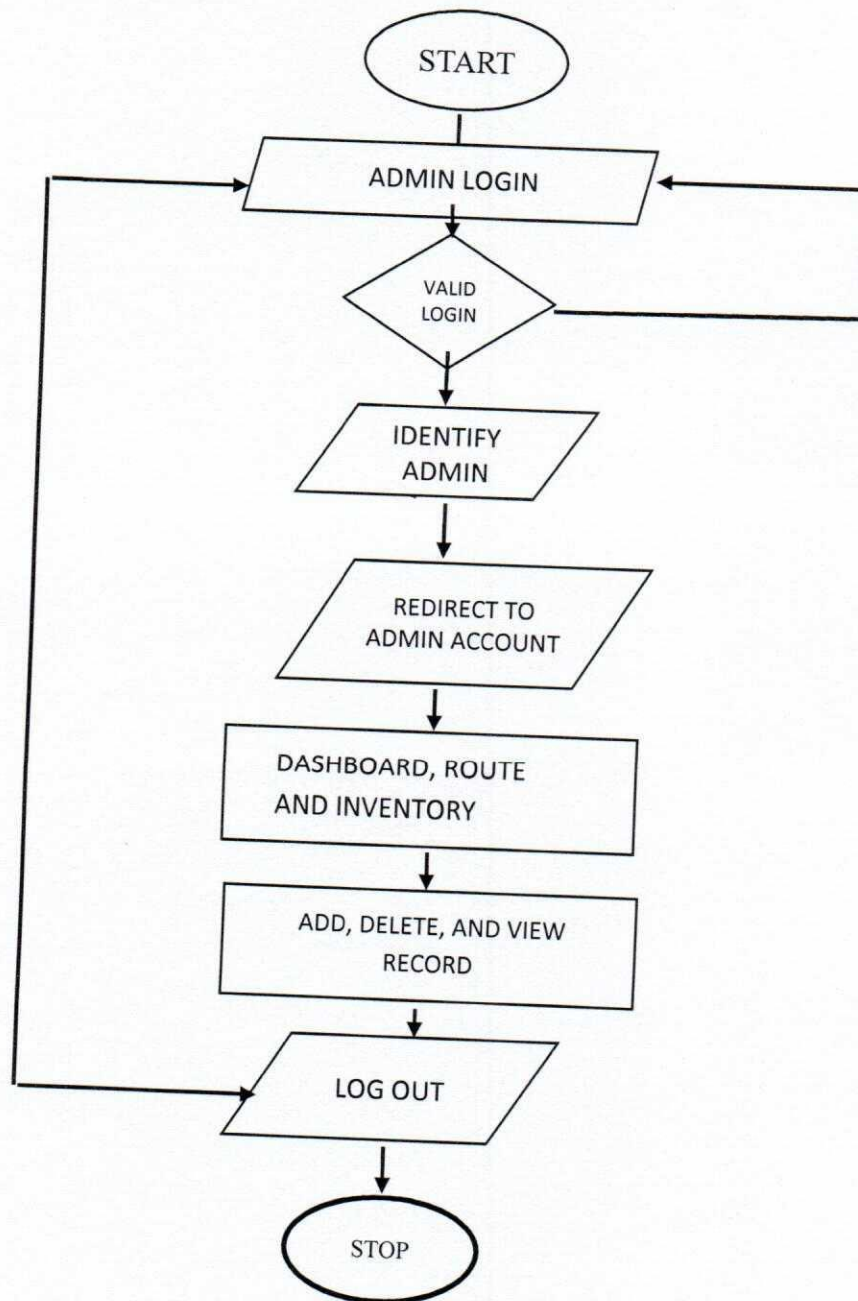


Figure 3.6 System Flow Chart

### 3.12 Categories of Unified Modelling Language Diagrams Used

The Figure 3.7 below describes the categories of the unified modelling language that will be used in modelling the hospital management system.

## UML DIAGRAMS

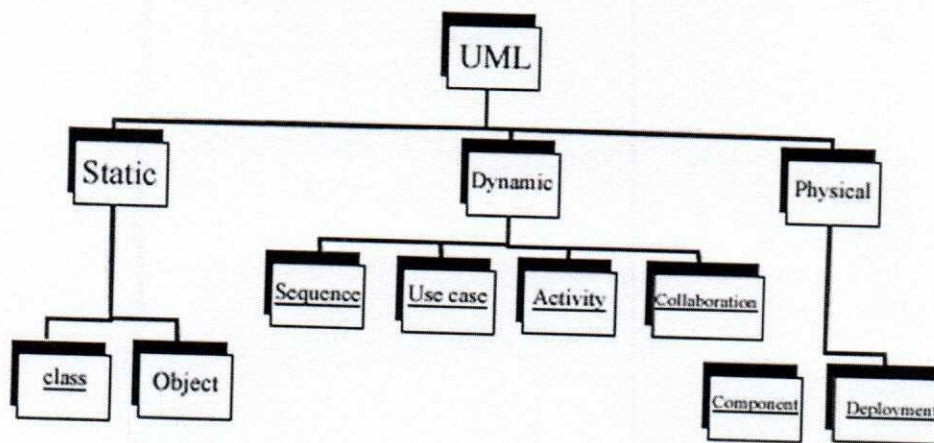
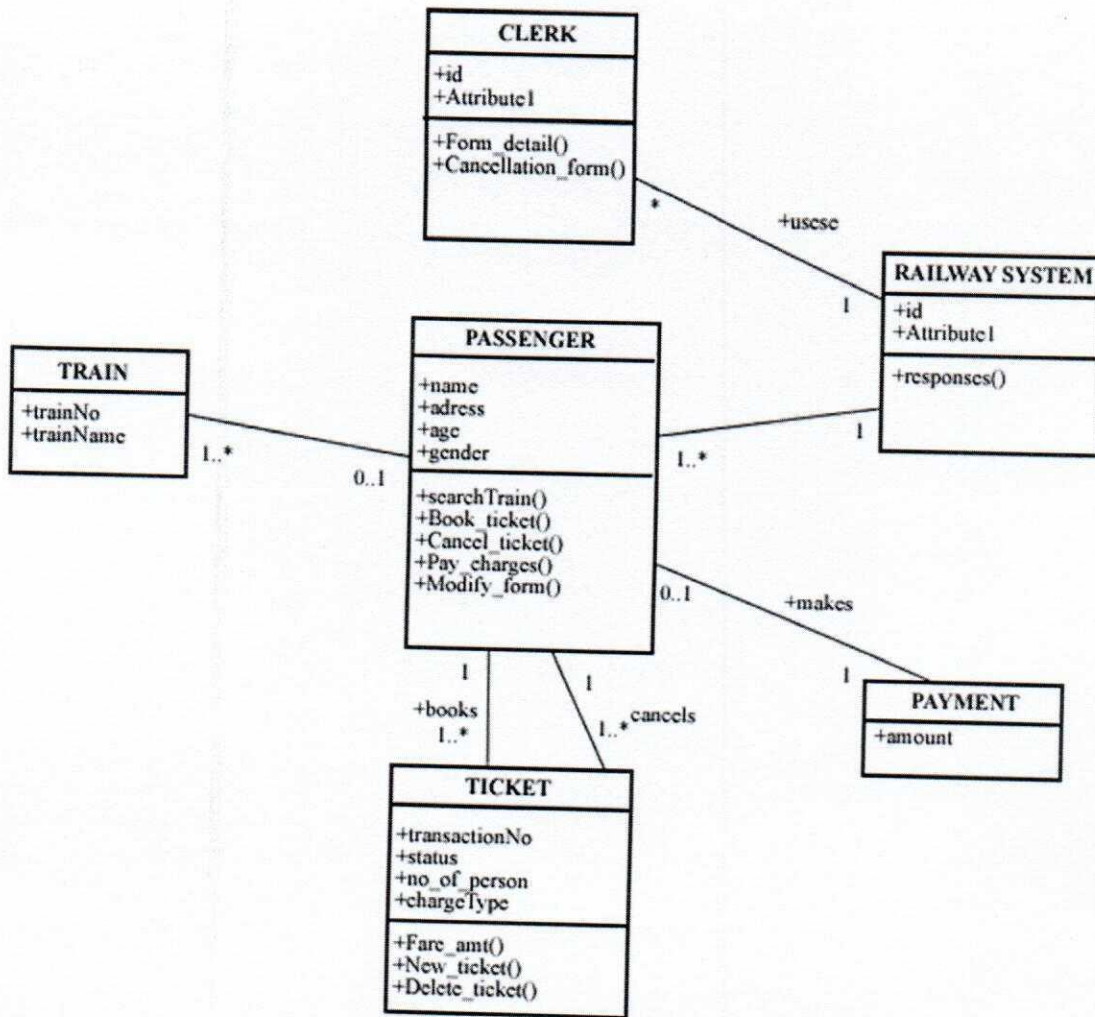


Figure 3.7 Types of UML diagram

#### 3.12.1 Class Diagram:

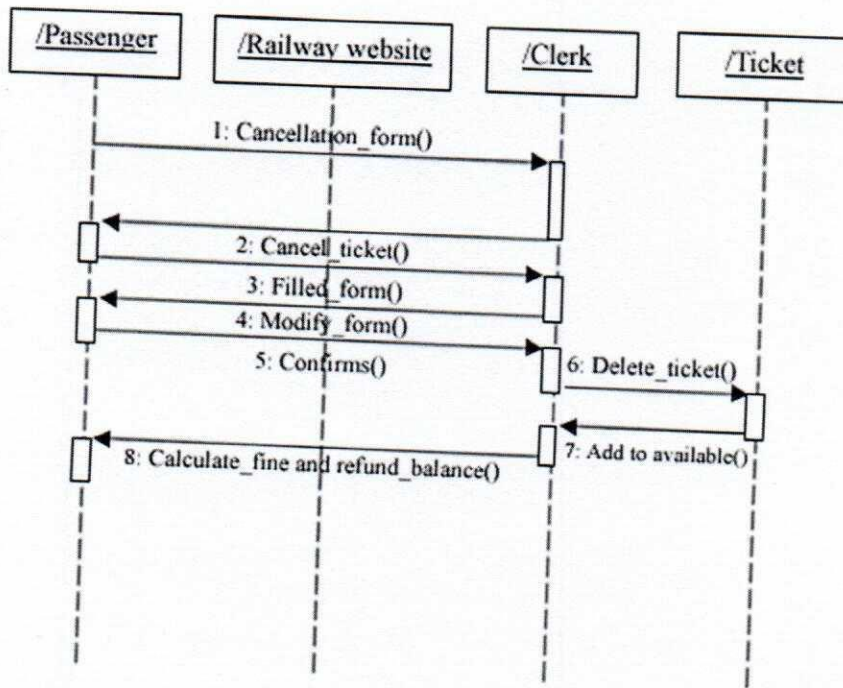
The class diagram in figure 3.8 is an illustration of the relationships and source code dependencies among classes in the unified modelling language. In this context, a class defines the methods and variables in an object, which is a specific entity in a program or the unit of code representing that entity.



**Figure 3.8 Class Diagram**

**3.12.2 Sequence Diagram:**

The Sequence diagram in figure 3.8 below shows object interactions arranged in time sequence. In particular it shows objects participating in the interaction and the sequence of messages exchanged.



**Figure 3.9 Sequence Diagram**

### 3.12.3 Use case Diagram:

The Use case diagram in figure 3.9 below is a description of set of sequence of actions. Graphically it is rendered as an ellipse with solid line including only its name. It depicts a behavioural diagram that shows a set of use cases and actors and their relationship in the Railway online reservation system. It is an association between the use cases and actors. An actor represents a real-world object.

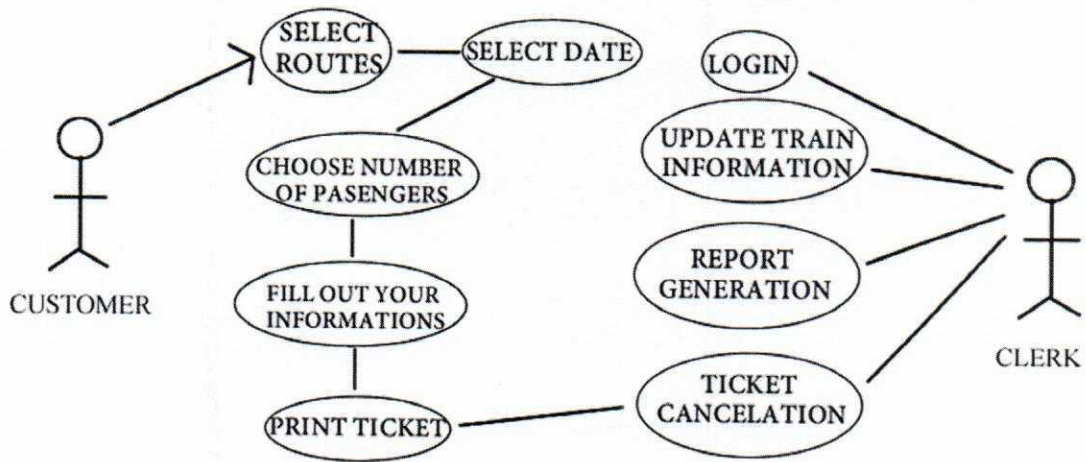


Figure 3.10 Use case Diagram



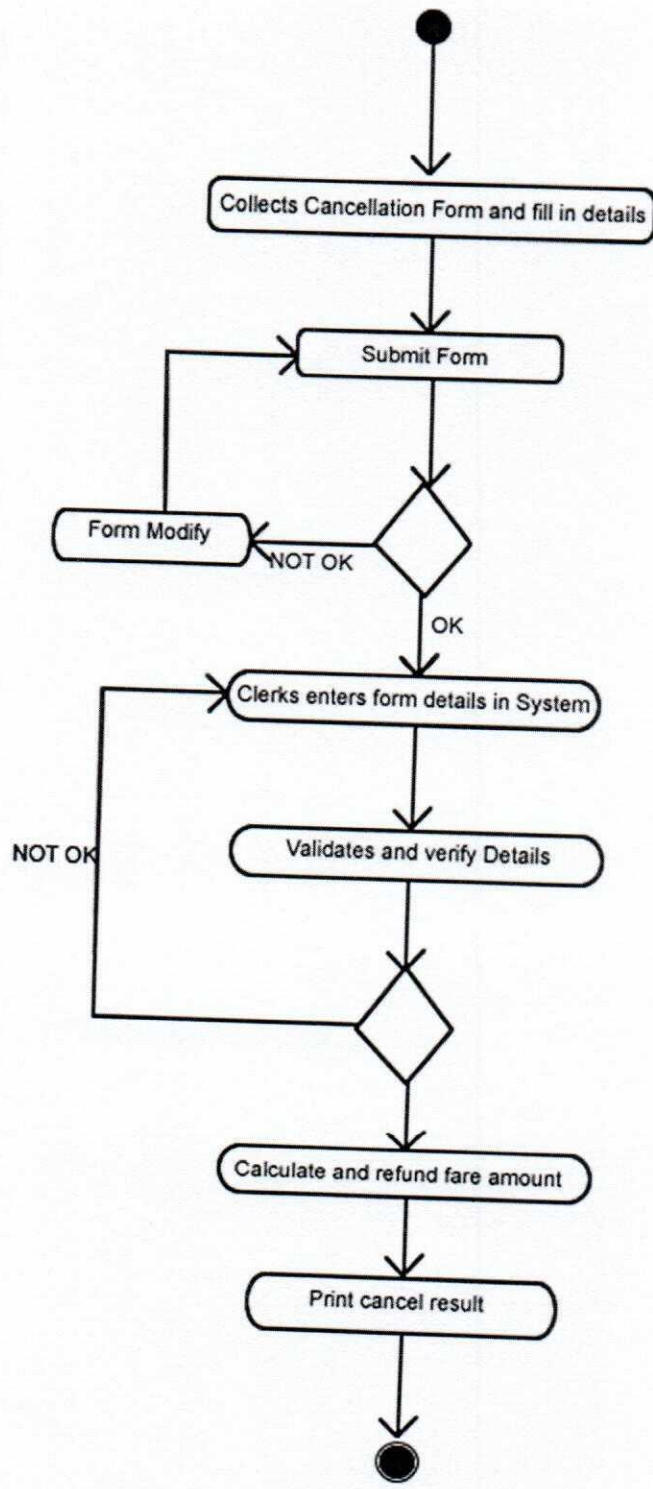
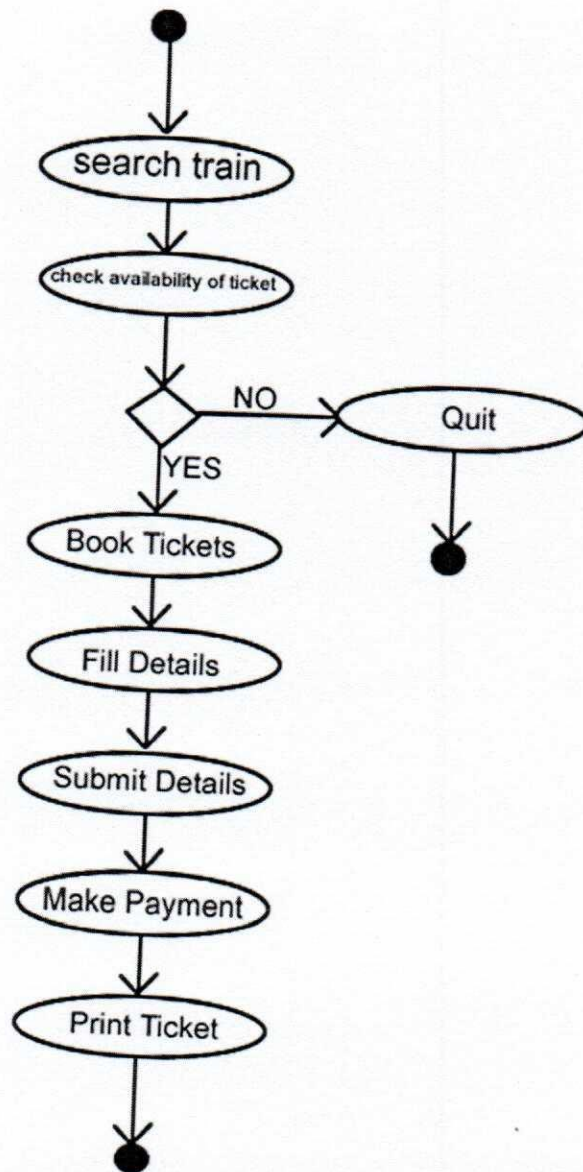


Figure 3.11 Activity Diagram for form Cancellation



**Figure 3.12 Activity Diagram for form Ticket Booking**

### 3.12.4 Collaboration Diagram:

The collaboration diagram also called a communication diagram or interaction diagram in figure 3.13 below is an illustration of the relationships and interactions among software objects in the unified modelling language.

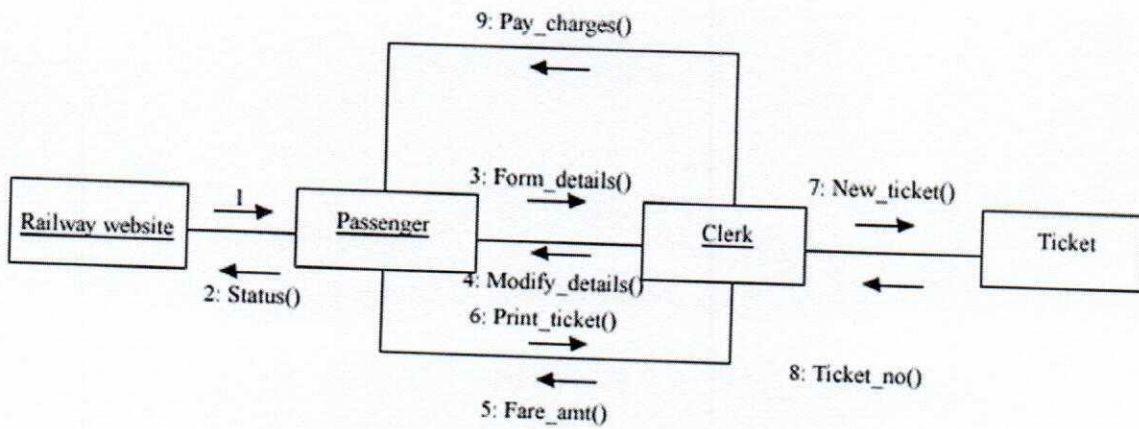


Figure 3.13 Collaboration Diagram for Ticket Booking

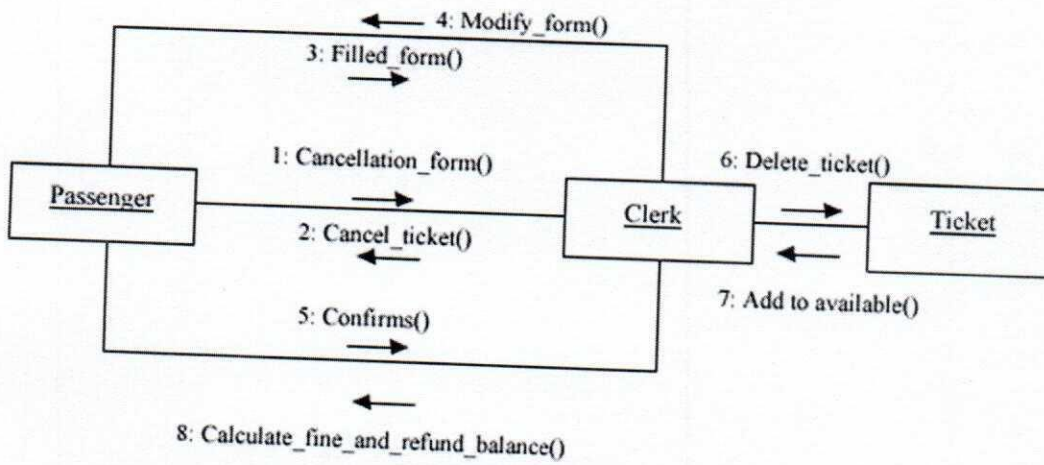


Figure 3.14 Collaboration Diagram for Ticket Cancellation

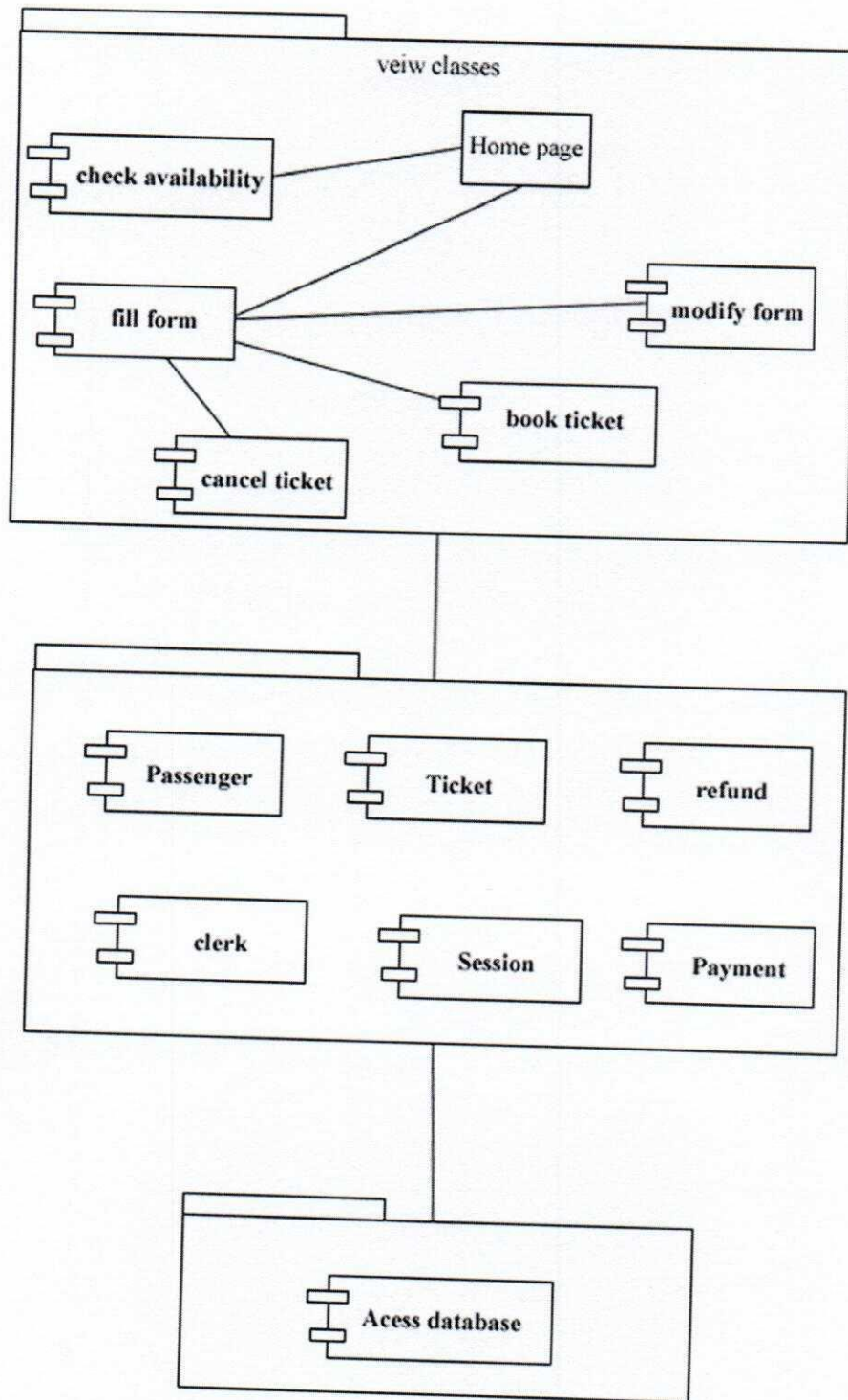


Figure 3.15 Component Diagram for railway reservation system

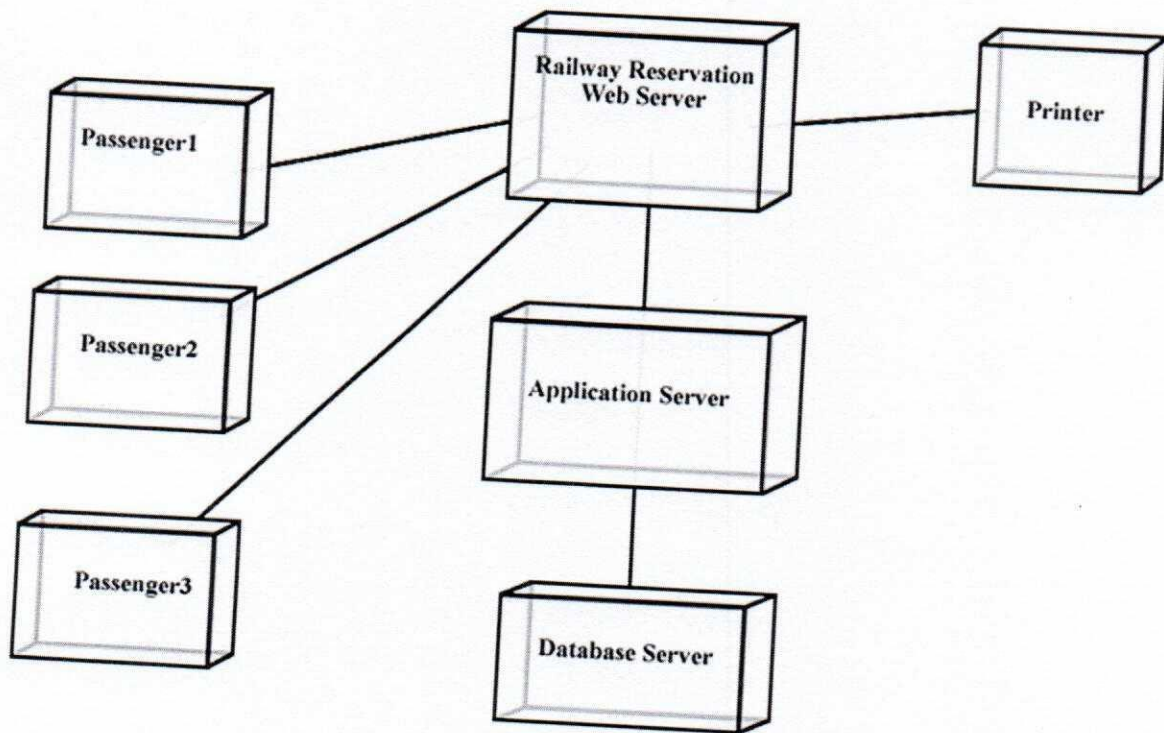


Figure 3.16 Deployment Diagram

## CHAPTER FOUR

### 4.0

## SYSTEM IMPLEMENTATION

### 4.1 System implementation and documentation

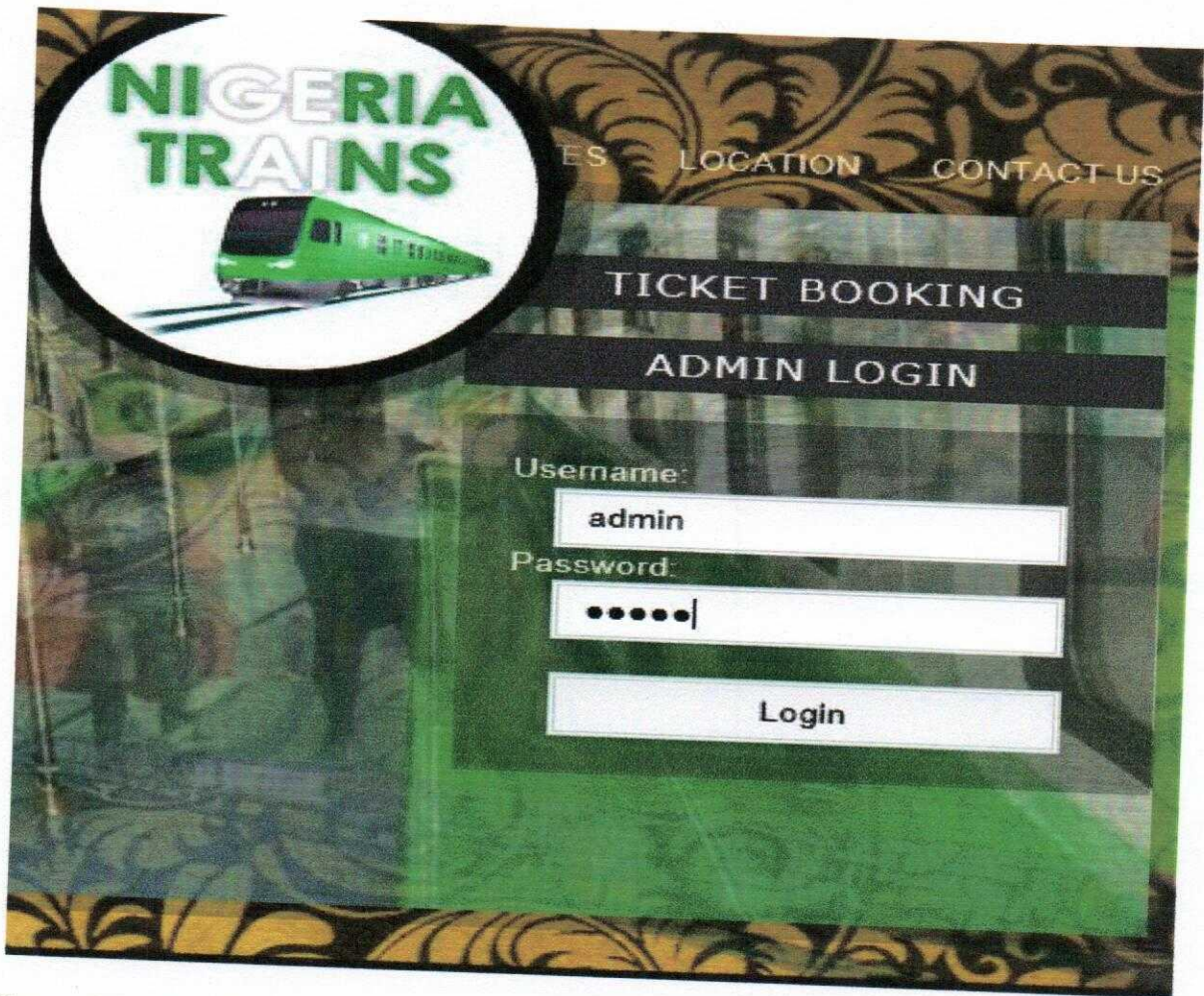
This describes how the system works and how best computers together with other resources may be applied to perform data storage, management and retrieval for decision making. System design and specification is very important in every software development. At this stage, I will put every factor into consideration while making this project system design. In the course of the design, the system has to be designed in a way that there will be a close relationship between the inputs and outputs. Also, the design format must be acceptable to the end users.

#### 4.1.1 Input design

In input design, user generated inputs are converted to a computer compatible format. The purpose of designing input is to make data accurate as possible. The first step in input design process is to organize the sources document. Then decision is made as to which media will accommodate data entry into the system. Below is the input interface in the proposed design and description on how to use the software;

#### **Administrator Page**

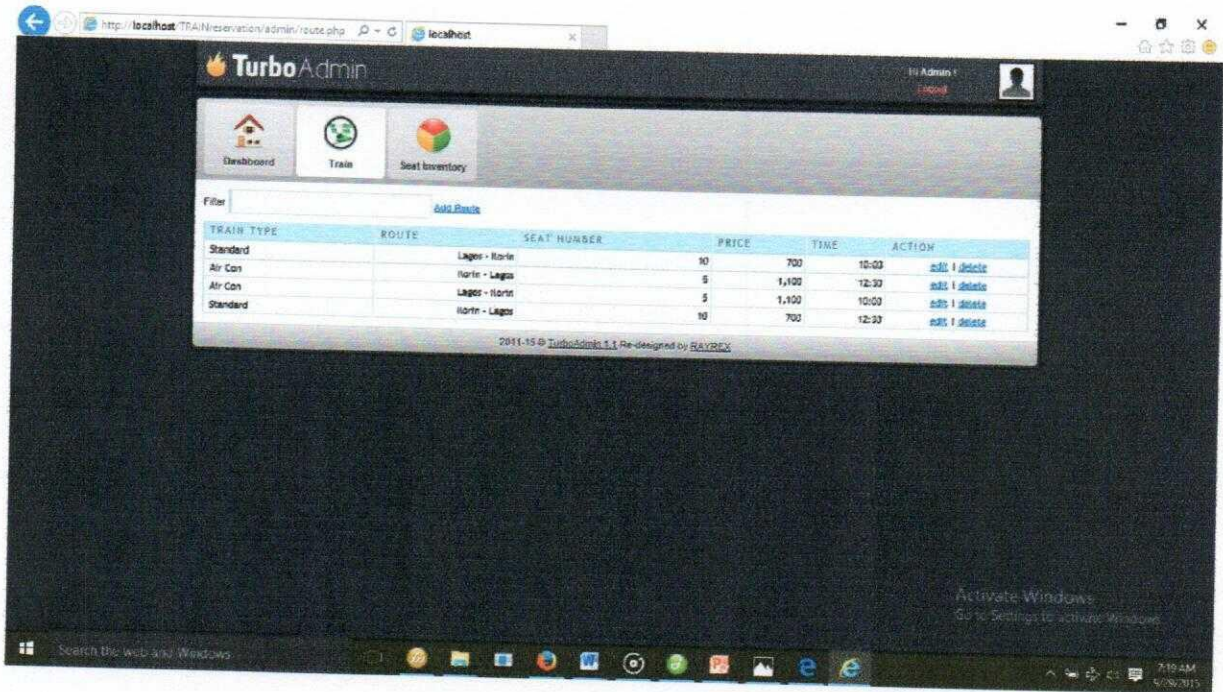
The Administrator Page below can only be access with username and password and this password is known by the administrator only. The administrator can add, delete and update the reservation system only when a valid username and password is provided.



**Figure 4.1 Administrator Login Page**

### **Add routes**

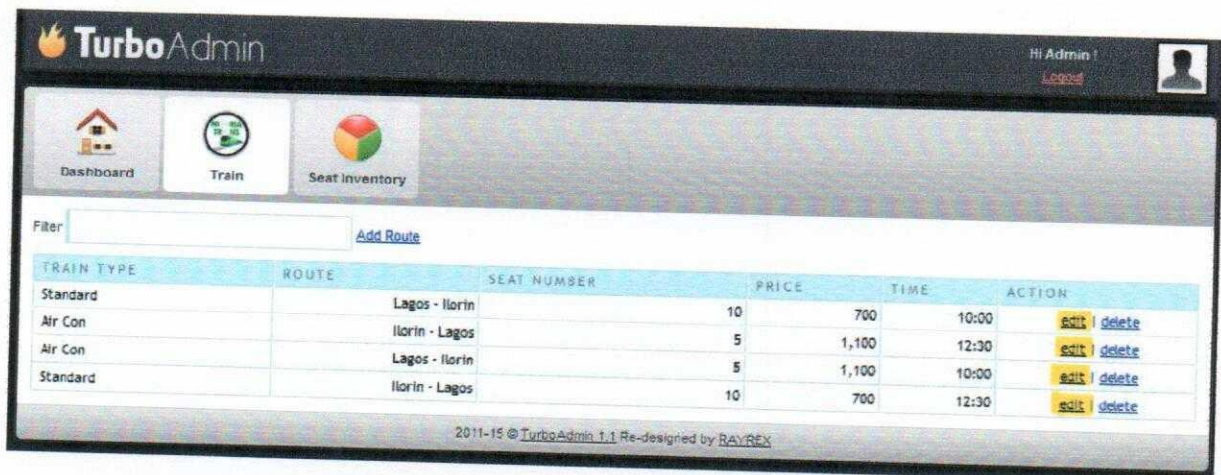
Here, only the admin have the authorized access to add a particular train routes to the system. The user has no access to this.



**Figure 4.2: Add Train Routes**

### Edit Train Routes

Here, only the admin have the authorized access to edit a particular Train Route and later store it in the system. The user has no access to this.

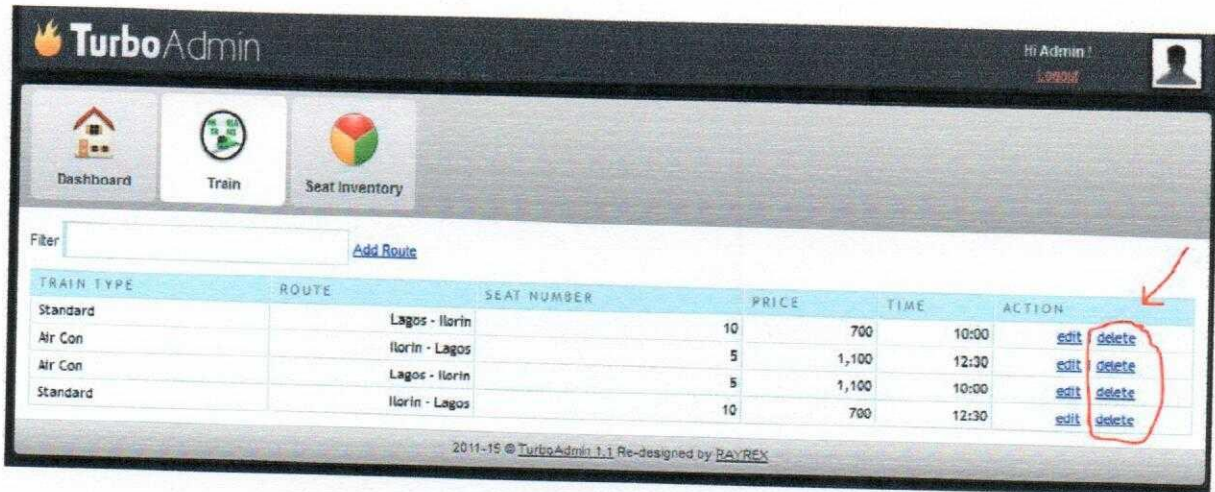


**Figure 4.3: Edit train routes**

### Delete Reservation Records

Here, only the admin have the authorized access to delete a particular farm record stored in the system. The user have no access to this except the admin.





**Figure 4.4: Delete train reservation records**

### Users Information form

Here, a new user ticket information can be added to the system. The user of the train gets registered by themselves not by the admin. For registration the member has to provide his/her user name, home address, cell phone number.

The screenshot shows a web browser window with the URL localhost/TRAINreservation/selectset.php. The form contains the following fields:

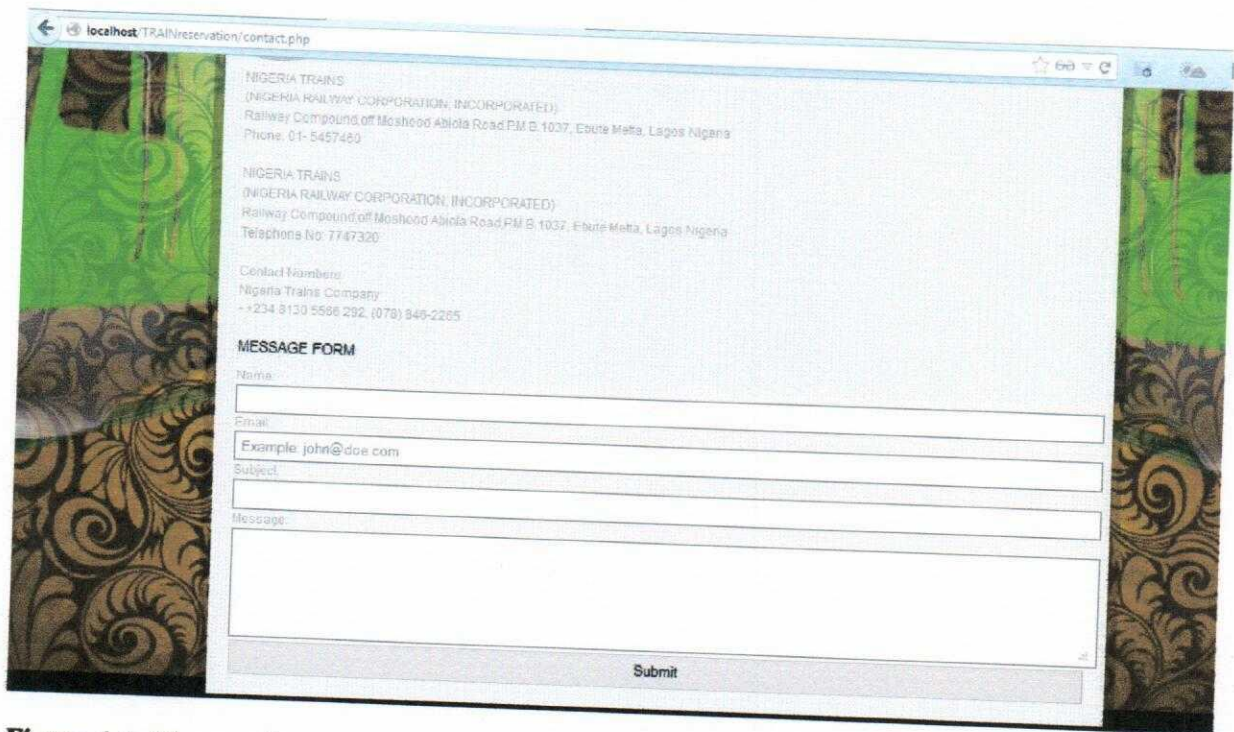
- Seat Number:** 1. (Auto Generated [view seat](#))
- First Name:** Enter first name
- Last Name:** Enter last name
- Address:** Enter Address
- Contact:** Enter Contact Number

A **Confirm** button is located at the bottom of the form.

**Figure 4.5: User information form**

### Messageform

With the below form any user who come across this website can send his/her comment or recommendation about this software to the administrator.



**Figure 4.6: Message Form**

#### **4.1.2 Output design**

This is the area that deals with the description of the input and output of the new or proposed system to be implemented. The output design used in this design are shown below;

#### **Home Page**

This is the first interface of the Railway Online Reservation System, it provides the basic page where user and admin can click on to access the railway reservation system.

The home, History, Routes, location, and Contact us sections are entailed in this page. Both the admin and the users of the system can access the home page of the Railway Online Reservation System as it has been authorized and authenticated for use.

Below is the screen shot of the homepage of the Railway Online Reservation System.



Figure 4.7 Home page

### Data Storage Interface

After the data is entered into the system, it is stored and can be retrieved at any time using the display functionality.

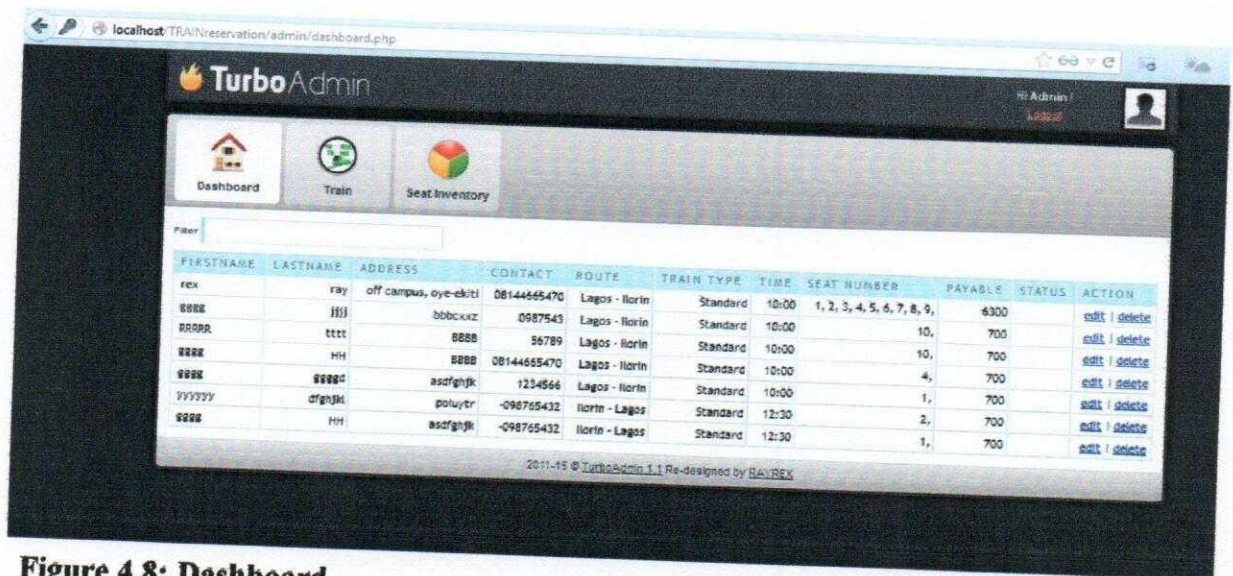


Figure 4.8: Dashboard

## Contact us Page

This page provides few about the developer of farm management information system software. Both user and admin have access to the contact us page of the farm management information system.

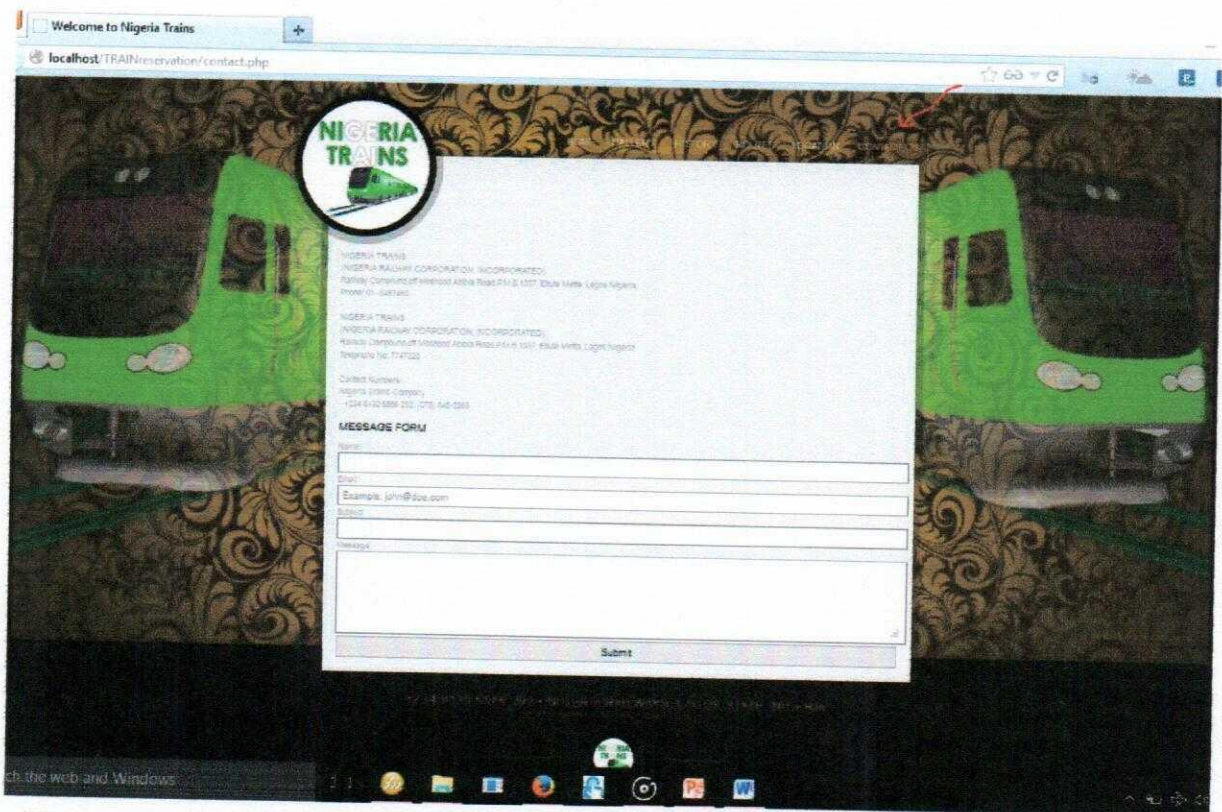
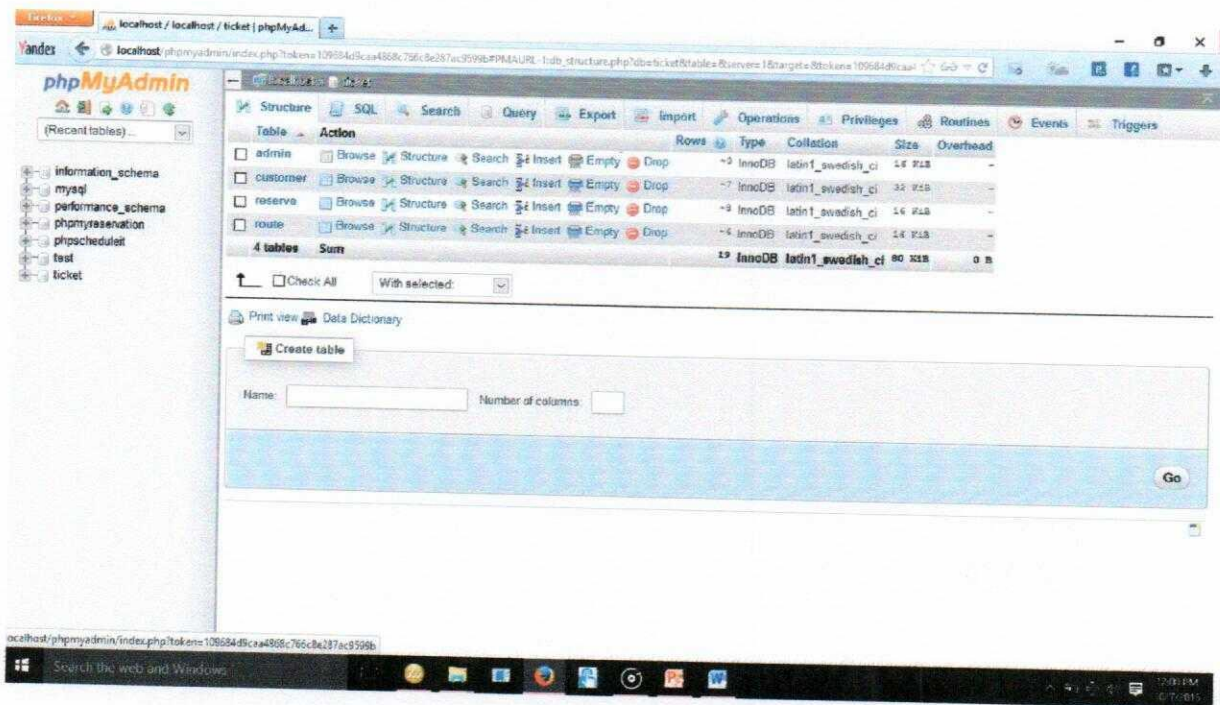


Figure 4.9: Contact us Page

### 4.1.3 Database structure

Files held in this project are made up of different data types. These types are integer, varchar, text, date/time, etc. some of the files used are designed and linked with database. Also in the project design, MySQL database was used.



**Figure 4.10: Database**

#### 4.1.4 Procedure design

The procedural design describes the system generally. It describes the various main programs in the system as well as the relationship that exist between all subprograms included. The procedural designs in this new system are of 4 menus (home, routes, location, contact us) of which each menu has its sub menu. The application also contains several modules of which each module has its own specific function. The purpose of dividing the program into modules is because it enhances maintainability, readability and easy debugging.

#### 4.1.5 Steps on how to use the system

In order for the proposed system to be used on any computer system it takes the following steps;

- i. Boot the system
- ii. Copy the folder to www inside WAMP folder of the drive C: after WAMP server is installed onto the system.
- iii. Open any browser on the system (Microsoft internet Explorer, Mozilla Firefox, Netscape Navigator, Opera, Flock, Safari etc.)

- iv. Type `http://localhost/TRAINreservation/` on the address bar and press the return key or enter key.

## **4.2 System implementation**

### **4.2.1 Choice of programming language**

The requirement of the research work demands that a capable programming language be used for its implementation. Hence, HTML(Hypertext markup Language), CSS (Cascading stylesheet), and PHP(Hypertext Pre-processor) was chosen, it was selected because it offers Rapid Application Development (RAD) features that enables software developers to put up visually appealing user interface design in less time. They include several features to help user develop applications that access data, the data source configuration wizard simplifies connecting your application to data in database. The code Editor has several enhancements, such as word wrap, incremental search, code outlining, and collapse to definition, line numbering, colour printing and shortcuts. Finally it has powerful debugging facility that provides useful hints and suggestion for error handling.

### **4.2.2 Hardware support**

The software designed needed the followings hardware for an effective operation of the newly designed system.

- A system running on Pentium 2 or higher processor
- The random access memory (RAM) should be at least 512mb.
- Enhanced keyboard.
- At least 20 GB hard disk.
- V.G.A or a colour monitor.

### **4.2.3 Software support**

The software requirements includes:-

- i. A window 98 or higher version for faster processing.
- ii. MySQL database
- iii. Micromedia dreamwaver and Wamp Server.

### **4.3 Implementation and Testing**

#### **4.3.1 Implementation**

Implementation is a very important aspect in the development of any computerized system, and this also applies to the development of the online railway reservation system.

Pro-development Implementation usually involves two main steps, these are;

- i. **System Construction:** The system is built and tested to make sure it performs as designed.
- ii. **Installation:** Preparation is made to support the installed system. This involves associated documentation

Under system construction, the main task is testing. In the next section is a detailed description of how this was carried out in the design of online railway reservation system;

#### **4.3.2 Testing:**

Testing is critical for a newly developed system as a prerequisite for it being put into an environment where the end users can use it. Exhaustive testing is conducted to ensure accuracy and reliability and to ensure that bugs are detected as early as possible. In the process of designing the online railway reservation systems, three levels of testing were conducted, namely, unit testing, integration testing and system testing.

#### **Unit Test**

Unit test is where the system is tested partially and independently, component by component, to ensure that particular portion or module is workable within it. In the development of the online railway reservation system, each component was tested independently before finally integrating each of them into one system. This test was carried

out in other to verify that every input of data was assigned to the appropriate tables and fields. Most of the modules were rather similar and therefore required a rather easy reusable testing process. However, the passenger (user) accounts module accessible to the system administrator was one of the unique components that needed to be carefully tested in the online railway reservation system. This involved testing each module. This was necessary to ensure that everything is working fine independently.

### **Integration Test**

Integration test is where a combination of several portions or components/sub components of programs are being tested sequentially and continuously. At this stage, all the system components were integrated and a test was based on how they worked together example is the ability of the admin to access reservation made by the passenger, and ability to confirm the validity of the seat and ticket number. This involved observing the interaction of the database and the interfaces. After which the system test followed.

### **System Test**

A system normally consists of all components that makeup the total system to function. It is required to ensure the smooth running of the system as a whole, and it should perform as expected and as required. Here, technical and functional testing was performed. The technical testing involved the process of testing the systems compatibility with the hardware, operating system, data integrity in the database and user authorization access rights. Functional testing was also carried out to establish how the system would function in its intended working environment.

### **User Acceptance Test**

Due to a few constraints, this part of testing was not done, however, after the oral presentation of this project work, I intend to review the system with the intended system users so as to analyse acceptability and usability and also to identify areas that may require



modification before the system can fully be commissioned for use by the Nigeria railway corporation (selected train station for the testing).

#### **4.4 System documentation**

The software (Application program) was written using PHP, HTML and CSS and can be run on window operating system not less than windows XP. To run the system, the folder that contains the application program is open and the form by selecting any of the option provided. Also good maintenance should be adopted to see that the system is continuously and correctly working for long period of time.

##### **4.4.1 Program documentation**

The need for documentation of a program arises from the fact that the program may develop problems usually referred to as 'bugs' long after it had been written. In this project work a detailed documentation is given for each module, therefore will ease the maintenances of the project work.

##### **4.4.2 Operating the system**

Before this project work can be used it requires the user to be oriented by the programmer, therefore, will enable the user to be familiar with the modules contained in the program and the function of each modules are expected to be explained in details by the programmer. Before the running of the program, it has to be installed on a PC and launched by the user, and then continues all orientated modules.

##### **4.4.3 Maintaining the system**

Maintenance is any activities carried out after the implementation of the new system to make sure that the system is correctly and constant running. This can be any of the following types of maintenance.

- (a) Corrective maintenance: This is done to correct and defect that discover in the course of using the new system to keep the system in tune with day to day function.
- (b) Adaptive maintenance: This is done to make sure that the system is not obsolete and adapt to any new systems of technology.
- (c) Preventive Maintenance: This is a kind of maintenance adopted for continuous improvement in new system without waiting for the failure to occur or for the user to change. This is adopted to prevent the occurrence of failure.

#### **4.5 Evaluations of the System**

In an attempt to evaluate the designed system, it is important that we look back at the predefined functionalities, goals and objectives and analyse those in relation to the expectations met by the system. The online railway reservation system was evaluated based on the set of predefined objectives and expected functionalities it was able to fulfill. The online railway reservation system was designed to facilitate efficient records management in passenger reservation by providing an efficient, reliable computerized passenger reservation information system and after a careful evaluation process; it met a considerable portion of those expectations.

The main objective was to implement system that enables faster and more efficient storage, retrieval and convenience to passenger and the staff of the railway corporation. As far as this is concerned, the system met this expectation by giving direct benefit to the railway corporation such as fast records retrieval. It also included functionalities that enable all data entrants to access the system web base with the assumption that a client-server architecture is in place, retrieve records on demand and execute important reports to support daily reservation tasks.

Fundamentally, the effectiveness of this project depended on meeting the project's specific objectives which were as follows; ease stress on customer when making reservation, database of available train and train stations, to ensure system issues passenger name record. All the objectives were met by the system, to a certain extent; Analysis was successfully completed. This evaluation is based on the fact that data requirements were collected that successfully enabled the design and development of the system.

The system design and development was carried out in a systematic manner and was based on user requirements defined by the end users. The design objectives of creating an efficient train reservation system was further accomplished with the creation of add, delete, search and edit functionalities in the system that not only enable computerized but rather efficient, reliable and fast data entry. All these functionalities possess a relatively high level of accuracy. In evaluating this objective in relation to the system's performance, it would therefore be accurate to state that it was achieved to a large extent.

Still while evaluating the system design and performance, the system enables the synchronization of records through its server-client architecture with a single database. Therefore data entered from one recording station will be seen on another recording station using the same system.

## CHAPTER FIVE

### 5.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Limitations of the System

Throughout the development of the Railway Online Reservation System, I overlooked few areas. Some of these limitations can be presented as follows;

##### **Usability**

With regard to its use, the system only caters for English speakers. The GUI and associated documentation is in English. This may present a problem for non- English speaking users

##### **Security**

The system also does not cater for the automatic back up of the data in the database. This may present a security problem in the event of data loss.

#### 5.2 Conclusion

In Conclusion, from a proper analysis and assessment of the designed system, it can be safely concluded that the system is an efficient, usable and reliable railway online reservation. It is working properly and adequately meets the minimum expectations that were set for it initially. The new system is expected to give benefits to the commuters in terms of increased overall productivity, performance and efficient records management.

#### 5.3 Recommendations/Future Research

As well as addressing the limitations presented in Section 5, there is scope for work to further the functionality and usefulness of this project. I would therefore make the following recommendations for future enhancements to the system.

### **Widening the scope**

Given the limited amount of time given to the developer, the project's scope was rather limited to only record Railway information system. To make a more integrated comprehensive system that covers the entire railway online reservation.

### **Increased accessibility**

The system can also be further enhanced so that the commuters in the countries can access their information online in a secure manner.

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## APPENDIX

```
<?php
    //Start session
    session_start();

    //Unset the variables stored in session
    unset($_SESSION['SESS_MEMBER_ID']);
?>

<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="Content-Type" content="text/html; charset=UTF-8" />
<title>Welcome to Nigeria Trains</title>
<link rel="stylesheet" type="text/css" href="xres/css/style.css" />
<link rel="icon" type="image/png" href="xres/images/favicon.png" />
<!--[if IE 6]><style type="text/css"> * html img { behavior: url("xres/iepngfix.htc")
}</style><![endif-->
<script type="text/javascript" src="xres/js/saslideshow.js"></script>
<script type="text/javascript" src="xres/js/slideshow.js"></script>
<script src="js/jquery-1.5.min.js" type="text/javascript" charset="utf-8"></script>
<script src="vallenato/vallenato.js" type="text/javascript" charset="utf-8"></script>
<link rel="stylesheet" href="vallenato/vallenato.css" type="text/css" media="screen"
charset="utf-8">

<script type="text/javascript">
$( "#slideshow > div:gt(0)" ).hide();

setInterval(function() {
    $('#slideshow > div:first')
```

```

        .fadeOut(1000)
        .next()
        .fadeIn(1000)
        .end()
        .appendTo('#slideshow');
    }, 3000);
</script>
<!--sa calendar-->
    <script type="text/javascript" src="js/datepicker.js"></script>
<link href="css/demo.css" rel="stylesheet" type="text/css" />
<link href="css/datepicker.css" rel="stylesheet" type="text/css" />
    <script type="text/javascript">
    //
    /*
</pre>
</div>
<div data-bbox="360 515 791 547" data-label="Section-Header">
<h2>A "Reservation Date" example using two datePickers</h2>
<hr style="border-top: 1px dashed black;"/>
</div>
<div data-bbox="358 574 486 596" data-label="Section-Header">
<h3>* Functionality</h3>
</div>
<div data-bbox="357 603 554 628" data-label="Section-Header">
<h4>1. When the page loads:</h4>
</div>
<div data-bbox="118 644 850 722" data-label="List-Group">
<ul style="list-style-type: none;">
<li>- We clear the value of the two inputs (to clear any values cached by the browser)</li>
<li>- We set an "onchange" event handler on the startDate input to call the setReservationDates function</li>
</ul>
</div>
<div data-bbox="350 727 602 752" data-label="Section-Header">
<h4>2. When a start date is selected</h4>
</div>
<div data-bbox="109 761 789 854" data-label="List-Group">
<ul style="list-style-type: none;">
<li>- We set the low range of the endDate datePicker to be the start date the user has just selected</li>
<li>- If the endDate input already has a date stipulated and the date falls before the new start date then we clear the input's value</li>
</ul>
</div>
<div data-bbox="343 880 594 908" data-label="Section-Header">
<h3>* Caveats (aren't there always)</h3>
</div>
<div data-bbox="104 920 818 945" data-label="List-Group">
<ul style="list-style-type: none;">
<li>- This demo has been written for dates that have NOT been split across three inputs</li>
</ul>
</div>
```

```

    */
    function makeTwoChars(inp) {
        return String(inp).length < 2 ? "0" + inp : inp;
    }

    function initialiseInputs() {
        // Clear any old values from the inputs (that might be cached by
        the browser after a page reload)
        document.getElementById("sd").value = "";
        document.getElementById("ed").value = "";
        // Add the onchange event handler to the start date input
        datePickerController.addEvent(document.getElementById("sd"), "change",
        setReservationDates);
    }

    var initAttempts = 0;

    function setReservationDates(e) {
        // Internet Explorer will not have created the datePickers yet so
        we poll the datePickerController Object using a setTimeout
        // until they become available (a maximum of ten times in case
        something has gone horribly wrong)
        try {
            var sd =
            datePickerController.getDatePicker("sd");
            var ed =
            datePickerController.getDatePicker("ed");
        } catch (err) {
            if(initAttempts++ < 10)
            setTimeout("setReservationDates()", 50);
        }
        return;
    }

```

```

// Check the value of the input is a date of the correct format
var dt = datePickerController.dateFormat(this.value,
sd.format.charAt(0) == "m");

return // If the input's value cannot be parsed as a valid date then

if(dt == 0) return;

// At this stage we have a valid YYYYMMDD date
// Grab the value set within the endDate input and parse it using
the dateFormat method

// N.B: The second parameter to the dateFormat function, if
TRUE, tells the function to favour the m-d-y date format

var edv =
datePickerController.dateFormat(document.getElementById("ed").value, ed.format.charAt(0)
== "m");

// Set the low range of the second datePicker to be the date
parsed from the first

ed.setRangeLow( dt );

// If theres a value already present within the end date input and
it's smaller than the start date

// then clear the end date value
if(edv < dt) {
    document.getElementById("ed").value = "";
}
}

function removeInputEvents() {
    // Remove the onchange event handler set within the function
initialiseInputs

    datePickerController.removeEvent(document.getElementById("sd"), "change",
setReservationDates);
}

```

```
datePickerController.addEvent(window, 'load', initialiseInputs);
datePickerController.addEvent(window, 'unload', removeInputEvents);
```

```
//]]>
```

```
</script>
```

```
</head>
```

```
<body>
```

```
<div id="wrapper">
```

```
  <div id="header">
```

```
    <h1><a href="index.php"></a></h1>
```

```
    <ul id="mainnav">
```

```
      <li class="current"><a href="index.php">Home</a></li>
```

```
      <li><a href="gallery.php">Gallery</a></li>
```

```
      <li><a href="history.php">History</a></li>
```

```
      <li><a href="routes.php">Routes</a></li>
```

```
      <li><a href="location.php">location</a></li>
```

```
      <li><a href="contact.php">Contact Us</a></li>
```

```
    </ul>
```

```
  </div>
```

```
<div id="content">
```

```
  <div id="rotator">
```

```
    <ul>
```

```
      <li class="show"></li>
```

```
      <li></li>
```

```
      <li></li>
```

```
</li>
```

```
<div id="logo" style="left: 600px; height: auto; top: 23px; width:
260px; position: absolute; z-index:4;">
```

```
<h2 class="accordion-header" style="height: 18px;
margin-bottom: 15px; color: rgb(255, 255, 255); background: none repeat scroll 0px 0px
rgb(53, 48, 48);">Ticket Booking</h2>
```

```
<div class="accordion-content" style="margin-bottom:
15px;">
```

```
<form action="selectset.php" method="post"
style="margin-bottom:none;">
```

```
Route: <span style="margin-right: 11px;">Select
```

```
<select name="route" style="width: 191px;
margin-left: 15px; border: 3px double #CCCCCC; padding:5px 10px;">
```

```
<?php
include('db.php');
$result = mysql_query("SELECT * FROM
route");
while($row = mysql_fetch_array($result))
{
```

```
echo '<option
value="'. $row['id']. "'>';
echo $row['route']. '
:'. $row['type']. ' :'. $row['time'];
echo '</option>';
```

```
}
?>
</select>
</span><br>
<span style="margin-right: 11px;">Date:
```

```
highlight-days-67 range-low-today" name="date" id="sd" value="" maxlength="10"
readonly="readonly" style="width: 165px; margin-left: 15px; border: 3px double #CCCCCC;
padding:5px 10px;"/>
```

```
</span><br>
```

Passenger:

```
<span style="margin-right: 11px;">No. of
```

```
margin-left: 15px; border: 3px double #CCCCCC; padding:5px 10px;">
```

```
<option>1</option>
```

```
<option>2</option>
```

```
<option>3</option>
```

```
<option>4</option>
```

```
<option>5</option>
```

```
<option>6</option>
```

```
<option>7</option>
```

```
<option>8</option>
```

```
<option>9</option>
```

```
</select>
```

```
</span><br><br>
```

```
style="height: 34px; margin-left: 15px; width: 191px; padding: 5px; border: 3px double
rgb(204, 204, 204);" />
```

```
<input type="submit" id="submit" value="Next"
```

```
</form>
```

```
</div>
```

```
<h2 class="accordion-header" style="height: 18px;
margin-bottom: 15px; color: rgb(255, 255, 255); background: none repeat scroll 0px 0px
rgb(53, 48, 48);">Admin Login</h2>
```

```
bottom: 15px;">
```

```
<div class="accordion-content" style="margin-
```

```
style="margin-bottom:none;">
```

```
<form action="login.php" method="post"
```

```
<input type="text" name="username" style="width: 165px; margin-left: 15px; border: 3px
double #CCCCCC; padding:5px 10px;" /></span><br>
```

```
<span style="margin-right: 11px;">Username:
```

```
<span style="margin-right: 11px;">Password:
<input type="password" name="password" style="width: 165px; margin-left: 15px; border:
3px double #CCCCCC; padding:5px 10px;" /></span><br><br>
```

```
<input type="submit" id="submit"
class="medium gray button" value="Login" style="height: 34px; margin-left: 15px; width:
191px; padding: 5px; border: 3px double rgb(204, 204, 204);" />
```

```
</form>
```

```
</div>
```

```
</div>
```

```
</div>
```

```
</div>
```

```
<div id="featured">
```

```
<div id="items">
```

```
<div class="item"> <a href="main-course.php"></a>
```

```
<h3><a href="main-course.php">ONLINE TICKETS</a></h3>
```

```
<p><a href="#"><strong>Lagos Train</strong><br />
```

```
Log in and experience<br />
```

```
New Train reservation<br /> specials today!</a></p>
```

```
</div>
```

```
<div class="item"> <a href="lodging.php"></a>
```

```
<h3><a href="lodging.php">New Route</a></h3>
```

```
<p><a href="lodging.php"><strong>Lagos to Ilorin Vice versa</strong><br />
```

```
Travelling in the day/evening in our 1st class suite, fully air
conditioned. </a></p>
```

```
</div>
```

```
<div class="item" style="width: 860px;">
```

```
<iframe
```

```
src="//www.facebook.com/plugins/likebox.php?href=http%3A%2F%2Fwww.facebook.com
%2F224961217554604%3Fref%3Dts%26fref%3Dts&width=800&height=290&am
p;show_faces=true&colorscheme=dark&stream=false&border_color&he
```



