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CONTEMPORARY APPROACH TO ENHANCED ROAD TRANSPORT SYSTEM IN NIGERIA THROUGH THE APPLICATION OF IT-BASED (ONLINE) BUS TICKETING AND PAYMENT SYSTEM

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ABSTRACT

The world is trending towards IT based technologies and Nigeria as a country is not left behind. The nature of transport needs makes it a key player in any viable economy. Owing to the possibilities that IT offers and the need for improved services (ticketing and otherwise) in the transport sector it is proper to look at what exists currently in the country and what steps could be taken based on current findings. This study looks at the existing ticketing systems, makes comparison with contemporary approaches to ticketing, draws information from other materials, journals, investigations and makes recommendations based on the findings. It further suggest a theoretical model for the Nigerian road transport system.

Key Words: Contemporary approach, Road transport system, IT-based bus ticketing and payment system

INTRODUCTION

Contemporary approach involves using the state-of-the art means of transportation to overcome those inherent problems of the ancient road transport system. This modern means of transportation incorporates Internet facilities to provide access to the users at the remote areas. Transportation could simply be defined as the movement of people and goods from one location to another. Throughout history, the economic wealth and military power of people or nation have been closely tied to efficient methods of transportation. Transportation provides access to natural resources and promotes trade, allowing a nation to accumulate wealth and power. Transportation system and the routes they use have greatly influenced both how and where people live. Reliable

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transportation allows a population to expand throughout a country's territory and to live comfortably in remote areas far from factories and farms.

Transportation is vital to a nation's economy so reducing the cost of transporting natural resources to production sites and moving finished goods to the market is one of the key factors in economic competition. Transportation is usually classified by the medium in which the movement occurs, such as land, air, water or pipeline. Within each of the three media, many different methods are used to move people and goods from place to place. Pipelines are used mainly for transportation of liquids or gases over long distances.

BACKGROUND OF THE STUDY

Sustenance in a highly competitive transport industry harbors on patronage. This patronage is dependent upon the type and quality of service offered to her customer; the watchwords are diversity and quality, both of which are interrelated and interdependent on each other. The question is how can an organization achieve this? Diverse emphasizes on the ability of the organization to offer various services to the customer while the quality relates to the efficiency and effectiveness of these services. This need is even enunciated in a transport company (ABC Transport) quarterly publication of August 2004 where the Assistant Manager of Cargo Operations wrote "…these steps; managing the spirit of innovation, performance and consolidation are necessary now that the competitors have taken advantage and dangerous positions, even ready to take advantage of our facilities and convert them to sustainable opportunities." With the advent of the Internet in Nigeria, there's being much major advancements in our Information Technology. Among the socio-economic effects, the Internet has spurred some forms for business transactions and exchange coined as Electronic Commerce. Though a recent development has already being internet banking system which many banks have initiated to enhance the service offered to their customers and also a medium of attracting new ones. So transport sector as an organization could integrate this technology like the banking sector, its services would definitely reap the bountiful opportunities and unique features it offers.

Aims of the Research

The aims of this system are:

- ✓ To provide a web-based buying bus ticket functions. Customer can buy bus ticket through the online system and no need to queue up to buy bus ticket in the counter.
- ✓ To provide anytime anyplace service for the customer. Customer can buy bus ticket 24 hours a day, 7 days a week over the Internet.

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- ✓ To enable customer to check the availability of the bus ticket online. Customer can check the time departure and arrival for every bus through the system.
- ✓ To ease the bus ticket payment by online. Customer has to pay for the bus ticket by Credit/Debit Card.
- ✓ To minimize the number of staff.

Boundaries of the Research

IT-based bus ticketing and payment system is an easy-to-use self-service system which enables the customer buy bus ticket online and pays for the bus ticket through Credit/Debit Card. The application is deployed in one of the Nigerian most popular transport company called ABC Transport Company (Your transport to service). The company uses the software to reserve seats for customers from far and near to the company and captures customer information. It will equally be used to schedule time for bus departure from its origin and arrival to its destination. It also allows customer to pay and print receipt online.

Why This Reseach Is Very Important?

This study would spur up a greater desire for an improvement in business strategies and services rendered in a bid to further enhance the organizations' performance. It is important to customers because they can check availability of the bus tickets, and pay for the bus ticket online. E-ticket is different from the traditional paper ticket because e-ticket is safer, faster, reliable and maybe cheaper. The profit of any transportation company that uses this system will be increased because the online system will attract more customers and no need to hire many staffs at the counter to sell bus ticket because ticket can be sold efficiently online. It should also assist the branch manager in calculating their daily collections and generating reports. In the long-term operation, the financial turnout from the sales of tickets is expected to increase as passengers' satisfaction is almost guaranteed with the availability of accurate information, shorter queues and better services.

REVIEW OF RELATED WORK

Introduction

The internet has become an integral part of a modern society helping revolutionize how businesses are conducted and our personal lives as well in addition to creating more jobs and transfer of technology by teaching new skills. This chapter defines facts and finding on Online Automated reservation system for transportation.

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IT-based (Online) bus ticketing and payment system

IT-based bus ticketing and payment system is synonymous to an online reservation system or computer reservations system (CRS) or central reservation system, Wikipedia, 2011. IT-based bus ticketing and payment system is a computerized system used to store and retrieve information and conduct transactions related to bus travel. This idea of IT-based bus ticketing and payment system was originally designed and operated by airlines operators before its use was later extended to road transport travel agencies. Major CRS operations that book and sell tickets for multiple airlines are known as global distribution systems (GDS). Airlines have divested most of their direct holdings to dedicated GDS companies, who make their systems accessible to consumers through Internet gateways. Modern GDSes typically allow users to book hotel rooms and rental cars as well as airline tickets. They also provide access to railway reservations in some markets although these are not always integrated with the main system. Based on Pedone (2001), widespread use of Internet has led to the emergence of a variety of electronic services, e-services. Electronic ticket, or e-ticket, is an example of such a class of e-services. E-tickets give evidence to their holders to have permission to enter a place of entertainment, use a means of transportation, or have access to some Internet services. Users can get the e-tickets by purchasing them from a web server, or simply receiving from a vendor, or from another user who previously acquired them. E-tickets can be stored in desktop computers or personal digital assistants for future use.

Advantages of IT-based bus ticketing and payment system

Quicker as the individual does not need to contact the airline, the bus company, and the hotel all separately

- Convenient as it can be done by anyone and anywhere with an internet connection
- Customers can compare bus, flight, hotel, and rental car rates
- Saves the time and trouble to find a suitable travel agent
- Cheaper fares/flying rates as some websites give lower rates for certain packages. Cheaper rates are also used to attract potential customers.

Road Transportation in Nigeria

Road transport (British English) or road transportation (American English) is transport on roads of passengers or goods. A hybrid of road transport and ship transport is the historic horse-drawn boat. The first methods of road transport were horses, oxen or even humans carrying goods over dirt tracks that often followed game trails. Transportation is a requirement for every nation, regardless of its industrial capacity, population size, or technological development. Moving goods and people from one place to another is critical to maintain strong economic and political ties between regions in the same state. How that movement takes place can be unique to location and technological development, but the requirement remains. Transportation derives demand from

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the things that it moves—it is only a valid economic force if there are valuable things to transport. The 'products' moved through a transportation network could be grain silage, electronics, or business executives. The cost of moving things from one place to another, whether it is measured in currency, fuel, or animals, typically remains stable over time, meaning that the relative cost of transporting a product decreases as the value of the product being transported increases. This phenomenon becomes important when examining nations with weak economies. If the relative value of the goods transported is low, the cost overhead for transportation is high. The reason for the relatively high cost of transport—and the low value of the products moved—is partially self-fulfilling. Because there are few valuable products to transport, there will be no transportation infrastructure to transport them. Because there is no way to transport valuable products reliably and cheaply to places where they might be marketed, there is no incentive to produce valuable products. If there is a correlation between transport systems and economic strength, part of the reason for modern Nigeria's economic weakness is its lack of strong transportation architecture. The current state of Nigerian transportation is a product of fifty years of colonial rule and mismanagement and another forty of relative neglect under self-rule. Civilian governments were often under-funded and their priorities were on maintaining regional divisions instead of maintaining transportation networks. This policy may have been self-fulfilling; by reinforcing regional divisions the appeal of inter-region transport infrastructure was further reduced. While some of the handfuls of military governments were interested in developing better transportation systems, they were often long term pipe dream-like solutions that would be solved with the future's money. This is evident in the practice of "National Development Plans" that don't come to fruition (Falola, Toyin and S.A. Olarenwaju, 1989). In addition, there is an ever-increasing amount of stress on Nigerian transport systems as the demand for transport services rises. Finally, the Nigerian transport systems designed under colonial rule and maintained under civilian rule were poorly designed and are unable to scale up to meet greater demand, a design flaw which causes traffic congestion on roads, overstressed railways, faltering airfields, and mass-transport blind spots. This paper covers the origins of modern Nigerian transportation problems, covering the pre-colonial, colonial, and post-colonial developments and problems in Nigerian transportation technology and systems. Pre-colonial transportation and trade systems were limited to porter age over land by animals and humans, as well as on small boats over the many waterways through southern and central Nigeria. Nigerian states had extensive trade routes within their own territory, but also included moving goods across the desert to trade with North Africa and later to the coast to trade with Europeans. In this period, goods included gold, salt, slaves, groundnuts, and palm oil. Roads were maintained by local leaders using hired labor, or conscripted locals on the basis of age. The king of the state of Wawa insisted on maintaining his roads even in the middle of the rainy season when roads often turned to muck. He believed that poorly maintained roads were a sign of 'a careless, slothful,

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cowardly governor' and that roads 'of convenient width, smooth, and free from grasses,' were a sign of a populous and prosperous society (Falola, Toyin and S.A. Olanrewaju, 1989). However, these tracks were often winding and elliptical; they were described by one European visitor as, "infinitely devious, turning aside here to dodge a thorn branch grown across the track, here to avoid a pool of the last season's rain" (Falola, Toyin and S.A. olarenwaju, 1989). These footpaths were highly subject to weather, many paths would turn into swamps during the rainy season and bridges would wash away. European travelers remarked that on some paths during the rainy season, "scarcely a day passed without our having several times to wade through water or soft mud nearly up to our waists, the result being that our feet were scarcely ever dry."(Falola, Toyin and S.A. Olanrewaju, 1989). The primary vehicles of trade in pre-colonial Nigeria were pack animals and human porters. Favored pack animals in Nigeria were the camel and the donkey, each for different tasks and for different reasons. The camel was ideally built for crossing the Sahara Desert into North Africa; it could travel for weeks without water and a week without food and it could carry five times the load of a donkey and ten times as much as a person. The camel was the basis for a robust and ancient trans-Saharan trade network dealing in gold, slaves, horses, and weapons. It became known as the *marktoub el Sahara*, or 'ship of the desert.' Donkeys, and to a lesser extent oxen, were used throughout Nigeria as pack animals. The donkey was especially popular because it was cheap, low-maintenance, could carry a significant weight, and could cover about 32 kilometers in a day.

Transport over water was done with a canoe made out of a dugout tree trunk, reeds, or pieces of wood sewn and sealed together. Larger boats were generally out of the question before river dredging by Europeans, they were simply too shallow to support deep-draft ships. In rainy season they could be as deep 11 feet, but only a foot and a half deep two months later in the dry season. However, despite the restrictions on the size of boats usable on Nigerian waterways, enough commerce passed along the rivers for it to be profitable to be a pirate.

The British claimed Nigeria in the late 19th century, and the pattern of British infrastructure development clearly revealed their intentions. The British immediately sought out to build a transportation network that would make ruling over the area as well as resource extraction easier. Road construction, and later railroad construction became primary goals of the colonial government. The unification of the Protectorate of Sokoto and the southern regions into one political entity in 1912 intensified these goals. A vast majority of the roads and railroads in Nigeria lead south-north, from the coast to the inland and back again. East west transportation routes weren't necessary because the flow of goods—such as ground nuts, cocoa, and cotton—was from the inland to the coast where it could be shipped to Britain for processing. The designers of the British road networks attempted to use existing footpaths to connect cities in Nigeria, but

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found that the nature of these footpaths made them difficult, if not impossible, to expand into wide roads suitable for automobiles. These new roads were still subject to the damaging effects of their rainy season, though, so they were often damaged destroyed every season when the rains came. Frustrated by repeatedly rebuilding bridges, some local governments stopped importing wood, steel, or concrete and used entirely local material to produce cheap, expendable bridges, instead.

Nigerians took advantage of the introduction of automobiles by developing taxi and goods transportation services. Nigerian methods of transportation were often more efficient than their British counterparts. They were more flexible, made use of more appropriate technology, and could charge lower rates. A British transport company called Weakes Transport announced that it was offering scheduled services in 1923. Because of the inflexibility of scheduled routes, weak Transport vehicles often ended up carrying less than full loads at higher prices than their indigenous counterparts. Nigerians tended to favor American vehicles for transportation during the colonial period. They were cheaper than British vehicles, costing about half as much as the equivalent British imported machine. They were also common and easily-serviced because of a plethora of spare parts, while British vehicles had lacking after-market support in colonial Nigeria. American cars, especially the Ford, were also very light and had pneumatic tires, which allowed it to travel over roads that wouldn't be suitable for the heavier British vehicles. A colonial administrator in Lagos commented that, "there are nearly 2,000 miles of road over which motor cars can travel. But only 180 miles are metaled to take heavy motor cars" (Drummond-Thompson and Phillip, 1990). He went on to comment that the American Ford completely outstrips the English equivalent in versatility. The drivers of Nigerian Lorries would wait to fill his vehicle before leaving for a destination. In this way they could outmaneuver their British competition. Below is the account of a traveler of his experiences with Nigerian drivers, written in 1950. He describes the poor condition of the road, and the Nigerian skill in avoiding its pitfalls, as well as the jury-rigged nature of the vehicles that travel Nigerian roads.

Historical Background of Abc Transport

Associated Bus Company Limited, operators of ABC transport commenced operations in road transportation on the 13th of February, 1993 as an off-shoot of rapid ventures with a view of running a modern road transportation system in Nigeria. ABC transport operates luxury bus services according to accepted international standards of road transportation. Its services are specially designed for distinguishing travellers who would otherwise use air service.

The operations of the company with the country is carried out with modern terminals, comfortable passengers lounge in various cities like Lagos, Aba, Owerri, Port-Harcourt, Abuja, Enugu, Onitsha, Umuahia etc. ABC buses are dubbed with the company's trademark the REINDEER. The choice of the REINDEER as the company's symbol was made after a careful

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study of the peculiarities of the animal which is strong, fast and move in herds. For the company's remarkable achievement in transportation, ABC transport was in 1996/2000 adjudged the best transporters in Nigeria by the chartered institute of transport in Nigeria and has since then consistently won the national bus operator of the year award along with other accolades by renowned bodies.

Services

- **Parcel/cargo:** After being licensed, this service offers non-traveling passengers an avenue to transporting mails, documents, parcels and goods to consign who pick them up at the terminals. Unaccompanied goods (way bills) are carefully tagged and delivered safely to the terminal, where the consignee comes to collect them with proper identification; this is not a door-to-door service. For hauling bulky goods' ABC transport also offer cargo delivery services with heavy duty trucks. The company effectively carries out haulage activities nationwide.
- **Transport Services:** Recently, the company increased its reach out with the expansion of facilities, terminals and the acquisition of state of the art buses like the sleeper. The company covers its routes daily in normal batches. ABC transport covers here zones – east, west and north with concentration on the east-west routes.

  Also, ABC has recently being involved in transportation between Nigeria and some close by West African countries like Ghana and others.

Classes of Bus Transport Service

ABC transport for operates two classes of services:

- **Business class:** A non-air conditioned but comfortable luxurious bus service at an affordable price with lunch packs.
- **Executive class:** This class of service is for passengers who want to travel in comfort. The price is a also affordable but slightly higher than that of the business class. It offers a non stop air conditioned service.

Operational Standards

Standards are policies or protocols which a company adhere to in all its official dealings. In ABC there are quite a number of them.

- **Safety:** Drivers do not move more than 90kkm/hr. must move in herds (if necessary) and stop in between terminals to rest the engine and for passengers to rest their legs. ABC has a road safety department which ensures compliance.
- **Receipt:** All payments must be accompanied with a receipt.

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- **Ticketing:** Tickets for trips must be obtained from the terminals and cannot be transferred. Sales of tickets are on a first come, first serve basis.
- **Tagging:** All cargos/loads accompanied or not must be tagged for identification purposes and clearance.
- **Cancellation:** A ticket cancellation made before the departure of the bus attracts 15% of the cost, after departure attracts 50% of the cost of the ticket. Tickets are valid for 90 days after issuance.
- **Reservation:** Reservations can be made in advance of three days provided it is accompanied with full payments. Passengers must try and confirm their reservation before departure time.
- **Exceptional cases:** Children below 12 years will be given rebate of 50% and must be accompanied. An adult passenger is entitled to two kids only.
- **Frequent Traveler Program:** Passengers who make up to eleven trips within a year are entitled to 50% discount on their twelfth trip. Such passengers will be awarded diamond card, which entitles them to privileges as provided by the company. Four times winner of the diamond cards consecutively within an operational year or four years will graduate into gold class with benefits as provided by the company.

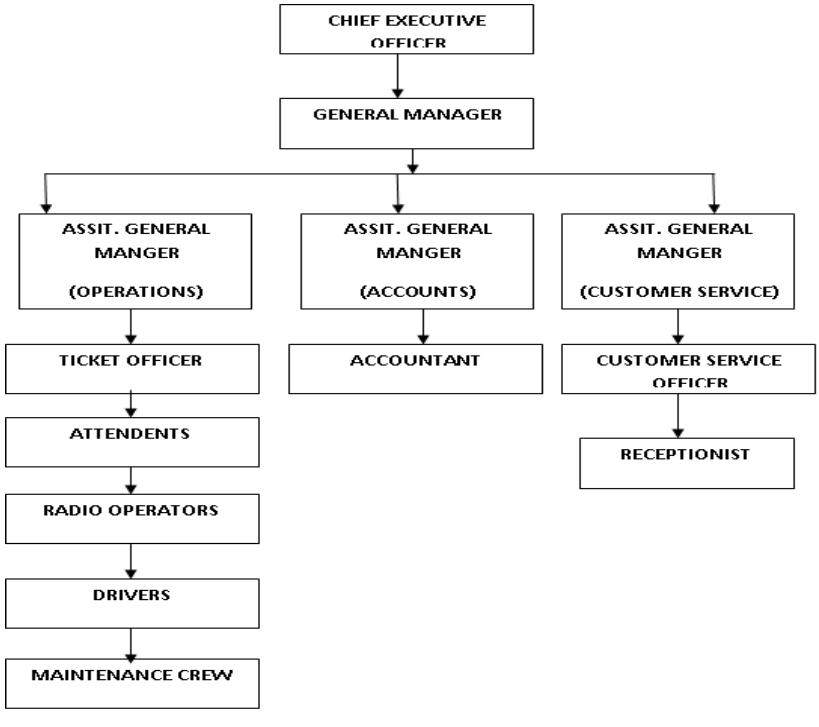

Fig-1. Organizational Structure

METHODOLOGY AND SYSTEM ANALYSIS ADOPTED

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A research methodology defines what the activity of research is, how to proceed, how to measure progress and what constitutes success. Methodology is generally a guideline for solving a problem with specific components such as phases, tasks, methods, techniques and tools. It can be defined as the analysis of the principles of methods, rules and postulates employed by a discipline. It could also be seen as a documented process for the management of projects that contains procedures, definitions and explanations of techniques used to collect, store, analyze and present information as part of a research process in a given discipline.

The study adopts SSADM (Structural system Analysis and Design Methods) for development which follows definite steps to achieve a given task.

SYSTEM INVESTIGATION AND ANALYSIS

System study aims at establishing requests for the system to be acquired, development and installed. It involves studying and analyzing the ways in which the transport organizations currently process the data to produce information. Analyzing the problem thoroughly forms the vital part of the system study. In system analysis, prevailing situation of problem is carefully examined by breaking them into sub-problems. Problematic areas are identified and information is collected. Data gathering is essential to any analysis of requests. It is necessary that this analysis familiarizes the designer with objectives, activities and the function of the organization in which the system is to be implemented.

METHOD OF DATA COLLECTION

This involves gathering facts about the existing system. The purpose of this analysis is to identify the inefficiencies associated with the existing system and the requirement analysis for the proposed system, Online Bus Ticket Reservation System. There are many fact-gathering techniques that can use in gathering the information such as interview, observation, questionnaires and other method.

- ✓ **Observation method:** This method is a technique used to obtain an overall virtual impact of a system environment. This takes into the study of details relating to customers and the traditional reservation system, the speed of operations, number of staff, bottlenecks and delays. Etc. The researcher took time to examine the way factors that are detrimental to customer satisfaction. This method helped the researcher to know the problem encountered by the traditional system that will be eliminated by the computerized system.
- ✓ **Questionnaire method:** This method was used to obtain information from external party about the system. Concise and unambiguous questions made up the questionnaire.

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- ✓ **Interviews:** This method was engaged so as to get detailed understanding of the system and clearer insight to the system and policies were also gathered. Summarily, this method gave up some integral dynamics and uses of the system.

Analysis phase is the step that is concern with first studying the existing system, then using the information gathered to define the requirements for a new system. Analysis follows the problem recognition and feasibility phases and must be completed before the design phase can begin.

ANALYSIS OF EXISTING SYSTEM

Here the researcher made a fact finding and was able to identify procedures and operations mapped out for the existing system. To avoid queues and hassles associated with last minute immediate travel bookings at terminals, some passengers look forward to make reservations before the actual date of travel. There are two methods involved; Direct and Call-in reservation. With both reservation methods, the customer must first confirm the financial implications, if there are available seats; the passenger must now choose a seat. All of this requires the staff manually opening and checking documents and books each time to get the required indication while the customer and the other possibly in a queue exercise the virtue of patience same applies to those calling the terminus. Finally the passengers' data is required in order to issue the ticket and prepare manifest. Basic data contained in the ticket are: Name, Address Seat number, Cost of fare and Next of kin phone number A ticketing officer handling more than one route repeats this process for every route and passenger. Routinely each day's operation starts with the ticketing officer drawing circles with numbers and crossing those seat numbers that have been reserved.

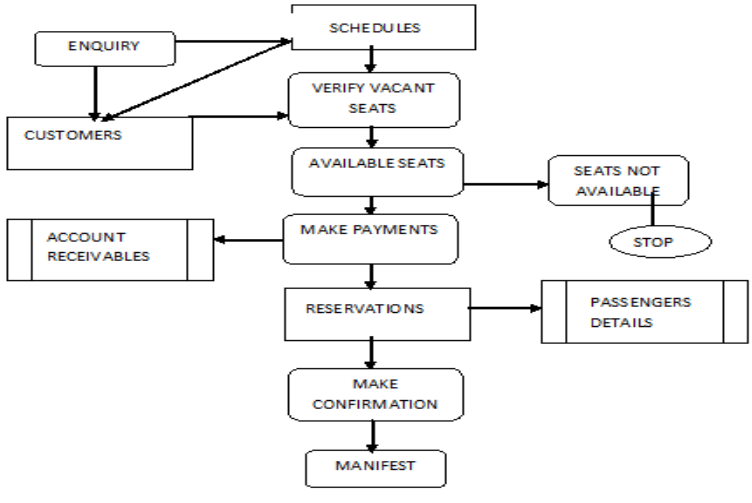

FIG.2 - PROCESS MODEL

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Weakness of the Existing System

Due to the fact that most reservation systems are human-driven, it gives room for the following identified weakness:

- Existing system is totally on book and thus a great amount of manual work has to be done. The amount of manual work increases exponentially with increase in bus services.
- Needs a lot of working staff and extra attention on all the records.
- There are various problems like keeping records of items, seats available, prices of per/seat and fixing bill generation on each bill.
- Finding out details regarding any information is very difficult, as the user has to go through all the books manually.
- Major problem is the lack of security.

Overview and Expectations from the Model of the Proposed System

After carrying out the analysis on the present system and thus highlighting its shortcomings, the researcher considered the option of introducing an innovative, efficient and effective system to implement the advance booking and reservation policy. The system is very simple in design and to implement. The system requires very low system resources and the system will work in almost all configurations. It has got following features

- Ensure data accuracy.
- Records are efficiently maintained by DBMS.
- DBMS also provides security for the information.
- Any person across the world, having internet can access this service.
- Seat numbers are auto generated
- Reservations can be cancelled.
- Minimum time needed for the various processing.
- Better Service.
- Minimum time required.
- This would help the corporation prepare and organize its schedules more efficiently on the basis of traffic demand.
- Personalized services.
- Optimization of manpower available.

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3.3.4. High Level Model of the Proposed System

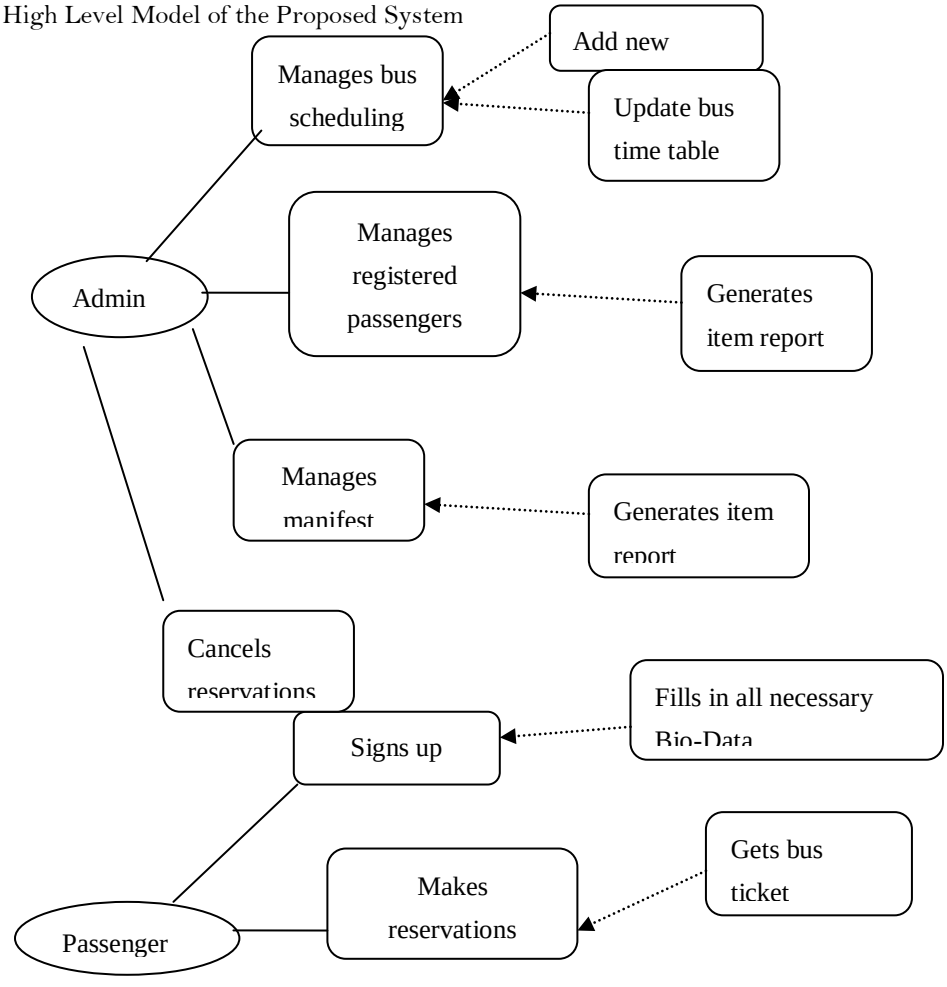

Fig.3 - High Level Model

System Design and Implementation

This chapter deals with the technical details of modeling the system, designing its inputs and outputs, the application architecture and producing specifications which will enable the application work.

Objective of the Proposed System

Amongst the objective of the system design is the implementation of a system that integrates the function of the existing system yet modifying and proffering innovation methods superior to the previous system.

Being a little specific, the new system is expected to be;

- Timely and reliable

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- Scalable – The new system should be able to be moved into a larger and more demanding environment with ease.
- Security enabled – This is vital in the design and expectation of any system. It should contain mechanism to protect the integrity and avoid changes or access by unauthorized users.
- Flexible – As a result of the huge resources expected to be invested into the system, the system is expected to be extensible to accommodate changes in infrastructure, business policies of the Transport Company in the future.
- Easily maintainable, easy to upgrade and make adjustments to.

ONLINE BUS TICKET RESERVATION SYSTEM (OBTRS)

The proposed system will be divided into four subsystems as shown below;

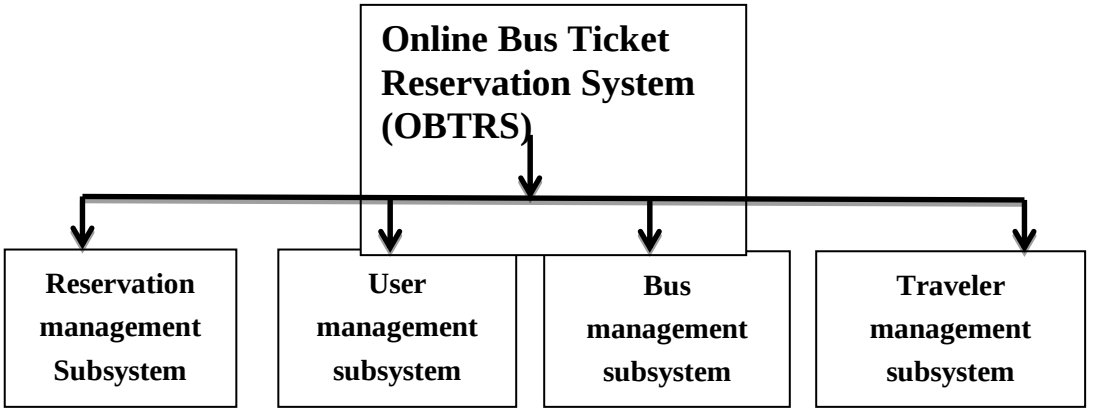

Fig-4. Decomposition Diagram of The Obtrs

Reservation Management System

The automated system allows the traveler to use the OATRS to make reservations and enquiries. It performs the following functions;

- Receives processes and stores requested user enquiries or reservation request.
- Changes passengers' reservations request and updates account.
- Generates online seat availability report.

This subsystem virtually takes the manual reservation operation and enquiry processing of the existing system.

User Management Subsystem

The user here is a staff of the transport Company that would be allowed to use the system whose authorization properties would determine his/her type of access. This subsystem will allow for;

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- Addition of new users
- Removal of users
- Changing users passwords

Bus Management Subsystem

This manages the bus schedule and fare details for each service. This subsystem allows for the following;

- Modification of bus fare
- Schedule and number of buses assigned to a route.

Traveler Management Subsystem

This subsystem provides the following functions;

- Registration of new travelers
- Travelers account transactions and auditing functions.

Database Design

The data in the database must be logically organized to store data and relevant information.
For this project, MYSQL database management system was decided to be used for the database development. After making a selection for the relational database to be used and also receiving requirement Information on the data to be managed in the project, a design showing the Entity Relationship Diagram for the database as drafted below.

Conceptual Design

Requirement Analysis: This concept deals with what data is needed.

List of Entities and their associated attributes:

- Bus-(*Bus id, Bus name, Executive type, Business type, Maximum seats, Route, Departure time, Price, status etc.*)
- Passenger- (*Passenger id, First-Name ,Middle-Name, Last-Name Mobile number, E-mail, Address, Username, Password, Registration date etc.*)
- Admin – (*Admin ID, Username, password etc*)
- Reservation- (*Bus reserved ID, Full name, Phone number, Route, Bus number, Bus name, Category, Username, Price, Date/time, MasterCard type, MasterCard pin, MasterCard expiry date*)etc.
- *Payment(payment_id,name,*
- *States(state_id, name etc.)*
- *Staff(staff_id, First name, middle_name, etc.)*
- *Trip(trip_id,total_amount,created date, schedule_id ect.)*

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- *Driver(Driver_id , First name, middle_name, etc.)*
- *Terminal(terminal_id, official phone,address, city, state_id etc)*
- *Schedule(schedule_id,from_terminal_id,to_terminal_id.amount etc.)*
- *Bus type(id,name,capacity etc.)*

Logical Design

ER-MODEL:

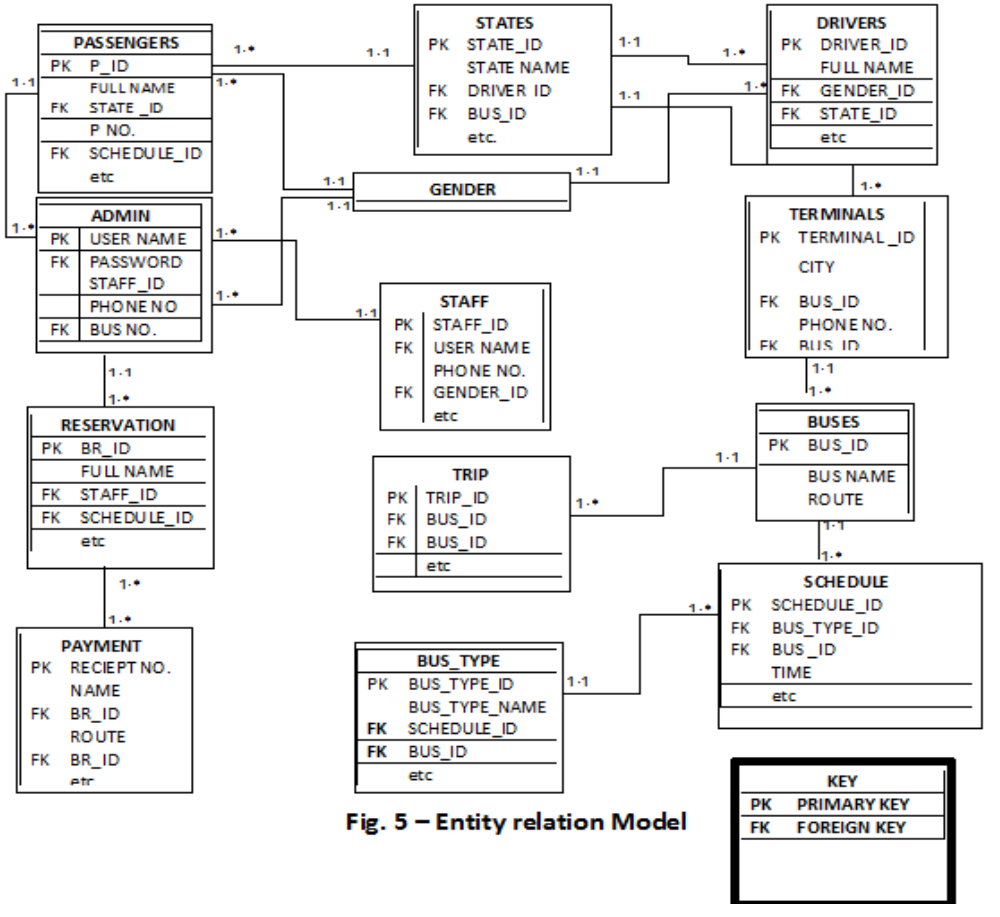

Fig. 5 – Entity relation Model

Table-1. Admin Table

Field Name	Type	Size	Description	Null	Default
Admin_Id	Tinyint	3	Admin Id	Not Null	Yyy
Username	Varchar	15	Admin Username	Not Null	
Password	Varchar	10	Admin Password	Not Null	
Staff_Id	Tinyint	3	Staff Identification Number	Not Null	Yyy

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Table-2. Passenger Table

Field Name	Type	Size	Description	Null	Default
P_Id	Tinyint	3	Passenger Id	Not Null	Yyy
First_Name	Varchar	15	Passenger Name	Not Null	
Middle_Name	Varchar	15	Passenger Name	Null	Null
Last_Name	Varchar	15	Passenger Name	Not Null	
Phone	Varchar	15	Phone Number	Not Null	
Email	Varchar	20	Email Address	Not Null	
Address	Varchar	30	Home Address	Not Null	
Username	Varchar	10	Passenger Username	Not Null	
Password	Varchar	10	Passenger Password	Not Null	
Reg_Date	Timestamp		Current Timestamp	Not Null	

Table-3. Reservation Table

Field Name	Type	Size	Description	Null	Default
Br_Id	Tinyint	3	Bus Reserved Id	Not Null	
First Name	Varchar	10	Passenger First Name	Not Null	
Middle Name	Varchar	10	Passenger Middle Name	Null	Null
Last Name	Varchar	10	Passenger La St Name	Not Null	
Phone	Varchar	13	Passenger Phone No	Not Null	
Routes	Varchar	10	Bus Route	Not Null	
Bus _No	Varchar	10	Bus Number	Not Null	
Bus_Name	Varchar	10	Bus Name	Not Null	
Category	Varchar	10	Bus Category	Not Null	
Username	Varchar	10	Passenger Username	Not Null	
Price	Decimal	10	Transport Fare	Not Null	0.00
Date Time	Varchar	8	Date And Time Of Departure	Not Null	
Cctype	Varchar	10	Mastercard Type	Not Null	
Ccpin	Varchar	10	Mastercard Pin	Not Null	0
Ccexpiry	Varchar	10	Mastercard Expiry Date	Not Null	

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Table -4. Staff Table

Field Name	Type	Size	Description	Null	Default
Staff_Id	Tinyint	3	Staff Identity	Not Null	Yyy
First_Name	Varchar	10	Staff First Name	Not Null	
Middle_Name	Varchar	10	Staff Middle Name	Null	Null
Last_Name	Varchar	10	Staff Last Name	Not Null	
Gender_Id	Tinyint	3	Staff Gender Identity	Not Null	Yyy
Phone	Varchar	13	Staff Phone Number	Not Null	
Reg_Date	Datetime	8	Registration Date	Not Null	
Addres	Varchar	30	Staff Address	Not Null	
State_Id	Tinyint	3	Staff State Identity	Not Null	Yyy
Username	Varchar	10	Staff User Name	Not Null	
Userpassword	Varchar	10	Staff Password	Not Null	

Table-5. Trip Table

Field Name	Type	Size	Description	Null	Default
Trip_Id	Decimal	3	Trip Identity	Not Null	Yyy
Total_Amount	Datetime	10,2	Trip Total Amount	Not Null	0.00
Created Date		8	Trip Date	Not Null	
Schedule _Id	Tinyint	3	Schedule Idntity	Not Null	Yyy
Bus_Id	Tinyint	3	Bus Identity	Not Null	Yyy

Table-6. Drivers Table

Field Name	Type	Size	Description	Null	Default
Driver_Id	Tinyint	3	Driver Identity Number	Not Null	Yyy
First Name	Varchar	10	Dirver's First Name	Not Null	
Middle Name	Varchar	10	Dirver's Middle Name	Null	Null
Last Name	Varchar	10	Dirver's Last Name	Not Null	
Gender_Id	Tinyint	3	Driver's Gender Identity	Not Null	Yyy

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Phone	Varchar	13	Driver's Phone Number	Not Null	
State_Id	Tinyint	3	State Identity	Not Null	Yyy
Address	Varchar	30	Driver's Address	Not Null	
Status	Varchar	7	Driver's Status	Not Null	

Table-7. Bus Table

Field Name	Type	Size	Description	Null	Default
Bus_Id	Int	11	Bus Identity	Not Null	Yyy
Busname	Varchar	10	Bus Name	Not Null	
Max Seats	Char	5	Maximum Seat	Not Null	
Executive	Char	5	Executive Bus Type	Not Null	
Business	Char	8	Business Bus Type	Not Null	
Routes	Varchar	10	Destination Route	Not Null	
Departure Time	Varchar	10	Departure Time	Not Null	
Price	Decimal	7	Transport Fare	Not Null	0.00
Status	Varchar	9	Booked Or Pending Buses	Not Null	

Table-8. Bus_Type Table

Field Name	Type	Size	Description	Null	Default
Bus_Id	Tinyint	3	Bus Id	Not Null	Yyy
Bus_Type_Name	Varchar	10	Bus Type Name	Not Null	
Capacity	Tinyint	4	Maximum Seat	Not Null	0

Table-9. Schedule Table

Field Name	Type	Size	Description	Null	Default
Schedule_Id	Smallint	5	Schedule_Id	Not Null	Yyy
From_Terminal_Id	Tinyint	3	Bus Departure Terminal	Not Null	Yyy
To_Terminal_Id	Tinyint	3	Bus Destination Terminal	Not Null	Yyy
Amount	Decimal	6	Stipulated Amount	Not Null	0.00
Bus_Type_Id	Tinyint	3	Business Bus Type	Not Null	Yyy

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Time	Timestamp	10	Current Db Time	Not Null

Table-10. Terminal Table

Field Name	Type	Size	Description	Null	Default
Terminal_Id	Tinyint	3	Terminal Id	Not Null	Yyy
Phone	Varchar	13	Terminal Official Phone No	Not Null	
City	Varchar	10	Maximum Seat	Not Null	
State_Id	Tinyint	3	Executive Bus Type	Not Null	Yyy

SYSTEM DESIGN

System design is the design of various program modules, their characteristics and functions and how they will interact with each other. The system design will consist of designing the front-end that is the database where all the data will be stored and functions and subroutines that will link the front-end and the back-end and provide data manipulations. The objectives of the new system will be used to develop some program modules to communicate; they will need a way to interact with each other. The Admin user, apart from management of users, bus availability, prices, and route management can also generate reports of signed up users, reservation made and manifest. These developments were all generally achieved using the development tool Dreamweaver to code the layout in HTML and CSS, while the function that is performed by different users were generally achieved using PHP scripting language and JavaScript whenever it is necessary. Finally the session tracking of the system users' were also implemented to track users' accessibility and authorization to various functions for example a regular user can't perform the functions of the admin of the system.

Choice of Programming Language

In software engineering, a web based application-sometimes called a webapp and much less frequently a web application-is an application that is accessed with a web browser over a network such as the internet or intranet. Web applications are popular due to the ubiquity of the browser as a client, sometimes called a thin client. The ability to update and maintain web applications without distributing and installing software on potentially thousands of client computers is a key reason for their popularity. Web applications are used to implement web mail, online retail sales, online auctions, wikis, discussion boards, web logs, MMORPGs, video logging and perform many other functions. Though many variations are possible, a web application is commonly structured as a three-tiered application. In its most common form, a web browser is the first tier, an engine using some dynamic web content technology (e.g. CGI, PHP, Java servlets or Active Server

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Pages) is the middle tier, and a database is the third tier. The web browser sends requests to the middle tier, which services them by making queries and updates against the database and generating a user interface. Therefore, the web based application is chosen in the development of this system.

Hypertext Pre-processor (PHP): is a general-purpose scripting language that is especially suited to server-side web development where PHP generally runs on a web server. Any PHP code in a requested file is executed by the PHP runtime, usually to create dynamic web page content. It can also be used for command-line scripting and client-side GUI applications. PHP can be deployed on most web servers, many operating systems and platforms, and can be used with many relational database management systems (RDBMS). It is available free of charge, and the PHP Group provides the complete source code for users to build, customize and extend for their own use.

Advantages of PHP

- It's fast**:** This is because it is embedded in HTML code, the time to process and load a Web page is short.
- It's free: PHP is proof that free lunches do exist and that you can get more than you paid for.
- It's easy to use**:** The syntax is simple and easy to understand and use, even for non-programmers. PHP code is designed to be included easily in an HTML file.
- It's versatile**:** PHP runs on a wide variety of operating systems, like Windows, Linux, Mac OS, and most varieties of UNIX.
- It's secure: As long as your scripts are designed correctly, the user does not see the PHP code.
- It's customizable: The open source license allows programmers to modify the PHP software, adding or modifying features as needed to fit their own environments.

My SQL

MySQL is a popular choice of database for use in web applications, and is a central component of the widely-used LAMP web application software stack — LAMP is an acronym for "Linux, Apache, MySQL, and PHP". Its popularity is closely tied to the popularity of PHP. MySQL is used in some of the most frequently visited web sites on the Internet, including Flickr, Facebook, Wikipedia and Google— though not for searches.

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Java Script Programming Language

JavaScript is a programming language that can be included on web pages to make them more interactive. You can use it to check or modify the contents of forms, change images, open new windows and write dynamic page content. You can even use it with CSS to make DHTML (Dynamic HyperText Markup Language). This allows you to make parts of your web pages appear or disappear or move around on the page. JavaScripts only execute on the page(s) that are on your browser window at any set time. When the user stops viewing that page, any scripts that were running on it are immediately stopped. The only exception is a cookie, which can be used by many pages to pass information between them, even after the pages have been closed.

How the System Is Implemented

This has to do with the orderly schedule of events and list of materials necessary to put the new system into use. The system implementation process for the online bust ticket reservation system is necessary for the following reasons:

- To define the hardware and software requirement
- To provide methodology for testing
- To provide management with a test plan and to implement the new system.

Hardware and Software Requirements

This is the minimum requirement by a computer system to be able to run the program well.

System Test Run

This involves the various ways required to verify whether the system is workable. Different specifications were used in testing the program. The test data were analyzed and fed into the computer. During testing, bugs found were debugged and the system was subjected to further testing. The output of the test run is attached to Appendix One.

Hardware Requirements

- A hard disk minimum size of 60GB
- A minimum of 600 MHZ Pentium processor.
- The minimum RAM requirement is 1GB
- A web server with robust storage device

Software Requirements

This includes both system software and application software. For optimal performance the following software was used:

- Database Management System (MySQL)

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- WAMP Server
- PHP and PHP editor (WAMP server and Macromedia Dreamweaver 8 handle this)
- Macromedia Dreamweaver 8

System Changeover

After the design of a new system, it is expedient to change to the new system. System changeover is simply the turning over from the manual system to the newly designed system. This changeover process can be achieved through parallel direct, Phase and Pilot changeover.

RECOMMENDATIONS

- Before the use of the new system, proper training and orientation should be given to both staff and management.
- Due to the time and cost constraints, especially the scope of the design was limited to the most basic capabilities.
- Numerous potentials of this system should not be neglected irrespective of its high overhead cost of implementation
- Management should endeavour to join the moving tend of IT sector to enjoy the competitive advantage provided by the IT
- Worker should be acquainted with contemporary IT awareness and literacy.

CONCLUSION

Transportation services have moved from the manual method to the one aided by new technology which gives comfort to travelers to make booking and reservations ahead of time rather than being in a queue waiting to get tickets. The ancillary infrastructure such as better internet services and rising level of awareness among the transportation sector towards this technology will promote the development and growth of the transport sector in Nigeria. Therefore, this system designed for luxurious bus owners especially ABC transport to integrate the new system of automation to the manual method is regarded as a value-added service in increasing revenue acquisition.

FEW HTML PROGRAM SEGMENTS

Passenger Registration Code

```
<?php require_once('Connections/OBTRS.php'); ?>
<?php
```


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```
function GetSQLValueString($theValue, $theType, $theDefinedValue = "", $theNotDefinedValue = "")
{
  $theValue = (!get_magic_quotes_gpc()) ? addslashes($theValue) : $theValue;

  switch ($theType) {
    case "text":
      $theValue = ($theValue != "") ? "'" . $theValue . "'" : "NULL";
      break;
    case "long":
    case "int":
      $theValue = ($theValue != "") ? intval($theValue) : "NULL";
      break;
    case "double":
      $theValue = ($theValue != "") ? "'" . doubleval($theValue) . "'" : "NULL";
      break;
    case "date":
      $theValue = ($theValue != "") ? "'" . $theValue . "'" : "NULL";
      break;
    case "defined":
      $theValue = ($theValue != "") ? $theDefinedValue : $theNotDefinedValue;
      break;
  }
  return $theValue;
}

$editFormAction = $_SERVER['PHP_SELF'];
if (isset($_SERVER['QUERY_STRING'])) {
  $editFormAction .= "?" . htmlentities($_SERVER['QUERY_STRING']);
}

if ((isset($_POST["MM_insert"])) && ($_POST["MM_insert"] == "form1")) {
  $insertSQL = sprintf("INSERT INTO passenger (Fullname, PhoneNo, Email, Address, Username, Pwd)
VALUES (%s, %s, %s, %s, %s, %s)",
                       GetSQLValueString($_POST['Fullname'], "text"),
                       GetSQLValueString($_POST['MobileNo'], "text"),
                       GetSQLValueString($_POST['EmailId'], "text"),
                       GetSQLValueString($_POST['Address'], "text"),
```


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```
                GetSQLValueString($_POST['Username2'], "text"),
                GetSQLValueString($_POST['Password2'], "text"));

 mysql_select_db($database_OBTRS, $OBTRS);
 $Result1 = mysql_query($insertSQL, $OBTRS) or die(mysql_error()); etc.
```

Passenger Details Code

```
<?php require_once('Connections/OBTRS.php'); ?>
<?php require_once('Connections/OBTRS.php'); ?>
<?php
//initialize the session
if (!isset($_SESSION)) {
  session_start();
}

// ** Logout the current user. **
$logoutAction = $_SERVER['PHP_SELF']."?doLogout=true";
if ((isset($_SERVER['QUERY_STRING'])) && ($_SERVER['QUERY_STRING'] != "")){
  $logoutAction .="&". htmlentities($_SERVER['QUERY_STRING']);
}
if ((isset($_GET['doLogout'])) &&($_GET['doLogout']=="true")){
  //to fully log out a visitor we need to clear the session varialbles
  $_SESSION['MM_Username'] = NULL;
  $_SESSION['MM_UserGroup'] = NULL;
  $_SESSION['PrevUrl'] = NULL;
  unset($_SESSION['MM_Username']);
  unset($_SESSION['MM_UserGroup']);
  unset($_SESSION['PrevUrl']); etc
```

Bus Reservation Code

```
<?php require_once('Connections/OBTRS.php'); ?><?php
//initialize the session
if (!isset($_SESSION)) {
  session_start();
}

// ** Logout the current user. **
```


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```
$logoutAction = $_SERVER['PHP_SELF']."?doLogout=true";
if ((isset($_SERVER['QUERY_STRING'])) && ($_SERVER['QUERY_STRING'] != "")){
  $logoutAction .="&". htmlentities($_SERVER['QUERY_STRING']);
}
if ((isset($_GET['doLogout'])) &&($_GET['doLogout']=="true")){
  //to fully log out a visitor we need to clear the session varialbles
  $_SESSION['MM_Username'] = NULL;
  $_SESSION['MM_UserGroup'] = NULL;
  $_SESSION['PrevUrl'] = NULL;
  unset($_SESSION['MM_Username']);
  unset($_SESSION['MM_UserGroup']);
  unset($_SESSION['PrevUrl']);
  $logoutGoTo = "index.php";
  if ($logoutGoTo) {
    header("Location: $logoutGoTo");
    exit;
  }
}
?>
<?php
if (!isset($_SESSION)) {
  session_start();
}
$MM_authorizedUsers = "";
$MM_donotCheckaccess = "true"; etc
```

GENERATED OUTPUTS

Passenger Login

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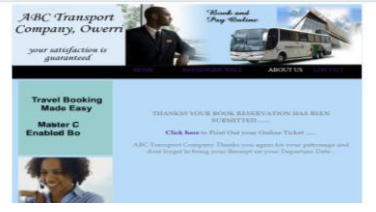
Passenger Registration Form

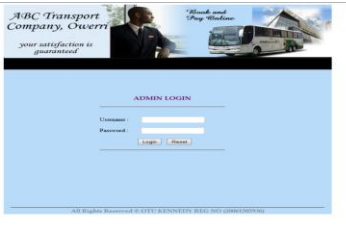
Passenger Wall

Reservation Form



Reservation Successful

Bus Ticket



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Admin Page

Admin Wall

Manifest

Registered Passenger

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