

Development of an Online Bus Ticket Reservation System for a Transportation Service in Nigeria

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Abstract

The use of bus traveling is a large growing business in Nigeria and other countries; the manual use of bus reservation is presently very strenuous and also consumes a lot of time by having to stay on a long queue. For this reason, an efficient system is to be proposed in this paper to ease the issue of bus reservation amongst indigenes within the country. The system is a web – based application that allows visitors to check bus availability, buy and pay bus ticket online. In this paper, the proposed bus reservation system was developed using Extensible Hypertext Markup Language (XHTML), PHP Hypertext Preprocessor (PHP), Structure Query Language (SQL), Ajax, Cascading Style Sheet (CSS), and JavaScript.

Keywords: Bus Reservation, Queue, Efficient

1. Introduction

The Online Bus Ticket Reservation System is a web-based application that allows visitors check bus ticket availability, buy bus ticket and pay the bus ticket online (Asaad, Ayad and Hayder, 2012). This system is established for all the home/office users after gaining access from the administrator. According to Invaderzim (2011), Online Bus Reservation System provides bus transportation system, a facility to reserved seats, cancellation of seats and different types of enquiry which need an instant and quick reservation. This system can be used by the users in performing online reservation via internet for their all business purposes. Users can use this program directly on their websites and no need to install it.

The use of bus traveling is a large growing business in Nigeria and other countries; hence bus reservation system deals with maintenance of records of each passenger who had reserved a seat for a journey. It also includes maintenance of information like schedule and details of each bus (Shivaji, 2010). Also, we get to know that there are many operations, which they have to do manually. It takes a lot of time and causes many errors. Due to this, sometimes a lot of problems occur and they were facing many disputes with customers. To solve the above problem, and further maintaining records of items, seat availability for customers, price of per seat, bill generation and other things, we are offering this proposal of reservation system. The reservation system has three modules. First module helps the customer to enquire the availability of seats in a particular bus at particular date, the second module helps him to reserve a ticket and with the third module he can cancel a reserved ticket.

However, since the current reservation system is still conducted manually and separately at each branch, contact must be made by each branch's front-officer to the head office for each customer's enquiry in order to get the latest update on schedule, seat availability and other reservation-related information; as well as to avoid duplicate bookings or over-capacity. There is also a physical limit to the reservation availability as each branch only operates during certain hours and reservations can only be made on-the-spot. These limitations are not the only issues the company is currently facing. Other factors that create problems include human errors (e.g. miscalculations in ticket price, mistakes in noting passenger data, etc.), the fluctuation of passengers during certain periods of time that causes a bottleneck in the check-in process because of the inability of the front-officer to multitask and the lack of overview or report of the on-going business; making it difficult for the company to judge past/current performance or plan future improvements. Looking at these problems and limitations, it is clear that both the company and the customers require an integrated reservation system that is more efficient in information update and reservation handling and also easy to use. Electronic tickets, or e-tickets, give evidence that their holders have permission to enter a place of entertainment, use a means of transportation, or have access to some internet services. Bus Ticket Reservation System enables the customer to buy bus ticket, make payment, and ask for information online easily. Furthermore, staff can sell bus ticket using Bus Ticket Reservation System after check bus ticket availability for the customer and print the bus ticket to the customer that queue up in the counter. The method to solve this problem is to create an online buying bus ticket system. Customer can buy the bus ticket over the Internet, 24 hours a day, 7 days a week and the bus ticket can't be lost, stolen or left behind. In addition, the online system lets the customers check the availability of the bus ticket before they buy bus ticket (Wee, 2007). Furthermore, customers no need to pay cash to buy bus ticket because they can pay the bus ticket by using deposit slip number order by bank.

2.0 Overview

2.1 *Bus Ticket System*

Bus ticket booking during the offline era posed various difficulties to the customers as well as the bus operators. Offline ticket booking reduced the scope of customers to choose different options based on their travel criterion (Gayathry, 2013). It also increased the franchising cost for the bus operators. At the same time, the bus operators were also finding it difficult to monitor their bus seat filling information. Many small and medium bus service organizations do not have their own online bus ticket booking system. Online Bus ticketing system web portal is a total internet ticketing operations offering the benefit of total in-house management of bus schedules, ticket bookings, ticket sales, report generation, and other business functions associated with ticket sales (Melisa, 2007). It also offers the power of decision making to customers to make a ticket booking through bus operators' popularity, performance and ranking. This powerful Internet based ticket booking system that allows a full control of not only on the ticketing inventory, but also the site's content.

According to Melisa (2007), stated the basic components of an Online Bus Ticketing System web portal that provides enhanced service to the bus operators and customers consist of the following:

- Capture of customer information such as name, address, phone number and e-mail address
- Price list
- Bus operators ranking
- Seating chart
- Loyalty Points/Redemption
- Search engine
- Payment information
- Organization's advertisement/slogan, phone number, fax number, and address
- Comments and suggestions section / option
- Reports

2.2 E-Ticket Reservation System

E-ticketing could be extended to major entertainment and touristic sites and thus facilitate access to major points of interest within cities, making e-ticketing also interesting for travelers. Urban tourism is the fastest growing tourism sector in the world (Paskaleva, 2014). In public transport, e-ticketing systems are not only means of payment but process huge amount of information which offer a large range of possibilities to make public transport easier to use, to manage and to control. They offer as well opportunities to introduce integrated pricing structure that are not easy to implement with traditional payment tools. Electronic ticketing technologies are classified according to the way they are used for payment. The closer the card is to the payment system, the more reliable the transaction is, but the more constraining it is for the user (Mezghani, 2008). Therefore, the long-term objective is for the customer to be able to pay for public transport without having to show or validate any card, relying on fully automatic fare payment.

Public transport operators have been trying to replace paper-based tickets with electronic media, and many countries have implemented or are about to introduce e-ticketing systems. The main characteristic of e-ticketing is that tickets are sold and stored in electronic devices. However, the benefits of a comprehensive e-ticketing system for public transport operators are hard to quantify, as the main aim of e-ticketing is an improved service quality. In monetary terms, e-ticketing could reduce administrative costs as fewer cashiers are needed, fare processing times could be reduced and a better throughput of passengers could be allowed (Maike, 2014).

Moreover, fare evasion and fraud resulting from cash handling could be reduced and better price differentiation would be possible. E-ticketing enables a better integration of alternative services into the scheme, making it more attractive for customers to use it (PricewaterhouseCoopers, 2011). Due to accurate data on passenger flows it might also help to better exploit the network's capacities and to improve the user experience by setting up tailor-made services for individual passengers. Costs apply that can be easily quantified, e.g., investment and operation costs, particularly the initial one-off costs (e.g., readers, software and consultancy on the scheme design). Integrated schemes appear to be particularly cost intensive, as different applications need to be connected (Wood, Downer, Toberman, 2011).

Additionally, running costs for marketing, maintenance and replacement need to be considered. Costs apply for training staff or resolving passenger disputes and for setting up a (regional or even national) clearing house responsible for centralized data and fare collection. The fear of outsourcing their expertise and responsibilities in ticketing to a third party of suppliers remains a worry to public transport operators (Turner & Wilson, 2010).

3.0 Methodology

3.1 Description of Proposed System

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:

- It will ensure data accuracy.
- Records will be efficiently maintained by DBMS.
- Availability of seats can be enquired easily.
- Passengers can also cancel their tickets easily.
- Minimum time needed for the various processing.
- It will provide better Service.

Shuchi, G. (2008) stated that system design is to create a technical solution that satisfies the functional requirements for the system. At this point in the project life cycle there should be a Functional Specification, written primarily in business terminology, containing a complete description of the operational needs of the various organizational entities that will use the new system. The challenge is to translate all of this information into Technical Specifications that accurately describe the design of the system, and that can be used as input to System Construction.

3.2 System Requirement

The requirement definition is concerned with the analysis of the existing system with the aim of determining and structuring the requirement of the proposed system. It is achieved with the aid of user requirement. The Analysis stage was specifically carried out in focus of the functionality dataflow at Young Legacy Line Transport Division.

3.3 Requirement Specification

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

3.4 Functional Requirements

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

- The system shall incorporate mechanism to authenticate its users
- The system shall verify and validate all user input and should notify in case of error detection and should help the user in error correction
- The system shall allow sharing of files in the system
- The system shall allow quick messages to be exchanged without face to face interaction

3.5 Non-Functional Requirement

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

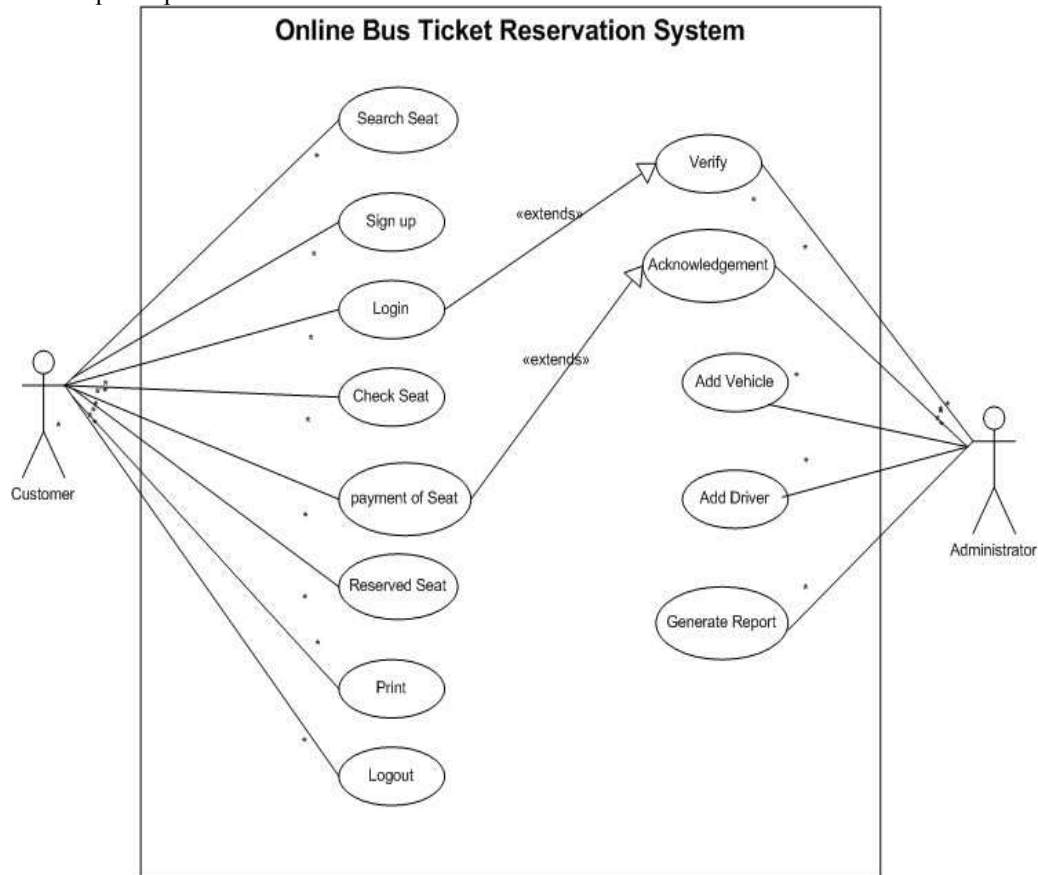
- The system shall be user friendly and consistent
- The system shall provide attractive graphical interface for the user
- The system shall allow developer access to installed environment
- The system shall target customer base

3.6 Architecture of The Proposed System

This process supports existing infrastructure requirements and provides specific recommendations for hardware and network solutions based on existing and projected user needs. Application requirements, data resources, and people within an organization are all important in determining the optimum hardware solution. It is represented using a three tier architecture that comprises of user interface, process management and Database Management System (DBMS). It shows the components of the system, the services they provide and the way they communicate to bring about the system functionality.

3.7 The Functional Model of the System

UML use case diagram of the bus reservation system is shown in the diagram below. In this figure, details of the various participants are also detailed



3.8 User Activities

The most common activities carried out by user are illustrated bellow

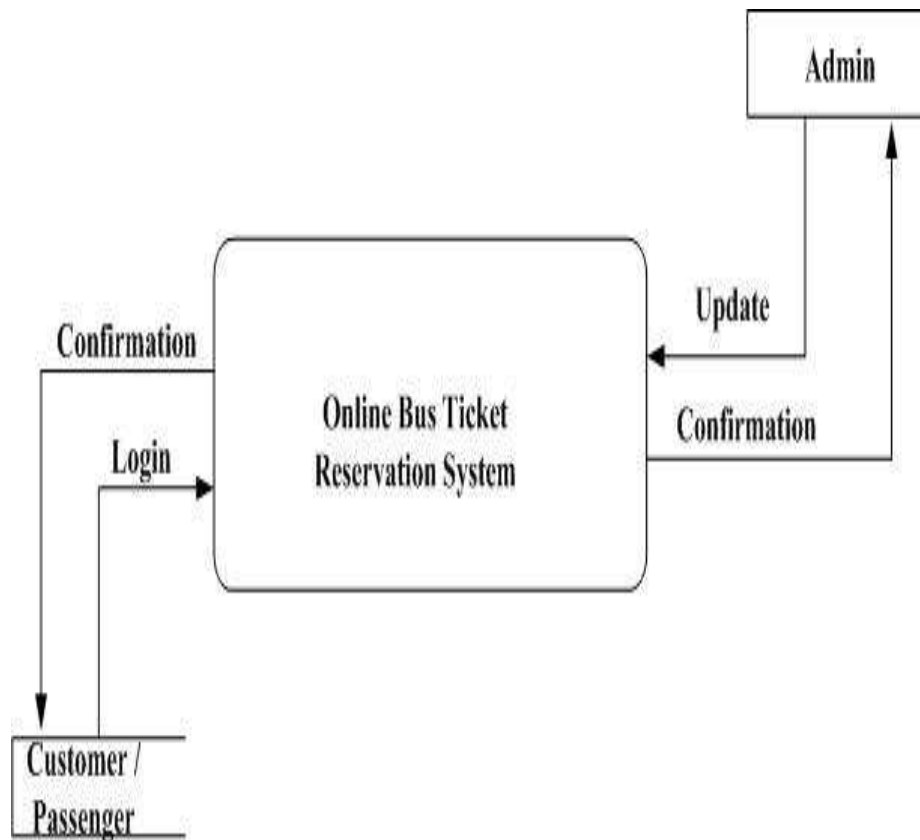
- The user can search for the seat
- The user can sign up/do registration with the system
- The registered user can login to the proposed system
- The user can check for the available seat
- The user can also do payment for the seat on the proposed system
- The user can print receipt on the system as evidence of payment

3.9 Administrator Activities

- The administrator will verify all the registered user, and allow them to login to the system
- The administrator give acknowledge to any payment user made on the system
- The administrator can add vehicle, driver and generate report as well

3.10 Data Flow Diagram

Data flow diagram is used to show the flow of data from external entities into the system. It is used to represent the physical and logical area of an information system. The data flow diagrams are pictorial or graphical representation of the Online Bus Ticket Reservation System. The data flow diagram covers all the processes and data storage area, which takes place during any transaction in the system.



4.0 RESULTS AND DISCUSSIONS

The proposed bus reservation system was developed using Extensible Hypertext Markup Language (XHTML), PHP Hypertext Preprocessor (PHP), Structure Query Language (SQL), Ajax, Cascading Style Sheet (CSS), and JavaScript. The relational database was adopted because it is made up of a group of logically connected tables (data that has a relationship to other data). Therefore, establishing a relational database management system is a great way to increase data integrity, efficiency, ask questions, sort and filter data, provide stronger security, and share information, ease of use, data independent among others (Goessl, L. 2009). Most of the commands used to implement processes and procedures are available in the Appendix. Some user and database table are shown in this section.

Table 1. Showing the Application Table

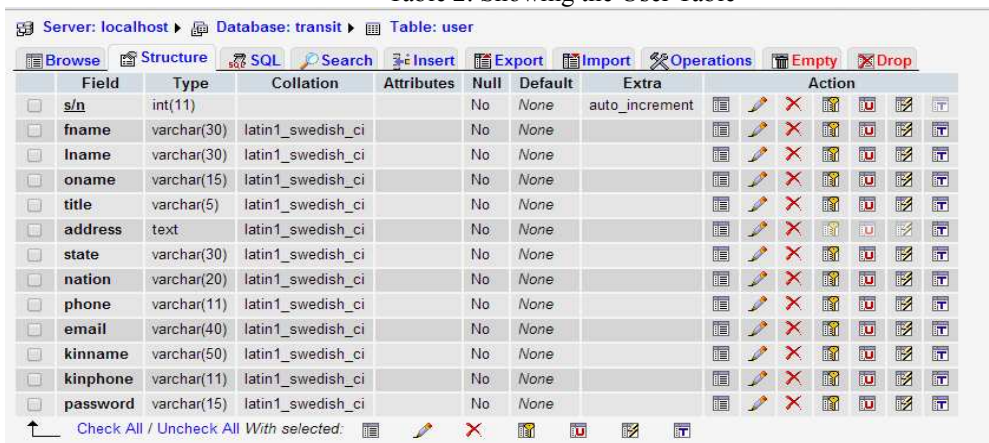
Table 1: Showing the Application Table

Server: localhost ▶ Database: transit																	
Structure		SQL		Search		Query		Export		Import		Operations		Privileges		Drop	
	Table ▼	Action						Records ¹	Type	Collation	Size	Overhead					
<input type="checkbox"/>	admin							2	MyISAM	latin1_swedish_ci	2.1 KiB	-					
<input type="checkbox"/>	contact							0	MyISAM	latin1_swedish_ci	1.0 KiB	-					
<input type="checkbox"/>	departed							1	InnoDB	latin1_swedish_ci	16.0 KiB	-					
<input type="checkbox"/>	driver							11	MyISAM	latin1_swedish_ci	3.0 KiB	-					
<input type="checkbox"/>	movement							2	InnoDB	latin1_swedish_ci	16.0 KiB	-					
<input type="checkbox"/>	states							10	MyISAM	latin1_swedish_ci	2.3 KiB	-					
<input type="checkbox"/>	teller							6	MyISAM	latin1_swedish_ci	2.3 KiB	40 B					
<input type="checkbox"/>	time							5	MyISAM	latin1_swedish_ci	1.1 KiB	-					
<input type="checkbox"/>	transit							12	MyISAM	latin1_swedish_ci	2.6 KiB	-					
<input type="checkbox"/>	user							9	MyISAM	latin1_swedish_ci	3.1 KiB	44 B					
<input type="checkbox"/>	vehicle							10	MyISAM	latin1_swedish_ci	2.4 KiB	64 B					
11 table(s)		Sum						68	MyISAM	latin1_swedish_ci	51.9 KiB	148 B					

⏮ Check All / Uncheck All / Check tables having overhead

With selected: ▼

Table 2. Showing the User Table

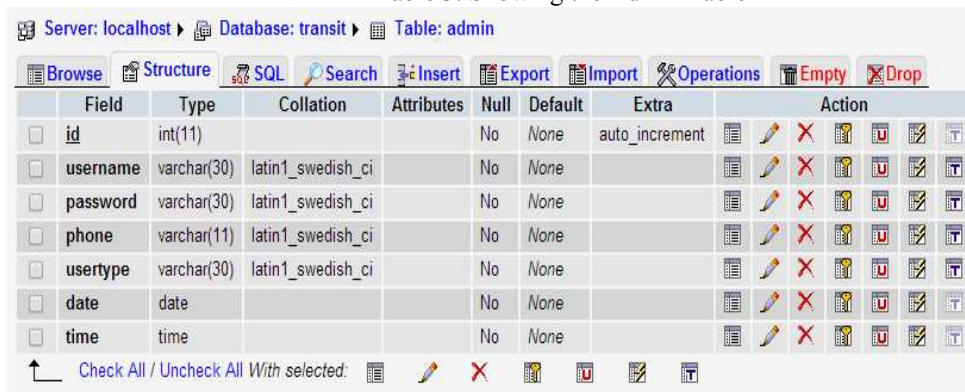


Server: localhost Database: transit Table: user

Field	Type	Collation	Attributes	Null	Default	Extra	Action
<input type="checkbox"/> s/n	int(11)			No	None	auto_increment	
<input type="checkbox"/> fname	varchar(30)	latin1_swedish_ci		No	None		
<input type="checkbox"/> lname	varchar(30)	latin1_swedish_ci		No	None		
<input type="checkbox"/> oname	varchar(15)	latin1_swedish_ci		No	None		
<input type="checkbox"/> title	varchar(5)	latin1_swedish_ci		No	None		
<input type="checkbox"/> address	text	latin1_swedish_ci		No	None		
<input type="checkbox"/> state	varchar(30)	latin1_swedish_ci		No	None		
<input type="checkbox"/> nation	varchar(20)	latin1_swedish_ci		No	None		
<input type="checkbox"/> phone	varchar(11)	latin1_swedish_ci		No	None		
<input type="checkbox"/> email	varchar(40)	latin1_swedish_ci		No	None		
<input type="checkbox"/> kinname	varchar(50)	latin1_swedish_ci		No	None		
<input type="checkbox"/> kinphone	varchar(11)	latin1_swedish_ci		No	None		
<input type="checkbox"/> password	varchar(15)	latin1_swedish_ci		No	None		

Check All / Uncheck All With selected:

Table 3. Showing the Admin Table



Server: localhost Database: transit Table: admin

Field	Type	Collation	Attributes	Null	Default	Extra	Action
<input type="checkbox"/> id	int(11)			No	None	auto_increment	
<input type="checkbox"/> username	varchar(30)	latin1_swedish_ci		No	None		
<input type="checkbox"/> password	varchar(30)	latin1_swedish_ci		No	None		
<input type="checkbox"/> phone	varchar(11)	latin1_swedish_ci		No	None		
<input type="checkbox"/> usertype	varchar(30)	latin1_swedish_ci		No	None		
<input type="checkbox"/> date	date			No	None		
<input type="checkbox"/> time	time			No	None		

Check All / Uncheck All With selected:

4.1 PRESENTATION OF THE APPLICATION INTERFACE

The presentation is based on the interface of the system and the outputs from the back end and the application interfaces consist of various windows that enable different categories of users to interact with the system. This includes some of the user pages, administrative pages and their respective outputs.

4.1.1 Home page Interface

The home page of the system shows various menus of the application. It also shows login link for already existing users at the top of the application and a link for new user to quickly register. The number of the menu depends on the role of the user. The forms were developed using HTML and PHP. Different forms were developed to enable the users perform the following tasks: User's login, Register the user by capturing personal information, Searching for the available seat, with the price and time of departure, Admin login and Viewing reports generated by the administrator.



Figure 1. Showing the Home page Interface

4.1.2 User Home Page

Figure shows the home page of a registered user when logged in into his/her account. The page shows the transit booking that consist of from and to location, leaving date, returning date (optional) and search button, which registered user will used to search for the available seat, departure time, price and some other functionalities.



Figure 2. Showing the Logged in User Home Page

4.1.3 Receipt Page

The Figure shows the payment page of a registered user when logged in into the application; this page serves as an evidence of payment for the user.

YOUNG Legay Line Transportation Service		MAIN OFFICE: No. 9/37, Unity Road Ilorin, P.O.Box 6174, ilorin east, kwara state, Nigeria. Tel: 08037169013, 08079728887, 08028146550	
BOOKING. RESERVATION. ENQUIRY BOOKING RECEIPT		HOTLINE: 08028146550 RECEIPT NO. 1404764657	
DATE	8 July 2014	TERM	Transit
FIRST NAME	Shittu	LAST NAME	Okiki
TEL.	08034547654	ADDRESS	N06, obafemi awolowo Road, ilorin
AMOUNT	#2200		
Transport business with integrity...			

Figure 3. Showing the Receipt page

5.0 CONCLUSION

Nowadays, bus agencies are taking important role in transportation, and to make reservation reliable they need a strong system that they will make reservation easier, faster and safer. This project designed to meet requirements of a bus reservation system. It has been developed in XHTML, PHP, CSS, JAVASCRIPT and database has been built in MySQL. By using this application, the company can provide reservation services and information to their customers without the limitation of office hours or manpower. Not only does it let customers book trips around the clock from any location with an internet connection but it is also designed for use by the company to internally manage their business processes; minimizing human errors and overcoming difficulties and problems that arose in the previous system.

6.0 REFERENCES

1. Asad, A.A., Ayad, M.J. and Hayder, N.K. (2012). Design and Developing Online Iraqi Bus Reservation System Using Unified Modeling Language. *International Journal of Scientific knowledge* Available at: http://www.ijsk.org/uploads/3/1/1/7/3117743/v3i103_information_technology.pdf Accessed 13th December 2014
2. Gayathry, S. (2013). *Online Bus Ticketing System: Tactful Management Research Journal Through Case Studies*. RedBus.in
3. Goessl, L. (2009). *Business Advantages of a Relational Database*. Available at: <http://www.insidebusiness360.com/index.php/business-advantages-of-a-relational-database-15806/>
4. Invaderzim08, (2011). *Online Bus Reservation System*. Retrieved from <http://www.studymode.com/essays/Bus-Reservation-System-741084.html> Accessed 20th November 2014
5. Maike, J.P. (2014). Train, bus and museum - Interrelations of diverse actors within integrated E - ticketing schemes. Available at: http://www.mobil-tum.vt.bgu.tum.de/fileadmin/w00bqi/www/Session_Poster/Puhe.pdf Accessed 16th October 2014
6. Melisa, K. (2007). *Online Bus Ticketing System: University Of Malaykuala Lumpur* Accessed 17th November 2014
7. Mezghani, M. (2008). Study on Electronic Ticketing in Public Transport. Available at: <http://www.emta.com/IMG/pdf/EMTA-Ticketing.pdf> Accessed: 16th November 2014
8. Paskaleva, K. (2014). Integrated Public e-Services: Joining-up Strategies and Technologies for City Available at: http://www.europarl.europa.eu/RegData/etudes/etudes/join/2014/513551/IPOL_JOIN_ET%282014%29513551_EN.pdf Accessed 18th October 2014
9. Pricewaterhouse Coopers (2011). Smart & Integrated Ticketing Report for Scotland. Available at: <http://www.transportscotland.gov.uk/files/documents/reports/j13684/j13684.pdf> Accessed: 30th October 2014
10. Shivaji. Varma. (2010). *Bus reservation system*. Retrieved from <http://shivajivarma.wordpress.com/2010/09/20/dbms-project-bus-reservation> Accessed 19th November 2014

11. Shuchi, G. (2008). *Explain the Phased Waterfall Model*. Available at: <http://www.careerride.com/testing-phased-waterfall-model.aspx>
12. Turner, M., & Wilson, R. (2010). Smart and integrated ticketing in the UK: Piecing together the jigsaw. *Computer Law & Security Review*, 26(2), 170–177. doi:10.1016/j.clsr.2010.01.015
13. Wee, K.I. (2007). Bus Ticket Reservation System. Available at: http://library.utem.edu.my/index2.php?option=com_docman&task=doc_view&gid=3237&Itemid=113 Accessed: 18th November 2014
14. Wood, A., Downer, K., Toberman, A., RS Consulting, & Great Britain. Dept. for Work and Pensions (2011). Evidence review of smartcard schemes in local authorities. London: Dept. for Work and Pensions.

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