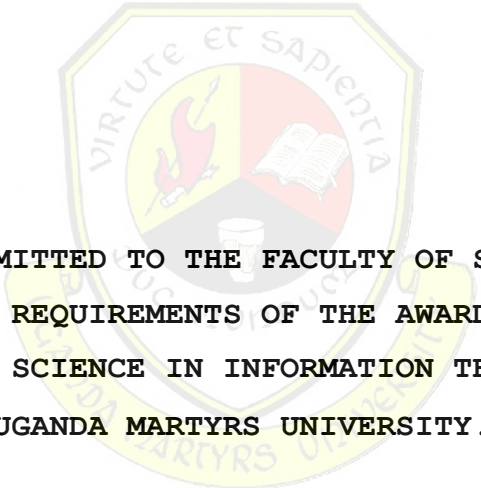


AN ONLINE CAR RENTAL SYSTEM

CASE STUDY: MUTARA MOTORS

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**A DISERTATION SUBMITTED TO THE FACULTY OF SCIENCE IN PARTIAL
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PREFACE

The Renting and Booking processes generally take thirty (30) minutes to accomplish not forgetting the fact that one will have travelled to the car rental office in person or physically. Such an activity does not favour an individual with a tight working schedule or an individual who lives a great distance from the booking office who would like to book a specific vehicle earlier in time.

It is such flaws that actuated the researcher to take on the project of designing an online car rental system. This report therefore, in six (6) chapters, elaborates on the processes and various activities that were involved in developing an online car rental system to solve the disadvantages associated with a manual rental system.

DEDICATION

To my loving parents Mr and Mrs Bayonde James who have whole heartedly supported me through all the walks of my life. May the Lord Bless you abundantly and sufficiently always.

ACKNOWLEDGEMENT

I thank all the stakeholders that have helped, guided and enabled me to accomplish my Bachelor's Degree and in the compilation of this report.

I give thanks and praise to the Almighty Lord God who has brought me this far, protected and looked over me and my supporters at all times.

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LIST OF ACRONYMS

DFD: Data Flow Diagram

ERD: Entity Relationship Diagram

HTML: Hyper Text Markup Language

ID: Identification

PHP: Hypertext Pre-processor

SDLC: System Development Life Cycle

SQL: Structured Query Language

ABSTRACT

Manual car rental is the type of renting where an individual is required to travel to the rental office or find a rental agent and make the renting physically. This process is so draggy and time consuming because it is a long process and it involves the physical movement of an individual to the car rental office.

With the current business trend however, this type of car renting is no longer paragon for both customers and the company. With the customer, it is time consuming and tiring and has limited working hours.

It was therefore ideal to come up with an online car rental system that eliminates the problems involved with the manual car rental system. The online car rental system ensures smooth business operations between the company and the potential customers of the company.

As discoursed in this report, the process of coming up with this system involved identifying the various problems associated with manual booking and then coming up with plan on how to solve these problems. The most logical plan was of designing an online car rental system hence various designs for the system were formulated. Later on, these designs were analysed and compared to come up with the best design. It is the best design that was thus used for completion of the entire system and its implementation using various tools as discussed here within.

At the end of the project, an online car rental system for Mutara Motors, which was the case study, was developed. To find out if it met the desired functionalities, unit, integration and system testing were done on it and it was discovered that it met all the functionalities.

CHAPTER ONE

1.0 General Introduction

A Car Rental System (CRS) was developed for Mutara Motors and this publication is a report from the research project that led to the development of the system. Previously, Mutara Motors relied on a manual file based system of record keeping and transacting business. The new system is to be used by three groups of users and these are the customers, administrators and the staff of Mutara Motors. The purpose of this system was to overcome problems faced by Mutara Motors while using the manual system. The system is therefore intended at smoothening all car rental processes and operations to make them easier to manage and record.

1.1 Project Background

In the company's race to catch up with the globalization of technology, computers have played an important role. A number of organisations have embraced the use of computerized systems in handling a number of their activities including but not limited to data processing and client feedback in order to make the organisations' operations more efficient. Computerised systems work in a way that they duplicate the characteristics of a manual system and convert them to a computerised process. All the manual processes can now be done using a computerised system in a faster and more efficient manner.

1.2 Problem Statement

The daily manual recording of the information as used by Mutara Motors to hire out vehicles is hectic due to the increasing data that needs proper maintenance. The rate at which data goes missing is characteristic of improper management and so a proper and systematic database must be devised to afford data growth and allow user update or to maintain efficiency of data.

Customers are delayed when it comes to searching for the specific vehicle of their interest and it is due to the manual search criteria which includes storage of data of different vehicles in different files which takes a lot of time during the search. Customers should be able to walk in and pick up the vehicle of their interest in the shortest period of time. The customer is limited from some credentials like vehicle type, vehicle makes and models in the chosen type, the seating capacity, and the luggage capacity. Furthermore, some important although little detail is left out like age restriction of the driver and fuel consumption of the vehicles are usually left out due to too much paper work which operates on the only outstanding goals of the company.

1.3 Objectives of the Project

1.3.1 Main Objective

To develop a more efficient and robust car rental system for Mutara Motors

1.3.2 Specific Objectives

1. To study the currently used system so as to find out the requirements of the new system.
2. Design a Car Rental System for Mutara Motors
3. Implement the online car rental System
4. Test the effectiveness of the Car Rental System.

1.4 Scope

The system was developed within a time frame of seven months, from September to April. Its geographical scope of coverage was the Mutara Motors company offices in Kampala along Jinja road opposite Diamond trust bank building. The intended users of the system; the users scope are the company clients, visitors,

company workers and the web administrator. The functionality scope includes but not limited to weekly and monthly report generation among other functionalities.

1.5 System Modules

There are six Car Rental System modules;

1.6 Rental car information

In this module, the user can add, find, view update and delete the rental car information.

1.7 Customer information

Here the user can add, find, view, update and delete customer information.

1.8 Booking

The functioning of this module is for staff to book car for certain dates and time for a specific customer. Customers can also make an online booking according to specific terms and conditions. Besides that, the booking that had been made can also be changed or cancelled according to the terms and conditions.

1.8.1 Renting a car

Here, we view the booking information that had been made and processed with the rental particulars such as the pickup date and time.

1.8.2 Returning the rented car

In this module, when the customer comes to return the rented car, we view the rental information of that specific customer and proceed with the renting calculation. All the particulars are noted for example the date, time and the condition of the car upon its return are noted.

1.8.3 Report Producing

This module is responsible for producing the reports associated with the renting car such as car rental report and statistics from time to time

1.9 Project Significance

CRS has its own significances to its users. Using this system helps the customer in making booking and renting cars easier. Therefore, it overcomes the problems faced by the current manual system. Using this system can also help the Mutara Motors management team to keep track of the entire car renting operation easier and faster. This system does not only help its users in the renting car processes but also lets the renter know the status of the car and whether the car they want is there or not. Therefore, all processes regarding car renting operations can be handled easily and this gives a lot of benefits to Mutara Motors.

1.10 Conclusion

As an overall, CRS is developed to make all the operations regarding car rental easier and more efficient. The system is developed in order to overcome the problems faced by using the manual system. Currently many car rental companies are using the manual system. Therefore, the system is hoping to help the car rental companies in managing the car rental operation besides providing better services to all users involved that is, the customers, staff and administrators. In this chapter, the problem statement, the objectives, the scope and the project significance are being identified in order to develop the system that will be used by the targeted users.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

Literature review means the collection, analysis and drawing of conclusion from all the debate issues raised in relevant body of literature.

In this chapter, the views and opinions of different authors concerning online booking and reservation systems is evaluated. Emphasis is put on the current type of renting system used by the company under study; Mutara Motors. Since I intend to develop an online renting system for the company, the views and ideas of different authors about an online reservation, booking and renting system are collected and presented as an overview of computerized reservation systems. This chapter relates the literature from various sources of data like text books, online journals and reports as well as tutoring websites and various newspaper articles.

Furthermore, the chapter gives and highlights the relationship between online renting and ecommerce as well as the advantages of e-commerce in line with online booking and renting. The storage cabinets for online booking data, the databases, are also reviewed and literature pertaining them is evaluated and compared in line with the research.

2.1 Domain

The car rental system for Mutara Motors is currently a manual system of storage of data. The renting process includes the customer coming to the head offices and making requisitions of the car rented.

The administrator has to give the customer a written document confirming the payment made. The document has to also include

details of the vehicle he or she has rented, including the date of renting and return as well.

2.2 Review of literature related to current Manual Booking Systems

Manual booking systems, as explained by Borovits and Neumann (1988), were the most widely used forms of booking and reservations in the early and mid-1980's. They further explain that there was a reservation clerk(s) or agent(s) at the reservation desk whose task was to receive the booking forms and send them to the Reservation department. In some incidences, these clerks would each be seated at a round table with a chart displaying all schedules and routes for a particular flight [bus] or group of flights [buses]. They further add that when a call came in or a customer walked into the station requiring information or reservation for a particular flight [bus], these clerks would have to look for a particular chart that has information about the flight [bus].

This was so tedious or tiresome since the chart concerning the particular service would be in use by another clerk or misplaced somewhere within the office. Back in the 1980's, a pencil and eraser would be used to add, edit and delete customer information on the reservation charts.

These always came in handy since it was necessary at all time to add customer information onto the charts. The writers further note that these charts were used for generation of data that was used to compile weekly and monthly reports.

Since the early 1990s, the Information and Communication Technologies (ICTs) and most of all the emergence of the Internet has introduced a second industrial revolution which has brought along rudimental changes not only for the business world but particularly also for the general public. This is especially becoming evident in the development of the Internet into a

virtual market space which is allowing the connection of the global demand and supply at the touch of a button. Moreover, the Internet has turned out to be the fastest growing medium of all time and today already 64 % of the world population is having access to the Internet.

According to (Anon., 2013), the following consumer guarantees are relevant to motor vehicles rented by a consumer:

1. Suppliers and manufacturers guarantee that motor vehicles are of acceptable quality.
2. A supplier guarantees that motor vehicles will be reasonably fit for any purpose the consumer or supplier has specified.
3. Suppliers and manufacturers guarantee that their description of motor vehicles (for example, in a brochure or television commercial) is accurate.
4. A supplier guarantees that motor vehicles will match any sample or demonstration model.
5. Suppliers and manufacturers guarantee that motor vehicles will satisfy any extra promises - or "express warranties" - made about them
6. A supplier guarantees "undisturbed possession" or that no one will try to repossess or take back motor vehicles, or prevent the consumer using them, for the term of the lease or hire agreement (except in certain circumstances).

Consumer guarantees cannot be excluded even by agreement and this is according to (Jennifer Flowers, 2011).

2.3 Major vs minor failures of consumer guarantees

According to (Avis, 2014; Anon., 2013), When a rented motor vehicle fails to meet a consumer guarantee, your rights and obligations depend on whether the failure is major or minor.

2.3.1 Major failures

A major failure to comply with the consumer guarantees is when

- A reasonable consumer would not have rented the motor vehicle if they had known about the full extent of the problem.
- The motor vehicle is significantly different from the description, sample or demonstration model shown to the consumer.
- The motor vehicle is substantially unfit for its normal purpose and cannot easily be made fit within a reasonable time and according to (Anon., 2012) the customer is free to ask for either refund or compensation with another car.
- The motor vehicle is not in good conditions for a purpose that the consumer told the supplier about, and cannot easily be made fit within a reasonable time and the customer in that case is free to either ask for compensation or a refund equivalent to the price paid for renting a specific vehicle.
- The motor vehicle is unsafe.

2.3.2 Minor failures

A minor failure to comply with a consumer guarantee is where a problem with a rental vehicle can be fixed and does not have the characteristics of a major failure. A minor failure does not initially allow the consumer to reject the vehicle and demand a refund, replacement or compensation for the difference in value. When the failure to comply with a consumer guarantee is minor, you can choose between providing a repair in a reasonable time

or offering the consumer a refund or an identical replacement (or one of similar value if reasonably available (Anon., 2013)).

2.3.3 Consequential loss

(Pearl of Africa Tours and Travels, 2012) clearly states that a consumer can claim compensation for any consequential loss arising from a failure to meet one or more of the consumer guarantees. You will have to pay for losses that could have been expected to result from that failure and were reasonably foreseeable. You would not have to pay for problems unrelated to your conduct or the products you supplied; or losses caused by something completely independent of your business after the rented vehicle left your control.

According to (Anon., 2013) If you use standard form car rental contracts, you must ensure these comply with national unfair contract terms laws. These laws are part of the ACL. Unfair contract terms laws protect consumers against contract terms that:

- would cause a significant imbalance in their rights and obligations under a contract
- are not reasonably necessary to protect the business
- Would cause detriment (financial or otherwise) to a consumer.

(Muneza, 2014) States the examples of terms that may be considered unfair including those allowing the business to:

- cancel or vary the terms of the contract, without allowing the consumer to do the same.
- make the consumer liable for things that would normally be outside the consumer's control prevent the consumer from

relying on representations made by the business or its agents.

- charge the consumer's credit card without giving the consumer notice or an opportunity to dispute the charges
- forfeit a security bond for any breach of the contract, that is, even if there is no causal link between the breach and the forfeiture.
- avoid liability for negligence
- Increase the fees and charges payable without the right for the consumer to terminate (free of any penalty).

According to (Slogget, 2013) to comply with unfair contract terms laws, you must ensure your contracts do not contain any unfair terms. It is not enough that you consider that applying your policies, procedures and discretion will ensure consumers are dealt with fairly in your view. If a court finds a term is unfair, that term is treated as if it never existed. If the contract can operate without the unfair term, it will otherwise still be binding.

A lack of transparency regarding a term in a standard form consumer contract may cause a significant imbalance in the parties' rights and obligations (Anon., 2013). A term is considered to be transparent if it is:

- Expressed in reasonably plain language
- Legible
- Presented clearly
- Readily available to any party affected by the term.

Examples of terms that may not be considered transparent include terms that are (Anon., 2013):

- Hidden in fine print or schedules
- Phrased in complex or technical language.
- Change of vehicle if you provide a consumer with a different type of vehicle from the one they booked, this is likely to be a breach of contract and may also raise a number of possible breaches of the ACL, depending on the circumstances.

According to (Anon., 2013) Some standard form car rental agreements enable businesses to substitute alternative vehicles without prior notice and without any compensation to the consumer should the substitute vehicle not meet the consumer's needs. However, according to the unfair contract term legislation, this type of term is likely to be regarded as unfair if it permits the operator to unilaterally vary the characteristics of the goods or services to be supplied under the contract.

According to (Travel Jigsaw Limited, 2012) When renting, customers often want to pick up a car and get away quickly and the business wants to help them do so. Within this environment, it is crucial that information available at the point of verbal explanations, forms, pamphlets, signs - does not mislead customers about key issues such as liability when things go wrong. (Anon., 2013) Further says that it is illegal for a business to make statements that are incorrect or likely to create a false or misleading impression. You also need to consider the overall impression your information makes. You cannot rely on small print and disclaimers as an excuse for a misleading overall message. This applies to damage cover that is supplied as part of the ordinary cost of hiring or at an additional cost to the hirer. Even such factors as the name of

the cover product and the impression that it creates are important.

(Avis, 2014) States that you should be particularly careful when explaining cover options at the counter when the consumer is collecting a vehicle. Your business must not create the impression that the consumer will get a greater or more extensive level of protection from liability for damage than is actually the case. This could be misleading conduct or a false representation.

According (Master Car rental, 2002) you cannot hold a consumer responsible for any pre-existing damage to a vehicle. You can help prevent disputes over alleged pre-existing damage by providing consumers with a pre-existing condition report (also called a 'vehicle damage report') when they hire a car. You cannot ask a consumer to acknowledge the vehicle is in an undamaged state unless you have provided them with this report and they have had an opportunity to inspect the vehicle.

(Master Car rental, 2002) Also says that a pre-existing condition report should only cover panel and other visible, external damage. You cannot require a consumer to attest to the mechanical condition, safety or roadworthiness of a vehicle, as they cannot ascertain these things. You are responsible for a vehicle's maintenance and general upkeep before it is hired, including ensuring it is roadworthy.

Online Renting Systems, Database and Database Management Systems Teach-ict.com; an online ICT tutoring website explains that a desired renting or booking system should have a stable database. A stable database is instrumental in the working of an online booking system because it provides a virtual file for the storage of all transactions done using the booking system. The site

further explains that a stable database is paramount when designing a booking system that is meant or targeted to accommodate multiple users and customers.

Raghu et al (2003) define a database as collection of data, typically describing the activities of one or more related organizations. A database relates various kinds of information for the organization or related organizations. A database uses a database management system to carry out its activities. They further explain that a Database Management System (DBMS) is software designed to assist in maintaining and utilizing large collections of data. It is a computer program that interacts with the database by issuing an appropriate request (typically a Structured Query Language statement) to the database management system according to (Thomas et al 2005)

2.4 Advantages and disadvantages of database management systems

Catherine (2005) explains the various advantages of a desired Database Management System (DBMS). A DBMS supports the sharing of data between various users. DBMS helps to control data redundancy data items are not replicated in different files and this ensures consistency and saves the storage space. DBMS ensures data consistency for the organization, improves the organization's data standards and it ensures data security. DBMS fosters the development of new applications within the organization and it helps in balancing of conflicting data storage requirements. DBMS ensures better data accessibility and improves the economies of scale of the organization

Despite the advantages of the DBMS, Catherine (2005) further states that DBMS have various disadvantages that are associated with them. They have high costs of conversion from the file based systems to the database systems. DBMS also have higher costs for the hardware used and slow processing of some

applications due to the volume of the database. DBMS have increased vulnerability and more difficulty in recovery in case the system breaks down.

2.5 Online Renting and E-Commerce

Järveläinen (2003) compliments Thomas (2009)'s statement by adding that Online travel agencies are major players in boosting e-commerce operations in the world today. He further notes that online renting procedures possess the characteristics of an online marketing process.

Processes like advertising, consumer's sales promotions and discounts, payment and money-back guarantees as well as secure payment processes characterize online booking. These characteristics are similar to the characteristics of e-commerce. It is therefore of utmost importance to analyse online renting processes in line with e-commerce operations.

Perrault and McCarthy (2005) describe e-commerce as an exchange between individuals or organizations and the activities that facilitate this exchange based on application of information technology. E-commerce can also be defined as the means of conducting business electronically to provide goods, information and services using internet technologies. (Ashford et al, 2009).

Online booking is a form of e-commerce since it involves conducting of business online or over the internet. E-commerce and internet technology have successfully duplicated various elements of offline or traditional commerce and marketing. Such features include good location, strong retail activity, secure payment, fast delivery, ready availability and strong customer service.

Introducing e-commerce into one of the processes of transportation is that the internet is also one of the mediums

of communication and often, online renting can be easier than queuing up.

E-commerce is advantageous because it allows people to carry out businesses without the barriers of time or distance. The direct cost-of-sale for an order taken from a web site is lower than that done through traditional means. Furthermore, electronic selling virtually eliminates processing errors, as well as being faster and more convenient for the visitor. Ecommerce is also considered the cheapest means of doing business especially if it is done over a large geographical area. From the buyer's perspective, ecommerce offers a lot of tangible advantages like the reduction in a user's sorting out time or time taken in making a decision over what item to purchase. E-commerce helps a buyer make better decisions since he/she has access to a variety of online shops just by a click of a button. When conducting e-commerce, less time is spent in resolving invoice and order discrepancies as well as increased opportunities for buying alternative products. E-commerce helps improve customer service through emails, comments and customer requirements that are collected through blogs and guest book signings. Most important of all, e-commerce has better business or working hours since it is operational 24hours and 7 days. As a business cost cutting process, e-commerce eliminates supervision costs and thus increases the rate of business turnover or profit.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter discusses the approach used to achieve the objectives of the project. It describes the techniques of data collection used in the research study of the proposed system

3.1 Target Population

The research targets the customers, staff and management personnel based at the head office in Kampala, Uganda. This is because they are the major users of the old system and are the targeted users of the system to be developed.

The customers are the people who rent from the company. The staff and management are the workers of the company who will use the system for data management among other uses. Management, being the decision makers of the company were also included in the target sample population because they generate the company reports

3.2 Data and Requirements Collection

In this section, an analysis of all the methods and tools that were used to collect data is made.

3.2.1 Data Collection Methods

Data for the proposed system was collected using the methods below:

3.2.1.1 Archival Analysis and Review

Accessible archives, reports and records of the company concerning renting were accessed and analysed to gather information about the current system. This was possible since the company still employs the File Based System of record keeping. Furthermore, the researcher analysed them in order to discover the type of information that has to be included in the database. This was necessary since this information was necessary for the development of an efficient database for the system. Renting reports and payment reports were the major emphasis given the fact that even the new proposed system has to tackle report generation. Staff employees were also studied and analysed to find out their roles and contributions in the renting process.

3.2.1.2 Interviews

Structured interviews with open ended questions were used for interviewing various respondents who included among others, Kelley McTavish the managing director of Pearl of Africa Tours and Travels, Mikyera Rudahingwa a tourist who uses Safari Tours and Travels besides Mutara Motors cars on personal businesses.

3.2.1.3 Observation

This technique was used to gather accurate information about how the system actually operates, particularly about processes. It involved the active participation in the booking processes to achieve a personal feel of the renting process of Mutara Motors. The activities were closely participated in and documented down. The activities observed included the renting process that required a customer to fill a form of the requirements of the

vehicles they needed, the administrators had to give written and detailed documents to the customer confirming payment and the vehicle rented out, the date of renting and return.

3.2.2 Data Collection Tools

These tools refer to the various instruments that were used to collect data from the respondents.

These were;

3.2.2.1 Interview Guide

This is an outline of different questions that were used during an interview. The interview guide comprised of structured open ended questions that were aimed at finding respondents' views about the current booking system. This guide was used to keep the interview on track so that it could be in position to guide the researcher in answering the various research questions. The interview guide was also used as a yardstick and a reminder about the necessary questions to ask so that the research objectives could be met.

3.3 Design Methodology

The following tools and techniques were used to design the system.

3.3.1 Design tools

Design tools are the various tools that were used to ensure thorough, complete and comprehensive design of the system.

3.3.1.1 Entity Relationship Diagrams (ERD)

Entity Relationship Diagrams illustrate the logical structure of databases. They show the relationships between the different entities of a database. Therefore, the use of these ERDs helps to highlight the relationships between the various entities to be included in the database of the proposed system. The data

that was collected from the managers and top officials of the company comes in handy at this stage. This data was compiled and organized together to come up with the required entities for the proposed system's database.

ENTITIES	ATTRIBUTES	ENHANCEMENT FEATURES
ADMINISTRATION	Id fname lname username pwd	Int(11), primary key, not null, auto increment Varchar(25) , not null Varchar(25) , not null Varchar(25) , not null Varchar(250) , not null
RENTINGS	id first name last name credentials travel_id capacity date time	int(11), primary key, not null, auto increment Varchar(25), not null Varchar(25), not null Varchar(25), not null Varchar(25), not null

		Varchar(25), not null time, not null
CAR INFO	id car type	Int(11), not null Varchar(25), not null, primary key Int(11), not null
CUSTOMERS	Id Customer first name Customer last name Credentials	Varchar(25), prim key, not null, auto increment Varchar(25), not null Varchar(25), not null Varchar(25), not null
DISTRICTS COVERED	Id Name Car type	Varchar(25), prim key, not null, auto increment Varchar(25), not null Varchar(25), not null
PAGES		

Table 1: an Entity Relationship Diagram table for the system

3.3.1.2 Data Flow Diagrams (DFD)

These are Hierarchical Input Process Output (HIPO) charts supported by documentation. They help to show the relationships between data and its flow within the system. In this case, the data that was collected during the research stage is categorically compiled to come up with various data types. The relationships between these various data types is shown and

demonstrated using the DFDs. Computer-Aided Software Engineering (CASE) tools were also used to provide automated assistance during the development of these DFDs to ensure that the requirements are complete and consistent.

3.4 Implementation

This section elaborates how the system was implemented

3.4.1 Notepad ++

Notepad++ is a text editor and source code editor for windows. It is a lightweight and robust editor for a variety of programming and scripting languages. Notepad++ supports tabbed editing which allows working with multiple open files. Therefore, Notepad++ was used in editing the various user interfaces of the new system and linking up of these interfaces together with the various programming languages and the interfaces themselves.

Notepad++ was used because it has the drag and drop speller checker for both text and code thus omitting any errors. Notepad++ has the brace and indent highlighting features which enable a user to know the particular section he/she is working with. Furthermore, it has smart programming and scripting languages, highlighting, syntax highlighting and folding as well as line sorting and text folding features that are user friendly. Since it supports PHP and HTML, it was chosen as the text editor for the online renting system for Mutara Motors.

3.4.2 PHP

Hypertext Pre-processor is an open-source server-side scripting language designed for web development to produce dynamic web pages. It is embedded into HTML (Hypertext Mark-up Language) rather than calling an external file to process the data. It is

a general purpose scripting language that is especially suited to server-side web development where it generally runs on a web server. Therefore, PHP was chosen as the scripting language for the online booking system because it is compatible with most web servers and operating systems. It can be used with many relational database management systems. It is also advantageous since most web hosting providers support PHP for use by their clients.

PHP has other various advantages over other programming languages which include the fact that it is an open source software hence it is completely free. It can easily be embedded directly into HTML and it is platform independent since it can run on Windows Linux or Mac servers. PHP also runs faster on the internet and easily integrates AJAX, Callback and other programming languages. PHP is as well advantageous because it interfaces very easily with Apache/MySQL and it has lots of good books and on-line help about it hence easy to learn and understand. PHP is available with documentation in many languages thus easier to learn as compared to many other scripting languages. It has a syntax that is easy to parse and is actually rather human friendly.

PHP was used as a general purpose scripting language to develop dynamic web content and it was embedded in HTML. It was also used to link forms in the user interfaces with the database, create sessions and store user information in the database since it has robust support for object oriented programming.

3.4.3 Adobe Photoshop

Adobe Photoshop is one of the most popular professional graphic editing software packages and it is highly ranked among the main programs used for website creation by web designers and developers. It supports a huge number of tools for creation of web graphics. With Photoshop, it is possible to easily create a

website's layout using a set of vector based tools, different shapes, styles, gradients and masks. Once the website design is finished, Photoshop offers the option of slicing up the created image for use in the final website. It also offers the option of 'Saving forweb' all the PSD (Photoshop Document Format) projects in various web optimized formats including the popular .JPG and .GIF.

Photoshop has various advantages among which is the ability to enhance colours in images and photographs which helps to create more beautiful and attractive images. It also has a vast collection of tools like the pen, gradients, masks and vector shapes among others that can be used in image editing. Photoshop can save projects in a variety of formats like web graphics, jpegs, pdf and psds which gives a user independence and choice over which format to work with.

Photoshop can be used on various operating system platforms which in turn support and enable various users.

Photoshop was so instrumental during the project because it was used for the creation and editing of the various web graphics used in the system. It was also used in the editing and enhancement of the photos and pictures that were used in the system's gallery.

3.4.4 Adobe Dreamweaver

Adobe Dreamweaver is a site building and publishing tool that is appropriate for intermediate to advanced users to create and edit web pages and applications using a graphical interface and built-in advanced design and coding features. Adobe Dreamweaver was used to create and edit web pages. Dreamweaver is the only web design software that develops web pages that can be viewed by all web browsers with relatively quicker development time as compared to other web site development softwares (*adobe.com*). Through the use of spry data and java scripting to handle dynamic

data, Dreamweaver replaces back-end databases hence being easier to integrate into both new and existing systems. Dreamweaver offers table less layouts for web pages since images and text no longer need to be placed in tables. It furthermore offers the developer a split screen for the display of the code being worked on and also the other half screen for a visual representation allowing for WYSIWYG (What You See Is What You Get) development. It is for such features and advantages that Adobe Dreamweaver was chosen to be used for the development of website that will house the online booking system.

3.4.5 Cascading Style Sheets

w3c.com states that HTML (Hyper Text Markup Language) HTML was never intended to contain tags for formatting a document; it was only intended to define the content of a document.

However, the need to include styles for the web pages led to the introduction of Cascading Style Sheets. CSS defines how HTML elements are to be displayed.

These styles are normally saved in external .css files. External style sheets enable you to change the appearance and layout of all the pages in a Web site, just by editing one single file.

Cascading Style Sheets were thus used in the Graphical User Interface of the system and the website to create an attractive and more beautiful interface. CSS sheets were used in the system through linking them to the Photoshop images hence creating an attractive interface.

3.4.6 MySQL

A relational database design was used to design the database. A relational database management system (RDBMS) is an excellent tool for organizing large amount of data and defining the relationship between the datasets in a consistent and understandable way. MySQL database management system was used

to build the system database since it is scalable and hence can accommodate large amounts of data and also provide high level security for stored information.

MySQL runs on many different operating systems including Linux and Windows and offers a lot of improvement over previous versions.

MySQL is an open source Relational Database Management System (RDBMS) that was used to create the database and tables that are required to store data entered by the user.

MySQL was used to create the database since it can accommodate large amounts of data and has high security for shared information. MySQL is a relational database management system that interacts with Structured Query Language (SQL), a tool used to manipulate data within the database. MySQL runs on popular OS (Windows, Linux, and MacOS) and it is easy to learn since its tutorials are extensively documented on the internet and there are many books on the subject. It is also portable because it occupies a very small disk space and it's cheaper to purchase as compared to other database Management Systems like ORACLE.

3.5 Implementation Methodology

Implementation of the system was done using the System Development Life Cycle (SDLC). The SDLC is a standard process followed in an organization when building and application. The SDLC consists of four major phases and processes. These were followed during the implementation of the proposed system.

3.5.1 Planning

At the planning stage, preliminary investigation of the problem was done and the reasons as to why the system should be developed were stated.

These are;

1. Lengthy booking process
2. Poor storage and management of customer records
3. Inadequate information concerning the travel routes

3.5.2 Analysis

At the analysis stage, the system requirements were determined through studying the current system. Various alternatives for the system were generated and compared so as to come up with the best recommended alternative.

3.5.3 Design

The logical and physical designs of the system were then developed with special emphasis put on both the business and technical aspects and specifications of the system.

3.5.4 Implementation

For implementation, emphasis was put on the installation of both hardware and software components of the system to ensure its running.

It is at the implementation stage that the running system was launched for performance and hence ready for testing.

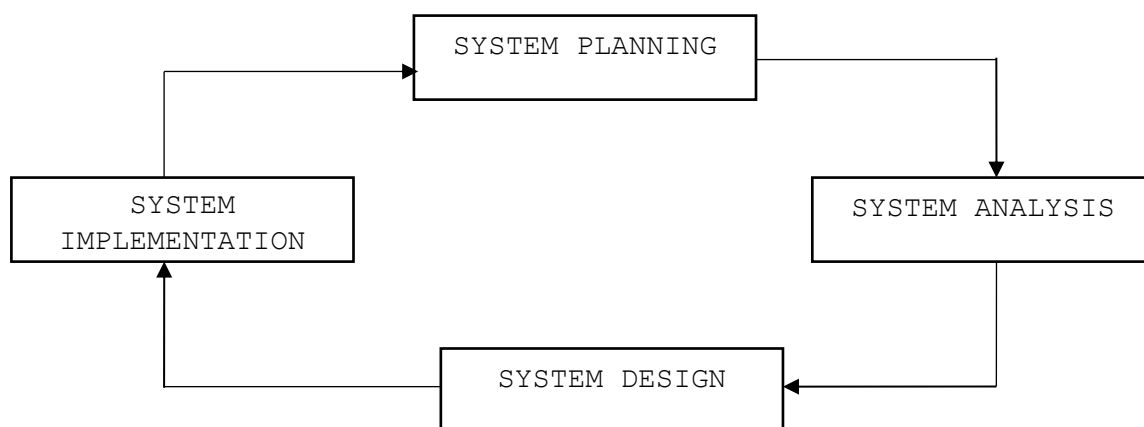


Figure 1: illustrates the System Development Life Cycle

3.6 Testing Methodology

Unit, integration and system testing were used to test the system.

MySQL, HTML and PHP scripts were run independently to test the system's functionalities under unit testing. Later, integration testing was carried out to test the compatibility of the various system components. MySQL was used to create and connect relational tables to the database. HTML was used to develop the GUI. PHP was used to process queries and request flash to integrate sounds and interfaces was done to develop the model that meets all the requirements of this system. System testing was carried out under different running environments like windows XP, 7 and 8 as well as Linux and IOS.

3.7 System Architectural Design

The system employs a two tier architecture which organizes the system into two layers. The user interface is the first layer and this is the view which is basically seen by all users. This layer acts as the client by sending queries to the database. The other layer is the data management layer which is concerned with data storage and management. It acts as a server and it sends data in response to queries sent by the client or user interface layer. The two layers are joined together by the application logic.

3.8 Conclusion

The online car renting system requirements were compiled from the data that was collected and analysed using the methods mentioned above.

The following chapter clearly elaborates and studies the current car rental system used at Mutara Motors.

CHAPTER FOUR

SYSTEM STUDY AND ANALYSIS

4.0 System Study

In this chapter, the findings from the data gathered and results of the analysis of this data are presented. The various strengths and weaknesses of the system were also studied and analysed in order to come up with the functional, non-functional and user requirements of the system.

4.1 The Current System

In this section, the pros and cons of the current system are presented. These were identified during the data collection stage and hence this section elaborates them.

4.1.1 Renting procedure

The current renting system at Mutara Motors is an entirely manual rental system.

Customers have to physically visit the Mutara Motors renting office to make the necessary booking. The renting office is open from 7:30am to 9:30pm to give customers ample time to make their choice of car for rent.

Before renting a car, the customer checks all the available vehicles so as to choose one of his choice according to the luggage he has and the number of people he or she is with that will use the car as well. After confirmation of the vehicle of his or her choice, he or she then goes ahead to make payments as agreed so as to hire the vehicle, he or she can choose to pay fully or at least make 40% payment . During the process, it will necessitate a customer to provide a few of his/her details. These details include the name, physical and emergency addresses, phone contact and the day the vehicle will be returned. After all this, the customer is issued with a receipt

to confirm the payment made and as per as the company's terms and conditions the receipt is valid for 20 days and payments are not returnable.

4.1.2 Records Monitoring and Storage

The company employs a manual system of record storage. In this system, the completed or used up log books containing customer data and details are stored in the archives section of the company. The used up receipt books are also stored in the same section as the log books. The log books; as earlier explained contain customer data and records while receipt books on the other hand contain duplicate paying information about the customers. Therefore, these books are kept to provide future reference for the management.

4.1.3 Report Generation

The company generates monthly reports that are used to gauge the financial state of the company. These reports encompass all the credit and debit arrears of the company.

The receipt and customer log books are used to generate and formulate the reports. This is done through the analysis of the issued out receipts in line with the number of people in the customer log book. These are matched together to find out the total number of hire outs carried out

4.2 System Analysis

During the research, the various strengths and weaknesses of the existing system were analysed.

This section, therefore, highlights both the strengths and weaknesses of the already existing system.

4.2.1 Strengths of the Existing System

The existing system proudly boasts of various strengths. These, according to Mr. Mutara Michael, the Mutara Motors manager, have enabled the company remain in business for a long time since its inception.

The current system ensures the one-on-one interaction between the company's employees and the customers. This ensures the proper addressing of a customer's needs and requests hence maximum customer satisfaction.

The existing system also ensures timely payment by the customers which in turn helps the company plan adequately for all the facilities for example fuelling the vehicle, servicing it among others. Timely payment is ensured in two ways; one is through paying at least 40% of the journey fare as a renting fee after payment or paying of the total fare for the journey immediately after booking the vehicle for use.

4.2.2 Weaknesses of the current system

Despite the existence of the current system's strengths listed above, various weaknesses also exist. There is poor storage of customer records and data. Records can easily be manipulated by any person who gets access to the storage section of the company and there is a high risk of damage due to moisture, rodents and fire.

Retrieval of records when using the current system is difficult given fact of the storage system of the records.

With the system currently being used, generation of reports is very hard and tiresome. This is because a critical analysis of all customer log books and receipt books has to be done independently. The reports, which are required for managerial purpose at times possess loopholes because of the lengthy and tiresome process involved in compiling the reports.

4.3 System Requirements

Taking consideration of the system analysis showed above, the user, functional and non-functional requirements for the new system were determined

4.3.1 Functional Requirements

These refer to the various capabilities and functions that a system must be able to perform successfully. Therefore, the proposed system shall possess various capabilities which are;

1. Login

The system shall provide a login page that allows only authorized users with valid usernames and passwords to gain access to the database.

2. Enable Various Types of users to access the system

The system shall enable access to various types of users. It will have the system administrator who will be able to add, delete and view all registered users with their login credentials. This will give users different access rights to the users depending on their status and role in the company.

3. Carrying out bookings

The system shall enable the customer to hire the vehicles of their choice from the company. The customers shall have to visit the system so as to do their hiring.

4. Confirmation of bookings

The system will also be able to perform and send confirmation messages of booking to the customers. This will be through the issuance of a message confirming the availability of the car to be rented.

5. Collection of user views and comments

The system shall be able to collect user views, comments and suggestions about the company's services and in turn address them to the management.

6. Storage of customer data and records

The system shall be able to receive, store and retrieve customer details and data.

7. Generation of reports

The system shall be in position to produce and generate weekly, bi-weekly and monthly booking reports for the company.

4.3.2 User Requirements

User requirements refer to the various requirements or advantages users require from a system.

1. Security

The various users of the system require assurance about the security features of the system.

This is achieved through providing various access levels to the various users of the system.

Customers do the booking using the system, Mutara Motors staff is able to view the various bookings of various vehicles, and management is able to generate reports and the database administrator is able to add, edit and delete existing users.

For the case of payments, users require assurance of safe and secure transactions when using the system.

2. Accessibility

The system should be readily available to all users at times or whenever required. This implies that users are not stuck with the rigidity of any time of the day anymore.

3. Speed

Users require a quick and speedy system that is able to execute tasks and produce timely and accurate results despite the number of users using it concurrently.

4. User Friendly System

The system should be user friendly and easy to understand with a simple logical interface that can be understood and followed easily. It also has graphical illustrations that enhance proper navigation.

5. Efficiency

The system is able to provide the correct results when correct input has been fed into it and prevent the users from making mistakes by validating their input. It also displays informative alerts and warning messages that trigger the user's attention in case of wrong or incorrect inputs.

4.3.3 Non Functional Requirements

Non-functional requirements refer to the added advantages and abilities that supplement a system's proper working in addition to its functional requirements.

1. Response times

The system should have a quicker response time as compared to the current system. This will be achieved through the use of light graphical illustrations to decrease on the screen refresh times and loading speed.

2. Query and Reporting times

For the case of query and search results, the system shall be in position to provide quick and faster querying of the database in order to save user's waiting time.

3. Capacity and Scalability

The system should have the ability of handling a number of users at a given period of time concurrently. It should also have the ability to be installed on various servers but serving the same functions all through.

4. Storage

The system should have the ability to store large amounts of customer data and details for a very long period of time of over 1 year. This implies that the system shall be able to handle the high volume of the company's customers.

5. Growth Requirements

The system should also be in position to handle the growth and extension requirements of the company. The system should allow growth, extension and upgrading.

6. Availability

The system should be available at all times for the users despite their access levels or user rights.

7. Backup time

The system should be able to backup data automatically to a secondary storage to avoid or prevent any data loss in case of system failure or crash down.

8. Duplication

The system should not allow two or more users to have the same username or password for logging into the system.

9. Validation of Entries

Data integrity must be enforced by preventing the system from accepting wrong entries. Data should be validated at entry level.

4.3.4 Hardware Requirements

For the system to operate effectively, there are particular requirements that the running environment should fulfil. Below are the hardware and software minimum requirements for the system;

1. Hardware

RAM with at least 512 MB of capacity

Hard disk space of at least 8GB

Uninterrupted power supply (UPS)

800 × 600 resolution monitor

Pentium 3 or above processor

Backup external drive of at least 20GB

2. Software

_ Windows XP, 7 or 8, Linux operating systems

_ Wamp Server

_ Antivirus (Preferably Avast anti-Virus)

_ Web browser

4.3.5 Organizational requirements

The ticketing department personnel, who will be the major users of the system, need basic training on how to perform tasks using the new system. They should as well have basic knowledge about

computing and information technology. Therefore, some resources have to be put aside to train users on how to operate the system. The customer side, on the other hand will have basic steps and easy to understand procedures on how to make a booking.

4.4 Major functions of the new system

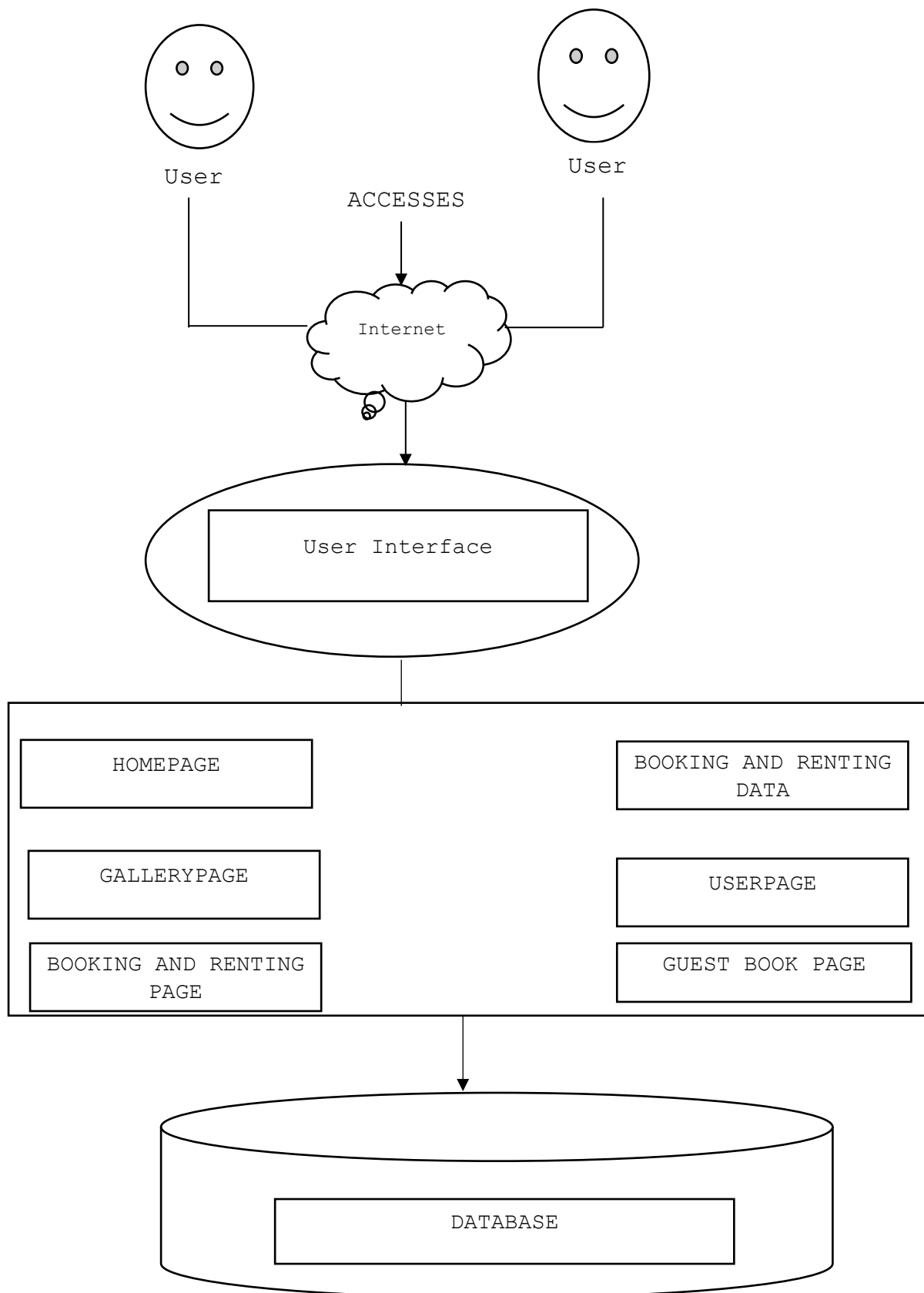
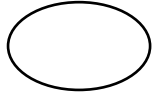


Figure 2: Major functions of the new system

The following figures have been used in the illustration above;



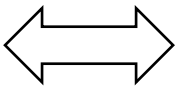
This is an emoticon and it illustrates the user of the system



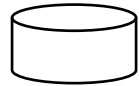
This is an oval and it displays a process in the system



The rectangle displays results of the processes within the system



This is a double sided arrow and it displays both input and output functions



The cylinder represents the database in the system

Figure 3: Logical System Design showing various processes carried out by the users

4.4.1 Home page Module

Through the Home page Module;

- Administrators can log into the system
- Customers can view and find rent tips and customer guarantees.
- Users can find out more about the company through the about us section

4.4.2 User Module

This particular module is the interface for the ticketing department personnel who will be using the system.

4.4.3 Bookings and Renting Module

Through this module;

- Customers can set up bookings of the vehicles of their own choice
- Customers can pay online the renting fares
- Administrators can log onto the system to view bookings data
- Customers can view travel security tips and advice

4.4.4 Booking Data Module

This module displays various users' booking data. This data is used for search queries and also generation of reports.

4.4.5 Gallery Module

This module helps in showcasing various graphical illustrations of the company's activities like the various vehicles and personnel of the company.

4.4.6 Employee Module

This module maintains all relevant employee related information. All information about an employee can be entered here. Information captured in this module is utilized by all other modules, this eliminating data redundancy. The Employee Module will be available to the admin with full control.

4.4.7 Guest Book Module

The Guest Book Module is the page on which the various employees and customers will post their comments, suggestions and grievances about the company's services. This particular module will also display past guest book entries for other visitors to read through.

4.5 Future System Users

This section highlights the future and proposed users of the new system. These include;

4.5.1 Customers

These are the one of the major users of the system. Customers refer to the various individuals or groups of individual who have the intention of using the company's services in terms of travel.

These will carry out the major function of the system which is booking and renting. Customers and other visitors to the system's website will also post and send views about the company's services.

4.5.2 Employees

These are the employees of the company who are directly concerned with the hiring out of the vehicles.

These will need to log into the system to view the various bookings data of the customers. They will also generate search queries from the user data.

4.5.3 Company Management/Administrator

This category encompasses the various members of the management team of Mutara Motors.

These will need administrator privilege access to facilitate the generation of reports, addition, removal and editing of user accounts.

The diagram below is a logical system design and it illustrates the different activities done by users using the system.

It illustrates the various activities carried out by the administrator, employees and customers of Mutara Motors using the new proposed system.

Figure 4: Logical System Design showing various processes carried out by the users

4.6 Flow Chart Diagram for the system

The flow chart diagram shows the various states of objects and their states in the system elaborating the way they flow from one activity to another. It shows the chronological sequence followed by the system to accomplish the tasks at hand. The diagram illustrates the online booking system processes and the modes of connection between different actions for the system.

DATAFLOW DIAGRAM

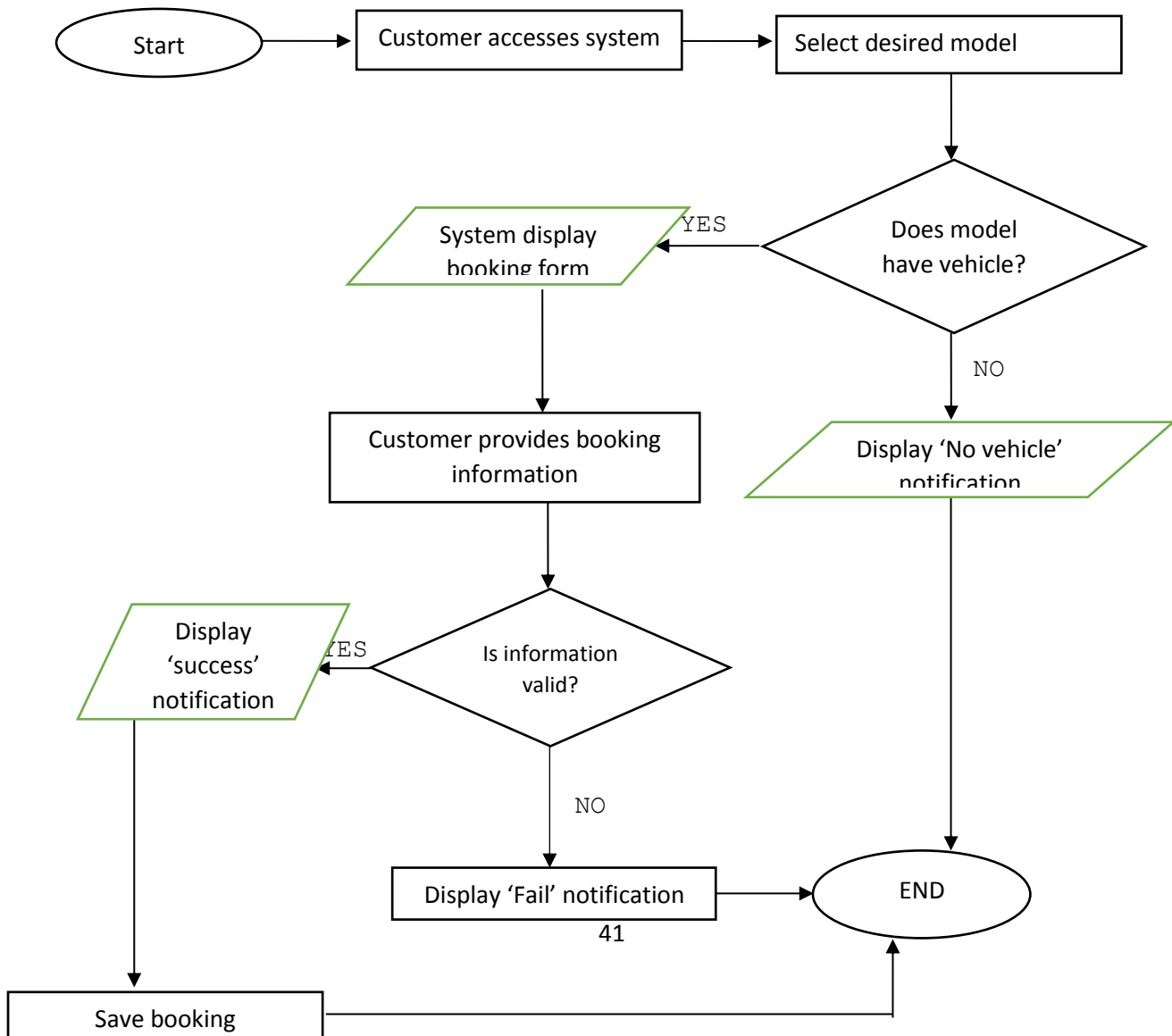
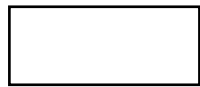


Figure 5: Flow Chart Diagram for the system

The program Flow Chart Elements Used

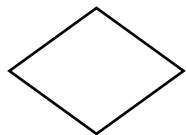
The following are the component used in the program flow chart:



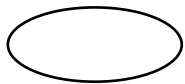
Indicates a set of processing operations



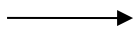
Represents input and output operations



This indicates the process of logic in a program that is aimed at getting an answer to a question or may be testing any conditions.



This indicates the process of logic in a program that is aimed at getting an answer to a question or may be testing any conditions.



The arrow indicates the direction of flow of information within the program

The system is an online booking system and hence it requires an internet connection to run and work efficiently and effectively. Having been connected to the internet, customers can easily utilize various features of the website for the company like viewing the gallery page, home page, terms and conditions, travel tips among other details. The customers can furthermore write comments, grievances and suggestions and in turn submit them to the company's database. It is with this submit feature that customers can still make bookings through submitting their

personal, renting and payment details to the company. As a security measure, the system has an authentication stage that requires a username and password to login. This security feature ensures authorized access since only administrators and employees can log into the system.

Employees can view renting data, employee lists and data, comments, suggestions, grievances and the payment records/details of customers. Administrators can on the other hand edit employee/user details in the system. Furthermore, they can generate booking, payment and travel reports. They can also utilize the system just like customers and employees.

4.8 Benefits and Cost of the proposed system

4.8.1 Benefits

Through the adoption and installation of the new proposed system, Mutara Motors will enjoy the following benefits;

There will be electronic data storage which will in turn lead to saving of the space occupied by the files in the office. This will in turn ease up data retrieval, sorting and processing thus improving the work efficiency of both employees and the company at large. There will also be improved data security since only authorized users will be the only one to access information. Furthermore, data integrity will be maintained but at the same time ensuring sharing of data amongst employees and the management. This system will also improve the quality of reports generated by the company.

4.8.2 Costs

For the proposed system to run efficiently, various costs were identified. These costs will be directly incurred by the company before and after the system has been implemented. The costs include;

The company will have to incur costs of procuring the required hardware components of the system as per set minimum requirements. The company will furthermore have to incur the costs of buying and installing of the required software requirements of the system and other peripherals like printers. More costs will also be incurred on user training to enable future users know the different functionalities and operations of the system. Costs will be incurred on employing or consulting various technical people such as programmers to maintain the system in good running order. The company will also incur installation costs and web hosting costs over the internet.

5.6.1 Admins table

This is the table that shows all the administrators of the system. The screenshot below describes the admin's table using a screenshot from phpMyAdmin.

Table	Action	Rows	Type	Collation	Size	Overhead
<input type="checkbox"/> columns_priv	Browse Structure Search Insert Empty Drop	29	MyISAM	utf8_bin	30.9 KiB	-
<input type="checkbox"/> db	Browse Structure Search Insert Empty Drop	3	MyISAM	utf8_bin	6.3 KiB	-
<input type="checkbox"/> event	Browse Structure Search Insert Empty Drop	0	MyISAM	utf8_general_ci	2 KiB	-
<input type="checkbox"/> func	Browse Structure Search Insert Empty Drop	0	MyISAM	utf8_bin	1 KiB	-
<input type="checkbox"/> general_log	Browse Structure Search Insert Empty Drop	2	CSV	utf8_general_ci	unknown	-
<input type="checkbox"/> help_category	Browse Structure Search Insert Empty Drop	40	MyISAM	utf8_general_ci	25.7 KiB	-
<input type="checkbox"/> help_keyword	Browse Structure Search Insert Empty Drop	475	MyISAM	utf8_general_ci	108.4 KiB	-
<input type="checkbox"/> help_relation	Browse Structure Search Insert Empty Drop	1,059	MyISAM	utf8_general_ci	28.3 KiB	-
<input type="checkbox"/> help_topic	Browse Structure Search Insert Empty Drop	529	MyISAM	utf8_general_ci	499.9 KiB	-
<input type="checkbox"/> innodb_index_stats	Browse Structure Search Insert Empty Drop	~126	InnoDB	utf8_bin	16 KiB	-
<input type="checkbox"/> innodb_table_stats	Browse Structure Search Insert Empty Drop	~40	InnoDB	utf8_bin	16 KiB	-
<input type="checkbox"/> ndb_binlog_index	Browse Structure Search Insert Empty Drop	0	MyISAM	latin1_swedish_ci	1 KiB	-
<input checked="" type="checkbox"/> plugin	Browse Structure Search Insert Empty Drop	0	MyISAM	utf8_general_ci	1 KiB	-
<input type="checkbox"/> proc	Browse Structure Search Insert Empty Drop	0	MyISAM	utf8_general_ci	5.2 KiB	1.2KiB
<input type="checkbox"/> procs_priv	Browse Structure Search Insert Empty Drop	0	MyISAM	utf8_bin	4 KiB	-
<input type="checkbox"/> proxies_priv	Browse Structure Search Insert Empty Drop	1	MyISAM	utf8_bin	5.7 KiB	-
<input type="checkbox"/> servers	Browse Structure Search Insert Empty Drop	0	MyISAM	utf8_general_ci	1 KiB	-

Figure 6: Admins table

5.6.2 Bookings table

This is the table that shows all the bookings within the system. The screenshot below describes the bookings table using a screenshot from phpMyAdmin.

SELECT * FROM `vehicle_bookings`

Number of rows: 25

Sort by key: None

+ Options

	id	dateadded	trash	author	dateupdated	vehicle_id	fname	lname	email	tel
<input type="checkbox"/>	1	2015-04-19 15:14:22	n	0	0000-00-00 00:00:00	1	oonyu	isaiah	oonyu@gmail.com	0712
<input type="checkbox"/>	2	2015-04-20 23:13:07	n	0	0000-00-00 00:00:00	1	Muhiire	Bill	mbil@gmail.co.ug	+256
<input type="checkbox"/>	3	2015-04-21 10:28:58	n	0	0000-00-00 00:00:00	5	linda	mirembe	mlinda@hotmail.com	0702
<input type="checkbox"/>	4	2015-04-21 11:52:48	n	0	0000-00-00 00:00:00	1	kalema	simon	ksimon	0782
<input type="checkbox"/>	5	2015-04-21 11:54:33	n	0	0000-00-00 00:00:00	1	mutara	quinday	mquinday@yahoo.com	0705
<input type="checkbox"/>	6	2015-04-22 21:45:12	n	0	0000-00-00 00:00:00	1	kabali	martin	kmartin@yahoo.com	0706
<input type="checkbox"/>	7	2015-04-28 01:54:16	n	0	0000-00-00 00:00:00	1	Emmanuel	Mugejjera	e.mugejjera123@gmail.com	0785

With selected: Check All Change Delete Export

Figure 7: Bookings table

5.6.3 Vehicle_info

This is the database table that shows all information concerning the vehicles within the company. This includes the vehicle names, number plates and their model id. The screenshot below describes the vehicle_info table using a screenshot from phpMyAdmin.

Number of rows: 25

Sort by key: None

+ Options

	id	title	slug	licence_plates	dateadded	trash	author	dateupdated	model_id
<input type="checkbox"/>	1	veyron 1	veyron-1	uax 567t	2015-04-19 09:19:34	n	1	0000-00-00 00:00:00	12
<input type="checkbox"/>	2	veyron 2	veyron-2	uaa 623s	2015-04-19 09:19:57	n	1	0000-00-00 00:00:00	14
<input type="checkbox"/>	3	audi 1	audi-1	ubb 348g	2015-04-19 09:20:21	n	1	0000-00-00 00:00:00	6
<input type="checkbox"/>	4	audi 2	audi-2	ubb 345x	2015-04-19 09:20:47	n	1	2015-04-19 10:15:00	6
<input type="checkbox"/>	5	bmw 1	bmw-1	uax 984r	2015-04-19 09:21:12	n	1	0000-00-00 00:00:00	10
<input type="checkbox"/>	6	bmw 2	bmw-2	uds 345g	2015-04-19 09:21:43	n	1	0000-00-00 00:00:00	14
<input type="checkbox"/>	7	1	1	a	2015-04-19 09:29:18	y	1	0000-00-00 00:00:00	14

With selected: Check All Change Delete Export

Figure 8: Vehicle_info

5.6.4 Users

The users table shows all details concerning all the users that help with the running of the company. It captures details like first and last name, user type, their email addresses and passwords. The screenshot below shows the description of the users table as viewed from phpMyAdmin.

	id	fname	lname	email	usertype	password
<input type="checkbox"/> Edit Copy Delete	1	Mutara	Quinday	admin@gmail.com	1	e10adc3949ba59abbe56e057f20f883e
<input type="checkbox"/> Edit Copy Delete	2	Test	Were	e@gmail.com	4	7cd2b5942be28759
<input type="checkbox"/> Edit Copy Delete	3	Joseph	Katerega	j@gmail.com	3	202cb962ac59075b964b07152d234b70
<input type="checkbox"/> Edit Copy Delete	4	Rwabutomize	Ben	r@gmail.com	3	202cb962ac59075b964b07152d234b70
<input type="checkbox"/> Edit Copy Delete	29	allan	smith	allan@gmail.com	4	e10adc3949ba59abbe56e057f20f883e
<input type="checkbox"/> Edit Copy Delete	30	wakaisuka	chris	chris@gmail.com	4	e10adc3949ba59abbe56e057f20f883e
<input type="checkbox"/> Edit Copy Delete	31	wokorach	ken	ken@gmail.com	4	e10adc3949ba59abbe56e057f20f883e
<input type="checkbox"/> Edit Copy Delete	35	kobusingye	betty	kobusingye@gmail.com	4	e10adc3949ba59abbe56e057f20f883e
<input type="checkbox"/> Edit Copy Delete	36	ssali	laban	laban@gmail.com	4	e10adc3949ba59abbe56e057f20f883e
<input type="checkbox"/> Edit Copy Delete	37	joseph	kiwendo	jk@gmail.com	4	e10adc3949ba59abbe56e057f20f883e
<input type="checkbox"/> Edit Copy Delete	38	kasauli	james	kasauli@gmail.com	4	e10adc3949ba59abbe56e057f20f883e
<input type="checkbox"/> Edit Copy Delete	39	oonyu	isaiah	oonyu@gmail.com	4	e10adc3949ba59abbe56e057f20f883e
<input type="checkbox"/> Edit Copy Delete	40	nsereko	peter	nsereko@gmail.com	4	e10adc3949ba59abbe56e057f20f883e
<input type="checkbox"/> Edit Copy Delete	41	onen	tom	onen@gmail.com	4	e10adc3949ba59abbe56e057f20f883e
<input type="checkbox"/> Edit Copy Delete	42	gilbert	kisakye	gilbert@gail.com	4	e10adc3949ba59abbe56e057f20f883e
<input type="checkbox"/> Edit Copy Delete	43	hakim	kabanda	hakim@gmail.com	4	e10adc3949ba59abbe56e057f20f883e
<input type="checkbox"/> Edit Copy Delete	44	omitta	hannington	omitta@gmail.com	4	e10adc3949ba59abbe56e057f20f883e

Figure 9: Users

4.9 Conclusion

This chapter covered the specifications and description of the current system including its strengths and weaknesses. It also covered the different requirements of the proposed system, its benefits and the costs to be incurred in order to fully implement the project.

CHAPTER FIVE

SYSTEM IMPLEMENTATION

5.0 Introduction

This chapter discusses and presents the results and findings of the project.

5.1 Administrator Rights

The screen shots in this section show the administrator login page and processes.

5.1.1 Administrator Login

This is the section on every page of the system where the administrator can log into the system.

It requires a username and password that were previously assigned to that particular user for a successful login.

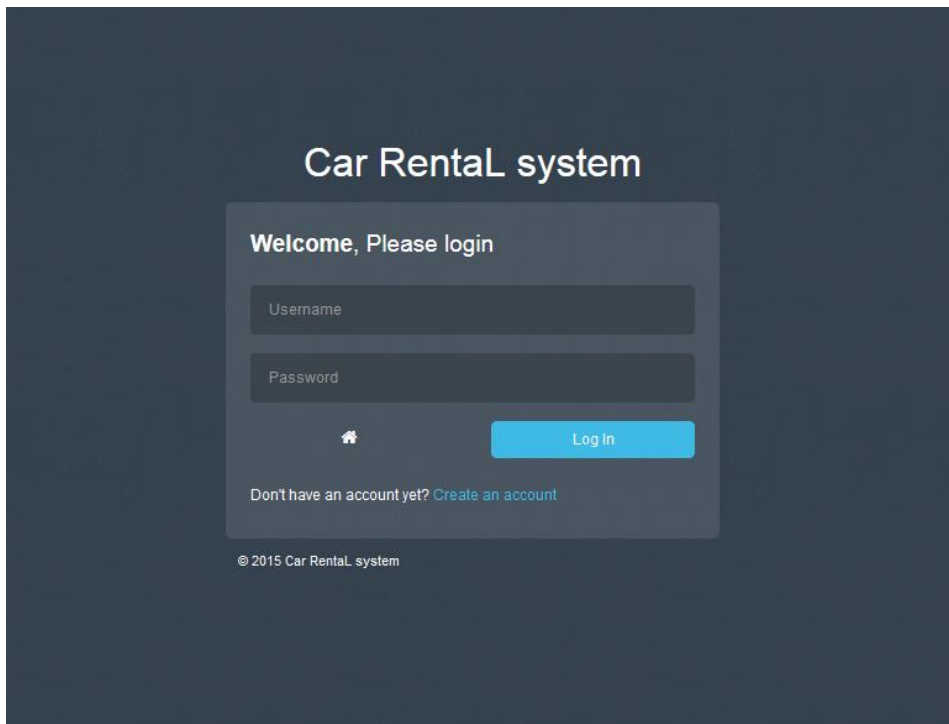


Figure 10: screenshot showing administrator login section

5.1.2 Successful Login

A successful login implies that the user has been able to successful log into the system. The screen shots below therefore show a successful login by the user.

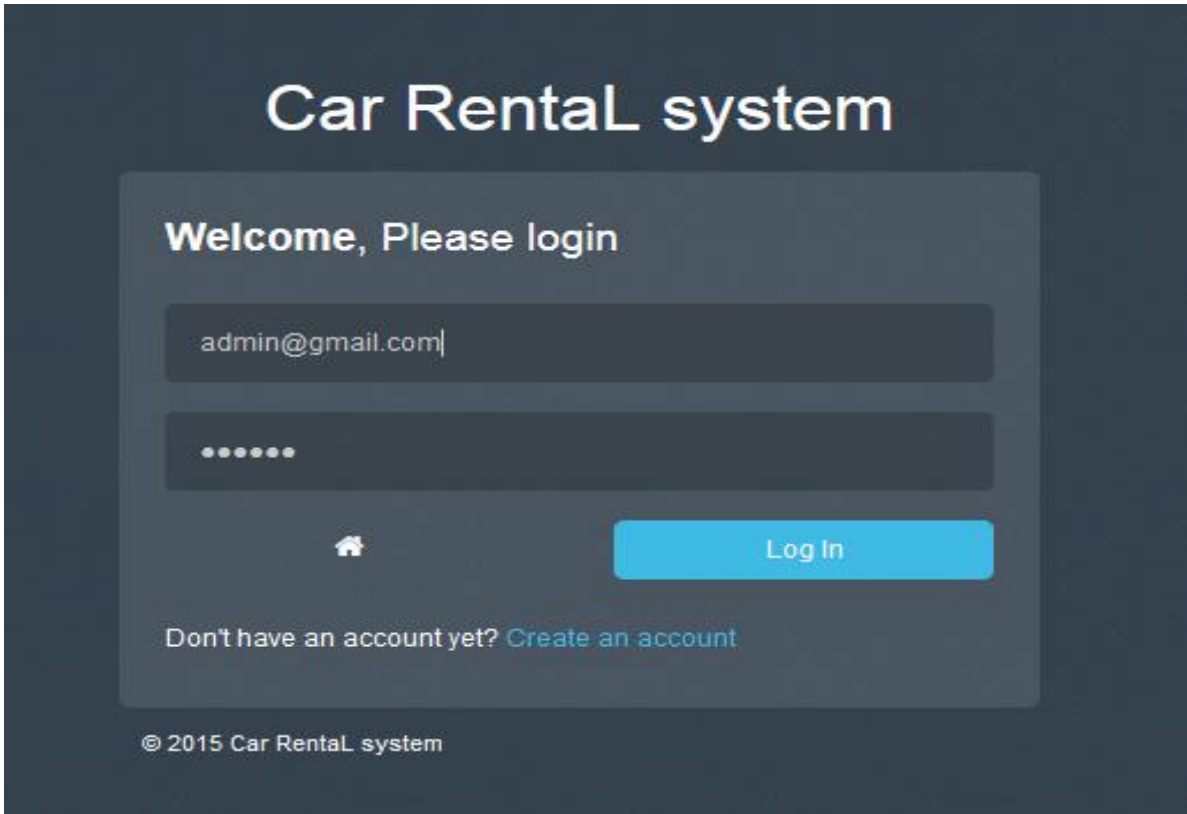


Figure 11: screenshots showing a successful login

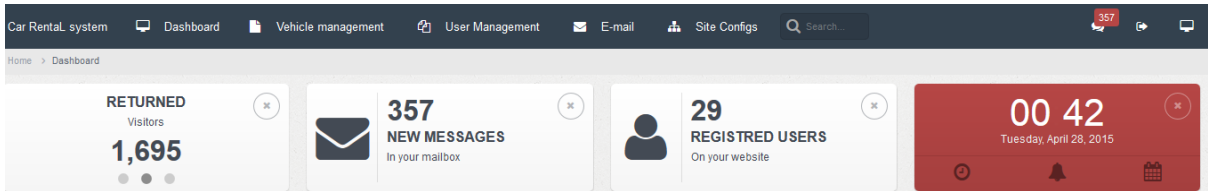


Figure 12: screenshots showing a successful login

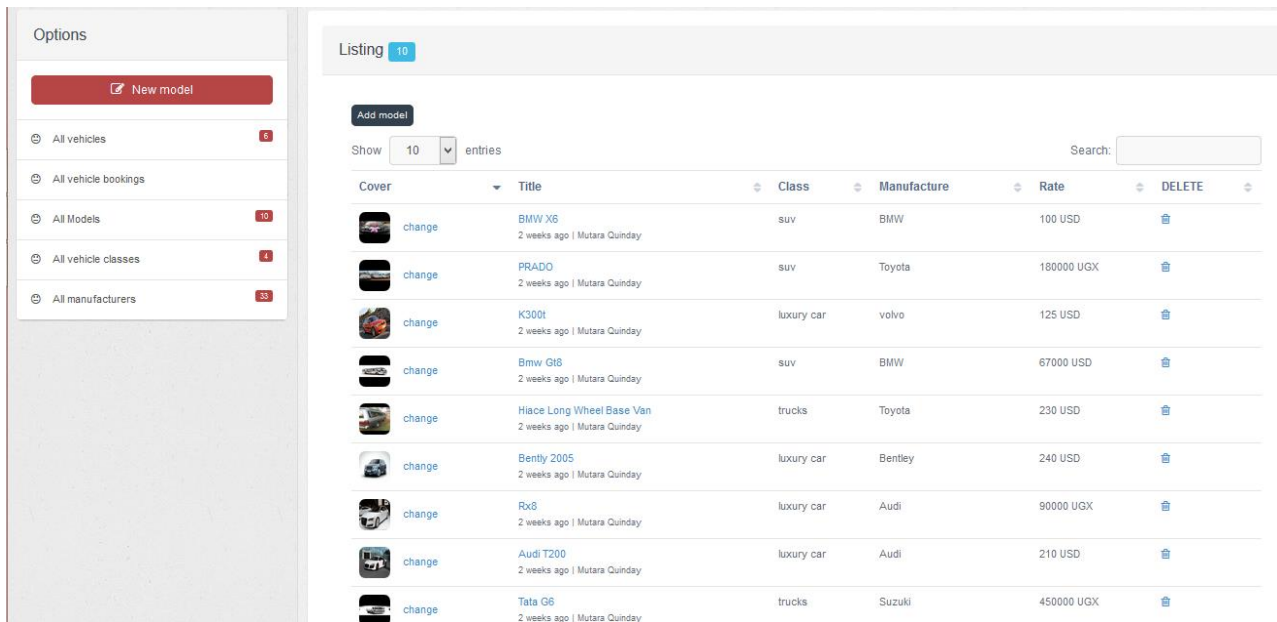


Figure 13: screenshots showing a successful login

5.1.3 Unsuccessful Login

In case of a wrong username or password, one is blocked from gaining access into the system and this is referred to as unsuccessful login. The screenshot below shows an unsuccessful login instance.

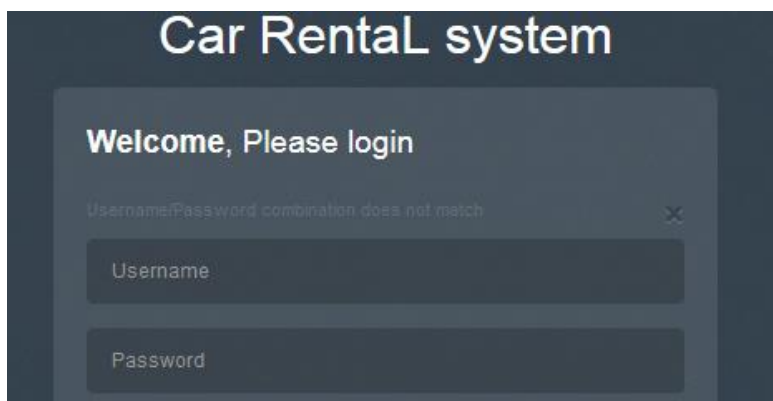


Figure 14: Unsuccessful Login

5.2 Renting Process

This section highlights the major function of the system; renting. Renting is carried out by the clients or customers.

5.2.1 Search Results

After inputting search queries for a particular vehicle, the system displays the results for the customer to choose the best option. The results include the amount of money for hiring a vehicle per day.

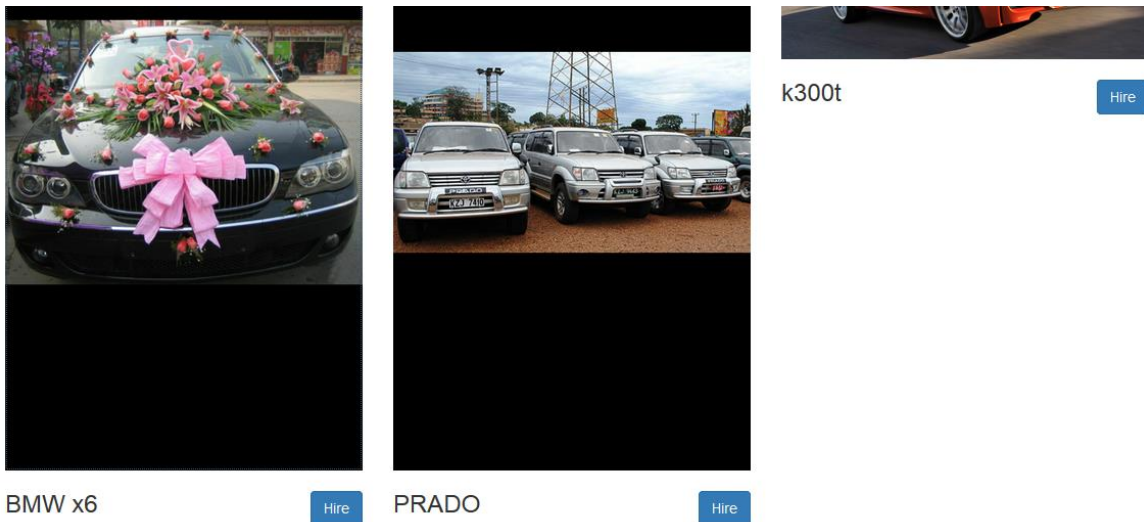


Figure 15: Search Results

5.2.2 Booking section

The screenshot shows the booking section of the website. On the left, there is a circular profile picture and the following text: 'Manufacturer Toyota', 'Daily Hire rate: UGX 180000', 'Vehicle class: suv', and 'Available cars: 1'. The main form area is titled 'Hire Vehicle' and includes a 'Need Help?' button. The form contains several input fields: 'Emmanuel', 'Mugejjera', 'm.mugejjera@gmail.com', and '0786453214'. Below these is a dropdown menu for 'Veyron 1'. At the bottom of the form, there are date pickers for 'From' (16-04-201€) and 'To' (23-04-201€), followed by a red 'Submit' button. A green confirmation box at the bottom states: 'Your booking has been recieved. We shall get back to you'.

Figure 16: Booking section

5.2.3 Confirmation of booking

After booking, the client is sent a confirmation message instantly and this is the confirmation that booking has been taken as seen in the screenshot above.

5.3 Graphical User Interface

This is the interface which all users will view when they visit Mutara Motors website. The screenshot below shows the interface

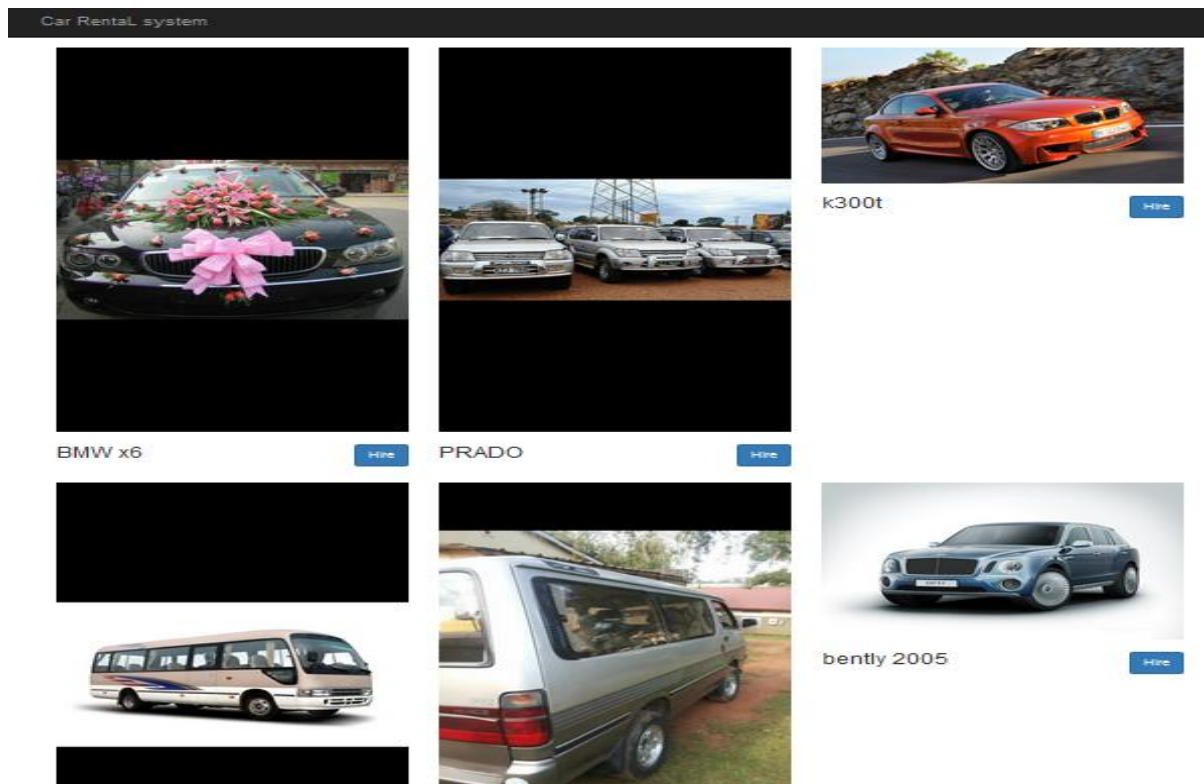


Figure 17: Graphical User Interface

5.4 Administrator Privileges

The system administrator of the new system has a variety of privileges. These privileges are presented in this section.

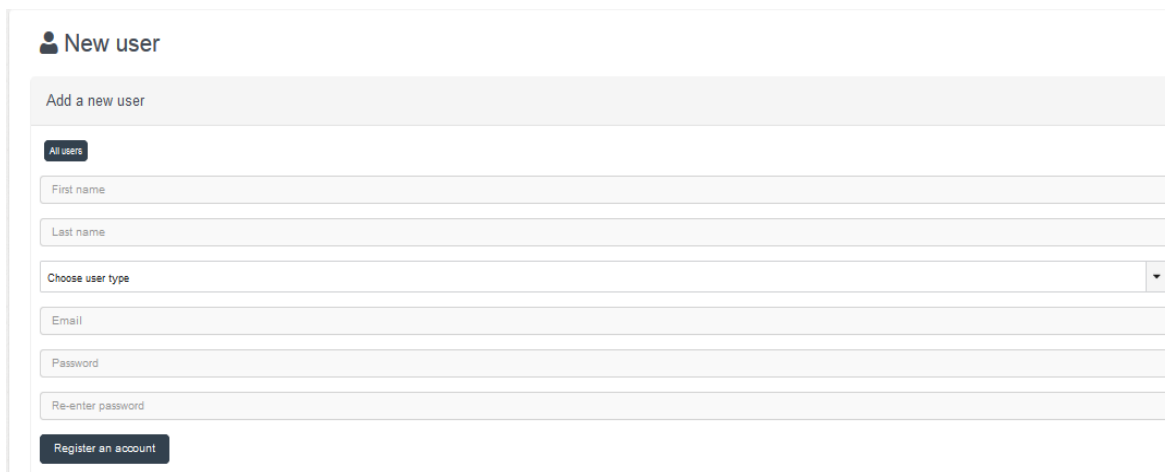
5.4.1 Creation of new content

The administrator enjoys the privilege of creating content that will appear in the Graphical user Interface of the system. The user can add vehicles, users like data entrants. The screenshots below show the various types of content that can be created by the administrator.



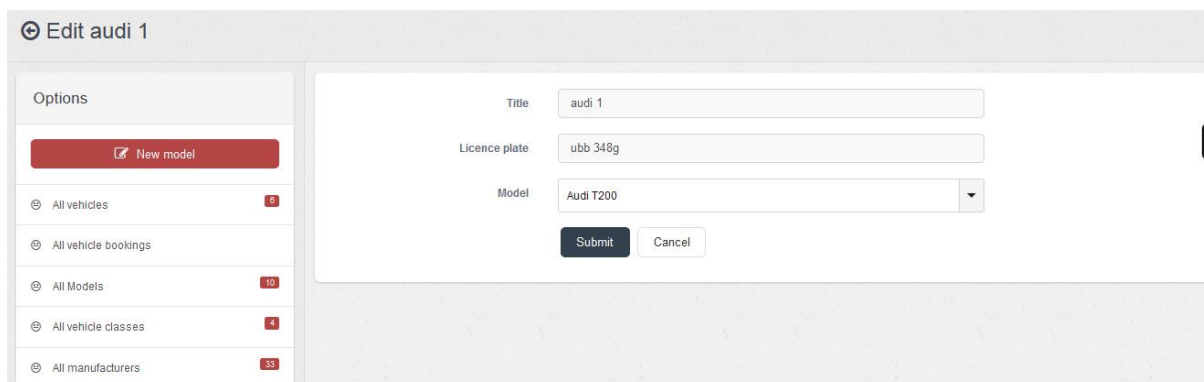
The screenshot shows a form titled "Update User info". It contains two text input fields: the first contains "Mutara" and the second contains "Quinday". Below these fields is a dark blue button labeled "Edit account".

Figure 18: Screenshot showing editable slot of a user account



The screenshot shows a form titled "New user" with a sub-header "Add a new user". It includes a "All users" button, followed by input fields for "First name", "Last name", "Email", and "Password". There is a dropdown menu for "Choose user type" and a "Re-enter password" field. A dark blue "Register an account" button is at the bottom.

Figure 19: Screenshot showing creation of a new user



The screenshot shows a form titled "Edit audi 1". On the left is a sidebar with "Options" including "New model" (with a pencil icon), "All vehicles" (6), "All vehicle bookings", "All Models" (10), "All vehicle classes" (4), and "All manufacturers" (33). The main form has fields for "Title" (audi 1), "Licence plate" (ubb 348g), and "Model" (Audi T200). "Submit" and "Cancel" buttons are at the bottom.

Figure 20: Screenshot showing the editing option for a vehicle

5.5 Form Validation

The system has the security feature of ensuring proper form validation. When filling in forms, the system requires that all fields have to be validated before the user can submit the form. The screenshots below show the feature of form validation.

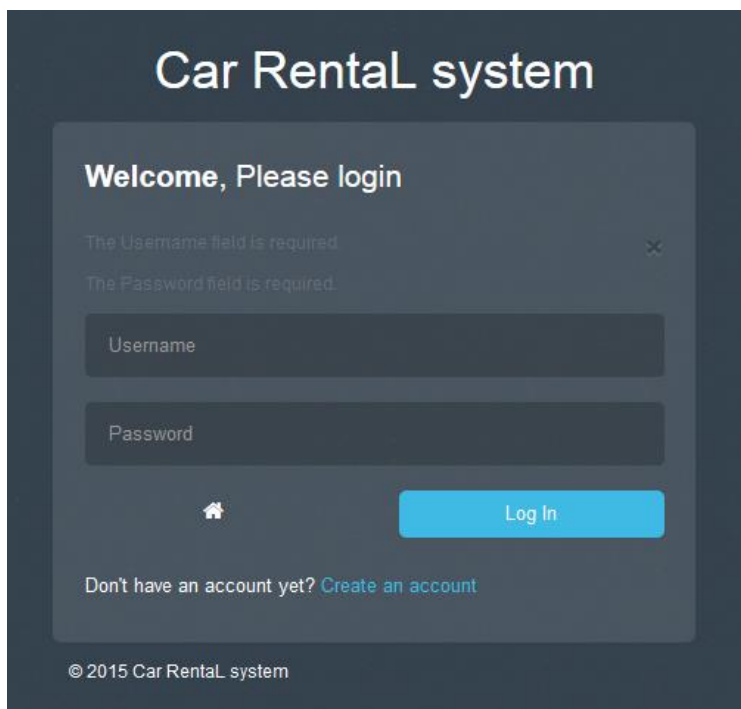


Figure 21: Screenshot showing form validation in the system

The screenshot shows a web interface for adding a new user. At the top left, there is a dark button labeled "All users". Below it is a registration form with the following fields: "First name", "Last name", "Choose user type" (a dropdown menu), "Email", "Password", and "Re-enter password". Below the form is a dark button labeled "Register an account". A light pink error message box is displayed below the form, containing the following text: "The First name field is required.", "The Last name field is required.", "The Email field is required.", "The Usertype field is required.", "The Password field is required.", and "The Confirm Password field is required.".

Figure 22: Screenshot showing form validation on addition of a new user by the administrator

5.6 The System Database

The System database was designed using MySQL server and tested using Xampp server. The following tables were included in the system database.

5.7 System Testing

The system was tested using both unit and system testing.

5.7.1 Unit testing

Unit testing was carried out by testing individual system codes by inputting test data to test their functioning.

5.7.2 Integration testing

This was carried out to test how compatible the individual components of the system can be integrated to work together.

5.7.3 System testing

System testing was done to check the system's functionality under different running environments like Windows XP, 7 and 8, Unix and Linux.

5.8 Conclusion

This chapter focused on the implementation of the system and the presentation of the results or the final system design.

CHAPTER SIX

DISCUSSIONS AND CONCLUSIONS, RECOMMENDATIONS AND FUTURE WORK

6.1 Discussions and Conclusions

This project will provide an alternative to the manual booking system that is currently in use by Mutara Motors. It will in the long run reduce the work burden on the company's employees since some of the customers will book online hence reducing the work burden. It will also afford flexibility in renting by the customers since they will not be constrained by working hours of the manual booking system.

This model system further provides a solution to the setbacks and disadvantages of the manual renting system since it directly solves them. Therefore, the concurrent running of both these systems will in the long run improve business operations for the company under study and other companies that would like to adopt them.

The system is however, disadvantageous because its effectiveness is entirely based on the speed of the internet connection. The faster the internet connection, the more efficient the system will be and vice versa.

6.2 Recommendations

This model has been developed to solve the problems of the manual booking system. To maximize its efficiency and workability, however, it is recommended that;

The company should increase awareness of the online booking system to its customers to ensure flexibility in the booking process of the company.

Administrators of the system should be more vigilant on the information posted over the system since it can be viewed by anyone who accesses the system's website.

6.3 Future work

It is recommended that in a bid to improve the system's efficiency, more research should be invested into the system so that the following can be achieved;

1. An online payment option should be integrated into the system to ensure prompt payment
2. An Instant Messaging option should be integrated into the system to cater for clients' special needs and suggestions
3. More time should be invested in research on how best the system can be integrated into a management system for the whole company.

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