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BUS TICKETING SYSTEM

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ABSTRACT

Traditionally, bus ticket purchase has been over the counter in bus terminals, however, today it has evolved with the rapid expansion of e-commerce. This project addresses the study and development of an Online Bus Ticketing System web portal that enable customers (passengers) and the staff to make an online bus ticket sale/purchase, generating of reports and etc. which also act as an operation tool for bus ticketing companies to operate their organization effectively.

This project also addresses the problems faced by customers and bus drivers especially on illegal bus operations, long wait to purchase a bus ticket, unsafe environment and many more. The project studies some issues on implementation and also recommendations on how Online Bus Ticketing System web portal can take place effectively. This project also recommends a Decision Support System to deal with the customer's requirement whereby it provides reliable choices to a customer to make decision. This project includes the development of a prototype Online Bus Ticketing System web portal to support the research objective. This web portal will assist in future development that would support a fully integrated system that links staff of the bus company to customers, staff to staff, staff to other mode of transport providers, staff to businesses and staff to government agencies.

PROPOSAL.

Ticket booking and seat reservation in the current transportation system is a major cause of stress to travelers and there are currently not many ways to address these problems. Bus stations either make use of manual reservations, through touts, or booking offices making the process of booking, which is characterized by long queues and disorganization, slow and cumbersome. This is all under the assumption that seats are even available - failure to which, the traveler has to find another means to get to their destination which is another headache on its own. With the addition that congestion in bus

stations is a major problem this mode of service delivery is not very efficient and is doomed to fail as population grows. Another common issue with the current transportation system is, there are no specific departure and arrival times for different vehicles. This is a major drawback especially for those in a hurry to get somewhere as they could be crowded with people who have no consideration of time.

To address the aforementioned problems, this work proposes the use of an Online Bus Scheduling and Booking System with the aim of providing customers with safe, convenient and instant service with regard to making reservations and getting information. This project would implement the use of an enhanced Booking System, running in synchronization with the booking office system, to allow customers to view available seats and safely reserve them.

Customer, through the user interface hosted on our website, will be able to choose their preferred time of departure, and the seats of choice that are available at that time. They will also be able to cancel at any time from the web interface through their login account. If the reservation is made an hour prior to departure time, the customer will be required to confirm his or her availability and make necessary changes if needed where the result will be updated in the system. In the case of failure to confirm, another prompt will be sent ten minutes prior to departure where an automatic refund will be made and the seat made available in the system in the case that there is no response from the customer. This work creates an intuitive way for users to quickly locate available seats and vehicles at their preferred time while also incentivizing users to be cautious with time to avoid unnecessary delays.

For an efficient system, new customers will be provisioned with a one-time registration with their credentials and hence returning customers will have the benefit of just signing in to access the services being provided. Also, for walk-in customers, the system will have been updated in real-time hence the staff can easily view the available spots and allocate them accordingly.

One novel idea that has been included in this system is giving each seat three states which determine the users' view of those that are available and those that are not. These three states are; **allocated**, **in progress** and **unallocated**. They vary in that, **allocated** seats are those that have been paid for, those **in progress** are those that a customer has reserved but

not yet paid for and the **unallocated** have not been reserved at all. This means that only the unallocated will be displayed to customers thus preventing conflict of interest. The seats marked with in progress will only remain in this state for a maximum of one minute before reverting back to unallocated to allow time for the customer to pay.

Another selling point will be the ease of boarding the booked vehicle. The issue here is authentication and this will be solved by providing each customer with a unique code after payment which will be received by the staff on ground to allow users into the buses. This unique code will be a buffer to prevent impersonation and ensure smooth boarding.

The payment method to be used in the website will be the new introduced Safaricom Mpesa API dubbed “The Daraja API” which supports integration of online payments with Lipa na Mpesa. Once the user clicks the payment button on the website and this triggers a post request to Daraja having the relevant payload amount. Daraja processes the request and sends an STK push to the user’s phone prompting him or her to enter M-Pesa password and click OK to complete the transaction. M-Pesa processes the request by debiting the user’s account and sending a web hook with the details for the transaction to your servers.

This system will also contain and keep record of all available vehicles, their destinations, drivers and maintenance information in the administrator’s view and this will allow him to make any changes like adding or removing vehicles and drivers.

The Online Bus Ticketing and Scheduling System will theoretically eliminate the problem of congestion and disorganization in bus booking stations as well as simplifying the entire process for customers thus making it less stressful. This will be a comprehensive upgrade to the traditional system and will simplify travelling for all.

CHAPTER 1: INTRODUCTION

PROJECT BACKGROUND

A ticket is defined as “a piece of paper or card giving the holder the right to admission to a place or event or to travel on public transport” (Oxford, 2005).

Generally, a bus ticketing system consists of all the activities involved in producing a ticket, which includes, producing tickets, booking ticket, selling tickets, rejection of the tickets, total tickets produced for a trip, total tickets sold and income gained through the ticket selling.

A bus ticketing system can let customer to know the information about the bus schedule and ticket. Nowadays, online are very common issues to every one so that checking information using online can save allot of time to the customer, so that customer no need to go to the counter to ask of bus and schedule.

Bus ticketing system is a complex system that is difficult to be managed by human, so as a result software system can be used instead of human, which will help to avoid a big percent of mistakes.

Online Bus ticketing system make process of scheduling trips easier and prevent conflicting in time, also it help customers to book their tickets from their homes and checks the pricing system of the routes, the price of ticket

may increase or decrease depending on the season, availability, time of booking, and also depending on the class that customer select and all these factors will be calculated automatically and instantly.

Online ticketing system is a system that assist not only the passengers but also the bus staff position as an efficient service provider, gaining competitive advantages and also lead to superior control over the reservation process and operation, compared to conventional manual processing. The main feature in this online e-ticketing system is to cater destinations between inter cities within Kenya. With this system, the passenger can perform an online bus booking at his or her own free time and will consecutively reduce the human traffic in the roads.

PROBLEM STATEMENT:

The System that is being used by the staff at the counter currently is an internal system and just used to sell the bus ticket at the counter. Customer has to go to the counter to buy bus ticket or ask for bus schedule.

Some factors that trigger the development of a new system are:

- 1) **Time consuming:** The manual system is very time consuming, stressful and more prone to errors in purchasing a ticket, storing of data, and accessing of data.
- 2) **Insecurity of data:** This means lack of security of data or information. In the manual method, records are kept in the office and several people may have opportunity to check all the files because all the files are kept in an appropriate way, this will lead to losses of data and even theft of the records that are valuable.

- 3) **Data Inconsistency and Redundancy:** In the manual method of keeping records for processing and manipulation, man has in course of time, devised certain tools which include paper, biro and pencil which he used in recording of data or information and using these manual tools makes him to have duplicate copy of stored data, with this redundancy of data and human errors may be encountered and also many papers are wasted and consume many space for storing the record.
- 4) **Delay in Accessing Data:** In the manual method of keeping records, accessing data or information become very tedious, because all the files that contained information are not well arranged the way that can be accessed in an appropriate and accurate manner, this will lead to losses of stored information.
- 5) **Ineffective Retrieval of Data:** Considering the manual method of keeping records, retrieving on information become very tedious, all files that contained the records are kept in sales office, therefore retrieving are done by checking the files one after the other, this will consume time, misplacement of data or information and wasting of energy. With this, many errors will be encountered. And it took time for the staff in the company to know all transactions.

- 6) **Lack of data Integrity:** Using manual method of keeping records, all information's stored are not prevented from people who do not have access to it, and making sure that those who should have access to it can get in a way that are expected to be for feature use.
- 7) **Ineffective Transfer of Data:** In a manual method of storing records, transferring of data or information that are stored in a file(s) is done by people who carry records from one office to the other, using this manual method many records are lost and will consume time.

PROPOSED SOLUTION:

The solution to this problem is to create an online portal for 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.

AIMS AND OBJECTIVES:

The main objectives of the online system include:

- To provide a web-based bus ticket buying functions. Customer can buy bus ticket through the online system and no need to queue up to buy bus ticket at the counter.
- To enable customer to check the availability of the bus ticket online. Customer can check the time departure and arrival for every Transnational's bus through the system.
- To ease the bus ticket payment by online. Customer has to pay the bus ticket by m-pesa money services or through paypal.
- To reduce the number of staff at the point of sale. The number of staff at the counter can be reduced after the online buying bus ticket system launch.

PROJECT JUSTIFICATION:

As mentioned in the previous section, the online system is just getting its roots in the country's transport system. It is important to customers because customers can check availability of the bus ticket, buy bus ticket, cancel bus ticket and pay the bus ticket online. E-ticket is different with traditional paper ticket because e-ticket is safer, faster, reliable and

cheaper. Besides that, this concept can be used by others bus company so that their customers will be satisfied. The profit for the bus company will be increased because the online system will attract more customers and no need to hire other staff at the counter to sell bus ticket because tickets can be sold efficiency online. Furthermore, the owner can schedule bus routes based on the margin returns. This is done through bus performance comparison. The factors of comparison in this module include but not limited to: the route, operational costs in a particular route and the number of breakdowns per bus

PROJECT SCOPE:

The system is web-based application. The users will gain access to the available buses per certain route and available seats by logging in through the customer's portal.

The staff will access the system by logging in via the staff portal where they can compare bus performance and monitor other related business performance issues.

PROJECT LIMITATIONS:

- User acceptance: some members of the staff may not be of the opinion that the counter system be made online for the fear that this may lead to loss of job.

- Computer literacy level: the intended customers may not possess the relevant ICT skills. to benefit from the proposed system. This may cause the company to some costs by offering to train their customers.
- Limited system testing: improper unit and system testing may pose some usability issues such as delays in some modules.

BUDGET AND RESOURCES

The budget and the resources for this project have been summarized and tabled Table 1: Budget and resources

Resource	Cost (Ksh.)
Laptop	35,000
Flash Disk (8GB)	1,500
Renting Database Server	2,500
Web hosting	2,000
Travelling	1,000
Printing	1,500
Total amount	43,500

PROJECT SCHEDULE

This project will comprise all the activities involved in SDLC (see Fig 1).

All these activities have been summarized in a Gantt chart below.

Weeks activity	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Problem Definition														
Requirement Identification														
Analysis														
Design														
Implementation testing documenting														

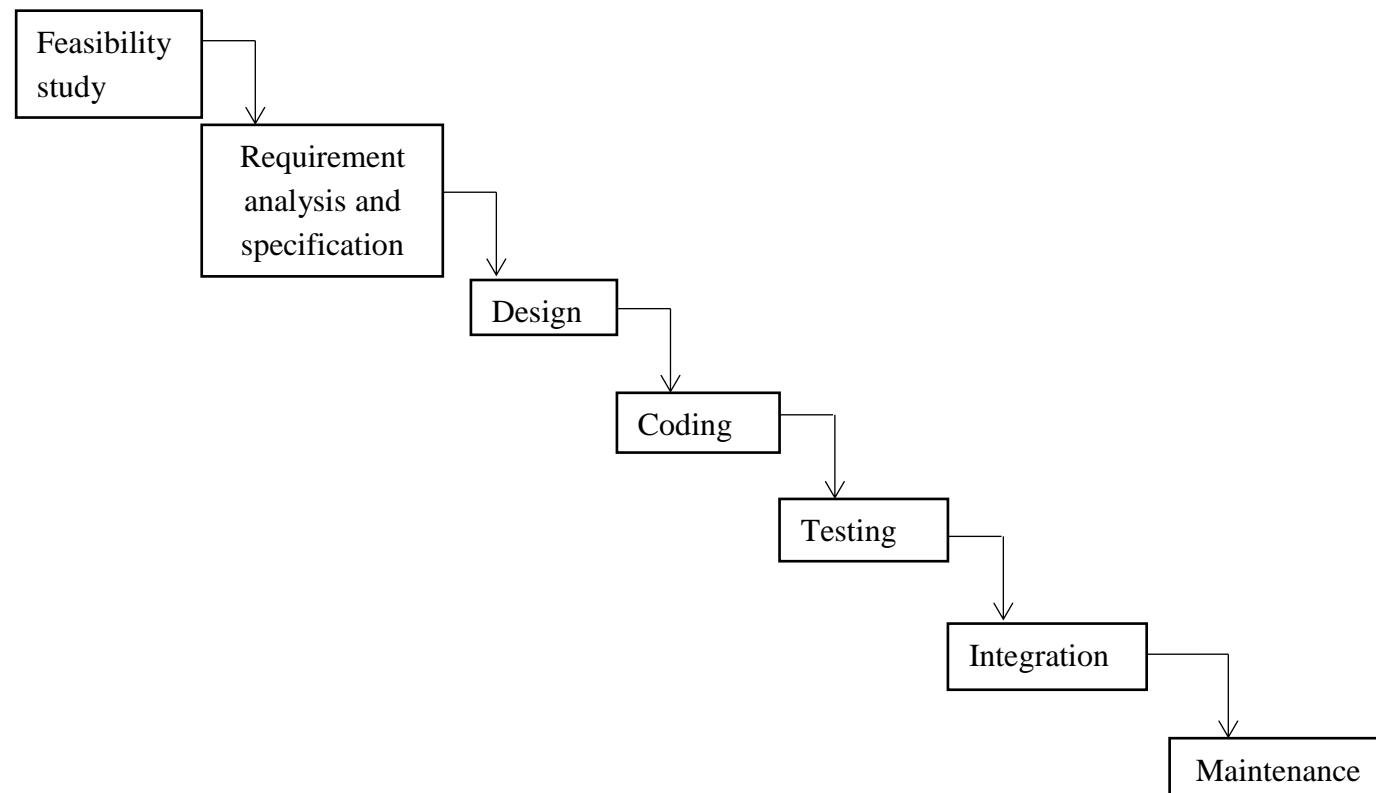
CHAPTER 2: SYSTEM ANALYSIS DESIGN DOCUMENT

Introduction

System Analysis is a phase which is conducted before the development of the Online Bus Ticketing System web portal. System Analysis shows the requirement or a description of the needs and desires for an information system. A requirement may describe functions, features, and constraints. Thus, system requirement defines the services provided by the system and prescribes constraints for its operation (Whitten, 2002). There are two types of requirement, functional requirement and non-functional requirement. Both these requirements will be discussed later in the chapter, but before that It is important to fulfill the planning for the implementation phase. This can only be done if proper methodology is selected. Methodology is important to make sure all project life cycle activities are being carried out without any shortcuts. Methodology helps the system developers to take one step at a time towards accomplishing the full system.

SYSTEM DEVELOPMENT METHODOLOGY

This system underwent all the stages of system development lifecycle (SDLC). According to the nature of this system and the data collected, a waterfall methodology was used to develop this system. This methodology included the following stages: feasibility study, requirement analysis and specification design, coding, testing, integration then maintenance. Each phase required a different amount of effort and every phase had a well-defined starting and point. Every phase had to be completed before beginning the next stage



DATA COLLECTION APPROACHES

So as to collect data for the bus ticketing system as well as its clients, appropriate methods of collecting data were needed. These techniques included the following:

Observation

This involved the researcher going to the field of study, making direct watch on the way the organization under study operates, identifying the possible drawbacks of the operating system analyzing the problems and developing a solution based on the observations made. This technique was employed since it provides a first-hand information which is quite reliable and accurate since the method provided a quick overview of the system. It is the most effective technique.

Interviews

This is a direct face to face conversation between the system analyst(interviewer) and the users of the system. This was used where the respondents were few in order clarifying and verifying gathered facts. This technique was important to use since some data could not be collected by direct observation unless interviewed, hence it helped in enriching the data for quality processing.

Questionnaires

A questionnaire refers to a set of questions prepared by the person collecting data in a paper which is issued to specific people who in turn respond to the questions privately without the presence of the interviewer. Once the respondent is through, he/she will issue the answers back to the person collecting the data. This technique was also important because some interviewees were not confident enough to respond to the question at the interview panel during the interview, and therefore a questionnaire best suited such people.

FEASIBILITY STUDY

The feasibility study was intended to examine the current system and determine whether there was need for a new system to replace it or not. It tended to check whether the current system was viable. Basically, this was meant to analyze the feasibility of a new system through cost-benefit analysis. It included: Legal feasibility, operational feasibility, economic feasibility, technical feasibility and schedule feasibility.

i. Social operational feasibility

This is a measure of how well a proposed system solves the problems, and takes advantage of the opportunities identified during scope definition and how it satisfies the requirements identified in the requirements analysis phase of system development. It dealt with the effect of the system on the current society within the company.

The operational feasibility assessment focused on the degree to which the proposed development projects fitted in with the existing business environment and objectives with regard to development schedule, delivery date, corporate culture, and existing business processes.

To ensure success, desired operational outcomes were imparted during design and development. These included such design-dependent parameters such as reliability, maintainability, supportability, usability, predictability, disposability, sustainability, affordability and others. These parameters were considered at the early stages of design where desired operational behaviors were to be realized. A system design and development required appropriate and timely application of engineering and management efforts to meet the previously mentioned parameters. A system may serve its intended purpose most effectively when its technical and operating characteristics are engineered into the

design. Therefore, operational feasibility is a critical aspect of systems engineering that needed to be an integral part of the early design phase. The bus ticket booking system solutions was found reliable and adaptable therefore making it operationally feasible.

ii. Legal feasibility

This study was conducted to determine whether the proposed system conflicted with legal requirements. These were data processing system must comply with the Local Data Protection Acts. Any legal aspects associated with the new system were assessed and then adequate measures taken to protect the interest of clients at the bus ticket booking system. The bus ticket booking system Solutions went through this stage successfully and the system was found feasible.

iii. Economic feasibility

The purpose of the economic feasibility assessment was to determine the positive economic benefits to the organization that the proposed system had to provide. It included quantification and identification of all the benefits expected. This assessment typically involved a Cost-Benefits Analysis (CBA). Undoubtedly the bus ticket booking system was found economically feasible and no possibility of it outliving its usefulness in the near future.

iv. Technical feasibility

The assessment focused on gaining an understanding of the present technical resources of ticket booking sector and their applicability in the proposed system. This was aimed at evaluating both hardware and software required for the new

system. It also determined whether the current facilities were adequate for the new system implementation. **v. Schedule feasibility**

Schedule feasibility is a measure of how reasonable the project timetable is. The project would fail if it took too long to be completed before it is useful. However, this means estimating how long the system would take to develop, and if it can be completed in a given time period using some methods like payback period. According to the time schedule of this system, it was clear that the project would be scheduled feasible since it would take approximately 3 months which was a relatively short period for such a system.

DESCRIPTION OF THE CURRENT SYSTEM

Overview of the current system

The manual mode of ticket booking, ticket purchasing, information dissemination and dispersion of files in the company is through phone calls, direct contact or through traditional messengers that are attached to offices of high rank staff.

The process goes as follows:

1. Each bus driver and his conductor are attached to particular bus
2. Each cashier is attached to particular route for financial management

3. The cashiers are attached to high rank financials officers. The financials officers are then attached to
General manager
4. Each messenger is attached to the office of a high rank staff of the institution.
5. The messenger (who is also a staff) is called or summoned upon to deliver the file, load, and objects to its
destination.
6. The messenger uses its digression to find ways to gets the files dispatched or information to its destination.
7. Customers are gathered in queue for booking or purchasing ticket either through phone calls or by direct
contact.
8. Customers visited company notice board every day to see latest information.

Problems associated with the current system

The main challenge associated with the current system is that potential customers have travel all the way to where the bus ticket booking system is located. As a result, there is consumption of time which would be avoided by having an automated system. Booking through a call can limit the provision of enough information which might cause inconveniences of service delivery. All these are both tedious and time-consuming activities.

There is also problem of customers being unable to assess the progress of their projects not unless they directly contact the manager which in turn consumes time in both parties.

Other problems include insecurity, redundancy, inconsistency, delay in data accessing, ineffective retrieval of data and cost etc., and off course there is need to overcome these problems.

DESCRIPTION OF THE PROPOSED SYSTEM

In efforts to improve the existing bus e-ticketing systems, observation on the problems and opportunities from the existing e-ticketing sites both in Kenya and overseas had been conducted. With that, it is recommended an integrated system of solutions that attempts to rectify many of the existing problems in the current bus eticketing and propose an innovative way to enhance the services provided in the bus e-ticketing system.

Therefore, the goal of the proposed Online Bus Ticketing System web portal is to provide a revolutionary way to interact effectively in a one stop venue. Furthermore, with this system, customers will be able to obtain a wider choice of bus tickets since they can reach a wider range of bus operators and a decision system to rate a driver base on behavior during the journey.

In short, with the proposed system, bus operators can now involve in making bus ticketing purchase transactions convenient, cost effective and finally can do away with the manual/conventional methods of selling bus tickets. Therefore, the proposed system will be superior and function as a catalyst in the competitive business environment regardless of the geographic barricades among the bus operators.

Intended Users

The system has the public (as Customers), super system Administrator, Cashiers, Managers bus operators are identified as the main users of the system. This is because this system can only be successful when there are customers to purchase and bus operators to sell their services.

Analysis of the Proposed System Functions

The system function can be divided into two sections, the Staff section and the Customer section. In the staff section, there will be four actors which are: administrator, cashier, manager and operator. The system allows the Administrator to edit/register staff (cashier, operator, manager and driver), a cashier manages all payment activities and operator handles bus, routes, driver allocation to bus, and travelling activities, while manager control the decision support system from customers of driver rating, manage customers, generate report, view user logs and activity logs.

In the Customer section, the customer will be able to view the home page to search on the bus details for the desired destination based on the preferred search detail which are route, date to travel and number of passengers. After booking ticket and it happens to be available, then the system will allow the customer to continue with the booking processes, seat view, customer registration details, payment activity and printing out of the booked ticket provided if the customer is a registered. There will also be a booking cancellation feature for a customer to cancel a booked ticket, postponed booked ticket, rate a driver or reset his password after login. In this module the customer will also be provided information such as latest news, travelling tips about the Online ***Bus Ticketing System web portal***.

Functional Requirement

Functional requirement is a function or feature that must be included in an information system to satisfy the business needs and user acceptance (Whitten, 2002). Staff and Customers will use this proposed Online Bus Ticketing System web portal. A clear and detail functional system requirements for this system are the Staff section and Customer section are described as following.

Staff

The staff can access some of the functions in this system, which include company staff management module, bus information module, purchasing, cancellation/postponement module, and the reports module. Each Staff has to perform their activities. The functional requirements for the staff' section is divided in to three functions which are: (a) Administrator (b) Manager (c) Cashier.

a) Administrator

Administrator is a super person that has the overall control of company staff which includes: ➤

Add, edit or delete staff (operator, manager, cashier and driver)

b) Manager

Manager is a company staff which manages company activities and has the ability to perform the following functions:

1. *Manage Customers*: Manager can view, edit, delete and search all the customer that register with the company.
2. *Activity Logs*: Manager can view all the activities perform by in the system.
3. *User's logs*: Manager can view all the activities perform by the staff and customers.
4. *Manage News*: Manager can post or delete news/events by topic name and date and publish to homepage for customers view.

5. *Generate report*: Manager can generate report by using a particular date or range base on paid, unpaid, travelled, not travelled, cancels or postpones for the company and also print it.
6. *Suspend/Release Driver*: Bus driver ranking system are viewed and analyzed to take decision of action on particular deriver using 5 stars: very-poor, poor, good, very-good and excellent. For each of the ranking stars are calculated using the formula below:

$$\frac{\text{Number of polls obtained by bus driver}}{\text{Total polls received}} \times 100$$

c) Cashier.

Cashier is a finance department person that accept payments from customers.

7. *Payment status*: Cashier can assign a customer payment status paid or not payment whether he/she pay using teller or using cash, so that a customer can travel after been verified.

Customers

The customers can access some of the functions in this system, which includes the main page module, registration module, bus schedule and details module, booking module, payment module, ticket module, postponement and cancellation module. The functional requirements for the customers section are as following:

1. Ticket booking:

A customer can perform the following activities:

- Check the ticket availability by selecting route, date and number of passengers to travel which a system will use to validate to see if a driver is allocated to that bus of that route selected and also the date is available. Seats available are to be incrementing from previous booking with the same date and route. After checking availability, now a customer can proceed to registration page and supply all requirement needed.
- After successful registration with validations from the system, a customer proceeds to payment page and can pay online or skip this step if wish to pay manually.
- Then lastly, a message will be sent via the mobile number a customer provided. Or a customer prints a ticket.

2. Postpone ticket booked:

Once a customer books a ticket, then they can login to postpone the ticket booked, but only if the date of travel has not passed.

3. Cancel ticket booked:

Once a customer books a ticket then they can login to cancel the ticket booked, but only if the date of travel has not passed.

4. Reset password:

Once a customer books a ticket then they can login to reset their password but only if the current password is provided.

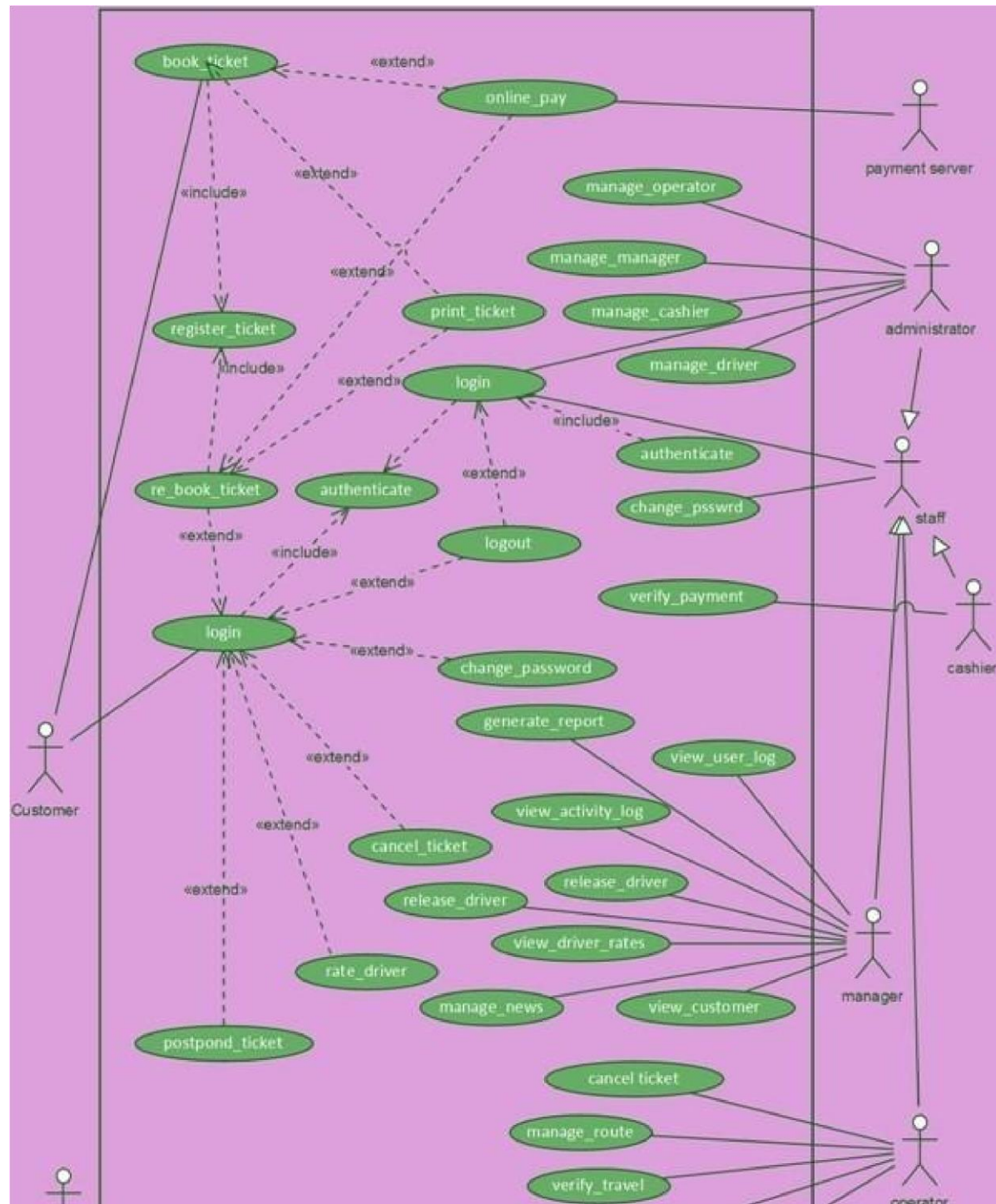
5. Rate/Rank a driver:

Once a customer booked a ticket then they login to rate their bus driver, but only if they travelled and the choice are to be selected only once which are: very poor, poor, good, very good or excellent.

USE CASE DIAGRAM

A use case diagram at its simplest is a representation of a user's interaction with a system and depicting the specification of a use case (Gemino & Parker, 2009). Use case analysis is a major technique used to find out the functional requirements of a software system. Use case, an important concept in use case analysis, represents an objective user wants to achieve with a system. It can be in text form, or be visualized in a use case diagram. A use case is an objective user(s) wants to achieve with a system. Use cases are named with verb or verb + noun phrase. It is usually short yet descriptive enough to describe a user objective. You are encouraged to use

concrete and specific verbs and nouns to avoid ambiguity. The diagram represents the use case diagram for the online ticketing system.



Use Case Description

Table 3.1 use case description.

Actor Action	Use case Name	System Response
Customer select route, date of departure and number seats need to book and click book ticket now.	Book ticket	System checks the date, seat and time slotted are available, if the details are available the system will then proceed to next phase else prompt error message.
Customers register their ticket by providing details.	Register ticket	the system checks all the necessary required field are provided, if the details are provided as needed it then proceed to next phase else prompt an error message.

Customers pays online on his wish or skip to next phase	Online pay	The online payment server returns true to the system if the payment is success, else return false and proceed to next phase.
Customer Print a ticket	Print ticket	The system prints a ticket using a printer.
Customer Login	Login	The system validates the login details of customer and access level, if success, the system proceeds to customer panel else display an error message.
Customer Re- book a ticket	Re- book ticket	System checks the date, seat and time slotted are available, if the details are available the system will then proceed to next phase else prompt error message.
Customer Postpone a ticket	Postpone ticket	The system postpones a ticket to customer if the ticket is paid and travel date does not past.
Customer Cancel a ticket	Cancel ticket	The system cancels a ticket for customer once he/she booked a ticket.

Customer rate a driver	Driver rate	The system rates a driver for a customer on a particular bus and route travelled only once.
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Customer change his password	Change password	The system changes a password for a customer if the current password is provided.
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Administrator login	Login	The system validates the login details of admin and access level, if success, the system proceed to admin panel else display an error message.
Administrator Manage Operator	Manage Operator	The system allows system admin to add edit and delete driver.
Administrator Manage Cashier	Manage Cashier	The system adds, edits and deletes driver.
Administrator Manage Manager	Manage Manager	The system adds, edits and deletes manager.
Administrator Manage Driver	Manage Driver	The system adds, edit and delete driver.

Manager login	Login	The system validates the login details of manager and access level, if success, the system proceeds to manager panel else display an error message.
Manager view users logs	View user's logs.	The system displays a manager user's logs.
Manager view activity logs.	View activity logs.	The system displays the manager activity logs.

Manager view driver rates	View driver rates	The system displays a manager the rates of selected driver.
Manager release a driver	Release driver	The system released a selected driver.
Manager suspend a driver	Suspend driver	The system suspends a selected driver.

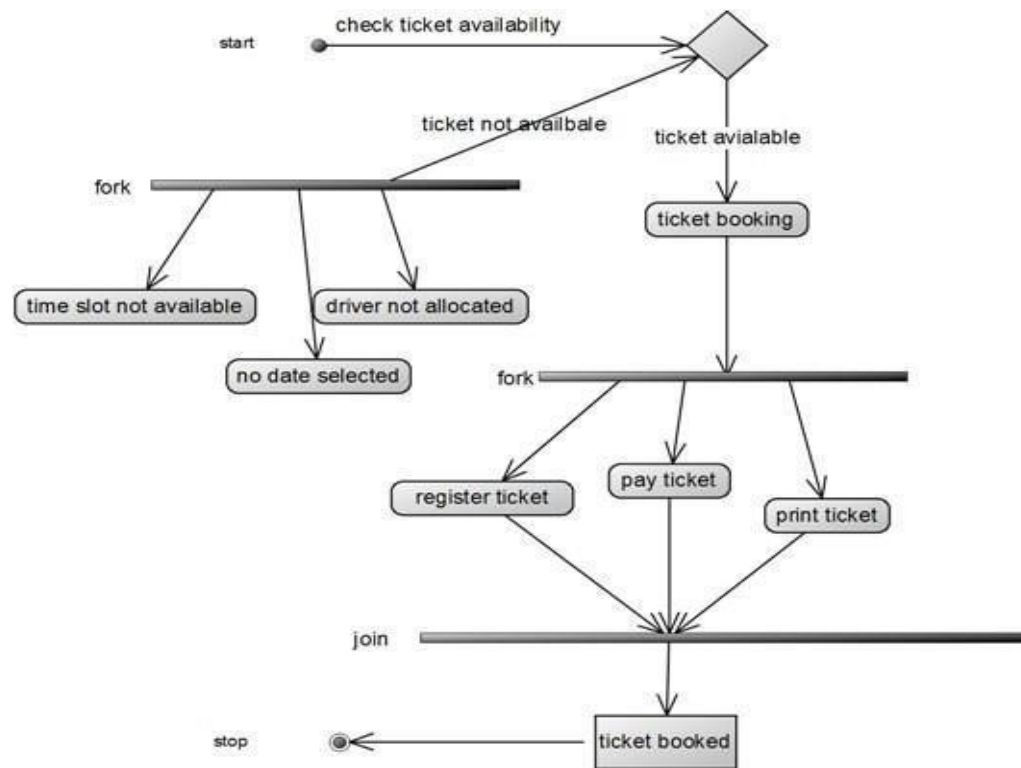
Manager Generate report	Generate report	The system displays a manager a report using paid, unpaid, travelled, not travelled, cancel ticket, or postponed ticket by using date range.
Manager manage news	Manage news	The system allows a manager to add, edit or delete news.
Manager manage customer	Manage customer	The system allows a manager to edit or delete a customer.
Cashier login	Login	The system validates the login details of cashier and access level, if success, the
		system proceed to cashier panel else display an error message.
Cashier verify payment	Verify payment	The system assigns a verified ticket booked paid or unpaid.

Activity Diagram

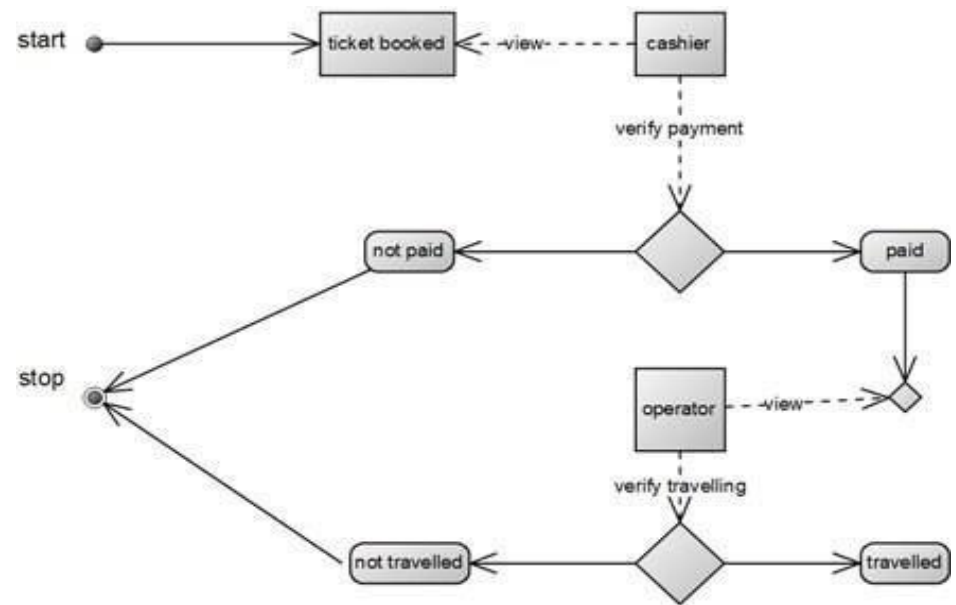
Activity diagrams are graphical representations of workflows of stepwise activities and actions with support of choice, iteration and concurrency (Rumbaugh & Jacobson, 1999). In unified modelling language, activity

diagrams are intended to model both computational and organizational processes (i.e. workflows). Activity diagrams show the overall flow of control.

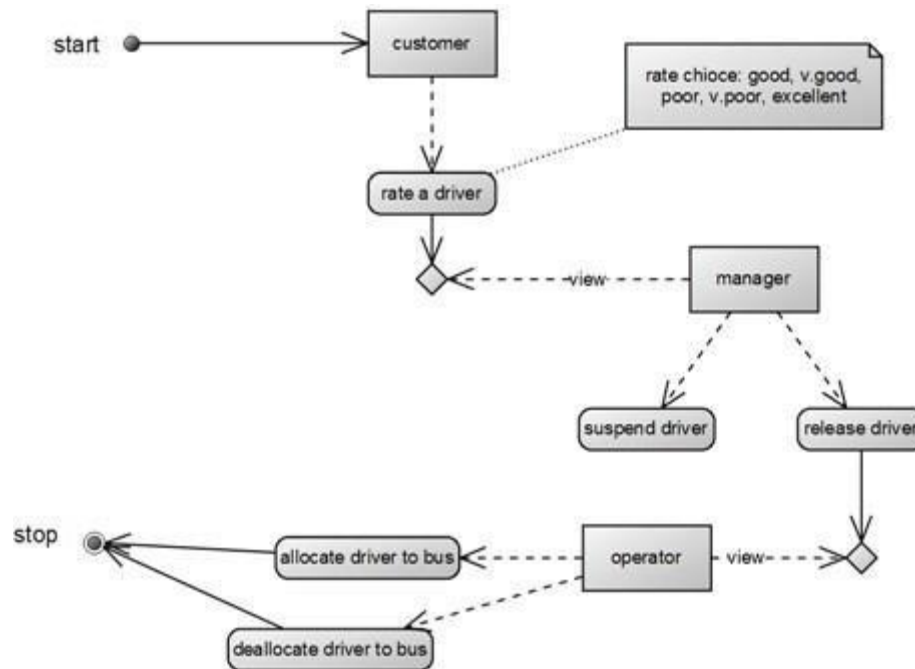
Activity diagrams are constructed from a limited number of shapes, connected with arrows. The most important shapes type: rounded rectangles represent actions; diamonds represent decisions; bars represent the start (split) or end (join) of concurrent activities; a black circle represents the start (initial state) of the workflow; an encircled black circle represents the end (final state). Arrows run from the start towards the end and represent the order in which activities happen.



Activity diagram for ticket booking



Activity diagram for booked ticket



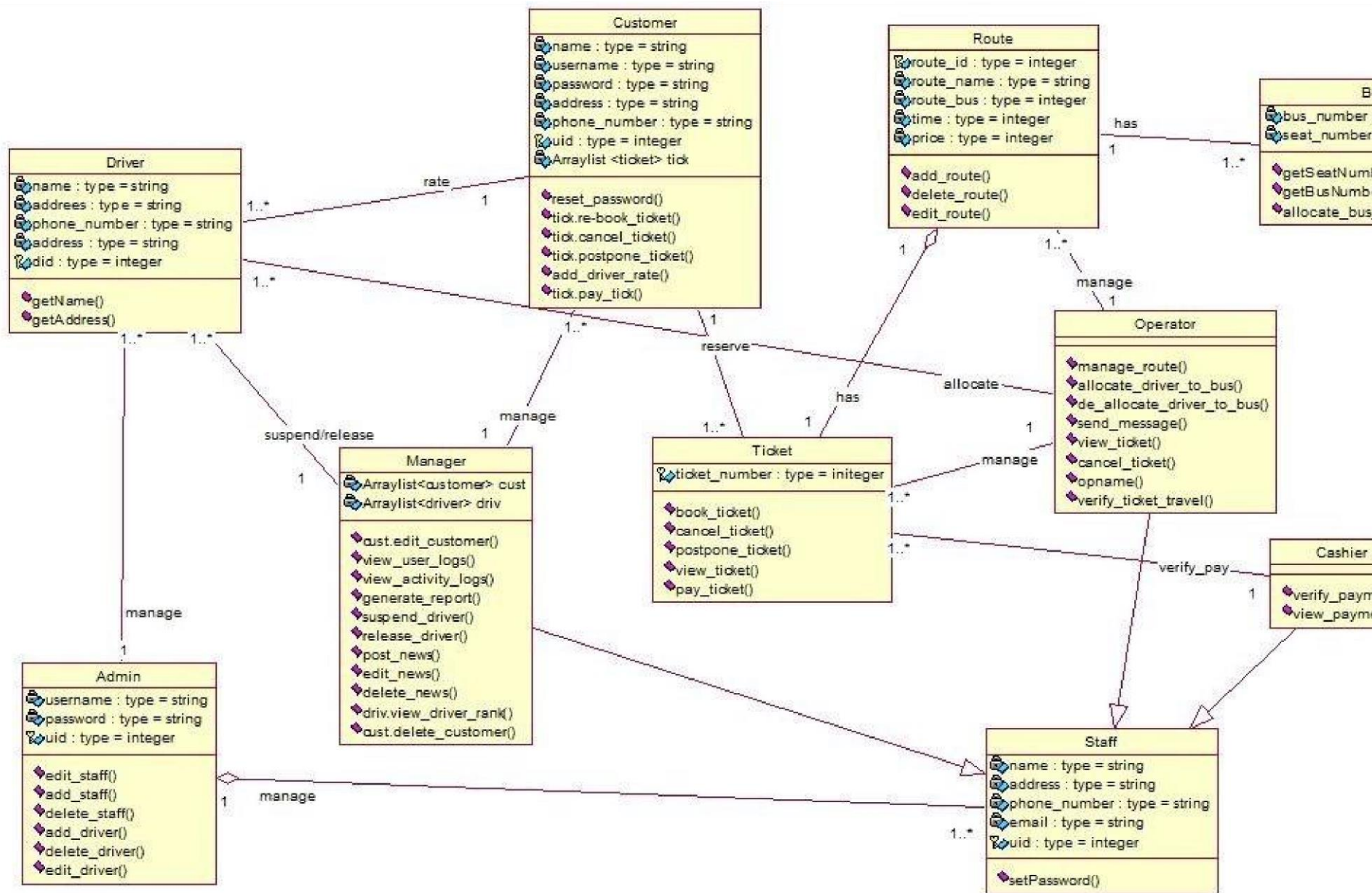
Activity diagram for driver rating

CLASS DIAGRAM

Class diagram in the unified modelling language (UML) is a type of static structure diagram that describes the structure of a system by showing the systems classes, their attributes, operations (or methods) and relationships among objects (Sparks & Geoffrey, 2011).

The class diagram is the main building block of object-oriented modelling. It is used for general conceptual modelling translating the models into programming code. Class diagram can also be used for data modelling. The classes in a class diagram represent both the main objects, interactions in the application and the classes to be programmed. Classes are represented with boxes which contain three parts:

1. The top part contains the name of the classes. It is printed in bold, centered and the first letter capitalized.
2. The middle part contains the attributes of the class. They are left aligned and the first letter is lower case.
3. The bottom part gives the methods or operations the class can take or undertake. They are also aligned and the first letter is lower case



class diagram for online ticketing system

Non- Functional Requirements

Non-functional requirement is a description of the features, characteristics, and attributes of the system as well as any constraints that may limit the boundaries of the proposed solution (Whitten, 2002). Such constraints usually narrow down the selection of programming language, operating system platform or implementation techniques.

The Online Bus Ticketing System web portal must ensure certain web application qualities such as ease of use, user-friendliness, correctness, functionality, reliability, response time, security, robustness as well as maintainability. The following lists the non-functional requirement of the system. a) Ease of use

- b) Maintainability
- c) Reliability
- d) Robustness
- e) Response time/speed
- f) Security
- g) User friendly

h) Functionality

i) Correctness

CHAPTER 3: SYSTEM DESIGN DOCUMENT

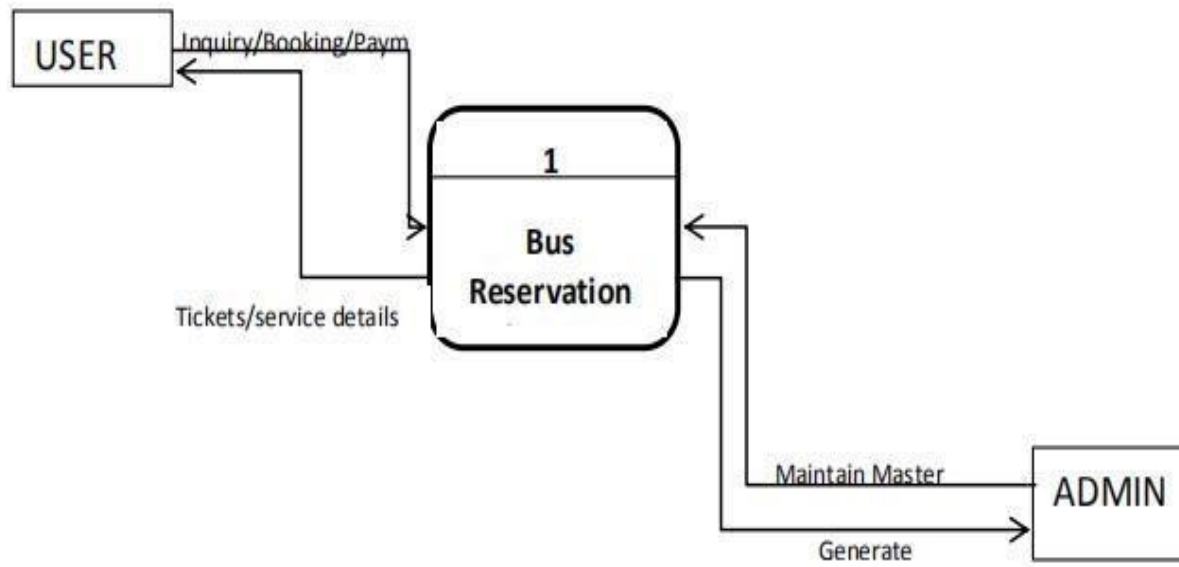
PHYSICAL PROCESS DESIGN

DATA FLOW DIAGRAM (DFD)

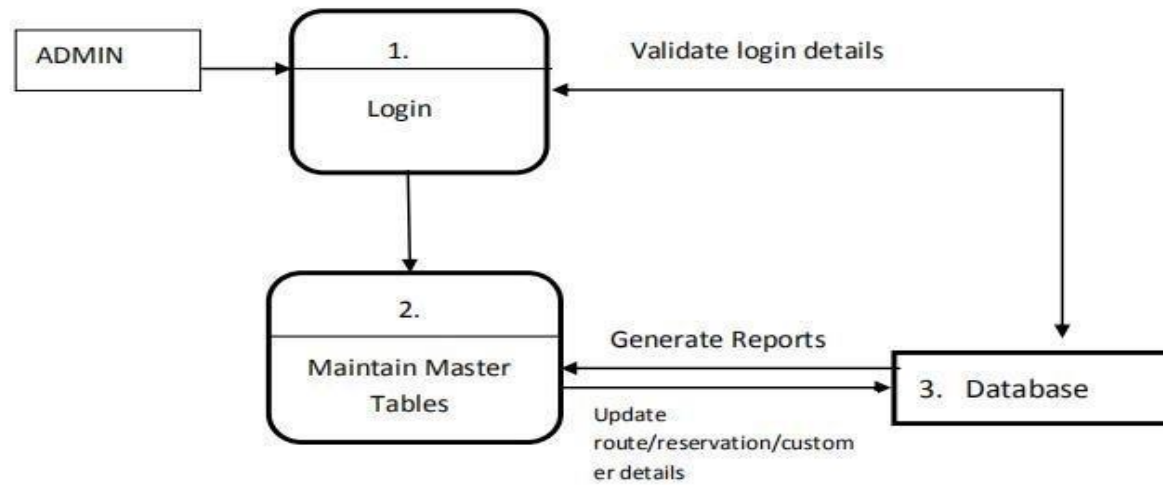
A data flow diagram (DFD) is a graphical representation of the "flow" of data through an information system, modeling its process aspects. A DFD shows what kind of information will be input to and output from the system, where the data will come from and go to, and where the data will be stored.

The development of DFD'S is done in several levels. Each process in lower level diagrams can be broken down into a more detailed DFD in the next level. The Top-level diagram is often called context diagram. It consist a single process bit, which plays vital role in studying the current system. The process in the context level diagram is exploded into other process at the first level DFD.

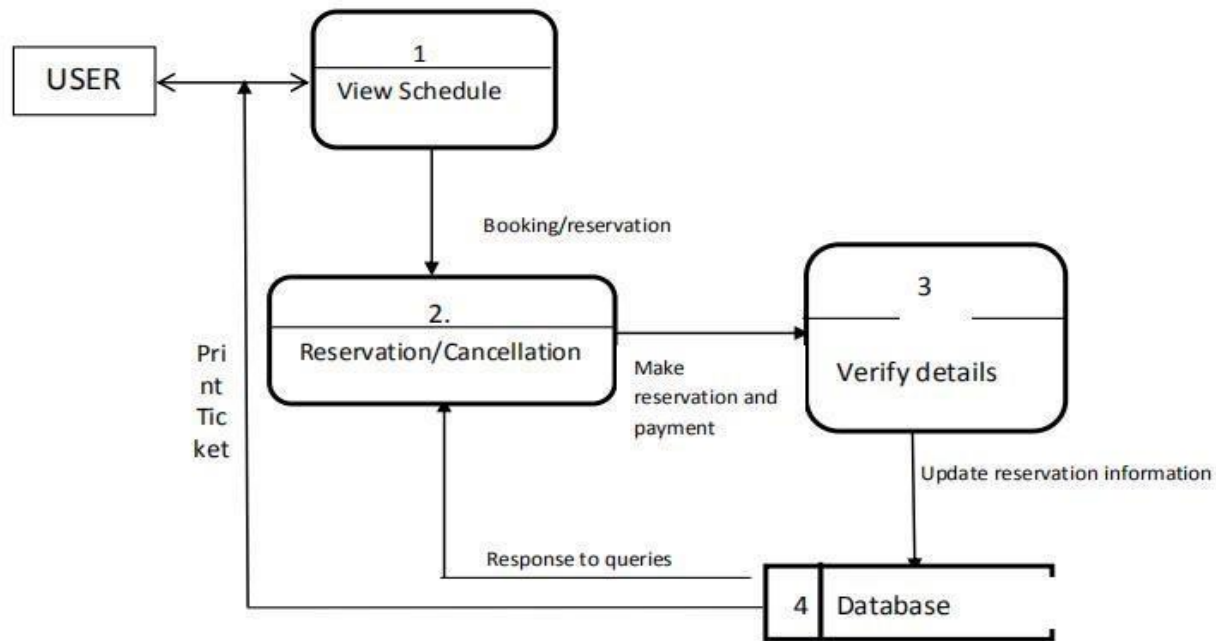
Level 0



LEVEL 1



Level 2



DATABASE DESIGN

The database called customer is designed using the structured query language (SQL) and has following tables:

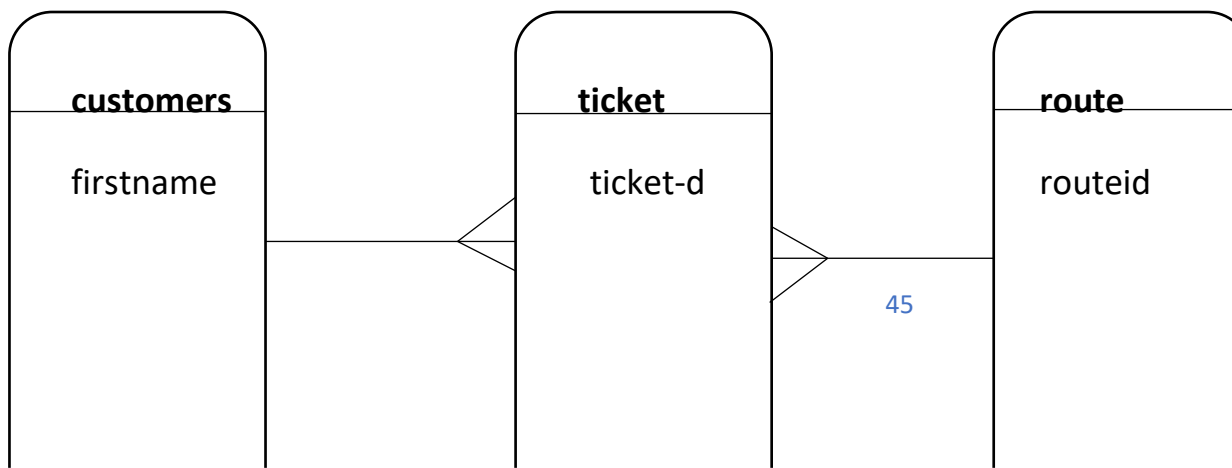
- customers
- ticket
- bus
- destination
- route

- timetable

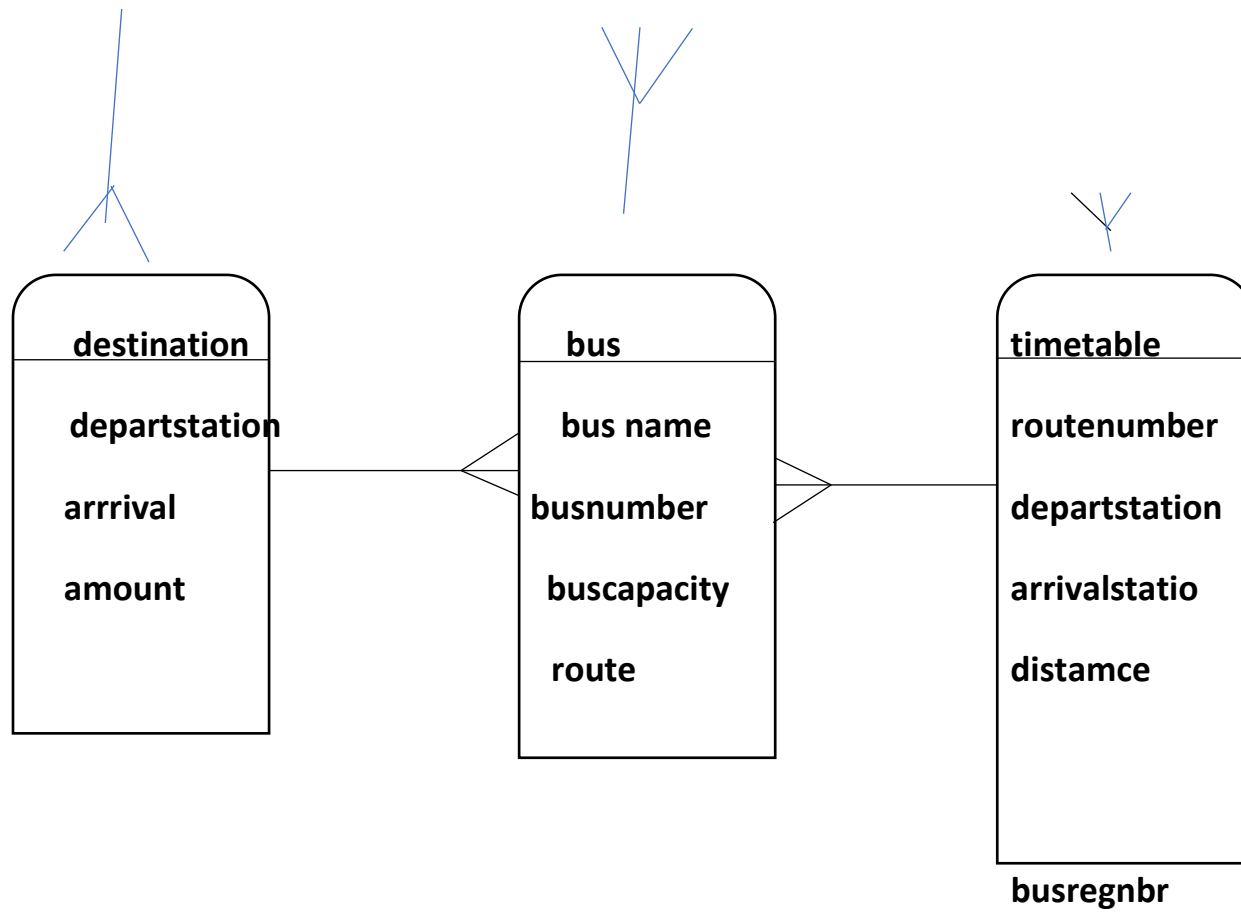
Conceptual design

Conceptual design is used to model information gathered from business requirements. Entities and relationships are modeled using ERD and are defined around the business's need. The need of satisfying the database design is not considered yet. Among the design models, conceptual design is the simplest.

This section therefore examines the conceptual database design for the new system at the bus ticket booking system. The relationship among entities is in figure 8 below;

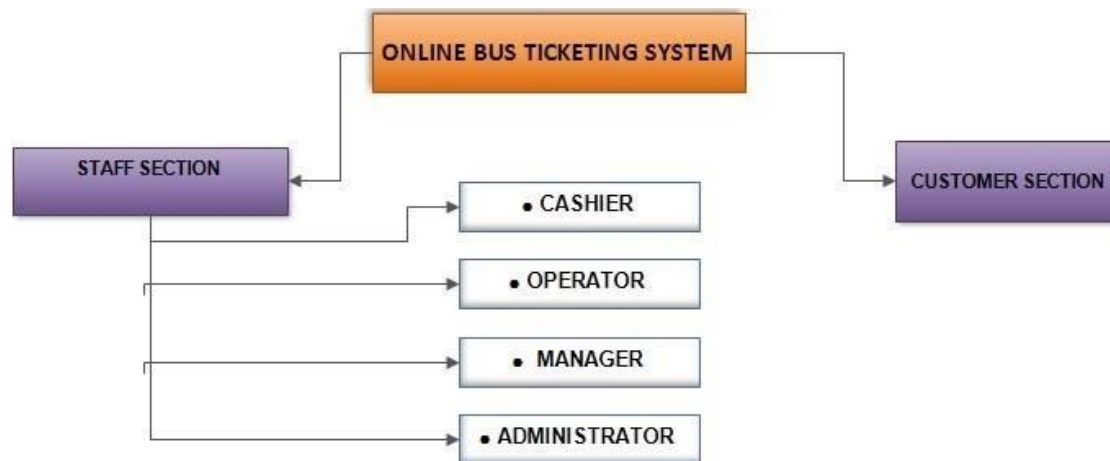


lastname	ticketamount	departstation
idno	datebooked	arrivalstation
contact		viastation
email		distance
password		timeSlot
		amount



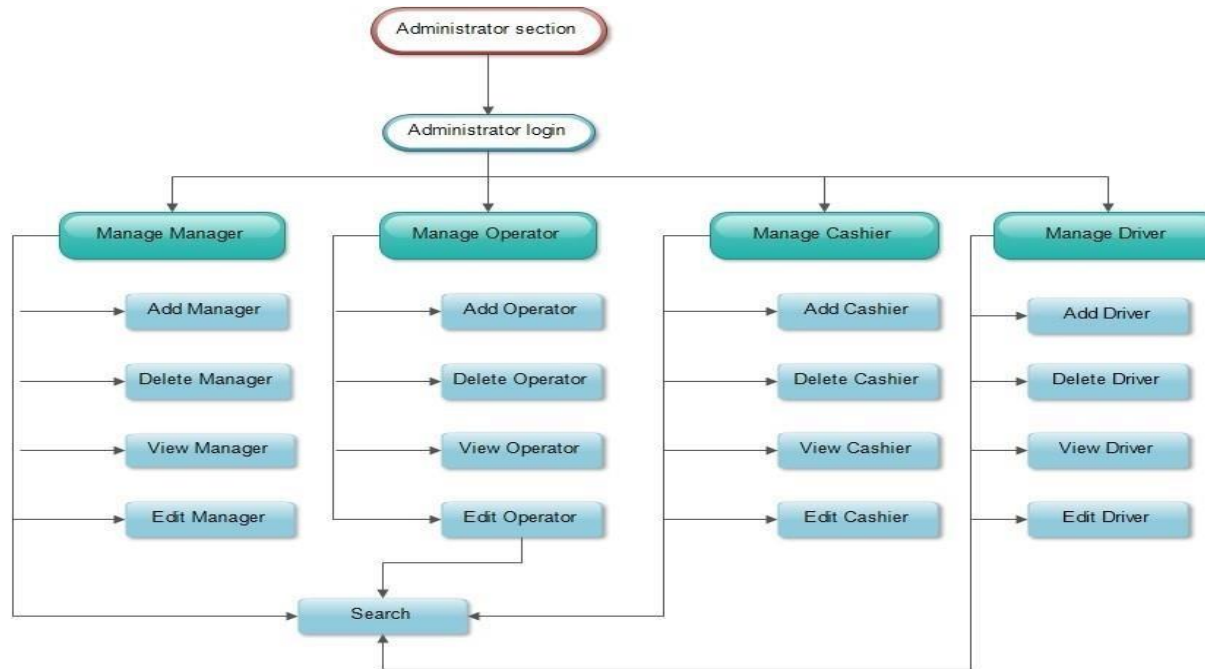
Structure Design

The Structure Design of Online Bus Ticketing System web portal shows a bird's eye view of the entire system. Generally the Online Bus Ticketing System web portal allows easy accessibility to obtain information. Customer can browse the web portal to obtain various types of information such as bus schedule information, latest news, feedback and tips updates. On the other hand the Staff would be able to assess the system to update the portal on bus schedule information, latest news, feedback and report generation and Administrator for managing staff. A structure diagram has been created for the Online Bus Ticketing System web portal. The main system of the Online Bus Ticketing System web portal is divided into 2 major sections, Customer section and staff section as shown in Figure 4.1.

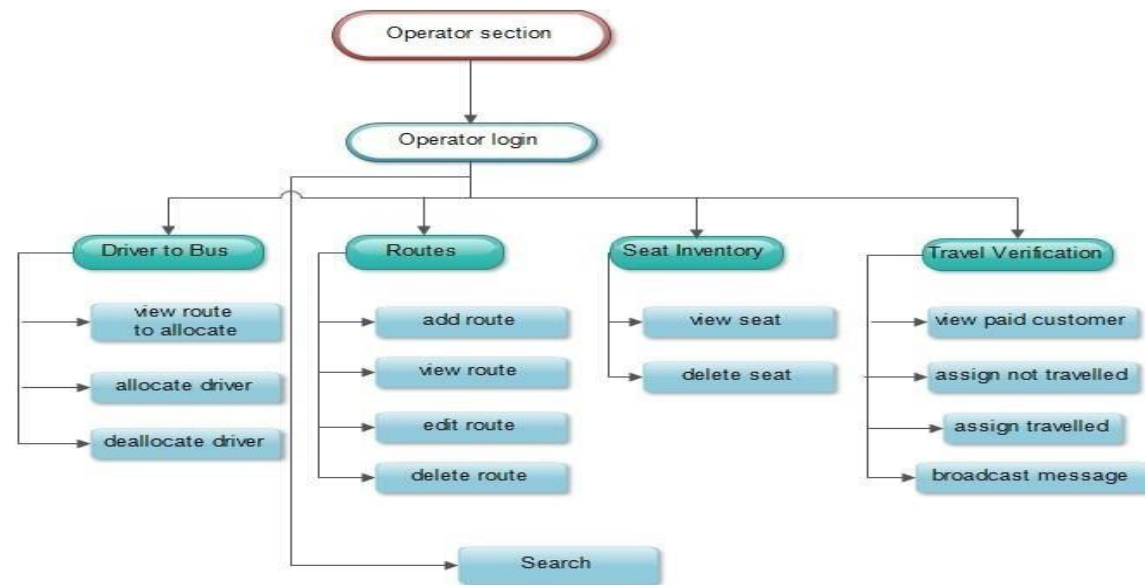


Structure Chart for Staff Section

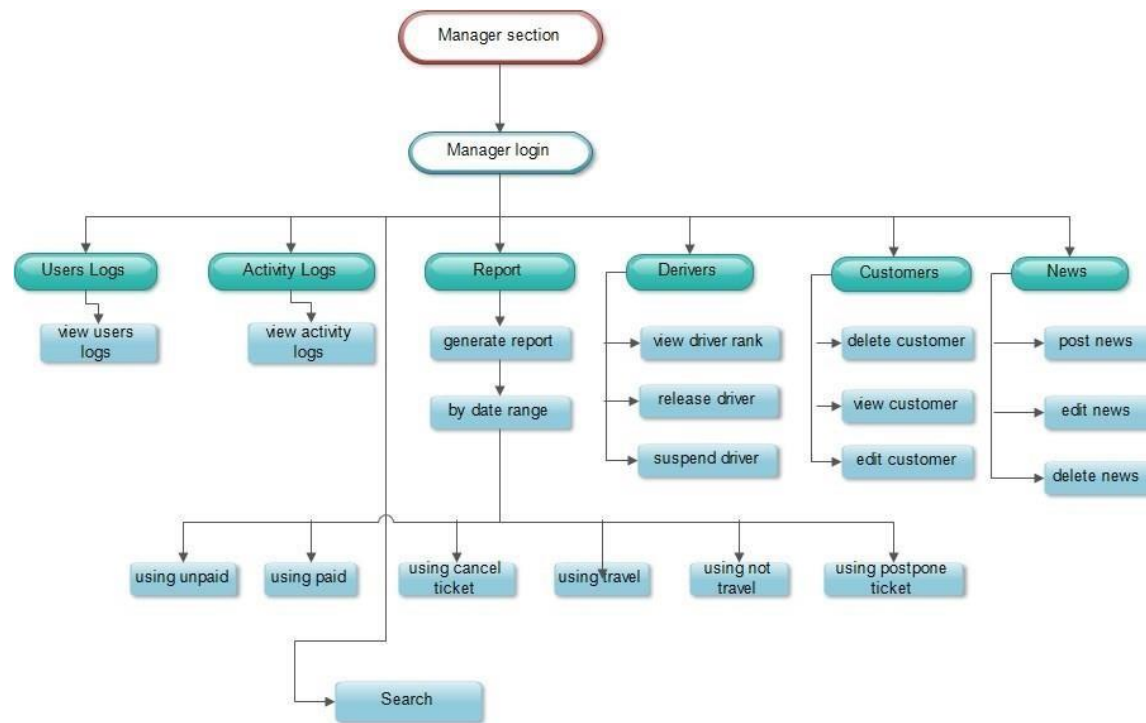
For the Staff section, there are modules which are further divided into sub-modules. The modules are system administrator, company manager, company operator and a company cashier.



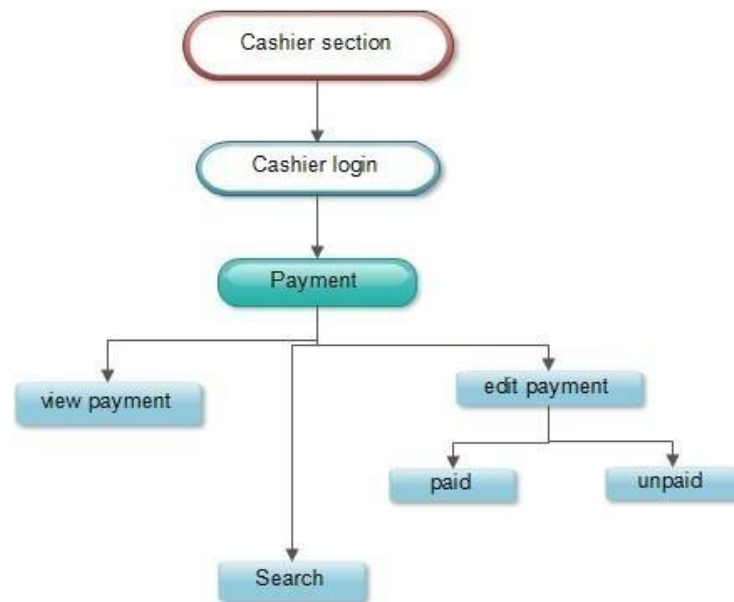
Administrator structure chart



Operator section chart.



Manager Section chart.

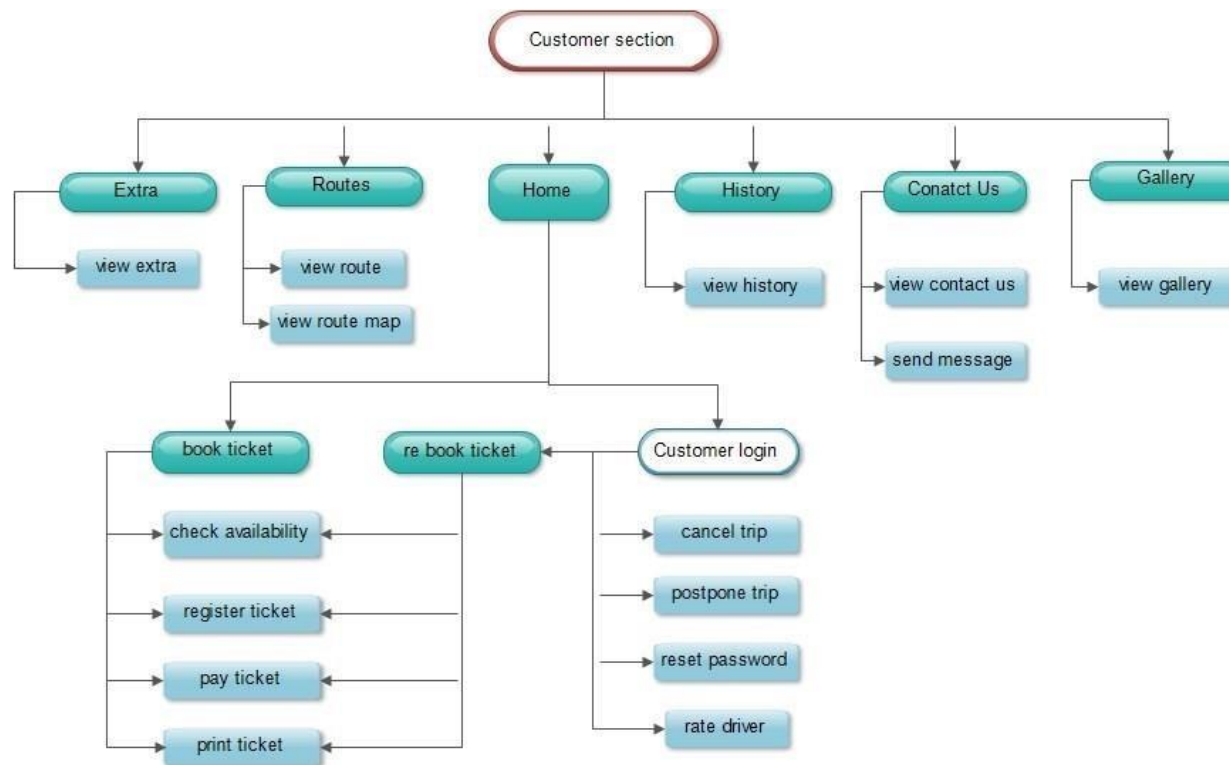


Cashier section chart.

Structure Chart for Customer Section

For the Customer section, there are 8 modules.

The structure chart for Customer section is shown below.



Customer chart section.

INTERFACE DESIGN

The new system has been designed with an interface that is simple for use by the users of the system. The interface itself will be a graphical user interface which is menu driven (see Figures 9,10,11,12 & 13). The users will be required to either select or enter details as required. Below is a representation of account creation interface:

CHAPTER 4: TEST MANUAL

Testing

Testing is the process that is carried out to ensure that the system conforms to the specification and meets the requirements of the users, namely staff, administrator and customers. Testing had been conducted not only in the end but also during the development of the prototype system. Functional and interface testing were carried out for the module or for the whole system. Each and every link had been checked to make sure all the links are working correctly. Interface testing is carried out to identify that the interface works correctly and faults are not created because of interface errors.

Unit Testing

Unit Testing is to test software in terms of a unit, a module, a function, a specific section of code. This testing occurs while the software is being developed and before completion (David Fletcher, 2000).

For Unit Testing, test cases are designed to verify that an individual unit implements all design decisions made in the unit's design specification. A thorough unit test specification should include positive testing where the unit does what it is supposed to do, and also negative testing where the unit does not do anything that it is not supposed to do. Table 4.2 shows the Unit Testing for the Administrator login module.

Table 4.2

Unit testing for administrator login module

Test procedure	Output/error	Analysis of the test result
Login as admin with login ID, password username.	Admin is redirected to the admin home.	Successfully redirected to the admin home after the system checks the validity of login ID, password and username.

Invalid login password or ID, username.	Error message is displayed	Login is denied and an error message of wrong login ID, password or username.
None	Message is displayed requesting the admin insert the required fields.	Login denied and a message is displayed requesting to insert the required fields.
<pre> elseif(\$member['role'] == 5) { \$_SESSION['SESS_ADMIN_ID'] = \$member['uid']; \$_SESSION['SESS_ADMIN'] = \$login; header("Location: admin/dashboard_manager.php"); \$update=mysql_query("insert into user_log (username,login_date,uid)values('\$login',NOW(),".\$member['uid'].")"or die(mysql_error())); } }else { ?> <script type="text/javascript"> alert("Invalid Username Or Password"); window.location = "index.php"; </script> </pre>		

Integral Testing

Upon completion of Unit Testing, Integration Testing will begin. The purpose is to ensure the distinct components of the application still work in accordance to customer requirements. Test sets will be developed with the purpose of exercising the interfaces between the components. This activity is to be carried out by the bus operators and customers. Integration test will be complete when actual results and expected results are either in line or differences are explainable or acceptable based on the user input.

System Testing

Upon completion of Integration Testing, System Testing will begin. During system testing, the complete system is configured in a controlled environment to validate its accuracy and completeness in performing the functions as designed. The system test will simulate production as it will occur in the “production-like” test environment and test every functions of the system that will be required in production. It is also important that validation of the system meets the functional and non-functional requirements. Table 4.3 shows the Integrated Testing for the

Customer Booking Ticket module.

Integrated Testing for the Customer Ticket Booking module

Test procedure	Output/error	Analysis of the test result
----------------	--------------	-----------------------------

Search the ticket availability by inserting the route, the number of passengers , departure date before the time and date of travel from the Current date.	Customer is redirected to the Bus Registration page, which contain the details of customer. The error message prompt If the route buses the driver is not allocated or number of seats is exhausted or the time slot is not available.	Successfully redirected the customer registration page, which contains customer Information. The customer fill the required field and Clicks on the confirm button, the system will
--	--	---

<p>Makes a payment either by choosing offline on skipping the page or by clicking make payment button to pay online using Credit Card.</p>	<p>The registered customer is Directed to the Online payment page on click Make pay.</p> <p>The price will be deducted From the Customer's account.</p>	<p>Successfully redirected the customer to the Online payment page, Or successfully moves to the print ticket</p>
--	---	---

System shows a confirmation message after a successful payment and allows users to print the Ticket.	The customer is shown a confirmation message and is given a option to print the Ticket.	Successfully a confirmation message appears and Customer can print his ticket.

```

$hours = date("H");
$mins = date("i");
$ampm = date('a');
$mydate = date('Y-m-d');
$thedata = $_POST['date'];
$dates = explode("/", $thedata);
$year = substr($dates[2], 2, 4);
$thedata = $dates[2].'-'. $dates[1].'-'. $dates[0];
//echo $thedata;
$f = mysql_query("SELECT * FROM route WHERE id='$_POST[route]'");
$f = mysql_fetch_array($f);

$t = $f;
$fr = $t['route'];
$fr = explode("-", $fr);
$lo = $fr[0];
$up = $fr[1];
$y = 0;
for($m=$lo; $m<=$up; $m++) {
    $er = mysql_query("SELECT * FROM driver_bus WHERE route=$m");
    if(mysql_num_rows($er) == 0)
        $y++;
}
$f = explode(':', $f['time']);
$h = $f[0];
$m = $f[1];
if(($hours <= $h && $mins <= $mins) || ($thedata != $mydate) || ($hours < $h && $mins >= $m)) {
    if($y == 0) {
        $busnum=$_POST['route'];
        $qty=$_POST['qty'];

```

```

<?php
    } else {
        echo "<script>alert('Bus occupied change the travel date');window.location='index.php'</script>";
    }
    } else {
        echo "<script>alert('driver not allocated');window.location='index.php'</script>";
    }
} else {
    echo '<script>';
    echo 'window.alert("Time slot not available");';
    echo 'window.location='../index.php'';

```

Acceptance Testing

Acceptance testing will give both Customers, staff, and Administrator the opportunity to verify the system functionality and usability prior to the system deployment. The users will test the system interaction with the database, using network communications, or interacting with other hardware or other applications. The system is tested with data supplied by the end users rather than simulated test data. Acceptance testing reveals errors and omissions in the system requirement definition because real data exercises the system in different ways from the test data. It also reveals requirements problem where the system's facilities do not really meet the user's need or the system performance is unacceptable. The testing process continues until the system developer and client agrees that the Online Bus Ticketing web portal is an acceptable implementation of the system requirement.

CHAPTER 5: SYSTEM MANUAL

Web Portal

[Sign Up](#) [Sign In](#) [Go Back](#)

Customer Panel

Email Address

Password

SIGN IN

localhost/bus/pro/individual.php

Gmail

YouTube

Maps

SOLUTION: Dodos,...

SVG

Tue 19, Jul 22

User Image

Demo Account

Home

New Booking

View Bookings

Schedules

Routes

Buses

Feedback

Logout

Online Ticket Reservation System

Passenger's Dashboard

Hi, Demo Account

Passengers

10

Buses

10

Schedules

26

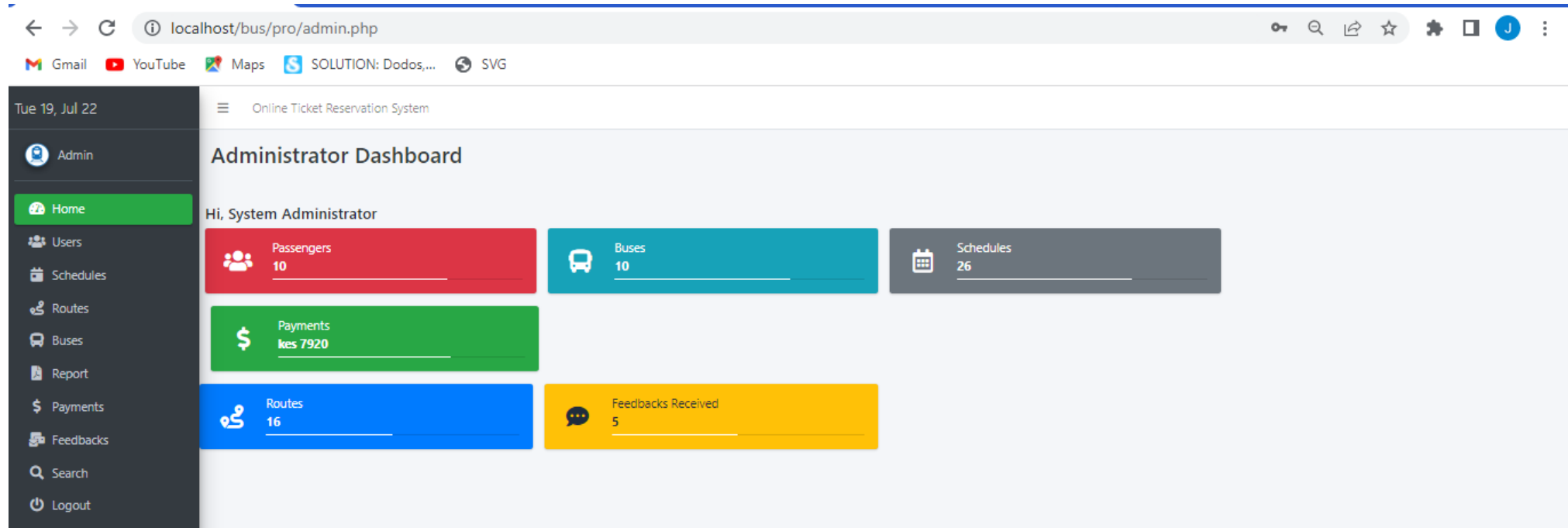
Routes

16

Quick Tips

Use the links at the left.
You can see list of schedules by clicking on "New Booking". The system will display list of available schedules for you which you can view and make bookings from.
Before your bookings are saved, you are redirected to make payment.
After a successful payment, system generates your ticket ID for you which you are required to bring to the station.
You are allowed to view all your booking history by clicking on "View Bookings".

63



Database

localhost/phpmyadmin/index.php?route=/sql&pos=0&db=otrsphp&table=booked

Gmail YouTube Maps SOLUTION: Dodos,... SVG

phpMyAdmin

Recent Favorites

Server: 127.0.0.1 Database: otrsphp Table: booked

Browse Structure SQL Search Insert Export Import Privileges Operations Tracking Triggers

Show all Number of rows: 25 Filter rows: Search this table Sort by key: None

Extra options

					id	schedule_id	payment_id	user_id	code	class	no	seat	date
<input type="checkbox"/>	Edit	Copy	Delete		15	5	12	4	2020/005/1324	first	1	F1	Tue, 11-Aug-2020 11:52:19 AM
<input type="checkbox"/>	Edit	Copy	Delete		17	5	15	3	2020/005/2645	first	5	F02	Tue, 11-Aug-2020 12:48:38 PM
<input type="checkbox"/>	Edit	Copy	Delete		18	6	16	3	2020/006/1655	first	8	F1 - F8	Tue, 11-Aug-2020 01:08:20 PM
<input type="checkbox"/>	Edit	Copy	Delete		19	6	1	4	2020/006/9146	second	1	S1	Tue, 11-Aug-2020 01:09:22 PM
<input type="checkbox"/>	Edit	Copy	Delete		20	8	18	4	2020/008/1144	second	8	S1 - S8	Tue, 11-Aug-2020 01:12:58 PM
<input type="checkbox"/>	Edit	Copy	Delete		21	18	19	1	2020/018/1671	first	8	F1 - F8	Tue, 11-Aug-2020 04:10:29 PM
<input type="checkbox"/>	Edit	Copy	Delete		22	20	20	5	2020/020/126	first	30	F1 - F30	Mon, 31-Aug-2020 11:36:57 PM
<input type="checkbox"/>	Edit	Copy	Delete		23	20	21	6	2020/020/31816	first	2	F31 - F32	Fri, 06-Nov-2020 10:10:44 PM
<input type="checkbox"/>	Edit	Copy	Delete		24	22	22	6	2020/022/1176	second	1	S1	Sun, 08-Nov-2020 02:08:07 PM
<input type="checkbox"/>	Edit	Copy	Delete		25	24	23	2	2020/024/197	second	2	S1 - S2	Sun, 15-Nov-2020 02:25:27 PM
<input type="checkbox"/>	Edit	Copy	Delete		26	26	24	8	2021/026/1183	first	4	F01 - F04	Fri, 17-Sep-2021 04:25:09 PM
<input type="checkbox"/>	Edit	Copy	Delete		27	98	25	7	2021/098/198	first	2	F1 - F2	Wed, 13-Oct-2021 05:17:54 AM
<input type="checkbox"/>	Edit	Copy	Delete		28	99	26	7	2021/099/157	second	1	S1	Wed, 13-Oct-2021 05:28:54 AM
<input type="checkbox"/>	Edit	Copy	Delete		29	100	27	7	2021/0100/1134	second	1	S1	Wed, 13-Oct-2021 05:39:18 AM
<input type="checkbox"/>	Edit	Copy	Delete		30	101	39	7	2021/0101/1116	second	1	S1	Wed, 13-Oct-2021 06:15:30 AM
<input type="checkbox"/>	Edit	Copy	Delete		31	102	40	7	2021/0102/1502	first	1	F1	Wed, 13-Oct-2021 06:18:10 AM
<input type="checkbox"/>	Edit	Copy	Delete		32	103	43	7	2021/0103/1792	second	2	S1 - S002	Wed, 13-Oct-2021 11:02:56 AM
<input type="checkbox"/>	Edit	Copy	Delete		33	103	44	8	2021/0103/3809	second	1	S3	Wed, 13-Oct-2021 02:21:40 PM
<input type="checkbox"/>	Edit	Copy	Delete		34	104	45	8	2021/0104/1526	first	2	F1 - F2	Wed, 13-Oct-2021 05:22:15 PM

Check all With selected: Edit Copy Delete Export

Show all Number of rows: 25 Filter rows: Search this table Sort by key: None

Console SQL operations

localhost/phpmyadmin/index.php?route=/sql&pos=0&db=otrsphp&table=bus

Gmail YouTube Maps SOLUTION: Dodos,... SVG

phpMyAdmin



Recent Favorites

- New
- busbooking
- information_schema
- mysql
- otrsphp
 - New
 - availability
 - booked
 - bus
 - feedback
 - passenger
 - payment
 - route
 - schedule
 - seats
 - users
- performance_schema
- phpmyadmin
- sbtbsphp
- test

Server: 127.0.0.1 Database: otrsphp Table: bus

Browse Structure SQL Search Insert Export Import Privileges Operations Tracking Triggers

Showing rows 0 - 9 (10 total, Query took 0.0004 seconds.)

SELECT * FROM `bus`

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

Show all Number of rows: 25 Filter rows: Search this table Sort by key: None

Extra options

			id	name	first_seat	second_seat
<input type="checkbox"/>	Edit	Copy	Delete	1	EGERTON BEBA	30 45
<input type="checkbox"/>	Edit	Copy	Delete	2	EGERTON CLASSIC	30 45
<input type="checkbox"/>	Edit	Copy	Delete	3	EGERTON SUPER	30 45
<input type="checkbox"/>	Edit	Copy	Delete	7	EGERTON OKOA	30 45
<input type="checkbox"/>	Edit	Copy	Delete	8	EGERTON SHUFFLE	30 40
<input type="checkbox"/>	Edit	Copy	Delete	9	BEBA COACH	20 50
<input type="checkbox"/>	Edit	Copy	Delete	10	SUPER COACH	30 45
<input type="checkbox"/>	Edit	Copy	Delete	11	CLASSIC COACH	30 40
<input type="checkbox"/>	Edit	Copy	Delete	12	SHUFFLE COACH	25 60
<input type="checkbox"/>	Edit	Copy	Delete	13	OKOA COACH	30 50

Check all With selected: Edit Copy Delete Export

Show all Number of rows: 25 Filter rows: Search this table Sort by key: None

Query results operations

Print Copy to clipboard Export Display chart Create view

Bookmark this SQL query

Let every user access this bookmark

Console

Payments(ticket)



EGERTON OKOA

JOSHUA MANASEH WAKOMO

OKOA SECONDCLASS COST KSH 11.00 /=-

Venue : EGERTON

Start's : TUE : 19 July 12:27 PM

End's : TUE : 2 August 12:28 PM



Bought from BUS BOOKING

REF # : 3493

BUS BOOKING – Online Payments Page

Make Online Payments Below



EGERTON OKOA

[Buy Tickets Now](#)

Select another online payments page below

localhost/phpmyadmin/index.php?route=/sql&pos=0&db=otrsphp&table=payment

Gmail YouTube Maps SOLUTION: Dodos,... SVG

phpMyAdmin



Recent Favorites

New
busbooking
information_schema
mysql
otrsphp
New
availability
booked
bus
feedback
passenger
payment
route
schedule
seats
users
performance_schema
phpmyadmin
sbtbsphp
test

Server: 127.0.0.1 Database: otrsphp Table: payment

Browse Structure SQL Search Insert Export Import Privileges Operations Tracking Triggers

Showing rows 0 - 18 (19 total, Query took 0.0004 seconds.)

SELECT * FROM `payment`

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

Show all Number of rows: 25 Filter rows: Search this table Sort by key: None

Extra options

				id	passenger_id	schedule_id	amount	ref	date
<input type="checkbox"/>	Edit	Copy	Delete	12	4	5	500	oyki20masb	Tue, 11-Aug-2020 11:52:19 AM
<input type="checkbox"/>	Edit	Copy	Delete	14	4	6	1000	oyki20masb	Tue, 11-Aug-2020 11:52:19 AM
<input type="checkbox"/>	Edit	Copy	Delete	15	3	5	300	5gtrjnzclw	Tue, 11-Aug-2020 12:48:38 PM
<input type="checkbox"/>	Edit	Copy	Delete	16	3	6	1500	dzwl1488r0	Tue, 11-Aug-2020 01:08:20 PM
<input type="checkbox"/>	Edit	Copy	Delete	18	4	8	100	hja9zvrmgk	Tue, 11-Aug-2020 01:12:58 PM
<input type="checkbox"/>	Edit	Copy	Delete	19	1	18	150	3TVSHVBQII	Tue, 11-Aug-2020 04:10:29 PM
<input type="checkbox"/>	Edit	Copy	Delete	20	5	20	150	84JP4U5LKZ	Mon, 31-Aug-2020 11:36:57 PM
<input type="checkbox"/>	Edit	Copy	Delete	21	6	20	100	VXIZSCHMOG	Fri, 06-Nov-2020 10:10:44 PM
<input type="checkbox"/>	Edit	Copy	Delete	22	6	22	50	TDHRBZTZO	Sun, 08-Nov-2020 02:08:07 PM
<input type="checkbox"/>	Edit	Copy	Delete	23	2	24	50	4TRM9FIFEV	Sun, 15-Nov-2020 02:25:27 PM
<input type="checkbox"/>	Edit	Copy	Delete	24	8	26	70	1QXPYSUTOI	Fri, 17-Sep-2021 04:25:09 PM
<input type="checkbox"/>	Edit	Copy	Delete	25	7	98	300	FIPJBLU5LC	Wed, 13-Oct-2021 05:17:54 AM
<input type="checkbox"/>	Edit	Copy	Delete	26	7	99	800	NKMGVH44QG	Wed, 13-Oct-2021 05:28:54 AM
<input type="checkbox"/>	Edit	Copy	Delete	27	7	100	50	NS5IEEK1HS	Wed, 13-Oct-2021 05:39:18 AM
<input type="checkbox"/>	Edit	Copy	Delete	39	7	101	450	OEPPIM8X9H	Wed, 13-Oct-2021 06:15:30 AM
<input type="checkbox"/>	Edit	Copy	Delete	40	7	102	150	M07FP4QTOV	Wed, 13-Oct-2021 06:18:10 AM
<input type="checkbox"/>	Edit	Copy	Delete	43	7	103	800	RITK5E5GDM	Wed, 13-Oct-2021 11:02:56 AM
<input type="checkbox"/>	Edit	Copy	Delete	44	8	103	600	H6CMTHBUU	Wed, 13-Oct-2021 02:21:40 PM
<input type="checkbox"/>	Edit	Copy	Delete	45	8	104	800	KH70GOC8KO	Wed, 13-Oct-2021 05:22:15 PM

Console

CHAPTER 6: CONCLUSION

It is clear that the existing systems of booking are limited to fixed bus company services and do not provide mobile bus company service feature. This is therefore a bit expensive to the clients as compared to when the bus company itself visits the clients who sometimes might be a singing group of 20 members or a band. Therefore, proposed system provides a module to select the nature of the bus company, i.e. either mobile or fixed and this helps the clients make order for the bus company itself to visit them. This will reduce unnecessary costs and time consumption.

The problems associated with the current system will be addressed with the new proposed system. The whole design of the proposed system is a clear automation of the current system at Modern coast bus ticket booking system and therefore the problems associated with the manual system are well addressed by this design.

Also, the new system has been developed with a graphical user interface that is simple for use and is therefore going to simplify the entire booking process. Despite a few challenges in the implementation process, the process was a successful one as It was possible to come up with a system that did not only work but also could get acceptance form users.

