WOLKITE UNIVERSITY

COLLEGE OF COMPUTING AND INFORMATICS

DEPARTMENT OF SOFTWARE ENGINEERING

ONLINE BUS TICKETING SYSTEM FOR SELAM BUS

SUBMITED TO DEPARTMENT OF SOFTWARE ENGINEERING

IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR

THE DEGREE OF BACHLER OF SCIENCE IN SOFTWARE ENGINEERING

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DECLARATION

This is to declare that this project work which is done under the supervision of **Mr. Alemu W.** and having the title online bus ticketing system for Selam bus is the sole contribution of: Yosef Alemayehu, Hana Kifle and Ashenafi Belachew.

No part of the project work has been reproduced illegally (copy and paste) which can be considered as Plagiarism. All referenced parts have been used to argue the idea and have been cited properly. We will be responsible and liable for any consequence if violation of this declaration is proven.

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APPROVAL FORM

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LIST OF ABBREVIATIONS

- HTTP Hypertext Transfer Protocol
- TDA Tigray Development Association
- HTML Hypertext Markup Language.
- CSS Cascading Style Sheet
- MYSQL My structural Query Language
- XML Extensible Markup Language.
- PHP Hypertext Preprocessor
- UML Unified Modeling Language
- ADMIN Administrator
- Mr. Mister
- Ms. Miss
- UI User Interface

Abstract

Transportation is a non-separable part of any society. Peoples move from one place to another place through different transportation system. In Ethiopia 60% of population use foot transportation system (walking). Buses are also one of transportation system which widely used in Ethiopia. There are different company which serve people by transportation system. Selam bus is the first modern luxury buses in Ethiopia it have many branch around four

corner of Ethiopia. Passengers buy ticket from office before traveling they suffer many problem before traveling and they didn’t feel comfort when they thinking about the process. We are part of those passenger and we motivated to solve the problem by developing automated system.to develop the new system we gather information from different people who have direct relation with the system and we review the existing system. The proposed system enable the passenger to make reservation, to make payment , to see the schedule and different service via internet and it help the company and driver.

CHAPTER ONE

1. INTRODUCTION

Transportation is a non-separable part of any society. It reveals a completely close relation to the fashion of life, the variety and vicinity of sports and the products and offerings as a way to be had for consumption. The records of transportation start from the human generation and persevered to change over a duration of time. The first approach of transportation became the human foot. People used to stroll huge distances to attain places. The first development made to this form of transportation became adapting to distinct surfaces. People knew that bushes and logs waft on water and in order that they dug out the center element of logs to shape a form of seating. This helped human's use water in our bodies as a method of shipping. Around 3500 BC, the primary wheeled cars had been used. From here humans went directly to tame animals like horses as a method of transportation.

Domesticating animals to apply them as a method of transporting humans and small items then began out following a trend. The development associated to transportation began out gaining huge momentum. Submarines got here into lifestyles round 1620 and with inside the 1660s well-functioning modes of public transportation had been to be had. Carriages, steamboats, cycles or even warm air balloons have become functioning cars which had been used on a huge scale. The first fueling engine automobile became made via way of means of Jean Lenoir with inside the 12 months 1862 and after this, in the 12 months 1867, the primary bike became invented. Finally, with inside the 12 months 1903, the Wright brothers designed the primary manned airplane with an engine. In the 12 months 1926, the primary liquid propelled rocket became released successfully! Other cars just like the helicopter, jets and hovercrafts got here after this. The types of transportation in lifestyles now are Land Transport, Railways, Water Transport, Air Transport or Aviation and Space Travel Transportation has contributed plenty to the improvement of economic, social, political and cultural fields and uplifting their condition.

Bus is a form of land transportation gadget, and it is one of the maximum extensively used transportation in Ethiopia which designed to carry a passenger normally alongside a fixed (precise) course at a precise time according to an agenda. There are many bus station that are chargeable for scheduling and ticketing. So they've their personal parameters to agenda and passengers must pass the workplace to get the ticket.

1.1.Background of the Organization

Selam Bus Line Share Company turned into installed in 1996 via way of means of Tigray Development Association (TDA) to cope with the nation-huge want for public transportation. The business enterprise released running dependable bus delivery offerings with a fleet of 25 IVECO maxi-buses with preliminary capital of 13.7million Ethiopian Birr Selam Bus Line Share Company turned into legally constituted on January 29, 1987, E. C with Registration No. 0014/87. Selam Bus Line share business enterprise buses are costly visitor buses with a potential of fifty-one seats that are prepared with Air conditioner, fridge, monitor, & protection belt in order that passengers are entertained via way of means of DVD/CD music/film, Cake & tender drink or plastic packed water/Juice whilst travelling. At present the business enterprise is rendering provider from Addis to Diredawa, Harrer,Jijiga, Jimma, Bahirdar, Gonder, Dessie, Mekelle, Shire, Assosa, Arbaminch and Moyale on each day basis. The head quarter and bus terminal and storage of Selam Bus has been installed in Addis Ababa with department places of work in all nearby capitals. Buses departing from Addis Ababa all the regional capitals providing all necessary information and entertainment services to the satisfaction of the passengers are expected to serve as the ambassador of the region. (2017)

1.2. Statement of the Problem

From the point of view of customer, the current system is very wasteful which require a lot of time and money. For example, if a person wants to reserve a place in the bus, he/she must go to the office so his/her time and money are lost.

- Passengers have to go office to get information about bus schedule.
- Passengers have to go office to buy ticket.
- Passengers don't get the type of bus they want to travel with and the seat number of the bus.

Selam bus Share Company have its own website and we have seen the website service but we got some problem they are:

- The system doesn't give detail information about the price, seat number, and etc.
- The system is not language advanced but it has unworkable icons which have language option.
- The system hasn't sign up but it asks users to sign in by their email address

1.3. Objectives of the Project

1.3.1. General Objective

The general objective of this project is to develop online bus ticketing system for Selam bus line. Our purpose is to make passengers to feel comfort when they think about traveling from one place to another by offering online reservation system.

1.3.2. Specific Objectives

- Identifying all problems of the current existing system
- Collecting different recourses to identify all functionalities of the proposed system
- Analyzing the collected data through different techniques
- Identify and design proposed system components
- Implement the proposed system.
- Testing of the developed system through different techniques before delivery

1.4. Feasibility Analysis

The feasibility study is used to investigate the proposed system in multiple dimensions. It is used to indicate whether the system feasible or not. The feasibility study is an important phase in both the research and software development process. It enables the developer to have an assessment of the product being developed. It refers to the feasibility study of the product in terms of outcomes of the product, operational use and technical support required for implementing it.

1.4.1. Operational Feasibility

The proposed system is satisfying the organization's needs and it also offers a secure, accurate, and efficient system to the organization. The system has a positive impact on users as they are involved in the development of this project by providing their opinion/feedback and understanding or adapt easily how it supports their day-to-day business operation.

1.4.2. Technical Feasibility

As we planned to implement the proposed system using a web-based applications system. So, it is evident that the necessary hardware and software are available for the development and implementation of the proposed system. Hardware like Personal computer (PC), Flash disk, Network cable and Software like MS word for document tools and Edraw Max 6.8 used to make UML diagrams. Also, in our team, there are both

programmers, tester &debuggers so we say that it is technically feasible. The system is going to be developed by technological development techniques such as Android,HTML, CSS, JS, MYSQL, and PHP. The team can develop this system without any difficulty since the team has studied the required methodologies and tools. So, the system is technically feasible.

1.4.3 Economic Feasibility

This Selam bus ticketing system reduce manual power needed by the bus station. It reduces paper base system in the company that used for ticketing and payment process in the system. The cost of developing proposed system including hardware and software needed is lower cost comparing to existing system.

Categorized as tangible and intangible.

Tangible benefits are:

- Using less manpower than the existing system.
- It reduces cost.
- Increase speed of the process.
- Reduce resource consumption.

Intangible benefits are:

- It satisfies user require
- It gives better service
- It reduces time taken by the process

1.5. Scope and Limitation of the project

This online selam bus ticketing system works in the management of bus station to assign buses to go to different places and passengers see and choose the bus that they want to go with.

1.5.1. Scope of the project

Based on the functionalist which are provided from online bus ticketing system we specify its scope.

- Reservation Module
- Bus Scheduling Module
- Bus Management Module
- Profile management module
- Payment Module
- Report Module

1.5.2 Limitation of the project

The system only runs on android devices but not on iOS or other mobile devices, because of time constraint we haven't used cross-platform libraries like flutter, react native, ionic and Xamarin to run on all mobile operating systems.

1.6. Significance of the Project

This project will be useful for the bus station staffs that they can easily assign buses schedule weekly or daily to go places and give buses turns to go. The passengers using this system can easily choose the bus that they want to go with and buy their ticket from anywhere using their android phone device. The system provides accurate payment tariff and passengers do not pay extra money illegally.

There are many more significance of the bus scheduling and ticketing system such as:

- It saves a lot of time for passenger because of Passengers can buy ticket form anywhere using their phone.
- Passengers can see all detail of the bus and choose the bus and its seats number using their android phone.
- The schedule and notifications are language advanced.
- It increases customer satisfactions.
- It helps the stations to handle customer information in an organized way
- It reduces the required man power.
- Totally remove the tedious work of scheduling.
- And increases bus stations profit by making their expenditure less.

1.7. Beneficiary of the Project

Beneficiaries are stockholders which have direct contact with the system such as:

- **Passengers:** the system provide detail information to the passengers and the passengers can see all details of bus like the bus type, the bus level, when the bus starts to go and payment detail. The passengers can buy a bus ticket using their phone form anywhere and anytime they want.
- **Bus stations:** using this system bus stations can assign buses easily to places weekly or daily and provide turn to those buses which bus go first and which go next. It increases their profit by making their expenditure less.
- **Drivers:** using this system drivers get there driving schedule in their mobile phones.so they are one of the beneficiary persons in the system.

1.8. Methodology of the Project

1.8.1. Data Collection Tools/Techniques

- **Observation:** we use participant observation techniques; meaning in this technique the observer is a part of phenomena or group which observed and he acts like both an observer and participant. When we use their transporting system we saw some the problems such as they used manual based system to assign buses, to sell bus ticket and to manage and control all system of Mizan branch Selam bus office. We capture photo of ticket we use as exhibit in chapter two existing system study. So we know how this system works and it will make our work easy to automate and modify this system.

- **Interview**: we contact the some organizations legal branch and we use one to one (face to face) interview method then we asked them how it has been working and the structure of this organization. Some legal offices didn't give detail information about the structure of the company the only tell about ticketing service that is provided by them. Birhan bank is one of legal office of company any passenger can buy ticket from them but passengers can't get detail information the travel.

1.8.2. System Analysis and Design

In the system analysis and design phase of a project we will use the object-oriented approach. Object oriented analysis is procedure of identifying software engineering requirements and developing software specifications in terms of a software system's object model, which comprises of interacting objects.
This will help us to

- Identify all objects
- Organize the objects by creating object model diagram
- Define the internals of the objects, or object attributes
- Define the behavior of the objects, i.e., object actions
- Describe how the objects interact

1.8.3. System Development Model

As system development model we chose waterfall model it is a classical model used in system development life cycle to create a system with a linear and sequential approach. It is termed as waterfall because

the model develops systematically from one phase to another in a downward fashion.and it is best when the requirements are very well known, clear and fixed, Product definition is stable, Technology is understood and The project is short. When come to our project behavior the proposed system is a small project, the requirements are well known and clear. The time given to develop system is short period so waterfall model is feasible.

Some advantage of waterfall model is Simple and easy to understand and use. Easy to manage due to the rigidity of the model – each phase has specific deliverables and a review process. Phases are processed and completed one at a time.

1.8.5. Development Tools and Technologies

For front-end technology we use

- Html, CSS, JavaScript
- Android

For backend we will use

- Php and MySQL

1.8.5.1 Documentation and Modeling Tools

In this project we use the following technology as Documentation and modeling tool:

Software tools*:* are software installed on a computer for documentation and implementation purposes.

Software tools	Description
Microsoft Word	For documenting the corresponding deliverables associated with the project.
Enterprise Architect	For designing unified modeling language (UML) diagrams.

Hardware tools: hardware tools used in the development of this project.

Hardware tools	Description
Computer (desktop or laptop)	For documentation and implementation.
CD or flash disk	For backup and storage.

1.8.5.4. Deployment Environment

We are planning to deploy our software in Xampp server. Since Xampp provide us free database server, we will use it as deployment environment.

1.9. Document Organization

- Chapter one defines and describes concepts with regard to the introduction of the project
- Chapter two describe the existing system.
- Chapter three is about overview of proposed system which includes functional and non-functional requirements.
- Chapter four consists of a flow of events which is the scenario, use case model with its description of the major use cases.
- Chapter five deals with system design. Which includes the overview of the system, design consideration, design goal, design tradeoffs, the architecture of the system, subsystem decomposition, persistent data management, and class interface

CHAPTER TWO

2. DESCRIPTION OF THE EXISTING SYSTEM

2.1. Introduction of Existing System

Selam bus is the first modern luxury buses in Ethiopia which bring passengers aircraft like luxury on wheel and it is the most preferable option due to the many enticing features incorporated in the bus; Recliner seats with head rest and arm support, VCD/DVD movies and music, Air Conditioning and Snack and water. All the services mentioned above are available for all 51 Seater. The company serves user by booking before few day of travel in its ticketing office.

Currently company uses a manual ticketing system and automated systems. In the manual system passenger can reserve ticket by going to the ticket office physically and by fulfilling the required information.

Passengers must tell their name, phone number, city where they want to travel and they have to pay based on the price. Then ticket attendant gives the ticket to the passenger. The information of the passengers is registered in a documents and company store these documents in the shelf. Finally passenger can travel by using the ticket at specific time and place.

The automated system is website of company which is available for any user on internet. The website have home page which give background history about the company and give information about the services provided by company. It have comment section which receive feedback and comments from users. And it have additional icons (buttons) like choose language, buy ticket and check your status.

The drawback of existing system is losing extra money and time when using the manual system and unworkable buttons in website; if passenger want to its ticket status he/she can't get correct information because the website give error message. Change language button also unworkable. It's all about introduction of existing system.

2.2. Users of Existing System

In Selam bus there are four users namely Administrator, Ticket attendant, Deriver and passengers they have their own role and importance in the operation of this ticketing system.

Administrators:

are person responsible for control and manage Selam buses where the bus should, go when should go. They work on assigning buses and declare the price of tickets in all areas. Administrators can hire and fire drivers of these buses.

Ticket attendant

In the current Selam bus ticketing system ticket attendants have office in many regions in Ethiopia. Their role is to give a detailed information about the bus ticket price, bus's initial time to go and sell tickets to customers or passengers.

Passengers

Passengers are peoples that are willing to travel with the selam bus. These passengers or customers are the backbone of this company. Their role is to buy a bus ticket from the ticket office travel using this bus.

Drivers

In the current system drivers are a person that hired by the administers that has responsible to drive buses to their scheduled place to go places.

- **Major Functions of the Existing System**

The current Selam bus line share ticketing system has the following major functions:

- **Assigning busses to routes:** manager of the company assigns the available busses to routes where there is a flow of people.
- **Provide information:** There are offices that passengers buy tickets there and in this they give information about the availability of busses, seats and amount of payment for the passengers.
- **Recording information of passengers:** the ticket clerk records all the information about passengers.
- **Receiving payments:** after registration of passenger, the passenger pays for the ticket.
- **Giving tickets to passengers:** after the payment the ticket clerk gives the ticket to passengers.

2.3. Forms and Other Documents of the Existing Systems

The current Selam bus ticketing system offers to passengers ticket in this form.

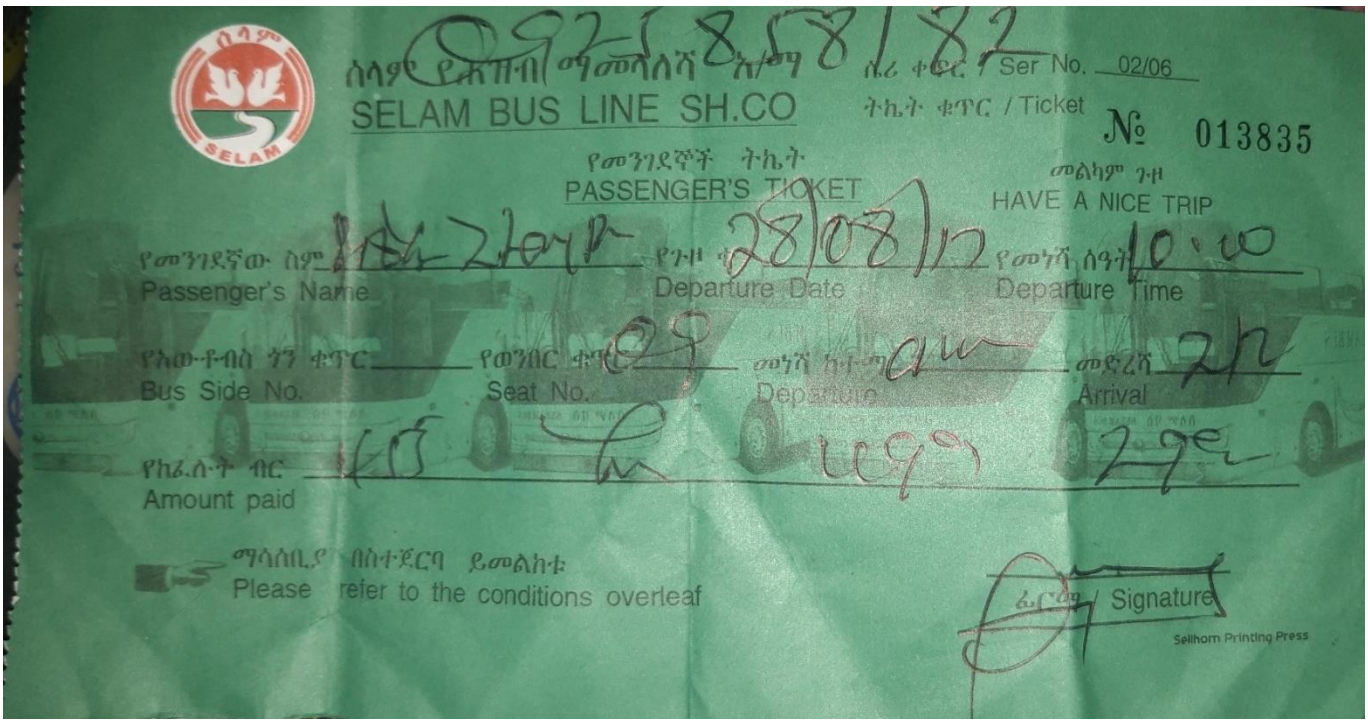


figure 2. 1 existing system ticket picture

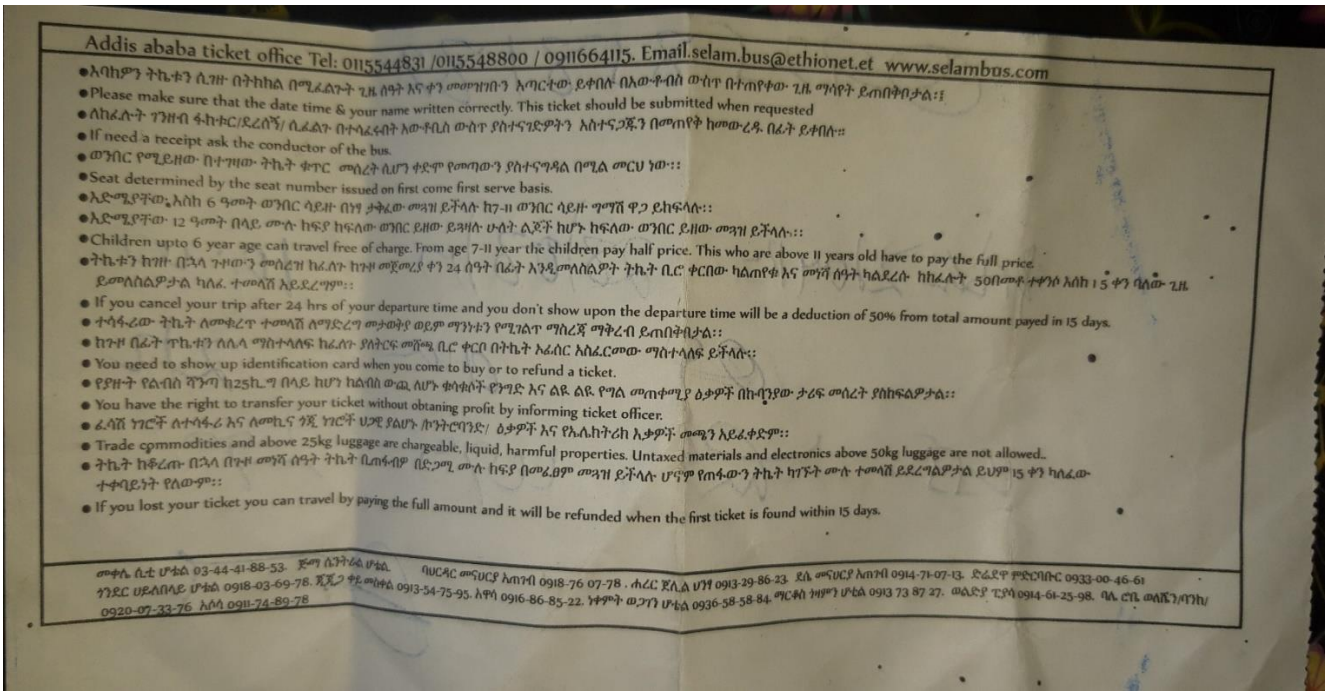


figure 2. 2 existing system ticket picture

2.4. Drawbacks of the Existing System

In the existing Selam bus ticketing system there are several drawbacks that actual cause a problem in the process of operating this system. These problems are listed below:

Time consuming:

In the current Selam bus ticketing system it takes much time for both admin and passengers of this system. Ticket attendant got a lot of paper work in selling tickets to customer this take a lot of time. Passenger also have to go to ticket office to buy ticket this takes a lot of time.

Insecurity of data:

In the current Selam bus ticketing system tickets of passenger could be lost due to lack of security of data or information. This cause problem in operating this system.

Delay in Accessing Data:

In this current system the recording of customer data is not good enough. This makes difficult to access the data because it doesn't arrange well. This causes a problem in the system.

Lack of data Integrity:

In the current Selam bus ticketing system data have no integrity, means customers data is not prevented from unauthorized peoples.

Ineffective Transfer of Data:

In the current Selam bus ticketing system storing records, transferring of data or information that are stored in a file 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.

2.5. Business Rules of the Existing System

A business rule is effectively an operating principle or policy the organization must follow. The Selam bus line share governs and controls the workflow through the following business rules. These are rules and policy which are used to govern all actives in specified workflow, control the workflow, and performed in the work environment. Selam bus line share provides the following business rules for the user of the system.

- The ticket should be submitted when requested.
- if you need a receipt ask the conductor of the bus.
- seat determined by the seat number issued on first come first serve basis.
- Children up to 6-year age can travel free of charge. From age 17-11 year the children pay half price. This who are above 11 years old have to pay the full price.
- if you cancel your trip after 24hrs of your departure time and you don't show upon the departure time will be a deduction of 50% from total amount paid in 15 days.
- you need to show up identification card when you come to buy or to refund a ticket.
- you have the right to transfer your ticket without obtaining profit by informing ticket officer.
- trade commodities and above 25kg luggage are chargeable, liquid, harmful properties. Untaxed materials and electronics above 50kg luggage are not allowed.
- if you lost your ticket you can travel by paying the full amount and it will be refunded when the first ticket is found within 15 days.

CHAPTER THREE
3.PROPOSED SYSTEM

3.1 Functional Requirements

Functional requirement explains and describes the interaction between the system and the users or in general with the environment. Functional requirement determines what the system can do as well as input and output of the System. The online Bus ticket reservation system is android application that helps passengers to reserve and book bus seats easily. This system will perform several tasks including

3.1.1 Bus Scheduling Module

- Add New Schedule
  - ✓ The system will have a function that allow administrator to add the new schedule and the destination to the driver.
  - ✓ The system will check on the same time, same day and same driver that already have the schedule or not, if yes then the system will not allow the administrator to add the new schedule for the particular driver on the same time, day and place.
  - ✓ If not, then the administrator can assign the new schedule for the particular driver.
- Edit Schedule Details
  - ✓ The system will have a function that allows the administrator to edit the schedule that already assigned. If have any happen occur so that the administrator needs to reassign the schedule for the driver.
- View Schedule Details
  - ✓ The system will have a function that allow the driver to view the schedule

that assign by the administrator according to their name so the driver can know when and what time they should driver the bus from one destination to another destination.

❖ Delete Schedule Details

✓ The system will have a function that allows the administrator to delete a schedule for the particular driver if they feel that the schedule not suitable for this particular driver on that time.

3.1.2 Reservation Module

❖ Add Reservation

✓ The system will have a function to allow the member to add reservation via online. When the member clicks the next button then will go to online payment form to make payment.

❖ Add Reservation Payment

✓ The system will have a function that allows the member to add reservation payment via online.

✓ When the member clicks the next button then will go to the online payment form and the member will key in all the information in the payment form then the system will check the credit card no and the credit card expired date whether is valid or not.

3.1.3 Bus Management Module

❖ Add New Bus

✓ The system will have a function that allows the administrator to add the new bus for the company if the company buys a new bus for company.

❖ Edit Bus Details

✓ The system will have a function that allow the administrator to edit the bus details such as the driver name, engine model, transmission model, color and so on

❖ View Bus Details

✓ The system will have a function that allows the administrator to view the

bus details inside the company database so that they can know have how many bus belong to the company.

- ✓ Delete Bus

  The system will have a function that allow the administrator to delete the bus inside the database if the bus already used many years and cannot used anymore for the company to carry the passengers.

3.3.4 Profile management module

- ✓ The system allows the admin to register employee profile.
- ✓ The admin can update and delete employees' profile.

3.3.5 Report Module

- ✓ The system enables the user to give feedback and comment.
- ✓ The system will generate report for passenger

3.2 Non-functional Requirements

Non-functional requirement describes the user-visible aspects of the system that are not directly related to the system and not designated to functional behavior of the system and it deals with the additional quality of the system. Such as the following: -

3.2.1 User Interface and Human Factors

User interfaces are the access points where users interact with designs. To make the proposed system easy to understand and easy to learn we will use graphically user interface (GUI).the reason why we use GUI is it didn't need additional training and feasible to all kind of users Because it includes Graphical representation like buttons and icons, and communication can be performed by interacting with these icons rather than the usual text-based or command-based communication Understanding.so the user interface of proposed system is user-friendly and simple, easy to remember and learn.

3.2.2 Hardware Consideration

The online bus ticketing system is an android based system and can run on any android devices without any additional requirements.

3.2.3 Security Issues

The system is secured that it doesn't allow any user to access the services without having their login credentials. So, any personal data cannot be accessed by other persons. The online payment platforms have their own security mechanism to achieve secure transactions.

3.2.4 Performance Consideration

Because android applications are usually 1.5 times faster than websites and they perform actions much faster, they are considered to run much faster than web applications. The response time for the user request will be very smaller not more than 2 second.

CHAPTER FOUR
SYSTEM ANALYSIS

System analysis is conducted for the purpose of studying a system or its parts in order to identify its objectives. It is a problem-solving technique that improves the system and ensures that all the components of the system work efficiently to accomplish its purpose. Analysis model contains three models: functional, object and dynamic models. The functional model can be described by use case diagrams. Class diagrams describe the object model. Dynamic model can also be described in terms of sequence, state chart and activity diagrams. For the purpose of this project, we have described the analysis model in terms of the functional model and dynamic models using use case, sequence diagrams, Activity diagram, State diagram, and class diagram.

4.1. System Model

To describe the abstract models of our system we use the following use case model with each of this use case model presenting of developing abstract models of the system. We can represent our system by using different system models such as use case models, object models, dynamic models, that describe the problem to be solved and as system models represented by graphically, they are more understandable than more detailed natural language description of the system requirement. (McGraw-Hill, 2016)

4.1.1. Use Case Model

The Use Case Model (use case diagram, use case description, use case scenario) is used to define the core elements and processes that make up our system. This Use Case Model capture the functional system components. Because Use Case Models are simple in nature, this Use Case Models are a great way to storyboard flows with users and define the system requirements being modeled and help write the scenarios later used in testing. (Ambler, 2012)

4.1.1.1. Use Case Diagram

Use case diagrams are used for capturing functional requirements of the system. It is the

functionality of the system or the service provided by the system. In use case diagram it considers the following elements.

- ❖ Use case - which is the functionality of the system which directly interacts with the user
- ❖ Actor - anything which interacts with the system.
- ❖ A relationship between the use case.

In this system we identified both actors and use cases (functionalities) as the following:

- ❖ Administrator
- ❖ Passenger
- ❖ Driver
- ❖ Ticket officer
- ❖ Assistance

The system has three actors and each actor can perform actions that are specific to a particular role. Figure 4.1: below shows the use case diagram of the system.

- ❖ Passenger

- A Passenger can login into the system and log out from the system
- A Passenger can Search bus.
- A Passenger can view Available bus
- A Passenger can view notification
- A Passenger can manage profile
- A Passenger can give feedback
- A Passenger can make reservation
- A Passenger can make request to cancel ticket.

- ❖ Driver

- A Driver can log in into the system and log out from the system
- A Driver can manage profile
- A Driver can view notification
- A Driver can view schedule
- A Driver can send feedback

- ❖ Ticket officer

- The ticket officer can register passengers
- The ticket officer can send notification
- The ticket officer can cancel ticket

❖ Administrator

- The administrator can log in into the system and log out from the system
- The administrator can manage user
- The administrator can manage profile
- The administrator can schedule bus
- The administrator can manage payment
- The administrator can generate report
- The administrator can manage feedbacks
- The administrator can cancel ticket

❖ Assistant

- The assistant can view schedule
- The assistant can check ticket

figure 4. 1 use case diagram

4.1.1.2. Use Case Description

The use case description is used to detail description of the use case what and how the use case works in order to perform user and system functionality. In this project, we discussed detail use case description as shown table below.

Table 4. 1 login use case description

Use case name	Login	
Use case id	U1	
Actor	Admin, driver, passenger	
Description	Login is authenticating admin, driver, passengers to grant privilege.	
Precondition	They must be registered first.	
Normal flow	Actor action	System response
	Step1: open home page Step2: click login button. *Step4:* enter user name and password	Step3: display login form Step5: checks user name and password Step6: users login to the user page *Step7:* use case ends
Alternative flow	5.1 if the user enters wrong user name and password back to step4	
Post condition	The admin, driver and passenger login the system and use.	

Table 4. 2 user register use case description

Use case name	Register
Use case number	**U2**
Description	The user who is new for the system should be registered
Actor	**Administrator, Passenger, Driver**

Precondition	Start the selam bus application
Normal flow	1. User clicks (register) link on the home page 2. The System displays registration page 3. User fulfill the information that the system request and click on (register) button 4. The System validates entered value from the user. 5. the system will Register user and display Successfully registered message. 6. The System display home page. 7. Use case end
Alternative flow	4.1. The user enters invalid information i. The System displays a messages that contain “field cannot be empty or you entered a wrong value” will be displayed. ii. User repeat number 3 from the normal flow
Post Condition	The user will have access to his account

Table 4. 3 view notification use case description

Use case name	View Notification
Use case number	U3
Description	Notifications that are sent to the user
Actor	Administrator, passenger, Driver
Precondition	Users should be registered.
Normal flow	1. User clicks on (notification) link on home page. 2. The System displays generated notification. 3. User view notification 4. Use case end
Alternative flow	Nothing
Post condition	Get important information

Table 4. 4 view available bus detail use case description

Use case name	Search bus
Use case number	U4
Description	looking for a specific bus
actor	Passenger
Precondition	User should open the application
Normal flow	1. User choose trip date in the calendar and departure and destination. 2. User clicks on the search icon on the home page.

	3. System validate and display the search results 4. Use case end.
Alternative flow	The system displays not found
Postcondition	Get information about a specific product

Table 4. 5 feedback use case description

Use case name	Feedback
Use case number	U5
Description	Commenting on the service.
Actor	passenger.
Precondition	Register and login into the system.
Normal flow	1. passenger clicks on (comment) link on home page. 2. The System display comment form. 3. passenger enters the comment and clicks on (comment) button. 4. The system validates entered input. 5. The system will display the comment Use case end
Alternative flow	4.1 user enters wrong input or left blank fields 1. The System displays Messages that contain “field cannot be empty or you entered the wrong character” will be displayed User repeat 3
Postcondition	Admins get feedback from passenger.

Table 4. 6 Logout use case description

Use case name	Logout
Use case number	U6
Description	Exiting from the system

actor	Administrator, passenger, Driver
Precondition	Login into system
Normal flow	1. user clicks on (log out) button on the home page 2. the system exit user from the system. Use case end
Alternative flow	Nothing
Postcondition	Exit.

Table 4. 7 Ticket reservation use case description

Use Case name	Ticket reservation	
Use case id	U7	
Actor	Passenger	
Description	reserving seat.	
Pre- condition	Must have available seat	
Normal flow	Actor action	System response
	Step1: open home page. *Step2*: click ticket reserve seat link. *Step4*: passengers fill departure & destination. Step5: click search button. Step8: passengers fill form. Step9: click submit.	*Step3:* The system display reservation form. *Step6*: The system validates the information. *Step7*: The system display ticket available seat and reservation form. Step10: The systems verify information. Step11: The system assign seat and Send message. *Step12*: The use case ends

Alternative flow	*6.1 If the information is invalid back to step4.* *6.2. The use case continues to step7.* *10.1 If the passenger fill wrong information return step 8.* *10.2 The use case continues to step11.*
Post- condition	The passenger will reserve a ticket.

Table 4. 8View available bus use case description

Use case name	View available bus.	
Use case id	U8	
Actor	Passenger	
Description	This use case allows the passenger to see available bus to journeys.	
Pre-condition	Must have available bus form.	
Normal Flow	Actor action	System response
	Step 1: Passengers open home page Step2: click view available bus link. Step 4: Passenger fills the required data. Step5: click search.	Step3: the system available bus form. display view Step 6: The system validates the information. Step 7: The system displays available bus with the required route. Step8: Use case end
Alternative flow	***Step***6.1 if the information is incorrect returns step4.	
Post-condition	It will show available bus	

Table 4. 9 Cancel ticket use case description

Use case name	Cancel ticket.
Use case id	U9
Actor	Admin

Description	**t**his use case allows cancel reservation ticket	
Pre-condition	Passenger must send cancel ticket request.	
Normal Flow	Actor action	System response
	Step1: open home page. *Step2*:click cancel ticket link. ***Step4***: select ticket. ***Step5:*** Select free button ***Step6***: click submits.	***step3***: The system displays reserved ticket list. ***Step7***: The system validates Information. ***Step8***: The system makes free seats and send successfully Cancelled message ***Step9***: The use case ends
Alternative Flow	*Step* 7.1If the user information is invalid return tostep4. *Step*7.2 The use case continues Step8 of the basic course of action.	
Post-condition	The selected reservation has been cancelled and updating the database information.	

Table 4. 10 Generate Report use case description

Use case name	Generate Report	
Use case id	U10	
Actor	Admin	
Description	Allows generate report	
Pre-condition	Admin must have been login	
Normal flow	Actor action	System response
	Step1: the login to the system. Step2: click generate report link. Step4: admin enters the generated report. Step5: admin click submit button	Step3: Then system displays generate report form Step6: The report is stored in database and is also display Step7: report is successfully display. Step8: The use case ends

Alternative flow	
Post-condition	The report has been generated

Table 4. 11 Delete route use case description

Use case name	Delete route	
Use case id	U11	
Actor	Admin	
Description	This use case allow deletion of existing route.	
Pre-condition	The route must have been available.	
Basic cores of Action	Actor action	System response
	Step1: login. Step2: click manage delete route link Step4: select delete route. Step6: Admin select route Step7: click delete button	Step3: The system displays the list Step5: The system displays the Exiting routes. Step7: validates information. Step8: The system displays message successfully deleted. Step9: end use case.
Alternative cores of action	***Step*** 7.1.**If** the input information is invalid return to step4. ***Step***7.2 The use case continues ***Step8*** of the basic course of action	
Post-condition	existing route haven been deleted	

4.1.1.3. Use case Scenario

A use case scenario, or scenario for short, describes a real-world example of how one or more people or

organizations interact with a system. They describe the steps, events, and/or actions which occur during the interaction. Use case scenarios can be very detailed, indicating exactly how someone works with the user interface, or reasonably high-level describing the critical business actions but not the indicating how they're performed.

Scenario name: Login.

Participating actors: MR. Yosef

Initial assumption: power and connection are available. Also, browser is open.

Normal flow of events:

- Mr. Yosef click on (login) link on home page.
- The System display login page.
- Mr. Yosef fulfils the username and password and then click on (Login) Button.
- The System validate input value.
- Mr. Yosef has access to his account (logged in).
- End use case.

Alternative flow:

- The System displays a Messages that contain “field cannot be empty or you entered wrong username or password” will be displayed.

Scenario name: User registration.

Participating actors: Mr. Ashenafi

Initial assumption: The system should be first displayed.

Normal flow of events:

- Mr. Ashenafi click on (register) link on home page.
- The System display registration page.
- Mr. Ashenafi fulfil the information that system request and click on (register) button.
- The System validate entered value from user.
- The system Registers Ashenafi and display Successfully registered message.
- The System display home page.
- Use case end

Alternative flow:

- Mr. Ashenafi enters incorrect information and the System displays a Messages that contain “field cannot be empty or you entered wrong value” will be displayed

Scenario name: View available bus.

Participating actors: Ms. Hana

Initial assumption: The system should be first displayed.

Normal flow of events:

- Passengers open home page
- Click view available bus link.
- The system available bus form display view
- Passenger fills the required data.
- Click search.
- The system validates the information.
- The system displays available bus with the required route.
- Use case end

Alternative flow:

- Mr. Hana enters incorrect information and the System displays a Messages that contain “you entered wrong value” will be displayed

4.2. Object Model

An object model is a logical interface, software or system that is modeled through the use of object-oriented techniques. It enables the creation of an architectural software or system model prior to development or programming. In our system we use object model like class diagram and data dictionary.

4.2.1. Class Diagram

In this section you are expected to illustrate (diagrammatically) the conceptual relationship among objects/classes without including visibility of data and members, association,

generalization, cardinality etc. (htt)

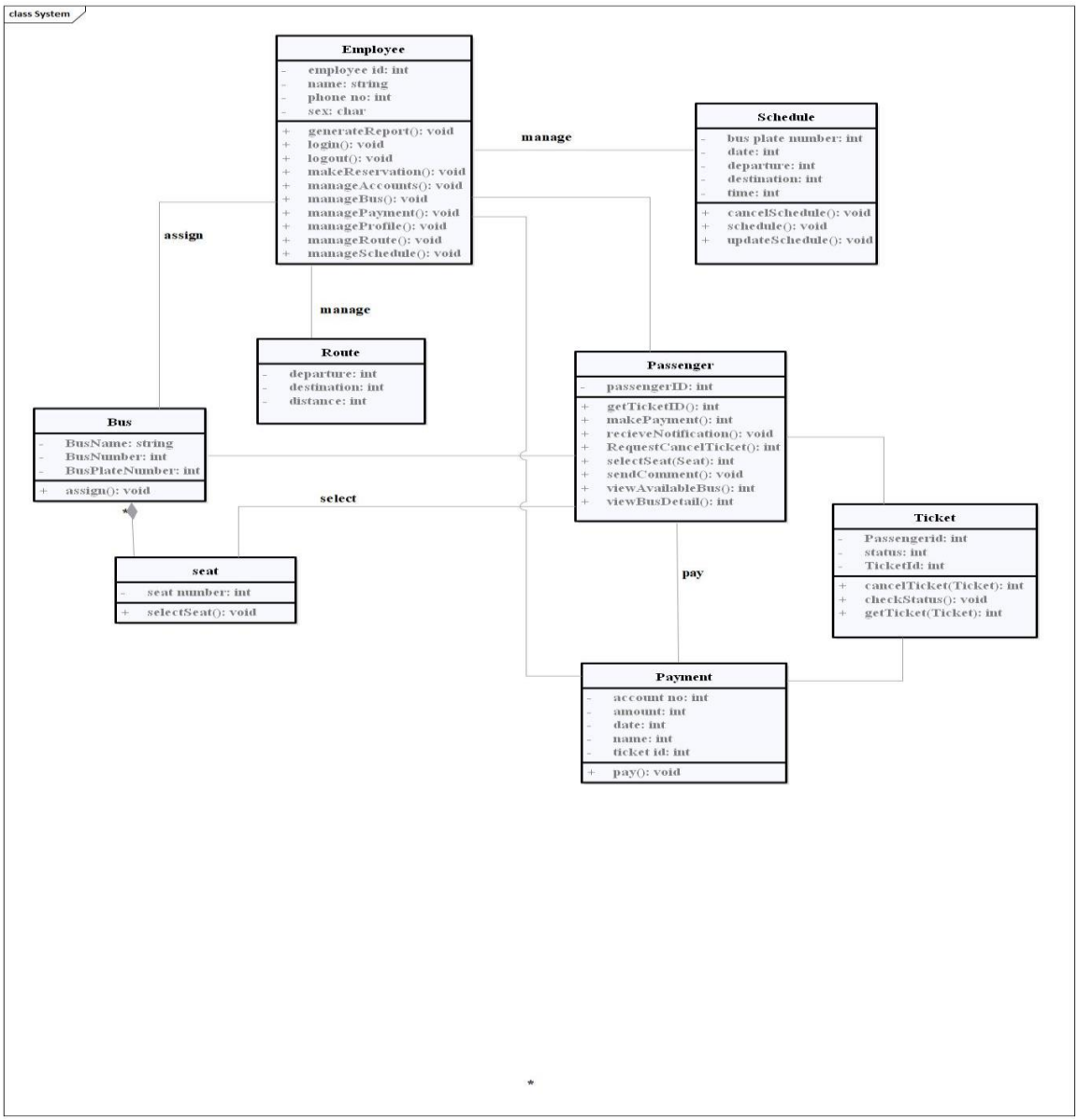


figure 4. 2 class diagram

4.2.2. Data Dictionary

In this section mention attributes, data type, data size, key constraints and constraints of the identified entities or classes by using tabular form.

Table 4. 12 data dictionary for passenger

Field name	Data type	Data size	Constraint	Description
First name	String	25	Not null	The first name of passenger
Last name	String	25	Not null	The last name of passenger
Phone Number	Int	13	Not null	Mobile or home phone number of the passenger
Address	String	30	Not null	Address of the passenger
Age	Date/time	-	Not null	Date of birth of the passenger
Sex	Char	6	Not null	Sex of the passenger

Table 4. 13 data dictionary for reservation

Field name	Data type	Data size	Constraint	Description
Departure city	String	25	Not null	Starting city of the reservation
Reservation amount	Int	4	Not null	No reservation
No of ticket	Int	5	Not null	No of ticket allocated for reservation
Destination city	String	25	Not null	Destination city of the reservation
Departure Date	Date/time	20	Not null	Date of the journey
Price	double	10	Not null	Price of the reservation
Reservation id	Int	20	Primary key	Reservation identity number

Table 4. 14 data dictionary for route

Field name	Data type	Data size	Constraint	Description
Route id	Int	25	Primary key	Route identity number
Price	double	10	Not null	Price of the route
Departure City	String	25	Not null	Starting city of the route
Destination City	String	25	Not null	Destination city of the route

Table 4. 15. data dictionary for schedule

Field name	Data type	Data size	Constraint	Description
Departure Time	Date/time	20	Not null	Departure time of the journey
Arrival Time	Date/time	20	Not null	Arrival time of the journey
Status	Canceled/not canceled	-	Not null	Time table
Departure Date	Date/time	20	Not null	Departure date of the journey

Table 4. 16 data dictionary for bus

Field name	Data type	Data size	Constraint	Description
No of seat	Int	5	Not null	No of seat of the bus
Plate number	Varchar	10	Primary key	Bus identity number

4.3. Dynamic Model

The dynamic model represents the time–dependent aspects of a system. It is concerned with the temporal changes in the states of the objects in a system. In this section you are expected to document the behavior of the object model, in terms of sequence, activity and state chart diagrams.

4.3.1. Sequence Diagram

A Sequence diagram is an interaction diagram that shows how processes operate with one another and in what order. It is a construct of a Message Sequence Chart. A sequence

diagram shows object interactions arranged in time sequence. It depicts the objects and classes involved in the scenario and the sequence of messages exchanged between the objects needed to carry out the functionality of the scenario so in this Selam bus ticketing system there will be different process to do specific actions and we include some sequence diagrams to handle these interactions.

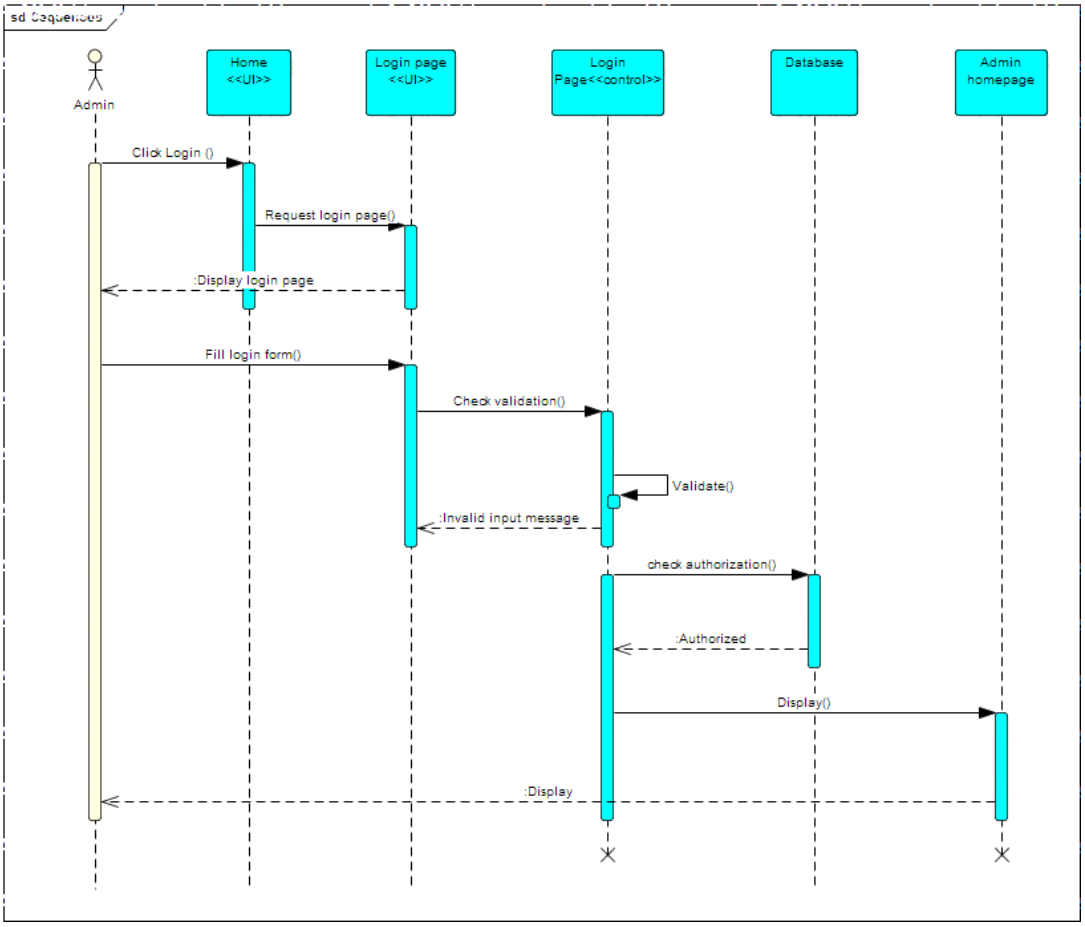


*figure 4. 3 a*dmin login Sequence diagram

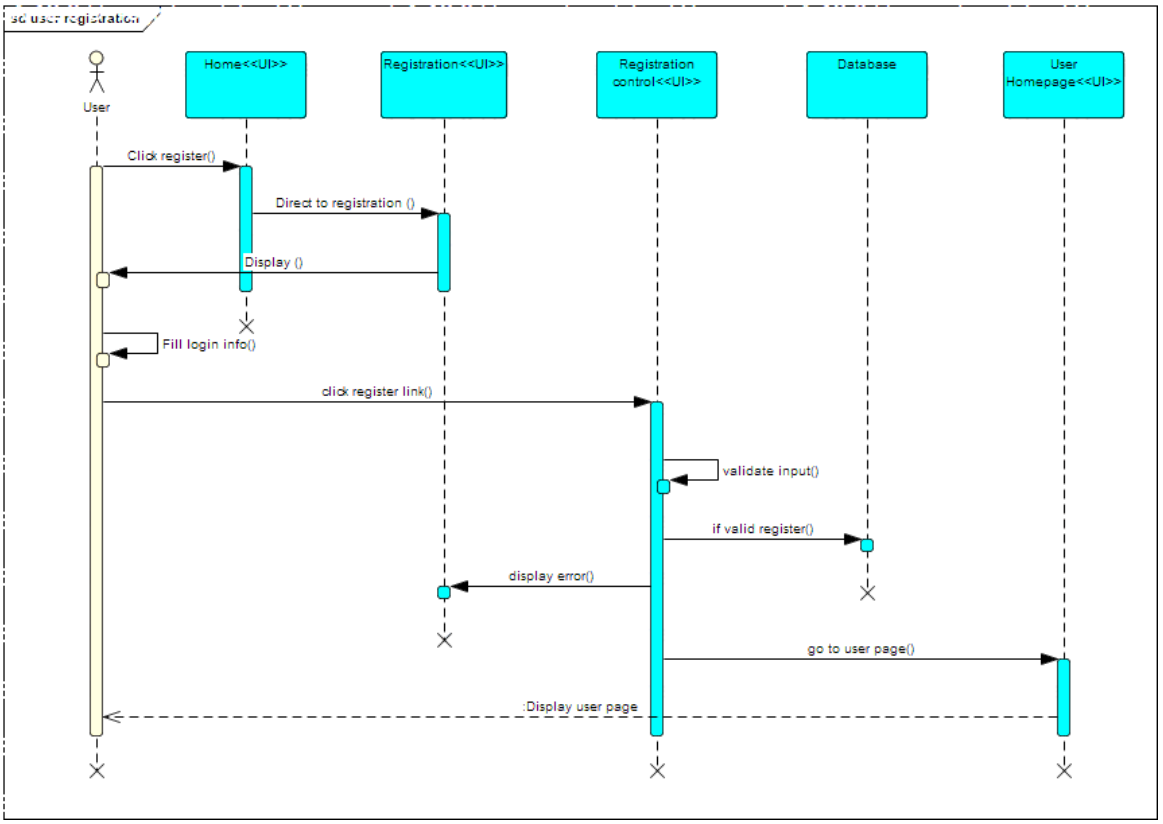


figure 4. 4. user registration Sequence diagram

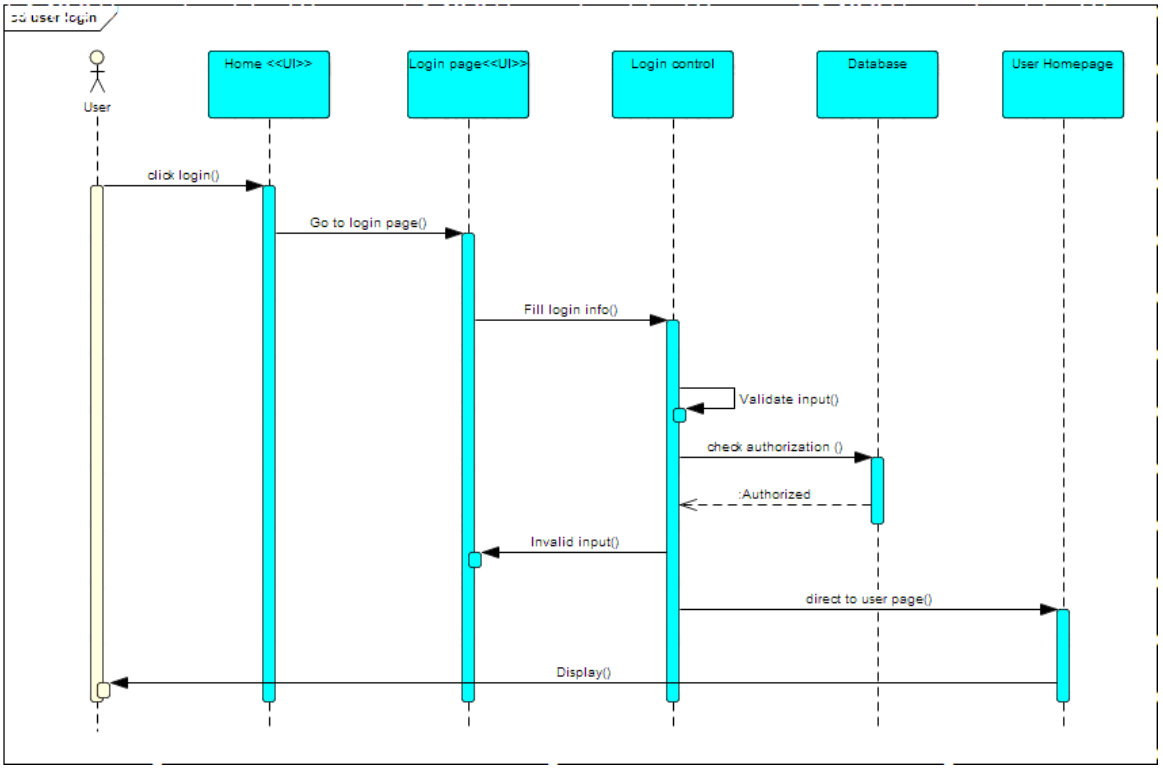


figure 4. 5 user login Sequence diagram

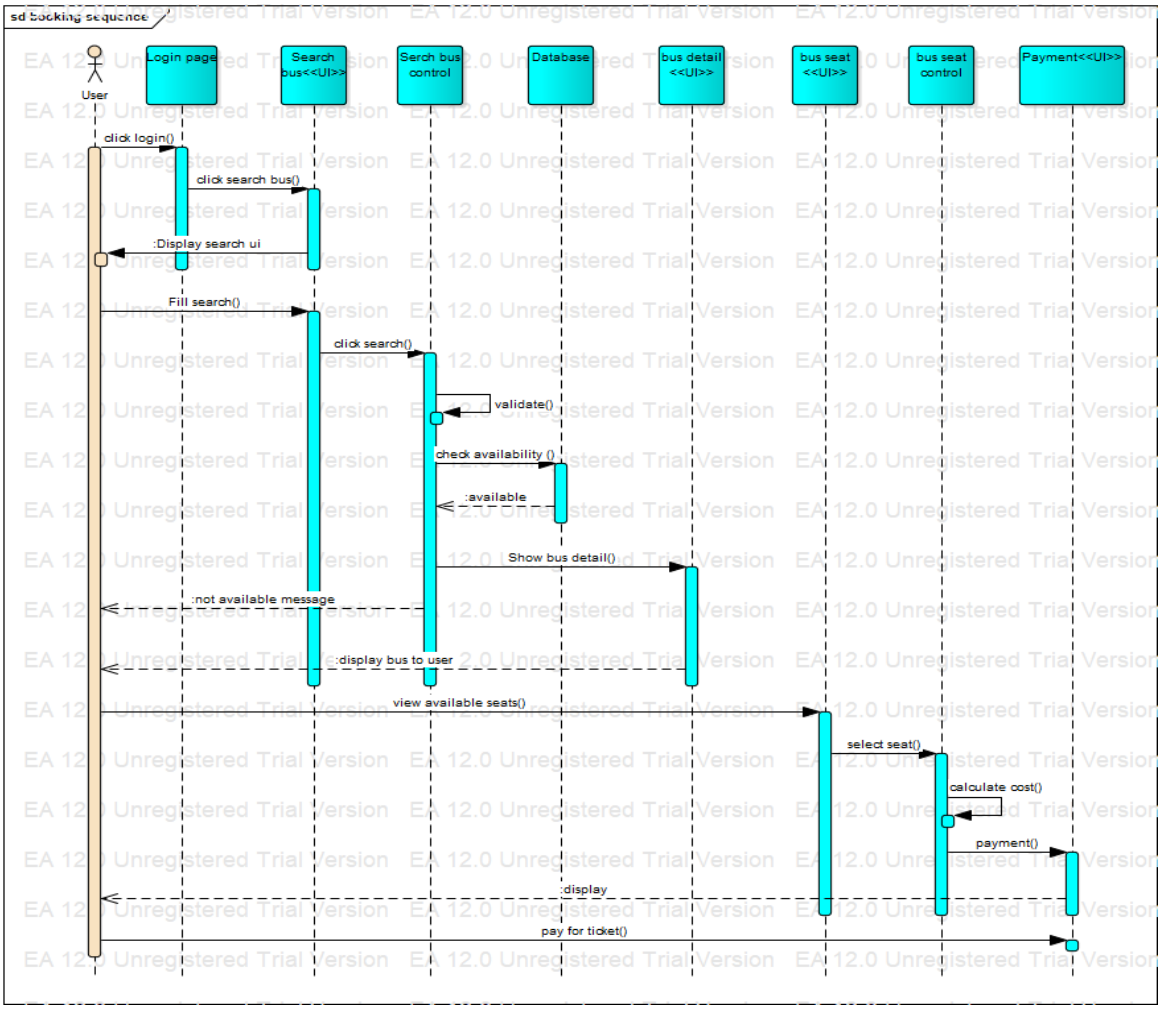


figure 4. 6 user booking ticket Sequence diagram

4.3.2. Activity Diagram

Activity diagram is basically a flow chart to represent the flow form one activity to another activity. The activity can be described as an operation of the system in order to perform many tasks there should be one or more activity to be done. figures down below are our system activity diagram

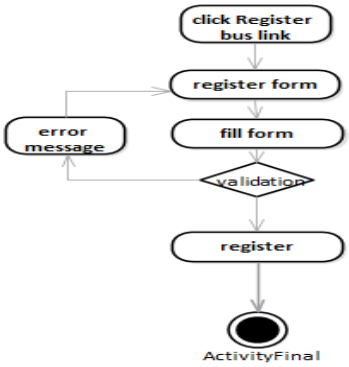


figure 4. 7 register activity diagram

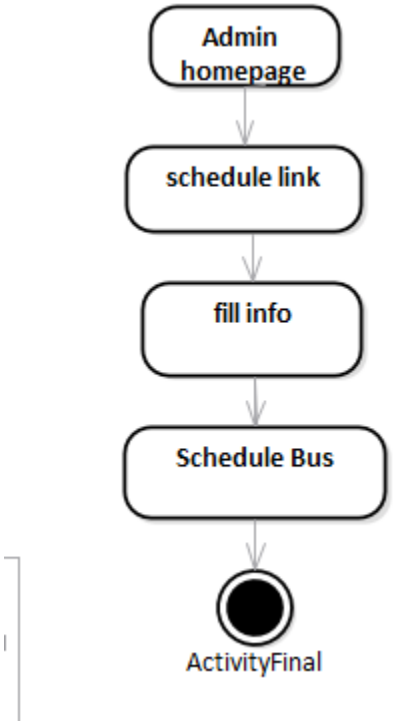


figure 4. 8 admin schedule bus activity diagram

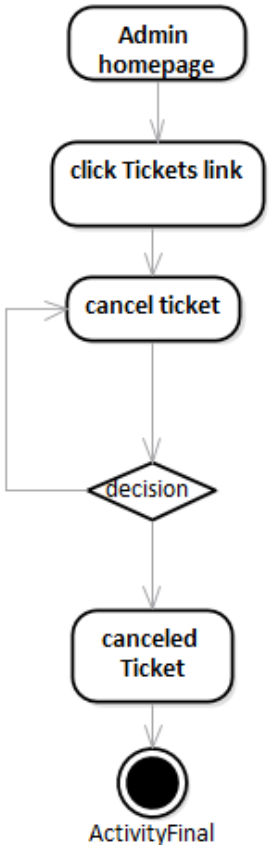


figure 4. 9 admin cancel ticket activity diagram

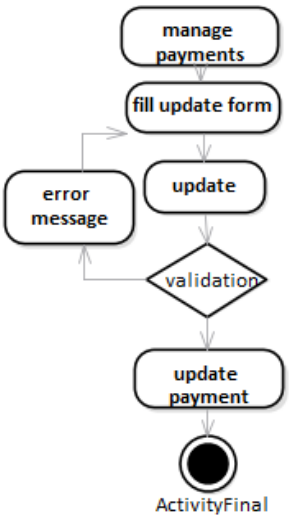


figure 4. 10 admin manage payment activity diagram

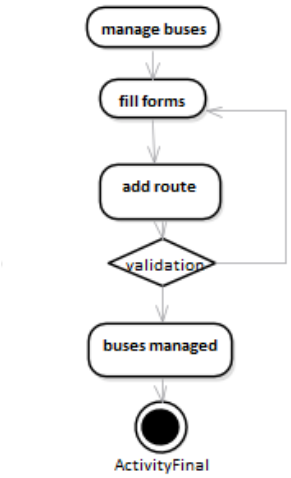


figure 4. 11 admin add route

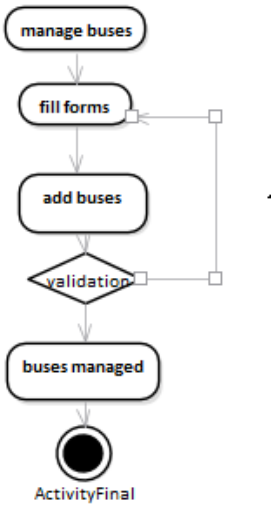


figure 4. 12 admin add bus activity diagram

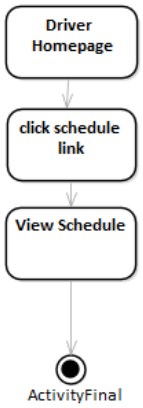


figure 4. 13 driver view schedule activity diagram

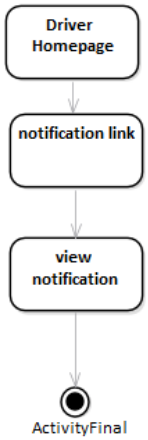


figure 4. 14 driver view notification activity diagram

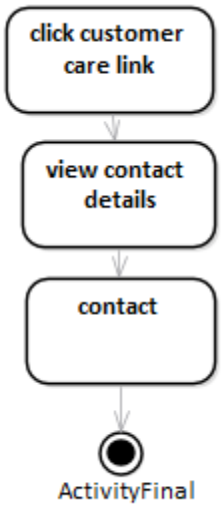


figure 4. 15 user customer care service activity diagram

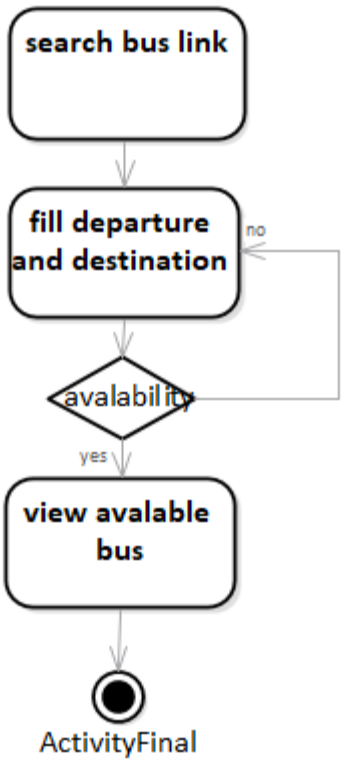


figure 4. 16 user search bus activity diagram

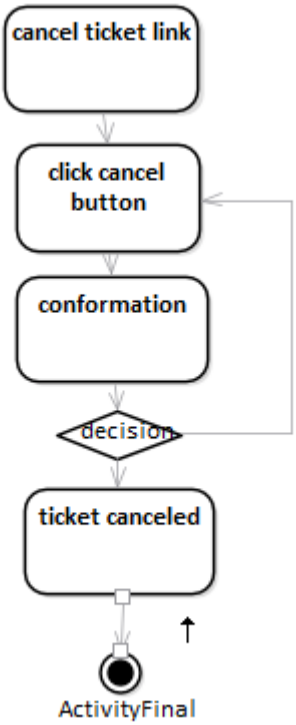


figure 4. 17 user request cancel ticket activity diagram

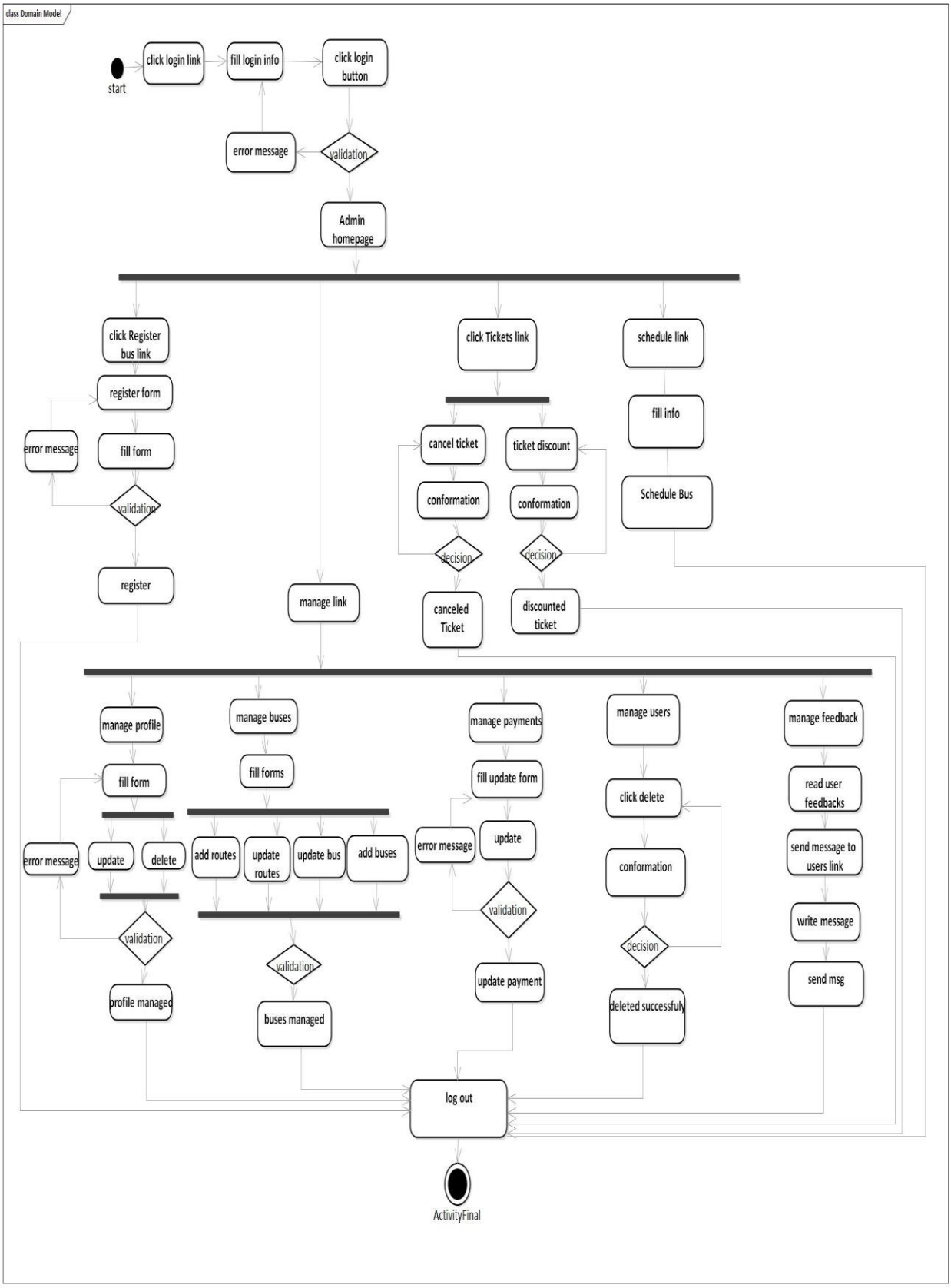


figure 4. 18 general admin side activity diagram

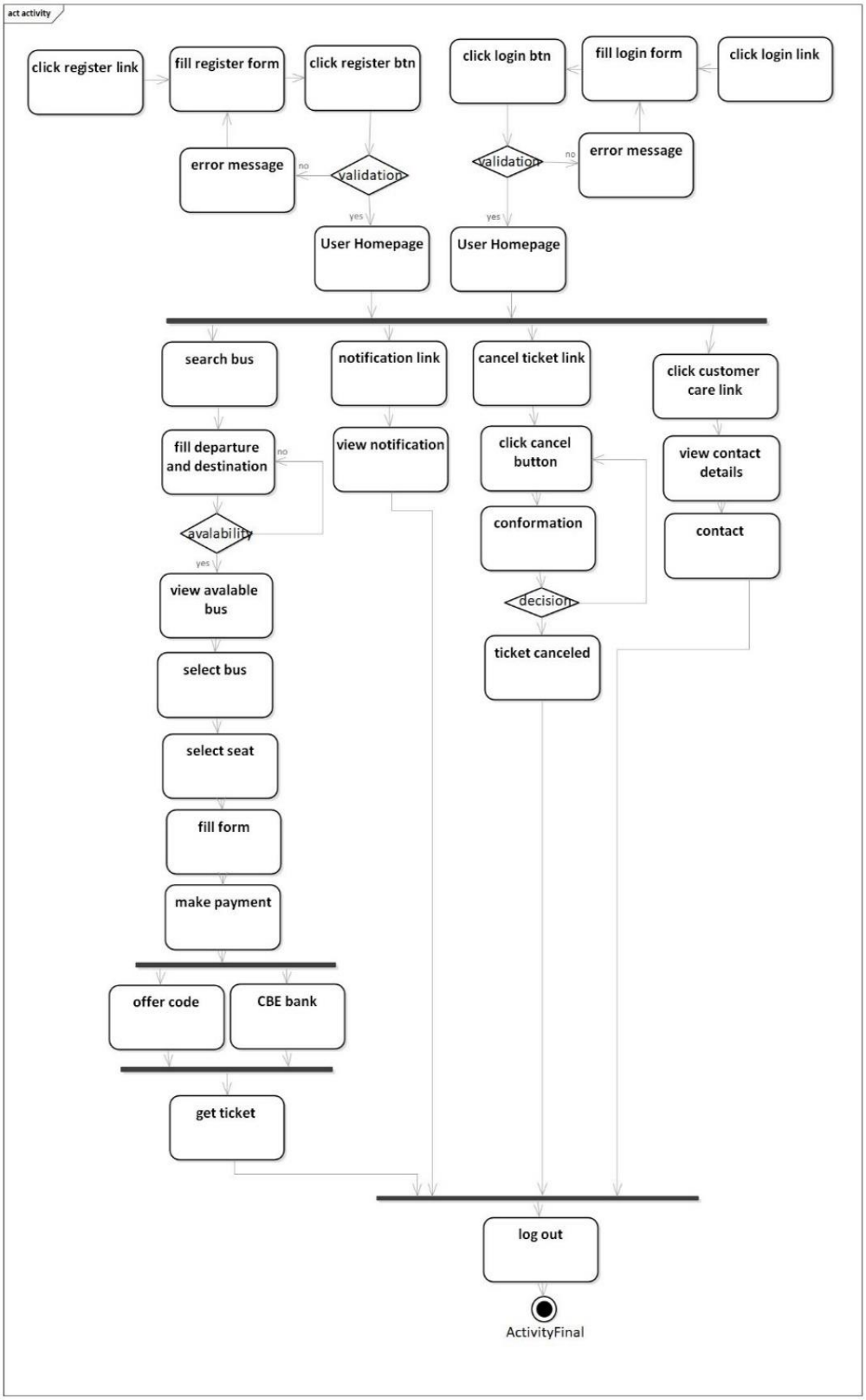


figure 4. 19 General passenger(Customer) side activity diagram

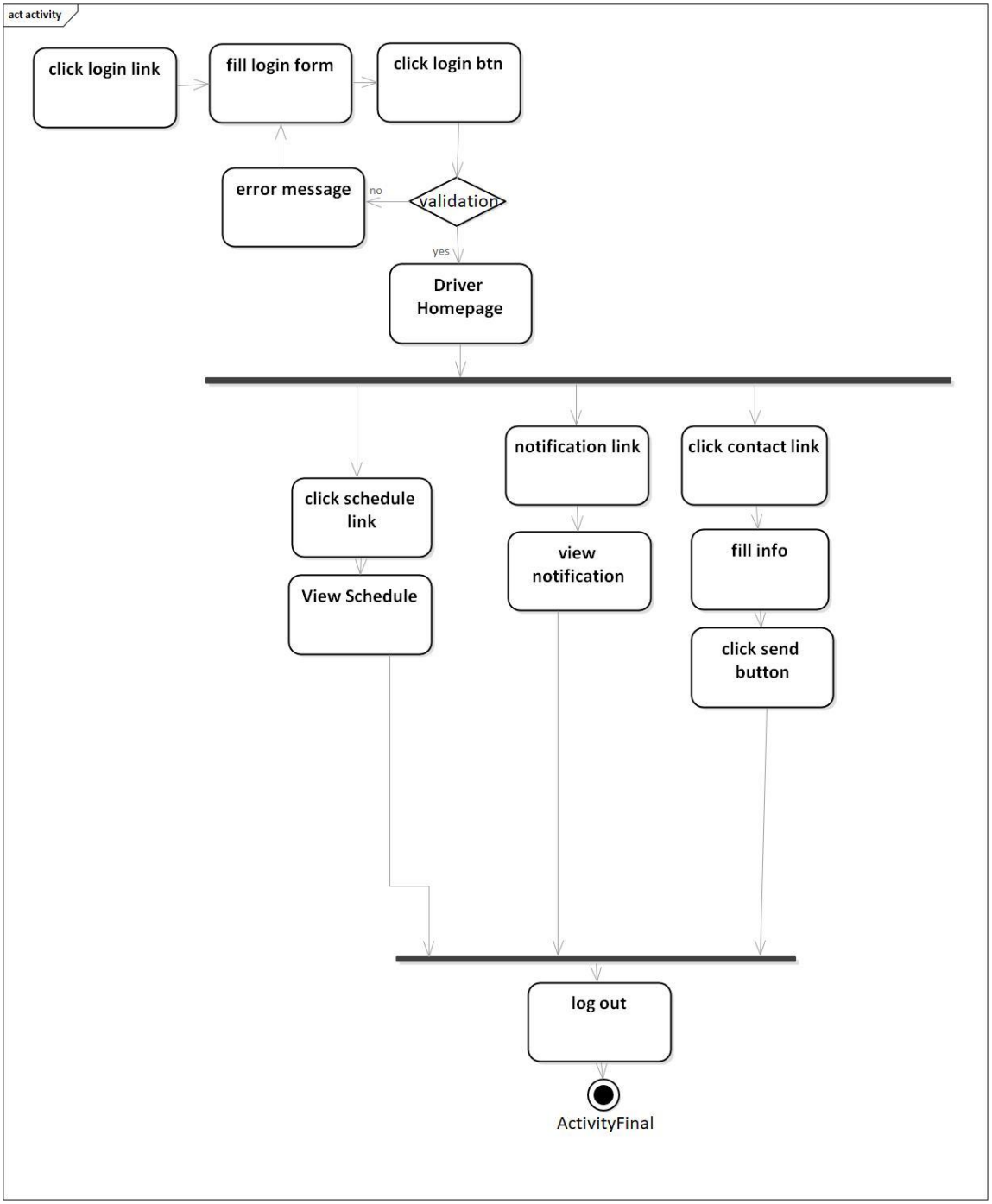


figure 4. 20 General Driver side activity diagram

4.3.3 State chart Diagram

State chart diagram describes the flow of control from one state to another state. States are defined as a condition in which an object exists and it changes when some event is triggered. So, the most important purpose of State chart diagram is to model life time of an object from creation to termination whenever performing different activities there will be some states that are included in activities.

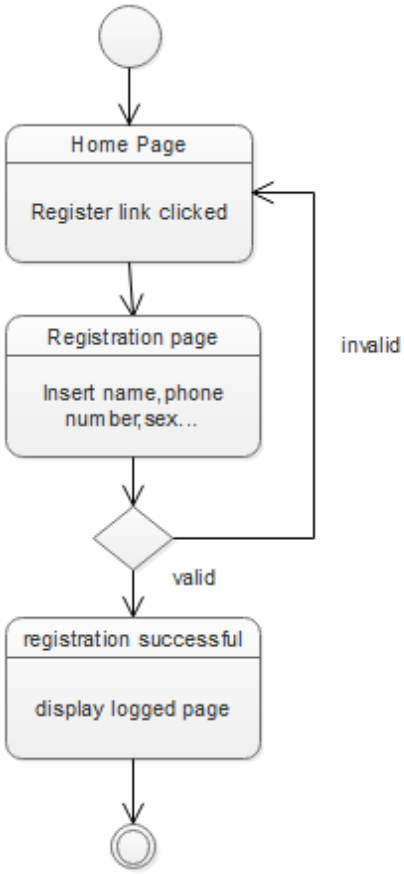


figure 4. 21 register state diagram

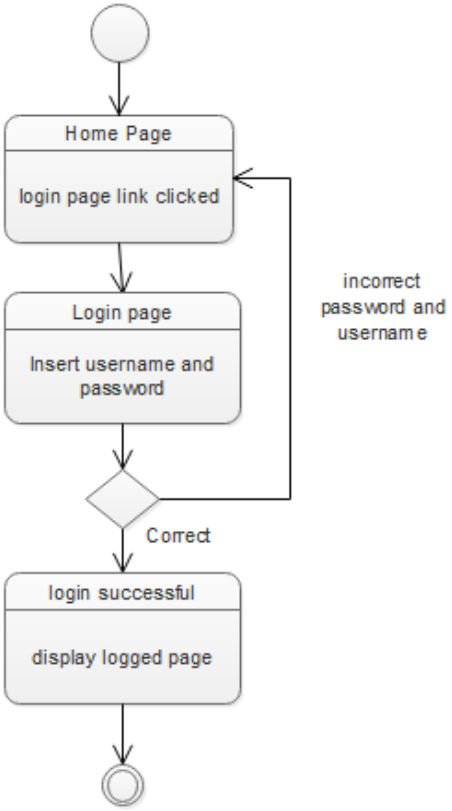


figure 4. 22 login state diagram

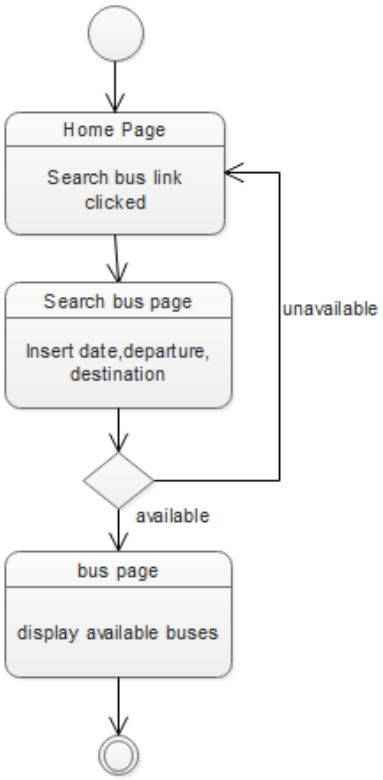


figure 4. 23 search bus state diagram

CHAPTER 5

5.SYSTEM DESIGN

5.1 Design Goals

The design goals of the system are taken from the non-functional requirement of the system and the aim is improving the security, accessibility and efficiency of the system. The Design Goals specify the qualities of the system that should be achieved and addressed during the design of the system. The following are illustrative examples of design goals.

- **Performance**

  The system performance is related to the response time of the system and the response time is short, means requests get response in short period of time. Even if the system performs all functions well but with slow speed, it will be boring by users.

- **Usability**

  Usability refers to the quality of a user's experience when interacting with products or systems This system has a well-defined and easily understood interface and the processes are easy to understand and useable by users at any level. Anyone who can read English can use the system, because, to use the system only navigating through the system parts by clicking a link is the only required thing from the system users.

- **Security**

  Since the system hold important information (data), the system requires strong security features to protect that valuable information i.e. not allow other users or unauthorized users to access data that has no the right to access it. To prevent SQL injection, attack the system has capable to protect using PDO (PHP Data Object) mechanism. To prevent credential data like password not easily view by anyone so, the system will encrypt those data or information using Enhanced message digest (MD) 5 hashing algorithm because it doesn't need any key and easy to implement.

5.2 Proposed System Architecture

The proposed software has three layers of architecture. The layers are the following:

- Presentation Layer
- Business/Logic layer
- Data layer

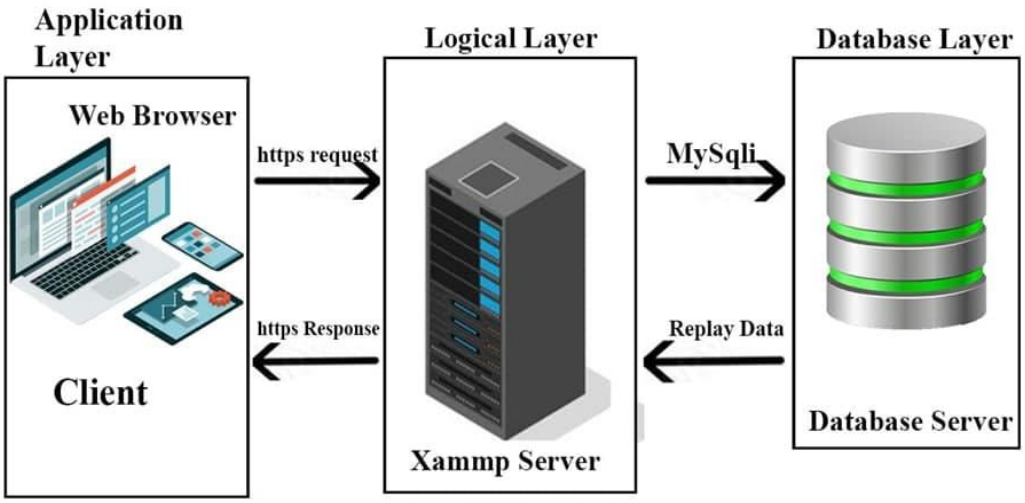


figure 5. 1 proposed system architecture

Presentation Layer: Layer which provides graphical user interface and application-specific entry forms to the user of the system. Application layer interacts with the logical layer through HTTP/ HTTPs protocol.

Logic layer: Layer that used to implement business rules and data rules, which keep the data structure consistent.

Data layer: This layer is used to store data entered by the user. In general client of our system use web browser and android phones to access the system using the internet.in this case when the user enters input and takes certain action application server process client request to interacting with the database server.

Using three-tier architecture (Website) has the following advantages in our proposed system:

- High performance, lightweight persistent objects.
- Scalability – Each tier can scale horizontally.
- Performance – Because the Presentation tier can cache requests, network utilization is minimized, and the load is reduced on the Application and Data tiers.
- High degree of flexibility in deployment platform and configuration
- Improve Data Integrity.
- Improved Security – Client is not direct access to the database.
- Easy to maintain and modification is bit easy, won't affect other modules.

5.2.1 Subsystem Decomposition and Description

Subsystem decomposition is the process of dividing the system in to manageable subsystems from the analysis model of the proposed system. The goal of the system decomposition is to reduce the complexity of design model and to distribute the class of the system in to large scale and cohesive components. Components are generally units of computation or data stores in the system. In the subsystem decomposition, we try to show the relationship between each component.

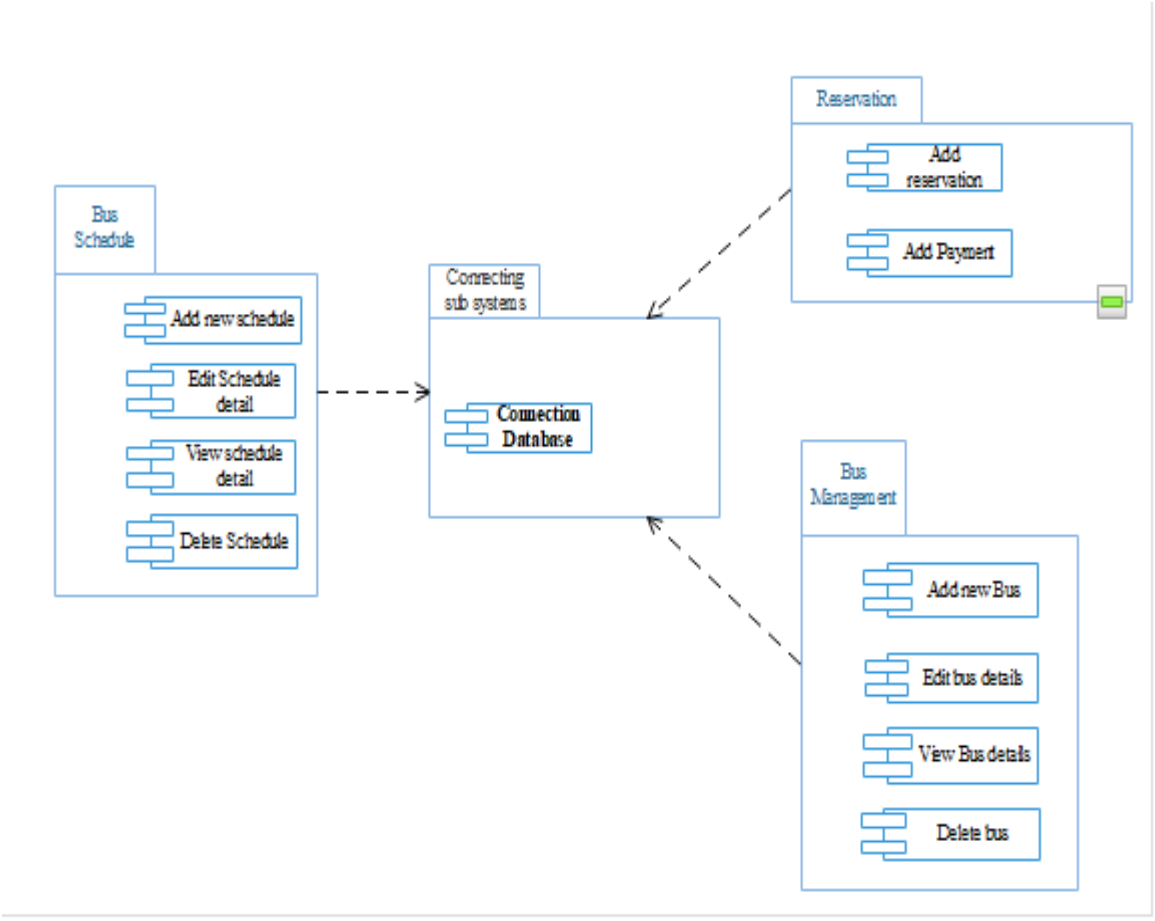


figure 5. 2 Subsystem Decomposition

5.2.2 Hardware/Software Mapping

Deployment diagram depicts a static view of the run-time configuration of processing nodes and the components that run on those nodes. In other words, deployment diagrams show the hardware for your system, the software that is installed on that hardware, and the middle ware used to connect the disparate machines to one another. You want to create a deployment diagram for applications that are deployed to several machines. It also shows how the software and the hardware components work together. Deployment diagram used to show the hardware of the system, the software that is installed in the

hardware and also the middleware that is used to connect the disparate machines to one and other.it also shows how the software and hardware components of the system work together. The figure 5.3 below is shows the deployment diagram of our system.

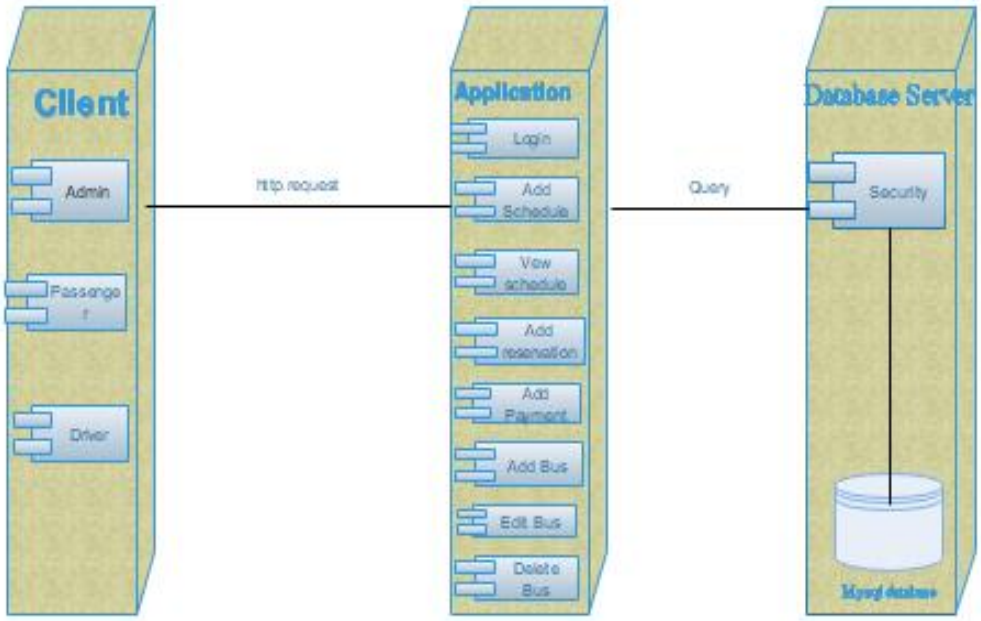


figure 5. 3 deployment diagram

5.2.3 Detailed Class Diagram

Class diagrams in the Unified Modelling Language (UML) is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among the classes.

Table 5. 1 detailed class diagram

Class name	**Attribute**	**Attribute type**	**Attribute visibility**	**Methods**	**Return Type**	**Methods Visibility**
Person	• Name • Phone no • sex	String Int Char	- - -	Login() Logout() manageProfile()	Void Void void	+ + +
Admin	• adminID	int	- -	addBuses(Bus) addRouts(Route)	Void Void	+ +

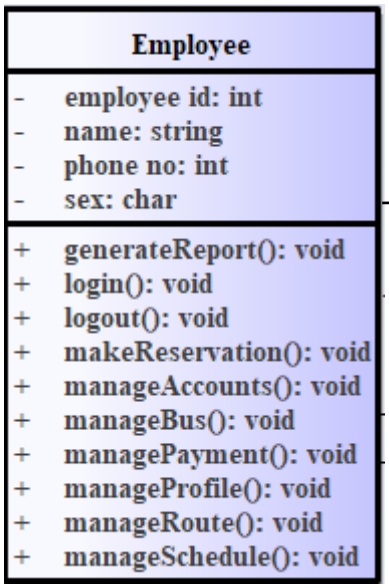
			- -	cancelTicket(Ticket) managePayment() recieveComment() updateBuses(Bus) updateRoutes(Route)	Void void Void Void Void	+ + + + +
Passenger	• passengerID	String	-	getTicketID() makePayment() recieveNotification() RequestcancelTicket() viewAvailableBus() selectSeats() viewBusDetail() sendComment()	Int Int Void Int Int Int int Int	+ + + + + + + +
Driver	• DriverId	int	- -	sendComment() viewSchedule()	Void void	+ +
Bus	• BusName • BusNumber • BusPlateNumber	String Int int	- - -	Assign()	void	+
Ticket	• passengerid • status • TicketId	int int int	- - -	cancelTicket(Ticket) checkStatus() getTicket()	Int Void int	+ + +
Route	• Departure • Destination • distance	Int Int int				
Schedule	• busPlateNo • date • departure • destination • time	Int Int Int Int int	- - - - -	cancelSchedule() schedule() updateschedule()	Void Void void	+ + +
Paymen	• accountNo	Int		Pay()	void	+

t	• amount • date • name • ticket	Int Int Int Int				
Seat	• seatNumber	int	-	selectSeat()	void	+

5.2.4 Persistent Data Management

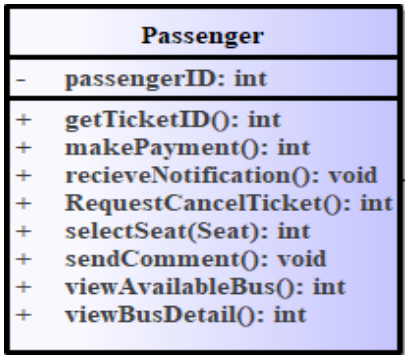
In this section the team describes how the persistent data stored by the system and the data management infrastructure required for it. The system will use the **MYSQL** database server for storing data. This will allow the database to be easily integrated with and accessed by the rest of the system. The database will retain passenger information (name, password etc.), and also retain configuration data such as authorized administrator. Each of these items will be store in a separate table.

These tables are:

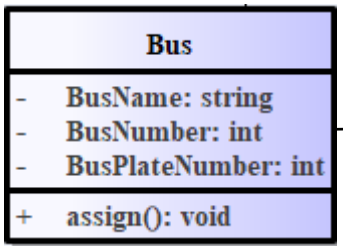


Employee<<Table>>
employeeId(primary key)
Name
phone
sex

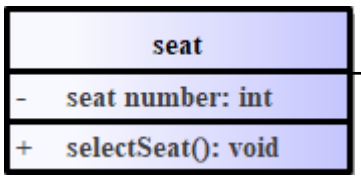
Passenger<<Table>>



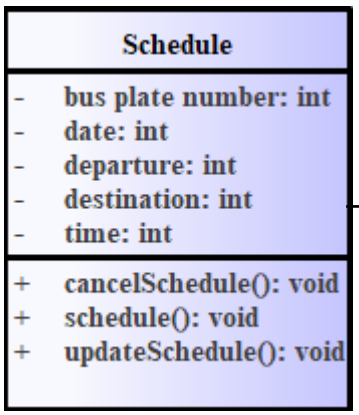
passengerID(primary key)



Bus<<table>>
BusName
BusNumber
BusPlateNumber(primary key)

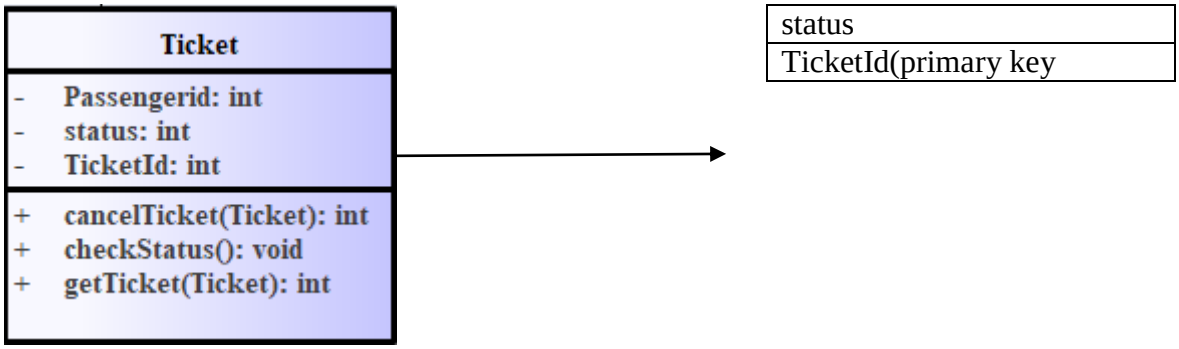


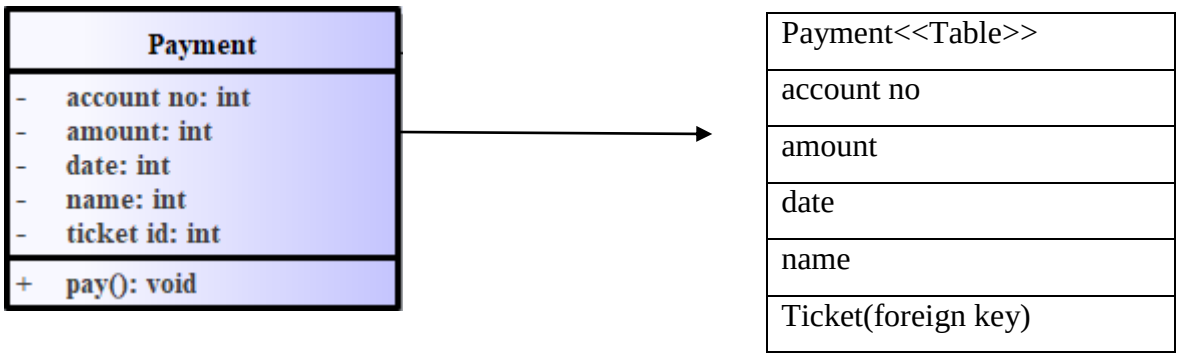
Seat<<Table>>
seatnumber

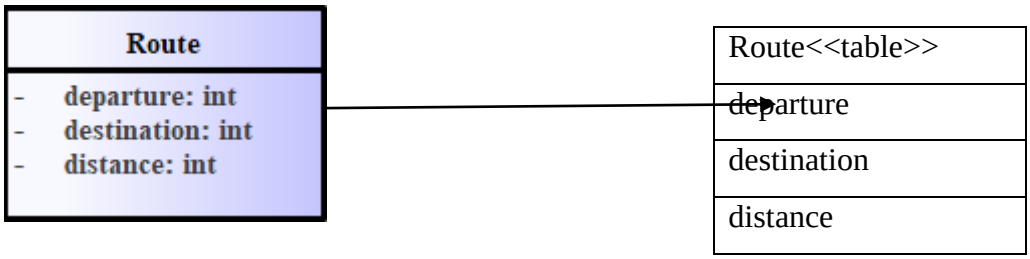


Schedule<<Table>>
bus plate number(Foreign key)
date
departure
destination
time

Ticket <<Table>>
Passengerid(foreign key)







5.2.5 Access Control and Security

Many levels of security protect sensitive documents and files from unauthorized viewers. Each user has a security access level and each document has a sensitivity level. Depending upon the access level of the user, they will see only the list of documents that is appropriate for their security access level. The proposed system follows multi user

system. In multi user system, different actors have access to different functionality and data. Then it must be having: -

➢ Confidentiality: Only authorized person can see the information. Private data is kept private; personal privacy is respected.

➢ Integrity: There are limits on who can change the data in this system.

➢ Availability: The system is available at all times to authorized users.

Generally, all users have their own user names and passwords to control security access levels and document sensitivity level.

The system accessed by different account levels:

- The administrator has been guaranteed to update schedule, generate report, add and delete route and assign and add bus.
- The driver has been allowed to view schedule and send message.
- The passenger has been allowed to reserve a seat, check availability of ticket, view schedule cancel reserved ticket.

The passenger has been allowed to reserve a seat, check availability of ticket, view schedule cancel reserved ticket.

Table 5. 2 Access Control and Security

	operation			
Actor	schedule	Bus	Route	ticket
Admin	CRUD	CRUD	CRUD	Cancel
Passenger	View	View	View	Buy, view
Driver	View	…	view	..

5.3 Packages

Package is an organized and functionality-based set of related interfaces and classes. Packages organize classes that belong to the same category or provide similar functionality.

In our system we category into bus schedule management package, reservation management package, bus management package and profile management package

Bus schedule management package: it is subsystem that responsible for managing overall scheduling system

Reservation management package: It is Subsystem that responsible for reservation process including payment.

Bus management package: it is subsystem that responsible for registering updating and deleting busses information.

Profile management package: this subsystem will be implemented by relational database and it is responsible for profile management of employees

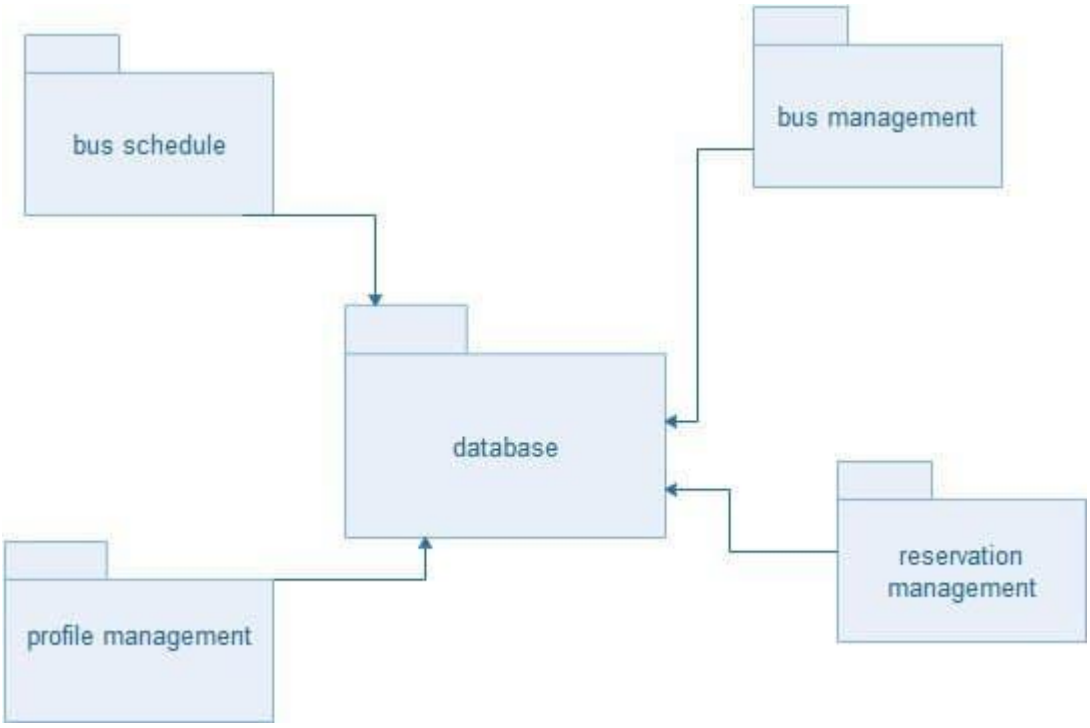


figure 5. 4 package diagram

5.4 Algorithm Design

Algorithms are designed to show the flow of programs in the system. They are semantic driven rather than syntax driven. That means, the rule of syntax is not respected as other programming language but it has a complete meaning as that of syntax-based programming language. In addition, Algorithms show the flow and steps of logic in each function. This design part is important in the coding part of implementation. Some of the algorithms are listed below.

Algorithm for authentication

Function Authentication (Username, password, type)

If password length=0

Display error message “Password required”

Return

Pass=Retrieve Password (Username)

If password! =pass

Display error message “Incorrect password”

Return

Type=Check Type (type)

If type=Administrator

Display Administrator main form

Else if type=Driver

Display Driver main form

Else if type=Passenger

Display Passenger main form

//end of the function authentication

5.6. User Interface Design

User interface design (UI) or user interface engineering is the design of user interfaces for machines and software, such as computers, home appliances, mobile devices, and other electronic devices, with the focus on maximizing the user experience. The goal of user interface design is to make the user's interaction as simple and efficient as possible, in terms of accomplishing user goals (user-centered design) so in our online selam bus ticketing system we have designed user interfaces that increase the user experience.

figure 5. 5 *admin home page user interface*

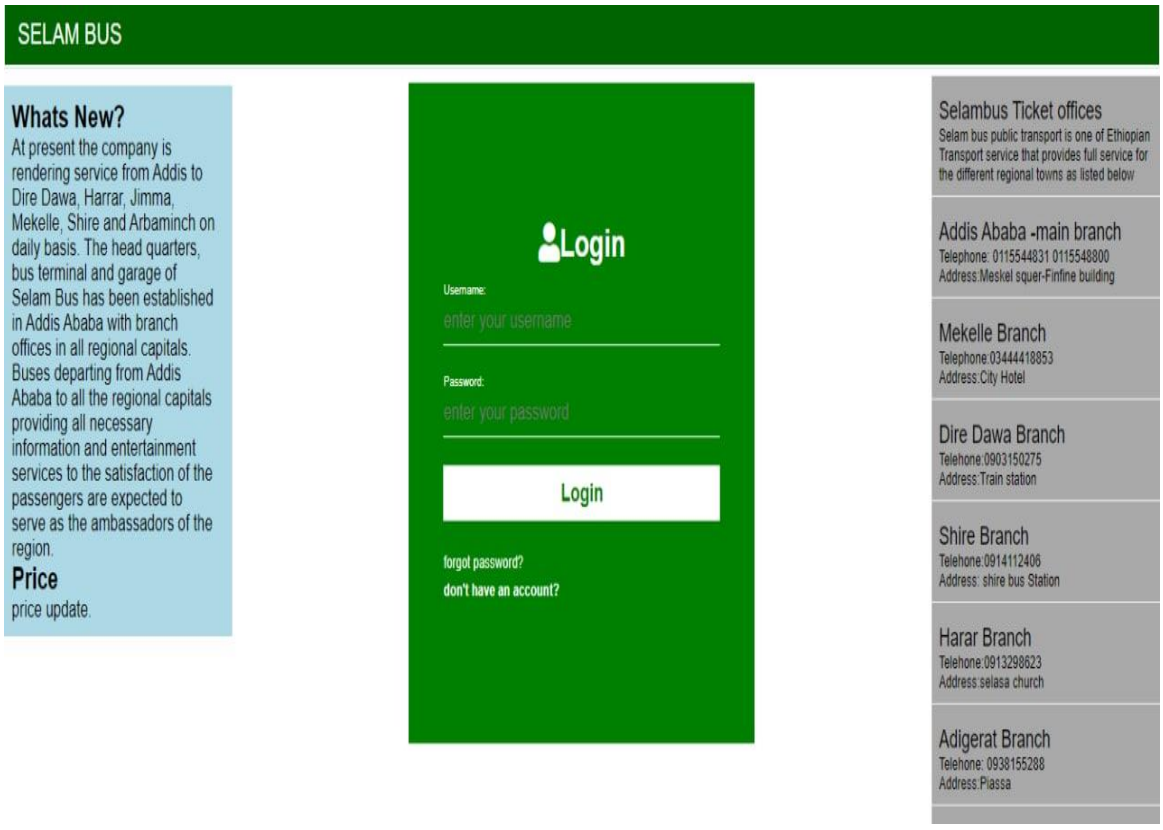


figure 5. 6 login page user interfac

CHAPTER SIX

6. IMPLEMENTATION AND TESTING

6.1 INTRODUCTION

During this phase physical design specification is turned into computer code and provide meaningful system all user who take care of the system. We implement the system based on the design which we previously did. Then we test the code until most of the error have been detected and corrected. The purpose of this activity to convert the final physical system specification into working model with reliable software and hardware.

6.2 IMPLEMENTATION OF DATABASE

To implement our project, we use the languages are MYSQL database. We use MYSQL because it can be deployed and run on any operating system. MYSQL is easy, fast and can be used for any type of database whether it is relation or simple, large or small. You should choose appropriate database management system, with justified reason. And we create a database which is called Selam and it have 8 different tables.

All tables

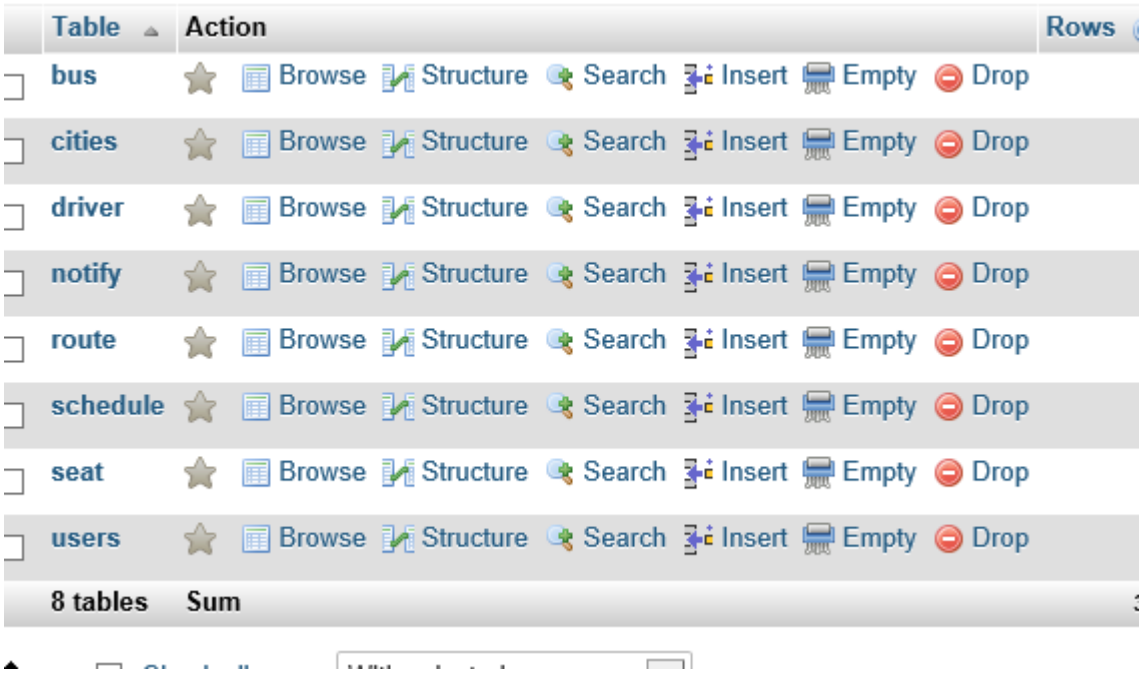


figure 6.1 database table names

Schedule table information

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	id	int(20)			No	None		AUTO_INCREMENT	Change Drop Primary Unique Index More
2	bus_id	int(11)			No	None			Change Drop Primary Unique Index More
3	inital	varchar(20)	latin1_swedish_ci		No	None			Change Drop Primary Unique Index More
4	destination	varchar(20)	latin1_swedish_ci		No	None			Change Drop Primary Unique Index More
5	journeydate	date			Yes	NULL			Change Drop Primary Unique Index More
6	price	double			No	None			Change Drop Primary Unique Index More

figure 6.2 schedule table atributes

6.3 Implementation of the Class Diagram

Based on the class diagram we implement the system. We use the attributes with appropriate data type and access visibilities (private, protected, public) and we implement according to the business logic. Here are the code and the class diagram.

6.4 Configuration of the Application Server

As application server we use xampp server. The reason why we select xammp **server** is that it is easy to configure and use. It is cross-platform software available for all kinds of operating systems such as Linux and Windows.

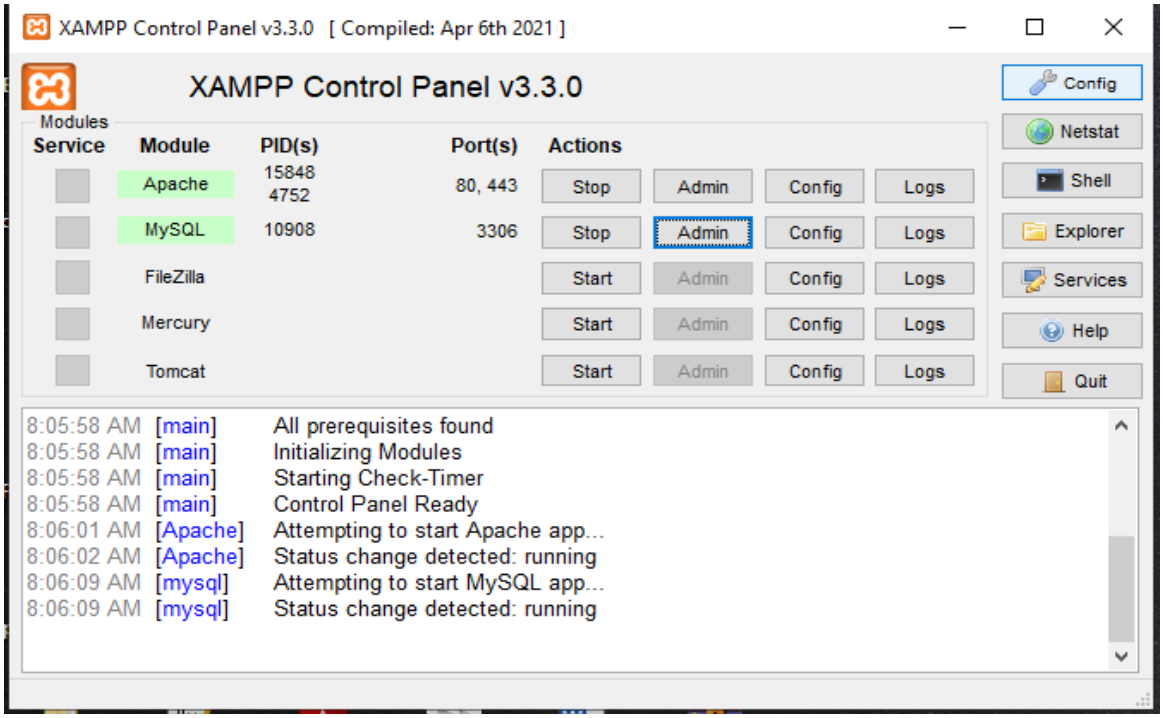


figure 6.3 xampp server diagram

6.5 Configuration of Application Security

For security purpose we use MD5 hashing algorithm to encrypt the data in database. because MD5 Algorithms are useful because it is easier to compare and store these smaller hashes than store a large variable length text.

Username	Password	Cpassword
asheex	d41d8cd98f00b204e9800998ecf8427e	d41d8cd98f00b204e9800998ecf8427e
ofsiifileet	d41d8cd98f00b204e9800998ecf8427e	d41d8cd98f00b204e9800998ecf8427e

figure 6.4 password encryptions

6.6 Implementation of User Interface

We use GUI to implement the interface. because is easy to use and understand for all kind of user and does not need additional training. Plus, it provides different feature which help users to remember easily. Here are some interfaces

figure 6.5 Home page

6.7 Testing

Developing a software is complex process. No matter how hard we try to eliminate all faults simply by going through the phase of requirements, analysis, design, specification and implementation, however through good practice we can make sure that the most

series fault does not occur in first place. In addition, we need a separate testing phase with the goal of elimination all remaining fault before release. To simplify the testing process the project team followed different type of tests that break the testing process up into the distinct levels. These types of testing are unit testing, integration testing and system testing

6.7.1 Test case

A test case is exactly what it sounds like: a test scenario measuring functionality across a set of actions or conditions to verify the expected result. We use the combination of both negative and positive test cases such as

- Verify if a user will be able to login in with a valid username and valid password.(positive)
- Verify if a user cannot log in with a valid username and an invalid password(negative)
- Verify the log in page for both, when the field is black and submit is clicked.(negative)
- Verify the “forgot password” functionality.(positive)

And we verify the functionality and non-functionality of the system. We write the following test cases for login page and registration form then we check them by the test case. Then we check the system in different taste case let see the registration page test case and the result.

No	Test cases	feature	description	Steps to execute	Test data/input	Expected results
1	TC 01	User interface	Check all the text boxes, radio button, etc..	1, click on radio buttons, buttons and dropdowns	Number/alphabet	UI should be perfect
2	TC 02	Required fields	check the required field by not filling any data	1, do not enter any value in the field. 2, click on the register button.	Number/alphabet	It should show a mandatory symbol (*) on mandatory fields

3	TC 03	Required fields	check the required field by filling any data	1, enter valid value in the field. 2, click on the register button.	Numb er/alp habet	1. Users should be registered successfully. 2. A successful registration message should show. 3. Mail should send to the user
4	TC 04	Optional fields	Check all the optional fields when do not fill data	1. Do not enter any detail in optional fields 2. Enter valid data in required fields 3. Click on the Signup button	Numb er/alp habet	1. It should not ask to fill the optional fields 2. User should be registered successfully 3. A successful registration message should show 4. Mail should send to the user
5	TC 05	Optional fields	Check all the optional fields when do not fill data	1. Enter valid data in optional fields 2. Enter valid data in required fields 3. Click on the Register button.	Numb er/alp habet	1. User should be registered successfully 2. A successful registration message should show 3. Mail should send to the user
6	TC 06	Password Validation	Check the password limit when enter value less than min	1. Enter value which is alphanumeric but less than 8. 2.Click on Register button	Passw ord	It should show validation message.
7	TC 07	Password Validation	Check the password limit when enter value greater than max	1. Enter alphanumeric value but more than 32. 2.Click on Register button	Any Rand om string with numb ers	It should show validation message
8	TC 08	Password Validation	Check the password when passing only numbers	1. Enter a value in numbers which is in between 6-32 2.Click on Register button	12345 678	It should show validation message

Check the password when passing only numbers 1. Enter a value in numbe
2.Click on Register butto

9	TC 09	Password Validation	Check the password when passing valid data	1. Enter value in alphanumeric which is in between 6-32 2.Click on Register button	Pass1 23456	It should show validation message
10	TC 10	Password Validation	Verify if the password required rules are not satisfied in the password	1. Enter the password which not satisfies the required rule. 2.Click on Register button	passw	It should display error with required rules for password value (like it should contain a special character, a small case, a number)
11	TC 11	Phone Number Validation	Verify if the length of the phone number is incorrect i.e. less than 10	1. Enter phone number less than 10 digits. 2. Enter all required fields. 3.Click on Register Button	91901 122	It should show the validation error message for phone number length
12	TC 12	Phone Number Validation	Verify if the length of the phone number is incorrect i.e. more than 10	1. Enter phone number less than 10 digits. 2. Enter all required fields. 3.Click on Register Button	21333 34455 55555 66434 4	It should show the validation error message for phone number length

Table 6.1 Test cases

Admin page

Case ID	Test case	Expected output	Actual output	Pass/fall	Remarks
01	Login test	Login with proper details and role.	successfully	Pass	Good
02	Managing detail	Manage information properly	successfully	Pass	Good
03	Add and update bus information	Add and update bus information properly	successfully	Pass	Good
04	Exception handling	Proper error message should display.	successfully	pass	Good
05	View tickets booking	View booking info	successfully	Pass	Good

		properly.			
06	View payment request properly	View payment request properly	successfully	Pass	Good

Table 6.2 Admin test case

Passenger page

Case Id	Test case	Expected output	Actual output	Pass / fail	Remarks
01	Login test	Login with proper details	Successfully	Successfully	Good
02	Registration information	Proper registration with exception handling	Successfully	Successfully	Good
03	View bus information	Proper bus information	Successfully	Successfully	Good
04	Search information	Search information properly	Successfully	Successfully	Good
05	Reserve ticket information	reserve bus ticket properly	Successfully	Successfully	Good

Table 6.3 Passenger test case

6.7.2 Testing environment and tool

A test environment is a platform designed and built to execute multiple test cases on the software and its associated hardware with required network configurations. It is needed to validate the software and assess the software's behavior when it is subjected to multiple test scenarios. A test setup also consists of a defect logging tool or mechanism. We already contain all the prerequisites of executing the software like Operating systems, servers, memory, drivers, operating systems and specific software, etc.

As testing tool we use manual testing. Manual testing is the process of manually testing software for defects which is easy and simple to test the system early. We developer's act like end user and play the role of an end user whereby they use most of the application's features to ensure correct behavior. So we perform the test by performing some steps such as Analyze requirements from the software requirement specification document (SRS)

and we create a clear test plan, base on it we write test cases that cover all the requirements defined in the document, then we execute the test cases and detect any bugs and correct the errors.

6.7.3 Unit Testing

Unit testing involves verification of individual components or units of source code. A unit can be referred to as the smallest testable part of any software. It focuses on testing the functionality of individual components within the application. We use the white box testing method which means we developers are discover bugs in the early stage of development life cycle by the test case which is derived from the internal design specification or actual code for the program. In this level of testing we test the interface for proper information flow and we examine the local data to ensure the integrity is maintained. We test all individual modules and check all paths that a program can execute by applying the test cases and we eliminate the defects early.

6.7.4 Integration testing

Integration testing is the next level of testing process which come before system testing and after unit testing. Integration testing give focus on integration between each module, so we system developers are test the system by combining individual unit of a program as a group. We find some defects during integration testing then we eliminate the defects and we fixed it.
For integration testing we use bottom up testing approach. To test each small individual functionality first and go to the largest function by integrating the modules.

6.7.5 System testing

System testing is validating the functional and nonfunctional requirements of the system. For functional system testing we follow both positive and negative approach to determine what the system supposed to do and check what the system is not supposed to do. So by formal testing approach we test the all procedures and proper documentation of the system. Additionally we test system functionality repetitively with multiple inputs to confirm the business validation are implemented or not which is called re testing. Finally we test the overall functionalities of system including the data integration among all the module. For non-functional system testing we validate some non-functional aspects such as

- **User interface testing (UI):** we check the spelling of the object, we check alignments of the objects, and we check the consistency in background color and font type and font size. So our system fulfill the above UI quality requirements.
- **Usability testing:** we check how system is easy to use and understand so our system is easy for user and it doesn't require additional training.
- **Security testing:** we check authentication and authorization, we check secured data. So our system is secured.

CHAPTER SEVEN

7. CONCLUSION AND RECOMMENDATION

7.1Conclusion

This project is undertaken to develop automated system for Selam bus share line. The team has conducted a thorough business area analysis and functional workflow of the current work environment. Analysis of the existing system was carried out. Requirements of the new system are also documented.

Since the success and failure of any system depends on gathering the right information through different fact-finding techniques and user involvements, the team has made the best effort to gather requirements. After a detail review and study of the existing system, models have been designed to reflect the new system that are supposed to solve problems.

In order to solve different problems existed, the team has propose a solution that solve the existed problems and model the proposed system using different tools and methodologies. The team believe the different tools and techniques has helped us a lot in capturing real user requirements and model the right system for the users for their day to day transactions.

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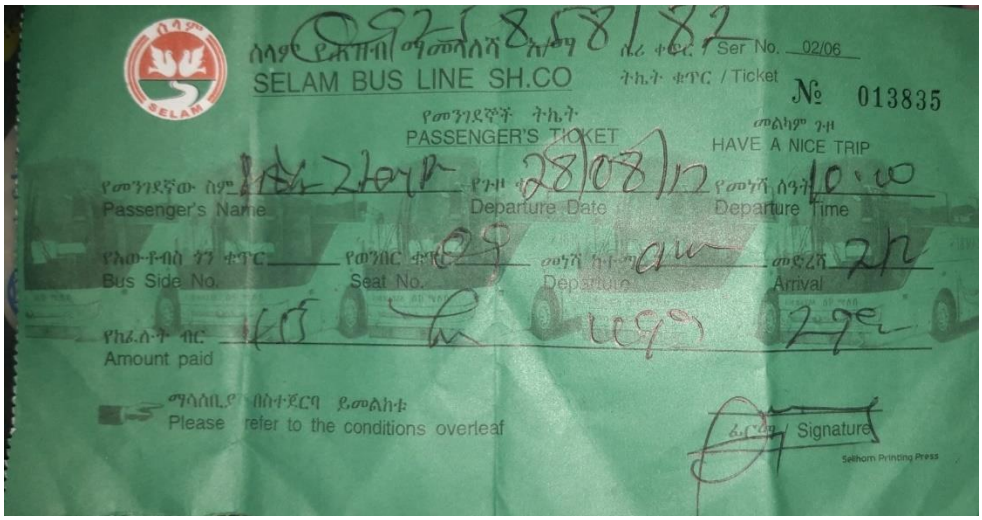
Appendices


SELAM BUS LINE SH.CO
Ser No. 02/06
Ticket
№ 013835
PASSENGER'S TICKET
HAVE A NICE TRIP
Passenger's Name
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Departure Time
Bus Side No.
Seat No.
Departure
Arrival
Amount paid
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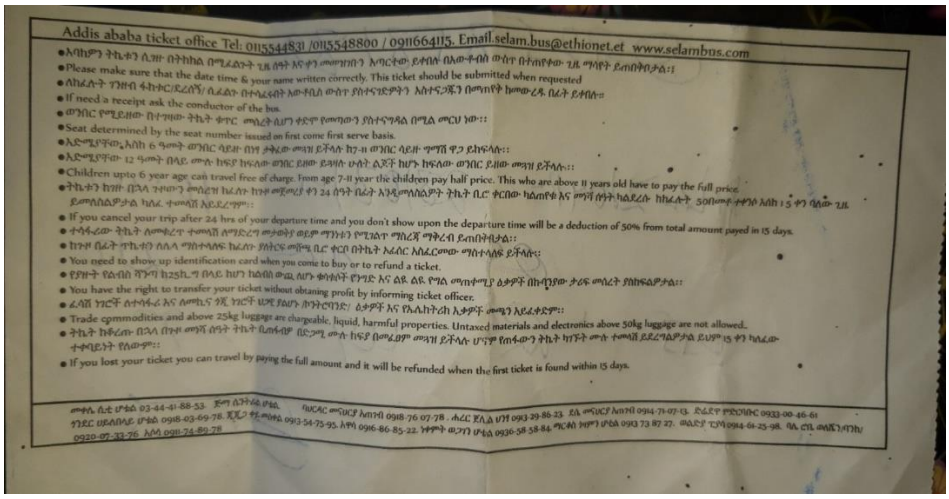
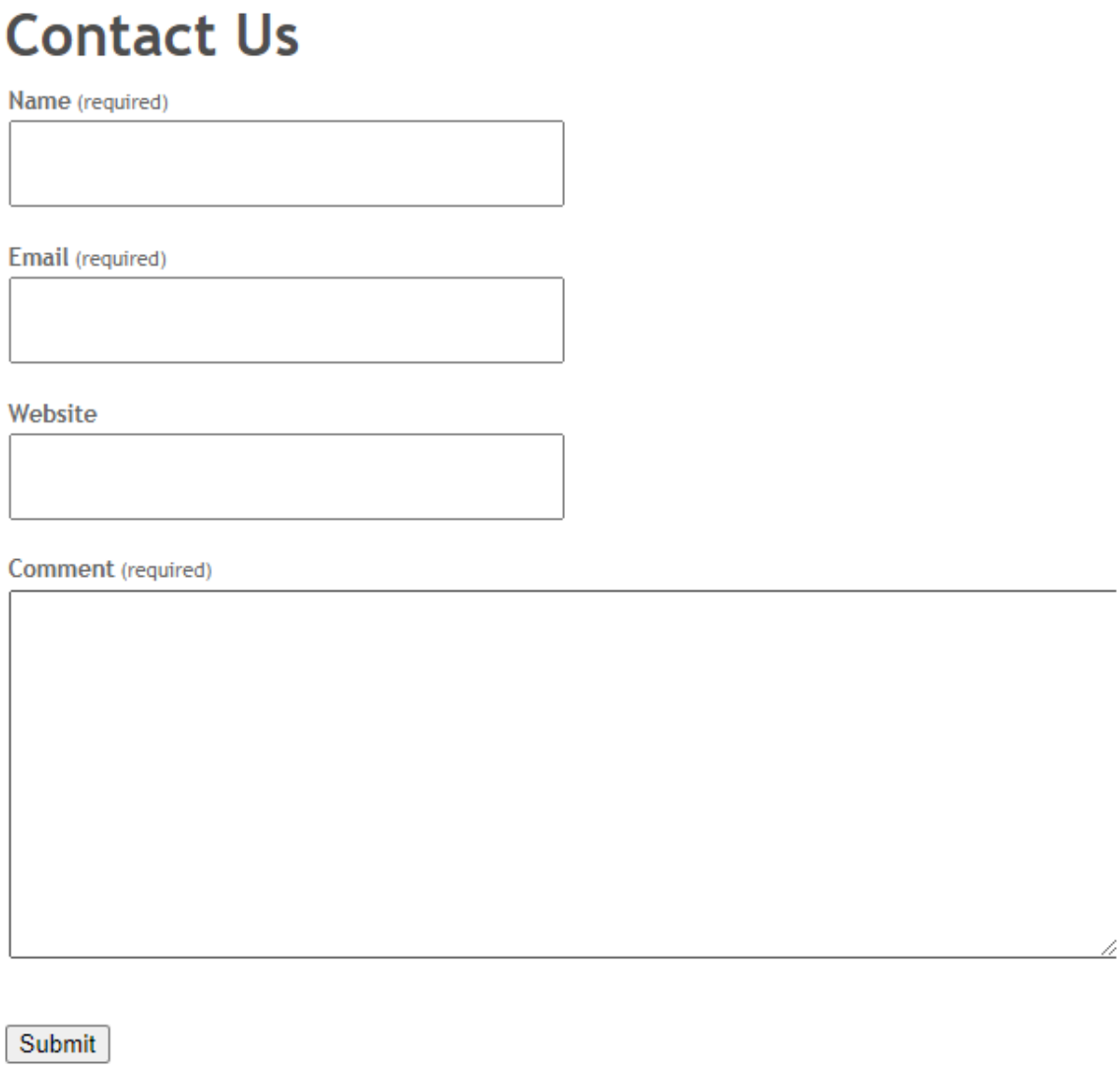

Addis ababa ticket office Tel: 0115544831 /0115548800 / 0911664113. Email.selam.bus@ethionet.et www.selambus.com
Please make sure that the date time & your name written correctly. This ticket should be submitted when requested
If need a receipt ask the conductor of the bus.
Seat determined by the seat number issued on first come first serve basis.
Children upto 6 year age can travel free of charge. From age 7-11 year the children pay half price. This who are above 11 years old have to pay the full price.
If you cancel your trip after 24 hrs of your departure time and you don't show upon the departure time will be a deduction of 50% from total amount payed in 15 days.
You need to show up identification card when you come to buy or to refund a ticket.
You have the right to transfer your ticket without obtaining profit by informing ticket officer.
Trade commodities and above 25kg luggage are chargeable. liquid, harmful properties. Untaxed materials and electronics above 50kg luggage are not allowed.
If you lost your ticket you can travel by paying the full amount and it will be refunded when the first ticket is found within 15 days.



Contact page in selam bus website.