



B2C platform for service providers and service recipients of vehicle related areas.

**A dissertation submitted for the Degree of Master of
Information Technology**

WMKS Bandara

University of Colombo School of Computing

2020



Declaration

The thesis is my original work and has not been submitted previously for a degree at this or any other university/institute.

To the best of my knowledge it does not contain any material published or written by another person, except as acknowledged in the text.

Student Name: WMKS Bandara

Registration Number: 2017/MIT/008

Index Number: 17550082



Signature:

Date: 20.11.2020

This is to certify that this thesis is based on the work of

Mr./Ms.

under my supervision. The thesis has been prepared according to the format stipulated and is of acceptable standard.

Certified by:

Supervisor Name: Prof. G.K.A. Dias

Signature:

Abstract

With the emerging of the new technologies related to Information Technology and the growth of the Information Technology Literacy, new business opportunities are risen in the society. People tend to use IT more rapidly to fulfill their daily needs.

Forhire.lk is a website which provides a B2C platform to the service recipients who are searching for vehicle related services from service providers. The vehicle related services can be divided into four main categories. They are,

1. Vehicle hiring
2. Roadside assistance & mechanical repair assistance
3. Vehicles for towing
4. Vehicle cleaning

The service providers, who are providing the above services, are given the opportunity to have their details published on the website and it can be accessed by the service recipients who are searching for the service providers without wasting their valuable time. The service providers and service recipients can have separate accounts in the system and maintain their records in the system. The history of the jobs requested by a particular service recipient through the site can be viewed and rated. And also, the history of the jobs taken through the website by a service provider can be viewed and rated. The administrators of this site have separate web site to view reports and make decisions using them. Reports will be progress reports of services taken place, progress reports on vehicle hiring, user detail reports, monthly and yearly services taken place. The power to blacklist and delete a customer have been given to the administrator.

Codeigniter was used as the PHP framework to build this site. Apart from that PHP, HTML, Javascript, MySQL, CSS was used as the technologies to develop the site. The JetBrains PhpStorm was used as the developing environment.

The project was finished with meeting with the requirements which was gathered from the clients earlier in the process. The site was given with positive client feedback.

Acknowledgement

This individual project was carried out during the years 2019-2020.

I am using this as an opportunity to express my sincere gratitude to everyone who has supported me throughout this project.

I owe my deepest gratitude to Prof GKA Dias at University of Colombo School of Computing, who was the supervisor of this project for his immeasurable support, guidance and encouragement. Without his continuous optimism regarding this project and the enthusiasm shown towards it this project would hardly have been completed.

In the same time, I express my sincere gratitude to the founders of forhire.lk for the help given to me through this project. I am grateful to them for choosing me as their partner for the developing of the web site and for sharing their truthful views on website developed.

Even though, I have taken efforts in this project, it would not have been possible without the kind cooperation and help of my husband, parents, all other family members and my friends. Their encouragement when times got tough was highly appreciated.

Table of Contents

Declaration	i
Abstract	ii
Acknowledgement	iii
Table of Figures	vii
1. Introduction	1
1.1. Motivation	1
1.2. Problem.....	1
1.3. Project Objective	2
1.4. Scope of the Project	3
2. Similar Systems and Technologies.....	6
2.1. Similar Systems.....	6
Vedako [1](Mobile Application)	6
RSA [2](Mobile Application)	7
Hoda Bass [3](Mobile and Web Application)	7
Pick My Load [4](Mobile & Web Application)	8
PickMe [5], Uber [6], YoGo [7](Mobile Application)	9
2.2. Technologies	10
Mobile application Development Languages [8]	10
Web application development Languages [11]	11
Design Strategies [16]	12
2.3. The selected design strategy	13
3. Analysis	14
3.1. Product Perspective	14
3.2. User Characteristics	14
3.3. Main Functionalities	15
Login and Registration Component.....	15
Vehicle hiring component/ Vehicle for towing component	15

Roadside assistance & mechanical repair assistance component and vehicle cleaning component	16
To the administrator following facilities will be given through the web site.....	17
FAQ section.....	18
3.4. Non - Functional Requirements.....	18
Performance Requirements.....	18
Software Quality Attributes.....	18
4. Design.....	20
4.1. Application Architecture	20
4.2. Methodological approach.....	21
Waterfall Model [19]	21
Rational Unified Process Model [21]	22
Agile Development [23]	23
4.3. Database Design	24
ER Diagram	25
5. Implementation.....	26
5.1. Project Direction.....	26
Project Plan.....	26
5.2. Development and Implementation Consideration.....	27
5.3. Implementation Environment and Existing Code that was Reused.....	27
6. Evaluation and Testing	36
6.1. Evaluation [28]	36
6.2. User Feedback.....	36
6.2.1. Staff Feedback	37
6.2.2. Customer Feedback.....	37
6.3. Testing [29]	37
6.3.1. Software Testing Types	37
6.3.2. Testing Methods.....	38
6.3.3. Testing Approaches	38

6.3.4. Testing Levels	38
6.4. Testing of the System	39
7. Conclusion and Future Works	40
7.1. Conclusion.....	40
7.2. Future works	40
7.3. Problems Encountered and Lessons Learnt	41
Appendix 1.....	42
Use case diagrams	42
8. References	44

Table of Figures

4. 1 System Achitecture	20
4. 3 Waterfall Model [20]	22
4. 4 Rational Unified Process [22]	23
4. 5 Agile Development Model [24].....	23
4. 6 ER diagram of vehicle hiring component	25
4. 7 ER Diagram for Service Requests.....	25
4. 8 Use case diagram for the Administrator.....	42
4. 9 Use Case diagram for the vehicle hiring component.....	43
4. 10 Use case diagram for the Service providing component	43
5. 1 Project Plan	26
5. 2 The internal flow of the CodeIgnitor[26]	28
5. 3 File Structure of the codeignitor.....	29
5. 4 Interface of the developing environment.....	30
5. 5 Main page of the site - 1	31
5. 6 Main page of the site - 2	31
5. 7 Main page of the site - 3	32
5. 8 Main page of the site - 4	32
5. 9 About Us - 1	32
5. 10 About Us - 2	33
5. 11 About Us - 3	33
5. 12 Help.....	34
5. 13 Contact Us	34
5. 14 Login and Register	35
5. 15 Login interface of administrator module	35

1. Introduction

1.1. Motivation

As we move into the current era, information technology has become a crucial asset in peoples' life. Use of web applications have been more prominent soon after the Internet was introduced to the world.

Now, web applications are used as an essential component in the business world as business can be developed, can be become simpler with the use of them. The objectives of the business can be achieved faster by producing web applications with the help of software developers to meet their business demands and the attention of a larger group of customers can be grabbed.

The customers can be reached directly by the brands and services without a long supply chain with the help of web applications. Sometimes, the user can be reached by the manufacturer or by the service provider directly. Products can be bought by customers from variety of choices by a button click. In today's scenario a busy lifestyle will be led by people. Hence, products and services can be bought by the customers as per their will with no time restriction. Products will be delivered at their homes.

Likewise, the demand for a web application to acquire services was also increased. All the vehicle related services have been prioritized in peoples' day-to-day life. Therefore, a web application for the vehicle related services will be a good business opportunity for a businessman.

1.2. Problem

The below problems were initiated in the client's mind when he is searching for new business opportunities.

- There isn't a single platform to meet all the people who are hiring vehicles such as cars, lorries, buses for personal use and transport goods and people who are seeking hired vehicles.

- To find a service provider who will visit the place of breakdown when a mechanical breakdown occurred such as faulty batteries, tire and wheel damage, faulty spark plugs, etc. is difficult for the users.
- When a vehicle breakdown or an accident has taken place sometimes vehicle user must have to tow their vehicle to transport to another place and it is always difficult to find towing services near to that place.
- Since most of the people are now busy with their own day-to-day tasks, and they are lacking time to wash and clean their vehicles. But it is difficult for them to find people who can visit any place to assist with cleaning vehicles.

1.3. Project Objective

Creating a platform to meet the service recipient with the service provider and vehicle hiring people is the main aim of this project. Solutions will be provided by the system to busy service seekers without wasting their time and energy and connecting them with service providers who are willing to visit the customer's doorstep and provide vehicles and services to the customers who are searching for them.

- Vehicles for personal use, transport goods and towing vehicles can be hired by the people who are using the system and the people who own vehicles could get their vehicles hired.
- A description of the job can be posted by the experts of the services related to vehicles, and quotes can be provided. Also, they can be get hired by the service recipient. Automobile repair and maintenance, collision repair, painting and restoring, electronics, air-conditioning and heating systems, and truck and diesel mechanics, roadside assistance and car washing may be included in these services.
- Reports can be viewed by the client using dashboard as the administrator of the system including progress reports of services taken place, progress reports on vehicle hiring, reports on service providers and service recipients.
- Even though, there are few web sites and mobile applications to get those services done individually, an all-in-one solution to the customer will be provided by the proposed system. Therefore, the customer is not needed to remember several site names.

- The proposed system will be a highly mobile compatible web-based application, so the system can be accessed by the customer anytime and anywhere.
- The system will be user-friendly and will be included minimum steps to fulfil a task, can use the system can be used by a person who is not very much familiar with technology without having to bother.

1.4. Scope of the Project

The project will be mainly included four major components as follows.

5. Vehicle hiring
6. Roadside assistance & mechanical repair assistance
7. Vehicles for towing
8. Vehicle cleaning

Customers who want above mentioned services could be signed up to the system using email ID or social logins (google). An option to store details about their vehicle will be included in the system for the customer to avoid repeated entering of same information to the system.

1. Vehicle hiring component/ vehicle for towing component
 - A detail description can be posted by drivers about the vehicle they own.
 - Posts regarding vehicles can be filtered by the location and the location can be edited by the driver.
 - The time and date which the customer wants to hire the vehicle can be specified in the vehicle request.
 - Vehicle requests by customers will come as an SMS alert to driver's mobile phone.
 - Vehicle requests which are coming to drivers can be managed either by accepting or declining.
 - After finishing the hire, an acknowledgement must be given to the driver.
 - The completed work and declined work of drivers can be viewed and history will be maintained.
 - A rating can be given to the driver by the customer and to the customer by the driver.

- The driver can be contacted by the customer via the web-site. The site will be included its own chat component to provide communication facilities among two people.
- Drivers can be compared customers based on individual reviews and ratings given by other users.
- The completed work for the customer can be viewed, and history will be maintained
- Payments cannot be done via the web site.

2. Roadside assistance & mechanical repair assistance component and vehicle cleaning component

- A detail description can be posted by the service providers about the service they provide.
- The time and date which the customer wants the service can be specified in the vehicle request.
- Service requests by customers will come as an SMS alert to service' provider's mobile phone.
- Service requests which are coming to service providers can be managed either by accepting or declining.
- After finishing the job, acknowledgement must be given to the service provider.
- The completed work and declined work of service providers can be viewed and history will be maintained.
- A rating can be given to the service provider by the customer and to the customer by the service provider.
- The service provider can be contacted by the customer via the web-site. The site will be included its own chat component to provide communication facilities among two people.
- Service providers can be compared by customers based on individual reviews and ratings given by other users.
- The completed work for the customer can be viewed, and history will be maintained
- Payments cannot be done via the web site.

3. The following facilities were given to the administrator through this website,
- The decisions on user activities can be reviewed and take decisions.
 - Reviews will be reports such are progress reports of services taken place, progress reports on vehicle hiring, user detail reports, monthly and yearly services taken place.
 - The authority to deactivate or blacklist a customer from the database will be granted to the client.

2. Similar Systems and Technologies

2.1. Similar Systems

Vedako [1](Mobile Application)

According to the Google PlayStore page relevant to the Vedako application, a host of home services such as gardening, carpentry, plumbing, electrical service, wall painting, vehicle painting, pest control service, CCTV fixing service, mason service, tile fitting service, handyman service, refrigerator repairs, ac installation & repairs, landscaping service, on demand, and many more delivered directly to your doorstep was offered by the Vedako Application.

A range of services in need can be chosen by the service recipient, professionals in their vicinity can be found, quotes can be taken, Service recipients can be contacted, negotiated and hired to complete a requirement. A job can be posted, and quotes can be provided by professionals, & get hired by the service recipient.

Advantages and Disadvantages of the application are given below.

Advantages of this application

- Easy platform to find service professionals 24x7 – when a service recipient wants and wherever a service recipient wants them.
- An option is included to chat, call and negotiate price before hiring the professional
- Videos and pictures can be shared with the service professional to best explain the job
- Many service professionals
- The sign up can be done with social logins such as google and facebook.

Disadvantages of this application

- Even though this app is providing lot of services in many categories the recipient will be in greater trouble to extract the vehicle related services.
- When a vehicle breakdown taken place sometimes the customer will need a towing vehicle too. These two different jobs cannot be done with the same application.
- The user must go through several pages to post a job description or to request for a job.

- Does not support PCs.

RSA [2](Mobile Application)

With the growth of the passenger vehicle segment in Sri Lanka, the requirement for an establish service provider to handle Roadside problems has become a necessity for most of the vehicle owners who has faced such unfortunate circumstances. Understanding this necessity in the market, DIMO(Diesel and Motor Engineering PLC) has launched the DIMO Roadside Assistance service island wide, to minimize the un-pleasantries of breakdowns that the DIMO RSA members would face by the road. According to the webpages about RSA application following facilities are given to the customers by the application.

- Services are provided through DIMO technicians and Dealers, appointed island wide.
- Tire Changes (to spare wheel)
- Battery Jump Start
- Lock smith services (Manual locks, Electronic locks, Battery replacements)
- Fuel Delivery, Oil Delivery and Coolant delivery
- Engine related issues, Electrical repairs (Those that could be done by the road itself)
- Any other repair that could be done without taking the vehicle to a garage
- Car Carrier service

Disadvantages of the application

- Does not support PCs.
- Can only function as an RSA application.

Hoda Bass [3](Mobile and Web Application)

It is a largest labour collection web site in Sri Lanka. The Hoda Bass website has given a detailed description on the following information.

Number of services are rendered to support day-to-day life through this site. The services can be found in the instance when the services are required from the service providers that are existing within the country currently. Service recipients was provided to locate services/providers who have a comparatively low chance on promoting their services.

Advantages of the application

- A collection of various services was provided by this application.
- It provides a call option to call to the service providers
- An excellent solution to the people who are in trouble with construction work.
- A clear categorization of work ability to choose from relevant area of expertise of the service providers

Disadvantages of the application

- The application shows the service providers from the areas of construction work and mechanical work. But it is prioritized much with the construction area.
- The application itself does not provide a mechanism to contact the service providers like a chat option or send request option before contacting them verbally.

Pick My Load [4](Mobile & Web Application)

Drivers of all sorts of commercial vehicles, from Three Wheelers to Prime Movers, and potential clients looking to ship goods from point A to point B are connected hassle-freely by the application PickMyLoad, without worrying about the size of the parcel to be sent.

A platform to engage with drivers/owners of a wide range of commercial vehicles, and the tracking of the delivery in real-time through a smartphone were provided by the application. Once the delivery is done, a detailed receipt was given and the option to pay the fee was provided at the touch of a button.

Advantages of the application

- Easy and fast booking
- Transparent pricing of the journey. The customer was provided a detailed receipt.
- Real time tracking of the journey of the parcel.
- Wider selection of vehicles to cater the shipper's specific requirements.
- Instant pay
- Drivers can be rated by the customers.

Disadvantages of the application

- Limited to the option of shipping of goods.
- The driver and customer have separate applications.

PickMe [5], Uber [6], YoGo [7](Mobile Application)

Drivers of all sorts of commercial vehicles, from Three Wheelers to large cars, with potential clients looking to rides from point A to point B are connected by these applications.

Advantages of the application

- The application provides a good service to the customers looking for a taxi
- Easy and fast booking of taxies
- Real time tracking of the journey of the rider
- Wider selection of vehicles

Advantages of the application

- Only limited to that option of booking taxies.
- The driver and customer have separate applications.

2.2. Technologies

Mobile application Development Languages [8]

A recent documentary on mobile application development languages [8] stated that the following languages are more commonly used to develop a website.

Swift [9]

Swift ensures an excellent way to create software, whether it's for machine or anything else that runs code. It's a harmless, quick, and interactive programming language. The compiler is highly optimized for performance and the language is optimized for development, without compromising on either.

Swift is a user-friendly language to new programmers.

Powerful inference and pattern matching were provided with a modern, lightweight syntax, and complex ideas were allowed to be expressed in a clear and concise manner.

C++

It is the basic base for most modern programming languages and has the power to create various dynamic apps. It is an object-oriented language. The simple and effective compiler-based approach of the language makes it a useful language that can be used for numerous platforms.

Java [10]

Java is one of the object-oriented programming languages that was considered as the standard language for Android developments. The language is much easier with the handling and many open source libraries. It can work on different types platforms, easy to learn and simple to use. It is an open source and free and has the huge base of community support.

Web application development Languages [11]

The following languages are used to develop modern websites and this was stated in the recent documentary. [11]

HTML (Hyper Text Markup Language) [12]

The World Wide Web's main markup language is HTML. Its general design has enabled it to be adapted, over the succeeding years, to describe several other types of documents and even applications.

CSS (Cascading Style Sheets) [13]

The style of an HTML document is described by the CSS language. CSS describes the way which the HTML elements should be displayed. The style of a web document can be controlled by CSS in a simple and easy way.

JavaScript [14]

JavaScript is a lightweight programming language with superb functionalities. While it is well-known as the scripting language for Web pages, many other non-browser environments also use it. JavaScript is a dynamic language, supporting object-oriented, imperative, and declarative styles.

jQuery [15]

jQuery can be regarded as a fast, small, and rich features JavaScript library. HTML document that is traversal and manipulation, and with event handling, animation can be made with it.

PHP

PHP is a widespread general-purpose scripting language that is commonly used for web development. Fast, efficient, flexible and pragmatic, PHP language, powers everything from blog writing to the most popular websites in the world.

Custom Made Websites

A Website that was built from scratch is a custom designed and hand-coded website. This refers to a site that is meticulously constructed according to the clients' requirements, and their specific business requirements.

Advantages of custom-made websites [17]

- The site is designed to keeps the visitors' attention on the site.
- Load faster than the website developed by website builders as these do not contain unwanted components.
- It is built around the actual requirements of the users
- Unique
- Better user experience
- Have a higher security level
- Can add lot of features to the site

Disadvantages of custom-made websites

- Higher cost
- Take much time to implement
- The developer should have a deeper knowledge on UI/UX design and technologies and basic understanding of search engine optimization

On the shelf websites

They are the site that was made with the aid of website builders and template websites that come with a set of inbuilt features.

Advantages of on the shelf websites [18]

- Readymade for the search engine optimization and social media sharing
- Opportunity to gain competitive advantage over the organizations' competitors and add value to the organization

- Cost efficient
- Implementation time is lower

Disadvantages of on the shelf websites

- They are built with many unwanted features
- Have a bad effect to the performance of the site

2.3. The selected design strategy

The proposed system was a web-based application which was included with many features. As the application is intended for the commercial use the interface of the system should be user friendly and attractive. The application must be well optimized for the search engines. The performance of the site must be in a good standard as the site should not be slow to cater the requirements of the customer.

Therefore, the website was decided to be made as a custom-made website and the PHP, HTML, CSS, JScript are used as the languages for scripting.

3. Analysis

3.1. Product Perspective

The product is supposed to be a web application which can be accessed via the world wide web. The following are the main features that are included in the proposed web application.

- Cross platform support: The system offers support for most of the well-known and commercial browsers. The browser must at least have the support for the HTML5.
- User account: The system allows the user to create their own accounts in the application and facilitate features of updating and viewing profiles.
- Category based post displaying section: The application provides a section to browse the jobs posted by the service providers based on the categories.
- Search: Search given the system is simply a local search engine which is based on key words. The application itself provide a search inside the application based on the user provided key words.
- Discussion Forum: The application provides users a platform to communicate and discuss their problems with the owners of the site and the service providers they are seeking.
- FAQs section: Frequently asked question section in the system contains answers for problems which the application's user frequently faced.

3.2. User Characteristics

The application is developed with the restriction that the user does have the basic knowledge of operating the internet and to have access to it. The administrator of the web application is expected to be familiar with the interface of the tech support system.

3.3. Main Functionalities

The functionalities of the website were analyzed and an usecase diagram was prepared. The prepared usecase diagram was attached in the appendix 1.

Login and Registration Component

The following are the functionalities which was given along with the login and registration component.

- Customers and the service providers who want to get the services could be signed up to the system using email ID or social logins (google).
- An option to store details about their vehicle will be included in the system for the customer to avoid repeated entering of same information to the system. This include the details such as vehicle brand and model.
- The stored details of the customers are included with name, address, city, username, and password.
- The service provider's profile is contained with details such as name, cities he like to provide services, username, password and mobile number.
- Users can view and update their profile details except for the username field.

Vehicle hiring component/ Vehicle for towing component

The following are the functionalities which was given along with the Vehicle hiring component/ Vehicle for towing component.

- A detail description can be posted by drivers about the vehicle they own. The description is included with the brand, model, and vehicle number.
- These above-mentioned details, name of the driver, mobile number and the location that the vehicle will be available can be viewed by the customer. When a request was sending to the service provider asking for a job this information will be send to the customer automatically.

- Posts regarding vehicles can be filtered by the location.
- The time and date which the customer wants to hire the vehicle can be specified in the vehicle request.
- Vehicle requests by customers will be come as an SMS alert driver's mobile phone.
- Vehicle requests which are coming to drivers can be managed either by accepting or declining.
- Vehicle description must be contained few keywords of driver's choice to make the customer's search easier
- After finishing the hire, an acknowledgement must be given to the driver.
- The completed work and declined work of drivers can be viewed and history will be maintained.
- A rating can be given to the driver by the customer and to the customer by the driver.
- The driver can be contacted by the customer via the web-site. The site will be included its own chat component to provide communication facilities among two people.
- Drivers can be compared customers based on individual reviews and ratings given by other users.
- The completed work for the customer can be viewed, and history will be maintained
- Payments cannot be done via the web site.

Roadside assistance & mechanical repair assistance component and vehicle cleaning component

The following are the functionalities which was given along with the Roadside assistance & mechanical repair assistance component and vehicle cleaning component.

- A detail description can be posted by the service providers about the service they provide. This description has the details such as service type, description, keywords and the location preferred.
- This description can be viewed by the customer along with the service provider's name and mobile number.

- Posts regarding services can be filtered by the location and the location can be edited by the service provider.
- The time and date which the customer wants the service can be specified in the vehicle request.
- Service requests by customers will be come as an SMS alert service' provider's mobile phone.
- Service requests which are coming to service providers can be managed either by accepting or declining.
- Job description must be contained with few keywords of service provider's choice to make service recipient's search easier
- After finishing the job, acknowledgement must be given to the service provider.
- The completed work and declined work of service providers can be viewed and history will be maintained.
- A rating can be given to the service provider by the customer and to the customer by the service provider.
- The service provider can be contacted by the customer via the web-site. The site will be included its own chat component to provide communication facilities among two people.
- Service providers can be compared by customers based on individual reviews and ratings given by other users.
- The completed work for the customer can be viewed, and history will be maintained
- Payments cannot be done via the web site.

To the administrator following facilities will be given through the web site

- The decisions on user activities can be reviewed and take decisions.
- Reviews will be reports such are progress reports of services taken place, progress reports on vehicle hiring, user detail reports, monthly and yearly services taken place.
- The authority to deactivate or blacklist a customer from the database will be granted to the client.

FAQ section

The following are the functionalities which was given along with the Roadside assistance & mechanical repair assistance component and vehicle cleaning component.

- This section is provided with a list of frequently asked questions and answers to them and the administrations can post them to the site by themselves.

3.4. Non - Functional Requirements

Performance Requirements

The following non-functional requirements regarding performance describes the aspects that need to be fulfilled in the system development.

Performance of the system

The system must be highly interactive with the user and the delays involved during the process must be less. Therefore, every action-response of the system must not be contained with sudden delays.

Safety of the information

Information transmission in the system must be securely transmitted to server without any changes in information. The stored information should be thoroughly secured in order to maintain the user trust.

Reliability of the system and information

The system is reliable in its operations and for securing the sensitive details.

Software Quality Attributes

The following non-functional requirements regarding software quality describes the aspects that need to be fulfilled in the system development.

Security given from the system

The main security concern is for users is updating sensitive data to the site. Hence there must be a proper login mechanism to avoid hacking.

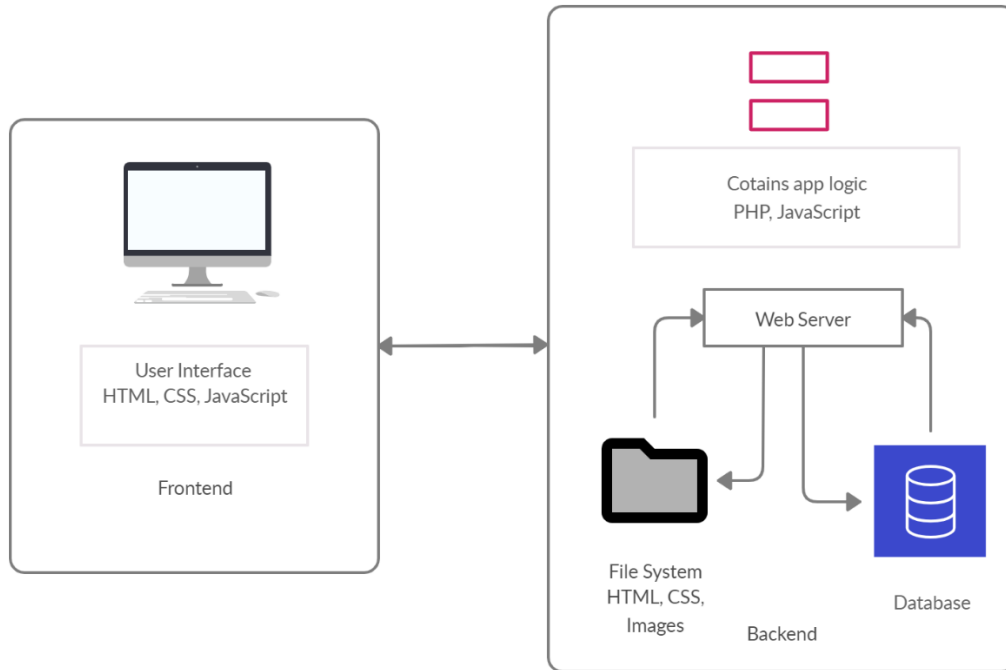
Usability of the system

The system must be easy to handle and must be navigated in the most user expected way with no delays. In that scenario the system program must react accordingly and navigate quickly between its states to give the highest user satisfaction. The system must be user friendly.

4. Design

4.1. Application Architecture

The final system will be a web application as indicated in the figure 4.1 which will be run on a typical web environment and consists of a relational database.



4. 1 System Achitecture

There are mainly two parts of the application.

1. Front End
2. Back End

Front end was developed using HTML, CSS, and JavaScript with a user-friendly interface. The back end was included with two main parts namely file system and database. File system mainly contains the application logic which was written using php and JavaScript and supporting images and libraries. Database was done using MySQL.

User will be logged into the application using the front end and they won't be able to control the and access the back-end part. When any value is entered and submitted by the user then they will be stored at the back end.

The proposed system can be considered as an information repository which will be helpful in finding services related to the vehicles it will create a new business opportunity to the client by acting as the platform to meet the customer and the service provider.

4.2. Methodological approach

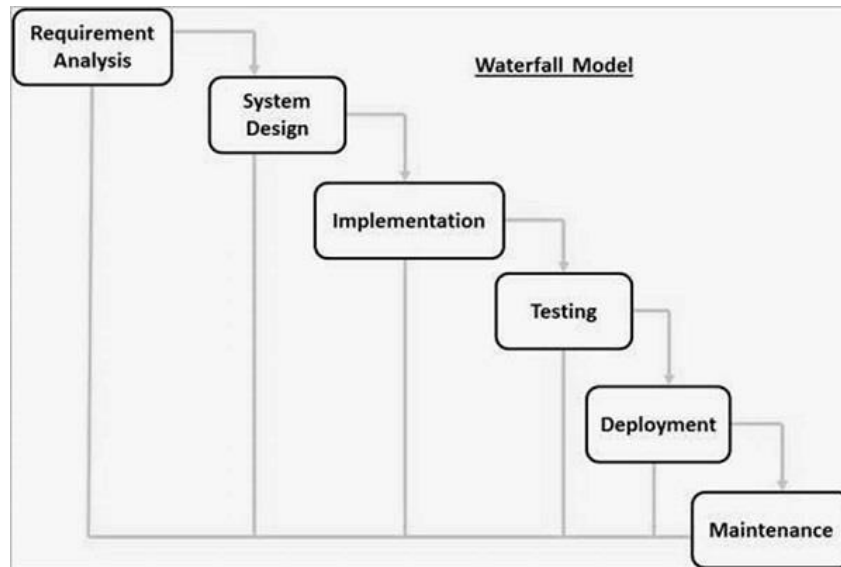
Nowadays each and every people in the society tends to use a vehicle for their convenience, the proposed system is considered to be developed in order to facilitate services related to the automobile area as fast as possible. The target audience of the system was identified as the service providers and the customers who get services from them.

Waterfall Model [19]

In the waterfall model [19], the system development life cycle was divided into distinct phases. The outcome which was gained from concluding one phase was used as the input for the next phase sequentially. This indicate that any phase of the development cycle can be begun only if the previous phase of the life cycle is complete.

Mainly the waterfall method will be provided with following phases as illustrated in figure 4.2.

- Initiation
- Analysis
- Design
- Implementation
- Testing
- Deployment
- Maintenance

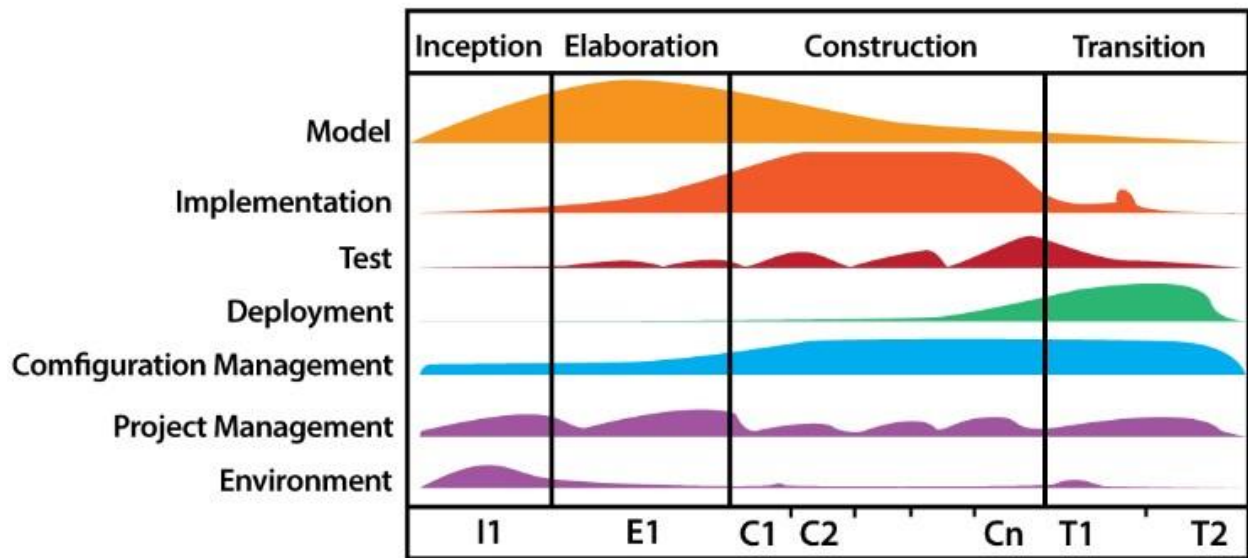


4. 2 Waterfall Model [20]

Rational Unified Process Model [21]

The rational unified process model[21] divides the software development process into four distinct phases that each of phases involves in business modeling, analysis and design, implementation, testing, and deployment which are the phases of the software development life cycle. The four distinct phases as shown in the figure 4.3 can be considered as:

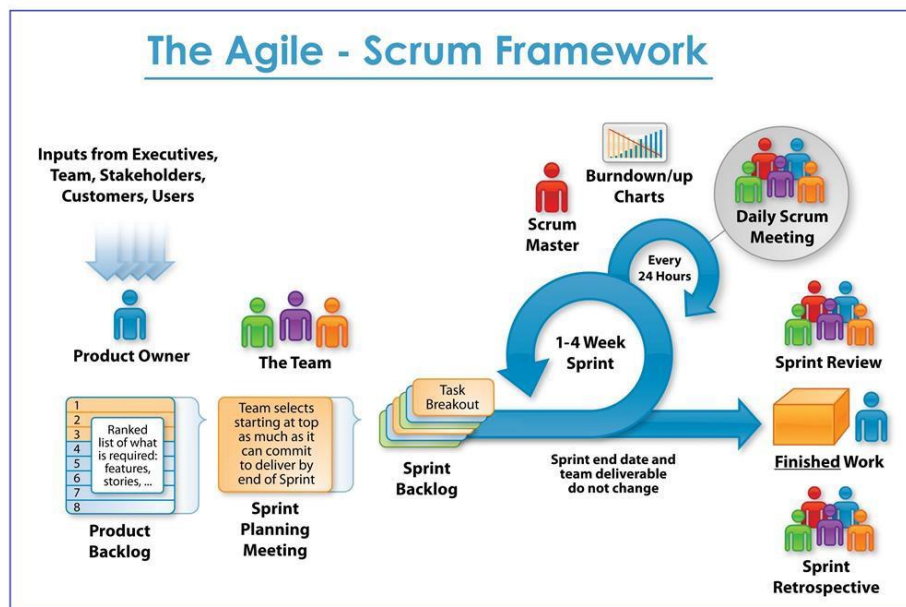
- Inception - During this phase the idea for the project is specified. The development team do a feasibility study to determine whether the project is worth of pursuing and what are resources that is going to be needed.
- Elaboration – During this phase the architecture of the project and required resources are further evaluated.
- Construction – The developing of the project is completed in this phase. The software is designed, coded, and tested for the errors.
- Transition - The software is distributed to the public during this stage. Final adjustments of the software or updates are made based on feedback given from end users.



4. 3 Rational Unified Process [22]

Agile Development [23]

Agile software development model[23] as illustrated in the figure 4.4 can be referred as a software development methodology which is based on iterative development, where requirements and output evolve.



4. 4 Agile Development Model [24]

The web application was developed using the rational unified process. As the first phase all the requirements were gathered and documented with the possibility of changing them as required when the other phases are in action.

Then the design phase was begun, and the design was made sure to cater the requirement which was gathered at the initial stage. The design can cater the modifications that will come in the later stages.

The web application was implemented as the design and it was time consuming since as some of parts in the design were time consuming in the implementation. The final output of the project was same as the initial design and got tallied with the requirements.

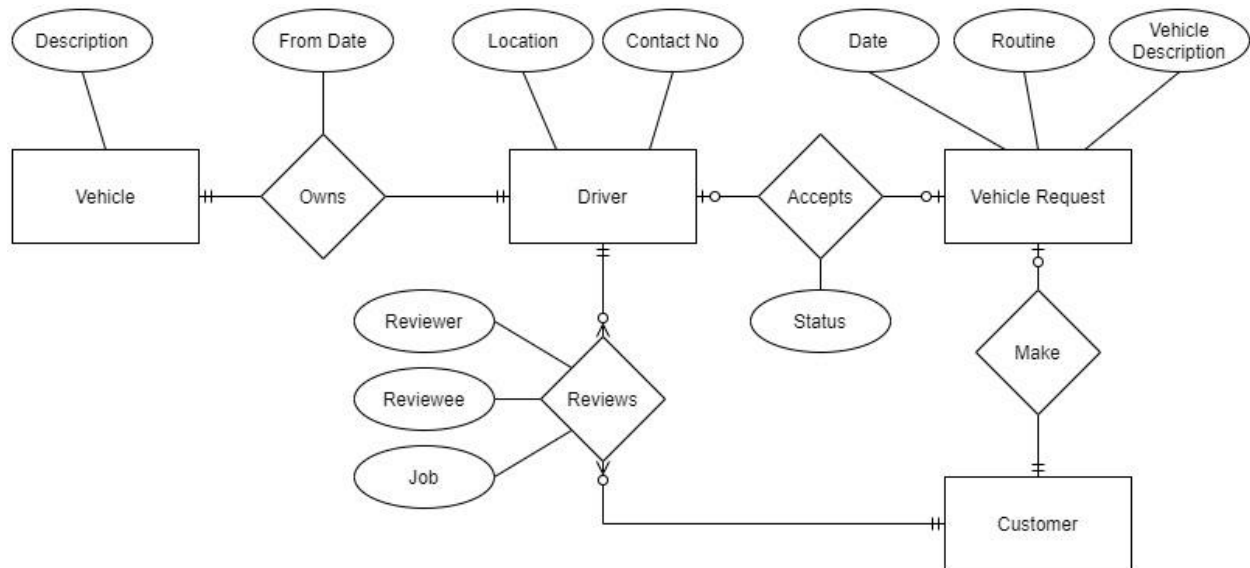
Testing was done separately with each and every module as unit testing and after the implementation all the features were combined and tested. Finally, the clients were consulted and give them an opportunity to conduct an acceptance testing.

4.3. Database Design

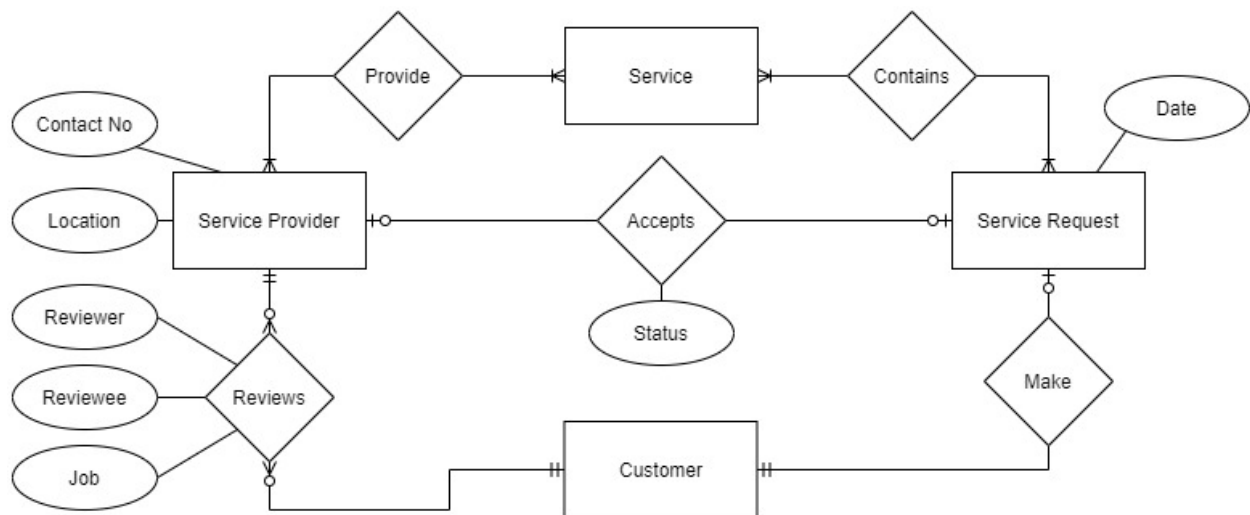
Database is one of the critical parts of the proposed web application. Database of the application was developed using MySQL.

Tables and field were named according to naming conventions. Shortened names were omitted, and meaningful names were used much as possible to avoid confusions. The ER diagrams of the system is shown in figures 4.5, 4.6, 4.7.

ER Diagram



4. 5 ER diagram of vehicle hiring component



4. 6 ER Diagram for Service Requests

5. Implementation

5.1. Project Direction

The implementation of the project was done according to the following milestones.

1. Getting to know the selected framework and the language.
2. Creating the database.
3. Configure the framework of the project to begin the coding of the project,
4. Requirement gathering and analyzing
5. Design
6. Coding
7. Testing
8. System integration

Project Plan

The project plan of the system is shown in the figure 5.1.

Task	Start	End	October				November				December				January				February				March				April			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1 Requirement Gathering and Analysing																														
Requirement gathering	10/1/2019	10/6/2019																												
Identifying the business logic	10/1/2019	10/6/2019																												
Analysis	10/7/2019	10/13/2019																												
Requirement Specification	10/7/2019	10/20/2019																												
Client acceptance	10/13/2019	10/20/2019																												
2 Design																														
Process design	10/21/2019	10/27/2019																												
Designing wireframes	10/21/2019	10/27/2019																												
Interface design	10/21/2019	10/27/2019																												
database design	10/28/2019	11/3/2019																												
Client acceptance	10/28/2019	11/3/2019																												
3 Coding																														
Login, Registration, Dashboard, Signout	11/4/2019	11/17/2019																												
Testing	11/11/2019	11/17/2019																												
Vehicle Hiring Component	11/18/2019	12/15/2019																												
Testing	12/9/2019	12/15/2019																												
Roadside assistance component	12/16/2019	1/19/2020																												
Testing	1/13/2020	1/19/2020																												
Vehicles for towing component	1/20/2020	2/16/2020																												
Testing	2/10/2020	2/16/2020																												
Vehicle cleaning component	2/17/2020	3/15/2020																												
Testing	3/9/2020	3/15/2020																												
4 Testing																														
Black box testing	3/16/2020	4/5/2020																												
User acceptance testing	4/6/2020	4/12/2020																												
5 System integration	4/13/2020	4/19/2020																												
6 Writing dissertation	10/1/2019	4/30/2020																												

5. 1 Project Plan

5.2. Development and Implementation Consideration

The whole system was developed by a single person. Therefore, the implementation strategies were chosen according to the personal skills of the developer.

- The considered personal skills as follows,
- Experience in computer programming and coding
- Previously developed software systems
- Object orient designing
- Problems solving and logical thinking capacities
- Experience in database administration

Coding of the system should be carried out according to the best practices of the coding in order to improve the quality of the software. The considered best practices are stated below.

- Commenting to decrease the cost of knowledge transfer between developers working in the same module and future references.
- Use of proper naming conventions and using descriptive names.
- Keep the code simple for the understanding of a future modifier of the code.
- Program code must not be contained with “hard-coded” values mentioning to environmental parameters, such as absolute file paths, file names, user names, host names, IP addresses, URLs, UDP/TCP ports.

5.3. Implementation Environment and Existing Code that was Reused

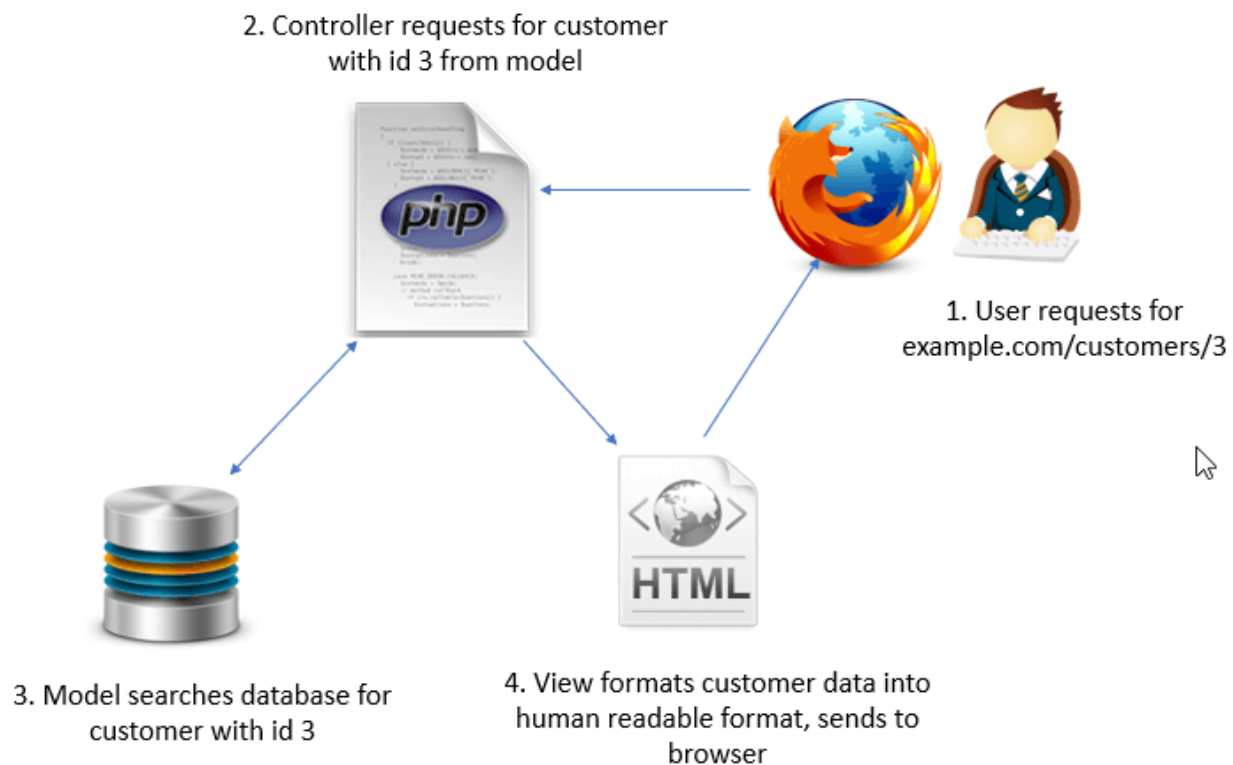
The developer is familiar mostly with PHP, HTML CSS and frameworks like CodeIgniter.

CodeIgniter [25], [26] is an MVC (Model, View and Controller) architecture based framework which was used commonly to develop php web applications. The whole size of the source code of the CodeIgniter is closed to 2MB. Therefore, the handling of the whole system will be much easier. The features given by the CodeIgniter can work independently without depending on each other components and this will make the changes of the source code much easier. The documentation of the framework is higher than the other frameworks. The CodeIgniter framework will come with

built-in libraries and helpers which will help in sending email, database management, session management.

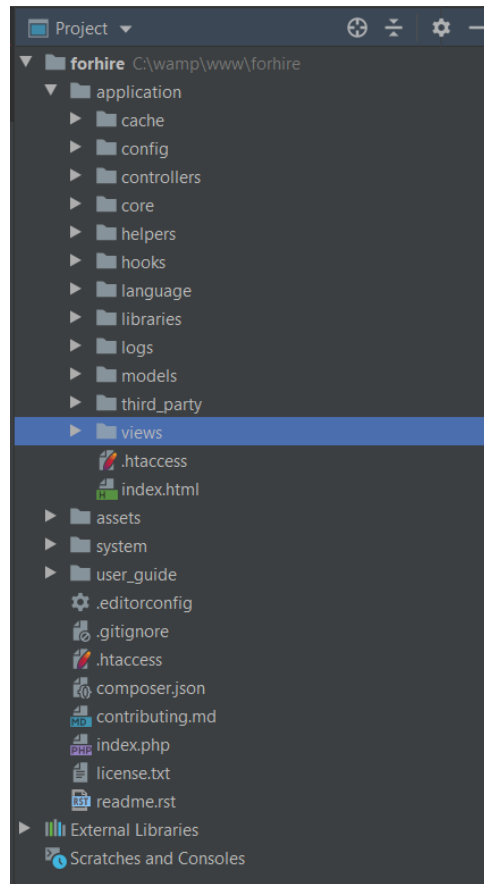
CodeIgniter framework will be worked as follows.

When a resource requested by a user, a response will be given by the controller. The user request will be understood by the controller and then the necessary data will be requested if it is important. This is illustrated in the figure 5.2.



5. 2 The internal flow of the CodeIgnitor[26]

Since there is no time for learning and experiencing new languages and frameworks the above framework was selected to carry out the implementation. The CodeIgniter framework version 3.1.11 was used for the developing of the system and related user interfaces. The file structure of the framework is shown in the figure 5.3.



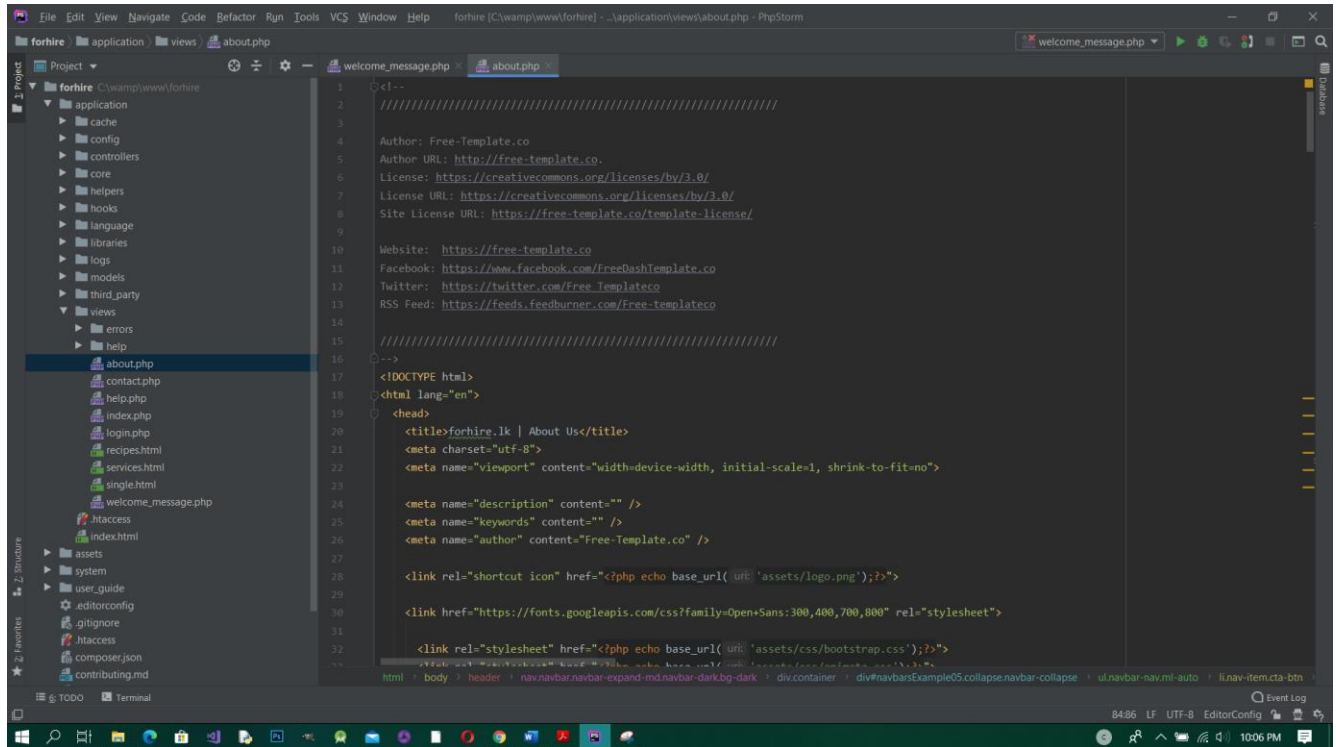
5. 3 File Structure of the codeignitor

The proposed system was a web application which is usually accessed through the common browsers such as Google Chrome, Mozilla Firefox and Microsoft Edge. Therefore, the technologies used in the application should be matched with the performing capacities of these browsers. For the ease of the coding, **JetBrains PhpStorm** [27] was used as it gives many features as follows to enhance the coding experience of the developer.

- Major frameworks like Symfony, Laravel, Drupal and CodeIgnitor support
- The PHP editor deeply understands the coding structure and supports all the PHP language features for modern and legacy projects.
- Built-in developer tools
- PhpStorm is included with full-fledged support for PHP and Databases/SQL support added on top.
- Hundreds of inspections are done to take care of verifying the code as you type, analyzing the whole project.

- Easy debugging

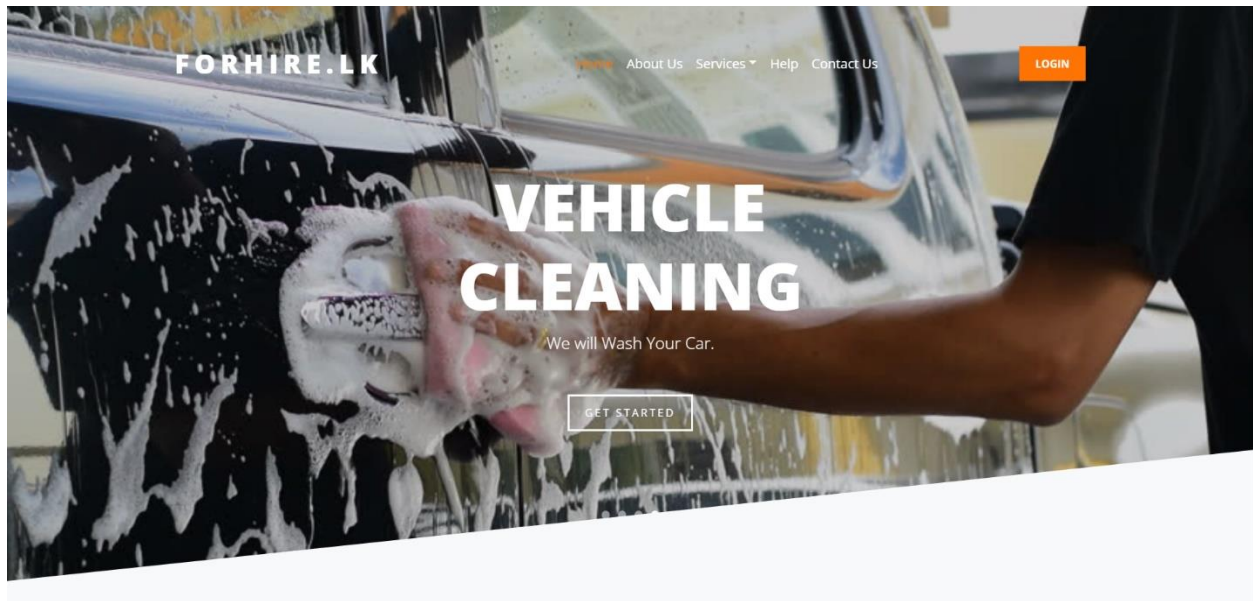
The developing environment during the coding stage can be seen in the figure 5.4.



5. 4 Interface of the developing environment

Two User interface templates were used for the implementation of the web application to implement the customer module and the administrator module separately. These templates were used for the easiness of the user interface designing.

The template foody-master was chosen as the template for the customer module. This template was supported with bootstrap 4 and provided with a descriptive documentation. Sample screens from the administrator dashboard can be seen in below figures 5.5, 5.6, 5.7, 5.8, 5.9, 5.10, 5.11, 5.12, 5.13 and 5.14.



5. 5 Main page of the site - 1



5. 6 Main page of the site - 2

Service's virtual working time and energy and controlling service providers who are willing to visit the customer. It will also provide vehicles to the customers who are searching for them and meet vehicle hiring people with customers.

LOGIN

5. 7 Main page of the site - 3

REGISTER

5. 8 Main page of the site - 4



5. 9 About Us - 1

FORHIRE.LK

As we move into the current era, information technology has been become a crucial asset in peoples' life. Use of web applications have been more prominent soon after the internet was introduced to the world.

Now, web applications are used as an essential component in the business world as business can be developed, can be become simpler with the use of them. The objectives of the business can be achieved faster by grabbing the attention of a larger group of customers.

The customers can be reached directly by the brands and services without a long supply chain with the help of web applications. Sometimes, the user can be reached by the manufacturer or by the service provider directly. Products or services can be brought to the customers from variety of choices by a single button click. In today's scenario, people are leading a busy life style. Hence, products and services can be bought by the customers as per their will with no time restriction. As well as products or services can be delivered to their homes.

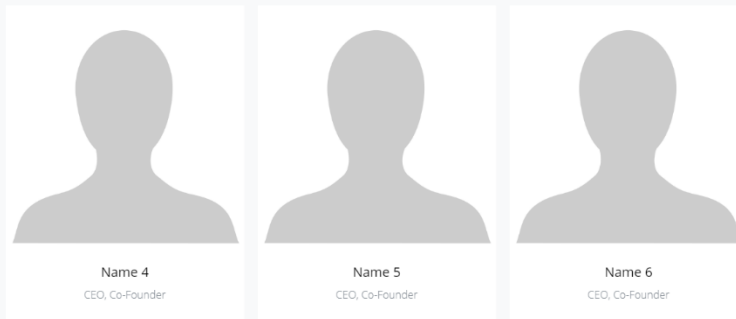
Likewise, the demand for a web application to acquire services was also increased. All the vehicle related services have been prioritized in peoples' day-to-day life. Therefore, the team **forhire.lk** thought of a web application for the vehicle related services to make customer's life much more comfortable.

The following benefits can be achieved by the users of this site,

- Vehicles for personal use, transport goods and towing vehicles can be hired by the people who are using the application and the people who own vehicles could get their vehicles hired.
- The forhire.lk will be a highly mobile compatible web-based application, so the system can be accessed by the customer anytime and anywhere.
- The is user-friendly and will be included minimum steps to fulfil a task.

5. 10 About Us - 2

FOUNDERS



5. 11 About Us - 3



REGISTRATION

How to get registered to the application?

December 05, 2019

Go to the registration section in home page...

[READ MORE](#)

5. 12 Help



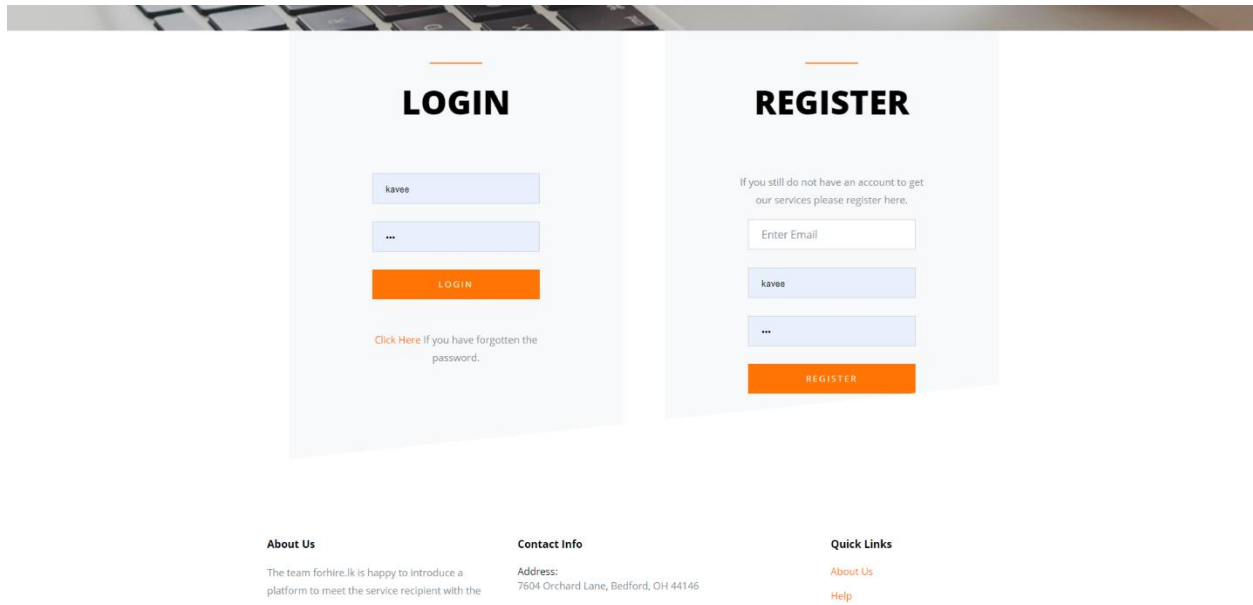
Now you can contact [forhire.lk](#) team regarding your concerns with our site.

Name	Phone
Email	
Write Message	
SEND MESSAGE	

Contact Details

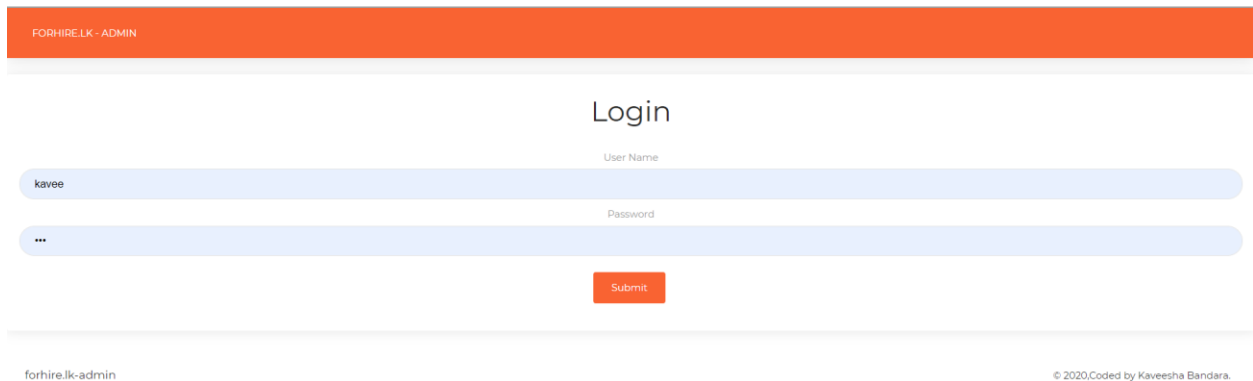
-  34 Street Name, City Name Here, United States
-  +1 242 4942 290
-  info@yourdomain.com

5. 13 Contact Us



5. 14 Login and Register

The template now-ui-dashboard-master was used for the administrator module development. It was chosen to match with the main customer module colour theme. The template was supported with bootstrap 4 and provided with a descriptive documentation. Sample screens from the administrator dashboard can be seen in below figure 5.15.



5. 15 Login interface of administrator module

6. Evaluation and Testing

6.1. Evaluation [28]

Typically, each and every software product should be evaluated for its quality. The evaluation is ensured that the most suitable piece of software was developed.

The standard evaluation criteria will be included with the following aspects.

- Fulfillment of the end user needs
- Functionality of the system
- Performance of the software
- Ease of use
- Compatibility with existing data and hardware
- Problem handling of the system
- Support given during lifetime

The evaluation of software can be done by a group of people from the software developing party and the client party or by third party professional or commercial body.

The system which was developed was evaluated by a group of people from the client party and the software developer against the above-mentioned evaluation criteria.

6.2. User Feedback

Feedback for the system was collected from the users of the system for the effective evaluation of the system.

Users of the system can be divided into two main groups. They are,

- Staff of the company
- Customers of the system.

6.2.1. Staff Feedback

The feedback for the staff was given to rate the system in 0-10 scale for the staff of the client company. The staff has rated the system and the replies are recorded and analyzed.

6.2.2. Customer Feedback

The customers of the systems were given a simple questionnaire to fill out after they have created an account in the system. The questionnaire was emailed to the customers.

Questions are,

- Age?
- Rate the system in the scale of 0-10?
- Rate the service you had received from the company in the scale of 0-10?

6.3. Testing [29]

Software testing is done to check to identify the actual results are matching with the expected results and to ensure that the developed software system is Defect free software. Identifying of errors, gaps or missing requirements against to the actual requirements can be also done with the testing of software. It can be done either by manually or using test automation tools.

6.3.1. Software Testing Types

1. Manual Testing

This is a process of testing software by humans to learn more about the software, to find whether it is working or isn't working.

2. Automation Testing

This is a process of testing the software using a test automation tool to find the defects of it.

6.3.2. Testing Methods

1. Static Testing

It is also called as Software Verification. This is done to ensure that we are building the product right.

2. Dynamic Testing

It is also known as Software Validation. This is done to check whether we are building the right product.

6.3.3. Testing Approaches

1. White Box Testing

White Box Testing is typically based on the application's internal code structure. The internal perspective of the system, programming skills, are used to design test cases when the white box testing is carrying on. This testing approach is usually done at the unit level.

2. Black Box Testing

Black Box Testing is a software testing approach that testers evaluate the functionality of the software without looking at the internal code structure.

3. Grey Box Testing

This is a combination of both White Box and Black Box Testing approaches.

6.3.4. Testing Levels

1. Unit Testing

Unit Testing is carried out to check whether the individual system modules of the source code are working properly.

2. Integration Testing

This is a testing process where the testers check the connectivity or data transfer between a couple of unit tested modules.

3. System Testing

This is done to ensure that the developed software works with all intended target systems.

4. Acceptance Testing

This is done to obtain customer sign-off as after that software can be delivered and payments received.

6.4. Testing of the System

The system was developed along with the testing standards from the beginning to the end.

Unit testing for the system was done by the developer as the coding carried out for the each and every module. The coding was done with the JetBrains PhpStorm and the developer was assisted in coding and syntax errors by that.

After completing implementation of all the components of the system a black box testing was carried out to recognize the errors in system functionality. This was also done by the developer against the requirements of the system.

Finally, an acceptance test was done with the client (system owner) and few sample users.

7. Conclusion and Future Works

7.1. Conclusion

Developer was a beginner to this field of website developing and therefore few certain things were needed to learn from the beginning. Developing work of the system was more challenging as the technical limitations made issues at some points. It affected the outcome of the system and lighted the power of the overall success to some extent.

The selected problem domain has answered with proven results of the web application and the outcome was more precise and accurate. The given time was enough to handle the project and author is happy to complete the dissertation within the given time frame even though some problems were occurred during the project time framework.

According to the results given in the testing and evaluating phase it is noticeable that the almost all of the useful features were implemented. Moreover, it shows that the captured requirements were useful to the customers of the system and the clients are satisfied with the outcome.

Finally, the author is pleased to state that, the entire work of this individual project was successful, and author has achieved all the objectives within the given time period.

7.2. Future works

The system was developed successfully as stated in the project proposal, but the current system can be further improved with below functions.

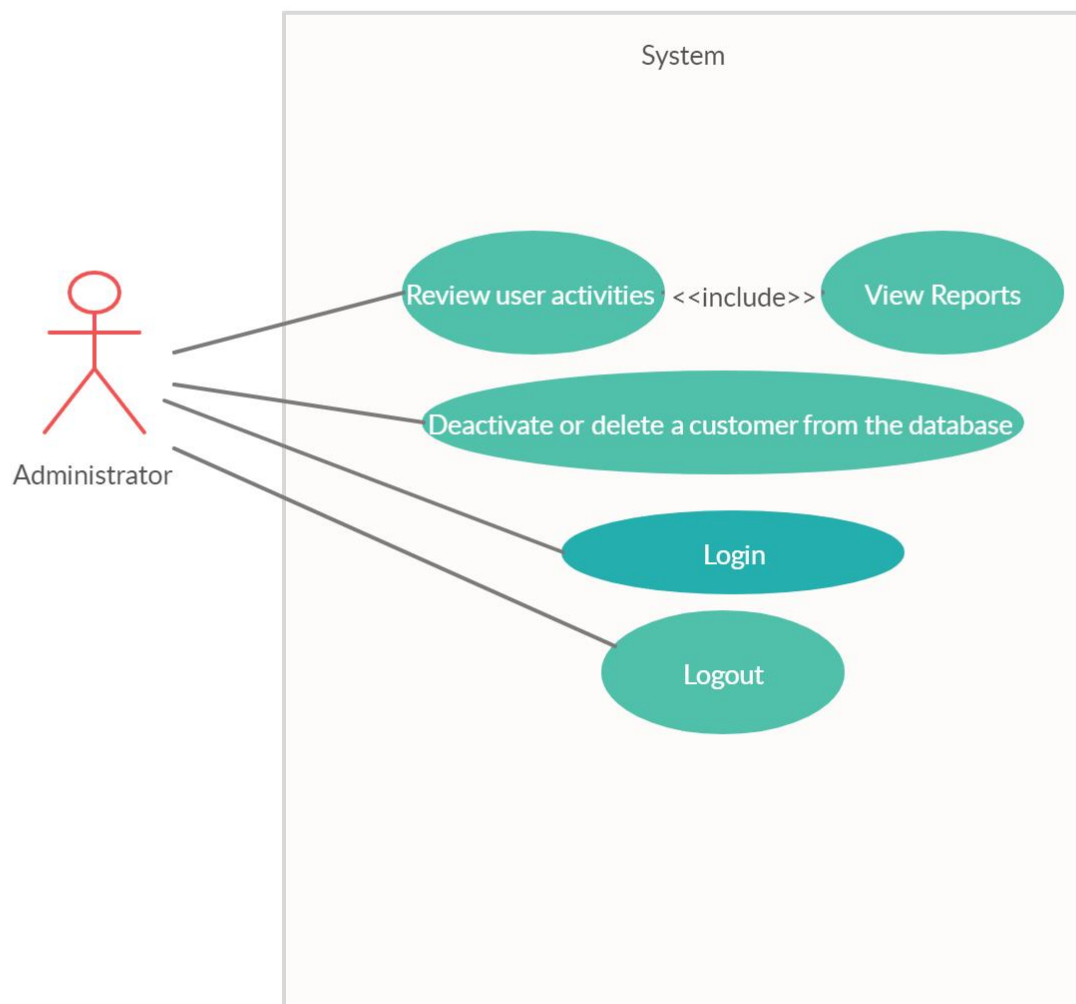
- Develop a mobile application for this web site
- Integrate a shopping cart facility to the system
- The system will be expanded to every kind of services that a customer can get.

7.3. Problems Encountered and Lessons Learnt

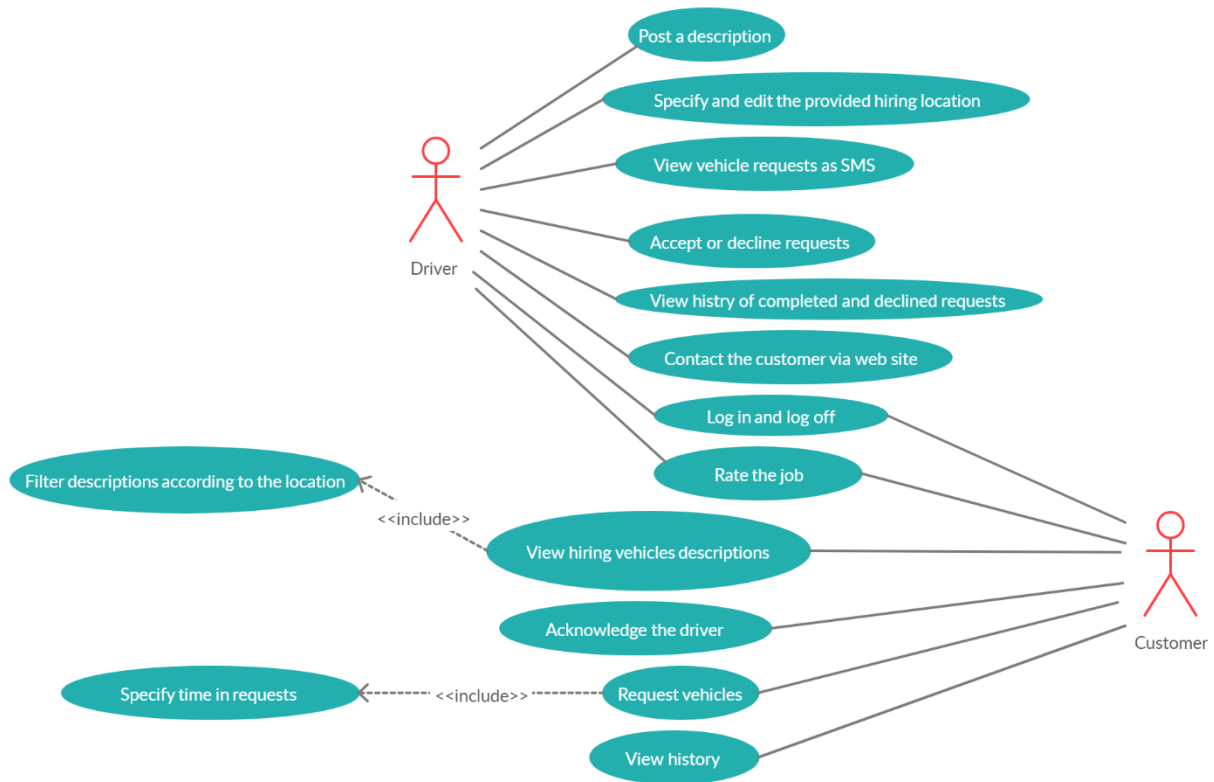
While developing the system the client of the site made few changes in the requirements. Therefore, the system had to be altered few times accordingly. Since the designs of the system were basic pencil sketches, after the sketches were drawn mismatches are occurred between what is intended to be developed and what was developed. The user interfaces and the functionalities of the systems must be synchronized according the requirements. Therefore, the need of improving the UIs and giving a more comfortable user experience for the users according to the requirements that was previously specified was arisen.

Appendix 1

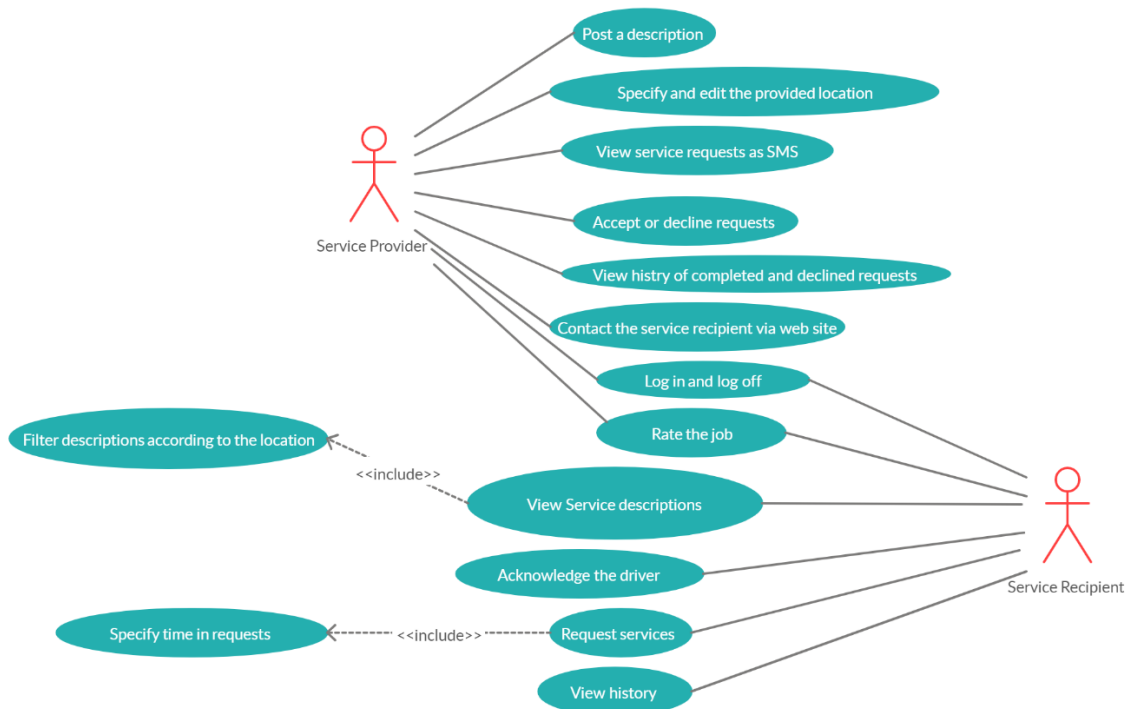
Use case diagrams



4. 7 Use case diagram for the Administrator



4. 8 Use Case diagram for the vehicle hiring component



4. 9 Use case diagram for the Service providing component

8. References

- [1] Google Play, "Vedako," Google Play, 22 May 2018. [Online]. Available: https://play.google.com/store/apps/details?id=com.syncbridge.vedako&hl=en_US. [Accessed 24 January 2020].
- [2] Google Play, "RSA," Google Play, 15 June 2018. [Online]. Available: https://play.google.com/store/apps/details?id=com.benworldwide.rsa&hl=en_IN. [Accessed 24 January 2020].
- [3] "About Us," Hodabass.lk, [Online]. Available: https://hodabass.lk/en/home/about_us. [Accessed 24 January 2020].
- [4] "Pick My Load," Pick My Load, [Online]. Available: <https://pickmyload.lk/>. [Accessed 24 January 2020].
- [5] "Pick Me," Pick Me, [Online]. Available: <https://pickme.lk/>. [Accessed 24 January 2020].
- [6] "Uber," Uber, [Online]. Available: <https://www.uber.com/lk/en/>. [Accessed 24 January 2020].
- [7] "YoGo," YoGo, [Online]. Available: <http://www.yogo.lk/>. [Accessed 24 January 2020].
- [8] R. Girish, "Top Technologies Used to Develop Mobile App," Fingent, 19 December 2018. [Online]. Available: <https://www.fingent.com/blog/top-technologies-used-to-develop-mobile-app>. [Accessed 24 January 2020].
- [9] "About Swift," Swift, [Online]. Available: <https://docs.swift.org/swift-book/>. [Accessed 24 January 2020].
- [10] "Java Inreoduction," W3shools.com, [Online]. Available: https://www.w3schools.com/java/java_intro.asp. [Accessed 24 January 2020].

- [11] B. Kohan, "Guide to Web Application Development," Comentum, [Online]. Available: <https://www.comentum.com/guide-to-web-application-development.html>. [Accessed 24 January 2020].
- [12] "HTML," [Online]. Available: <https://html.spec.whatwg.org/multipage/introduction.html#abstract>. [Accessed 24 January 2020].
- [13] "CSS Tutorial," Tutorials Point, [Online]. Available: <https://www.tutorialspoint.com/css/index.htm>. [Accessed 24 January 2020].
- [14] "Javascript," MDN Web Docs, 9 December 2019. [Online]. Available: <https://developer.mozilla.org/en-US/docs/Web/JavaScript>. [Accessed 24 January 2020].
- [15] "JQuery," JQuery, [Online]. Available: <https://jquery.com/>. [Accessed 24 January 2020].
- [16] R. Bereznoi, "BUILDING A WEBSITE FROM SCRATCH – WHAT DOES IT MEAN?," F5 Studio, [Online]. Available: <https://f5-studio.com/articles/what-does-it-mean-to-build-a-website-from-scratch/>. [Accessed 24 January 2020].
- [17] A. Haydash, "Are Custom Web Design Services Worth It?," Progmatic, 15 May 2019. [Online]. Available: <https://progmatic.com/blog/custom-web-design-pros-cons>. [Accessed 24 January 2020].
- [18] "7 ADVANTAGES OF BESPOKE WEBSITES OVER ‘OFF-THE-SHELF’ SOLUTIONS," Evoluted, 20 February 2018. [Online]. Available: evoluted.net/thinktank/web-development/7-advantages-of-bespoke-websites-over-off-the-shelf-solutions. [Accessed 24 January 2020].
- [19] LAKSHAY SHARMA, "ToolsQA," [Online]. Available: <https://www.toolsqa.com/software-testing/waterfall-model/>. [Accessed 29 02 2020].
- [20] Tutorials Point, [Online]. Available: https://www.tutorialspoint.com/sdlc/sdlc_waterfall_model.htm. [Accessed February 2020].

- [21] "Tech Terms," [Online]. Available: <https://techterms.com/definition/rup>. [Accessed 29 February 2020].
- [22] "Test Bytes," 2 May 2019. [Online]. Available: <https://www.testbytes.net/blog/rational-unified-process/>. [Accessed 29 February 2020].
- [23] "cprime," [Online]. Available: <https://www.cprime.com/resources/what-is-agile-what-is-scrum/>. [Accessed 29 February 2020].
- [24] J. Lara, "Medium," 18 December 2018 . [Online]. Available: <https://medium.com/@realjoselara/agile-scrum-process-in-a-nutshell-6ec32a59efb>. [Accessed 29 February 2020].
- [25] "Codeigniter," [Online]. Available: <https://codeigniter.com/>. [Accessed 20 June 2020].
- [26] "What is CodeIgniter? How does it Work?," [Online]. Available: <https://www.guru99.com/what-is-codeigniter.html>. [Accessed 20 June 2020].
- [27] "PhpStorm," JetBrains , [Online]. Available: <https://www.jetbrains.com/phpstorm/>. [Accessed 07 May 2020].
- [28] "Evaluation of software and hardware," [Online]. Available: <https://www.bbc.co.uk/bitesize/guides/zx9wxnb/revision/3>. [Accessed 12 June 2020].
- [29] "What Is Software Testing – Definition, Types, Methods, Approaches," [Online]. Available: <https://www.softwaretestingmaterial.com/software-testing/>. [Accessed 12 June 2020].