Information System for Riyotop Service Center

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Information System for Riyotop Service Center

A dissertation submitted for the Degree of Master of Information Technology

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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.

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This is to certify that this thesis is based on the work of Mr. N.M.T.R.Navarathna under my supervision. The thesis has been prepared according to the format stipulated and is of acceptable standard.

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ABSTRACT

Riyotop (pvt) Ltd has been established as an automotive services supplying company in Kurunegala, started its operations in 2015. Traditional business model of Riyotop is based on giving vehicle services and maintaining vehicles in Kurunegala area. After two years' time it has been established its name as the biggest vehicle service center in the area. Managing such a Service Station manually needs lots of paper work and it could create problems such as data redundancy, data inaccuracy, and difficulty to keep the track of the previous service information and customers.

The developed Information System for Riyotop Service Center is helpful to overcome the problems and difficulties which were created by the manual system. This system is helpful to store and manage all service information, generate relevant reports and invoices, keep track of the past records/customers, track and monitor monthly income, mange all inventories and employee data. And system will be allowed to use different user levels. So only authorized people can add, view or change the data of the system.

The system will be implemented as a web based system using the WordPress CMS (Content Management System). Unified Modeling Language (UML) is used for the analysis and design phases of the project. The development environment was created using XAMPP with Apache server and MySQL database server. On top of that WordPress was installed. For implementing the functionality exiting WordPress plugins were used and PHP language was used with Atom Text Editor to implement the custom-made functionalities.

The project completed successfully with the requested functionalities resulting the Riyotop Service Center to manage the business effectively by overcoming the difficulties made by the manual system.

ACKNOWLEDGEMENT

I owe a great many thanks to a great many people who helped and supported me to complete this project successfully.

First of all my deepest thanks goes to Mr. Shaminda Samarasinghe (Owner/Manager – Riyotop (pvt) Ltd) for allowing me to select this project and helping me throughout the process. Then I would like to express my thanks to Mr. H.H.T.D.Gunawardane (Technical Specialist) for explaining me, the main functions and flow of the service station and guiding me throughout this project. And also I would like to thank all the employees of the Riyotop service for the support they gave to success this project.

I would like to express the deepest appreciation to Mr. G.K.A.Dias for guiding me throughout this project as my Project Supervisor.

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LIST OF ABBREVIATIONS

SMS	Short Message Service
CMS	Content Management System
URL	Uniform Resource Locator
ER Diagram	Entity Relationship Diagram
NIC	National Identity Card
MIT	Master of Information Technology
UCSC	University of Colombo School of Computing
SQL	Structured Query Language
UML	Unified Modeling Language
DB	Database

CHAPTER 01: INTRODUCTION

1.1.The Client

Riyotop (pvt) Ltd has been established as an automotive services supplying company in Kurunegala, started its operations in 2015. Traditional business model of Riyotop is based on giving vehicle services and maintaining vehicles in Kurunegala area. Activities that comes under these services are as follows,

- Oil changing
- Filter changing
- Body wash
- Interior cleaning
- Exterior cleaning
- Running repairs
- Vehicle check reports
- Cut and polish
- Selling lubricant
- Selling Oil filter

These services are given with the highest technological equipment's that are introduced in this industry. Also human resources of Riyotop are highly competent in their fields and they are highly committed to give their maximum to their customers. Kurunegala is a large city with a huge requirement for quality vehicle service station facility because of this reason Riyotop (pvt) Ltd has decided to fulfill that need.

1.2.Motivation

Riyotop Service Station undertake more than 40 Vehicle Services per day using various kinds of equipment and materials. Although they have high quality technological equipment they do not possess a system to manage their day to day tasks. They use a paper based manual system to manage and maintain the service station.

Managing the Service Station using the existing manual system needs lots of paper work and inevitably results following problems;

- Since all records are generated using the manual system, they may not be accurate
- Hard to find previous customer details and service records of a selected vehicle
- Information about Machinery and raw material(stocks) are not maintained properly
- Unavailability of up to date Employee details
- Unavailability of data backups in emergency situations
- Larger storage space is required for storing books and files.

Implementation of the proposed system for Riyotop (Pvt) Ltd will be helpful to overcome the above mentioned difficulties. Hence it was decided by the management of the Riyotop to implement a computer based solution to address all the issues which they currently have with the existing manual system.

The motivation for this project can be summarized as follows:

Successful implementation of this project could be useful to Riyotop Pvt Ltd to manage the Service Station effectively by overcoming above mentioned difficulties using a professional Service Station Management System.

1.3. Objectives

The main objective of this project is to implement a computer based solution to manage the overall process of the service station and improve the efficiency of the day to day tasks. Following can be identified as the main objectives of the proposed system.

- Create a system to generate and store accurate records of the services - Each and every service record need to be tracked along with the vehicle number
- Create a system to manage billing and receipts - Billing system should be integrated. After service is done, receipt should be emailed and SMS to the customer
- Make it easy to find historical data regarding the services - All previous service information should be able to track using the vehicle number
- Create a system to maintain the inventory details - System should support to store inventory details.
- Create a system to maintain the employee details - System should support to store employee details
- Create a system to manage the Financial Information - System should support to store all income and expenditure.
- Make a way to back-up and restore the system - It should be possible to make backups of the system and restore them when necessary. Backups should be small in size
- Create a system to generate accurate management reports - Reports should include paying receipts, monthly income and expenditure, Inventory status, Current employee list, Vehicle service history
- Create a system to for the customers to schedule services and check their past service records through internet

- Customer should be able to log in to the system via internet, using his own user profile. After logging to the system customer is able to schedule a service. If the scheduling was successful, all the information will be sent to customer via email and/or SMS.
- Customer should be able to check past service records through internet. It will inform him when the next service is due and information regarding all previous services of the vehicle

Also the system must not be complicated. It should be user friendly and easy to learn by any person with basic computing knowledge.

The hardest part of using the existing manual system is to track the previous service records. These issues must be overcome with the proposed system. Any service record should be able to track easily using the vehicle number.

Upon successful implementation of this project, I believe this system will be helpful to manage the day to day tasks of Riyotop [Pvt] Ltd effectively, by minimizing the manual paper work.

1.4.Scope

The proposed system will be helpful to manage the day to day activities of the Riyotop [Pvt] Ltd effectively. As per the client’s requirements, the scope of the proposed Information System can be stated as follows;

- Ability to register new customers – Should be able to register the new customers in the system. Following data should be mandatory.
    - Vehicle Number
    - Customer Name
    - Mobile Number
    - Email address

When registering the customer information mandatory validation will be triggered for all the above information. Other than that Mobile number and email addresses are validated to check whether they are in the correct format. If the required information is available and passed the respective validation checks, it will then check whether the vehicle number already available in the system. If not it will register the vehicle in the system. If the vehicle is available it will prompt user to select the existing vehicle or create a new vehicle in the system.

After registering a new customer on the system, system will automatically send an email/SMS notifying the customer regarding the system registration and login credentials to the Riyotop online portal.

- Ability to record service information to existing customers – All service records which are currently maintained manually, need to be tracked based on the vehicle number
- Ability to notify the customer regarding the service status via email or SMS – After service is marked as completed in the system, it automatically notify the status to the customer via email/SMS. This notification will include the bill amount, completion timestamp, and proper text to inform that the service is completed
- Undertake bill payments and print payment receipts – After a successful bill payment it will either print a receipt or email/SMS the receipt to the customer based on his requirement. This can be used to minimize the printed reports.
- Customers should be able to schedule services and check their past service records through internet
    - Customer should be able to log in to the system via internet, using his own user profile (This information will be sent to the customer when the customer first registering in the system). After logging to the system customer should be able to schedule a service. If the scheduling was successful, all the information will be sent to customer via email and/or SMS.
    - Customer should be able to check past service records through internet. It will inform him when the next service is due and information regarding all previous services of the vehicle
- Ability to find historical data regarding the services
    - User should be able to search all historical records and get only one output by using the search parameter 'vehicle number'. Vehicle number should be an unique identifier in the system and user should not be able to keep two separate records for any vehicle number
    - User should be able to search the system using a general search criteria if the vehicle number is not given. This criteria should include "date range", "Customer name" and "Vehicle brand/model"
- Ability to generate relevant management reports - Reports should include paying receipts, monthly income and expenditure, Inventory status, Current employee list and Vehicle service history. This should be only possible to the Manager

- Ability to manage financial information – All income and expenditure should be managed under this module. All income should be logged automatically when a bill is generated (printed or email/SMS). User should be able to add, edit and view these data and add comments to the relevant fields. Expenditure should be added manually by the respective user. This module is only accessible by the Manager. But other users should be able to add expenditures with a respective comment. In this case the comment field should be mandatory.
- Ability to manage inventory – All inventory details should be able to manage in the new system. This should include add, edit and remove functionality to the inventory.
- Ability to manage human resources – All employee information and salary information should be able to manage by the user. Since there are sensitive information, this functionality should be only possible to the manager
- Ensure the security of customer information by creating different user levels, allowing only the authorized people to see the relevant information. – There should be three user levels for the Manager, front desk and customers. Manager have access for the all modules.
- Ability to crate database backups and restoration - It should be possible to make backups of the system and restore them when necessary. Backups should be small in size. This module is only accessible to the Manager user level

1.5.Structure of the Dissertation

This Interim Report is divided into four main chapters to provide a clear idea about the Service Station Management System. Structure of the dissertation and a brief description about each chapter can be identified as follows.

Chapter 1 – Introduction

In the first chapter it includes a brief description about the client, project, objectives and the scope of the project and the structure of the dissertation

Chapter 2 – Background

In this chapter it describes the background information required for the project and similar systems which are available in the market. Also Requirement Analysis part and functional and nonfunctional requirements of the expected system is described in this chapter

Chapter 3 – Analysis and Design

This chapter consists information about the software design phase. It includes mainly the designing approach, design diagrams and the main user interfaces of the system. Also the adaptation of the software engineering concepts will be discussed in this chapter

Chapter 4 – Implementation

Selection of Implementation Technology including Implementation environment (software and hardware) will be recorded under this chapter. Also the major code segments of the modules and acknowledgement of any reused existing code segments are described in this chapter.

Chapter 5 – User Evaluation and Testing

In the Evaluation chapter it consists information about how the system was tested. It includes the test plan, results, problems encountered and how the errors were addressed during the evaluating stage.

Chapter 6 – Conclusion

Here the main conclusion about the system is addressed. It also include the things learned during this project and brief description about future improvements for the system

References

All the books, websites and text referred while writing the dissertation are mentioned here accordingly.

Appendices

Appendices include extra information about the system. It is useful to technical or non-technical users who are interested to gain extra knowledge about the implemented Information system.

In the appendices section Design Documentation, User Documentation, Management Reports, Test Results and System Documentation are included.

Glossary and Index

This will consist of Glossary of terms and an extensive index

CHAPTER 02: BACKGROUND

2.1.Background

To implement a system it is needed to know the requirements. Fact finding techniques are used to gather requirements from the client to build the optimum system. Many techniques are available for gathering requirements. Among them following techniques were used to extract information from the client.

- Study existing documentation
- Observation of the work environment
- One-on-one interviews
- Group interviews

Study existing documentation and observation of the work environment was used as the primary fact gathering techniques. Then interviewed the people who are related with the main process to gather specific information about the system and to find out their expectations from the proposed system.

2.2.Existing Manual System

Although Riyotop service station, possess high quality service equipment, they do not have a system to manage their day-to-day tasks. All tasks were managed manually using log books and Microsoft Excel documents.

Refer the 'Figure2.1' for the basic use case diagram of the Existing Manual System.

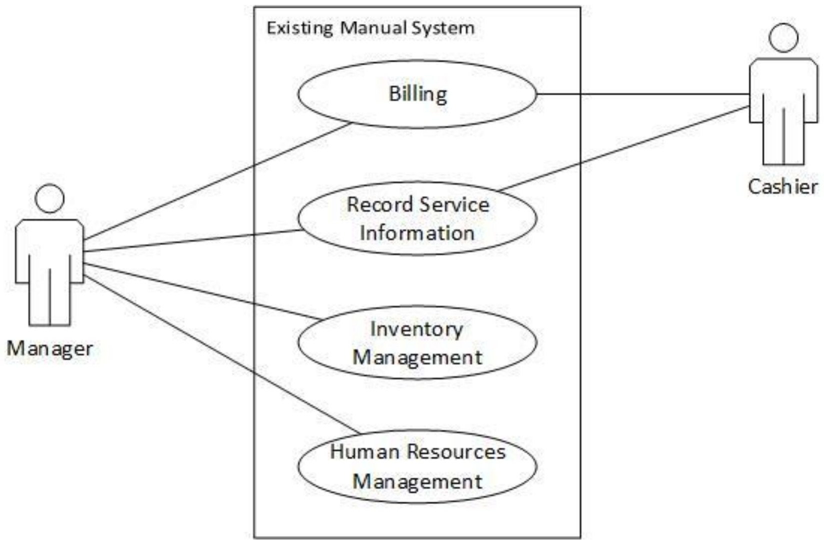


Figure 2.1 Existing Manual System

The existing system mainly consists of four subsystems. They are,

- Billing
- Record Service Information
- Inventory Management
- Human Resource Management

When a customer comes for a service, the required instructions are given and marked in a “Job Sheet” along with the customer information. Then the vehicle is transferred to the “Service Bay” and a new worker will start the service as requested in the “Job Sheet”.

After the service is completed an employee will mark the performed tasks, record the used inventory in the “Job Sheet” and provide it to the office. There the invoice will be prepared based on the “Job Sheet”.

Then finally customer is notified, that the service is completed. If the customer is not present at the site, he/she will be informed over the phone.

Also there are two subsystems for the inventory management and human resource management. Inventory was managed using log books and Microsoft Office Excel documents. There is no proper way to maintain the stocks. Since only few employees working in Riyotop Service there was no proper system for the human resource management. All employee details are filed separately and attendance were marked in a log book. At the end of the each month attendance and leaves were calculated manually.

2.3.Drawbacks of the Existing Manual System

Following major drawbacks were found on the existing system;

- All receipts and reports were hand written and printed reports were obtained by entering data manually in to Excel template
- Lots of paperwork included
- Difficulty to find previous service records of a customer
- Difficult to find previous service records of a vehicle
- Some confidential data might be recorded in the log books
- Stock information is not maintained properly
- Unavailability of up to date employee details
- No mechanism to backup or restore data
- Larger storage space is required to maintain the file system

Because of the above drawbacks it was decided to implement a computer based solution in Riyotop Service Station.

2.4.Similar Systems Available in the Market

Few Systems in the market were analyzed to check whether they cater the requirement of the Riyotop (Pvt) Ltd

- **<u>ELVA DMS vehicle service management system</u>**

ELVA DMS

"Effective and convenient auto repair services to attract and maintain a loyal customer base. Vehicle repair service business is all about the time and quality. Reduce service downtime and plan service recourses including mechanics and equipment. Vehicle service management system from Elva DMS ensures vehicle repair business functions and allows to manage entire organization using this one system" [1] (Figure 2.2)

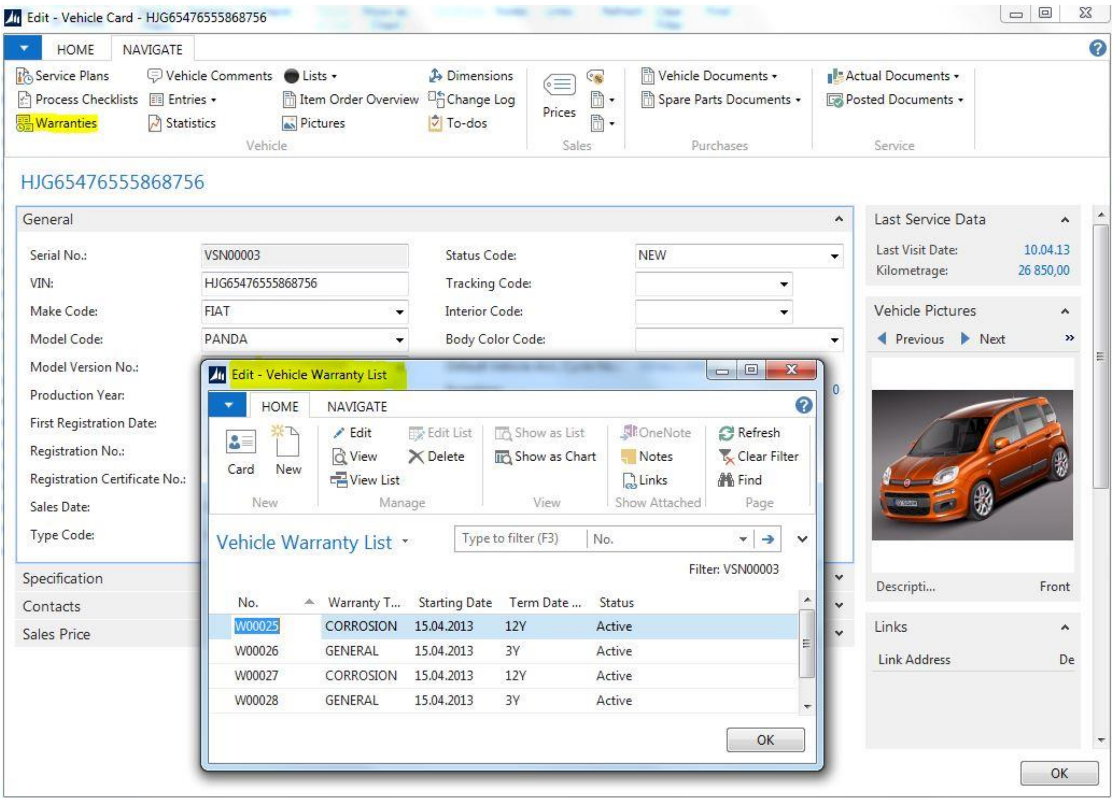


Figure 2.2 "ELVA DMS" Service Management System

Drawbacks of ELVA DMS

– The whole package include many facilities which are not required for the Riyotop (Pvt) Ltd. Eg. Spare parts management, Warranty management, Tire management, Insurance Management, Catalogue Integration etc. And due to these not required functionalities the system is more complex and difficult to use by non-technical users.
– Cannot customize as per the requirement of the Riyotop (Pvt) Ltd
– The ELVA DMS system costs **$149** per month per user
– Since this is advanced, the users need to be train well, before using the system

- **<u>“Servicestation.lk” Service Management System</u>**

“This is an online software, which is designed to do day to day transactions of a car wash or vehicle service station. This includes Sales, Stocks, Debtors and many more features related to a service station.

Car wash owners, vehicle service stations owners can utilize this online facility easily in island wide. You only need an internet connection for the location and PC or a laptop with a printing machine” [2] (Figure 2.3).

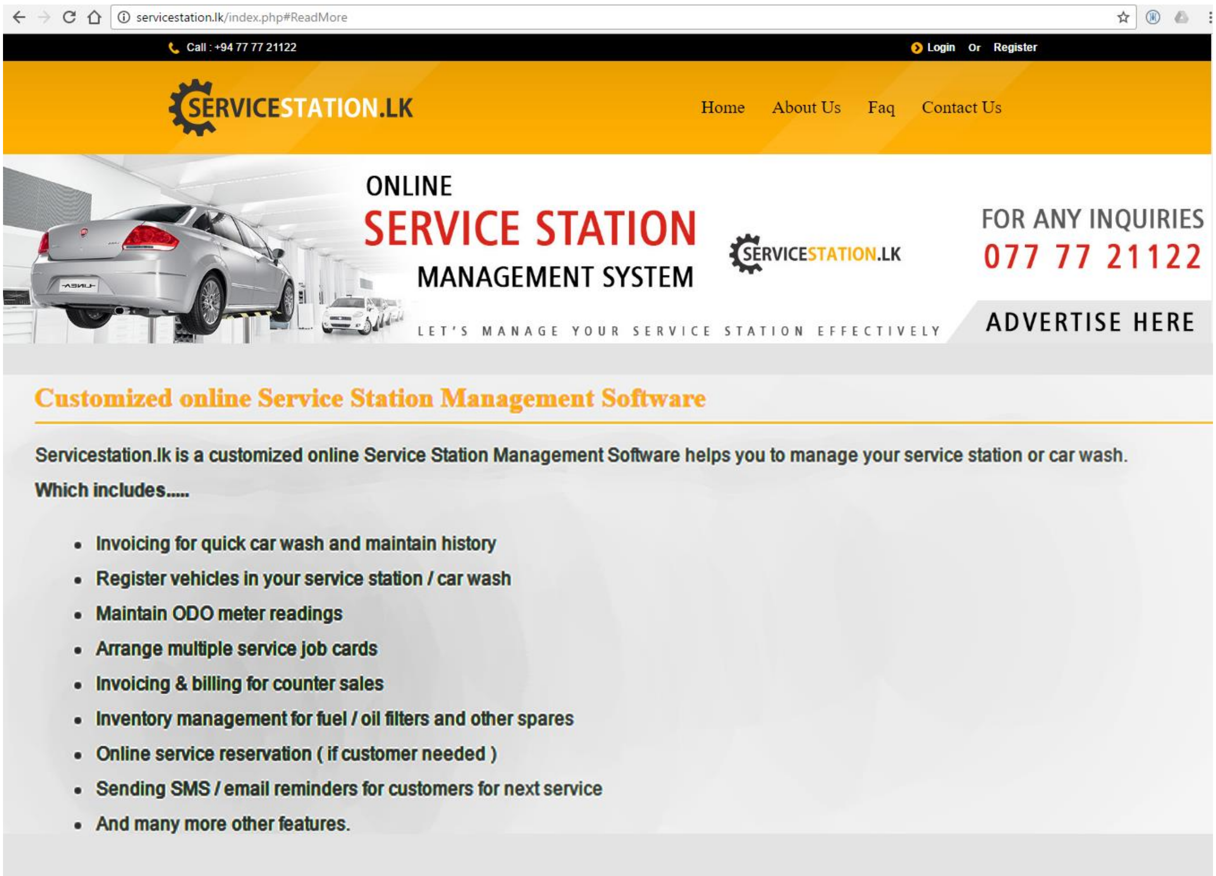


Figure 2.3 “ServiceStation.lk” Service Station Management System

Drawbacks of “ServiceStation.lk”

– Cannot customize as per the requirement of the Riyotop (Pvt) Ltd
– Some required services for Riyotop is not available in the ServiceStation.lk
– Need a monthly payment

2.5.Functional Requirements

Following requirements were identified as the functional requirements of the proposed system. The proposed system should have three user levels with the ability of doing the following functionalities. The three user levels are ‘Customer’, ‘Cashier’ and ‘Manager’.

Functional requirements identified for each user level can be described as follows

Customer:

- View current service status
- View Previous service records
- Schedule Appointments
- Edit Contact information

Cashier:

- Register new vehicles and Edit existing vehicle information
- Start, Update and Complete service Job
- Billing
- Search service records of any vehicle
- Manage Online Appointments
- Add Income / Expenses
- Enter Usage of Stocks/Inventory

Manager:

- Register new vehicles and Edit existing vehicle information
- Start, Update and Complete service Job
- Billing
- Search service records of any vehicle
- Manage Online Appointments
- Add Income / Expenses
- Track and monitor income for a given time period
- Stock Management
- Human Resources Management
- Update Prices

Other than the above, following should be common functionalities for all user roles

- Log in to the system using a ‘user name’ and ‘password’
- Change the password of the logged in user
- Log out of the system.

2.6.Non-Functional Requirements

Following can be identified as the non-functional requirements of the proposed system.

- **User Friendliness of the system** - The system should be easy to learn for the employees, and the user interfaces should be simple easy to use.
- The system should be **Reliable**. Ability to make backups and restore them can be categorized under this requirement. ("Reliability measures the level of risk and the likelihood of potential application failures" [3])
- The system should be **Accurate** and **Consistent** – Accuracy and consistency of the functions are essential non-functional requirements of the system
- **Security** – Only authorized users should be able to operate the system and availability of different user levels protects confidential information.
- **Maintainability -** The system should be able to maintain in the future. That means functionalities could be added, removed or modified without affecting the core functions of the system. In order to achieve this, a proper documentation of the system should be available.

CHAPTER 03: ANALYSIS AND DESIGN

3.1.Introduction

Software design plays an important role in the software development life cycle. It usually involves problem solving and planning a software solution. This includes both low-level component and algorithm design and high-level, architecture design. Software design can be defined as follows.

“Software design is the process by which an agent creates a specification of a software artifact, intended to accomplish goals, using a set of primitive components and subject to constraints” [4]

The requirements identified in the analysis phase are transformed into design models during the software design phase. A software design model can be known as the blueprint of the software which is to be implemented. Goal of the software design process is to produce a model which satisfies the requirements of the client without any bugs.

3.2.Design Overview

As identified in the Functional Requirements following will be the most important functions of the system which is planned to be implemented

Service Module

- Register Vehicle information
- Search Vehicle
- View past Service Records
- Create new Service Record
- View Service Status and change status according to the completion stage
- Generate Invoices and Billing
- Schedule and Manage Online Appointments

HR Management

- Save Employee Records
- Edit Employee information
- View all Employee information

Manage Financial Information

- Add Income
- Add Expenses
- Income and Expenditure Overview
- Generate summary and detailed reports

Stock Management

- Add new Stock Types
- Add new Transaction
- View Stock Overview
- View Transaction Overview

3.3. Alternate Solutions Evaluation

When designing the Information System for Riyotop Service, there were different technological solutions to choose. Among them following options were identified as the most suitable solutions for the proposed Information System.

Option 1: Standalone System

This refers to a system which runs only on one computer. The program and the database will be installed in a single machine and users need to use this machine access the system. This type of system is useful only if, the user does not require to access information through multiple computers. User can access all information only by using the respective computer.

Option 2: Network System

This refers to a system which includes multiple computes and a common database server to access by each computer networked in the system. Separate instances of the software will be installed in each computer and multiple users will be able to access and exchange information using the common database. This type of systems does not require an internet connection to communicate between the respective computers. All computers and servers will be interconnected via a Local area network (LAN)

Option 3: Web Based System

This refers to a system which will be available through the internet. The system will be published on a server and users will be able to access the system via the internet. To use these types of system user should have an uninterrupted working internet connection. Users can access this type of systems from anywhere in the world. Hence when developing a web based system, security should be a main concern to protect confidential information of the users.

Option 4: Commercially Available Systems

This refers to the systems which are already in the market, manufactured by vendors including common options required for the users. These types of systems cannot be customized based on the user's requirement. Refer the "Chapter 2.4" to identify some systems in the market.

3.4.Selected Solution Justification

Among the 4 options mentioned in the above, it was decided to select the **Option 3: Web Based System** due to the following reasons

- System will be required to access by the customers, to book timeslots and to view their past service records. (Hence 'Option 1: Standalone System' and 'Option 2: Network System', were removed from the consideration)
- The all requirements of the user should be catered by the new software product. (Hence 'Option 4: Commercial systems' was removed from the consideration)

It was decided to build the solution as web based using a Content Management System. The main reason to use CMS is easy implementation and maintainability of the system. Since it has thousands of readymade functionalities, it will be easy to implement the system.

The system will be built considering all the functional and non-functional requirements of the user. Since this solution is web based, any user is able to login over the internet and manage its tasks from anywhere.

3.5.System Design Methodology

"A system development methodology refers to the framework that is used to structure, plan, and control the process of developing an information system. One system development methodology is not necessarily suitable for use by all projects. Each of the available methodologies is best suited to specific kinds of projects, based on various technical, organizational, project and team considerations." [5]

There are several system development methodologies such as Waterfall, Agile, and prototyping. Here Waterfall methodology was chosen as the system development approach for this Service Station Management System because of the following reasons.

- Waterfall methodology is ideal for the supporting less experienced project teams
- The objectives and requirements are clear and stable
- Progress of the system can be measurable easily
- Users of the system has the fully knowledge about the business process

The basic structure of the waterfall methodology can be identified in the Figure 3.1

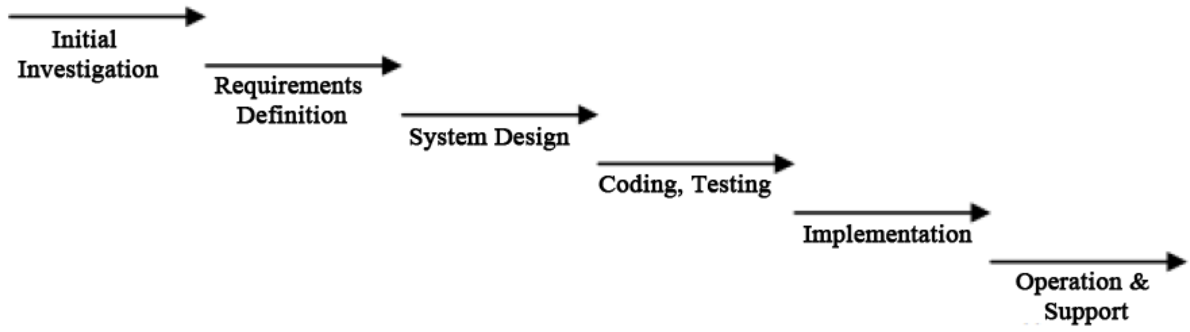


Figure 3.1 Waterfall Methodology

3.6.Design Diagrams

Following diagrams were designed based on the functional requirements.

- Use Case Diagram and respective use case descriptions
- Database Design
- Activity Diagram
- Sequence Diagrams for the complex paths

In this chapter use case diagram and few use case descriptions, database design and activity diagram is added. Refer the '*Appendix A – Design Documentation*' for see the complete design diagrams

3.6.1. Use Case Diagram

A use case diagram is a simple representation of a user's interaction with the system in each user's perspective. A use case diagram can show the different types of users of a system and the various ways that they interact with the system.

The Figure 3.2 shows the high level use case diagram for the proposed system.

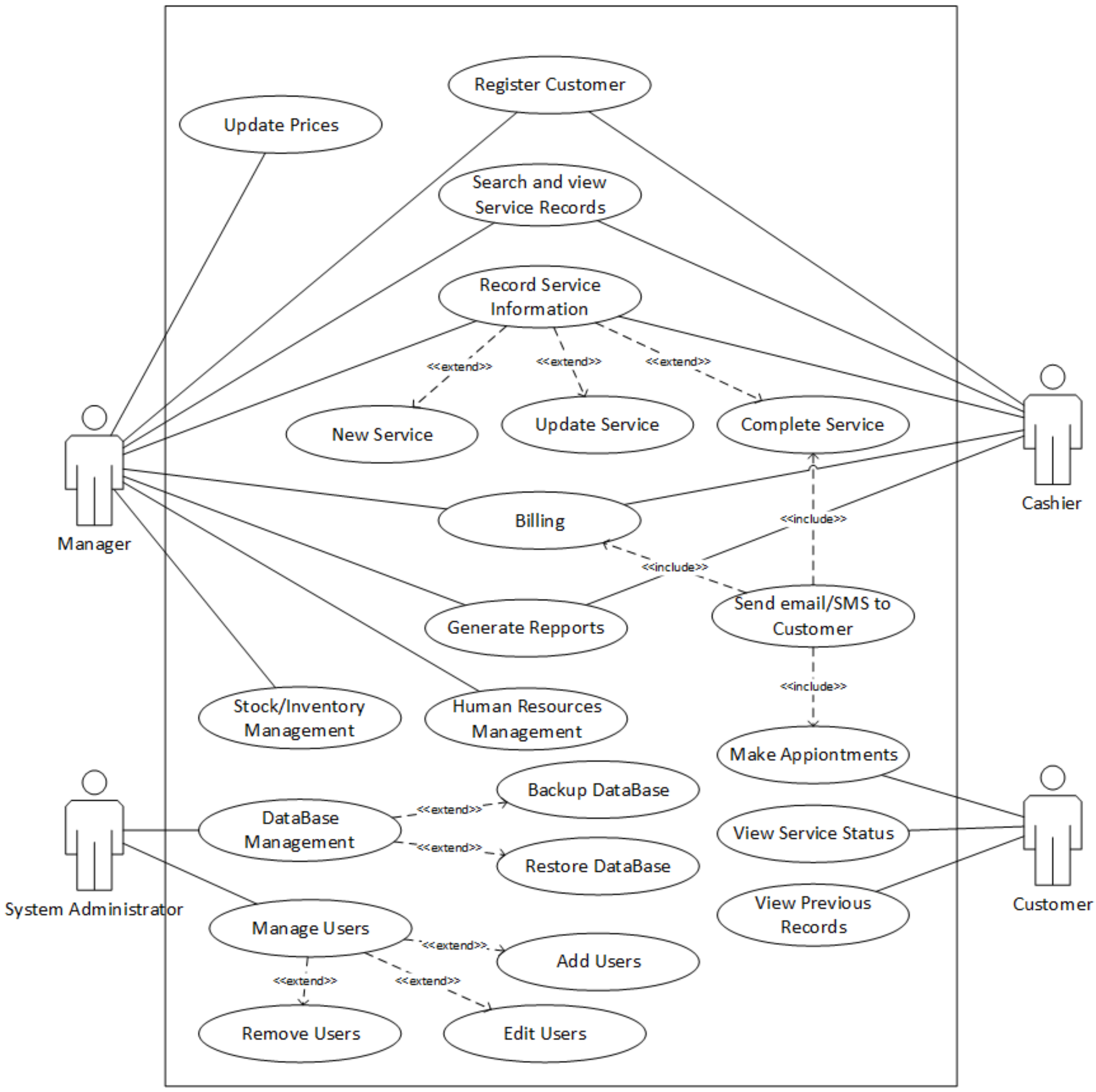


Figure 3.2 Use Case Diagram

Use Case Description – Login

Login module is used by the all user categories and it can be described as follows (Table 3.1)

Use Case	Login
Actors	Manager, Cashier, Customer
Description	
All registered users can login to the system, using their unique username and password	
Pre-conditions	
Have a authorized username and password combination	
Flow of Events	
1. Enter user name and password 2. If the username and password is valid then they can log in to their respective 'Home' page 3. If the username and password combination is invalid, a relevant error message will be displayed	
Post-conditions	
Only the authorized persons have the access to the system. Others cannot log in to it	

Table 3.1 Use Case Description - Login

Use Case Description – Register Customer

Refer the ‘Table 3.2’ for the Register Customer use case description

Use Case	Register Customer
Actors	Manager, Cashier
Description	
Manager and the Cashier roles are able to register new customers in the system	
Pre-conditions	
Logged in to the system with Manager or Cashier role	
Flow of Events	
1. Navigate to Register New Customer Page 2. Enter all Mandatory Information 3. Submit the Information	
Post-conditions	
If the Customer information saved successfully in the system, Customer will be notified by email/sms regarding the registration and provide with username and password for login to the online portal	

Table 3.2 Use Case Description - Register Customer

Use Case Description – Search Vehicle

Refer the ‘Table 3.3’ for the Search Vehicle use case description

Use Case	Search Vehicle
Actors	Manager, Cashier
Description	
Manager and the Cashier roles are able to search for the vehicles in the system	
Pre-conditions	
Logged in to the system with Manager or Cashier role	
Flow of Events	
1. Navigate to Search Vehicle Page 2. Enter the vehicle number 3. Search for the vehicle	
Post-conditions	
If a vehicle record found it will show brief information of the vehicle and provide with 3 options to proceed with (View Past Service Records, Create New Service Note, Search for a different vehicle) If vehicle record is not found it will show an information message and provide 2 options to proceed with (Register a new vehicle, Search for a different vehicle)	

Table 3.3 Use Case Description - Search Vehicle

Refer Appendix A – Design Documentation for the description of all use cases

3.6.2. Database Design

The high-level Database Design for the proposed Information system can be identified as follows. As shown in the Figure 3.3, since the usage of WordPress many tables will be created automatically by the CMS and the used plugins, but only the following tables will be changed/accessed manually when using the Information System

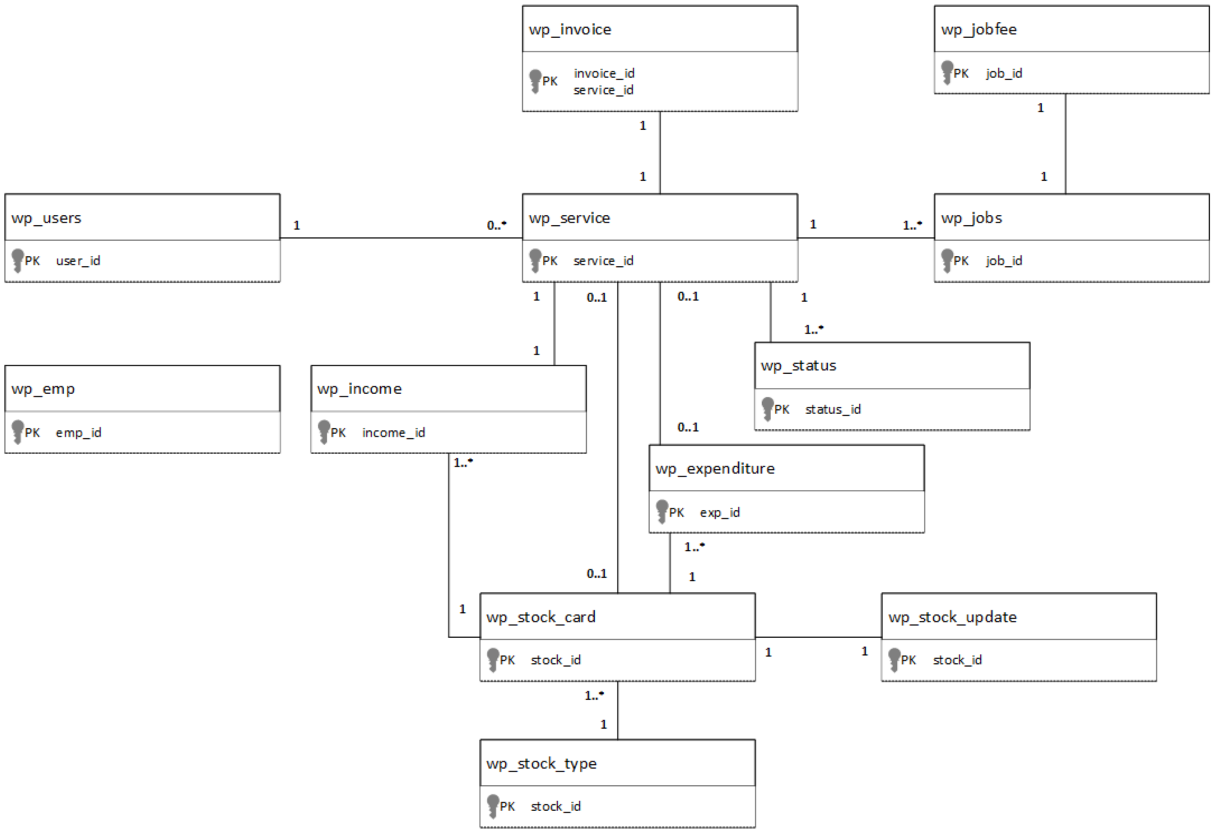


Figure 3.3 Database Design

3.6.3. Activity Diagram for the Service Process

The following activity diagram (Figure 3.4) shows all the activities in the service process. Refer the following tables for the respective Use Case Descriptions

- Table A.2 Use Case Description – Register Customer
- Table A.3 Use Case Description – Search Vehicle
- Table A.4 Use Case Description – Record Service Information
- Table A.5 Use Case Description – Search Service Records
- Table A.6 Use Case Description - Complete Service
- Table A.7 Use Case Description - Generate Invoice
- Table A.8 Use Case Description - Cancel Service Note

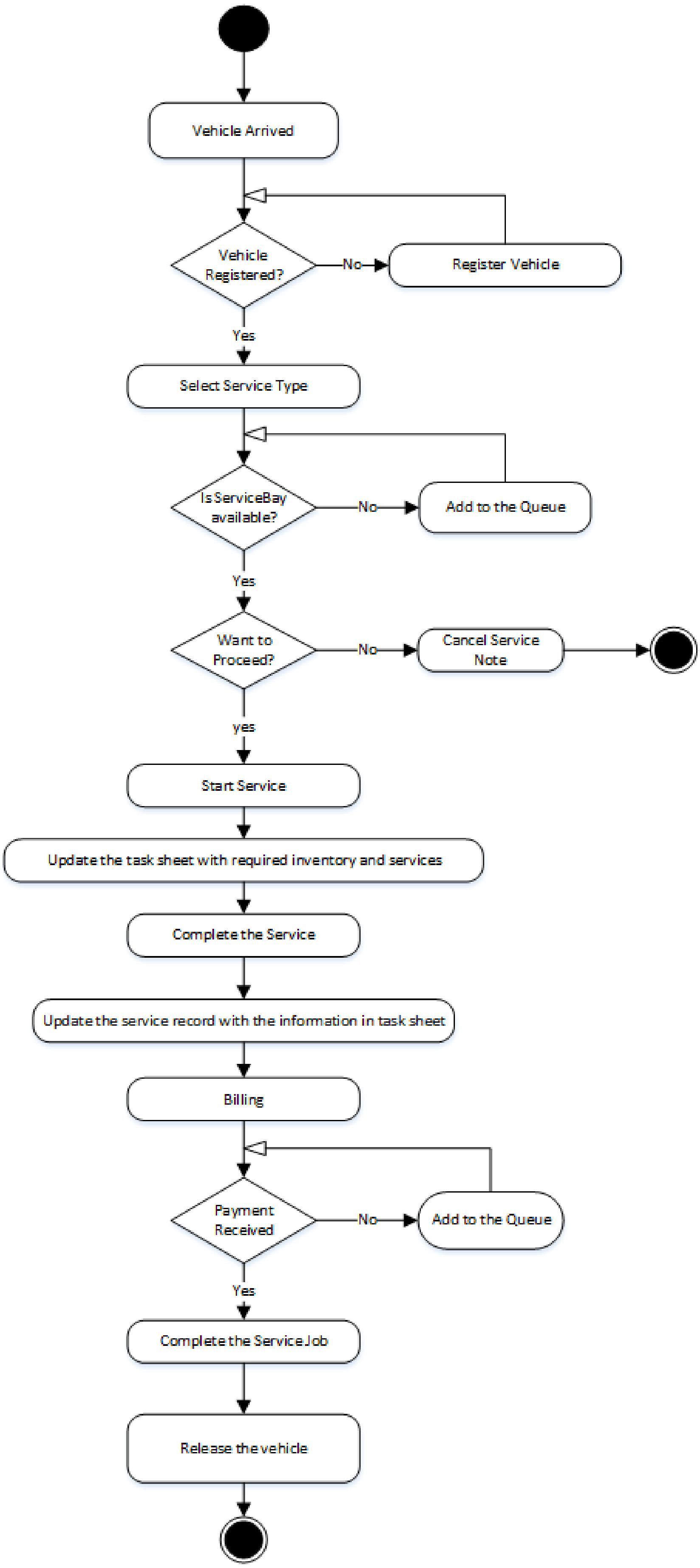


Figure 3.4 Activity Diagram for the Service Process

3.7. User interface Design

To work with the system users have to be able to control the system without having any programing knowledge. And also user doesn't need to know what is actually happening behind the screen. So to connect a user to the system in such a way, user interfaces have to be implemented. It is one of the most important parts of any program because it determines how easily a user can make the program to do what he wants.

To implement effective user interfaces, following facts were considered;

- Exactly know what client expect from each user and each interface
- Easy navigation through the system
- Use understandable titles and fields in each interface
- Use meaningful error messages
- Keep the user interface simple
- Use familiar user interface patterns
- Use colors and background images intelligently

Following are some wireframe interface designs specifically designed for the Service Station management system. (To design the wireframes 'Moqups' [6] online application was used)

3.7.1. User Interface – Login

In 'Login' screen user should be able to log in to the system by entering the User Name (i.e. Vehicle Number) and Password. For the both fields text fields can be used, and the characters of the password field should be hidden to prevent others from reading it. Also there should be a 'Button' to login and a mechanism to recover the password if the password is forgotten. The basic login interface can be design as follows (Figure 3.5)

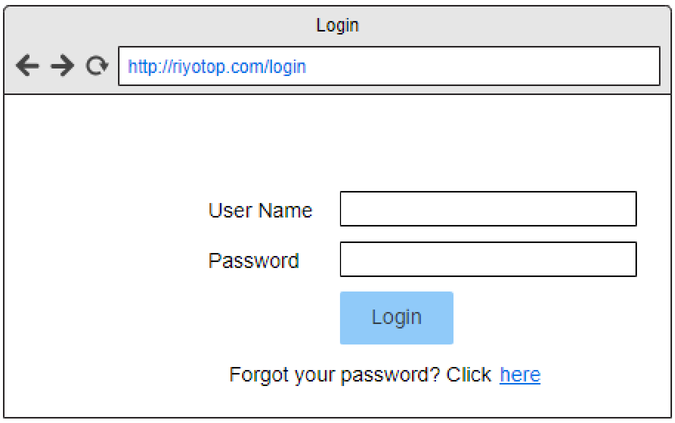


Figure 3.5 User Interface - Login

3.7.2. User Interface – Search Vehicle

In ‘Search Vehicle’ screen user should be able to search for a vehicle which is saved in the database. There should be a text field to enter the text and a search button. If a vehicle number is available for the entered text it should show the relevant information and links to proceed from that point forward. If the searched vehicle is not available it should show a message for the user. The basic search vehicle interface can be designed as follows. (Figure 3.6)

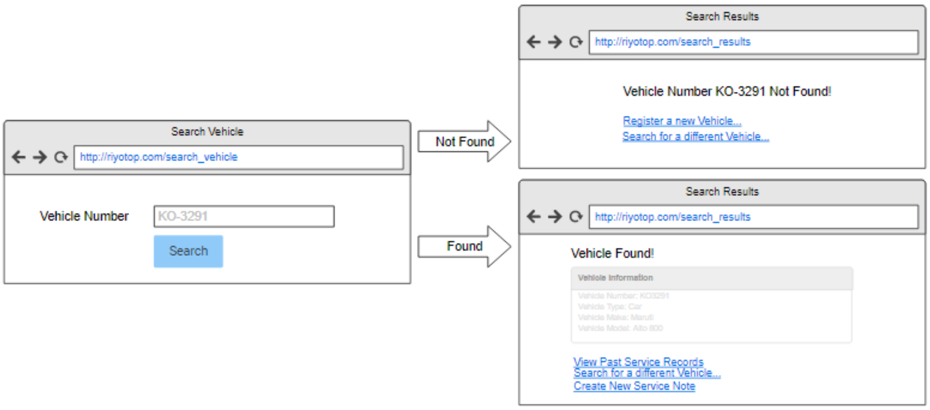


Figure 3.6 User Interface - Search Vehicle

3.7.3. User Interface – Record Service Information

To record service information a page was designed as follows (Figure 3.7). In the top of the page it shows the selected vehicle information as labels. Then there will be a number field to input the odometer reading. After that a set of check boxes will be available for the respective job. If a user wants to perform a job, the respective check box should be checked. After that text area is added to add any additional information regarding the service. Finally a date/time field and a Submit button will be available in this screen.

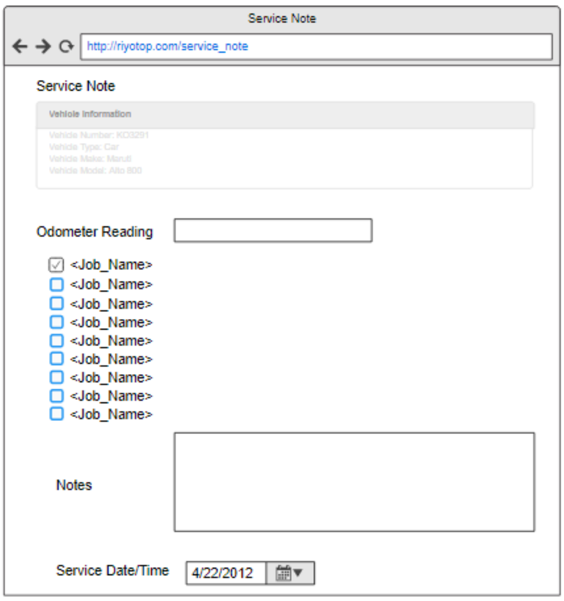


Figure 3.7 User Interface – Record Service Information

3.7.4. User Interface – Search Previous Records

'Search Previous Records interface' is one of the most important interfaces in this project. As shown in the Figure 3.8, at the top of the window there is a search panel with four parameters. They are 'Status' – drop down combo box, 'Vehicle No' – text input field, 'From Date' – date field, 'To Date'- date field. Below the search panel there will be a button (Search button) and the search results will be displayed in a table. To navigate to the detailed service record of a relevant search result, user should click on the relevant service id. Here service id will act as a hyperlink.

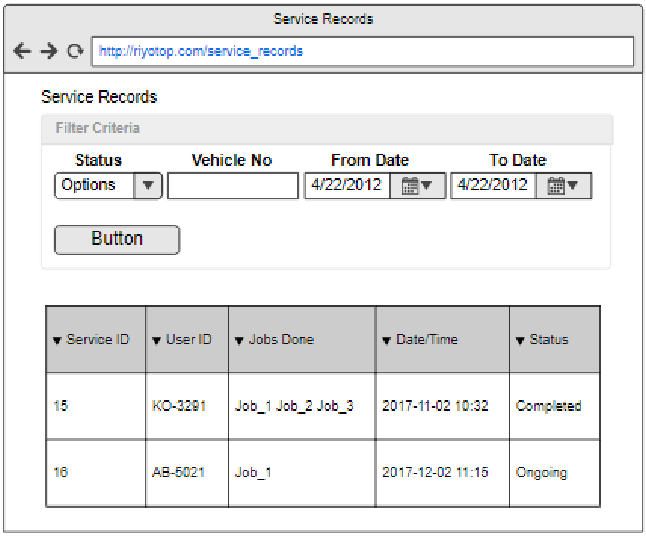


Figure 3.8 User Interface – Search Previous Records

3.7.5. User Interface – Save Employee Records

Save Employee Records page is designed with four panels. Each contain various kinds of information about the employee. As shown in the Figure 3.9 inside the panels there are various input fields to collect information. All input types are labeled in Figure 3.9

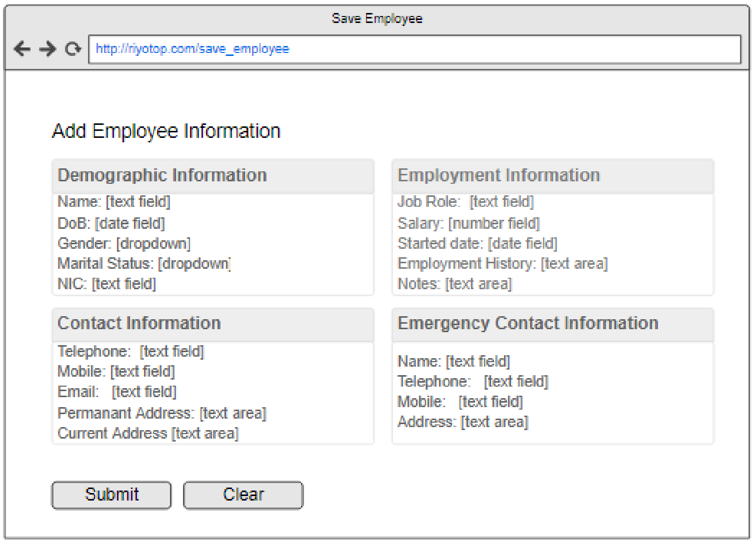


Figure 3.9 User Interface – Save Employee Records

3.7.6. User Interface – Save Financial Information

Both Add Income and Add Expenditure pages will have the following format which is shown in Figure 3.10, except for the respective label change. Both pages will contain following five fields, which are,

- Name – Text box (Mandatory)
- Income Category – Dropdown list (Mandatory)
- Date and Time – Date/ time fields (Mandatory)
- Amount – Number field (Mandatory)
- Notes – Text Area (Not Mandatory)
- Submit – Button

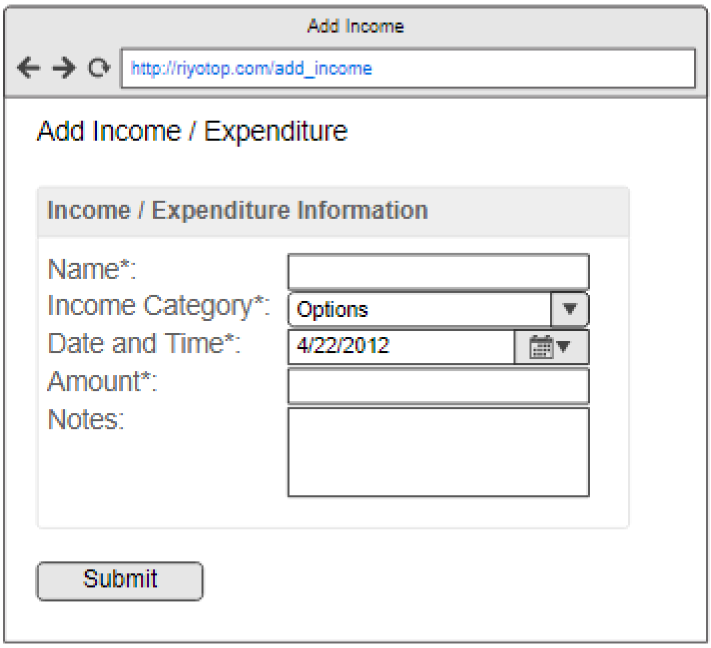


Figure 3.10 User Interface – Save Financial Information

CHAPTER 04: IMPLEMENTATION

4.1.Introduction

Implementation is the phase which transforms the requirements (functional and non-functional) and the design of the software into an executable application.

The Information System was implemented, using several system implementation tools and technologies, to fulfill the requirements which were found in the analysis phase and developed the system to satisfy the client.

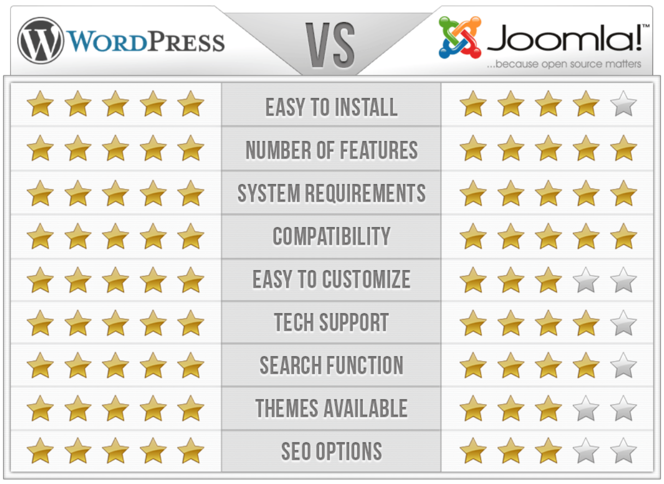
The implementation environment, brief description about implementation tools and the main parts of the code listing is included in this chapter. Code was written in a readable and understandable format and comments were added in relevant places for the easy identification.

4.2.Selection of the Implementation Technology

It was agreed to develop the system Web Based, using a Content Management System (CMS) due to following reasons

- Non-technical users will be managing the site
- Easy to use
- Access to templates and plugins
- Quick Implementation
- Low cost

There are many Content Management Systems available in the market to use. Among them Joomla and WordPress were taken in to consideration. According to the Figure 4.1, [7] selecting WordPress has more advantages as a beginner to the web development industry [8]. Hence WordPress was selected as the CMS to implement the Information System



[9]

Figure 4.1 WordPress and Joomla comparison

4.3. Implementation Environment

XAMPP was installed with Apache server and MySQL database server [10]. On top of that WordPress is installed on the local environment for the development purpose. After the development done, plan is to move all the content to a live site [11]. Figure 4.2 shows the XAMPP Control Panel

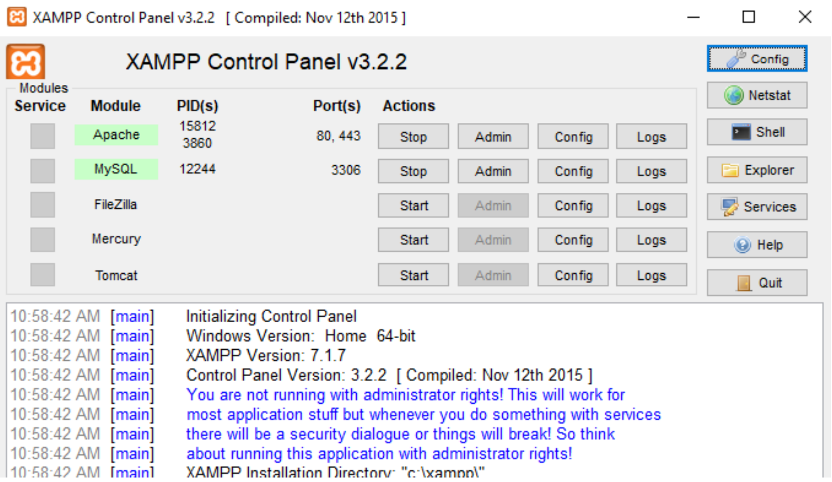


Figure 4.2 XAMPP Control Panel

As shown in the Figure 4.3 MySQL server was hosted to store all data of the Information System including the contents of WordPress CMS

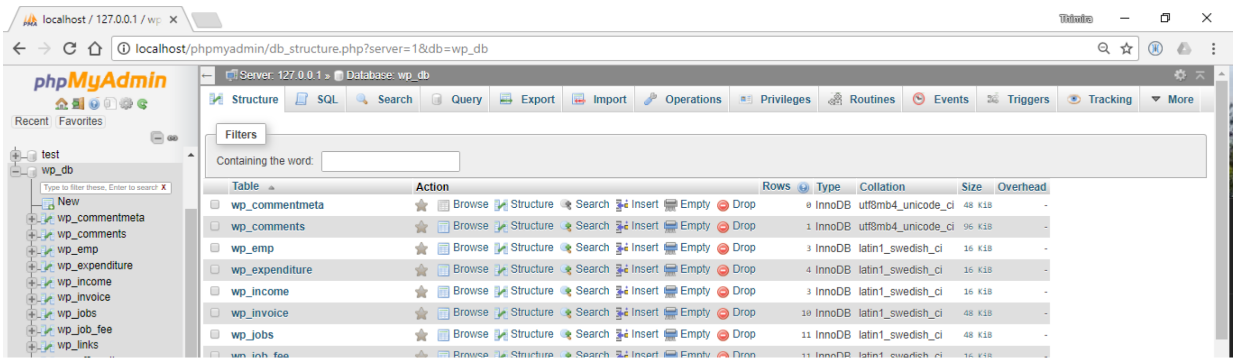


Figure 4.3 MySQL Server

As shown in the Figure 4.4, WordPress Dashboard is used to manage all contents of the CMS

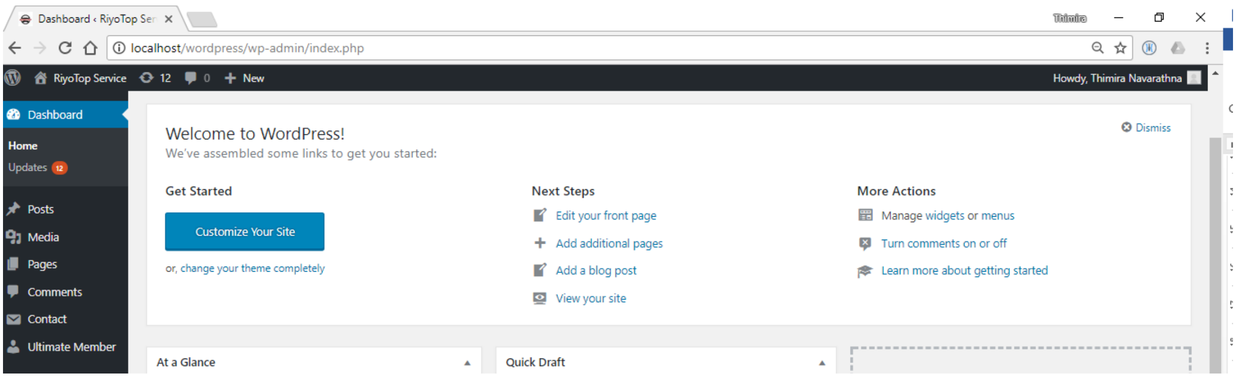


Figure 4.4 WordPress Dashboard

Figure 4.5 shows the Architecture of the CMS [12]

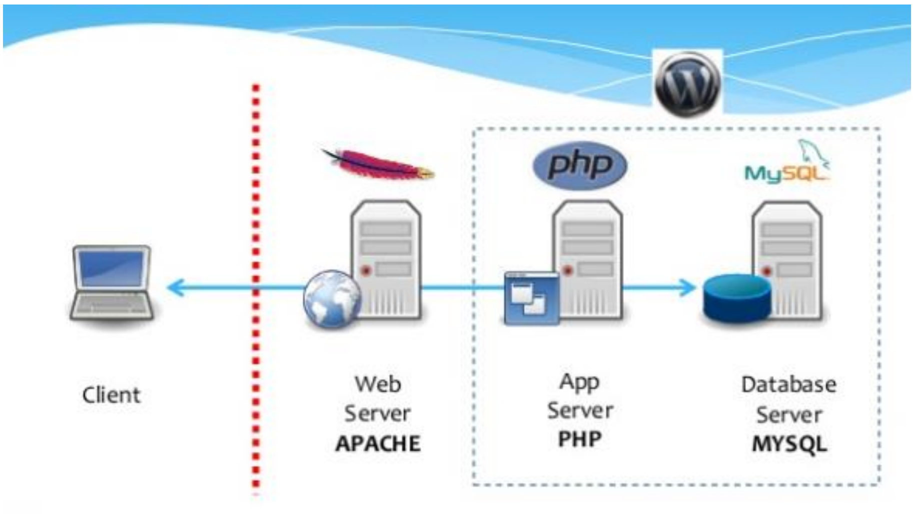


Figure 4.5 Architecture of the CMS

4.4.Development of the System

The development was done on top of the WordPress 4.8.5 using the Template 'Twenty Seventeen' [13]. Following Plugins were used to build the Information System for Riyotop service.

- **Insert PHP** - Run PHP code inserted into WordPress posts and pages. The PHP code is between special tags ("[insert_php]" instead of "<?php" and "[/insert_php]" instead of "?>"). The PHP code runs as the page is sent to the browser. Output of the PHP code is published directly onto the post or page where the PHP code between the special tags is located [14].
- **Popup Builder** - create and manage powerful promotion modal popups for your WordPress blog or website. Powerful, and yet, easy to use popup plugin that will help you to grab your visitors' attention to introduce them your offers, discounts or other kind of promotional notices [15].
- **PrintFriendly** - Extends WordPress' template system to support printer-friendly templates for posts, pages, and custom post types. Uses WP standard template naming to support templates on a post-type basis. Supports printing paged posts on single page. Adds nice URLs for printer-friendly pages [16].
- **Salon Booking** - Salon Booking is a complete and easy to manage appointments booking system to help your business getting more reservations on your website and saving a lot of time with your agenda management tasks [17].

- **UpdraftPlus WordPress Backup Plugin -** UpdraftPlus simplifies backups and restoration. It is the world's highest ranking and most popular scheduled backup plugin, with over a million currently-active installs. Backup your files and database backups into the cloud and restore with a single click [18].

Other than the above plugins all other functionalities were implemented by custom coding. When Coding, 'Atom' Text Editor was used (Figure 4.6) [19].

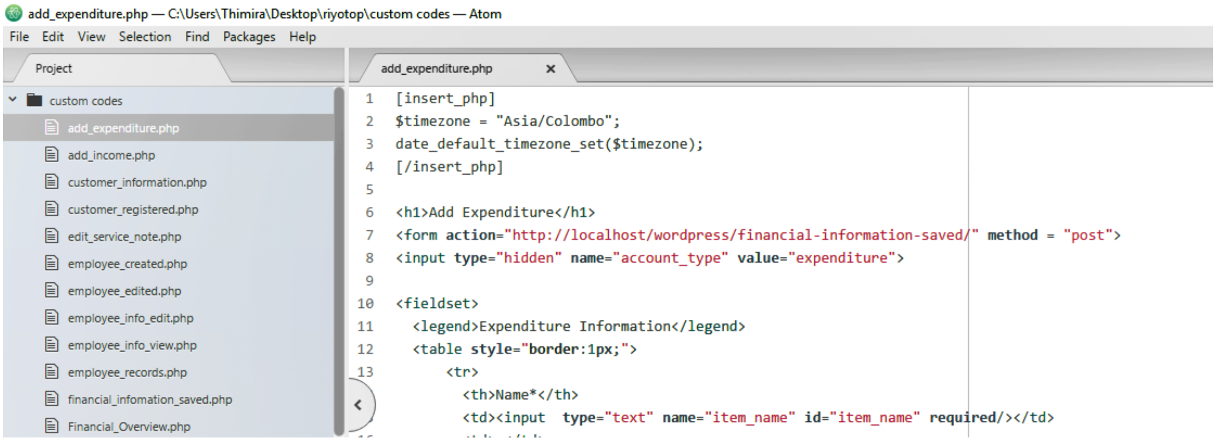


Figure 4.6 'Atom' Text Editor

4.5.Code and Module Structure

The Figure 4.7 shows the Code and Module structure in the implemented Service Management System. (Since the usage of WordPress, coding was done inside the pages using the 'Insert PHP' plugin. Hence here included the pages which have custom made code segments)

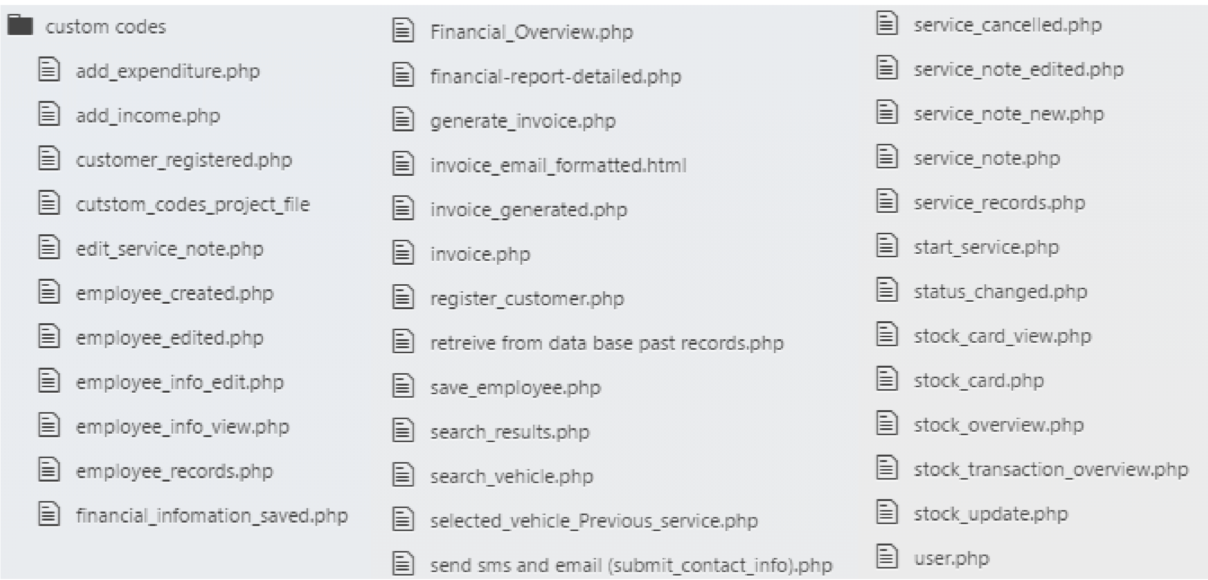


Figure 4.7 Code and Module Structure

4.6.Acknowledgement of any reused existing code

Coding was done by referring many websites in the internet. No code segments were directly copied from anywhere when implementing this project. (Except for the above plugins mentioned in Chapter 4.4)

The following websites and forms were mainly used to refer the coding standards and methods.

- Stackoverflow.com [20]
- C-sharpcorner.com [21]
- Sourcecodeonline.com [22]
- Support.Wordpress.com [23]
- Wpbeginner.com [24]

CHAPTER 05: USER EVALUATION AND TESTING

5.1. Introduction

Software testing can be stated as the process of validating and verifying that a software;

- meets the requirements,
- works as expected,
- And satisfies the needs of stakeholders.

Software testing is a critical stage of the software developing life cycle. It improves the quality of the system, reduce costs and also helps to preserve customer satisfaction

5.2. Software Testing

There are four levels of software testing [25].

1. **Unit Testing** is a level of the software testing process where individual units/components of a software/system are tested. The purpose is to validate that each unit of the software performs as designed.

2. **Integration Testing** is a level of the software testing process where individual units are combined and tested as a group. The purpose of this level of testing is to expose faults in the interaction between integrated units.

3. **System Testing** is a level of the software testing process where a complete, integrated system/software is tested. The purpose of this test is to evaluate the system's compliance with the specified requirements.

4. **Acceptance Testing** is a level of the software testing process where a system is tested for acceptability. The purpose of this test is to evaluate the system's compliance with the business requirements and assess whether it is acceptable for delivery.

5.3. Test Plan and Test Cases

Test plan for the Service Management System was developed to conduct both white box and black box testing. It should be noted that the white box testing is based on the internal structure of the system (mainly code analysis) while the black box testing is based on the output of the system.

Since the Waterfall method is used as the system implementation method following Test Plan is used (Table 5.1) to test the complete system

#	Test Stage	Test Method
1	System Testing (Phase_1)	Execute all Test Cases
2	Fix Bugs and Functionality Improvements	
3	System Testing (Phase_2)	Execute all Test Cases + Exploratory testing
4	Final Demo and User Evaluation at customer site	User Evaluation

Table 5.1 Test Plan

The following test cases were planned to test the output of the entire system. Test cases includes the test description and the expected results of that respective test. The total of 96 Test Cases were written and categorized under the seven modules as follows

1. Common Functions
2. Service Module
3. Employee Records
4. Financial Information
5. Stock Management
6. Online Reservations
7. Other Modules

Common Functions

All the test cases related to the common functions, can be seen in Table 5.2

#	Page /Module	Test description	Expected Results
1.	**Login**	Login without entering the user name AND password	Prompt user to enter required fields
2.		Login without entering the user name OR password	Prompt user to enter required fields
3.		Login with invalid username AND Password	Notify user name or password is incorrect
4.		Login with invalid username OR password	Notify user name or password is incorrect
5.		Login with a correct username and password combination	Log in to the system
6.	**Log Out**	Logout	Logout the user and display the Home page
7.	**Change Password**	Try to Change the Password while entering the old password incorrectly	prompt password is incorrect
8.		Try to Change the Password while keeping the old password blank	Prompt user to enter all fields
9.		Try to change the Password while Keeping any field blank	Prompt user to enter all fields
10.		Try to change the password while entering different values for “New Password” and “Retype Password” fields	Prompt user that passwords do not match
11.		Try to change the password by entering all fields correctly	Change the Password of the respective user
12.	**Change Basic Info**	Change Basic user information from 'Account' Page	Basic information should be changed successfully

Table 5.2 Test Cases - Common Functions

Service Module

All the test cases related to the Service Module, can be seen in Table 5.3

#	Page /Module	Test description	Expected Results
13.	**Register vehicle**	Fill the form without filling mandatory fields	Should not be able to save without mandatory fields
14.		Enter different values in 'Password' and 'Confirm Password' fields	Information should not be saved. Message should popup saying passwords do not match
15.		Enter all information and save	New vehicle information should be saved
16.	**Search Vehicle**	Search for an invalid vehicle number	Message should be shown saying 'Vehicle number not found'
17.		Search for a valid vehicle number	Vehicle information should be found
18.		View Past Service Records	All available service records should be visible for the selected vehicle
19.	**Create new service record**	Submit the form without filling the mandatory fields (eg. Odometer Reading)	Should not be able to save without mandatory fields
20.		Enter all mandatory information and Submit	Service note should be saved successfully
21.	**Service Records**	Search for an invalid vehicle number	Message should be shown saying 'Vehicle number not found'
22.		Search for valid records	All available service records should be visible for the selected filter criteria
	Edit Service Record	Precondition: Navigate to 'Service Records' Enter filter criteria and search for records Select a 'Service ID' of a record	
23.		Try to edit few service records which have the following statuses Pending Payment Completed Cancelled	It should not possible to "Edit" the service records with those statuses
24.		Try to edit few service records which have the following statuses In Queue Ongoing	It should be possible to "Edit" the service records with those statuses
25.		Click Edit button and, change some information in the service note, and Submit	Changed information should be saved successfully
26.		Click Edit button and, Clear some mandatory fields, and click 'Submit'	Mandatory field validation should be available

27.		Click Edit button and, change some information in the service note, and click "Cancel"	Changed information should NOT be saved.
	Cancel Service Record	Precondition: Navigate to 'Service Records' Enter filter criteria and search for records Select a 'Service ID' of a record	
28.		Check the "Cancel the Service Record" check box	"Cancel" check box will only enable for the status "In Queue" For all other "Statuses" it should remain disabled
29.		Click the "hyperlink" to check more information	Popup message should be available with more information regarding cancellation of the record
30.		Select a record which have "In Queue" status, without "Selecting" the cancel Check box click "Cancel" button	Cancel button should not be clicked.
31.		Select a record which have "In Queue" status, "Selecting" the cancel Check box click "Cancel" button	Service record should be cancelled, Status should be changed to "Cancelled"
32.	**Work Flow**	Check the work flow of the service module from start to end (status change, button availability)	Expected result should be the same as in the flow diagram (Figure xxx)
	Billing	Precondition: Navigate to 'Service Records' Enter filter criteria and search for records Select a 'Service ID' of a record which has the "Status", "Pending Payment"	"Generate Invoice" button should be visible. This button should only visible if the current status is "Pending Payment" and Invoice is currently not generated
33.		Click "Generate Invoice" button. Enter all information and click "Submit"	Invoice Should be Generated
34.		Check the buttons in "Service Note" after generating the Invoice	"Payment Done" and "View Invoice" buttons should be visible, "Generate Invoice" button should not be visible
35.		View Generated Invoice	Invoice should be available with correct values
36.		Send email and SMS when generating the invoice	Eemail and SMS should be sent to the customer successfully
37.		Print Invoice or Save as PDF	It should be possible to print the generated invoice and save the invoice as a PDF
38.		Click "Payment Done"	Status should be changed to "Completed"
39.		Check the buttons in the "Service Note" after payment is done	Edit, Cancel Service and View Invoice button should be visible Edit and Cancel Service should be disabled

	Online booking	Preconditions: Login to the System using a customer account Click Reserve Online	
40.		Try to reserve a time slot for a past date	Cannot reserve timeslots for past days
41.		Try to reserve a time slot for a future date	Cannot reserve timeslots for future days
42.		Select the current date and select a time slot and schedule a booking by entering the required information	Time Slot should be booked
43.		Login Using Admin and accept the booking using the "Salon" Plugin	Booking should be accepted, confirmation email should be sent to the customer
44.		Login Using Admin and Reject the booking using the "Salon" Plugin	Booking should be rejected, email should be sent to the customer

Table 5.3 Test Cases - Service Module

Employee Records

All the test cases related to the Employee Records Module, can be seen in Table 5.4

#	Page /Module	Test description	Expected Results
45.	Employee records	Save Employee record without adding mandatory values	Should not be able to save without mandatory fields
46.		Save Employee record with invalid email (eg. Aabbc.com)	Should not be able to save with invalid email
47.		Enter all information and save	Employee Information should be saved
48.		View Employee information by Navigating to the Employee Records	All saved employee records with basic information should be visible
49.		Print Employee information or Save as PDF	It should be possible to print the information or to save the information as a PDF
50.		select and Employee by "Employee id"	Detailed employee information should be visible
51.		Click Edit button and navigate to Edit Employee information page	Previously saved employee information should be visible in the form
52.		Alter the information in Edit page and click Submit	Employee information should be altered successfully
53.		Alter the information in Edit page and click Cancel	Changed information should NOT be saved.
54.		Alter the information in Edit page and Clear some mandatory fields, and click 'Submit'	Mandatory field validation should be available

Table 5.4 Test Cases - Employee Records Module

Financial Information

All the test cases related to the Financial Information Module, can be seen in Table 5.5

#	Page /Module	Test description	Expected Results
55.	Financial Information	Add income without adding values to the mandatory fields	Should not be able to save without mandatory fields
56.		Add income with all mandatory fields	Income should be saved
57.		Add expenditure without adding values to the mandatory fields	Should not be able to save without mandatory fields
58.		Add expenditure with all mandatory fields	expenditure should be saved
59.		Navigate to Financial Overview	Filter Criteria should be defaulted to the current date
60.		Try to Search by removing From and To dates	Should not be possible to search without mandatory fields
61.		Print Summary Report or Save as PDF	It should be possible to print the information or to save the information as a PDF
62.		Click detailed Report and Navigate to the "Detailed Financial Report" for the given period	Should be possible to navigate and all income and expenses for the given period should be visible
63.		Print Detailed Report or Save as PDF	It should be possible to print the information or to save the information as a PDF

Table 5.5 Test Cases - Financial Information Module

Stock Management

All the test cases related to the Stock Management Module, can be seen in Table 5.6

#	Page/ Module	Test description	Expected Results
64.	Stock Management	Add new stock information using the 'Stock Card', without adding values to the mandatory fields	Should not be able to save without mandatory fields
65.		Add new stock information using the 'Stock Card' with adding values to all mandatory fields	Stock Card should be saved
66.		Enter Stock information in stock card and click "Clear" button	All entered information should be cleared
67.		Enter text in the 'Stock Card', 'Quantity' field	Should not be able to enter text values in the quantity field. Only numerical values can be entered
68.		After successfully saving the 'Stock Card', check the 'Stock Overview'	Added stock information should be visible in the 'Stock Overview'
69.		Check the added stock information by clicking on the stock index	Stock Card should be opened with the previous information in Edit mode.
70.		Try to edit the stock card in edit mode	Only Status and comment fields should be editable
71.		Change the Status and comment fields and Save	Changes should be saved successfully
72.		Update Stock information, without adding values to all mandatory fields in Transaction Card	Should not be able to save without mandatory fields

73.		Update Stock information, by adding values to all mandatory fields in Transaction Card	Transaction Card should be saved
74.		Load the stock names by each stock type in Transaction Card	Correct Stock names should be loaded when selecting each Stock Type
75.		Enter Transaction information in Transaction card and click "Clear" button	All entered information should be cleared
76.		Enter text in the Transaction Card', 'Quantity' field	Should not be able to enter text values in the quantity field. Only numerical values can be entered
77.		After successfully saving the Transaction Card', check the Transaction Overview'	Added transaction should be visible in the 'Transaction Overview'
78.		Check the filters in the Stock Overview	Search Results should be available based on the Filter Criteria
79.		Check the filters in the Transaction Overview	Search Results should be available based on the Filter Criteria
80.		Print Stock Overview Information	It should be possible to print the information or to save the information as a PDF
81.		Print Transaction Overview Information	It should be possible to print the information or to save the information as a PDF

Table 5.6 Test Cases - Stock Management Module

Online Reservations

All the test cases related to the Online Reservations Module, can be seen in Table 5.7

#	Page/ Module	Test description	Expected Results
82.	**Online reservations**	Navigate to Booking page from the customer portal, select available date and time and click next	It should successfully navigate to the required jobs page
83.		without selecting any job click next	it should not possible to click next without selecting any job
84.		Select a job and finalize the booking	Booking should be successfully added and email should be received to the configured email address of the Riyotop service center
85.		Click on the email	It should navigate to the WordPress booking plugin view where the Manager can accept or reject the booking
86.		Click accept booking	booking should be accepted successfully and the customer should receive a proper email
87.		After accepting check the account from the customer view	booking should be in confirmed status
88.		Cancel the booking from the customer view	booking should be cancelled successfully
89.		Check the Plugin calendar, using the Manager view	All the added bookings should be available in the Plugin Calendar, and the user can accept or reject the bookings from plugin calendar view

Table 5.7 Test Cases - Online Reservations Module

Other Modules

All the test cases related to the Other Modules, can be seen in Table 5.8

#	Page/ Module	Test description	Expected Results
90.	Contact Us	Submit the 'Contact Us' form without filling the mandatory fields	Should not be able to save without mandatory fields
91.		Submit the 'Contact Us' form by filling all the mandatory fields	Contact Us form should be submitted successfully, and message should be prompt to the user
92.		After submitting the 'Contact Us' form check the user emails	Email should be sent to the user with the content in the Contact Us form
93.		After submitting the 'Contact Us' form check the email account of Riyotop	Email should be sent to the Riyotop with the content in the Contact Us form
94.	Backup and Restore	Using the 'UpdraftPlus Backup' take a backup of the system	Backup should be taken successfully
95.		Using the 'UpdraftPlus Backup' Restore the system	System should be Restored successfully
96.	Static Pages	Check all static pages	All Static pages should be available with proper text

Table 5.8 Test Cases - Other Modules

The Test coverage by each module can be summarized in a graphical representation as in the Figure 5.1

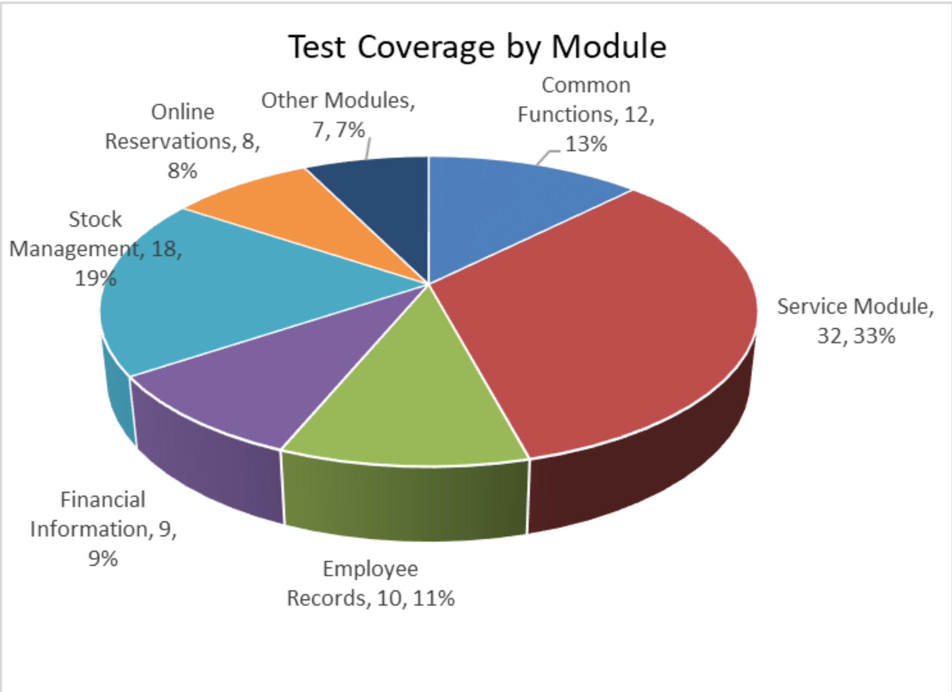


Figure 5.1 Test Coverage by Module

5.4.Test Results

The above test cases were tested in both Testing Phases as described in the Test Plan and verified whether the actual results were matched with the expected results. Refer the Table 5.9 for the test results which were acquired from the Common Functions.

(All the Test Results in both Phase 1 and Phase 2 are included in "Appendix D – Test Results")

Module: Common Functions				**Test Result**	
#	**Page/Module**	**Test description**	**Expected Results**	**Phase_1**	**Phase_2**
1.	**Login**	Login without entering the user name AND password	Prompt user to enter required fields	Passed	Passed
2.		Login without entering the user name OR password	Prompt user to enter required fields	Passed	Passed
3.		Login with invalid username AND Password	Notify user name or password is incorrect	Passed	Passed
4.		Login with invalid username OR password	Notify user name or password is incorrect	Passed	Passed
5.		Login with a correct username and password combination	Log in to the system	Passed	Passed
6.	**Log Out**	Logout	Logout the user and display the Home page	Failed (Navigate to a different Page)	Passed
7.	**Change Password**	Try to Change the Password while entering the old password incorrectly	prompt password is incorrect	Passed	Passed
8.		Try to Change the Password while keeping the old password blank	Prompt user to enter all fields	Passed	Passed
9.		Try to change the Password while Keeping any field blank	Prompt user to enter all fields	Passed	Passed
10.		Try to change the password while entering different values for "New Password" and "Retype Password" fields	Prompt user that passwords do not match	Passed	Passed
11.		Try to change the password by entering all fields correctly	Change the Password of the respective user	Passed	Passed
12.	**Change Basic Info**	Change Basic user information from 'Account' Page	Basic information should be changed successfully	Failed (Issue with a plugin)	Passed

Table 5.9 Test Results - Common Functions

The summary of test results in each phase can be identified in Table 5.10 and Table 5.11

	Phase_1							
	Common Functions	Service Module	Employee Records	Financial Information	Stock Management	Online Reservations	Other Modules	Total
Passed	10	20	5	6	10	0	2	53
Failed	2	10	0	1	2	0	2	17
Blocked	0	2	5	2	6	8	3	26
Total	12	32	10	9	18	8	7	96

Table 5.10 Summary of Test Results in Test Phase 1

	Phase_2							
	Common Functions	Service Module	Employee Records	Financial Information	Stock Management	Online Reservations	Other Modules	Total
Passed	12	32	9	9	18	8	7	95
Failed	0	0	1	0	0	0	0	1
Blocked	0	0	0	0	0	0	0	0
Total	12	32	10	9	18	8	7	96

Table 5.11 Summary of Test Results in Test Phase 2

Based on the Test Result statistics in Table 5.10 and 5.11, following graphical representations (Figure 5.2) was done to explain the test results in two phases

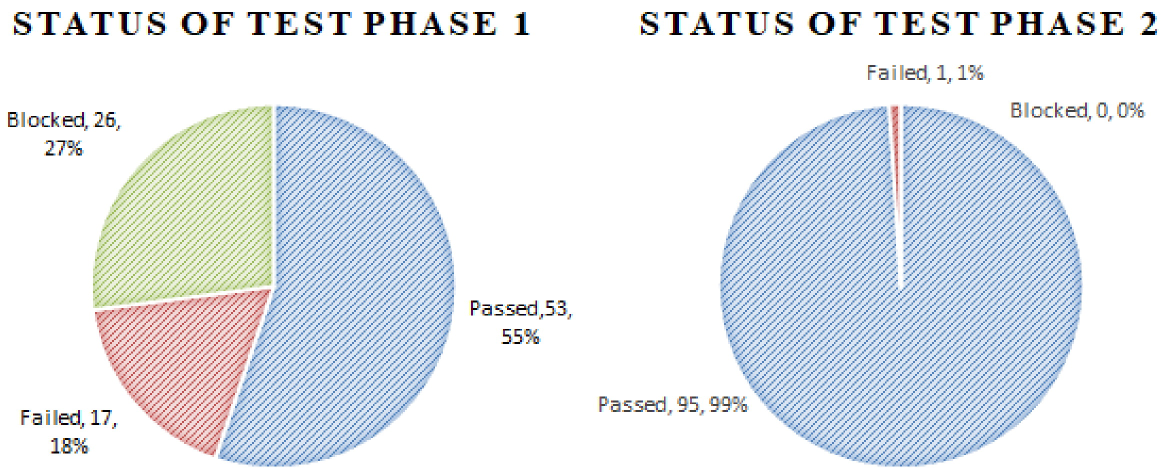


Figure 5.2 Graphical Representation of Test Results

5.5. User Evaluation

The Information System was tested by the Manager of the Riyotop Service Center. An actual data set was used to find out whether their functional and nonfunctional requirements were met by developing the system.

It was observed that the system is very user friendly and easy to learn by any person who does not have a good computer knowledge. And they were very satisfied with the “Search module” which could be useful to solve their biggest problem, finding previous records. Evaluation forms were marked and feedbacks/ suggestions were given by them for the future improvements of the system. Figure 5.3 shows the User Evaluation Form which was used to evaluate the Information System

Successful acceptance of the Information system by the client indicates that the main objective of this project is achieved which is to satisfy the customer

Figure 5.3 shows the Graphical Representation of User Evaluation which was done by the Manager of the Riyotop (Pvt) Ltd.

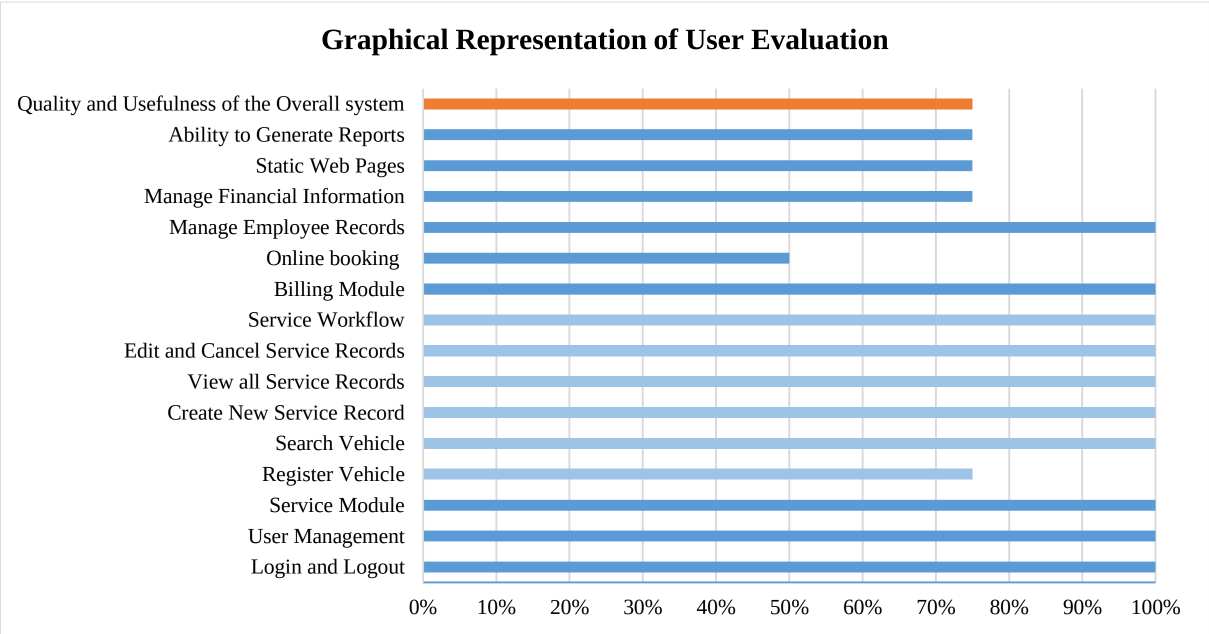


Figure 5.3 Graphical Representation of User Evaluation

User Evaluation Form

Information System for Riyotop Service Center

Tester Name: …………………………………… Tester Role: ……………………..

Kindly fill the relevant fields in the following table indicating whether you are satisfied or not with each function of the Information System. If there are any suggestions to improve the system, please be kind enough to mention them in the suggestions box.

Rating			
Excellent	Good	Average	Not good enough
A	B	C	D

No.	Category	Rating (A/B/C/D)
1	Login and Logout	
2	User Management (Including Change Password, Basic Info)	
3	Service Module	
	Register Vehicle	
	Search Vehicle	
	Create New Service Record	
	View all Service Records	
	Edit and Cancel Service Records	
	Service Workflow	
4	Billing Module	
5	Online booking	
6	Manage Employee Records	
7	Manage Financial Information	
8	Static Web Pages	
9	Ability to Generate Reports	
10	Quality and Usefulness of the Overall system	

Suggestions

………………………………………… ………………………………..

Signature Date

Thank you for your valuable time!

Figure 5.4 User Evaluation Form

CHAPTER 06: CONCLUSION AND FUTURE WORK

6.1.Overview

Riyotop (Pvt.) Ltd. is a recently started Service Centre which is located in Kurunegala district. It offers a variety of vehicle services to its customs. Although they have high quality equipment they do not possess a management system to manage its daily tasks. All tasks were managed by a manual system resulting very difficult to store and track past records.

The implementation of the new system could be used to overcome the drawbacks in manual system. It has a simple and effective user interfaces which allows user to easily manage their tasks.

6.2.Problems Encountered

Lack of Knowledge and Experience

The main problem encountered was the lack of knowledge in the developing environment. To overcome it and gain knowledge in the development environment many books, websites and video tutorials were referred.

Also it was a challenging experience to plan, implement and deliver a complete project without errors in a limited time period. Since I haven't done any software development projects using WordPress this was a great experience for me.

Requirement was not Clear and Complete

The employees of the Service centre have a good knowledge of the current manual system. But when explaining the system requirement they do not have an idea of the process that they want. Because of that the Service Process had to be changes time to time based on their requirement

Unavailability of WordPress Plugins for some tasks

At the beginning I choose WordPress because of the Plugin availability. But when creating the project it was hard to find the Plugins which are capable of handling the features of the system. Hence I had to custom code almost everything inside WordPress pages without using the support of Plugins

6.3.Lessons Learnt

The knowledge, gained through the years of learning, was able to apply for the implementation the Information System. It was a good experience to working on every stage of the software development life cycle from planning to deployment.

Also by implementing this project I was able to acquire knowledge WordPress, PHP and MySQL. Also I was able to find some good Plugins which supports the WordPress

Also gained a good knowledge in project management including the time and resource management and the report writing knowledge, which was acquired by writing this dissertation, will be very important for my future career.

6.4.Future Work

According to the suggestions and comments gained by the client through the acceptance testing phase some functional and non-functional requirements could be added to improve the system.

The following functions could be added to improve the effectiveness of the system.

- Currently bills are produced mainly based on the vehicle type. Need to improve this by implementing a more advanced billing system
- Improve the Inventory management system to manage all day to day inventories and stocks automatically with the service note
- Create process to generate gate pass along with the bill. So when taking a vehicle out of the service centre, the respective Pass will be checked and marked from the gate
- Work assignment need to be managed from the system and should be logged accordingly with the service note. This will be helpful to identify which employee serviced which vehicle. And as a future work from this information management reports can be generated to identify the productivity of each employee.

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Appendix A – Design Documentation

High level use case diagram and use case descriptions

Refer the following high level use case diagram (Figure A.1) and the use case descriptions to gain a clear idea about the “Information System” which was designed for the Riyotop Service Station

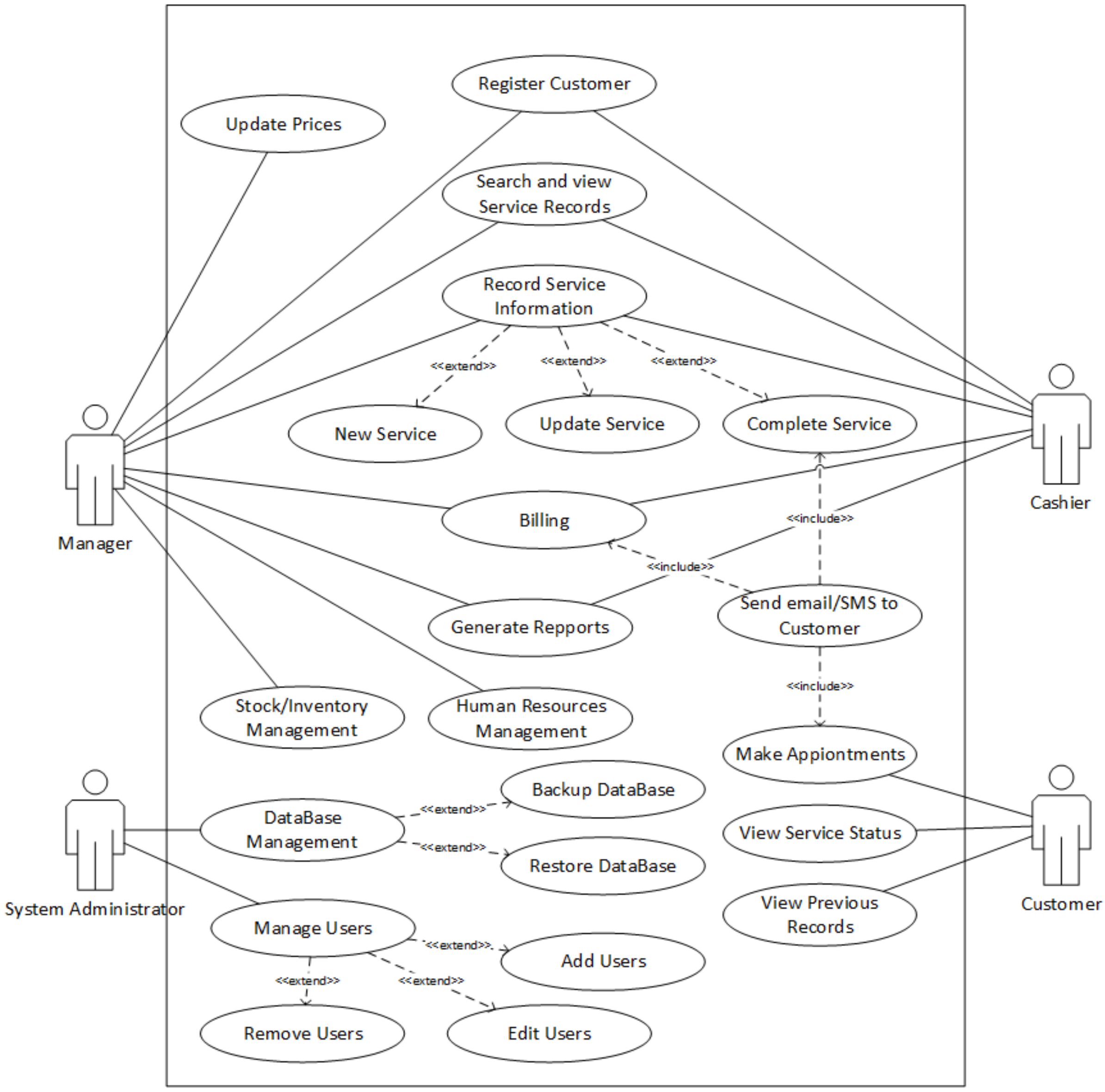


Figure A.1 Use Case Diagram

Use Case Description – Login

Refer the ‘Table A.1’ for the Login use case description

Use Case	Login
Actors	Manager, Cashier, Customer
Description	
All registered users can login to the system, using their unique username and password	
Pre-conditions	
Have a authorized username and password combination	
Flow of Events	
1. Enter user name and password 2. If the username and password is valid then they can log in to their respective 'Home' page 3. If the username and password combination is invalid, a relevant error message will be displayed	
Post-conditions	
Only the authorized persons have the access to the system. Others cannot log in to it	

Table A.1 Use Case Description – Login

Use Case Description – Register Customer

Refer the ‘Table A.2’ for the Register Customer use case description

Use Case	Register Customer
Actors	Manager, Cashier
Description	
Manager and the Cashier roles are able to register new customers in the system	
Pre-conditions	
Logged in to the system with Manager or Cashier role	
Flow of Events	
1. Navigate to Register New Customer Page 2. Enter all Mandatory Information 3. Submit the Information	
Post-conditions	
If the Customer information saved successfully in the system, Customer will be notified by email/SMS regarding the registration and provide with username and password for login to the online portal	

Table A.2 Use Case Description – Register Customer

Use Case Description – Search Vehicle

Refer the ‘Table A.3’ for the Search Vehicle use case description

Use Case	Search Vehicle
Actors	Manager, Cashier
Description	
Manager and the Cashier roles are able to search for the vehicles in the system	
Pre-conditions	
Logged in to the system with Manager or Cashier role	
Flow of Events	
1. Navigate to Search Vehicle Page 2. Enter the vehicle number 3. Search for the vehicle	
Post-conditions	
If a vehicle record found it will show brief information of the vehicle and provide with 3 options to proceed with (View Past Service Records, Create New Service Note, Search for a different vehicle) If vehicle record is not found it will show an information message and provide 2 options to proceed with (Register a new vehicle, Search for a different vehicle)	

Table A.3 Use Case Description – Search Vehicle

Use Case Description – Record Service Information

Refer the ‘Table A.4’ for the Record Service Information use case description

Use Case	Record Service Information
Actors	Manager, Cashier
Description	
Manager and the Cashier roles are able to record service information	
Pre-conditions	
Logged in to the system with Manager or Cashier role. Registered vehicle should be available in the system	
Flow of Events	
1. Navigate to Search vehicle page and search for a vehicle 2. Click "Create new service Note" from the vehicle found page 3. Fill all information in the service note and submit	
Post-conditions	
Vehicle service note will be created. Status will be set as "In Queue"	

Table A.4 Use Case Description – Record Service Information

Use Case Description – Search Service Records

Refer the ‘Table A.5’ for the ‘Search Service Records’ use case description

Use Case	Search Service Records
Actors	Manager, Cashier
Description	
Manager and the Cashier roles are able to search for the previous service records	
Pre-conditions	
Logged in to the system with Manager or Cashier role service records should be available in the system	
Flow of Events	
1. Navigate to Service Records page 2. Enter the respective search criteria 3. Submit the Information	
Post-conditions	
Service Records applicable for the given search criteria will be displayed in the bottom of the page in tabular format. If detail information is required regarding a specific service, user can click on the 'Service ID' which will navigate the user to the detailed Service Report	

Table A.5 Use Case Description – Search Service Records

Use Case Description - Complete Service

Refer the ‘Table A.6’ for the “Complete Service” use case description

Use Case	Complete Service
Actors	Manager, Cashier
Description	
Manager and the Cashier roles are able to complete service records	
Pre-conditions	
Logged in to the system with Manager or Cashier role Service Record should be available with the status "In Queue"	
Flow of Events	
1. Navigate to the "Service Records" Page 2. Search for a service which has the Status "In Queue" 3. Select the respective service record by "Service ID" 4. Click "Start Service" button - Status should be changed to "Ongoing" 5. Click "Service done" button - Status should be changed to "Pending Payment" 6. Click "Generate Invoice" button and generate the Invoice 7. Click "Payment Done" button in the service note - status will be changed to "Completed"	
Post-conditions	
Service Note will be marked as Completed. User can check the invoice at any time from the service note	

Table A.6 Use Case Description - Complete Service

Use Case Description - Generate Invoice

Refer the ‘Table A.7’ for the ‘Generate Invoice’ use case description

Use Case	Generate Invoice
Actors	Manager, Cashier
Description	
Manager and the Cashier roles are able to register new customers in the system	
Pre-conditions	
Logged in to the system with Manager or Cashier role Service Record should be available with the status "Pending Payment"	
Flow of Events	
1. Navigate to the "Service Records" Page 2. Search for a service which has the Status "Pending Payment" 3. Select the respective service record by "Service ID" 4. Click "Generate Invoice" button 5. Fill all required information and Click Submit 6. Click "View Invoice" button. 7. If Required Print the Invoice	
Post-conditions	
Invoice will be generated using the given information. Customer will be notified about the service completion and the bill amount by email/ SMS	

Table A.7 Use Case Description - Generate Invoice

Use Case Description - Cancel Service Note

Refer the ‘Table A.8’ for the ‘Cancel Service Note’ use case description

Use Case	Cancel Service Note
Actors	Manager, Cashier
Description	
Manager and the Cashier roles are able to cancel the service notes	
Pre-conditions	
Logged in to the system with Manager or Cashier role Service Record should be available with the status "In Queue"	
Flow of Events	
1. Navigate to the "Service Records" Page 2. Search for a service which has the Status "In Queue" 3. Select the respective service record by "Service ID" 4. Tick the "Cancel the Service Record" check box - "Cancel" button will be enabled 5. Click the "Cancel" button	
Post-conditions	
Service Record will be cancelled. Cancelled service record notes cannot be continue in the work flow and cancelled records cannot be reverted to the initial status.	

Table A.8 Use Case Description - Cancel Service Note

Use Case Description - Save Employee Information

Refer the ‘Table A.9’ for the ‘Save Employee Information’ use case description

Use Case	Save Employee Information
Actors	Manager
Description	
Only the Manager role is able to save the employee information	
Pre-conditions	
Logged in to the system with Manager Role	
Flow of Events	
1. Navigate to the "Save Employee" page 2. Complete all relevant information 3. Click "Submit" button	
Post-conditions	
The Employee Record will be saved. User can view/edit the employee records from Employee Overview	

Table A.9 Use Case Description - Save Employee Information

Use Case Description - View Employee Information

Refer the ‘Table A.10’ for the ‘View Employee Information’ use case description

Use Case	View Employee Information
Actors	Manager
Description	
Only the Manager role is able to view employee information	
Pre-conditions	
Logged in to the system with Manager Role	
Flow of Events	
1. Navigate to the "Employee Records" Page - All employee records will be visible 2. Click on the "Employee ID" of a selected record - Detailed Employee Information will be available	
Post-conditions	
If user wants user can print the summary/detailed employee records	

Table A.10 Use Case Description - View Employee Information

Use Case Description - Add Income / Expenses

Refer the 'Table A.11' for the 'Add Income / Expenses' use case description

Use Case	Add Income / Expenses
Actors	Manager, Cashier
Description	
Manager and the Cashier roles are able to add income/expenses	
Pre-conditions	
Logged in to the system with Manager or Cashier role	
Flow of Events	
1. Navigate to the "Add Income" or "Add Expenditure" Page 2. Fill all mandatory information 3. Click "Submit"	
Post-conditions	
Income or Expenditure information will be saved. User can check the financial records from "Financial Overview"	

Table A.11 Use Case Description - Add Income / Expenses

Use Case Description - View Financial Information

Refer the 'Table A.12' for the 'View Financial Information' use case description

Use Case	View Financial Information
Actors	Manager
Description	
Only the manager role is able to view Financial Information	
Pre-conditions	
Logged in to the system with Manager role Previously added Income or Expenditure records should be available for a selected time period	
Flow of Events	
1. Navigate to the Financial Overview 2. Select a date range from the filter criteria and search for the records - summary of financial information for the selected time period will be visible 3. Click "Detailed Report" button - Detailed report will be available	
Post-conditions	
If user wants user can print the summary/detailed financial records	

Table A.12 Use Case Description - View Financial Information

Database Design

Following Diagram (Figure A.2) shows the complete structure of the database in the Information Management System

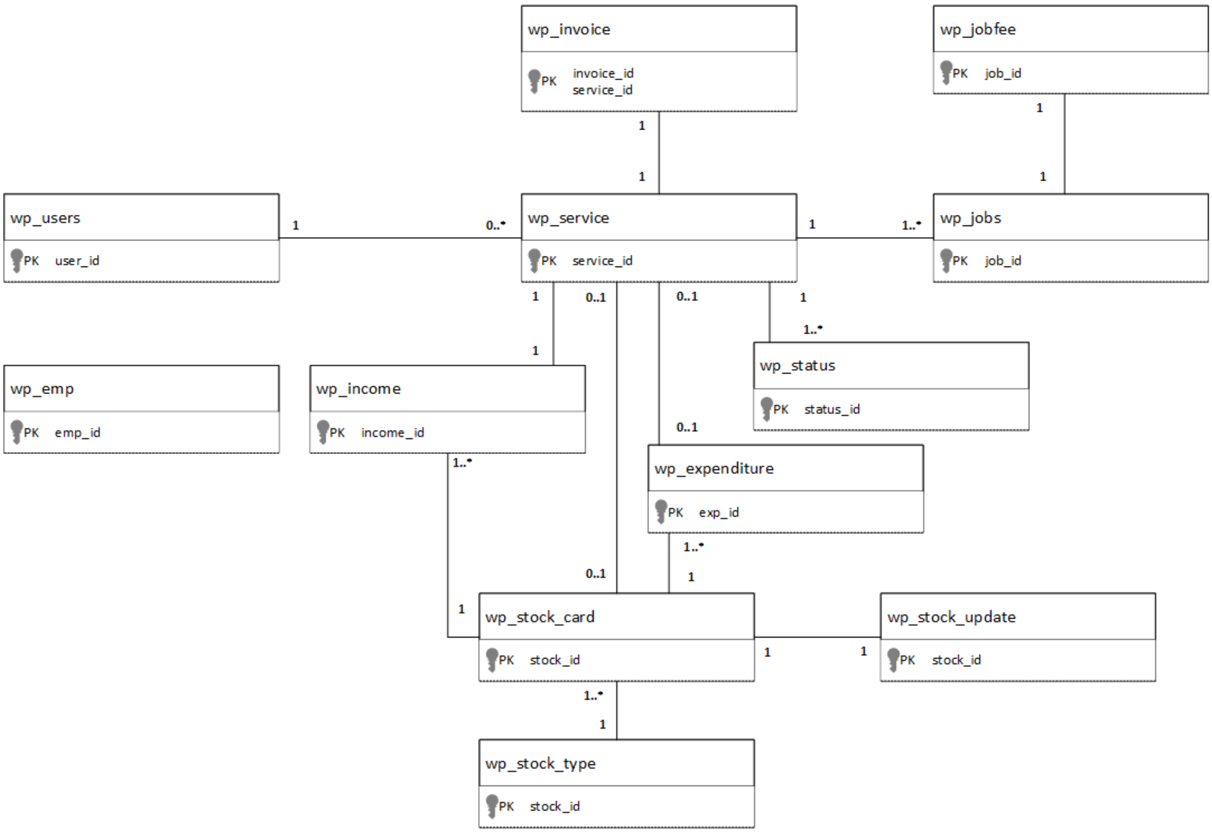


Figure A.2 Database Design

Activity Diagram

The Figure A.3 shows the Activity diagram for the Information system.

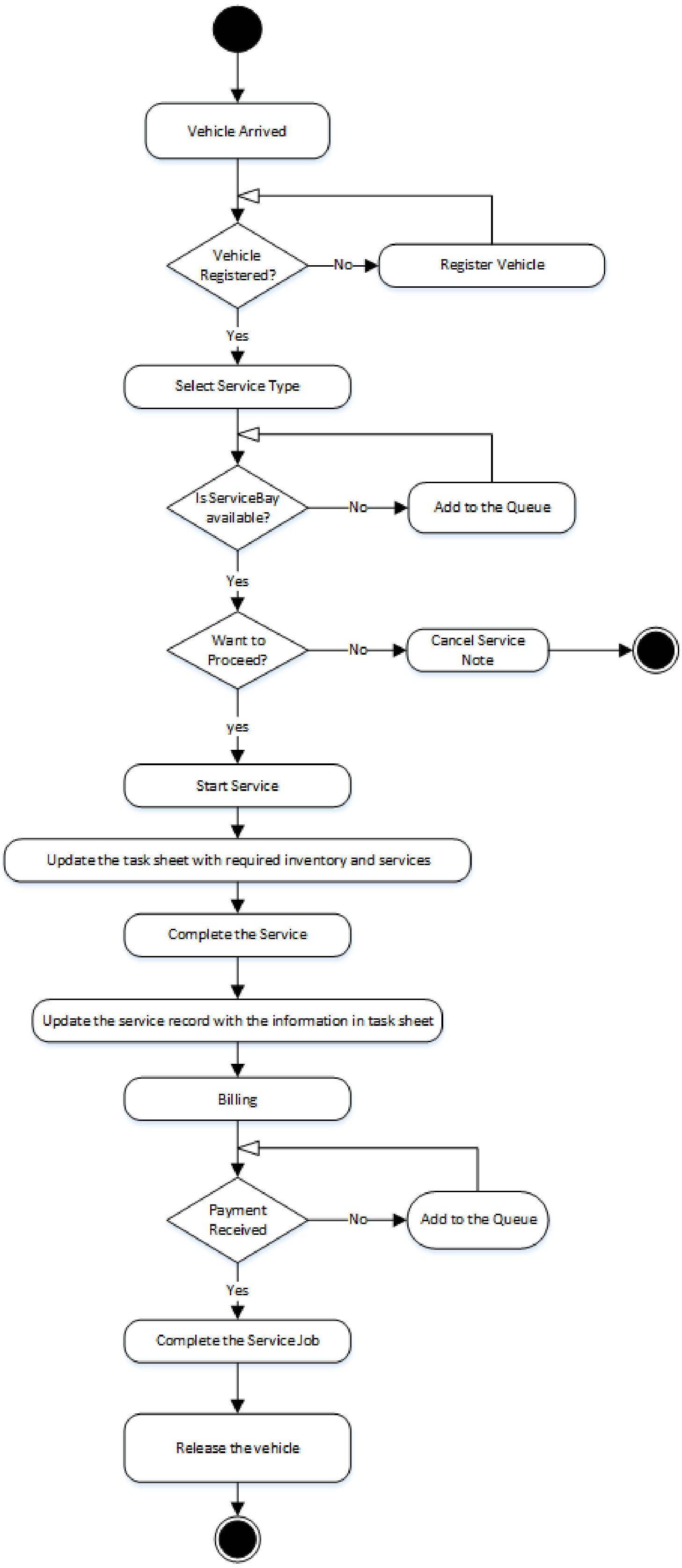


Figure A.3 Activity diagram

Sequence Diagrams

The Figure A.4 shows the Sequence diagram for the Online Booking Process.

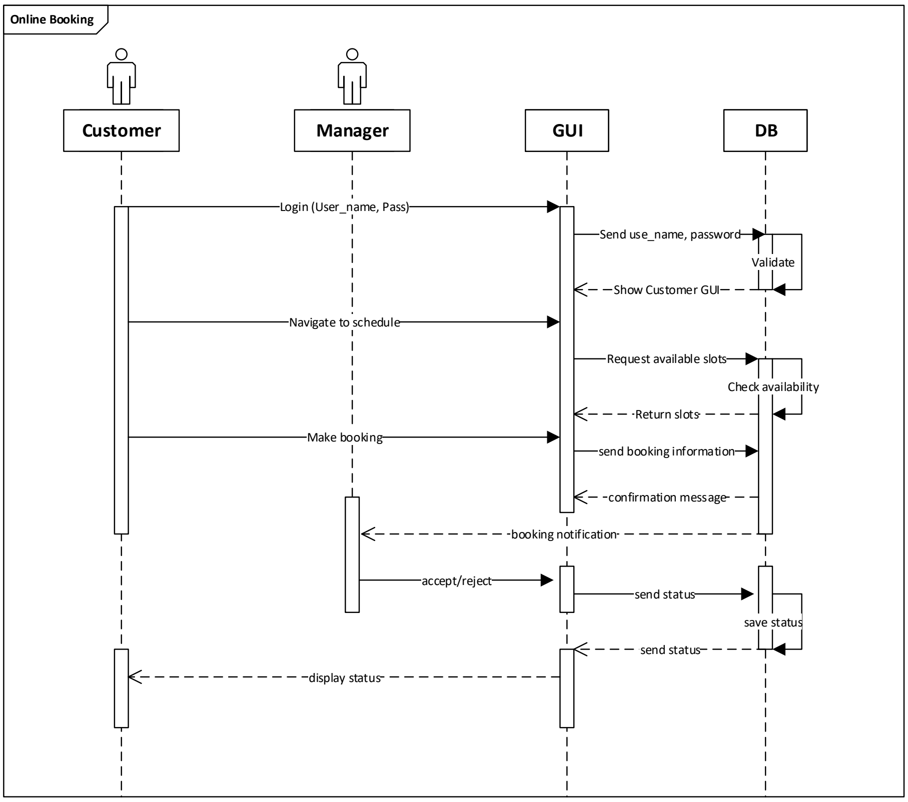


Figure A.4 Sequence Diagram for the Online Booking Process

The Figure A.5 shows the Sequence diagram for the Backup and Restore Process.

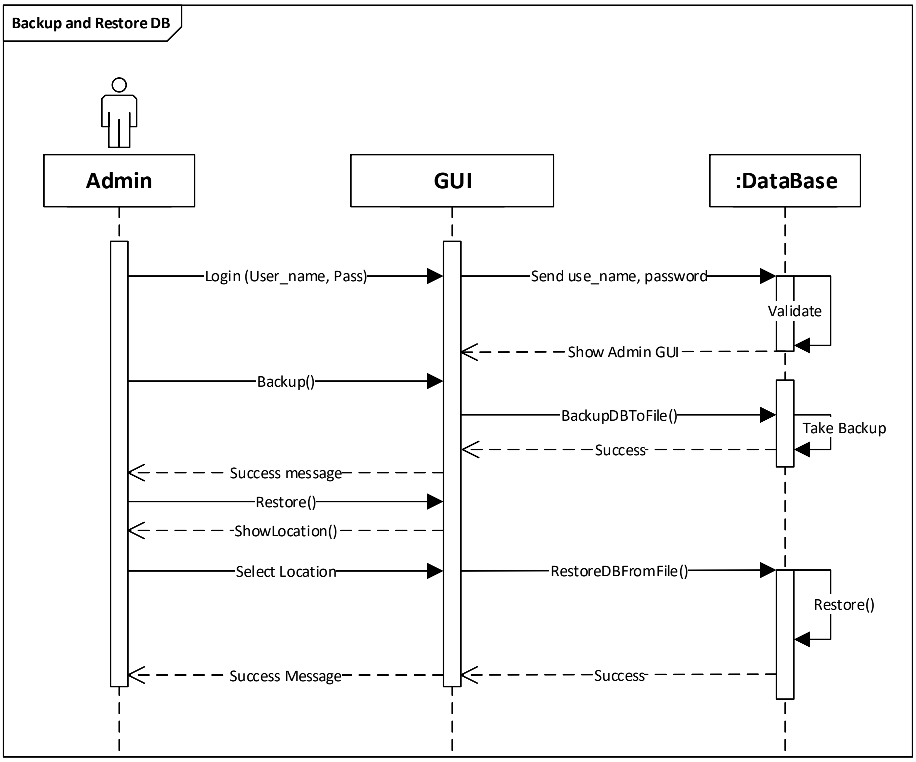


Figure A.5 Sequence Diagram for the Backup and Restore Process

Appendix B – User Documentation

The Information System which was developed for Riyotop service center is intended to use by three user categories which are Manager, Cashier and Customer. The sytem administrator role is only required to acces the WordPress Dashboard and the MySQL DB. Hence no functionalities are included for the System Administrator within the system.

The main purpose of this Appendix is to include a user guide for the most important parts of this System.

System Login

The Figure B.1 shows the "System Login" interface. Any authorized user can use it to login to the Service Management System. When login to the system any user must enter a valid user name and password. If the user name and password combination are correct they will be redirected to the 'Home' page else proper error message is shown.

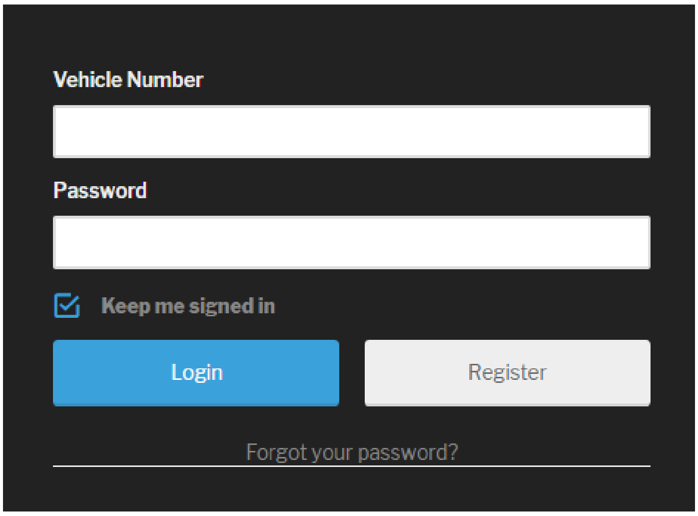


Figure B.1 System Login

User Registration

User Registration can be done by the Manager and the Casher roles. When a vehicle is arrived to the Service Station first user will try the Search function. If the Vehicle does not have a user account user will be registered using the Registration Form (Figure B.2). Primary Key in User Registration Form will be the 'Vehicle Number'. After submitting the Registration Form the email/SMS notification will be sent to the user with information of how to login to the online system if required.

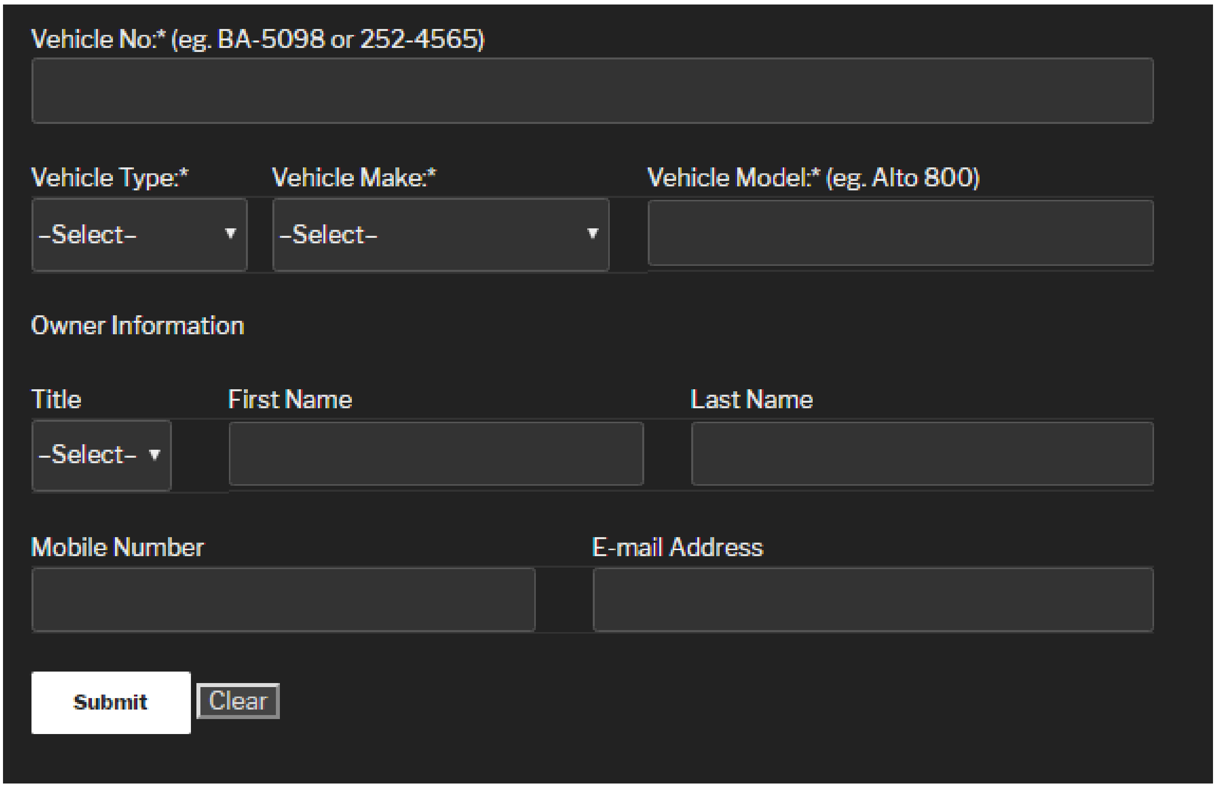


Figure B.2 User Registration

Search Vehicle

When a vehicle arrived to the Service Center, Cashier or Manager will search for the vehicle using this screen (Figure B.3).

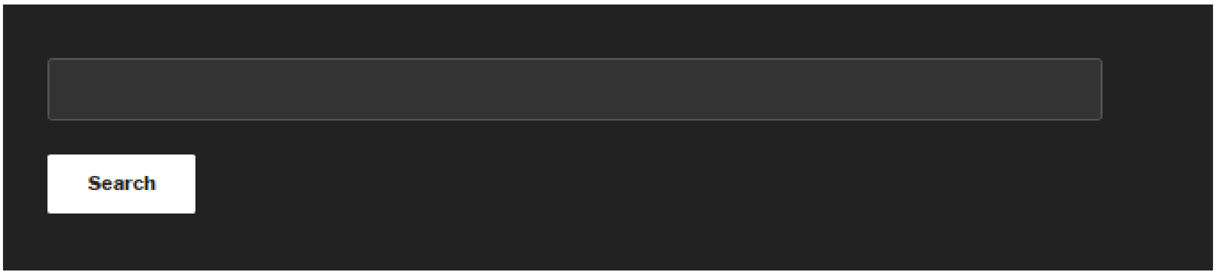


Figure B.3 Search Vehicle

If the search is successful and the respective vehicle is found it will redirect the user to a page where brief vehicle information is available and then the user can proceed from there as they want. If the Vehicle number is not available in the Database it will notify the user and provide with the options to "Register new vehicle" or "Search for a different vehicle". Figure B.4 shows Search Results Page in both instances.

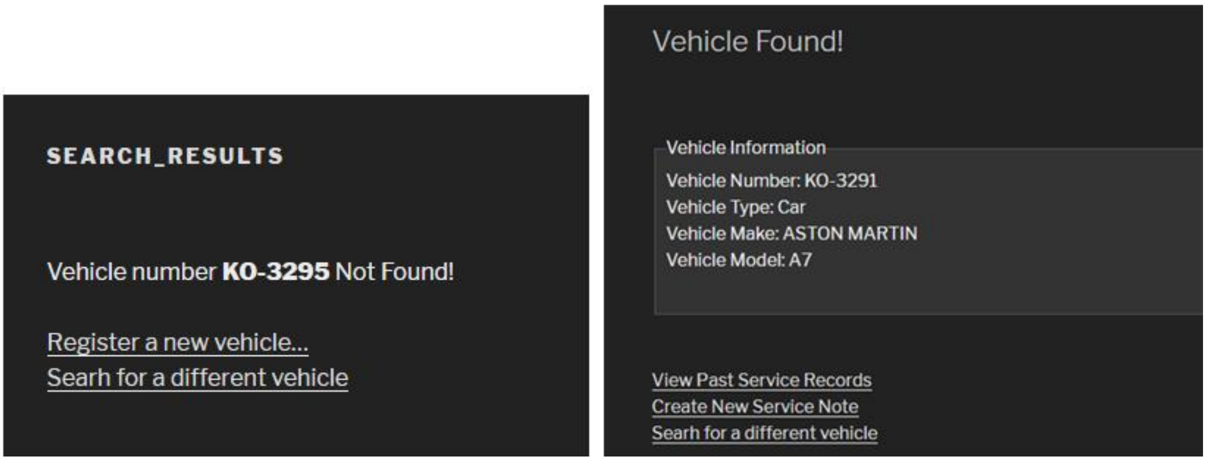


Figure B.4 Search Results

New Service Note

After Searching for a vehicle if the vehicle is found user can create a new service record using the screen in Figure B.5. In the top of the window it will show a summary of the selected vehicle (Not editable) and then all the input fields available to enter the respective service information. After submitting this page a new service record will be created and the user can continue updating the service record from there on.

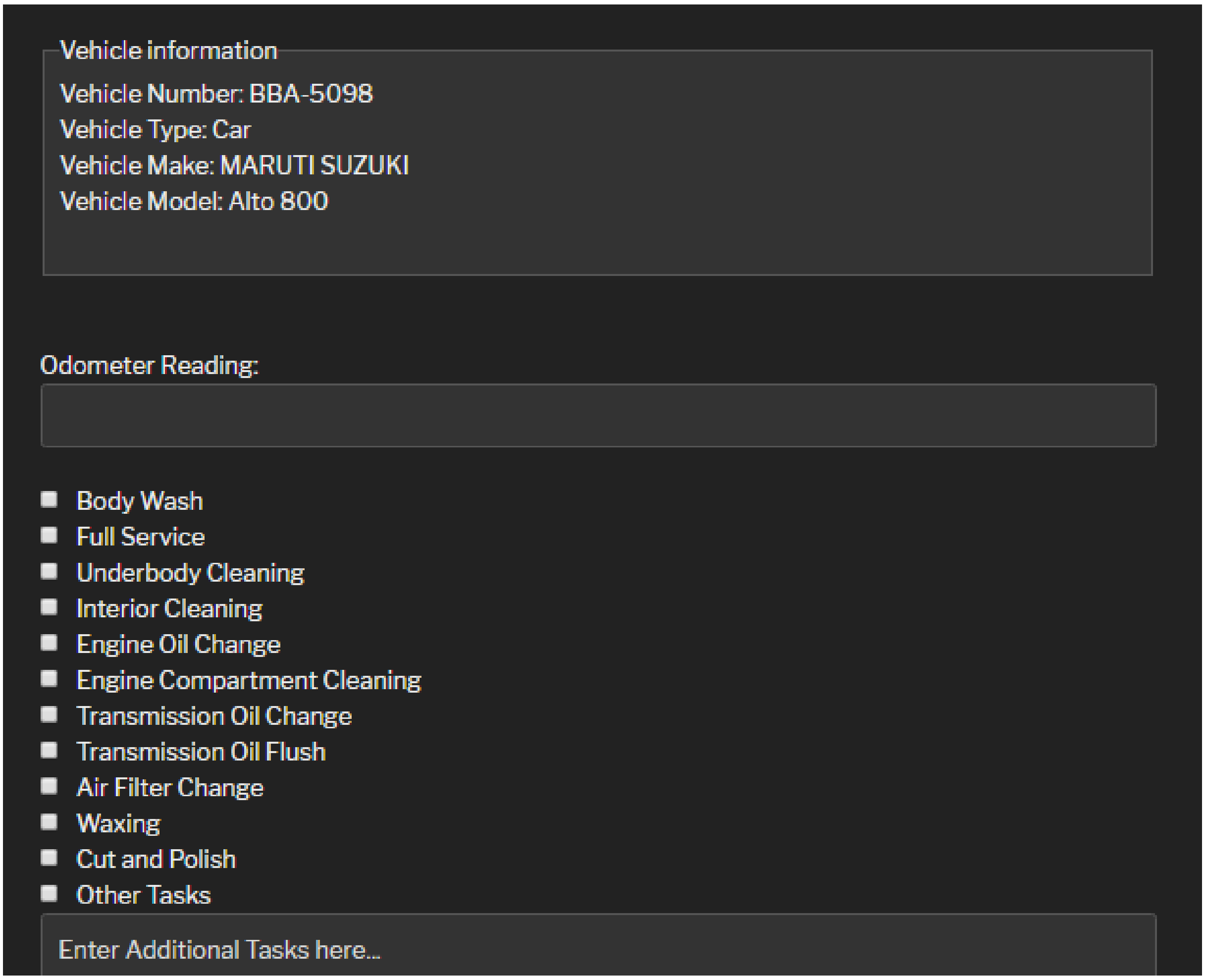


Figure B.5 New Service Note

Previous Service Records

After searching for a vehicle, if the vehicle is found user can check the previous service records of the selected vehicle as shown in the Figure B.6. This page will be available for the all user categories. User role “Customer” cannot search a vehicle, but have the option to check the respective vehicle record of own account using the same page.

Previous Service Records for BBA-5098

service id	User id	Jobs done	Date/Time	Status
1	BBA-5098	Interior Cleaning	2018-01-03 22:28:00	Completed
2	BBA-5098	Body Wash , Full Service , Underbody Cleaning , Interior Cleaning , Engine Oil Change , Engine Compartment Cleaning , Transmission Oil Change , Transmission Oil Flush , Air Filter Change , Waxing , Cut and Polish	2018-01-03 22:51:00	Completed
3	BBA-5098	Full Service , Engine Compartment Cleaning	2018-01-03 22:55:00	Cancelled
4	BBA-5098	Body Wash , Underbody Cleaning	2018-01-03 23:24:00	Cancelled
5	BBA-5098	Body Wash , Full Service , Transmission Oil Change , Cut and Polish	2018-01-03 23:29:00	Ongoing
6	BBA-5098	Body Wash , Full Service , Transmission Oil Change , Cut and Polish	2018-01-03 23:29:00	Pending Payment

Figure B.6 Previous Service Records

Search Service Records

This module is only available for the Manager and the Cashier roles. Here the user can search for any service records using the given filter criteria as shown in the Figure B.7. The Search Results will be available as a table below the Filter Criteria. If a user wants a detailed report about any specific service they can click on the service id and navigate to the detailed service report.

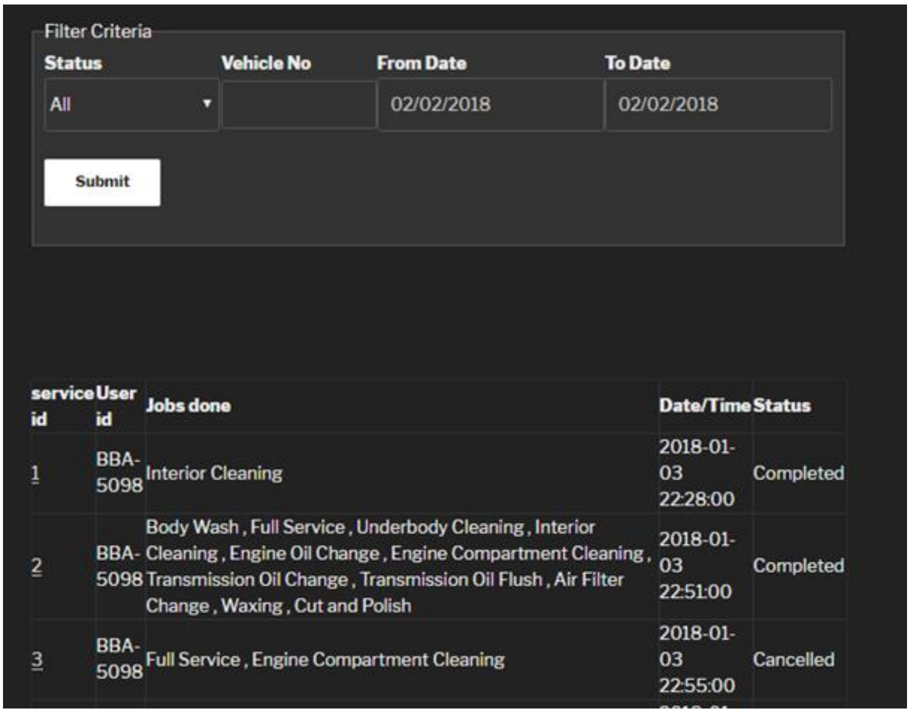


Figure B.7 Search Service Records

Service Invoice

After Completing the Service, user can generate the invoice from the service note page. After Generating the Invoice it can be viewed anytime and the invoice will be attached to the each Service Note. Form the Invoice page user can print the invoice or generate the invoice as PDF as required. Figure B.8 shows the invoice in both web view and print view.

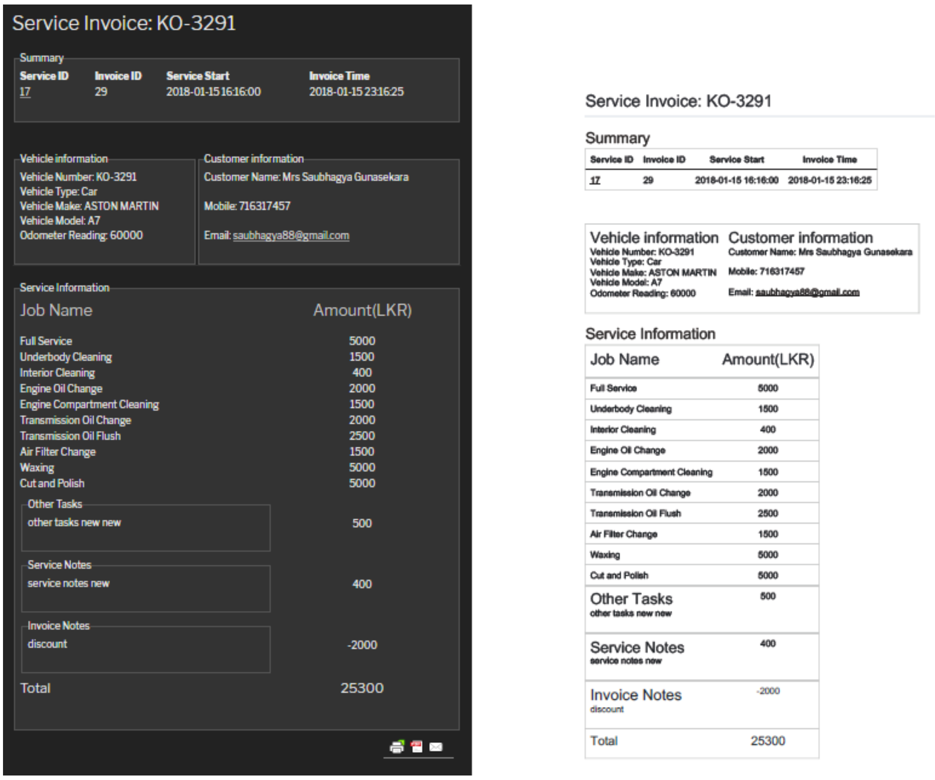


Figure B.8 Service Invoice

Save Employee Information

Employee Information Module is only available for the user role “Manager” From the Save Employee Information window user can save the relavant information of an Employee. Part of the Save Employee Form can be seen in Figure B.9. After Saving the Information user can view/ edit the information at any time.

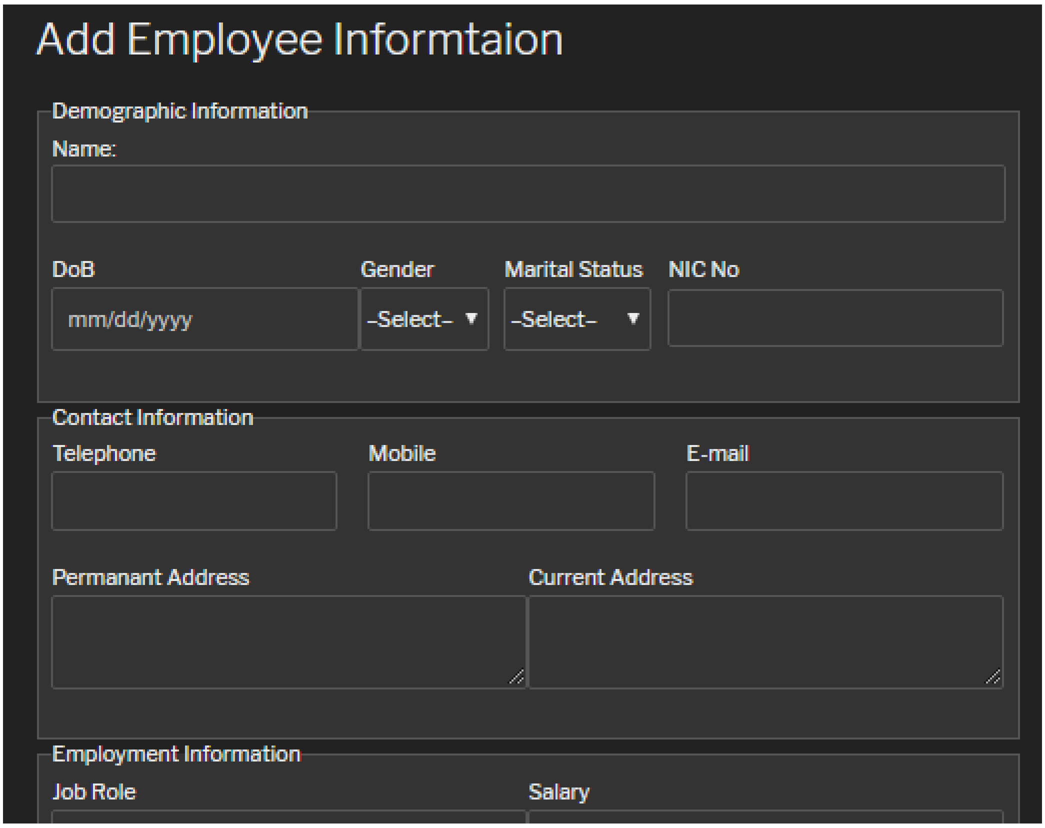
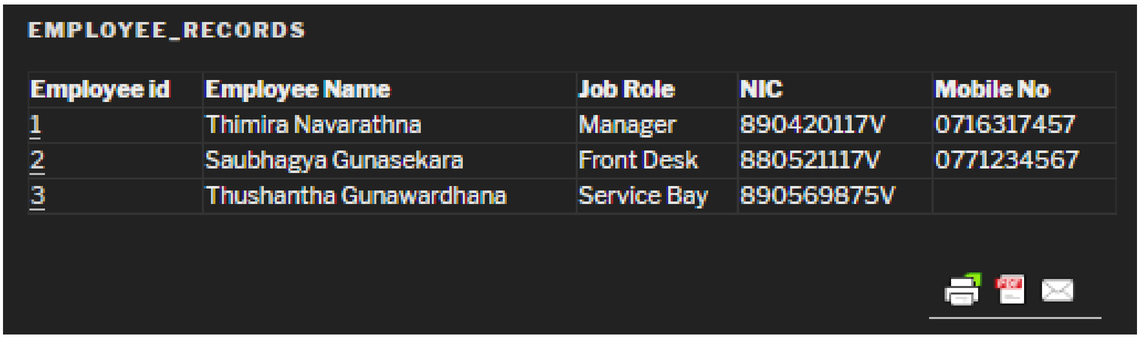


Figure B.9 Save Employee Information

Employee Information Overview

After saving the Employee Information user can view them at any time using the Employee Information Overview (Figure B.10). In the overview it will only show a summary of the information. From the overview, user can click on any ‘Employee ID’ and view/ edit the detailed information about the selected employee.



EMPLOYEE_RECORDS

Employee id	Employee Name	Job Role	NIC	Mobile No
1	Thimira Navarathna	Manager	890420117V	0716317457
2	Saubhagya Gunasekara	Front Desk	880521117V	0771234567
3	Thushantha Gunawardhana	Service Bay	890569875V	

Figure B.10 Employee Information Overview

Add Income and Expenses

User can add any other "Income" or "Expenses" using the following screens in Figure B.11. All the added Income and Expenses will be visible in the 'Financial Overview'

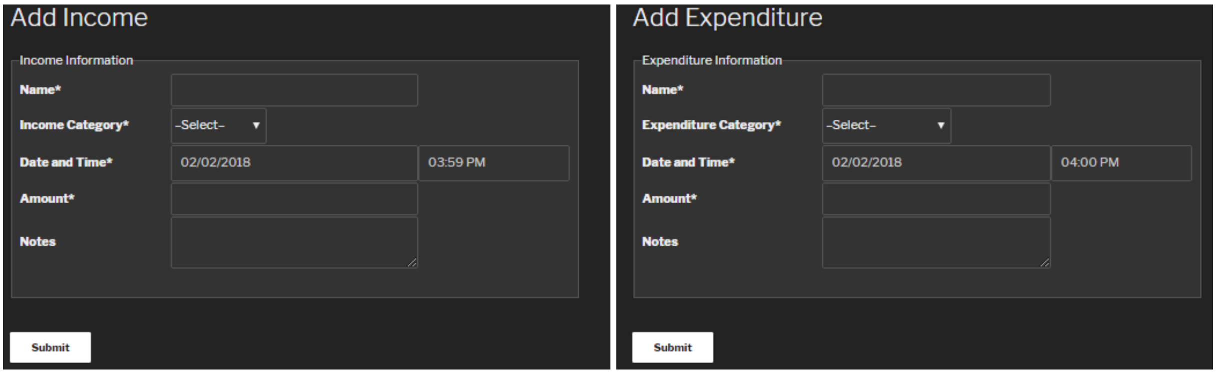


Figure B.11 Add Income and Expenses

Financial Overview

All the manually added income and expenses and the income received from the Service Module is calculated and shown in the 'Financial Overview' as a summary (Figure B.12). There a user can calculate the income and expenses for a given time period using the filters 'From' and 'To' dates. If a user wants user can print the summary report or user can check the detailed report for the selected time period. Sample 'Detailed Financial Report' is shown in Figure B.13.

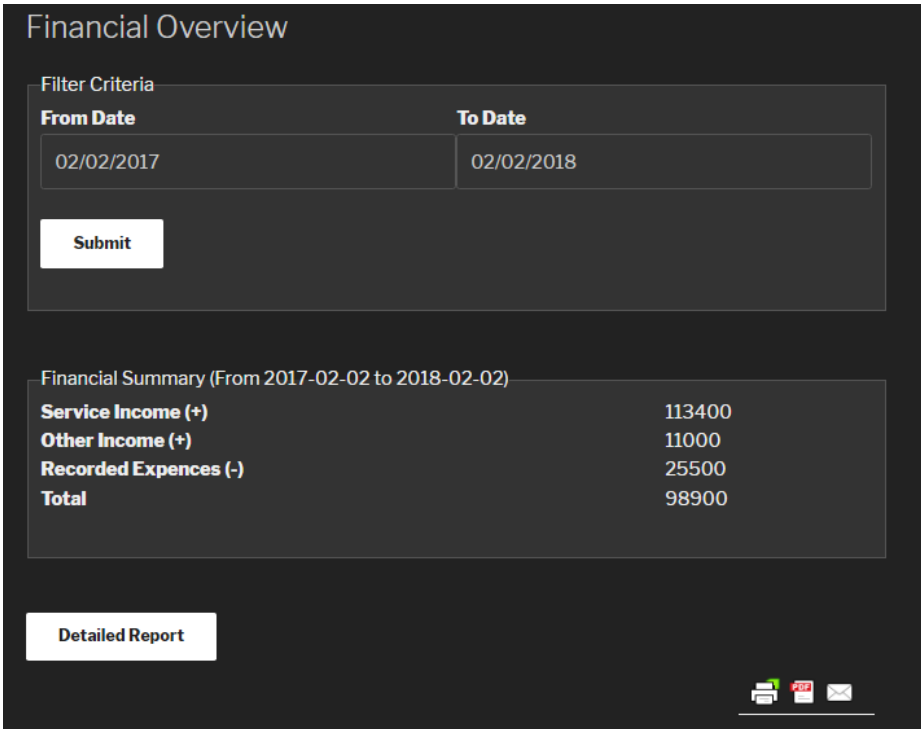


Figure B.12 Financial Overview

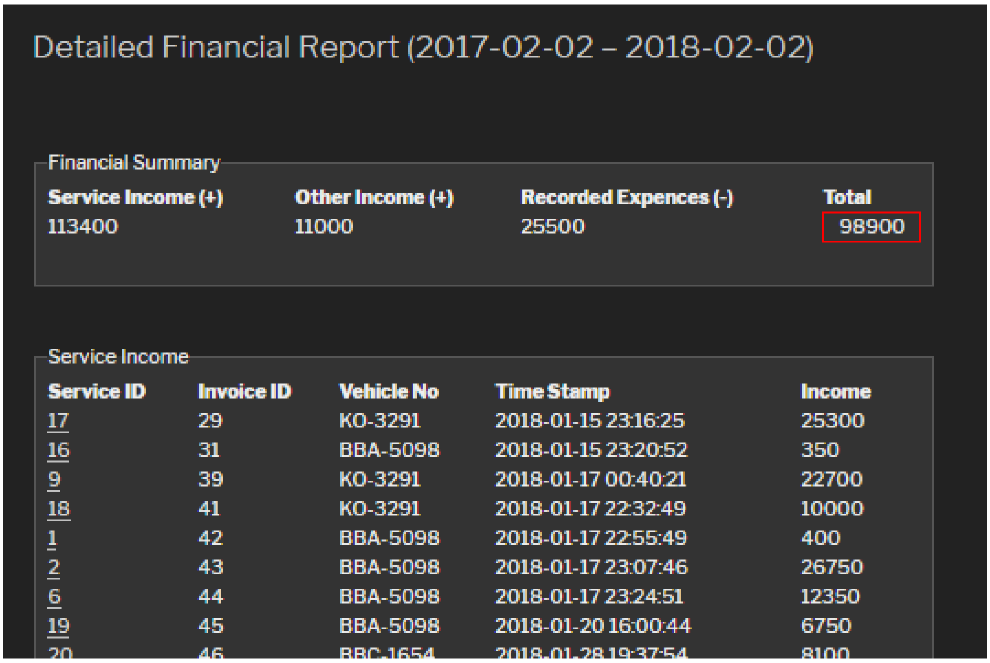


Figure B.13 Detailed Financial Report

Stock Management

User can manage Stock/Inventory information using two windows and able to view the information using two overviews as follows

- Stock Card
- Transaction Card
- Stock Overview
- Transaction Overview

User can create new stock types using the stock card as shown in 'Figure B.14' and all the stock types with their available quantities can be visible in the Stock Overview as shown in 'Figure B.15'. User can filter the results in Stock Overview by 'Type' and 'Status'

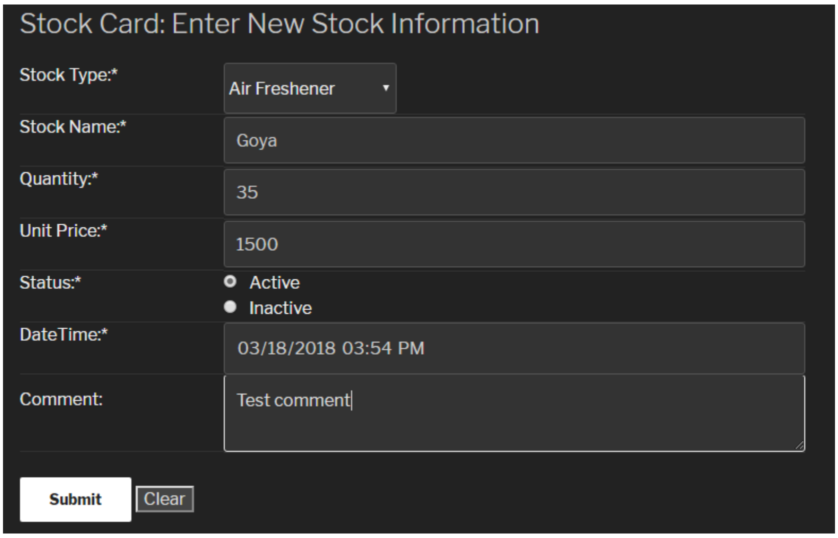
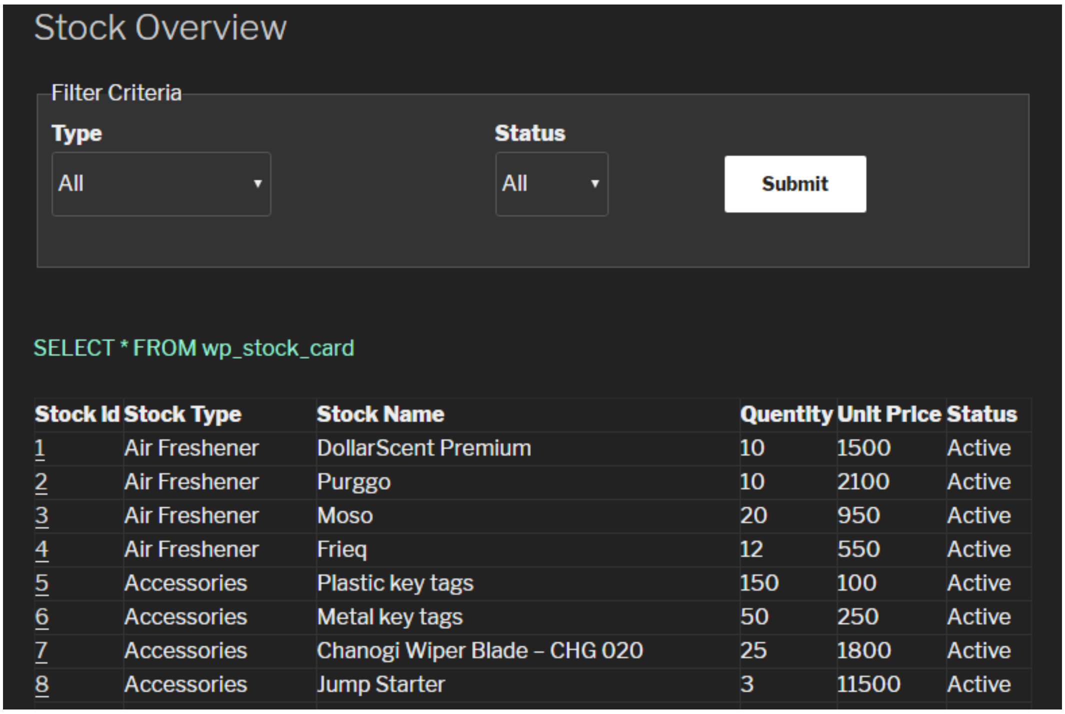


Figure B.14 Stock Card



Stock Id	Stock Type	Stock Name	Quentity	Unit Price	Status
1	Air Freshener	DollarScent Premium	10	1500	Active
2	Air Freshener	Purggo	10	2100	Active
3	Air Freshener	Moso	20	950	Active
4	Air Freshener	Frieq	12	550	Active
5	Accessories	Plastic key tags	150	100	Active
6	Accessories	Metal key tags	50	250	Active
7	Accessories	Chanogi Wiper Blade – CHG 020	25	1800	Active
8	Accessories	Jump Starter	3	11500	Active

Figure B.15 Stock Overview

Existing Stocks can be updated using the 'Transaction Card' as given in the Figure B.16. After each transaction the information can be visible in 'Transaction Overview' (Figure B.17)

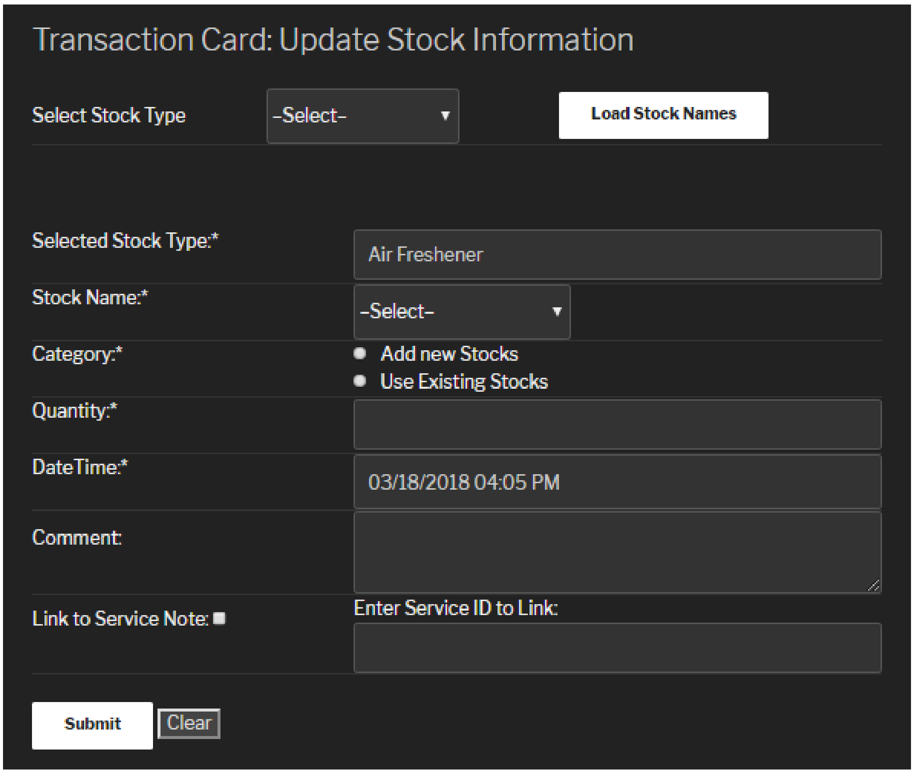


Figure B.16 Transaction Card

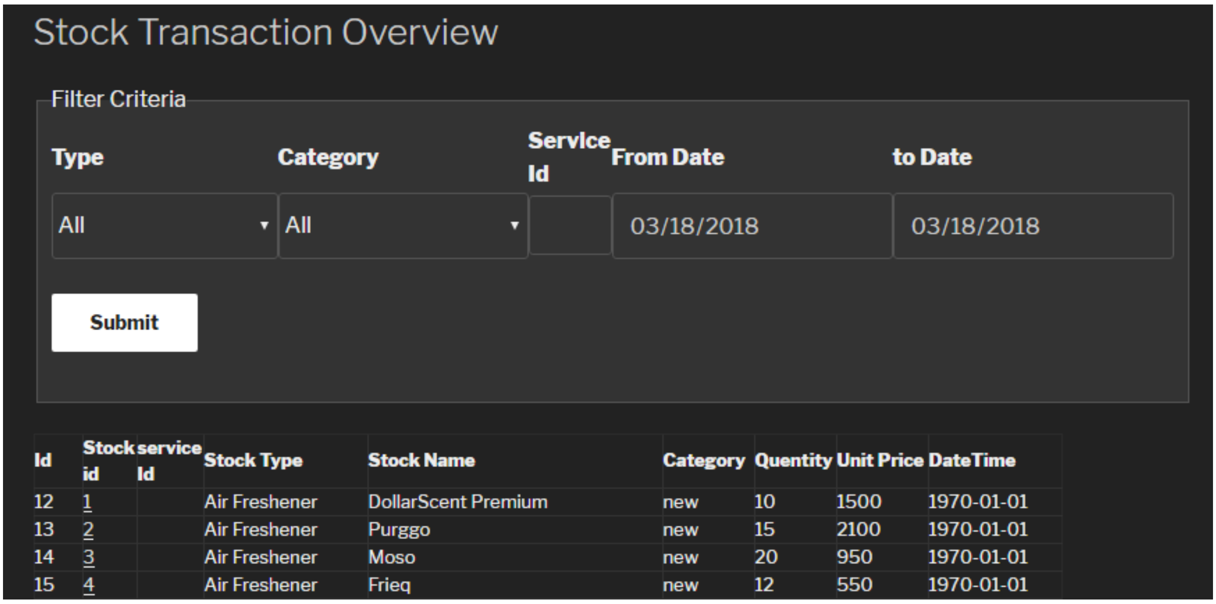


Figure B.17 Transaction Overview

Backup and Restore Database

To backup and restore the database, navigate to the ‘UpdraftPlus Backup/Restore’ plugin from the WordPress dashboard (Figure B.18). From the plugin page user can create new backups or user can restore the database using a previous backup file. All the previously taken backup records are visible in the plugin dashboard.

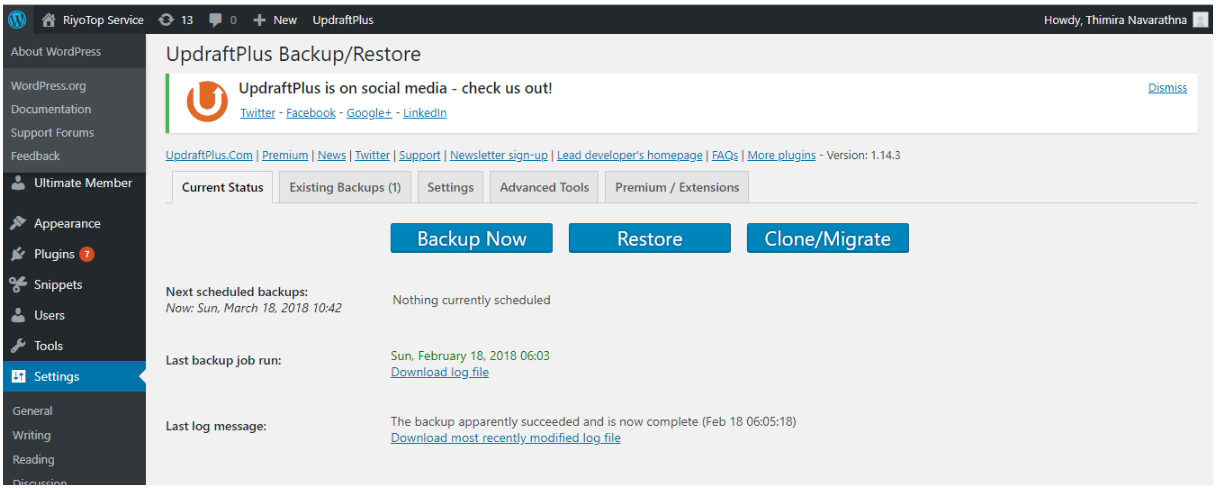


Figure B.18 Backup and Restore Database

Appendix C – Management Reports

Service Invoice

Figure C.1 shows the Service Invoice generated from the system for the billing purpose. This includes all tasks done and the respective cost for each task. Additionally this includes "Other Tasks", "Service Notes" and "Invoice Notes" if available. And finally the total payable amount is calculated and presented in the invoice.

Service Invoice: KO-3291

Summary

Service ID	Invoice ID	Service Start	Invoice Time
17	29	2018-01-15 16:16:00	2018-01-15 23:16:25

Vehicle information
Vehicle Number: KO-3291
Vehicle Type: Car
Vehicle Make: ASTON MARTIN
Vehicle Model: A7
Odometer Reading: 60000

Customer information
Customer Name: Mrs Saubhagya Gunasekara
Mobile: 716317457
Email: saubhagya88@gmail.com

Service Information

Job Name	Amount(LKR)
Full Service	5000
Underbody Cleaning	1500
Interior Cleaning	400
Engine Oil Change	2000
Engine Compartment Cleaning	1500
Transmission Oil Change	2000
Transmission Oil Flush	2500
Air Filter Change	1500
Waxing	5000
Cut and Polish	5000
Other Tasks other tasks new new	500
Service Notes service notes new	400
Invoice Notes discount	-2000
Total	25300

Figure C.1 Service Invoice

Summary Financial Report

Figure C.2 presents the "Summary Financial Report", which is generated by the system. This includes the "Financial Summary" within a selected time period.

Financial Summary (From 2017-02-02 to 2018-02-02)

Service Income (+)	113400
Other Income (+)	11000
Recorded Expences (-)	25500
Total	98900

Figure C.2 Summary Financial Report

Detailed Financial Report

Figure C.3 presents the "Detailed Financial Report" which is generated by the system.

Detailed Financial Report (2018-02-02 – 2018-02-03)

Financial Summary

Service Income (+)	Other Income (+)	Recorded Expences (-)	Total
350	1500	500	1350

Service Income

Service ID	Invoice ID	Vehicle No	Time Stamp	Income
22	48	BBA-5098	2018-02-02 10:38:06	350
			Total	**350**

Other Recorded Income

ID	Name	Category	Time Stamp	Notes	Income
4	Oil Can	Oil	2018-02-02 11:36:00	KB-1125	1500
			Total		**1500**

Recorded Expences

ID	Name	Category	Time Stamp	Notes	Income
5	Lunch	emp	2018-02-02 22:55:00	Employee Lunch	500
			Total		**500**

Figure C.3 Detailed Financial Report

Summary of all Employee Records

Figure C.4 presents the report “Summary of all Employee Records”

employee_records

localhost/wordpress/employee_records/

Employee id	Employee Name	Job Role	NIC	Mobile No
1	Thimira Navarathna	Manager	890420117V	0716317457
2	Saubhagya Gunasekara	Front Desk	880521117V	0771234567
3	Thushantha Gunawardhana	Service Bay	890569875V	

Figure C.4 Summary of Employee Records

Employee Detailed Report

Figure C.5 presents the Detailed Employee Report which is generated by the system

employee_info_view

localhost/wordpress/employee_info_view/

Employee Information of Thimira Navarathna…

Basic Information

Employee ID:	1
Employee Name:	Thimira Navarathna
NIC no:	890420117V
Date of Birth:	1989-02-11
Gender:	male
Marital Status:	married

Contact Information

Telephone No:	0372233058
Mobile No:	0716317457
Email:	thimira007@gmail.com
Permanent Address:	132/24, Bauddhaloka Road, Kurunegala
Current Address:	same

Employeement Information

Job Role:	Manager
Salary:	50000
Started Date:	
End Date (If available):	No End Date Available
Employeement History:	none
Special Notes:	none

Emergency Contact Information.. (In case of Emergency Contact the following..)

Name:	NMS Navarathna
Telephone No:	0372233058
Mobile No:	0718297331
Address:	132 /24, Bauddhaloka Road, Kurunegala

Figure C.5 Detailed Employee Report

Appendix D – Test Results

Common Functions

Table D.1 represents the Test results of the Common Functions

#	Page /Module	Test description	Expected Results	Phase_1	Phase_2
1.	Login	Login without entering the user name AND password	Prompt user to enter required fields	Passed	Passed
2.		Login without entering the user name OR password	Prompt user to enter required fields	Passed	Passed
3.		Login with invalid username AND Password	Notify user name or password is incorrect	Passed	Passed
4.		Login with invalid username OR password	Notify user name or password is incorrect	Passed	Passed
5.		Login with a correct username and password combination	Log in to the system	Passed	Passed
6.	Log Out	Logout	Logout the user and display the Home page	Failed (Navigate to a different Page)	Passed
7.	Change Password	Try to Change the Password while entering the old password incorrectly	prompt password is incorrect	Passed	Passed
8.		Try to Change the Password while keeping the old password blank	Prompt user to enter all fields	Passed	Passed
9.		Try to change the Password while Keeping any field blank	Prompt user to enter all fields	Passed	Passed
10.		Try to change the password while entering different values for “New Password” and “Retype Password” fields	Prompt user that passwords do not match	Passed	Passed
11.		Try to change the password by entering all fields correctly	Change the Password of the respective user	Passed	Passed
12.	Change Basic Info	Change Basic user information from 'Account' Page	Basic information should be changed successfully	Failed (Issue with the used Plugin)	Passed

Table D.1 Test Results - Common Functions

Service Module

Table D.2 represents the Test results of the Service Module

#	Page /Module	Test description	Expected Results	Phase_1	Phase_2
13.	Register vehicle	Fill the form without filling mandatory fields	Should not be able to save without mandatory fields	Passed	Passed

14.		Enter different values in 'Password' and 'Confirm Password' fields	Information should not be saved. Message should popup saying passwords do not match	Passed	Passed
15.		Enter all information and save	New vehicle information should be saved	Passed	Passed
16.	**Search Vehicle**	Search for an invalid vehicle number	Message should be shown saying 'Vehicle number not found'	Failed (Not Handled- No message shown)	Passed
17.		Search for a valid vehicle number	Vehicle information should be found	Passed	Passed
18.		View Past Service Records	All available service records should be visible for the selected vehicle	Passed	Passed
19.	**Create new service record**	Submit the form without filling the mandatory fields (eg. Odometer Reading)	Should not be able to save without mandatory fields	Passed	Passed
20.		Enter all mandatory information and Submit	Service note should be saved successfully	Passed	Passed
21.	**Service Records**	Search for an invalid vehicle number	Message should be shown saying 'Vehicle number not found'	Failed (Not Handled- No message shown)	Passed
22.		Search for valid records	All available service records should be visible for the selected filter criteria	Passed	Passed
	Edit Service Record	Precondition: Navigate to 'Service Records' Enter filter criteria and search for records Select a 'Service ID' of a record			
23.		Try to edit few service records which have the following statuses Pending Payment Completed Cancelled	It should not possible to "Edit" the service records with those statuses	Failed (All statuses navigated to the Edit Page)	Passed
24.		Try to edit few service records which have the following statuses In Queue Ongoing	It should be possible to "Edit" the service records with those statuses	Passed	Passed
25.		Click Edit button and, change some information in the service note, and Submit	Changed information should be saved successfully	Passed	Passed
26.		Click Edit button and, Clear some mandatory fields, and click 'Submit'	Mandatory field validation should be available	Passed	Passed

27.		Click Edit button and, change some information in the service note, and click "Cancel"	Changed information should NOT be saved.	Failed (Cancel button didn't trigger any action)	Passed
	Cancel Service Record	Precondition: Navigate to 'Service Records' Enter filter criteria and search for records Select a 'Service ID' of a record			
28.		Check the "Cancel the Service Record" check box	"Cancel" check box will only enable for the status "In Queue" For all other "Statuses" it should remain disabled	Failed (Cancel check box enabled for all Statues)	Passed
29.		Click the "hyperlink" to check more information	Popup message should be available with more information regarding cancellation of the record	Failed (Issue with the used Plugin)	Passed
30.		Select a record which have "In Queue" status, without "Selecting" the cancel Check box click "Cancel" button	Cancel button should not be clicked.	Failed (Cancel Button clicked regardless of the checkbox value)	Passed
31.		Select a record which have "In Queue" status, "Selecting" the cancel Check box click "Cancel" button	Service record should be cancelled, Status should be changed to "Cancelled"	Passed	Passed
32.	**Work Flow**	Check the work flow of the service module from start to end (status change, button availability)	Expected result should be the same as in the flow diagram (Figure xxx)	Failed (some workflows were not working as expected)	Passed
	Billing	Precondition: Navigate to 'Service Records' Enter filter criteria and search for records Select a 'Service ID' of a record which has the "Status", "Pending Payment"	"Generate Invoice" button should be visible. This button should only visible if the current status is "Pending Payment" and Invoice is currently not generated		
33.		Click "Generate Invoice" button. Enter all information and click "Submit"	Invoice Should be Generated	Passed	Passed
34.		Check the buttons in "Service Note" after generating the Invoice	"Payment Done" and "View Invoice" buttons should be visible, "Generate Invoice" button should not be visible	Failed (all buttons were visible)	Passed
35.		View Generated Invoice	Invoice should be available with correct values	Passed	Passed

36.		Send email and sms when generating the invoice	email and sms should be sent to the customer successfully	Blocked (Not Implemented yet)	Passed
37.		Print Invoice or Save as PDF	It should be possible to print the generated invoice and save the invoice as a PDF	Blocked (Not Implemented yet)	Passed
38.		Click "Payment Done"	Status should be changed to "Completed"	Passed	Passed
39.		Check the buttons in the "Service Note" after payment is done	Edit, Cancel Service and View Invoice button should be visible Edit and Cancel Service should be disabled	Failed (all buttons were visible and enabled)	Passed
	Online booking	Preconditions: Login to the System using a customer account Click Reserve Online			
40.		Try to reserve a time slot for a past date	Cannot reserve timeslots for past days	Passed	Passed
41.		Try to reserve a time slot for a future date	Cannot reserve timeslots for future days	Passed	Passed
42.		Select the current date and select a time slot and schedule a booking by entering the required information	Time Slot should be booked	Passed	Passed
43.		Login Using Admin and accept the booking using the "Salon" Plugin	Booking should be accepted, confirmation email should be sent to the customer	Passed	Passed
44.		Login Using Admin and Reject the booking using the "Salon" Plugin	Booking should be rejected, email should be sent to the customer	Passed	Passed

Table D.2 Test Results - Service Module

Employee Records

Table D.3 represents the Test results of the Employee Records Module

#	Test description	Expected Results	Phase_1	Phase_2
45.	Save Employee record without adding mandatory values	Should not be able to save without mandatory fields	Passed	Passed
46.	Save Employee record with invalid email (eg. Aabbc.com)	Should not be able to save with invalid email	Passed	Passed
47.	Enter all information and save	Employee Information should be saved	Passed	Passed

48.	View Employee information by Navigating to the Employee Records	All saved employee records with basic information should be visible	Passed	Passed
49.	Print Employee information or Save as PDF	It should be possible to print the information or to save the information as a PDF	Blocked (Not Implemented yet)	Passed
50.	select an Employee by "Employee id"	Detailed employee information should be visible	Passed	Passed
51.	Click Edit button and navigate to Edit Employee information page	Previously saved employee information should be visible in the form	Blocked (Not Implemented yet)	Passed
52.	Alter the information in Edit page and click Submit	Employee information should be altered successfully	Blocked (Not Implemented yet)	Passed
53.	Alter the information in Edit page and click Cancel	Changed information should NOT be saved.	Blocked (Not Implemented yet)	Failed (Cancel button not available)
54.	Alter the information in Edit page and Clear some mandatory fields, and click 'Submit'	Mandatory field validation should be available	Blocked (Not Implemented yet)	Passed

Table D.3 Test Results - Employee Records Module

Financial Information

Table D.4 represents the Test results of the Financial Information Module

#	Test description	Expected Results	Phase_1	Phase_2
55.	Add income without adding values to the mandatory fields	Should not be able to save without mandatory fields	Passed	Passed
56.	Add income with all mandatory fields	Income should be saved	Passed	Passed
57.	Add expenditure without adding values to the mandatory fields	Should not be able to save without mandatory fields	Passed	Passed
58.	Add expenditure with all mandatory fields	expenditure should be saved	Passed	Passed
59.	Navigate to Financial Overview	Filter Criteria should be defaulted to the current date	Passed	Passed
60.	Try to Search by removing From and To dates	Should not be possible to search without mandatory fields	Failed (No validation)	Passed
61.	Print Summary Report or Save as PDF	It should be possible to print the information or to save the information as a PDF	Blocked (Not Implemented yet)	Passed
62.	Click detailed Report and Navigate to the "Detailed Financial Report" for the given period	Should be possible to navigate and all income and expenses for the given period should be visible	Passed	Passed
63.	Print Detailed Report or Save as PDF	It should be possible to print the information or to save the information as a PDF	Blocked (Not Implemented yet)	Passed

Table D.4 Test Results - Financial Information Module

Stock Management

Table D.5 represents the Test results of the Stock Management Module

#	Test description	Expected Results	Phase_1	Phase_2
64.	Add new stock information using the 'Stock Card', without adding values to the mandatory fields	Should not be able to save without mandatory fields	Passed	Passed
65.	Add new stock information using the 'Stock Card' with adding values to all mandatory fields	Stock Card should be saved	Passed	Passed
66.	Enter Stock information in stock card and click "Clear" button	All entered information should be cleared	Blocked (Not Implemented yet)	Passed
67.	Enter text in the 'Stock Card', 'Quantity' field	Should not be able to enter text values in the quantity field. Only numerical values can be entered	Passed	Passed
68.	After successfully saving the 'Stock Card', check the 'Stock Overview'	Added stock information should be visible in the 'Stock Overview'	Passed	Passed
69.	Check the added stock information by clicking on the stock index	Stock Card should be opened with the previous information in Edit mode.	Passed	Passed
70.	Try to edit the stock card in edit mode	Only Status and comment fields should be editable	Failed	Passed
71.	Change the Status and comment fields and Save	Changes should be saved successfully	Failed	Passed
72.	Update Stock information, without adding values to all mandatory fields in Transaction Card	Should not be able to save without mandatory fields	Passed	Passed
73.	Update Stock information, by adding values to all mandatory fields in Transaction Card	Transaction Card should be saved	Passed	Passed
74.	Load the stock names by each stock type in Transaction Card	Correct Stock names should be loaded when selecting each Stock Type	Passed	Passed
75.	Enter Transaction information in Transaction card and click "Clear" button	All entered information should be cleared	Passed	Passed
76.	Enter text in the Transaction Card', 'Quantity' field	Should not be able to enter text values in the quantity field. Only numerical values can be entered	Passed	Passed
77.	After successfully saving the Transaction Card', check the Transaction Overview'	Added transaction should be visible in the 'Transaction Overview'	Blocked (Not Implemented yet)	Passed
78.	Check the filters in the Stock Overview	Search Results should be available based on the Filter Criteria	Blocked (Not Implemented yet)	Passed
79.	Check the filters in the Transaction Overview	Search Results should be available based on the Filter Criteria	Blocked (Not Implemented yet)	Passed

80.	Print Stock Overview Information	It should be possible to print the information or to save the information as a PDF	Blocked (Not Implemented yet)	Passed
81.	Print Transaction Overview Information	It should be possible to print the information or to save the information as a PDF	Blocked (Not Implemented yet)	Passed

Table D.5 Test Results - Stock Management Module

Online Reservations

Table D.6 represents the Test results of Online Reservations Module

#	Test description	Expected Results	Phase_1	Phase_2
82.	Navigate to Booking page from the customer portal, select available date and time and click next	It should successfully navigate to the required jobs page	Blocked	Passed
83.	without selecting any job click next	it should not possible to click next without selecting any job	Blocked	Passed
84.	Select a job and finalize the booking	Booking should be successfully added and email should be received to the configured email address of the Riyotop service center	Blocked	Passed
85.	Click on the email	It should navigate to the WordPress booking plugin view where the Manager can accept or reject the booking	Blocked	Passed
86.	Click accept booking	booking should be accepted successfully and the customer should receive a proper email	Blocked	Passed
87.	After accepting check the account from the customer view	booking should be in confirmed status	Blocked	Passed
88.	Cancel the booking from the customer view	booking should be cancelled successfully	Blocked	Passed
89.	Check the Plugin calendar, using the Manager view	All the added bookings should be available in the Plugin Calendar, and the user can accept or reject the bookings from plugin calendar view	Blocked	Passed

Table D.6 Test Results - Online Reservations

Other Modules

Table D.7 represents the Test results of Other Modules

#	Page/Module	Test description	Expected Results	Phase_1	Phase_2
90.	**Contact Us**	Submit the 'Contact Us' form without filling the mandatory fields	Should not be able to save without mandatory fields	Passed	Passed
91.		Submit the 'Contact Us' form by filling all the mandatory fields	Contact Us form should be submitted successfully, and message should be prompt to the user	Passed	Passed
92.		After submitting the 'Contact Us' form check the user emails	Email should be sent to the user with the content in the Contact Us form	Failed	Passed
93.		After submitting the 'Contact Us' form check the email account of Riyotop	Email should be sent to the Riyotop with the content in the Contact Us form	Failed	Passed
94.	**Backup and Restore**	Using the 'UpdraftPlus Backup' take a backup of the system	Backup should be taken successfully	Blocked	Passed
95.		Using the 'UpdraftPlus Backup'Restore the system	System should be Restored successfully	Blocked	Passed
96.	**Static Pages**	Check all static pages	All Static pages should be available with proper text	Blocked	Passed

Table D.7 Test Results - Other Modules

Appendix E – System Documentation

This System Documentation provide the guidelines to install the Service Information System on any user computer. Since the system is created as a web based software there will be no special configuration required for the user to access the system other than a working internet connection.

Although the following Requirements should be available with the server to host the WordPress website [26]

- PHP version 7.2 or greater
- MySQL version 5.6 or greater or MariaDB version 10.0 or greater
- HTTPS support

Below described the process to configure the Development Environment in local computer and restore the DB of the service management system using a plugin

Configuring Development Environment

Step 1: Download and install XAMPP on the computer- In the setup choose 'MySQL' and 'PHPMyAdmin' to install as shown in 'Figure E.1'

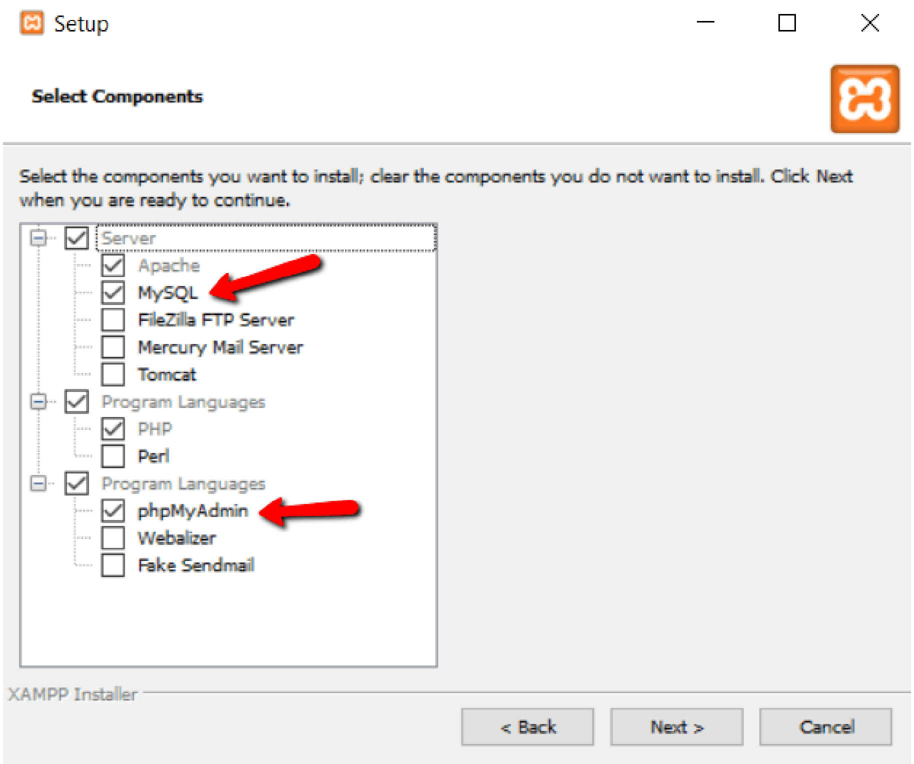


Figure E.1 XAMPP Installation

Step 2: Start the 'MySQL' and 'PHPMyAdmin' and navigate to http://localhost/ in any web browser to test the server as shown in 'Figure E.2' and 'Figure E.3'

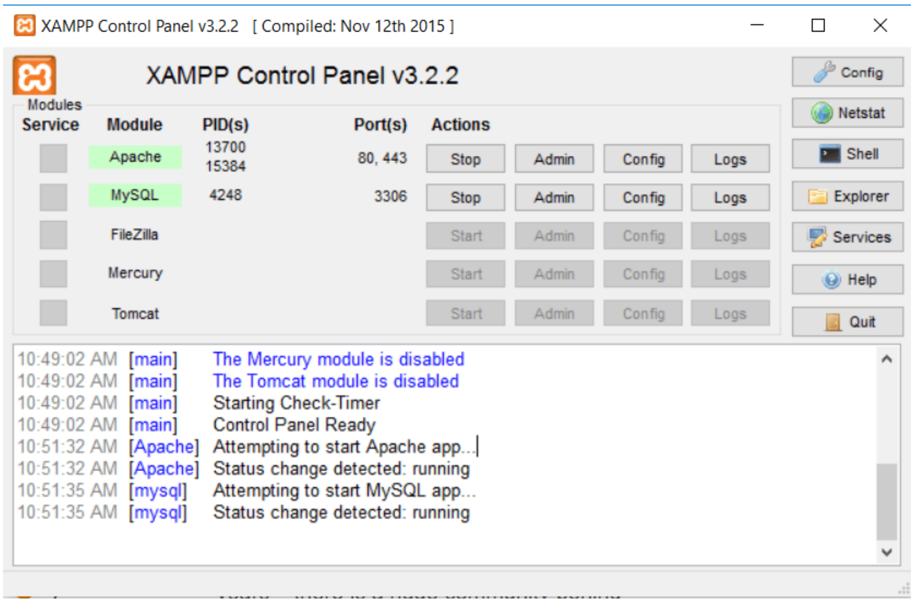


Figure E.2 XAMPP Control Panel

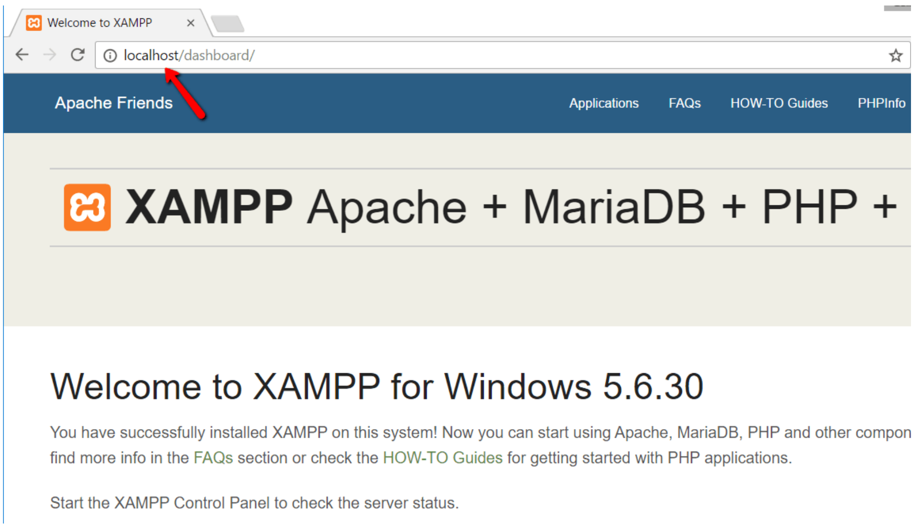


Figure E.3 Test XAMPP Server

Step 3: Add the WordPress files to the XAMPP server - Navigate to www.wordpress.org and download the latest version of WordPress version. Then in windows navigate to the folder where XAMPP is installed and copy the WordPress files inside the 'htdocs' folder (FigureE.4)

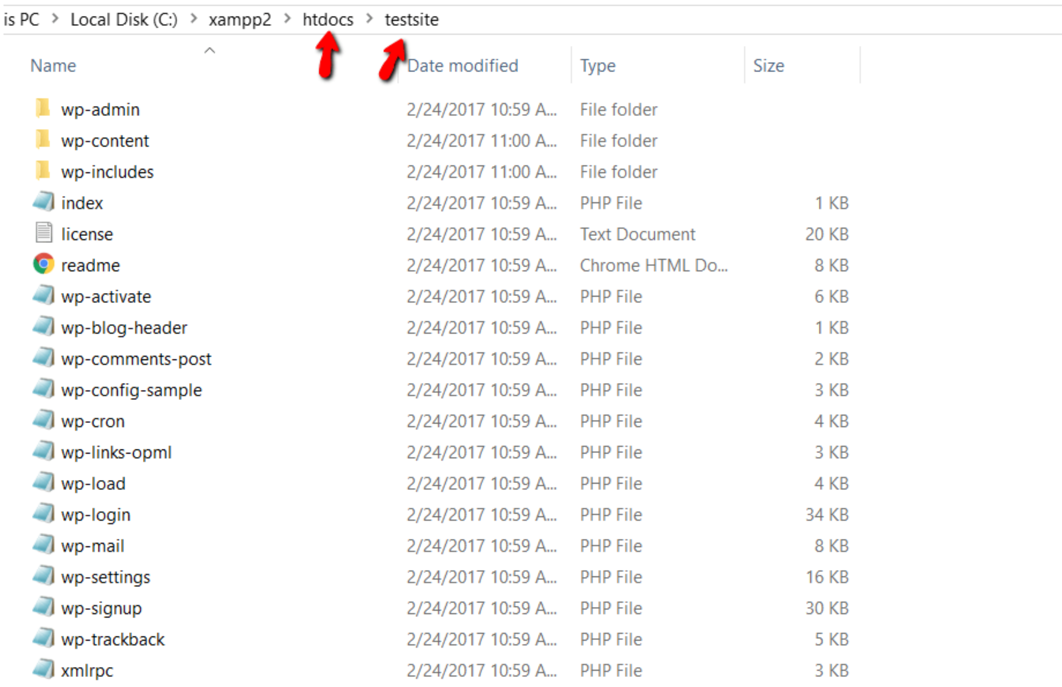


Figure E.4 Test Site Location

Step 4: Create a database for WordPress - Create a MySQL database for the WordPress install using PHPMyAdmin. And enter a name for the database and click Create (Figure E.5)

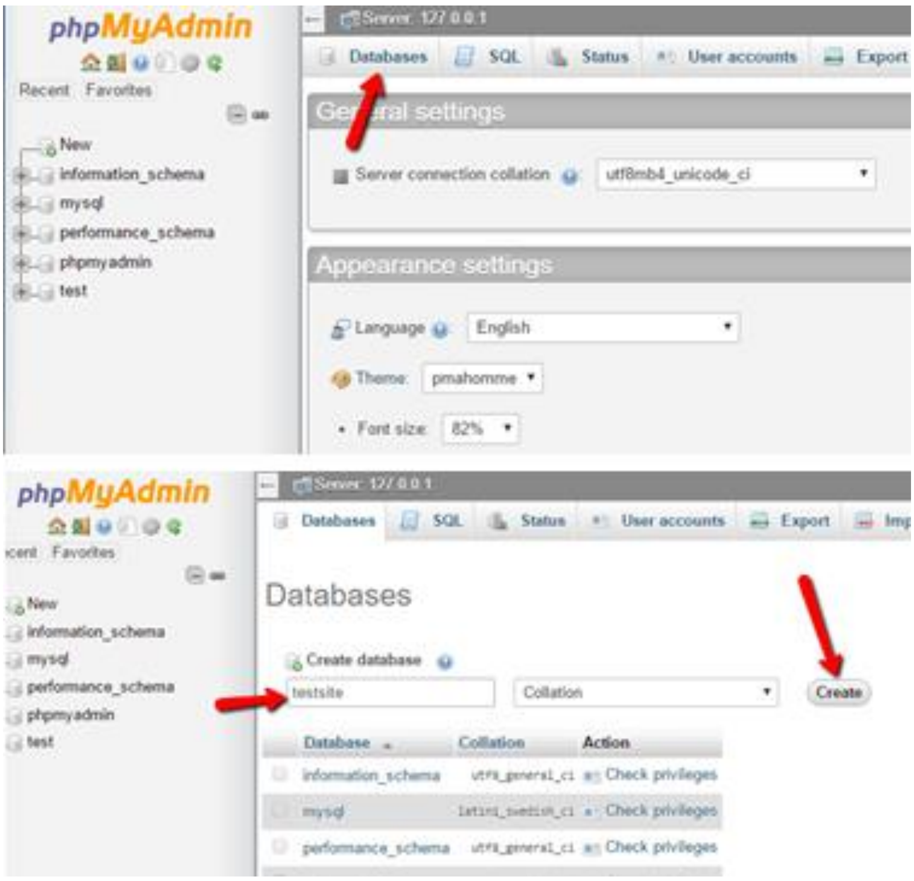


Figure E.5 Create WordPress DB

Step 5: Run the WordPress installer - Visit to the test site (http://localhost/FOLDERNAME) and install the WordPress using the step by step guide as given in 'Figure E.6'

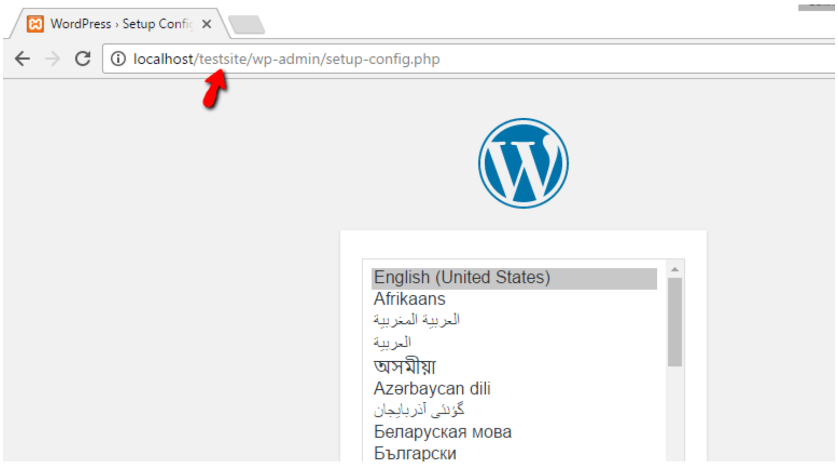


Figure E.6 WordPress Setup

Enter the database details as given in 'Figure E.7'

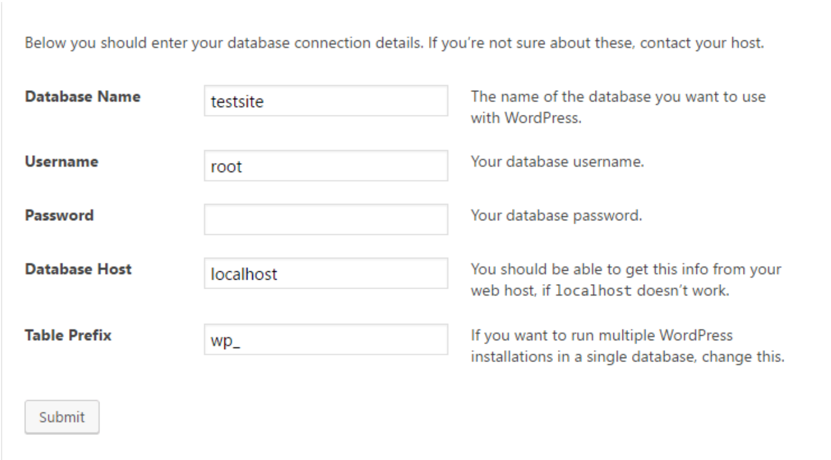


Figure E.7 Database information

Once the installation is done test site should be running perfectly on the local host as in the 'Figure E.8'

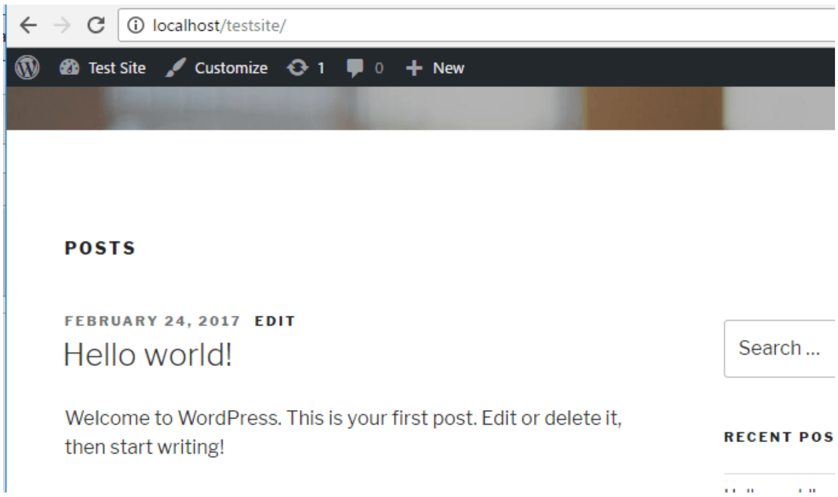


Figure E.8 Test Site

Step 6: Install the plugin 'UpdraftPlus - Backup/Restore' (Figure E.9) and navigate to the plugin location

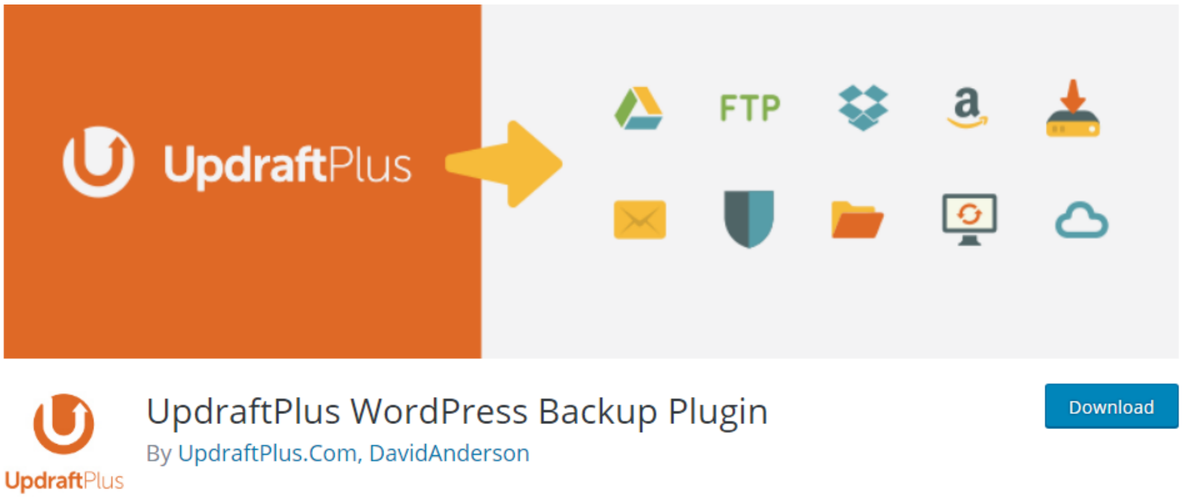


Figure E.9 Plugin: UpdraftPlus

Step 7: Restore the Information System using a previous backup via UpdraftPlus Plugin (Figure E.10)

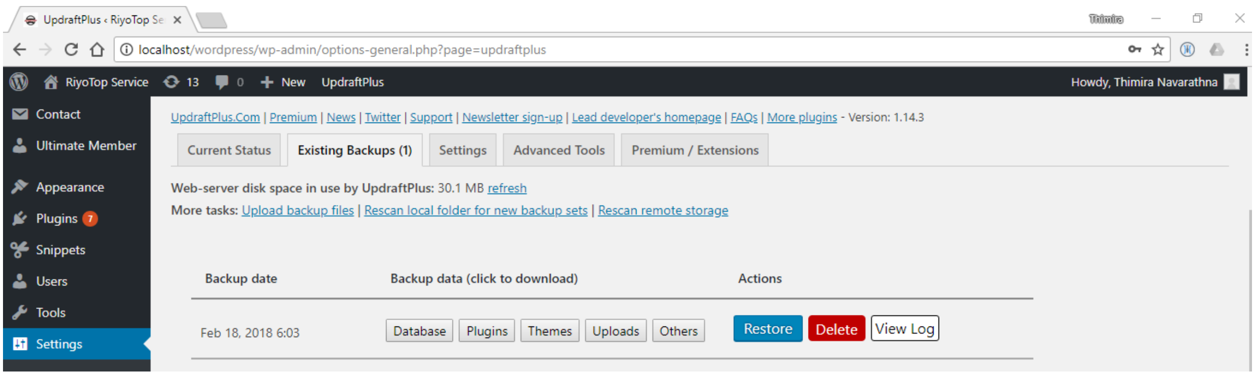


Figure E.10 Restore From Backup

Step 8: After the backup is restored navigate to http://localhost/wordpress/ (Figure E.11)

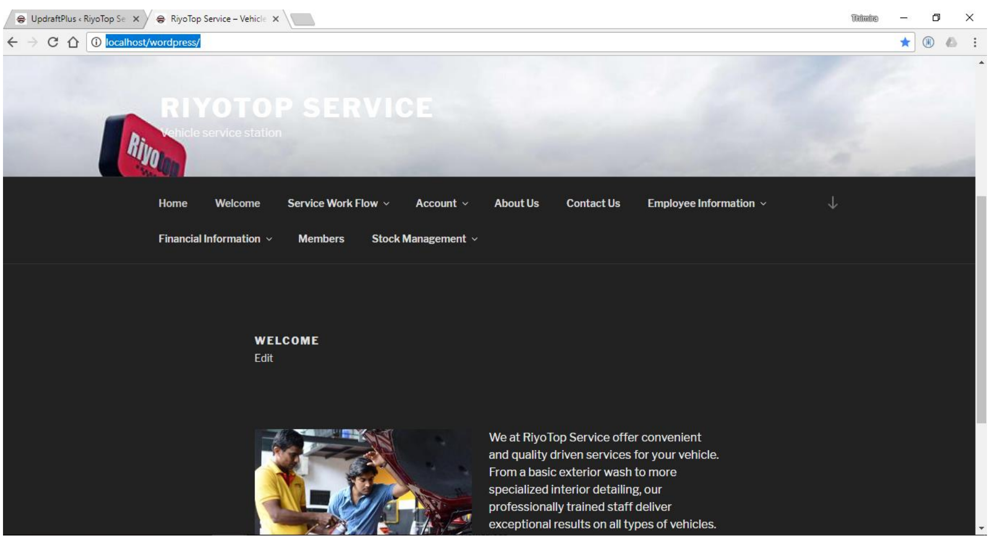


Figure E.11 Information System for Riyotop Service

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