Web Based SatelliteTV Fixing Management System

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

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Abstract

"Srisat services" is a satellite TV service provider. All of the activities of this service providers are currently functioning as a manual system. To keep the records, they use ledgers to maintain customer's and technician's details. Any people want to get a technician support he/she has to go to the shop or make a call. The main problem for technician is find the customer's residence. It takes more time.

 The web based "Satellite TV Fixing Management System" (WSFM) is built to overcome some of the problems and inefficiencies of the current manual system. This solution is built in a way to cover the overall administration processes of the Sri Sat services, such as: assign viewing card number for new connection, Technician's repair cost estimation approval, adding new tv, adding new package, add new technician and Report Generation. Further, the best part is the web-based system makes it possible to monitor the srisat services processes from any location. The proposed system is designed in php7 as front end and MS-SQL Server as the back end. AdminLTE framework is used for the developing framework.

The graphical interface designed for this project makes it easy for users to interact with the system and get information that he or she requires. The database design is designed to include large amount of data which is managed in an efficient manner. These exclusive properties of the proposed system make it better than the existing system.

 Addition to these major technologies, this system used other effective technologies like Bootstrap, Data tables, Twilio SMS System also. This system capable to generate various type of reports which are most important to the management level admin to take decisions. Just the viewing card number of the customer is enough to know that customer's whole history such as past recharge details, repair complaints and solutions.

This system was successfully verified and validated by the various types of testing that including unit testing, integration testing, system testing, acceptance testing and usability testing. And the testing results are used to the improvements of the system.

Acknowledgements

I would like to express my sincerest thanks to my supervisor Mr W.V.Welgama, Senior Lecturer, University of Colombo School of Computing for his ideas and suggestions and especially for his guidance through the difficulties encountered during the development of this project.

Further thanks to The Owner Of the srisat service, technicians to their supports and helps to complete my project on time.

My gratitude also to all my family and friends for your moral support throughout the whole project and encouraging me to do my best in the difficult times.

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List of Abbreviations

WSFM   - Web based   Satellite TV Fixing Management

ICT   - Information Communication Technology

PACT   - People - Activity - Context - Technology

SQL   - Structured Query Language

XSS   - Cross Site Scripting

SSL   - Secure Socket Layer

CPU   - Central Processing Unit

RAM   - Random Access Memory

RAD   - Rapid Application Development

RUP   - Rational Unified Processing

UI   - User Interface

HTML   - Hyper Text transfer Protocol

API   - Application Programming Interface

STMP   - Simple Mail Transfer Protocol

SMS   - Short Message Service

URL   - Universe Resource Locator

ORM   - Object-relational mapping

PDO   - PHP Data Objects

Chapter 1: Introduction

1.1 Introduction

Information Communication Technology is widely utilized for many applications at present. Almost all the processes are being computerized to bring more efficiency and reliability in them. People have the tendency to think that machines are more reliable to handle sensitive and non-sensitive data. That is why most of the processing is done by machines. Sri Lanka, being a developing country, encourages automation of the processes of companies and factories. Therefore, this web-based System is built to make a contribution to the business enhancement of srisat services.
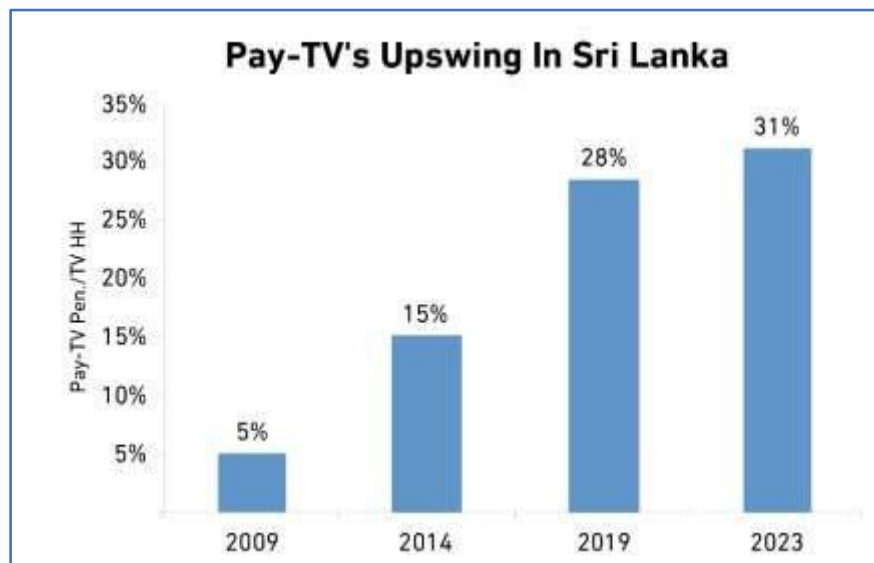
Figure 1.1 Pay TV Upswing in srilanka

Figure 1.1 shows the growth level of pay tv viewers in srilanka. Nowadays in Sri Lanka, the satellite television is used by children to elders for not only the entertainment purpose but also the education and research purpose. These satellite tv channels charge a fee for their service to throw the agents. The customers can subscribe to these channels by monthly basis or annually by their wish. Charges were depending on the channel companies. Sri-Sat service is the organization which provide the satellite TV server as the agent of companies such as Dish TV, Sun direct, Videocon, Airtel[**1**].

1.2 Motivation for Project

WSFM have started their satellite TV fixing, recharge and repair service manually with a lot of paper works. This manual obsolete system causes numerous problems. It is a time consuming and inefficient process. Modern days such manual systems may lead the Sri Sat service to undue risks. Considering these issues, this developed web-based system will help Sri sat service to provide a better competitive service and to lead the new business to a success. It will minimize the cost and time of the business while providing a better interaction with their customers and will improve the overall customer service. The WSFM system can store their daily business activities and customer information easily with the ability to review them on demand in order to forecast the future business needs.

1.3 The Problem

Currently, Sri-sat service does their day-to-day activities manually. This manual method has these following issues.

- Time consumptions high for Sri-sat when doing new fixing orders, package recharge and repairing management activities.
- Customer face trouble when they need a new connection or package recharge or choose a service provider and package choosing.
- There are only by hand payment method is accepted currently.
- Customer needs to visit the outlet when they want to recharge the package.
- There are major issues when allocating the time slots of the technician for new fixing satellite tv or repairing.
- Every time when allocating the technician to the particular task management needs to call for check their availability.
- Technician face problem when identifying the customer's resident address.
- Organization's business activities are limited within a particular geographical area. ☐ This current manual activity increases the paperwork.
- There are difficulties to identify priority customers of provider categorized service for them.
- Take much time consuming to generate organization's yearly, monthly management reports.

1.4 Objective of Project

The main objectives of this project are to develop a web system which supports the core functions of the satellite TV business in order to carry out the business effectively and efficiently. This system can provide the better solution for the whole current issues. This Satellite TV management system makes simple and less time consumption by easy online cash payment methods and self-satellite TV, Package selections. Satellite TV System provides less time consumption for the technician to identify a particular customer's location. Admin can easily get the important tactical decision through backend monthly, yearly management reports and visual graphs. For example, through the recharge, new satellite TV installation reports admin can easily identify the organization's business situation. Admin easily control all activities within technician and user. When admin inserts a connection VC number system provides its owner, location, past recharge details, past repair details etc. Additionally, WSFM system provide SMS notification for every important activity. The system provides package notification for each customer. This satellite TV system Provide customer loyalty through special points for each package recharge.

1.5 Scope

System Admin, User(customer) and Technician are the three roles of this system. Admin only can add a Technician, Satellite TV subscribers and packages. Any customer becomes a registered user through the self-registration Admin must approve each user registration through his dashboard. A registered user can select a satellite TV, select a package, recharge and make a repair complaint. Admin can be able to insert or de activate any customer, Technician. Any registered user, unregistered user can get new connection and make recharge. Registered user's feedback will display after admin's approval.

Any registered user can instantly make their recharge with the help of online payment from their residence and WSFM system gives special loyalty points for each package recharge to every customer. customers can make repair complaint from anywhere through this system WSFM system send SMS notification to particular technician. Technician create a repair cost estimation. After Admin's approval that repair cost estimation will go to customer's approval. Technician can make three types of job finish notification for each of his job such as Finished, partially finished, couldn't finished with comments. Admin can send remainder notification to technician for each customer's complaints.

1.4 Structure of The Dissertation

The dissertation contains five main chapters to provide an overall knowledge on the web-based Factory Management System. This document is written to facilitate both non-technical and technical users of the system.

Chapter 2 - Background

The system analysis chapter explains about the requirements gathering techniques and collected functional, non-functional requirements to design and develop the system. Top level Use-Case diagrams are used to make it easier to understand the system. This chapter also includes detailed Use-Case diagrams and er diagram.

Chapter 3 - Methodology

The Methodology chapter describes the development procedures of the system. Further, the implementation environment, software tools and technologies used at the time of development are explained. This chapter also incorporates major code segments of the system.

Chapter 4 – Evaluation

This chapter defines how WSFM system meets all stakeholder's requirements. This includes user sample questioner and analysis report.

Chapter 5 – Conclusion

This chapter consist summary of the work of this project and future developing plans.

Chapter 2: Background

2.1 Analysis

This chapter is written to give an overview of the existing system as well as the fact-gathering techniques and collected functional, non-functional requirements. Requirements collection and analysis is a very important role for a project's success. Therefore, a significant amount of time and effort were put in this segment. The main processes of this phase include domain understanding, requirements collection, classification, structuring, prioritization, and validation. Suitable collective methods and procedures were engaged to carry out the analysis phase in an effective way.

2.1.1 Fact Gathering Technique

Multiple techniques were employed here to capture requirements from different stakeholder perspectives. The main methods used for the fact-finding process were

·Interviews

·Observation

·Gathering sample material [2].

Facts were primarily gathered by interviewing the WSFM Tech Admin who is the primary user of the proposed system. Additional knowledge needed to complete analysis, was discovered through observation and through gathering sample material such as Recharge Entry Book, Satellite TV Repair Entry Book.

Combinations of close-ended and open-ended interviews were conducted. These methods helped to prompt new questions related to the existing problems during interviews. It can be considered beneficial, when we intend to acquire more knowledge and understanding about the domain.

The observation was carried out to collect implicit information which plays a critical role in the system. Relevant documents and paperwork of the existing manual system were analyzed and studied through a sampling process.

2.1.2 Analyzing the Existing system

As we are new to this domain, a domain analysis was carried out through certain fact-gathering techniques and consulting domain experts in the domain's own terminology. The WSFM system consists of three main processes. A detailed study was carried out in order to understand the functionalities of each subsystem. The divided subsystems are as follows,

- New Satellite TV Ordering process
- Package Recharge process
- Repair Complaint Process

New Satellite TV Ordering process

Sri Sat Tech they distribute three types of satellite Tv for their customers. And they give technician support to customers they need to fix their satellite TV at their living place. When a customer wants to get a new connection, he/she follow these steps.

- Select Satellite TV Vendor
- If he/she needs the Technician Support mentioned it.
- Gave The customer's Details
- Pay The money

After That Admin Insert the VC number for his/her connection. Finally Technician find the location and VC number of particular customer through the WSFM system after his job finishing technician send notification through the WSFM system.

Package Recharge Process

When a Customer wants to recharge a package for a particular satellite TV he/she follow these steps,

- Select the Satellite TV Vendor.
- Select the Package.
- Gave the Number of months for that package.
- Give the Viewing Card Number and contact number.
- Pay the money.

Repair Complaint Process

Sri Sat Tech provides Technical support services for their valuable customers. When a customer needs technical support for his/her repair on satellite TV he comes to the shop and provides his problem information's, his location and contact number. After that admin informed to his technician about new repair job.

2.1.3 Functional Requirements

Functional requirements capture the intended behavior of the system. This behavior may be expressed as services, tasks or functions the system is required to perform. In product development, it is useful to distinguish between the baseline functionality necessary for any system to compete in that product domain, and features that differentiate the system from competitors.

Functional Requirements of the Sri Sat Tech

1. System admin(owner) shall be able to access all business activities.
2. System admin(owner) shall be able to send notification about a job to a particular technician.
3. System admin(owner) shall be able to generate various types of management reports.
4. System admin(owner) shall be able to send notification about special offers to their customers.
5. System admin(owner) shall be able to control customer feedback forum.
6. System admin(owner) shall be able to add/edit package information (channels, price), satellite TV receiver on system.
7. System admin(owner) shall be able to view job status (Finished/Not finished) such as new satellite tv installation, repair.

8. System admin shall be able to view the customer"s recharge / repaired history

9. System admin(owner) shall be able to post FAQ.
10. System admin(owner) shall be able to get a database backup.
11. Customer shall be able to register with the system.
12. Customer shall be able to recover his/her password.
13. Customer shall be able to edit their profile.
14. Customer shall be able to deactivate their account.
15. Customer shall be able to select their location.
16. Customer shall be able to use an advanced search facility to find packages and satellite tv receivers.

17. Customer shall be able to make an order for new satellite tv installation.

18. Customer shall be able to recharge monthly or yearly.

19. Customer shall be able to make a repairing complaint.

20. Customer shall be able to make online payments for every business transaction.

21. Customer shall be able to view their past package recharge details.

22. Customer shall be able to post their feedback.

23. The technician shall be able to view assigned jobs to him.

24. The technician shall be able to view the customer's location.

25. The technician shall be able to change the status to the system about their job completes.

2.1.4 Non -Functional Requirements

Maintainability
The system should be able to easily adopt future changes without doing major changes in existing components.

Availability
The system should be guaranteed with 99 percent uptime

Security
* The system shall be able to protect against unauthorized activities
* The system shall be able to protect against common web application security threats that including SQL injection.
* The system shall not allow the users to access pages or contents by edit the URL
* Data inputs shall be validated properly
* The system shall automatically log out all users after a period of inactivity.
* Number of fail attempts shall be limited
* A connection from the web server to browser shall be protected with Secure Socket Layer (SSL)

Scalability
The system should be handling increases in load without impact on the performance

Portability
The system should be support for all modern browsers and screen sizes

Efficiency
System server should be able to manage the connections nearly fifty percent of Sri Lanka population at a time.

Supportability

The system should provide helpful information for identifying and resolving when it fails to work correctly
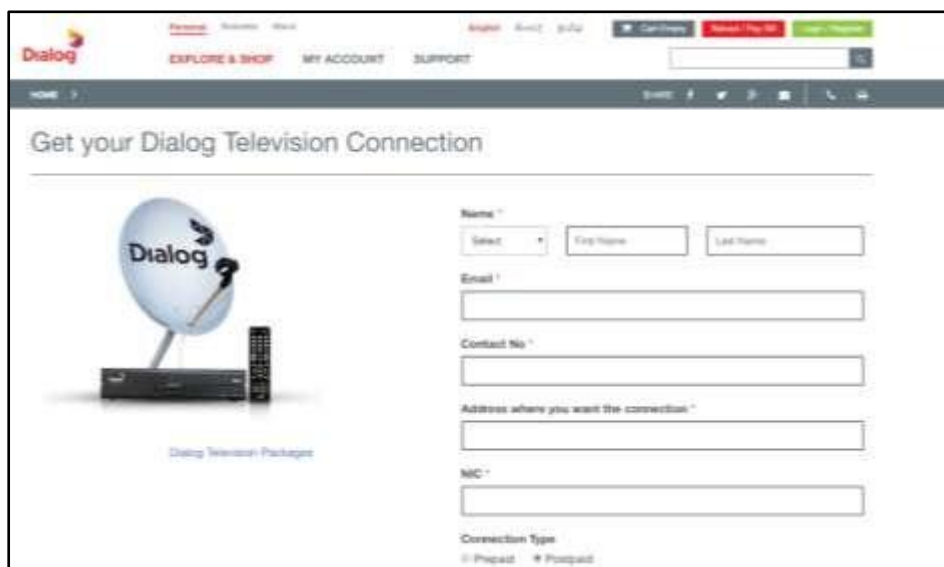
Usability

- The user interface should be simplified and provide a clear sequence of screens
- Reading characters on the screen should be easy
- Organization of information should be clear
- Use of terms are should be proper
- Terminologies are should be related to tasks
- The position of notifications should be proper on screen
- The system should be informed about its progress
- The system should be easy to learn to use the system
- The system should be performing tasks straightforward

2.2 Review of Similar Systems

2.2.1 Dialog tv

Dialog TV is a direct broadcast satellite pay TV service provider based in Sri Lanka. Dialog TV is a supplier of Standard Definition TV (SDTV), High Definition TV (HDTV) and Personal Video Recording (PVR) benefits in Sri Lanka. "Every Day Packages" enables the client to pay a day by day rental expense extending from Rs.3 to Rs.12 for a set number of channels. On the other hand, the Post-paid installment technique has 5 bundle alternatives with a month to month rental expense of between Rs.699 to Rs.1949 for a higher number of channels [**3**].

Figure *2.1* Dialog Tv home page

Initiating Channel Packs: Dialog Television offers the customer the comfort to pick extra Channel Packs differing from Movies, Sports, Entertainment, Edutainment and numerous more any categories through the web.

Payment Method: Dialog TV allows online payment such as ez- cash, credit card.

2.2.2 Dish TV Sri Lanka

Dish TV Sri Lanka is a supplier of DTH Satellite TV benefits in Sri Lanka which gives a wide assortment of neighborhood stations alongside a portion of

he stations from its Indian administration. Dish TV was the primary DTH organization in Sri Lanka to present Personal Video Recorder benefit for the greater part of the TV channels on the administration. Figure 2.2 shows the dish TV srilanka home page.

Figure 2.2 DishTV srilanka

Recharge: It offers instant recharge facilities to its customers. Customers can select a monthly or annually scheme [**4**].

Payment method: dish tv Srilanka support online and cash payment through the nearest outlet. dish tv Srilanka consist of online payment method such as credit card, PayPal.

The above Two systems Dialog tv and Dish tv Srilanka have had their own satellite TV and provides service Get new connection, package recharge. Dialog TV provide repair service through their customer care service.

2.3 Design strategies

Design Techniques

Design techniques are the methods used to model the solution domain. Although there are various designing practices like Modern Structured design, Prototyping, Rapid Application Development and Rational Unified Process methodology. Object Oriented design technique was chosen out of them for the main design concepts like abstraction, inheritance, modularity, reusability, encapsulation and message passing. Unified Modeling Language (UML) plays an important role in Object Orientation. UML allows us to build easy to use and easy to understand models of objects so that programmers can easily write software [**5**].

2.3.1 High Level Use Case Diagram for the WSFM

Figure 3.1 shows the Use Case diagram which graphically represents the functionality of the system. It includes Actors, Use Cases (goals) and the relationship among the use cases and actors. The relationships such as Include, Extend, Generalization and Association may vary depending on the situation. The following Use Case diagram covers the main system functionalities and it shows how the main actors interact with each functions (Use Cases).
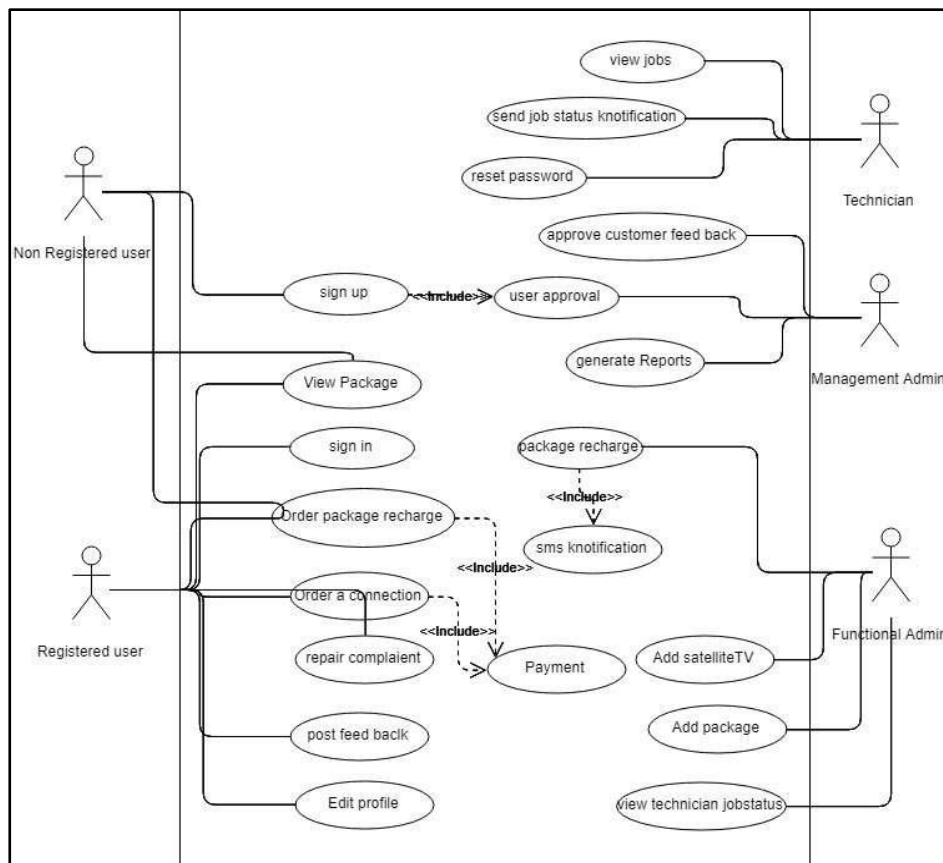
Figure 2.3 Use Case Diagram

2.3.2 ER Diagram for the Sri Sat Tech

An entity relationship diagram (ERD) shows the relationships of entity sets stored in a database. An entity in this context is an object, a component of data. An entity set is a collection of similar entities. These entities can have attributes that define its properties. ER diagram for the WSFM system is illustrated in figure 2.4

Figure 2.4 ER Diagram

Chapter 3: Methodology

3.1 Introduction

This chapter explains the software development methodology that used in this system designing and compares with other alternative solutions. And also it describes the structure and architecture of the proposed system.

3.2 Software Development Methodology

Software development methodologies play an important part in developing the software system. There are several methodologies that are utilized by the professional software system development firms these days. There are bound benefits and drawbacks related to each of them. the fundamental purpose of those methodologies is to provide sleek software system development consistent with the project requirements.

This completed WSFM system developed under Rational Unified Process methodology. There are many development methodologies. Waterfall Model, Prototype Methodology, Rapid Application Development methodology (RAD) are some famous software development methodologies. For the nature of this WSFM system, Rational Unified Process methodology is most suitable one[6].

Waterfall model is one of the traditional software methodologies. It is a linear sequential flow process model that means it is not possible to start a particular development phase rather than that the phase which is previous one to the current phase is completed. This development approach does not allow to go back to the previous phase and work on changes in requirements. The nature of the human, it is not possible to understand or delivering the accurate requirements in a very first step. Changes in requirements are very common and frequent one in software development. May it possible to rise a change requirement in very last movements also. The nature of this completed system is complex because of the functionalities. Therefore, it is not possible to define all requirements in initial movement. For this reason, waterfall model is not ideal for this WSFM System.

The prototype is also one of the trending software development methodology which that allows the developer to develop a prototype of the real system and demonstrate the functionalities to the clients. In this methodology allow the clients to get the detailed understanding of the system and they can realize and deliver the actual requirements. And developer can make necessary modification before the development of actual software. But this methodology needs very much

of client involvement. It is not possible to get regular support and involvements from police officials because of their busy work nature. And the over modifications are causes negative impacts on the structure of the system like WSFM and it easily affects the workflow of the entire development process.

Rapid Application Development (RAD) is also one of the leading software development methodologies. It allows the developer to provide quicker development. But the major drawback is that this methodology depends on the strong team performance and clearly identified system requirements.

WSFM system follows the Rational Unified Process methodology for the system development. This modern methodology divides the development process into four phases which are inspection, elaboration, construction and transition. These four phases are each involves business modelling, analysis and design, implementation, testing, and deployment. This object-oriented and web-enabled development methodology helps developers for providing them guidelines and templates for all stage of the software development. Following Figure 3.1 shows the RUP methodology as a graphical view [7].

Figure 3.1 Rational Unified Process Methodology

The idea for the project is stated in inspection phase and the project's architecture and required resources are further evaluated in elaboration phase. In the construction phase, the project is developed, completed and tested. The transition is the final phase. In this phase, the software is

released to the client. And the final adjustments or updates are made based on end users' feedbacks.

The RUP is easy to tailored to fulfill almost any of the user requirements and working iteratively allows higher risks to be addressed in the early stage of the software development process.

The elaboration phase allows making sure that the proposed software architecture works. It projects technical risks during the development of the system skeleton in the elaboration phase. Through the iteration, it is easy to realize that the proposed architecture satisfies the requirements or not.

3.3 Structure Chart for the Sri WSFM
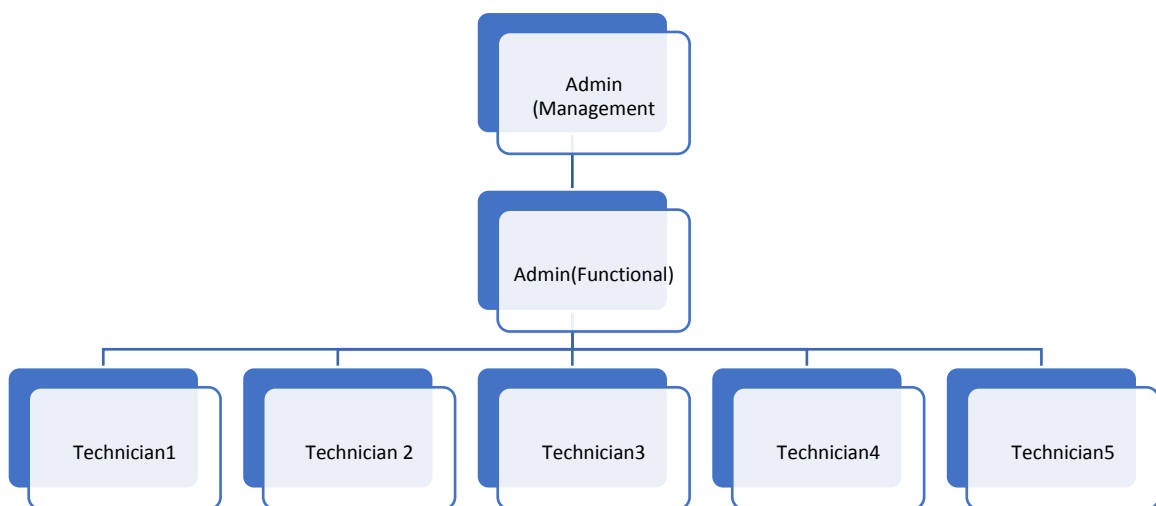
Figure 3.2 Structure chart

The above figure shows top to lower management levels. Functional Admin Control All Activities Related technician and customers. Management level admin monitor all activities and approve each customer registration.

3.3 Class Diagram for the WSFM

Class Diagram is one of the main design models which can be used for conceptual modeling. The detailed model of a class diagram can be translated in to a programming code. Class diagram for the sri sat tech system is illustrated in figure 3.3.
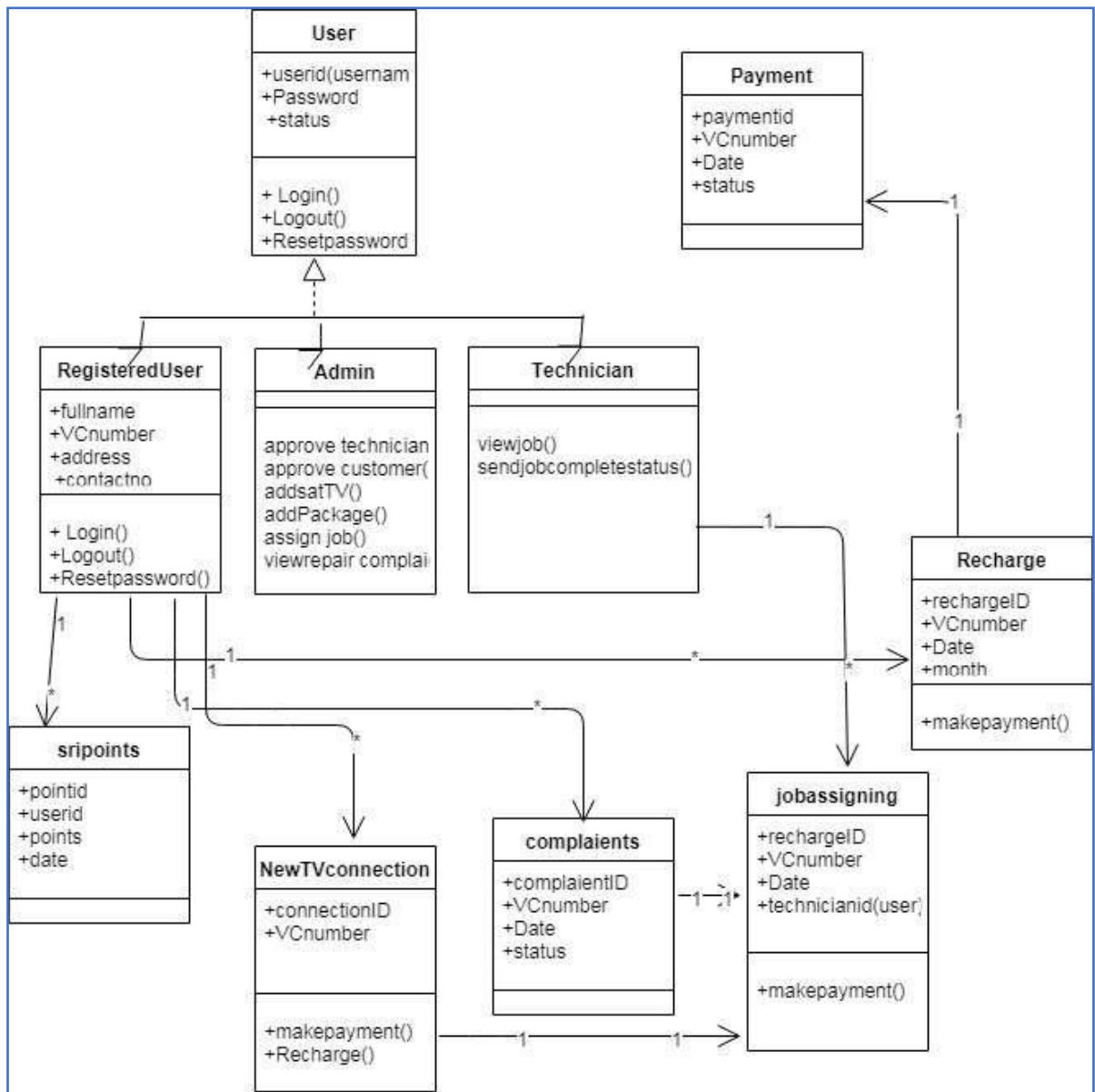
Figure 3.3 Class Diagram

3.4 User Interface Design

User interface designing should be simple and understandable. By the PACT Analysis of WSFM (Refer Appendix A) users of the completed system are physically, psychologically and socially differ from each other. By the people-centered designing methodology, system interface should be support for every user.

The interface should be kept in a simple manner and want to avoid the unnecessary elements. It is better to use very common UI elements in interface designing. its provide more comfort to the users and allow them to hit the targets quickly.

System alerts and notifications are should use suitable colors and positions. for the example success messages should be green and warning messages are orange like.

For the strategically decision making, information is should be represented by graphical view and reports are should be easily customizable. The elder people may have some physical problems like vision, color blind etc. Big fonts, dark texts and light backgrounds are the solutions for the people who are suffering from vision problems. For the color blindness peoples, the system needs to be sure that colors that system users do not convey important information. And increase the contrast between similar colors, lighten light colors and darken the dark ones, increase saturation of colors, use patterns, symbols and strokes are also providing a positive impact on color blind and vision problems.

Following Figure 3.4 and Figure 3.5 are the sample mockups for the system design. Figure 4.4 shows the planed administrator's home page and the Figure 4.5 shows the public user homepage.
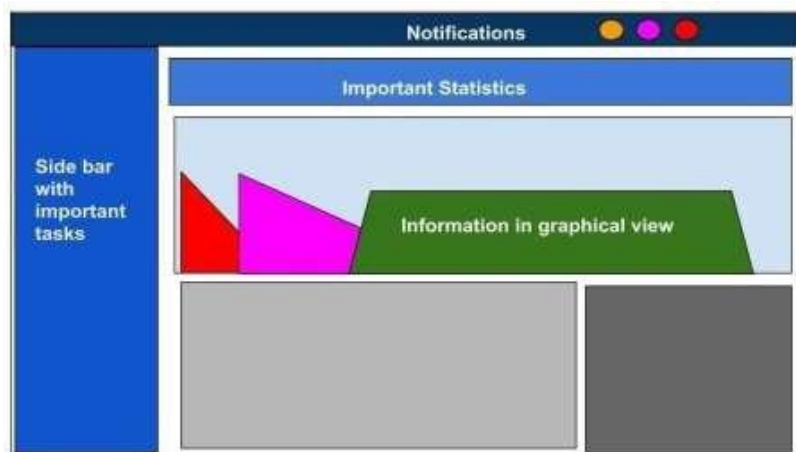
Figure 3.4 Administrator home page Mockup

Figure 3.5 Public user home page Mockup

3.5 Web-Based System

WSFM is a web-based system that allows the users connect to this centralized system from various locations throw web browser. Unlike traditional desktop applications, it is possible to access the web-based systems anywhere, anytime and any web-enabled devices. Web-Based systems just plug and play for the users and they do not need to worry about anything technical. Web-based is most suitable for the system like WSFM system which for the users with different technical knowledge level and from different locations.

3.6 Languages And Used Technologies

The system has been developed using the following languages and technologies.

- PHP (Hypertext Preprocessor) —This is a widely-used general-purpose scripting language that is especially suited for Web development and can be embedded into HTML.
- Bootstrap - Bootstrap is an open source toolkit for developing with HTML, CSS, and JS. Quickly prototype your ideas or build your entire app with our Sass variables and mixins, responsive grid system, extensive prebuilt components, and powerful plugins built on jQuery
- CSS (Cascading Style Sheets)
- Java script

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3.7 Database

MySQL database is one of the Laravel recommended database and free to use and open source. It provides stable and reliable database solution and with advanced features and trusted by the world leading web applications like WordPress, Drupal, Joomla, Facebook and Twitter [8]. Data security, on-demand Scalability, high performance, complete workflow control and the flexibility of open source are the advantages of MySQL. Especially, MySQL gives an assurance of twenty-four hours- seven-days uptime.

3.8 User Interface

The user interface is that the area wherever interactions between humans and machines occur. The goal of UI design is to produce a UI that makes it straightforward, efficient, and pleasant (user-friendly) to control a machine within the approach that produces the specified result. User Interface of the srisat designed in a simple manner with Twitter Bootstrap 3 integration. Bootstrap is a trendiest and effective lightweight frontend framework which come with CSS UI elements, layouts and JavaScript components using the jQuery. Responsiveness is the one of best bootstrap feature which allows the application to run on many devices including smartphones and tablets

Some of the UI components are extended from AdminLTE bootstrap 3 based admin dashboard template to this system for better usability. It is open source and available on GitHub with MIT License[9].

WSFM support the admin and the higher officials to make a strategical decision by providing a graphical data representation. Figure 3.6 shows the admin panel of the WSFM System.

Figure 3.6 Administrator Home page view of srisat System

3.9 Other Technologies And Security Featuries that used to the Implementation

3.9.1 Data Tables - The jQuery JavaScript Library

srisat system enhanced with the free open source Datatable.net jQuery JavaScript library to provide an advanced interaction controls for the HTML Tables. Data Tables come with MIT license that means free to use and possible to modifying and redistributing the code. Pagination, instant search, multi-column ordering and mobile friendly are the notable advanced features in data Tables [10]. Figure 3.7 shows recharge management system used by admin that integrated with data tables technology

Figure 3.7 Sample table that integrated with datatables technology in srisat System

3.9.2 Twilio Short Message Service

WSFM system used Email and desktop notification systems to allow the users connect with an application. These two methods are little far with providing fulltime connectivity scenario because of it is not practically possible to expect the users use these services all time. The solution is SMS notification. SMS services are easily accessible even with feature phones also. It is the best communication way to increase the users' engagement with the system. This completed system used Twilio SMS service to providing SMS notifications. Twilio is one of the leading and stable SMS service providers in worldwide, and come with reasonable pricing [11]. This SMS service allows the developer to deal with trail SMS in developing and testing phase by providing numbers of free SMS. And also provide twenty-four hours customer support.

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PHP code for Twilio SMS

```php
<?php
// Require the bundled autoload file - the path may need to change //
based on where you downloaded and unzipped the SDK
require_once('twilio-php-master/Twilio/autoload.php');
// Use the REST API Client to make requests to the Twilio REST API use
Twilio\Rest\Client;
// Your Account SID and Auth Token from twilio.com/console
$sid = 'ACd27bcf2d4530b35d7a76a1a46fd3222f';
$token = '09fe8795b61f238dc908cf5d90859e6e';
$client = new Client($sid, $token);
// Use the client to do fun stuff like send text messages!
$client->messages->create(
    // the number you'd like to send the message to
    '+94762928985',
array(
        // A Twilio phone number you purchased at twilio.com/console
        'from' => '+1 (256) 667-6288 ',
        // the body of the text message you'd like to send
        'body' => "Your Satellite TV Recharged. It Will Expired On".$_SESSION['date']."
          Your reference number - ".$_SESSION['reference']."
    Thank You Four Coperation SRI SAT TECH"
    )
);
?>
```

above code describe after admin recharge for a particular connection WSFM system will send a SMS to user. this code get from the Twilio web site.

3.9.3 Security Features

The data which are handled by this srisat system is very sensitive. Not only the public security, also the state security is depending on this data. Nowadays, security of the web applications is in very critical condition. Correct the vulnerabilities of the system and keep the application securely is an essential part.

WSFM system is proofed by these following security features to prevent the attacks against the system security.

3.9.3.1 MD5 Hashing Function
Users passwords are saved in the database as its Hash values. Hash values are the one-way property and cannot reversible. WSFM system using MD5 Hashing algorithm and passwords are converted as the 128-bit digest. By this Hash function, user accounts are save even the database was compromised [**12**].

3.9.3.2 Protection against SQL Injection
WSFM system using the Eloquent ORM. it uses the PDO parameter binding to prevent the SQL Injection. This PDO parameter binding method, data which pass from users are not utilized in SQL queries. Therefore, it is not possible to compromise the query by the third person [**13**].

Chapter 4: Evaluation

4.1 Introduction
This chapter describe the testing objectives, strategy and testing plan. And also this chapter critically analyze the testing results.

Quality is the most valuable thing of any product. The software product is different from others by its complexity, invisibility and the limited opportunity to detect defects. By this unique characteristic, the software product requires special attention on its quality. By the IEEE definition, software quality is "The degree to which a system, component or process meets specified requirements". Software quality assurance is the key to ensure the software quality.

4.2 Testing Objective
The main part of the software quality assurance is the software testing. Main objectives of the software testing are to verify and validate the software. Verification ensures that built the software right and the validation ensure that built the right software.

4.3 Testing Strategy
The incremental testing strategy was applied in the testing process of Srisat. Because this system is the large one and the big bang strategy is not suitable for this. The incremental strategy allows to test and debug during smaller iteration. By this incremental testing strategy, unit testing, integrating testing, system testing and the acceptance testing were performed.

4.4 Verification and Validation
The unit testing, integration testing and the system testing were performed by the developer of the WSFM to verify the system and the acceptance testing was done by the variety of users to validate the system. The completed testing process used both black-box testing and white-box testing classification for unit testing and the integration testing and black-box testing classification for system testing and acceptance test[**14**].

4.4.1 Unit Testing

Individual modules of the WSFM system were tested by the developer under this methodology. Identified issues are fixed and the testing process applied again to that fixed modules. This testing methodology helped to capture the defects in the early phase and allows better refactoring of code.

4.4.2 Integration Testing

After the completion of the unit testing, an integration test was executed by the developer under the Big-Bang strategy to test the integrated units. Integration testing verified the functional and performance of software units that are integrated.

4.4.3 System Testing

System testing performed under black-box testing technique. Prepared test cases were tested with completed WSFM system by the developer. Functionalities of the completed system have tested an end to end perspective. Part of the system testing, load and stability test also performed.

4.4.4 Acceptance Testing

Specially selected group of users form both technician and public were performed the testing to evaluate whether or not the system met the software requirements specifications.

4.4.5 Usability Testing

Part of the acceptance test, the usability of the system also tested by the targeted group of persons including both system admin, Technician and public with different educational level and age group. They are allowed to use the WSFM system individually and collected their opinions by the questionnaire which contained the questions under categories of overall reaction, interface, terminology, system information, learnability and system capability. And also those users were allowed to mention the negative, positive aspects of the system.

Security test also performed in addition to these above four testing methods. Part of the security test, srisat system's capability against SQL injection, Cross-Site Request Forgery and Cross Site Scripting were checked with sample inputs.

4.5 Result Analysis of Usability Test Questionnaire

Following analysis completed by the data which got from sixty filled Questionnaires. For the easy understanding, data were graphically converted as the pie chart.

Note: Positive of the answer is increasing with the increase of the color's darkness.

4.5.1 Section: Overall Reaction

From question number 1 to 5								
Answer	1	2	3	4	5	6	NA	
Count (Percentage)	0	0	0.6	6.7	86	6.7	0	
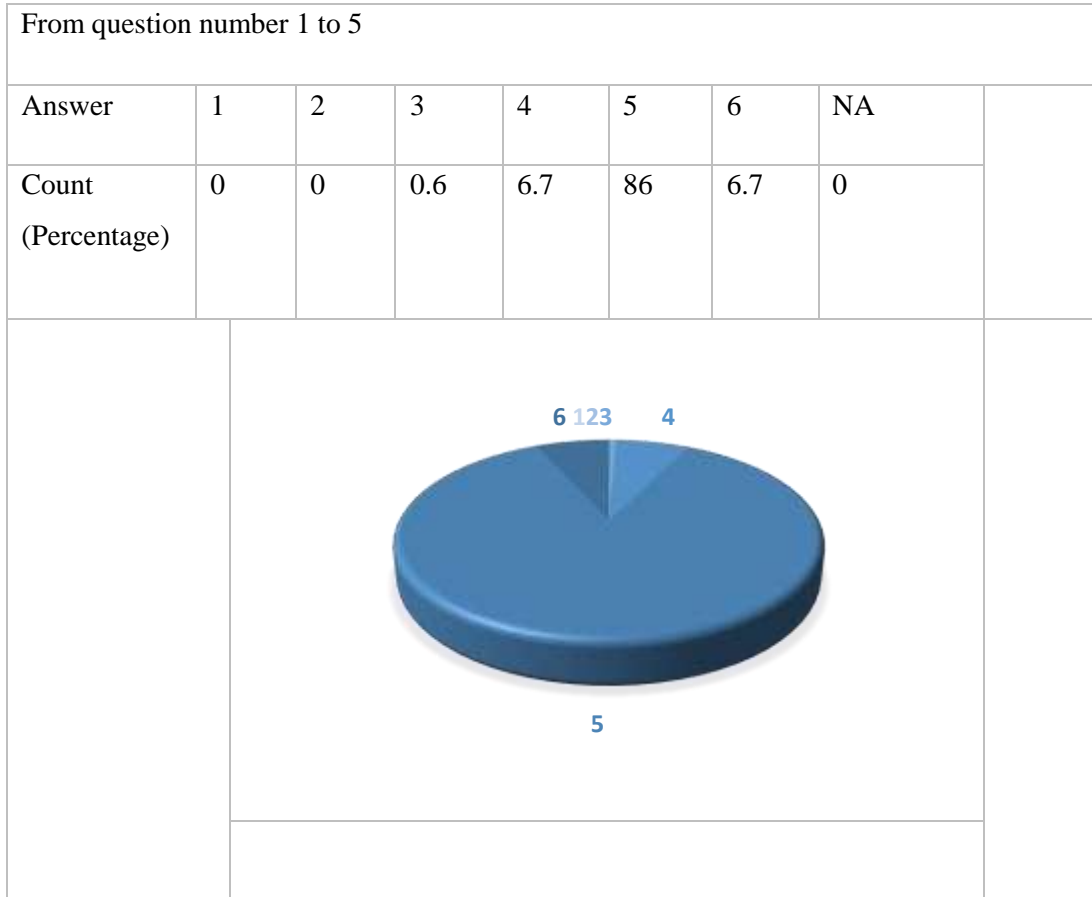
Figure 4.1 Usability test results of overall reaction about WSFM System

The above Figure 4.1 displaying the overall reaction to the software. Users were allowed to express their opinion by the titles of easiness, satisfying, stimulating and flexible. It clearly shows the WSFM system satisfied the users in a good manner.

4.5.2 Section: User Interface

From question number 6 to 9							
Answer	1	2	3	4	5	6	NA
Count (Percentage)	0	0.4	1.25	4.6	88.3	5.42	0
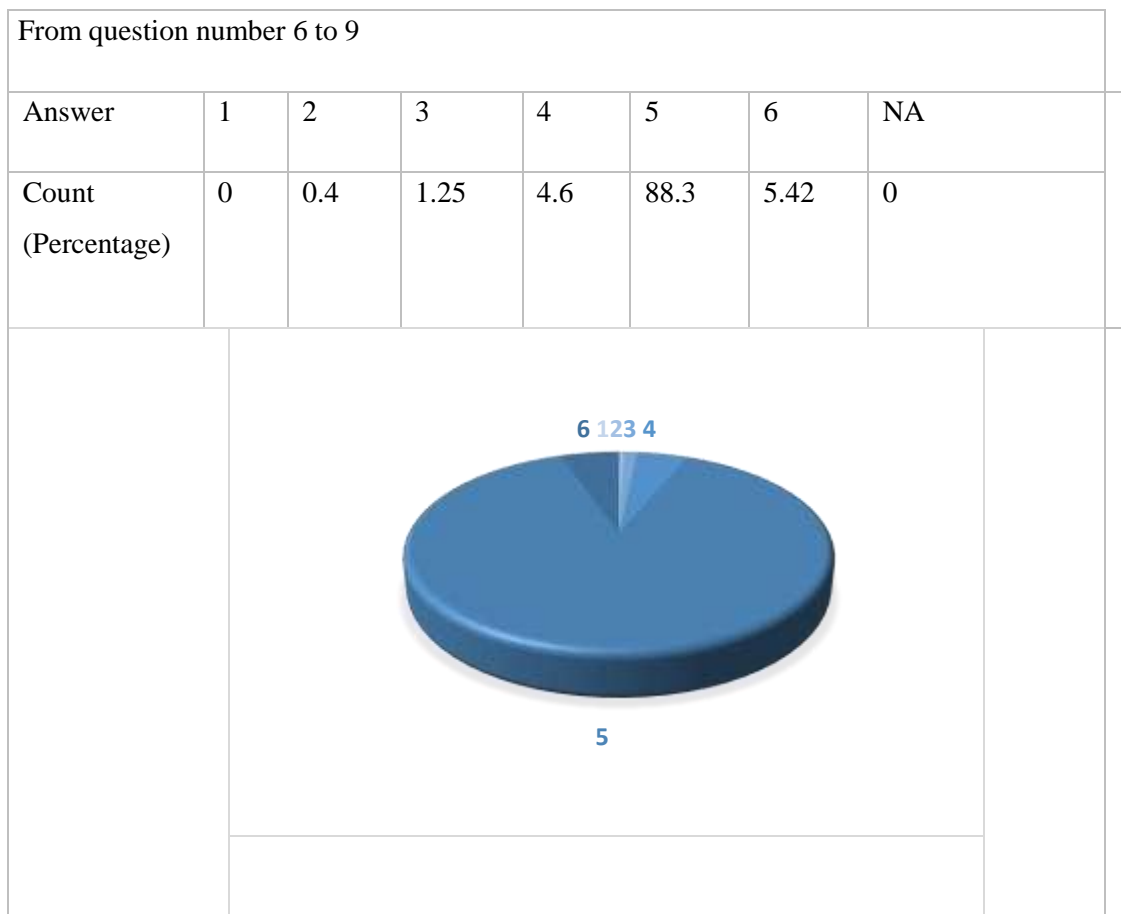
Figure 4.2 Usability test results of User Interface of WSFM System

user-friendliness of the graphical user interface was checked with four question that, Is the reading characters on the screen are easy, system highlighting and simplifies the task, the system organizes the information as correct manner and system maintain the sequence of screens. Summarization answers that show in Figure 4.2 of those questions are shows that the system interface providing a proper friendliness.

4.5.3 Section: Terminology and System Information

From question number 10 to 15							
Answer	1	2	3	4	5	6	NA
Count (Percentage)	1.39	2.2	5	10.56	68.33	12.5	0
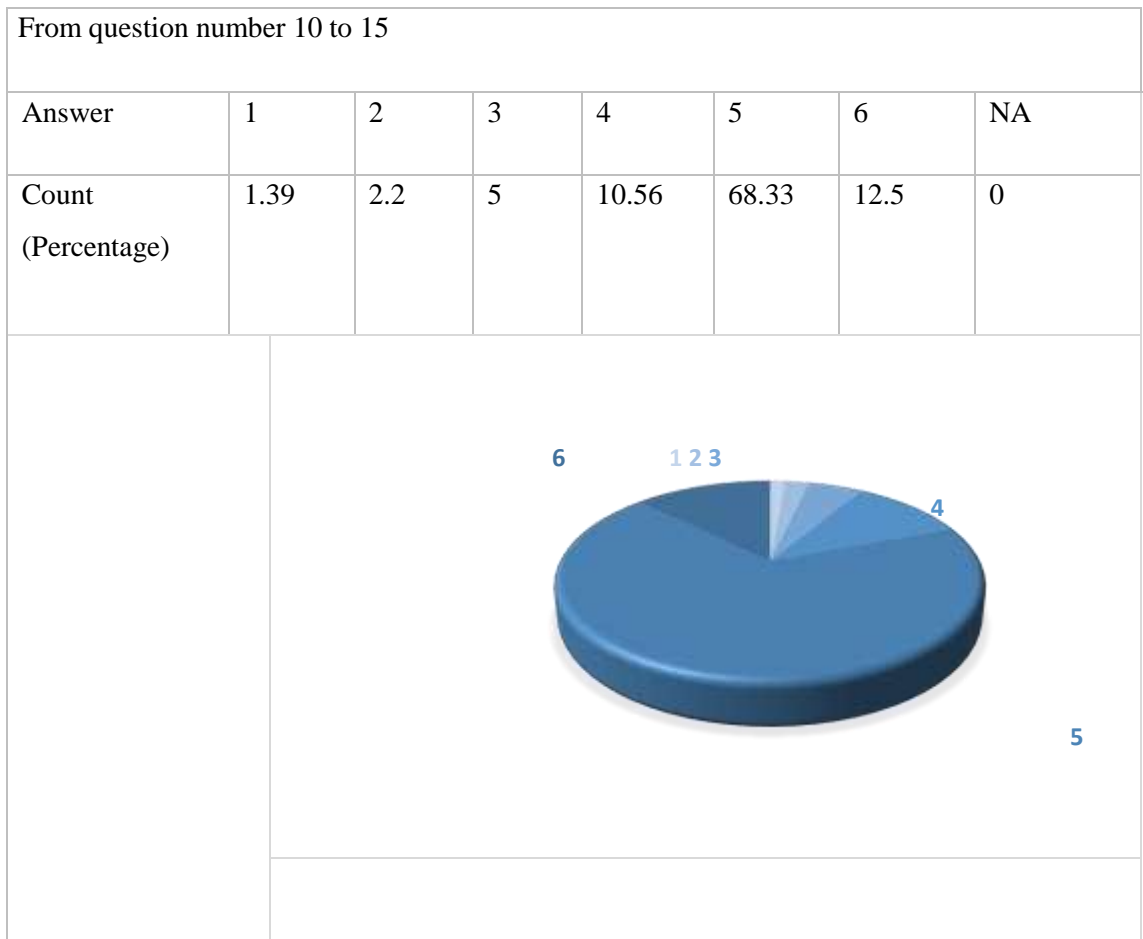
Figure 4.3 Usability testing results of terminology and system information that used in WSFM System

The above Figure 4.3 shows the analysis of terminology and system information of the WSFM System. Terminology and system information was tested by the categories of questions that use of terms, terminology related to the task, position of messages on the screen, prompt for input, information of system progress, error messages. In that above chart, part of the negative is little increased with compare to the previous sections. Hence a deep analysis needs on that issue.

4.5.4 Section: Learnability

From question number 10 to 15							
Answer	1	2	3	4	5	6	NA
Count (Percentage)	0	0	0.42	4.6	87.5	7.5	0
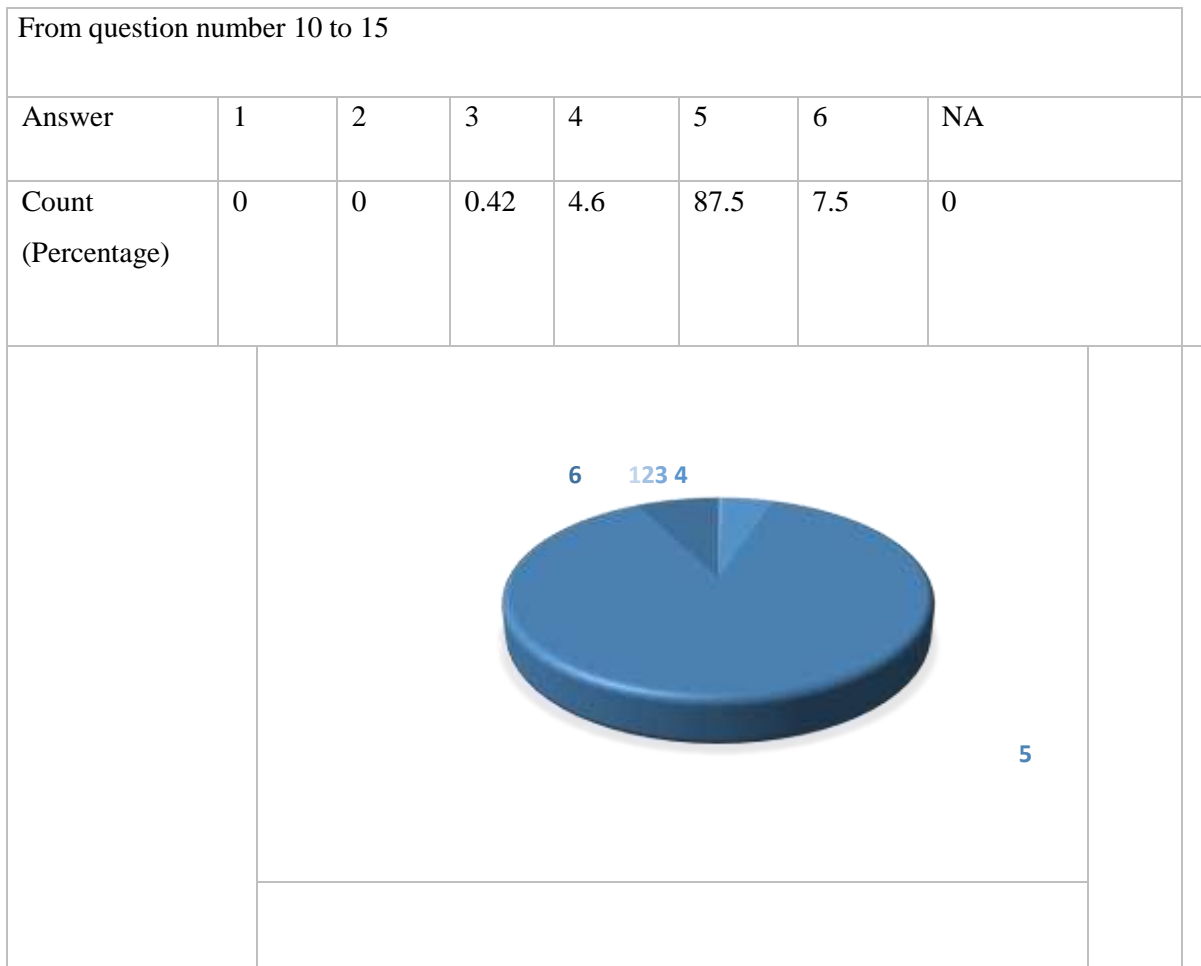
Figure 4.4 Usability results about learnability of WSFM System

Learnability is the important part of usability concept. The system should allow the user to learn them self. Learnability was evaluated by the system's capability of allowing to exploring the new features by trial and error, straightforward task performing, help messages. By this above Figure 4.4, learnability of the WSFM System is acceptable.

4.5.5 Section: System Capabilities

From question number 10 to 15							
Answer	1	2	3	4	5	6	NA
Count (Percentage)	0	0	0.4	5.9	86.7	7	0
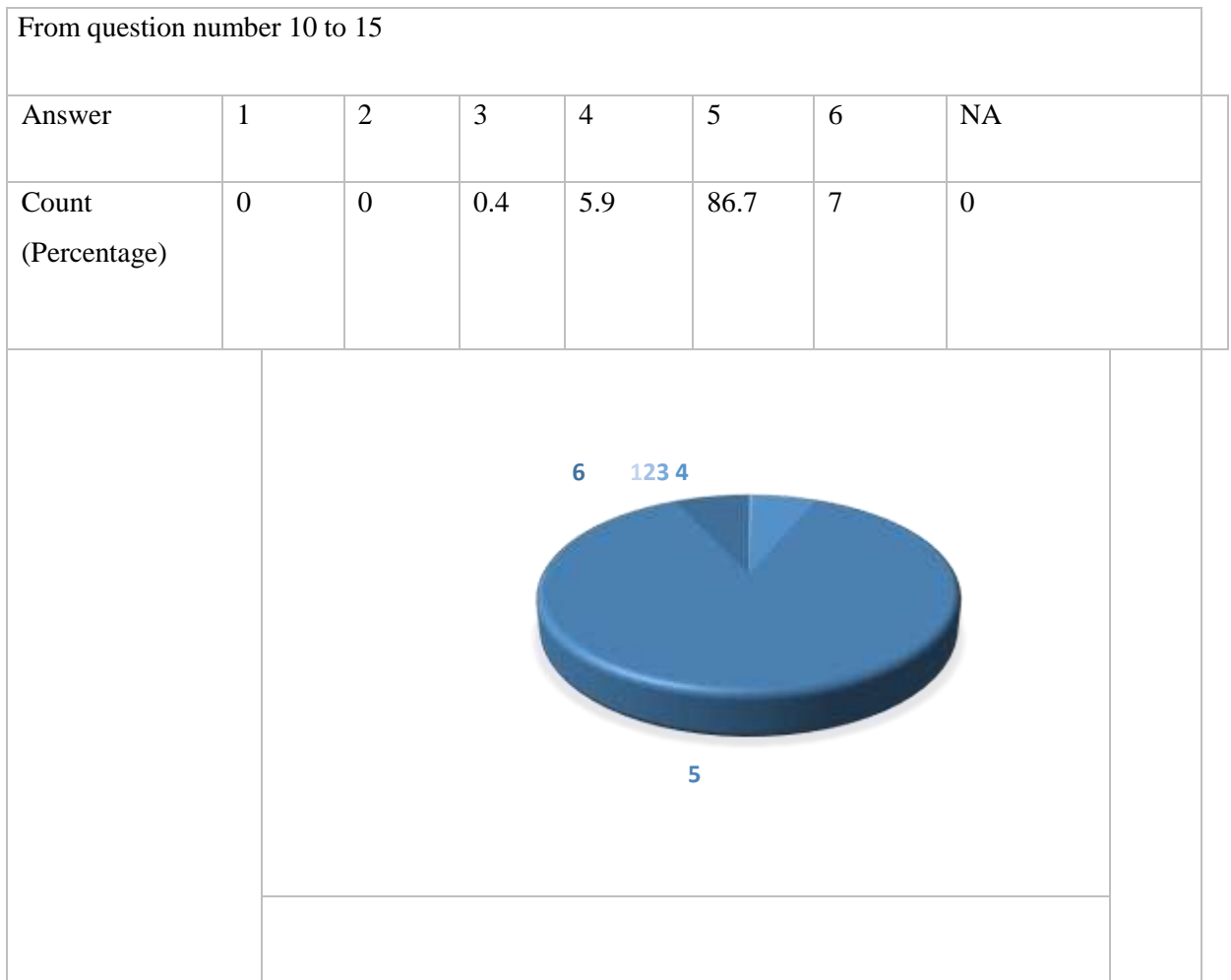
Figure 4.5 Usability results about system capabilities of WSFM System

System capabilities which that speed, reliability, correcting the mistakes and all user-level support were evaluated. Result shows, that the system capabilities are perfect.

CHAPTER 5 Conclusion

5.1 - Overview

WSFM which is a well-known satellite tv sales, recharge and maintenance shop in Jaffna district. Without considering new business technologies, they have started the business as a traditional manual business. However, with the business competition they have come to know that they need some change in the way of carrying out the business, a way to simplify the operations, utilize the resources and to enhance customer relationship to gain a better position in the market. Online recharge, repair complaint(online), generate management reports daily or monthly, assigning a technician, sending notification (SMS) which are main new deliverables of this system.

5.2 - Problems Encountered

One of the major problems encountered during the development of the system was the initial lack of knowledge regarding the development tools, and languages. Online tutorials, forums and books were used to gain the required level of knowledge.

5.3 - Lesson Learnt

The knowledge and experience which I have gained during the project development period is vast. It was able to gain better idea of applying theories and techniques into practical scenarios. Software Engineering and Project Management Knowledge and Skills were able to brush up in a great deal. More importantly, good experiences gained in data gathering and requirement analysis activities.

Obviously vast level of technical knowledge was gained by implementing this system in some areas such as PHP, JavaScript, AJAX and HTML etc. Further the skills like finding appropriate information sources were developed. Moreover, code writing skills were improved.

As a whole the implemented system was successful, since it achieved all the planned functional and non-functional requirements as well as some additional features. However, there was a deviation from initially planned time schedule, due to more time was taken during the analysis and design phase of the project. A great deal of effort was required to move again the time schedule by working some extra hours.

5.4 - Further Work and problems encountered

The developed web-based system for sri sat services can be improved further by adding more features. One major improvement which can be done is improving the security features of the system.

These are the future extensions:

- It is possible to create our own mail server.
- It is possible to create chat server so that user can communicate with technical person and get instant problem solutions.
- adopt Google map to indicate each user's locations.

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Appendix A - PACT Analysis for Web Based Satellite TV Fixing Management System

A.1 Introduction

The purpose of this article is to act as a PACT analysis for a Web based Satellite Tv Distributers. Nowadays in srilanka the satellite television is use by children to elders for not only the entertainment purpose but also the education and research purpose. These satellite tv channels charge a fee for their service throw the agents. The customers can subscribe these channels by monthly basis or annually by their wish. Charges were depending on the channel companies. For example, there are some satellite Tv companies which are dish-TV, Videocon, Sun direct provide services in srilanka, and also these satellite tv companies provide channel base package. Sri-Sat service is the organization which provide the satellite tv server as the agent of these above companies.

The public can easily make complaints without any delay with complaint trace facility and also they can get security related warnings and information which are the post by police through this system on time.

A.2 People

Under this we discuss people's abilities and special characters, who are interact with this web base system. In IT field we can mentioned that interact people as stakeholders. Stakeholders Customers (Registered, nonregistered), Admin, Technician. Every human being differs from one another, from physical appearance to the attributes they have. People have unique personalities and react to things in different ways. This depends largely on the five senses, that is hear, sight, smell, taste, and touch, so it is important for my website to be friendly, usable, pleasurable for all kinds of people. System will be used by people approximately from 18 years to 70 years of age. There will be both male and female users. There can be people with some disabilities which limit the physical function such as blind or color identifying problems. We will need to make sure that colors that can affect color-blindness are not mixed. So This website caters for people with disabilities such as visibility impairment (such as long/short sight, color blinded etc.) There are different types of visual impairment. Some people face difficulty of seeing small things.

So, We will need to make sure that the contents in our site can be magnified for such users. We have to ensure that the quality of the site is undisturbed when the information is

magnified as this may cause confusion for many users. Clients getting to our webpage might be beginners, intermediate or experts, so it is compulsory for this website to satisfy all of its users. Because this organization's growth level is starting point. If any user has a law computer literacy, they don't like to use web base application. So, it is most probable that even those users that are very computer/internet literate may still be beginners when they visit our website. For example, use simple terms and gave a FAQ support.

.

A.3 Activities

There are numerous qualities of activities that designers need to consider. These can be both basic and complex. Main Activities of this Sri sat service's Website are Customer registration, Find a satellite tv/package through search, Order new satellite tv, Package recharge, Repair complaint,

- The regularity of activities- Remainder for about package end date. This will be done by this website through SMS alert to every registered customer. After that that customer can select his package and instantly make order through this website.

- The response time from the system- At the search time the suitable results will be display without any delay.

- Individual vs co-operative work: When a customer makes a repair complaint admin should assign a technician for that job. When the admin assigns a technician for any job system allow only available technician. So, it is very important at the end of every job technician must notify his job finish through his portal.

- Coping with errors: When registration time user makes any errors such as at name field input any number there will be a java scrip client-side error message display about the type of the error.

- The textual information- And when any customer wants to make any online order all instructions clearly display at this website.

- There will also be forums and blogs so that people can give their opinions etc. This website Users also have a user feedback facility. The site will also allow users to see what type of satellite tv for them, for example dish tv, sun direct etc. There will also be a search facility for users to use if the need to. The search facility, and inbuilt google map will allow easy access of information.

A.4 Context

Physical Environment

The context type that affects this website is the physical environment. Physical environment- this is important for Sri sat service. so, because I can understand what the physical environment of the website will be. For example, the website should cater for people who may be logging on to my web site in an area that has slow internet access. This will be a problem if they decide that the website is taking more time to upload. Users will access the website in different places such as the home, workplace, Public park or internet cafes. Therefore, it is vital that the site is accessible for those visitors that use different resolutions, operating systems, color depths platforms and browsers

Social Environment

When a customer makes a repair complaint that response time will depend on technician availability. Because at that time all technician are non-available that will take more time.   A.5 Technology

Technologies can carry out a variety of operations and usually consist of a lot of data, or information. Interaction is required and so there is a need for a range of styles. There are many different technologies that users can use to access our site.

Appendix B – Use Case Narratives

Use case Name	User login
Use case ID	01
Version	1.0
Priority	High
Actors	Admin function, Admin Management, Technician, Customer
Description	Authenticate the user
Pre-conditions	Internet connection should be available
Main Scenario	1. visit the application 2. click the „login" button 3. The system asking for the user name and password 4. user provides the username and password and click login button 5. system does authentication 6. system checks the account activation status 7. system redirect the user to the suitable homepage by his/her role

Use case Name	User Registration
Use case ID	02
Version	1.0
Priority	High
Actors	Admin Functional, Customer
Description	Register the user into the system
Pre-conditions	Internet connection should be available
Main Scenario	1. visit home page 2. system asks nic number, type, password, confirm password 3. user enter the details and submit "register" button 4. system redirect the user to the second registration form 5. user enter the details and press "next" button 6. system redirect the user to the "account activation instruction page"

Annex C - Activity diagrams of WSFM System

Activity diagrams are uses to model the activities of the system. These diagrams represent the dynamics of the system.

C.1 Activity diagram of user login
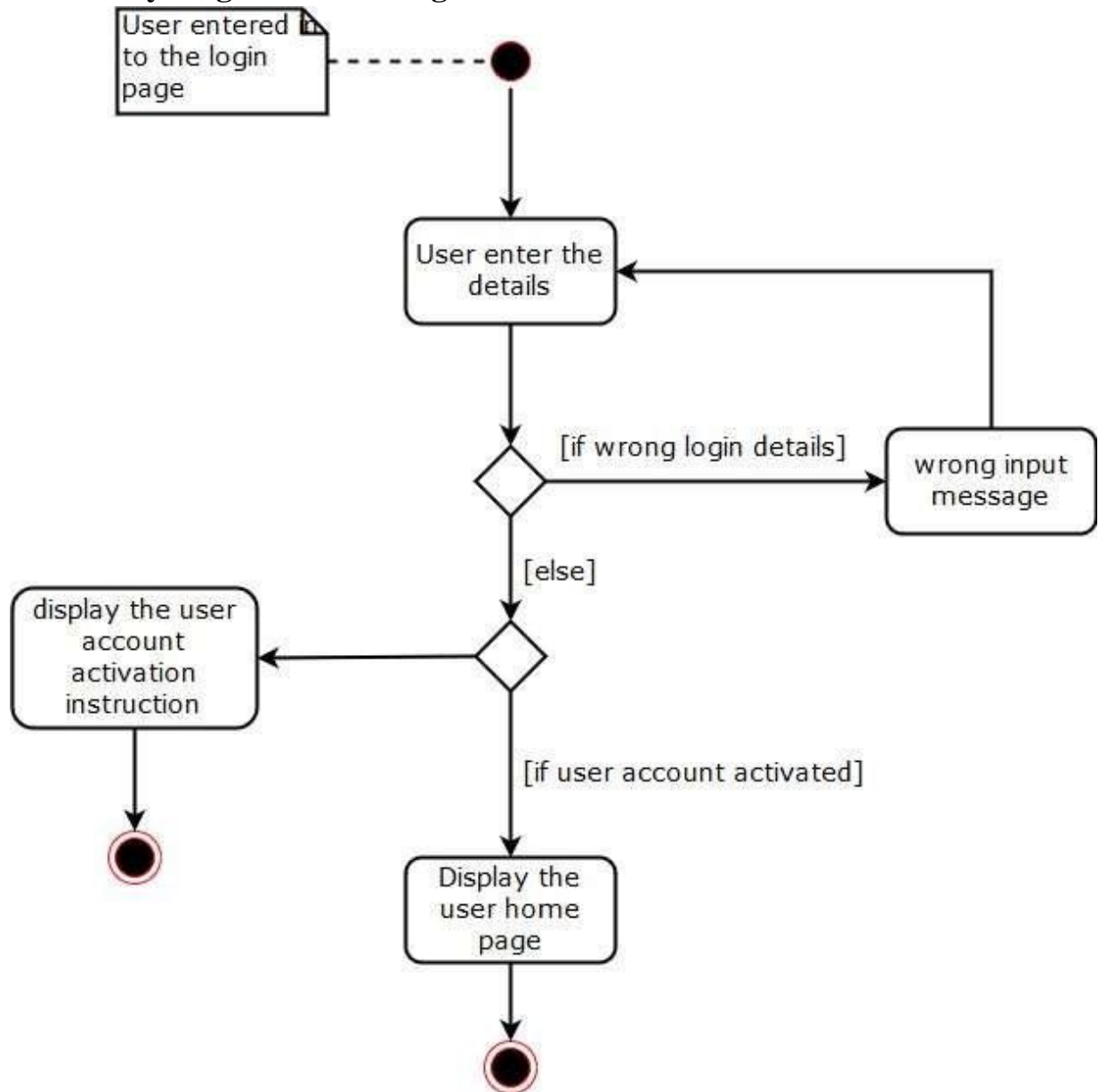
C.2 Activity diagram of user Package Recharge
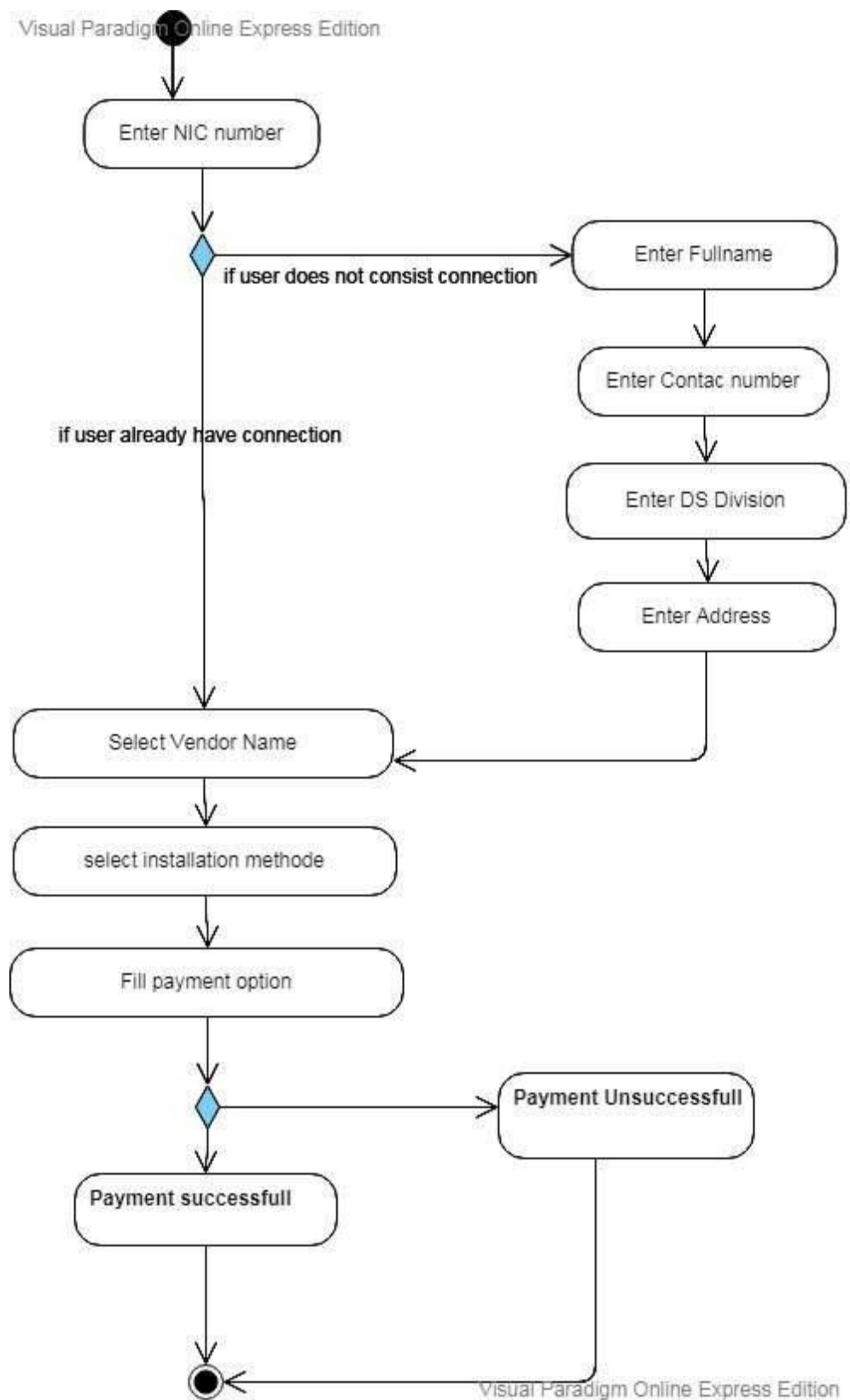
Annex D - Sequence Diagrams of WSFM System

Following sequence diagrams are shows object interactions arranged in time sequence.

D.1 Sequence diagram of user registration scenario
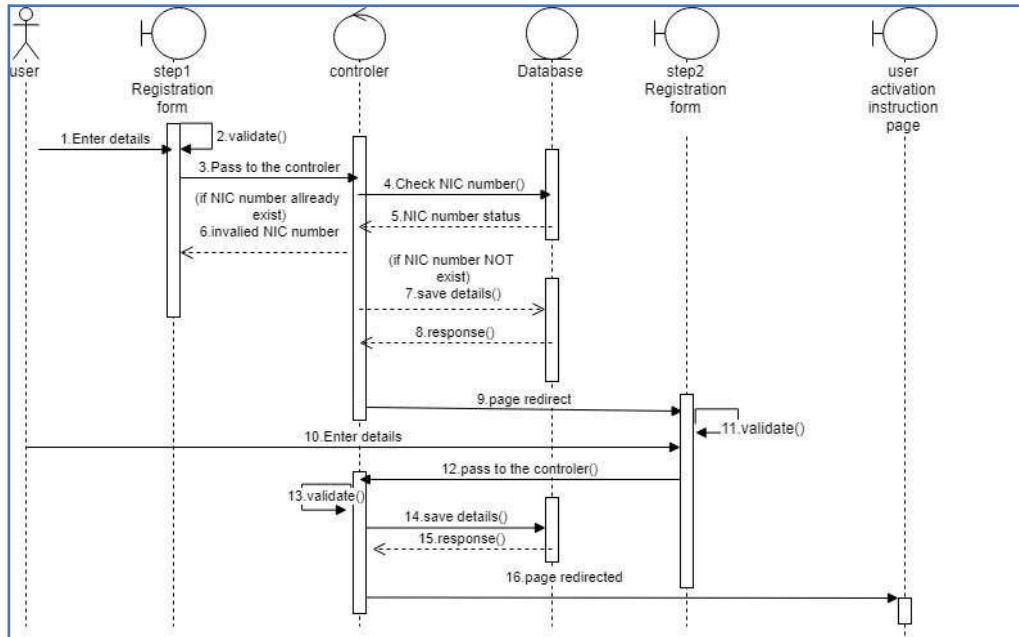
D.2 Sequence diagram of user registration scenario
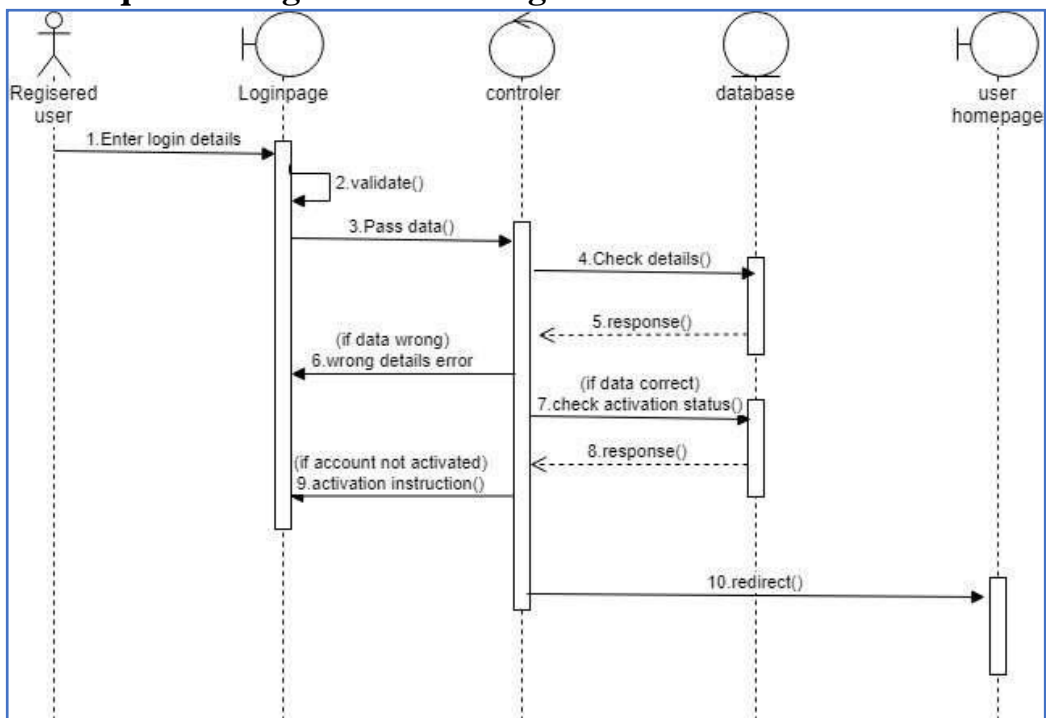
D.3 Sequence diagram of Package Recharge
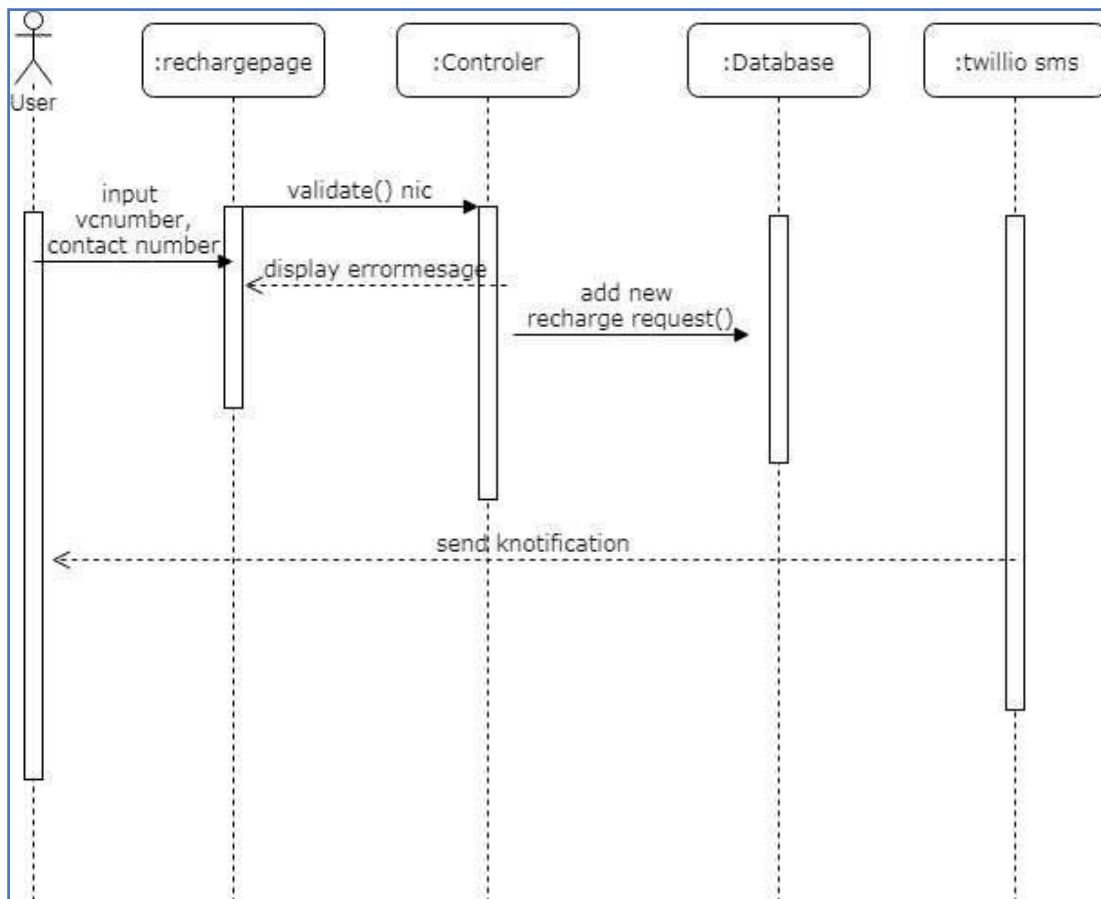
Annex E – Test Plan and Test cases

E.1 Introduction

Test plan, which covers all types and phases of testing, was used as a guide for the entire testing process. The test plan was designed before the implementation of the system. A test plan includes test objectives, schedule and logistics, test strategies, and especially test cases. Test cases were created once the test plan was designed. That consists of data, procedure, and expected result, and represents just one situation under which the system or part of the system might run. Test cases were designed for each module separately to reduce complexity of the testing process. The following tables specify some test cases.

Test Case Id	Test Objective	Precondition/ Rerequiste	Steps	Test Data	Expected Result	Actual Result	Status
1	Verify to staring of the system	Need Browser and a internet connection	Type the url on the browser and click the enter button	www.srisat.lk	System Home page open		pass
Admin							
2	Verify the login module (negative)	Open the login page	Type the username at the username box and type the password at the password box	Incorrect username or password	Display an error message		pass
3	Verify the login module (possitive)	Open the login page	Type the username at the username box and type the password at the password box	correct username and password username:admin pass:admin@123	Redirect to the admin's home page		pass

4	Add a new user	Open the and usermanagement page	Fill in parameters for the user who already doesn"t have an account.		The administrator should be able to create a new user.		pass
5	Add a New Technician	Open the and Technician management page	Fill in parameters for the Technician who already doesn't have an account.		The administrator should be able to create a new Technician.		pass
6	Add a new satellite tv package	Open the and Technician management page	Click add new package link and fill out correct data & click save.	Provide to interface new enter pack info ,and save to DB	Admin should be able to Create a new package		pass
7	Request to view system users.	Open the usermanagement page	Click usermanagement page and click view user	Click view all button	Display the user s and their related details.		pass
8	Take backups.	Open the backup page	Open the suitable page	Enter the correct username and password	Database backup will be saved		pass
9	Assign technician for a particular job	Open customer repair management page	Click assigning technician button and select available technician for each job		Technician id will be saved in the repair job table.		pass

10	Send Notification to customer □ possitive	Open usermanagement page	Click usermanagement page and click notification button select all or particular user and type the message and click the send button.	Click the all or particular user radio button , Type message in the box	Notification will be send to the customer's inbox.		pass
11	Send Notification to customer □ negative	Open usermanagement page	Click usermanagement page and click notification button select all or particular user and type the message and click the send button.	Click the all or particular user radio button , Click send button with empty message box	Warning will be display cann't send without message.		pass
Report Module							
12	Generate reports		Select parameters and click go button/ generate button.	Select year, mont	The system should display reports on screen and also as a popup to print.		pass
13	Test valid Date/year/ID.		Select valid Date/year/ID selection.	valid date and year	Display and popup valid report.		pass
14	Test invalid Date /year/ID.		Select invalid Date /year/ID.	Invalid date or year	Display Invalid		pass

					Selection Error.		
15	Print Report.		Click print button.		Send print job to the printer.		pass
			Payment				
16	Make payment		Type the amount , select the payment method and type the other parameters such as card pin no, expiry date.		Payment process will be successful y done.		pass
			Technician				
17	Send job status notification	Open the technician's portal	Click job tab and click his finish job then select send notification	Select job id and fill message in the in box	Notification n will be send to the adman's inbox		pass

E.15 Usability Test Questionnaire

<table>
<tr><td colspan="4" align="center">Questionnaire for Usability Testing</td></tr>
<tr><td colspan="4" align="center">Web Based Satellite TV Fixing Management System</td></tr>
</table>

Name : ....

Age : ....

Higher   Educational   Qualification   :
....

Job   Designation   :
....

			1	2	3	4	5	6		NA
OVERALL REACTION TO THE SOFTWARE			1	2	3	4	5	6		NA
1		terrible	O	O	O	O	O	O	wonderful	O
2		difficult	O	O	O	O	O	O	easy	O
3		frustrating	O	O	O	O	O	O	satisfying	O
4		dull	O	O	O	O	O	O	stimulating	O
5		rigid	O	O	O	O	O	O	flexible	O
SCREEN			1	2	3	4	5	6		NA
6	Reading characters on the screen	hard	O	O	O	O	O	O	easy	O
7	Highlighting simplifies task	not at all	O	O	O	O	O	O	very much	O
8	Organization of information	confusing	O	O	O	O	O	O	very clear	O
9	Sequence of screens	confusing	O	O	O	O	O	O	very clear	O
TERMINOLOGY AND SYSTEM INFORMATION			1	2	3	4	5	6		NA
10	Use of terms throughout system	inconsistent	O	O	O	O	O	O	consistent	O
11	Terminology related to task	never	O	O	O	O	O	O	always	O
12	Position of messages on screen	inconsistent	O	O	O	O	O	O	consistent	O
13	Prompts for input	confusing	O	O	O	O	O	O	clear	O
14	Computer informs about its progress	never	O	O	O	O	O	O	always	O
15	Error messages	unhelpful	O	O	O	O	O	O	helpful	O
LEARNABLITY			1	2	3	4	5	6		NA
16	Learning to operate the system	difficult	O	O	O	O	O	O	easy	O
17	Exploring new features by trial and error	difficult	O	O	O	O	O	O	easy	O
18	Performing tasks is straightforward	never	O	O	O	O	O	O	always	O
19	Help messages on the screen	unhelpful	O	O	O	O	O	O	helpful	O
SYSTEM CAPABILITIES			1	2	3	4	5	6		NA
20	System speed	too slow	O	O	O	O	O	O	fast enough	O
21	System reliability	unreliable	O	O	O	O	O	O	reliable	O

22	Correcting your mistakes	difficult	O	O	O	O	O	O	easy		O
23	Designed for all levels of users	never	O	O	O	O	O	O	always		O

	……………………………………							………….	
	Signature							Date	

Annex F – System Documentation

This documentation provides guidelines prior to the setup of the WSFM. This is to assist the software engineers, Administrators and managers to install the WSFM in their PC"s, Servers or Workstations. The system documentation can be referred if there are any changes to be made in the WSFM.

In order to install the system, the Device chosen for installation should meet the following prerequisites of Hardware and Software.

SOFTWARE REQUIREMENTS	
Operating System	Microsoft Windows 10/Windows 8/Windows 7. Linux Ubuntu 9.0 or above
Bundle package	XAMPP 1.7.1 or above / LAMPP /WAMPP. or Individual packages- MySQL5.1 ,PHP 5.3, Apache2.2.
Code editor	Adobe Dreamweaver CS or higher version / suitable editor.
Image editor	Adobe Photoshop Version 7 or a higher version.
Web browser	Internet explorer/Fire Fox/Google Chrome/Opera/Safari.

WSFM SETUP

1. Copy the **WSFM** folder given in the supplementary CD and paste it inside the htdocs folder in the following paths,

Windows Environment with XAMPP installed - the path would be - C:\xampp\htdocs

Linux Environment with XAMPP installed – the path would be – /opt/lampp/htdocs

2. Install other relevant software packages according to their user manuals.

DATABASE SETUP
1. Open phpMyAdmin by typing the following URL in the browser's address bar

http://localhost/phpmyadmin/
2. Login by giving the username and password.
3. Create a blank database named WSFM.
4. Click the Import tab and browse through the supplementary CD"s database folder (The path would be .../Database/ WSFM sql) and select WSFM.sql file.

5. Click the go button to import the folder into the nearly created WSFM database.

CONFIGURATIONS

1. Create a folder to store the daily backups in any partition of your operating system or at a network location.

2. Define the backup folder path file in a_backup_restore.php file, in this following path assuming XAMPP package was installed in windows environment.

C:\xampp\htdocs\Teafms\application\controller\a_backup_restore.php

3. Define backup folder path in a_backup_restore.php file like,

   $save_path = "E:\\backup\\"

4. Configure the Database username and password in the db_helper.php file in this following path, assuming XAMPP package was installed in windows environment

   C:\xampp\htdocs\Teafms\application\helper\db_helper.php

WSFM USAGE

Once the WSFM folder is located in htdocs folder and the database is imported and the configurations are done. You can open preferred web browser and type the following URL in the address bar: http://localhost/teafms/login or http://127.0.0.1/teafms/login And Login to gain access, by providing correct username and password.