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

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

Certified by:

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_____

Signature: Date:

Abstract

As a very successful business in past 10 years in hardware industry in western province of Sri Lanka; I.M.N.Hardware requires Information management system to fulfill their service.

The Current system is manual and use Microsoft office package for data processing. This method is very time consuming and it make staff extra work. The staff have to document everything in the business and it impacts the company's daily processes. Current system could not handle large amount of data and highly inflexible, Business continuity is at risk in case of damage to information and analysis data is very difficult.

Therefore the objective of this project was to design and develop a system that provides a solution to solve existing issues, improve the efficiency and effectiveness of the whole processes and mitigate the risk. After carefully analyzing the requirements, a new Information System was proposed and designed.

In this system mainly includes about the handling the products, manage the employees and customers. At the products module include about the issuing and receiving products. For the customers module include there details about payments & their personal information's. After the payment receipt will be printed through the system. And employees' module includes their personal details, salary details. Management can get report by this sytem.It is easily to get day to day reports by this system.

System was implemented using Visual Studio .NET (vb.net) and MYSQL handles the database components. The entire application could be viewed on Windows platform. Apart from the implementation, the development practice included a proper Quality Assurance process, user training sessions, and demonstration to improve the benefits of the system.

An information system is an imperative requirement which is directly affect customer satisfactions and the business progress. Therefore, it is essential to establish and enforce a proper system that will serve as a tool in utilizing processes in the most efficient manner.

Acknowledgment

I would like to express my deepest appreciation to all those who provided me the possibility to complete this project. A special gratitude I give to my supervisor and coordinator, Dr.Lakshman Jayaratne has supported and guided to carry out the project and observant during the progress of the development of system, stimulating suggestions and encouragement.

Furthermore I would also like to acknowledge with much appreciation the crucial role of the staff of I.M.N. Hardware, who gave the permission to use all required documents to complete the project.

I would like to take this opportunity to thank my friends, who gives endless support and advices during the development of this project.

Millions of thanks to my parents and beloved family. Without the continued strong support and encouragement provided by them, especially during those difficult times of my project I may have not reached the end of this strenuous journey.

A.M.S.J.Atapaththu

List of Abbreviations

TCP/IP	Transmission Control Protocol/Internet Protocol
SQL	Structured Query Language
PC	Personal Computer
OS	Operating System
GUI	Graphical User Interface
UML	Unified Modeling Language
ERD	Entity Relationship Diagram

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Chapter 1 - Introduction

1.1. Nature of the business

Information Technology (IT) has long been viewed as having great potential for improving decision making in Srilanka. IT has connected the world globally and is now changing our life style and social consciousness dynamically. In all phases of the hardware industry, information technologies are vital to the management and success of a business. Hardware systems has also been greatly influenced by IT. Information Technology is rapidly becoming more and more visible in society and other sections. IT refers to how we use information, how we compute information, and how we communicate information to people. People must have computer and information technology. To participate and make informed decisions in the industry a person must have ability to gather, process, and manipulate data.

This chapter gives the background of the organization, background of the problem, significance of the problem, overview of the proposed solution and the objectives target to achieve from the proposed solution given. This chapter will also discuss about the complete overview and list the requirements which meet the needs of the Hardware Management System.

1.2 Background of the Organization

I.M.N Hardware is located in Kurunegala and it has 5 branches in Kurunegala and Anuradhapura districts. Thirty employees working in that hardware in different locations. All the hardware main stock of the hardware is located in Kurunegala. After that they distribute item for other hardware's. They handle most of the day to day operations. They faced lots of problems because they done all the worked manually.

1.3 Overview of the current System

Existing system is content with paper based processes. System main actors are Manager, Agent, Operator and Super user. These levels are in the operational level but there is no facility to control the authority level with the current system because all processes are paper base. Any party of the organization can access the particular document without any restrictions. At present Customer Details, Main Stock Details, Item Receive Module, Item Issue Module, Return Module, Item Sale, have been maintained in separate registers by operator.
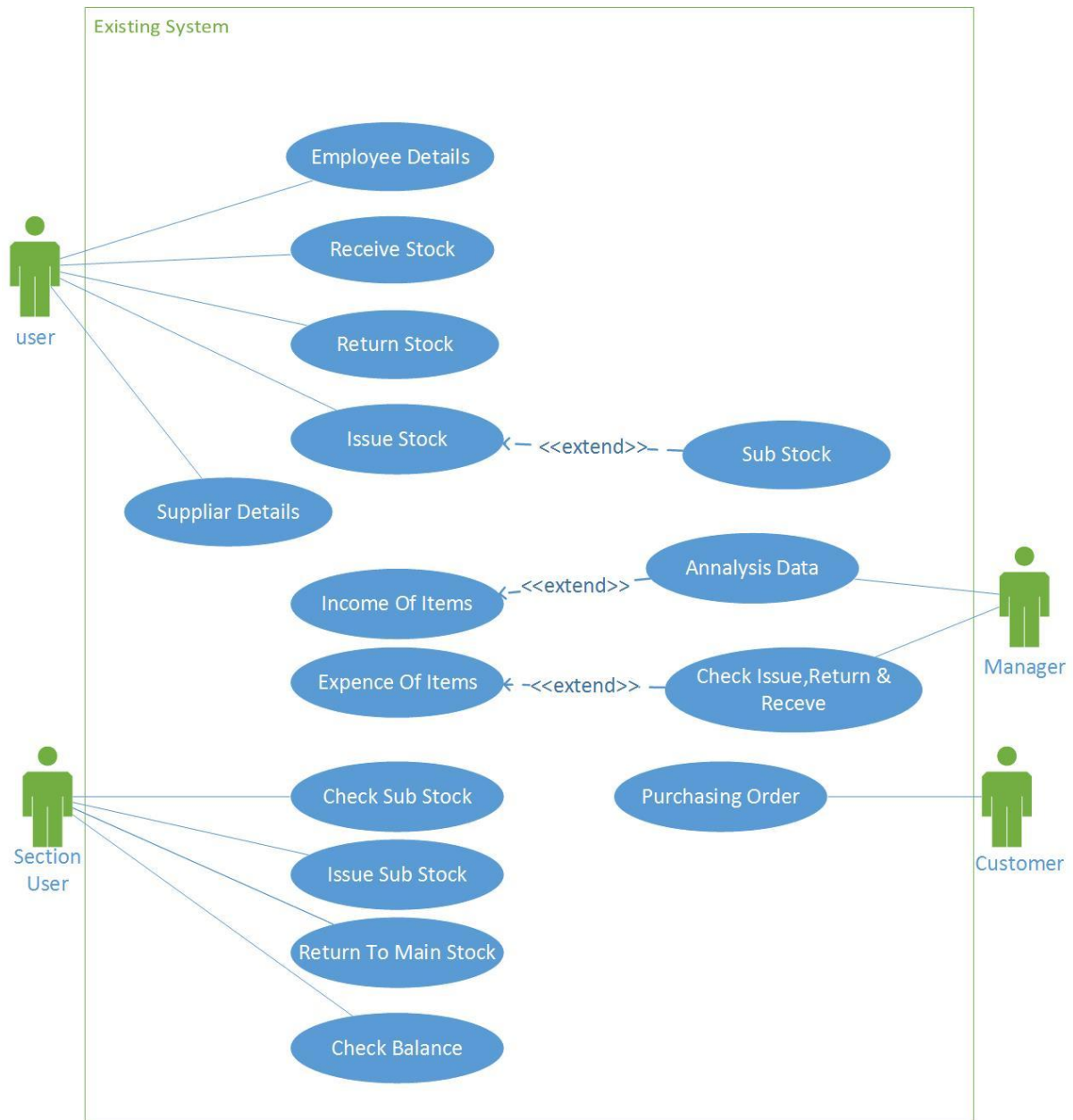
Figure 1 : Use case for existing system

1.4 Problem Statement

They did all work manually. They enter all the data in paper based. Due to manual handling of work at hardware's, it leads to wrong decision making which mainly affects employees. Managers do not have complete and up to date information about the stocks and items. Illegible handwriting leads to many confusion and many documents were found with incomplete information. It results in incorrect resource allocation for the hardware's.

Mishandling of stocks is untraceable and it has become a serious problem at present. It is difficult to find out where the problem is occurring.

- Check the availability of the stock whenever they needed.
- They keep so many paper works for every day stock handling.
- All these procedures are time consuming is the main problem for the hardware.
- Cannot get reports.
- Traditional methods not user friendly and paper wastage.
- It is very difficult to analyze the paper works manually.
- Manual work very time consuming.
- Information was redundant and inconsistent.
- It didn't integrated all the modules and decision making was difficult.

1.5 Objective of the proposed system

- To get accurate decisions for the management to ensure stock allocation is done appropriately and reduces wastage whilst saving time.
- To ensure that the relevant sub hardware's do not involve in corruption and it has become a major concern for the hardware.
- Providing user friendly and simple services through the system.
- Aims to develop a strong information management system to handle hardware information, stock management and employees.
- Emphasizing more security by adding user accounts with different privileges to hardware's and regular back up of data.
- Ensuring an informative MIS system with detailed report for different sections.

1.6 Scope of the Project

This system includes both hardware MIS & Stock management system. In hardware MIS mainly includes about their products, customers & employees. For the customers module include there details about payments and their personal information's. After the payment (cash, cheque, credit) receipt will be printed through the system and employees' module includes their personal details, salary details. Finally they can get any kind of reports that they want through the system.

In the other section of the system includes combined of both inventory part and stock part. In the hardware they had various types of items. And they had branches. For this main, subcategory and sections included. Then according to categories include items. Items provided by the different suppliers. In the system can allocate different item for different suppliers. In item receive section includes about all the receiving details according to bill numbers and items. And also prices of the item will be maintained in this section. In the issue section all the items issued for other hardware's. All the issue details maintain in issue section. All the return items maintain in return section. And also some items may be expired. Then they destroy that items. This section also handle by this system. Some of the employees & managers should able to log to the system and do their tasks. This should be able to category different user levels and give privileges.

Some tasks should be able to access for managers. User management & login module handle these kind of situations. This system should be able generate any kind of reports that they needed. Such as main stock, employees, customers,receving and also receipts that the user want. Should be simple and user friendly for the users.

1.7 Benefits

- Eliminate data redundancy
- Increase the efficiency of the existing process
- Provide better user friendly environment

Chapter 2- Background / Literature Review

2.1 Literature Review

A literature review discusses published information in a particular subject area, and sometimes information in a particular subject area within a certain time period. A literature review can be just a simple summary of the sources, but it usually has an organizational pattern and combines both summary and synthesis.

Computerization makes it easy for a company to do their internal and external works. There are many studies and researches found in terms of implementing Hardware MIS and stock control software. The point is that they are very common and people may find it difficult to customize according to their business needs because of their busy life cycle. Business people are now interested in having customized software module for their business to reduce their work headache. Because they believe that customized solution is always becomes user friendly as it is required very less technical knowledge to operate. Because of these reasons they only need simple user-friendly system.

2.2 Similar Systems

There are several Hardware control systems & stock control system available in the technology market. There also many online database system available these days. Below are some of the top example available in the online market.

Sumelro Hardware System → This is one of the hardware's located in kurunegala. In this hardware there is system for control hardware items. I.M.N. hardware owner is friend of this hardware. So I visit there and looked features of that system. In this system also include item receive and issue modules. But there is no subsections. And user logins provide by the software developed company. Item return module not include in this system. Not having proper navigation user faced problems to find the interface. In this include only day to reports like issuing and receiving.

Zoho Inventory→Zoho Inventory is an online application that enables to manage orders and inventory. With multi-channel selling, shipping integrations and powerful inventory control system. In this system can divide categories into three subcategories. Users can log to system any place in the word and can order the products. They shipped item only for their country. Can customized the features of this system. It is advantage for the system users. Proper

reporting module also included in this system. But it is not user friendly and not provide proper user manual.

InFlow Inventory→InFlow Inventory Software offers users and opportunity to organize every aspect of their business by drawing information on customers, warehouse stock, pending orders, sales, and more. InFlow is dominated by four major modules for organizing a business, including Sales, Purchasing, Inventory, and Reports useful for most small business managers. InFlow was designed for small to mid-sized businesses looking for a simple, easy to learn and use solution to completely manage their inventory from purchasing to sales. The menu button located on the top left gives you access to all important aspects of the software including sales, purchasing, inventory, reports and settings. Access restricts right option that has access to see or modify the different component. InFlow allows users to create different login users, each with a different set of access rights. After selecting a product, it enables to view all the important information related to it with the ability to make changes, other details such as the product's vendors and movement history can be viewed by selecting the tabs. The product view conveniently displays all the products in a list.
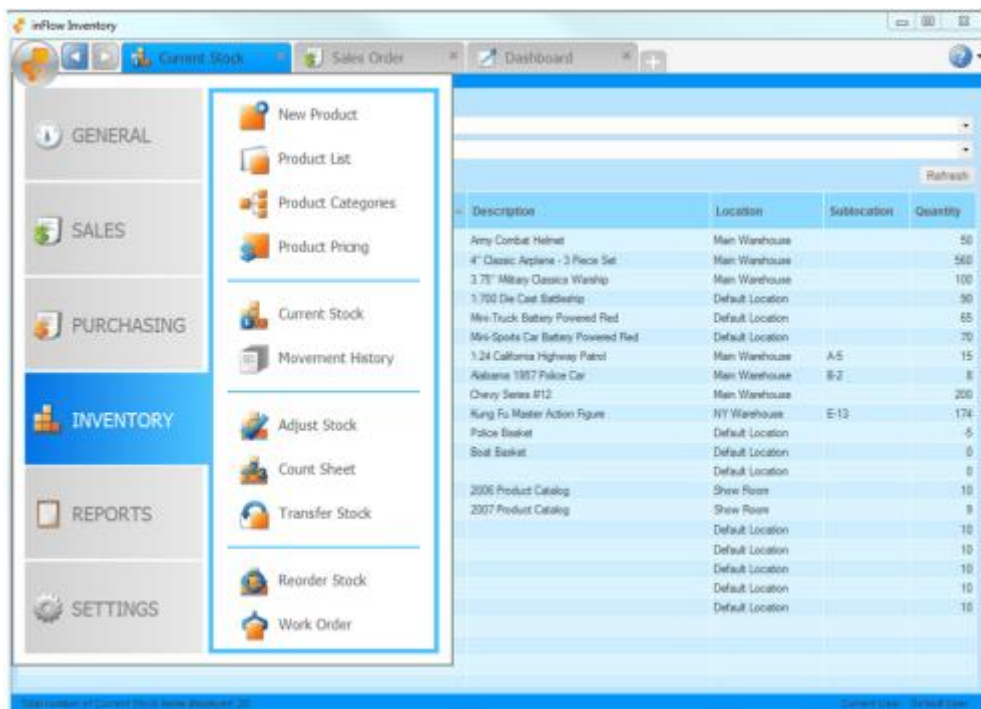
Figure 2-InFlow Inventory Menu

BigStore→Inventory software that is designed specially to meet the requirements of small and medium sized stores. This is only for small types of business and only include main functions of the processes. Such and receiving and issuing [1].

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2.3 Recommended Hardware Requirements

The recommended minimal server hardware specification in order to obtain the best application performance

Table 2-1 : Hardware Requirements

1. Intel Core i3 2.20 GHz or better
2. 1 GB RAM minimum (2GB RAM) recommended
3. 800*600 resolution; 16 bit color (1024*768, 24 bit is recommended)
4. For offline message audio is preferred, but no need. 15" monitor (17" monitor recommended for best results)

2.4 Recommended Software Requirements

The required and recommended software application in order to implement the hardware management system

Table 2-2 : Software Requirements

Network Layer	TCP/IP
Language Specification	Vb.net
Databases	MySQL
Operating Systems	Windows XP, Windows 7, Windows 8.1

2.5 Recommended Operating Systems

An operating system (OS) is software, consisting of programs and data, that runs on computers and manages computer hardware resources and provide common services for efficient execution of various application software [2].

- Windows XP
- Windows 7
- Windows 8
- Windows 8.1
- Windows 10

2.6 Language Specifications

2.6.1 Visual Basic .NET

Visual Basic .NET (**VB.NET**) is a multi-paradigm, object-oriented programming language, implemented on the .NET Framework. Microsoft launched VB.NET in 2002 as the successor to its original Visual Basic language. Although the ".NET" portion was dropped in 2005, this article uses "Visual Basic [.NET]" to refer to all Visual Basic languages releases since 2002, in order to distinguish between them and the classic Visual Basic. Along with Visual C#, it is one of the two main languages targeting the .NET framework.

Microsoft's integrated development environment (IDE) for developing in Visual Basic .NET language is Visual Studio. Most of Visual Studio editions are commercial; the only exceptions are Visual Studio Express and Visual Studio Community, which are freeware. In addition, .NET Framework SDK includes a freeware command-line compiler called vbc.exe. Mono also includes a command-line VB.NET compiler. [3]

2.7 Database Specification

2.7.1 MYSQL

MySQL is a relational database management system (RDBMS that runs as a server providing multi-user access to a number of databases. MySQL is officially pronounced ("My S-Q-L"), but is often also pronounced ("My Sequel"). It is named after developer Michael Widenius daughter, my. The SQL phrase stands for Structured Query Language. The MySQL development project has made its source code available under the terms of the GNU General Public License, as well as under a variety of proprietary agreements. MySQL was owned and sponsored by a single for-profit firm, the Swedish company MySQL AB, now owned by Oracle Corporation [4].

USE:

MySQL is a popular choice of database for use in web applications, and is a central component of the widely used LAMP web application software stack—LAMP is an acronym for "Linux, Apache, MySQL, and Perl/PHP/Python".

2.7.2 Database Engine

A database engine (or "storage engine") is the underlying software component that a database management system (DBMS) uses to create, read, update and delete (CRUD) data from a

database. Most database management systems include their own Application Programming Interface (API) that allows the user to interact with their underlying engine without going through the user interface of the DBMS. Many of the modern DBMS supports multiple database engines within the same database. For example, MySQL supports InnoDB as well as MyISAM some database engines are transactional. Such as Follows:

Table 2-3 : Database Engine

NAME	FREE	TRANSACTIONAL
Blitz DB	GPL	No
Falcon	GPL	Yes
Inno DB	GPL	Yes
Maria	GPL	No
MyISAM	GPL	No
Xtra DB	GPL	Yes
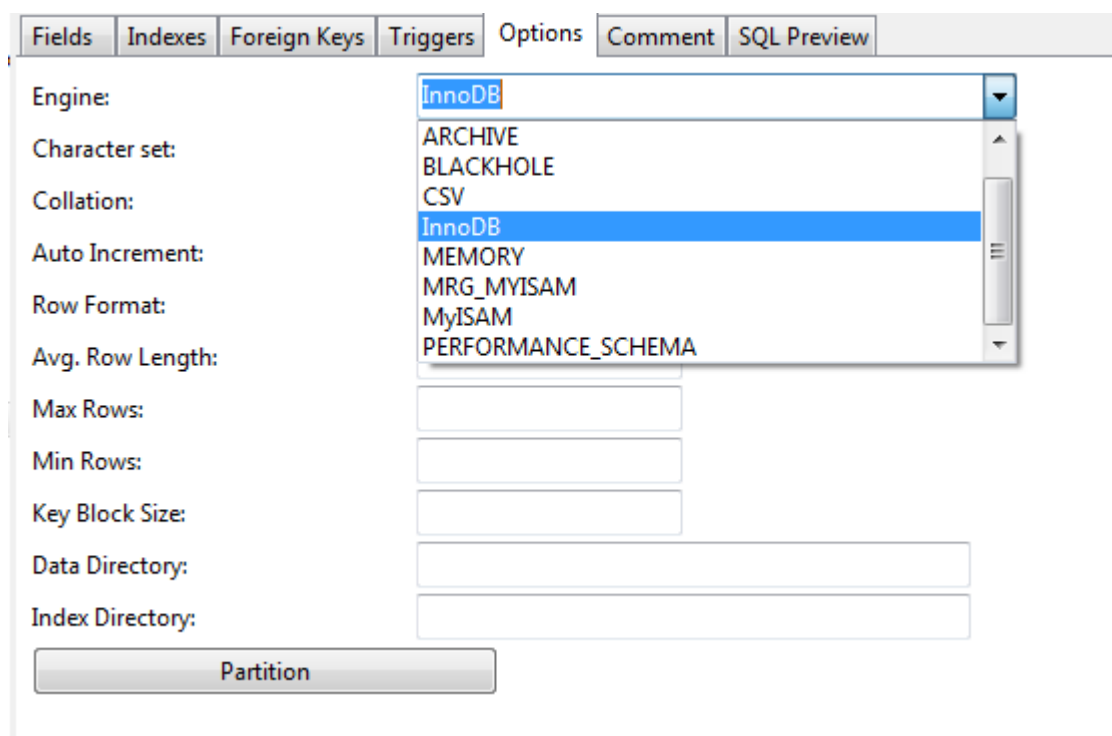
Figure 3 : Database Engine

INNO DB:

InnoDB is the default storage engine for MySQL as of MySQL 5.5. It provides the standard ACID-compliant transaction features, along with foreign key support (Declarative Referential Integrity). It is included as standard in most binaries distributed by MySQL AB, the exception

Being some OEM versions. InnoDB became a product of Oracle Corporation after their acquisition of Innobase Oy in October 2005. The software is dual licensed; it is distributed under the GNU General Public License, but can also be licensed to parties wishing to combine InnoDB in proprietary software [5].

MYISAM:

MyISAM was the default storage engine for the MySQL relational database management system versions prior to 5.5.It is based on the older ISAM code but has many useful extensions. The major deficiency of MyISAM is the absence of transactions support. Versions of MySQL 5.5 and greater have switched to the InnoDB engine to ensure referential integrity constraints, and higher concurrency.

Chapter 3- Analysis and Design/ Methodology

This chapter describes the detailed description of requirement gathering process, requirements specification and object oriented design of the system. The requirement specification section includes the identified functional requirements and non-functional requirements. Furthermore, Use cases and Sequence diagrams are used to describe the functionalities of the proposed Hardware Management solution.

3.1 Requirement Analysis

Requirement analysis plays a major role in a software development process. Initially it is done as a necessity before the project commences. Usually requirements analysis occupies capturing both functional and non-functional requirements. The successfulness of the project always depends on the way of doing the requirement analysis. Requirement gathering, analyzing requirements and recording requirements are three main activities involve in requirement analysis

The problem analysis was done in precise manner when considered with the actual problem domain. Requirements analysis involves frequent communication with system users to determine specific feature expectations, resolution of conflict or ambiguity in requirements as demanded by the various users or groups of users, avoidance of feature creep and documentation of all aspects of the project development process from start to finish. Energy should be directed towards ensuring that the final system or product conforms to client needs rather than attempting to mold user expectations to fit the requirements

In here concern on requirement gathering from the client and analyzing gathered data. This is the most important phase in the Software Development Life Cycle (SDLC) of the project as the state of affairs of the client can be evaluated here. The requirements can be defined clearly to ensure the design and implementation success. Different kinds of tools are being used to do the analyzing to find a solution to the expectations.

3.2 Requirement Gathering

Requirement gathering or requirement eliciting is the process of addressing the needs and conditions of the new system. There are many fact gathering techniques available for analysis,

such as SQIRO (Sampling, Questioners, Interviews, Background Reading, Observations) among them Observation, Interviewing and Background Readings were used in this project work.

3.2.1 Interviews

This is one of the best method to collect accurate information from stakeholders. Operator, Agent and Manager had been interviewed. It was enabled to share different knowledge in different user point of view. Main drawback in this method was limited time availability of resource persons due to present busy environment. With the interview observed that they have different educational backgrounds so designing system should be understandable for all users those who use system.

With the operation officers and some of the staff initial informal discussions were carried out and was able to get some time from their busy schedule to do the formal interview. During the interview it was clear that they were facing more difficulties with regard handling the stock & maintained it. Further it was clear how the whole operations taking place in this organization. It was difficult to reach top level management personnel due to their busy schedule and was unable to interview them.

3.2.2 Sample documents and manuals

Sampling is also a good method for gathering user requirements. This include forms, reports, screen designs and records and also can be examined to determine the type and extent of information. This was used as it was convenient to get the documents from the authority and had the chance to refer their manuals as they were really in need of an automated system.

Stock books, Sales reports, Purchase orders, Goods Issuing's and Goods Receiving had been carefully examined to obtain proper knowledge about the manual process. Also it's assisted to design required formats to be included in to the proposed system. Document analysis used for thoroughly to design this system because it is very difficult to gather data from other methods. This method is very useful for because all the transactions has been recorded. So data is reliable when considering the other methods.

3.2.3 Prototyping

Prototyping is a relatively modern technique for gathering requirements. Using this approach gathered preliminary requirements which should be used to build an initial version of the

solution of prototype. Created prototype was shown to the main system user and it had been developed in advanced manner using Operator's comments. This method gave clear idea about the new system should expect by the company.

3.2.4 Questionnaires and Surveys

Questionnaires and surveys take a different approach for interviews for the purpose of gathering information. The focus shifts from the flexible and friendly approach provided by interviewing to the preparation of unambiguous questions and statements for the gathering of more precise information. Provide structure type question to user and obtain brief idea about specific areas. These questionnaires prepared based on the educational level of the users and these data helped to develop proper system without any out of boundary implementations.

3.2.5 Survey

Majority of information related to surveys were collected through internet. Related blogs & forums had been referred and analyzed demo versions of existing similar systems of proposed system to capture main valuable concepts. Above forms of methods examined thoroughly to get a proper picture with the required system. This requirement gathering method assist to add value addition functionalities to the system to satisfy the customer.

3.2.6 Observation

Observation is the study of users in their day to day activities and performance of assigned tasks and duties. By observing users it was noted that process flows, awkward steps, pain points and opportunities for improvement. Also observed the existing manual system users and assisted to gather valuable key points to be developed.

3.3 Feasibility Study

Feasibility study is a vital process in order to find out the strengths weaknesses. Opportunities and threats (SWOT) of a proposed system to fulfil the main. Requirements of the system. A detailed feasibility study was carried out regarding this System, mainly focusing on the following facts. Legal feasibility, Economic feasibility, Operational feasibility and Schedule feasibility. Proposed system mainly considered Economic feasibility, Operational feasibility and schedule feasibilities.

3.3.1 Technical Feasibility

This method mainly focuses on gaining an understanding of the present technical resources of the organization and their applicability needs to be incorporated to the proposed system. It is an evaluation of both hardware and software. Users must know how to interact with the computer.

3.3.2 Operational Feasibility

This is an evaluation to determine whether the system is operationally acceptable. It also assess that how well system solve the users problem and how well it'll be useful to the end users of the system. To ensure success, desired operational outcomes must be imparted during design and development. The proposed systems functions were analyzed to see whether they accomplish the Client's requirements. User satisfaction was very important factor when designing the system.

3.3.3 Legal Feasibility

In this system legal feasibility involves some part as it is a Private organization. There was a process to get approved from the top level management. When it was requested it nearly took a month as it had to go through many levels of authority. And most important factor was their data should be secured. They signed agreement for this project. If anything happens in this duration I must take the responsibility for those things. Any information that users have given to the system will not be shared with anyone and stored by not violating DPA 2008.It was very difficult task to work on it because of legal things that have in authority

3.3.4 Economic Feasibility

Economic analysis is the most frequently used method for evaluating the effectiveness of a new system. In here analyzed the existing manual system with proposed system. In this analysis considered the manual system time wastage of each processes, number of employee used and their salary and costs, paper wastage as weak points. However, compared to proposed system, it was noted that majority of drawbacks stated in the manual process could be reduced with proposed system. Hence, proposed system would be economically viable project.

Typically involves cost benefits analysis process. There will be a cost involved with implementing the system such as buying equipment and training the users. According to their rules and regulations first must get the approved budget report. Since they have already got

approval for their budget includes these functionalities. Economic feasibility considers the following

- The cost to conduct a full system investigation.
- The cost of hardware and software for the class of application.
- The benefits in the form of reduced cost or fewer costly errors
- The cost if nothing changes (i.e. the proposed system is not developed)

The proposed system is economically feasible because

- The system requires very less time factors.
- The system will provide fast and efficient automated environment instead of slow and error prone manual system, thus reducing both time and man power spent in running the system
- The system will have GUI interface and very less user-training is required to learn it.
- The system will provide service to view various information for proper examination decision making

2.3.5 Schedule Feasibility

A project will fail if it takes too long to be completed before it is useful. Typically this means estimating how long the system will take to develop, and if it can be completed in a given time period using some methods like payback period. Schedule feasibility is a measure of how reasonable the project timetable is.

3.4 Non-functional requirements

Non-functional requirements are often called qualities of a system. It is a requirement that specifies criteria that can be used to judge the operation of a system, rather than specific behaviors. Followings are Nonfunctional requirements of the system.
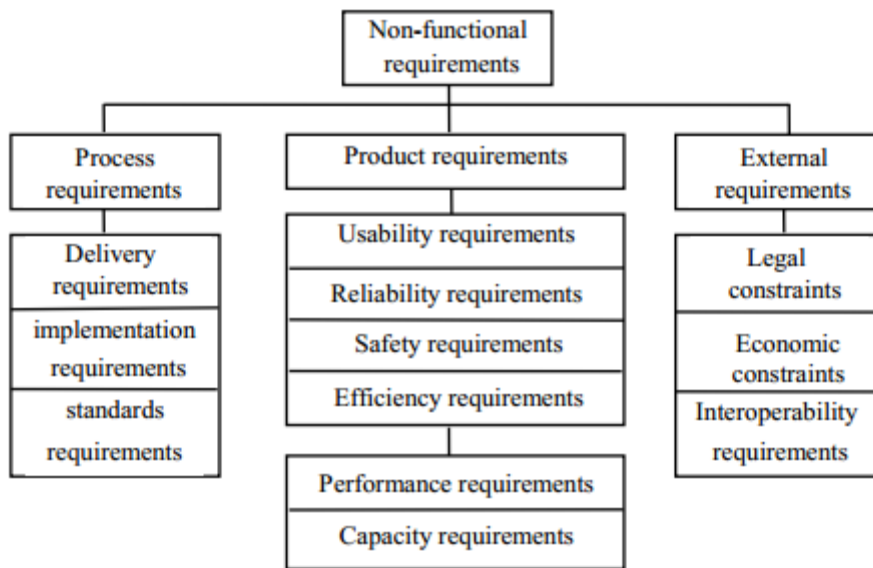
Figure 4 : Diagrams illustrate how the non-functional requirements can be categorized.

➕ Process requirements

Process requirements are constraints placed upon the development process of the system. Process requirements include: Requirements on development standards and methods which must be followed CASE tools which should be used the management reports which must be provided a disaster recovery plan for the system development must be specified

➕ Product Requirement

Specify the desired characteristics that a system or subsystem must possess.

➕ External Requirement

External requirements are the one which Derived from the environment in which the system is developed.

- The need for the system to work with other systems
- Health and safety or data protection regulations

Easy System Accessibility to the authorized parties' while was ensuring that data is protected from unauthorized access. The system shall include a user authorization

procedure where users must identify themselves using a login name and password. Only users who are authorized in this way may access the system data.

Availability

The application also needs to be available all 24/7. If there is a down time and if it's planned down time that needs to be informed early, so that the hassles and inconveniences will be minimized. If it's an unplanned one the down time needs to be minimum and needs to be speedily up.

Performance and Efficiency

System needs to responds quickly for the requests made by the user. User cannot wait for the systems to respond, the data must be ready available no sooner the request made. Because this is a system which used by the users when the patient is in front or may be online via the phone. The information requests from the systems needs to be readily accessible at a single click.

Usability

The current system is a total manual system, hence working with computers are not going to be easy for all the users. There for if the system is complex, People who are not very confident in handling computer will find difficult. Also the system needs to be developed in such a way that user should be able to use this system for users convenience and to improve their productivity and serve the patient effectively and provide the better service.

Security

Stock details, personal information, account details is a very confidential hence Author have a high responsibility of maintaining the security and to make sure that the information is not passes to the third part personals.

Risk Management

Managing risks is an important part of the project. It is important to establish procedures to ensure that the system is up all throughout the time. Hence monitor, and manage internal and external risks throughout a project's life cycle. Internal risks include items

changing functional requirements, unexpected personnel changes or inaccurate development assumptions and work flow challenges, process changes.

3.5 Functional Requirement

In software engineering, a functional requirement defines a function of a software system or its component. A function is described as a set of inputs, the behavior, and outputs. Functional requirements may be calculations, technical details, data manipulation and processing and other specific functionality that define what a system is supposed to accomplish. Behavioral requirements describing all the cases where the system uses the functional requirements are captured in use cases. Followings are the functional requirements of the new system.

- ✓ **Login system(Access control)**
    - o This is the one of the main part of the system. Admin gives the usernames and passwords for the sections. Sections can access their area only. Management had the fully access privileges for the system. They can do modifications to the system. The system will limit access to authorized users. It improves the high security of the system.

- ✓ **Issuing items**
    - o In this section items will be issued.

- ✓ **Information storing and retrieving**
    - o All the information stored in a database. Through the database can retrieving whatever the data that user needs.

- ✓ **Reporting system**
    - o Management must need summarized and up to date details for proper decision making process. System provides most of the reports that management wants for day to day operations.

- ✓ **Searching**
    - o This will be a user friendly function and filters the details according to what user wants. Can search details according to sections.

3.6 Database Analysis:

Database design is an important place in designing a system. During this phase care should be taken to avoid redundancy of information storing into a database, since it leads to wastage of memory space. Database should properly analyzed for the project.

3.7 Logical Database Design

Table Name: add_user

This table stores the user information's of the system

Table 3-1-Add_user table

Table Name: main_category

This table stores the main categories of the hardware

Table 3-2 : Main_category table

Table Name: sub_category

This table stores the sub category information's according to the main category

Table 3-3 : Sub_category table

Name	Type	Length	Decimals	Not null	
sub_cat_id	int	50	0	✔	🔑1
sub_cat_name	varchar	50	0	☐	
cat_id	int	50	0	☐	

Table Name: add_item

This table stores the items of the hardware

Table 3-4 : Add_item table

Name	Type	Length	Decimals	Not null	
item_code	varchar	50	0	✔	🔑1
sub_cat_id	int	50	0	☐	
item_name	varchar	50	0	✔	
measurment	varchar	50	0	✔	
reoder_level	varchar	50	0	☐	

3.8 UML Diagrams

Unified Modelling Language (UML) is a standardized, general-purpose modelling language in the field of software engineering. The Unified Modelling Language includes a set of graphic notation techniques to create visual models of object-oriented software-intensive systems. Object Oriented Designing (OOD) is a method that uses objects to develop a system. Each object interacts with each other and they have their own states and operations. UML is one of the most popular methods used in order to develop systems with OOD concept. There are some object models defined by UML. The following object models were used for the designing process of the system. The UML defines nine graphical diagrams:

1. Class Diagram
2. Object Diagram

3. Use-Case Diagram

4. Sequence Diagram

5. Collaboration Diagram

6. State chart Diagram

7. Activity Diagram

8. Component Diagram

9. Deployment Diagram

3.8.1 Use case diagrams:

The Use case diagram is used to define the core elements and processes that make up a system. The key elements are termed as "actors" and the processes are called "use cases." The Use case diagram shows which actors interact with each use case. The requirements are further described below with aid of use cases for ease of understanding the main functions of the System. Use cases could be clarified furthermore by their use case scenarios
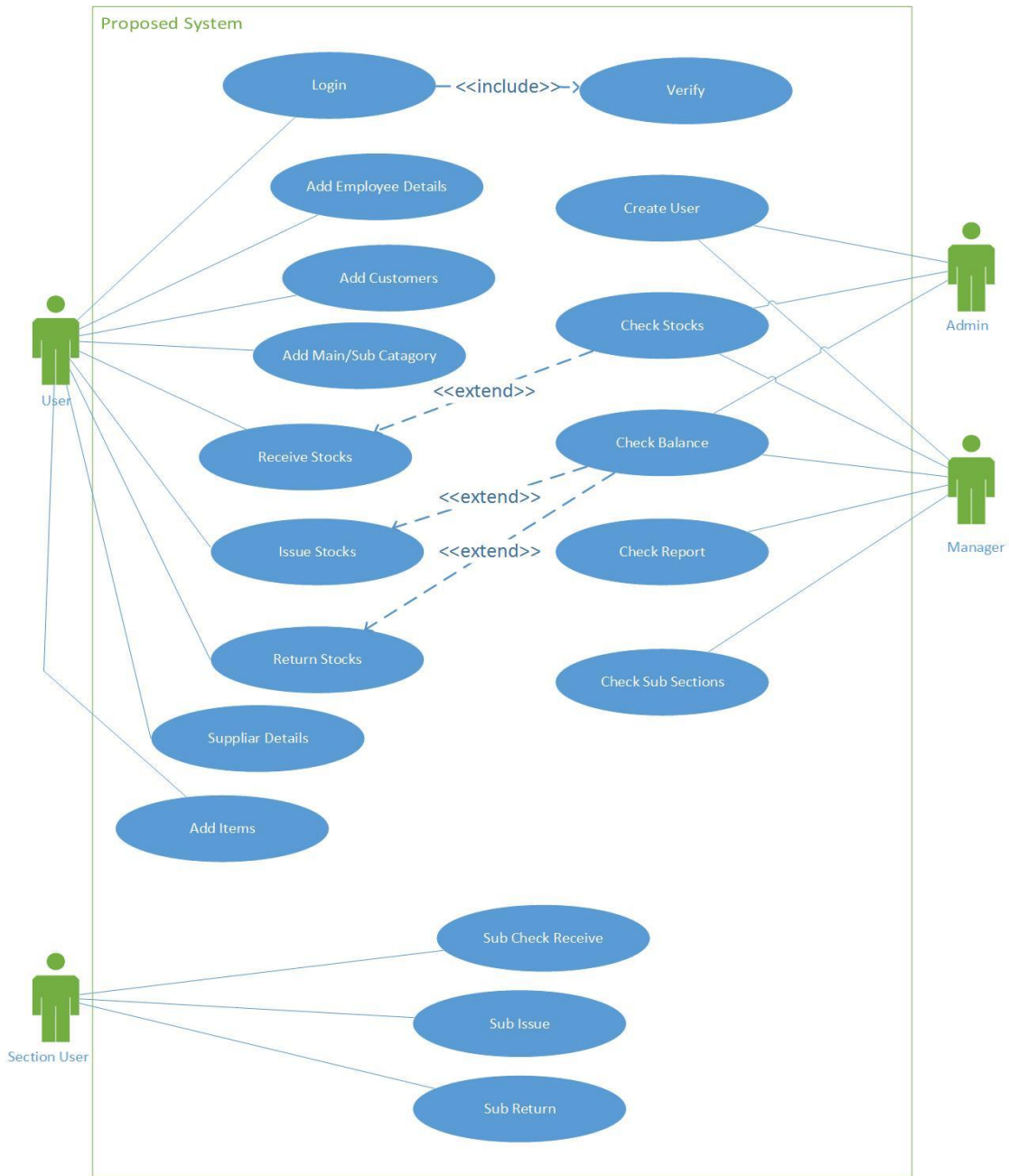
Figure 5 : Use case for proposed system

3.8.2 ER diagrams:

An Entity Relationship (ER) Diagram is a type of flowchart that illustrates how "entities" such as people, objects or concepts relate to each other within a system
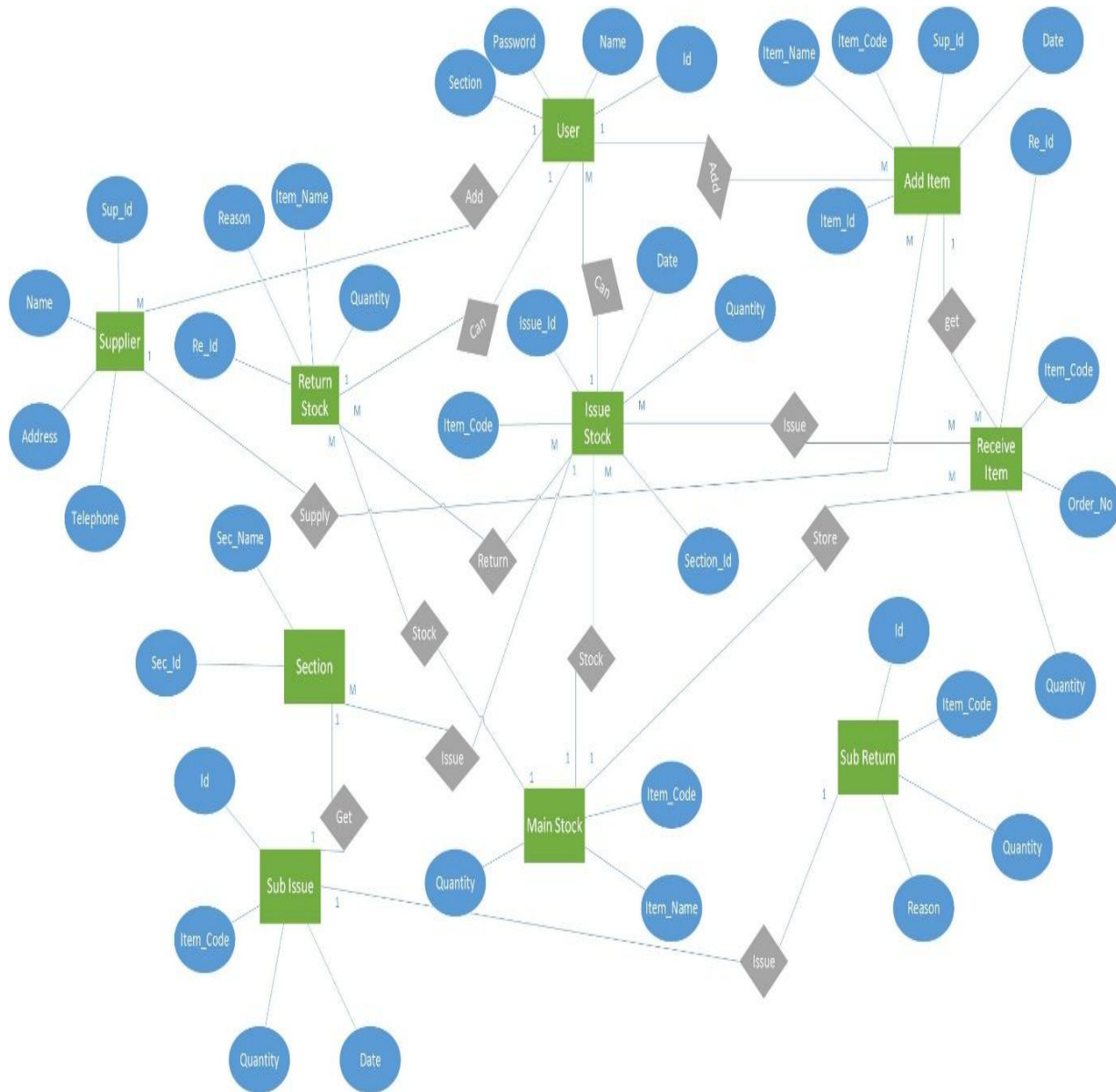
Figure 6 : ERD Diagram

3.8.3 Class diagrams:
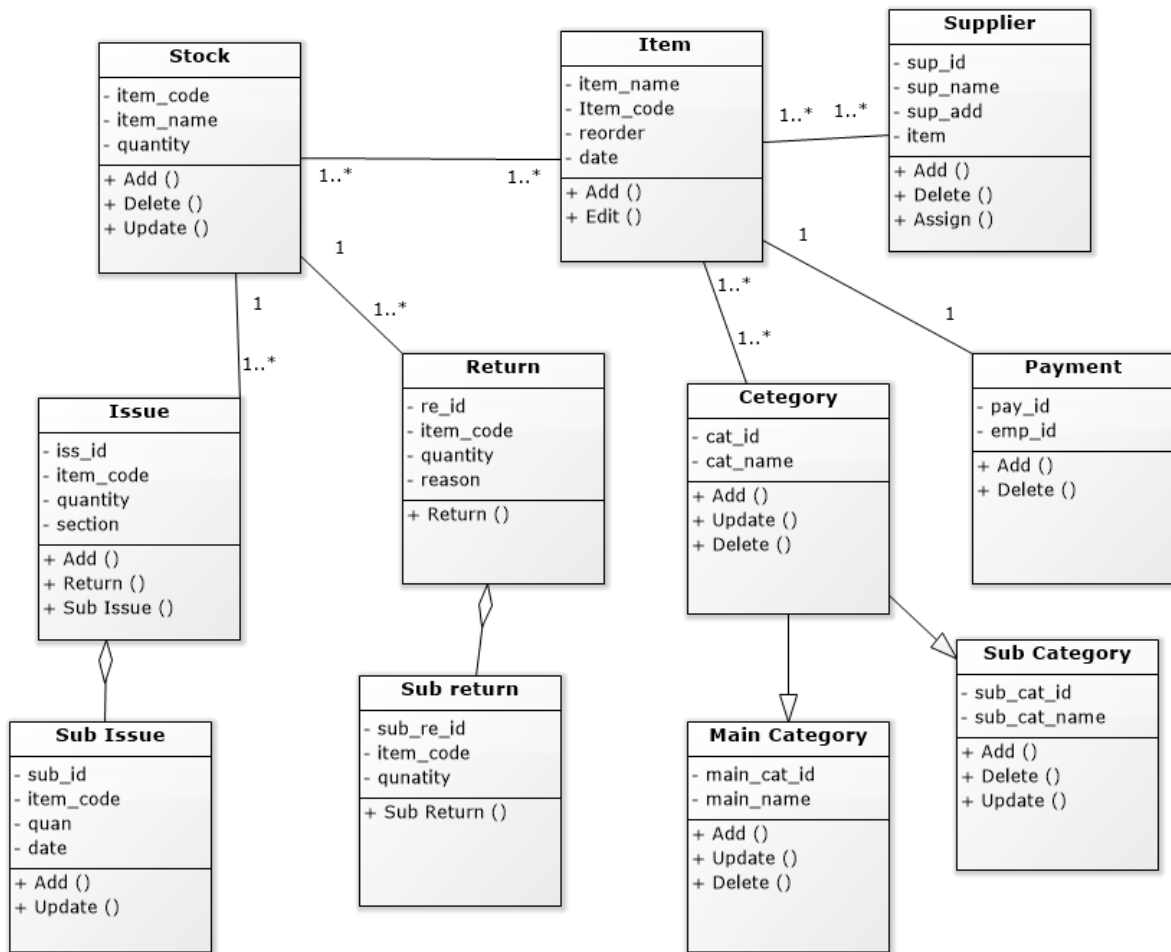
Figure 7 : Class Diagram

Other diagrams were shown in **APPENDIX (B)**

3.9 User Interface Design

Possibility of user error occurrences is considerably high in the absence of a good user interface design. Because of this good user interface design is vital to the success of a system. Most of the application system users are interested in using graphical user interfaces because of the following advantages.

- Fast and immediate accessibility to anywhere on the screen
- Easy to learn and handle
- Facility of using multiple screen (Windows)

Below mentioned some of the interfaces in Hardware MIS,
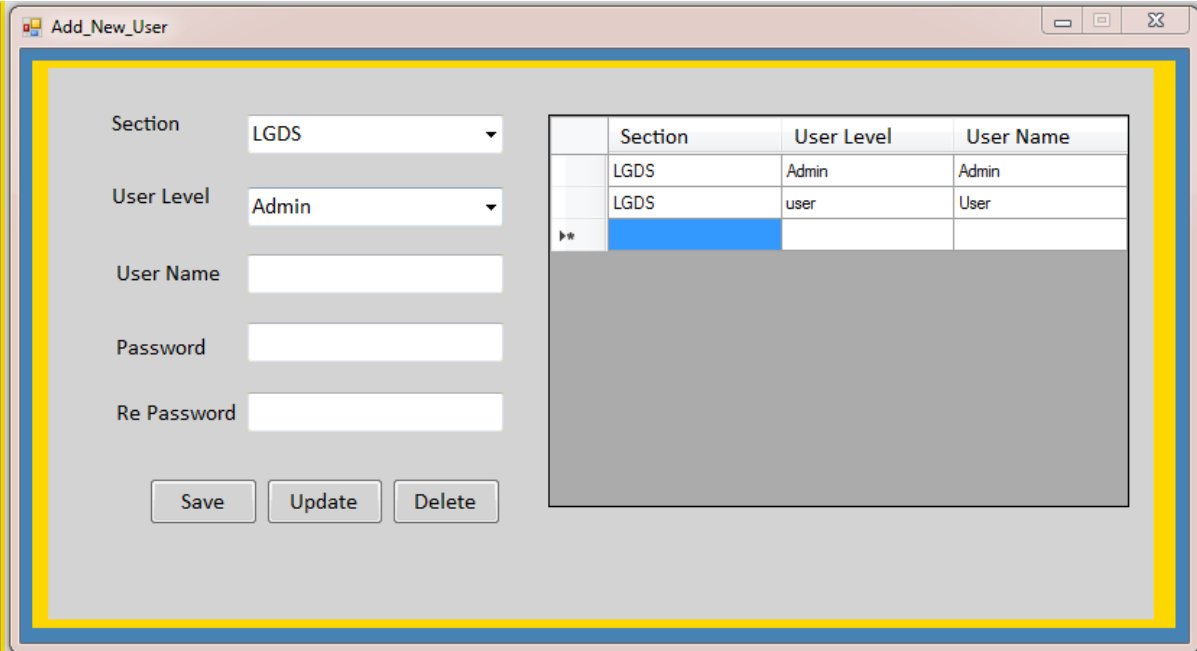
Login Interface

Figure 8 : Login Interface

Add User Interface

Figure 9: Add User Interface

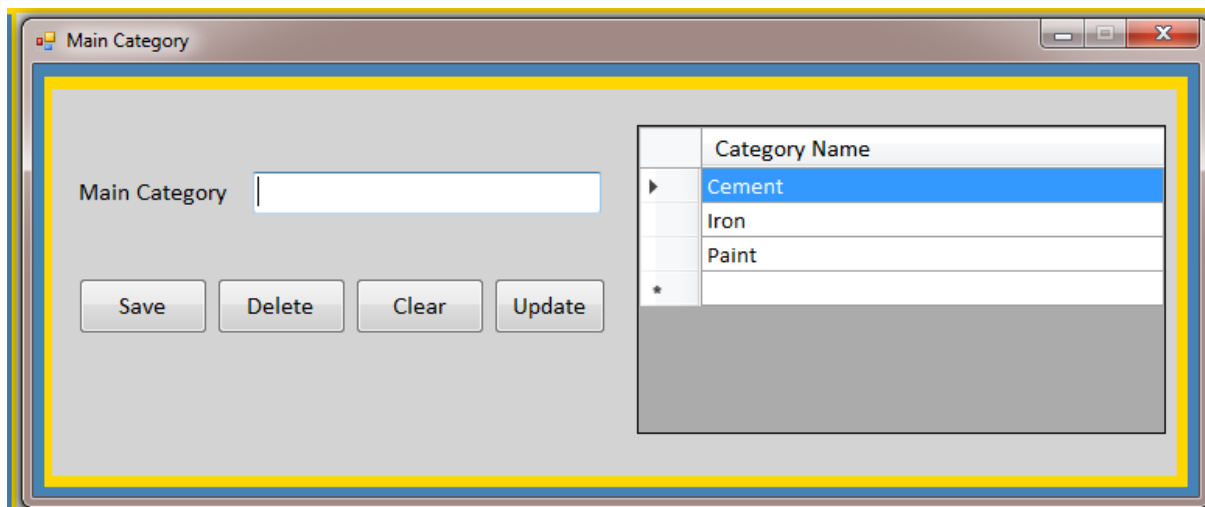**Main Category Interface**

Figure 10 : Main Category Interface

Report Dashboard

Figure 11: Report dashboard

Chapter 4 - Implementation

4.1 Introduction

This chapter is focused about the actual implementation process of the proposed system, which is the conversion of the design to a set of programs. A good implementation can reap vast rewards in organizational strengths and efficiencies. This chapter describes the activities carried out during the development of the Hardware management system and it will explain how implemented environment, Reusable codes and Development tools were integrated effectively as per the System Design.

The .NET Framework is the technology introduced by Microsoft that provides support for easy design, development, and deployment of computer applications. Its major design goal is to ease the development of Internet applications and distributed applications development. The .NET Framework includes the .NET Framework Class Library (FCL), a framework that can be used for the creation of system tools and application packages. Some of the main features of vb.net are listed below.

- Simple

Vb.net is very easy to learn it has built in memory management

- Modern

Vb.net has been based according to the current trend and is very powerful and simple for building interoperable, scalable, robust applications

- Object oriented

Vb.net supports Data Encapsulation, inheritance, polymorphism, interfaces

- Scalable

.NET has introduced assemblies, which are self-describing by means of their manifest. Assemblies need not to be register anywhere

4.2 Implementation Architecture

The system was developed using 3- tier architecture. This is a client-server architecture in which the functional process logic, data access, computer data storage and user interface are developed and maintained as independent modules on divided platforms. Three-tier architecture is a software design pattern and well-established software architecture. Its three tiers are the Presentation Layer, Business Logic Layer and Data Access Layer.

4.3 Development Process

Development started by first defining classes related to each of the layer in the layered architecture described in Chapter 4. It was decided to use some of the new technologies that 27 relationships with Visual Studios 2012 and free reusable components in the implementation stage of the program. The first step of the development process was to identify the conventions that should be used when coding. It was decided to use namespaces to logically group similar classes.

4.3.1 Major code segments

Cording of the proposed system was done using Visual Studio 2012. In below included the some major code segments of the system.
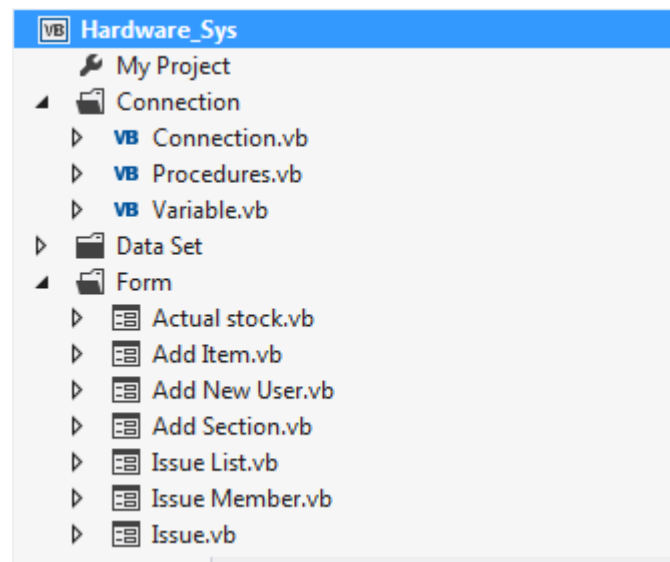

Figure 12: Structure of VB.Net

4.3.2. Login

When implementing the Login functionality, it was decided to provide maximum security possible by using password encryption and preventing multiple logins. The function for password encryption and decryption is implemented as follows.

```vb
Public Function StrToHex(ByVal Data As String) As String
    Dim sVal As String
    Dim sHex As String = ""
    While Data.Length > 0
        sVal = Conversion.Hex(Strings.Asc(Data.Substring(0, 1).ToString()))
        Data = Data.Substring(1)
        If sVal.Length < 2 Then
            sHex = sHex & "0" & sVal
        Else
            sHex = sHex & sVal
        End If
    End While
    Return sHex
End Function
```

Figure 13: Encrypt & Decrepit Code

```vb
Private Sub btnLogin_Click(sender As Object, e As EventArgs) Handles btnLogin.Click

    searchLogin(cmbUserIns.SelectedValue, txtUserName.Text, txtPass.Text, lblIns, lblUser, lblInsName)
    Dim sqlQuery As String
    sqlQuery = "SELECT * FROM add_user WHERE institute ='" & cmbUserIns.SelectedValue & "' AND user_name = '" & txtUserName.Text & "'AND pas
    login(sqlQuery)

    'Dim sText As String
    ' Dim sText1 As String
    'sText = lblIns.Text
    'sText1 = lblUser.Text
    'Dim frm As New Main(sText, sText1)
    ' frm.Show()
End Sub
```

Figure 14: Login code

4.3.3. Validation

In the below code segments used to validate the system.

```
        Public Function validateEmail(emailAddress) As Boolean
         Dim email As New Regex("\w+([-+.']\w+)*@\w+([-.]\w+)*\.\w+([-.]\w+)*")
        If email.IsMatch(emailAddress) Then
       Return True
          Else
          Return False
         End If
    End Function
```

Figure 15-Email validation code

```
Public Shared Function CheckPhoneNumber(ByVal strPhoneNumber As String) As Boolean
       Dim MatchPhoneNumberPattern As String = "^\(?([0-9]{3})\)?[-. ]?([0-9]{3})[-.
]?([0-9]{4})$"
       If strPhoneNumber IsNot Nothing Then
           Return Regex.IsMatch(strPhoneNumber, MatchPhoneNumberPattern)
       Else
           Return False
       End If
    End Function
```

Figure 16-Phone number validation code

```
 Public Function validateNIC(nicnumber) As Boolean
       Dim nic As New Regex("^[0-9]{9}[vVxX]$")
       If nic.IsMatch(nicnumber) Then
           Return True
       Else
           Return False
       End If
    End Function
```

Figure 17-NIC number validation code

Some other sample coding include in **APPENDIX (E)**

4.3.4 Database

This is very important code segment this code used for connect the MySQL database. And using transactions queries for efficiency system.

```
Imports MySql.Data.MySqlClient
Imports MySql.Data
Imports System.Data
Imports System.Data.Common
Imports System.Configuration

Module Connection
    Public Sub connection_open()
        ' Dim con As MySqlConnection = New MySqlConnection("server=127.0.0.1;user id=root;database=water_project")
        d_conn = New MySqlConnection("server=localhost;user id=root;database=inventry_system;characterset=utf8")
        d_conn.Open()

    End Sub

    '* Closing the database
    Public Sub connection_close()
        d_conn = Nothing
        d_cmd = Nothing

    End Sub
```

Figure 18: Connection to MYSQL

4.3 Sample reports

Reports is very import section of the system. All the top level management uses this report for decision making process.
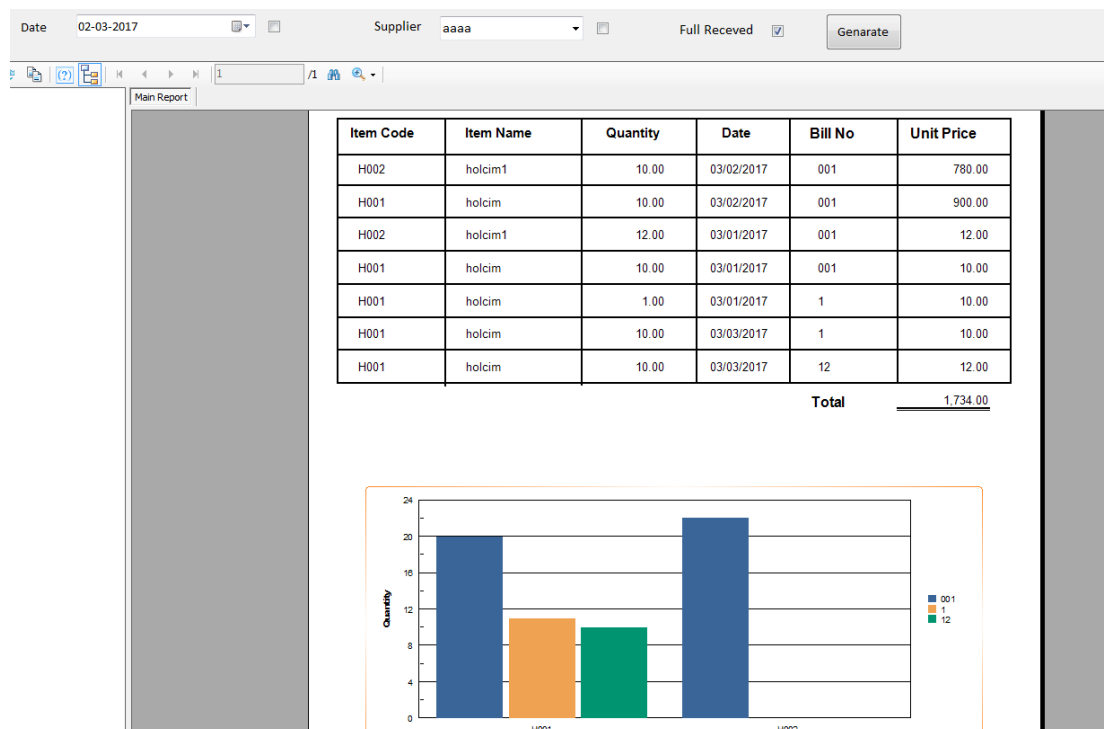
Figure 19-Item receive report-Full

Item Receve Report

Iteam Code	Iteam Name	Quantity	Bill No	Unit Price
H002	holcim1	10.00	001	780.00
H001	holcim	10.00	001	900.00
H002	holcim1	12.00	001	12.00
H001	holcim	10.00	001	10.00
			Total	1,702.00
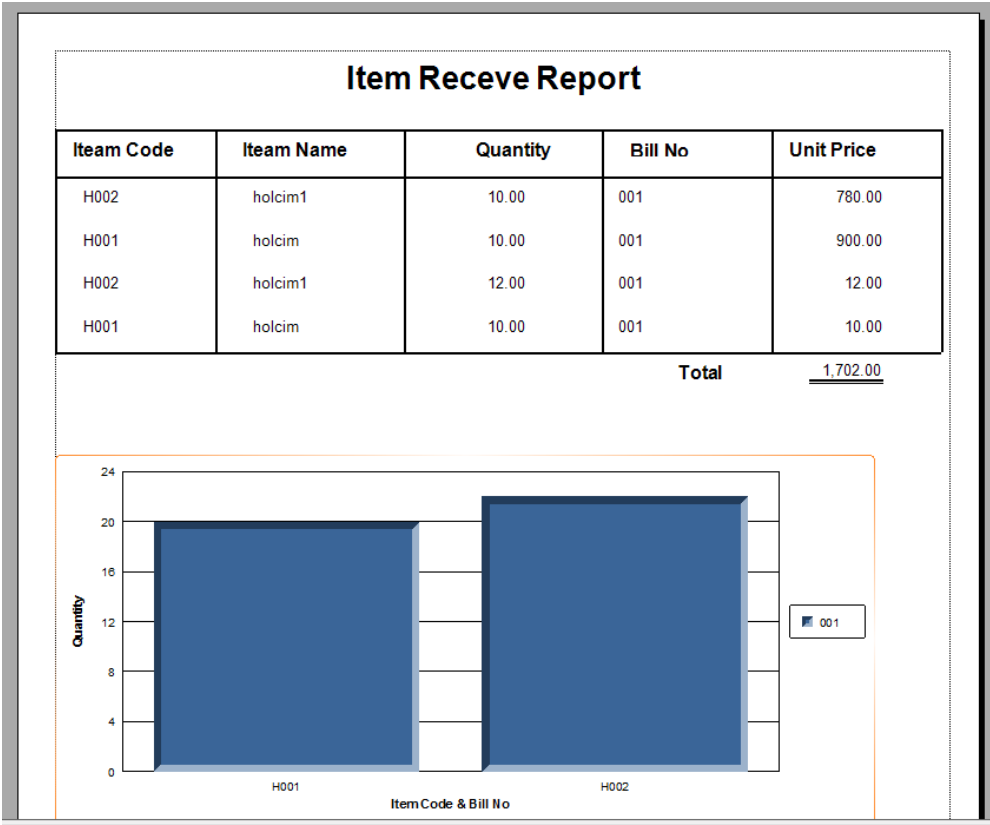
Figure 20-Item receve report-Item code

Chapter 05 – Evaluation

5.1. Introduction

Evaluation is a systematic determination of a subject's merit, worth and significance, using criteria governed by a set of standards. It can assist an organization, program, project or any other intervention or initiative to assess any aim, realizable concept/proposal, or any alternative, to help in decision-making; or to ascertain the degree of achievement or value in regard to the aim and objectives and results of any such action that has been completed. The primary purpose of evaluation, in addition to gaining insight into prior or existing initiatives, is to enable reflection and assist in the identification of future change. Evaluation is often used to characterize and appraise subjects of interest in a wide range of human enterprises, including the arts, criminal justice, foundations, organizations, government, health care, and other human services.[7]

5.2. Evaluation Techniques

There were various types of evaluation techniques used to evaluate the software. Some of the main methods listed below,

- Benchmarking.
- Testing.
- Interviews.
- Focus groups.
- Inspection.
- Walkthroughs.
- User feedbacks.

5.2.1 Benchmarking

Benchmarking is the process of comparing your performance to that of other leading organizations, groups or communities. Typically it involves the use of specific measures that give an 'apples to apples' comparison, and is often used as a longitudinal measure of change.

5.2.2 Focus groups

A focus group is a structured discussion with pre-selected individuals intended to collect information or gauge opinion on a specific issue or idea. The group is led by an impartial

facilitator in a non-threatening environment. In community development, focus groups provide a deliberative venue for learning, trust-building, creative problem solving, and ultimately serve as a way for citizens to influence strategic community planning and development.

5.2.3 User feedbacks.

This is also an important part of the evaluation. It can take the form of freeform text comments and also it is about what user feels about the system. User feedback questioner and evaluation results mentioned on **APPENDIX (F).**

5.2.4 Database testing

All the information is stored in the database according to categories and may not deal with the same type of data. It is very important part of the system. Because of the data is lost or any corruption occurred whole operation will be failed. All the database fully normalized and include the primary keys and foreign keys. Usually SQL queries are used to develop the tests. Ex. **Select * from employee where emp_id="001"**. Data that were violating the constraints were also tested for insertion, to test the effectiveness of the constraints. Security level should be improved in the database. This system is installed into three machines and use navicat software and locked using password. If we need to do any changes in the database password is needed.

5.2.5 Software testing

How to get test data

For the proper testing it is very important to get test data correctly because the users may enter data in different ways so to make proper discipline in data entry and to catch errors proper sample data need to be chosen. I.M.N. hardware provides sample documents to be used as the test data. After deliver the system they use the same data for the system. Because of it, we can easily identify the bugs of the system.

Although there were different types of Evaluation techniques Testing and User feedbacks used for this project. Because of the strict time period and busy time schedule in the hardware. Results of this techniques include in the appendix.

5.3. Procedures of testing

A proper system testing should be carried out to evaluate the system and it helps to see and understand its compatibility as a solution for the problem domain. Software testing is most often done and at this phases working with executable system components. The test results developer to identify and minimize errors (software bugs) in the system during the development itself. Using the Iterative RUP software development life cycle made it possible to test the system.

Quality and the reliability of the system is another key factor in making the application a success. Since users do not like to access to the applications which causes invalid or inaccurate results. Few methods of testing were applied throughout the duration of this project to ensure the quality of the application and to detect the introduction of regressions in the source code during the development process.

Testing was another most important part of the project. Some Testing processes were carried out throughout the project. Testing was based on main two categories,

Validation and Verification.

Validation - Check whether the system meets its customer requirements.

Verification - Check whether system meets its all functional requirements.

Testing was improved the system's quality. This was a critical phase of the Software life cycle. Therefore testing must be done throughout the project life cycle .Following testing types were used in this system.

- Unit Testing
- Integration Testing
- System Testing
- Black-box testing
- White-box testing
- Regression Testing
- Acceptance testing

5.3.1 Unit Testing

Unit testing was done while implementing the project. This is done for individual units.

E.g.: Login module was tested with three types of cases.

1. Username and password was provided and it logged in to the system.

2. When the username was entered correctly and password was wrong, it failed to log in and showed an error message.

3. When both of these fields were provided incorrectly, it failed to log in to the system.

5.3.2 Integration Testing

Integration Testing is carried out after the separate software modules have been unit testing. Integration testing is based on the functional specification of the software. E.g. When provided the correct credentials to the login module, it logged to the administration module.

5.3.3 System Testing

System testing is carried out at the completion of the integration testing. The purpose of system testing is to prove that the software meets the agreed user requirements and works in the target environment. System testing covers both functional and non-functional requirements.

E.g.: By logging into the system and routing through different processes the whole system was tested.

5.3.4 Black-box testing

This type of testing is done without testing its internal structure. Testing is done only to see whether it meets desired outputs.

5.3.5 White-box testing

This is done to test the systems internal structure. This is also called Glass box testing.

5.3.6 Regression Testing

This is done after changes are made to a system application. This test is to prove that the change has been made correctly and that change has not introduced any new errors.

5.3.7 Acceptance testing

Acceptance tests are black box system tests. Each acceptance test represents some expected result from the system. Customers responsible for verifying the correctness of the acceptance tests.

5.4. System Test Case

Test case is an outline which tests a feature or set of features. It provides developer a systematic approach for testing. Therefore it will ensure the completeness of test and provide the highest likelihood for uncovering errors in the software. Test case consist of:

- Test data
- Expected results
- Purpose of having the particular test data.

For the functions and procedures a unit testing is carried out first when coding the system. The behaviour is intended by the unit test. The units of codes are tested and it is called a code level testing. To test the modules of the system an integration testing is processed. When using different kinds of implementation technologies this is a must to ensure the proper working of all the integrated components for the relevant outcome. The whole system has been tested after the unit testing and integration testing to guarantee the standard of the system using an environment similar to the environment where the system is going to practically used. A customer confirmation is obtained by a user acceptance testing after the completion of the system. It ensures the requirements are fulfilled by the developed system.

5.5. Test plan

Test plan is a document containing the detailed systematic approach to test a system. It basically consists of the details of how the system will be in final workflow. To get a proper outcome from the testing procedure a test plan is created before the implementation of the system covering all types of phases. Entire testing process is guided by the Test plan and also test cases are designed to execute that feature with possible inputs and outputs.

It has logically three major component,

- Database testing.
- Software testing.
- Collective system (both database & software) testing.

5.6 Test data

Test data is actually the input given to a software program. In order to test a software application need to enter some data for testing most of the features. Some test data is used to confirm the expected result, i.e. when test data is entered the expected result should come and some test data is used to verify the software behaviour to invalid input data. For the system entered test data provide by the hardware and input sample data for the system. They provide forms that they collected from the employees.

5.7 Test Users

For the success of the testing it is important to select test users. At the beginning users involve in testing to find out system is user friendly and the language is useful to them. Some employees were selected who had good IT knowledge and tested the admin components discussed the results with the manager. Other management module were also tested because top level management couldn't involve in this process.

Login Module

Table 4-1 : Login test case

Test Number	Test Description	Steps to test	Expected Output
1	Validate the account statues	Enter correct username and password	Go to dashboard
2	Validate the user input details	Enter invalid username, password & section	Display error message
3	Validate the user input details	Empty username & password	Display error message
4	Validate the user input details	Enter only username	Display error message
5	Validate the user input details	Enter only password	Display error message
6	Validate the user input details	Enter pressing 'Enter' key	Go to dashboard

Main Category Module

Table 4-2 : Main category test case

Test Number	Test Description	Steps to test	Expected Output
1	Save the category details	Without filling all the require fields	Display error message

2	Save the category details	filling all the require fields	Successfully Save with message & display in the table
3	Save the category details	Enter same category again	Display error message
4	Update the category details	Click the main category in the table that want update.	Successfully Update with message & display in the table
5	Delete the category details	Click the main category in the table that want delete.	Successfully Delete with message
6	Delete the category details	Delete the main category that entered the sub category.	Display error message

Item Receive Module

Table 4-3 : Item receive test case

Test Number	Test Description	Steps to test	Expected Output
1	Save the receive items	Enter some of the require fields	Display error message
2	Save the received items	filling all the require fields	Successfully Save with message & display in the table
3	Update the category details	Click the record in the table that want update.	Successfully Update with message & display in the table

4	Edit main category, sub category & item details	Click main category, subcategory and try to edit	Couldn't edit the details
5	Display items according to main & sub categories	Click the main category & sub category	Display the items in the grid.
6	Delete the receive details	Click the row in the table that want delete.	Successfully Delete with message

Item Issue Module

Table 4-4 : Item issue test case

Test Number	Test Description	Steps to test	Expected Output
1	Issue the received items	Enter some of the require fields and issue	Display error message
2	Issue the received items	Filling all the require fields	Successfully Save with message & display in the table
3	Issue the received items	Click the record in the table that want update.	Successfully Update with message & display in the table
4	Issue the same issue number	Enter same issue number & click enter button	Display error message
5	Issue the quantity more than in the main stock	Click the main category & sub category	Display the items in the grid.

Test Number	Test Description	Steps to test	Expected Output
6	Remove the issue item	Click the row in the table that want delete.	Successfully Delete with message

Add Item Module

Table 4-5 : Add item test case

Test Number	Test Description	Steps to test	Expected Output
1	Save the items	Enter some of the require fields and save	Display error message
2	Save the items	Filling all the require fields	Successfully Save with message & display according to sub category in the table
3	Enter same item again	Enter same item and save	Display error message
4	Delete items	Select data from table and enter value that need to delete	Successfully delete with message
5	Delete items	Select data from table where already issued item	Display error message

Test Results

The tested results for the cases give above are attached in the **Appendix (D).**

Chapter 06 – Conclusion

6.1 Introduction

A critical evaluation for the final system is included in this chapter with the suggestions for future enhancements and descriptions of lessons learnt. A detailed check list is also intended to be presented in this chapter in order to prove that the expected requirements of the client have been successfully fulfilled.

6.2 Problems Encountered and Lessons Learnt

- Had to visit the place of the customer sometimes, to clarify some unclear requirements.
- Had to do some major changes in the database and ER because of the client's requirements.
- Lack of experience in developing system because of non IT person.
- Some rules and regulations of the hardware.

Above mentioned about the problems encountered while working with the system

Learning a new language was a lesson experienced in the project which allows getting extensive knowledge of the vb.net language. Project planning is another lesson, before the start of the project a feasible project plan was developed. A step by stem approach was taken in developing the system. The experience of the Stressful work load is another example of a lesson, in the industry a developer always needs to meet various deadliness want work according to strict schedules. It was a challenge to develop a system within a limited time period and with busy office work. The experience of writing a formal project dissertation was another lesson leant in this project. The experience gained in that process was an encouragement to develop a system methodologically and with own efforts.

6.3 Critical Evaluation of the Project

In this topic is mainly focus about comparison about the selected similar systems and developed hardware system.

Mostly most of the sections include in the systems were similar. But there are some kind of features include in this system. Mostly most of the similar systems not user friendly. User couldn't understand what should do it. Some interfaces were very complex and not consistence.

Barcode system not provide in the some similar systems. One of the similar systems have print all the barcode at once. But in this system they should print it one by one. But they can print any number of barcodes in this system.

And also in this system has customer and employee information's sections. Can divide sections and users can add to different sections. Anyone who don't have prior computer knowledge can use this system.

Customize report is another feature include in this system. And also can get reports by any type of charts. Top level management can easily get decisions according to reports.

6.4 Suggestions for Future Enhancements

When the system was developed and submitted for the client's approval, the client was really satisfied and requested few more additional features to be added to the system. However, at the moment, it is hard to develop those features and deliver them, since it would creep its scope of project and creeping the project schedule too.

System running on a standalone PC will not fulfill this requirement so that Web Based Application will be introduced. So other sub branches of the hardware can access it. Everyone will be able to access the system under the terms and conditions through the Internet. This will ease the work of the staff and save time of the users. Introduced system has been developed with the possibility of any expansions such as adding more functions to the system much easily.

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APPENDIX A - SYSTEM DOCUMENTATION

This document explains, the guidelines to be followed when installing the Hardware Management System. This also includes the minimum hardware and software requirements to operate the system. This document is helpful in the initial stages and latter stages, when extensions are added to the system.

The above mentioned installation processes could be completed according to the following steps.

1. Installation of Xampp

Download the Xampp server from the below link and download it.

https://www.apachefriends.org/index.html
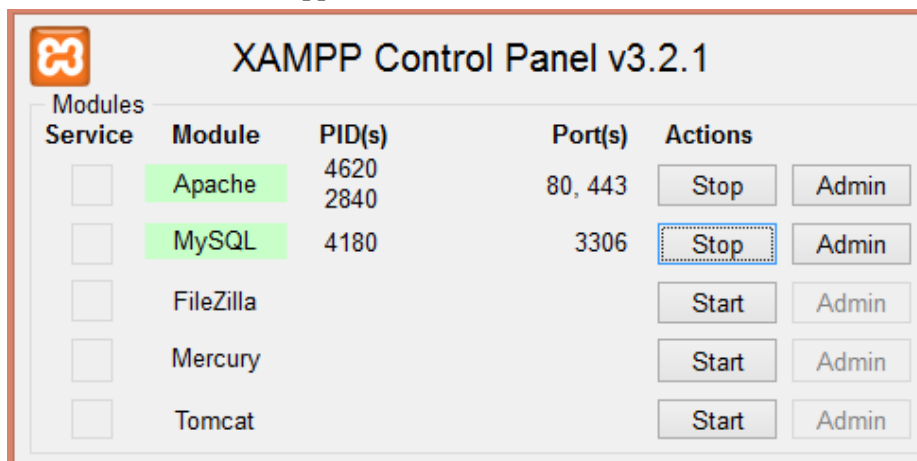
Figure 21 - Download the Xampp
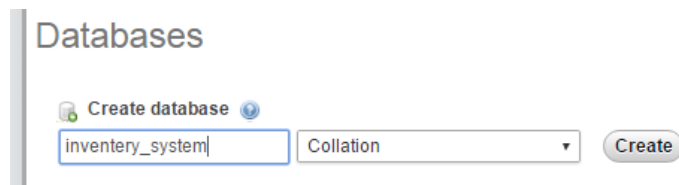
Start the services of Xampp

Figure 22-Xampp services

Go to phpmyAdmin and crate the database and import the .sql file in the CD include the db.
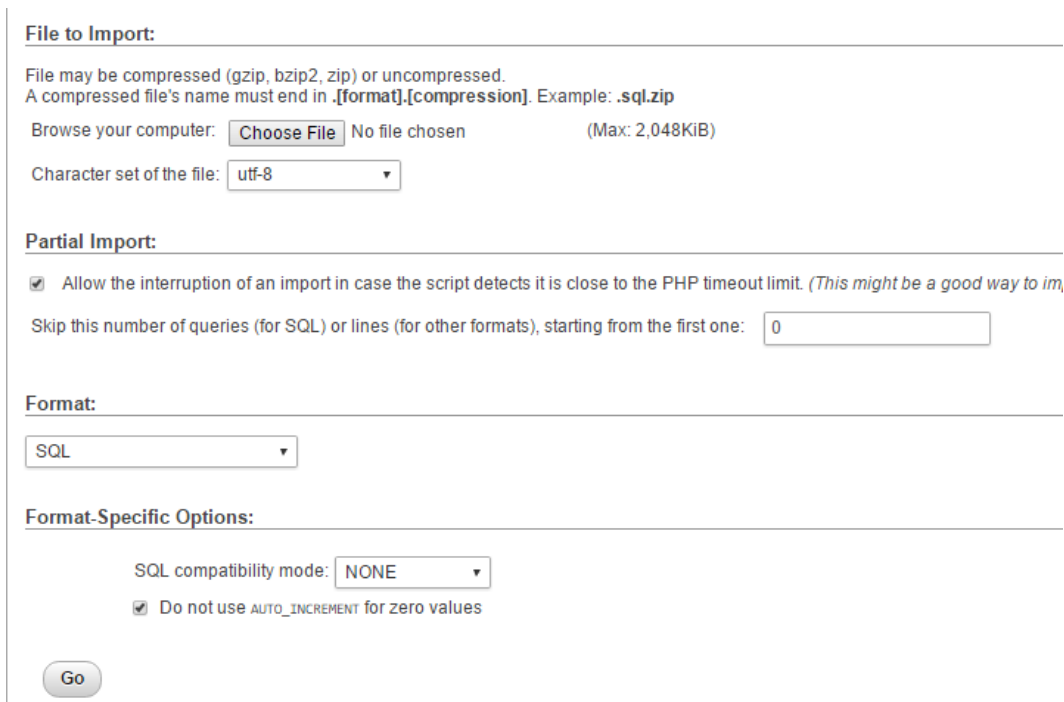
Figure 23-Create database

Figure 24-Import the sql to phpmyAdmin

2. Installation of ODBC Driver

✓ Go to the Control Panel, select "System and Security". Then select "Administrative Tools". Under "Administrative Tools", double-click on "Data Sources (ODBC)" to open the ODBC Data Source Administrator. Select System DSN tab and Click "Add" button.

✓ If the installation is doing on a server machine, select SQL Server as the Data Source. If it is a client machine, SQL Server Native Client as the Data Source. The ODBC Data Source Administrator window is represented in Figure A.3.
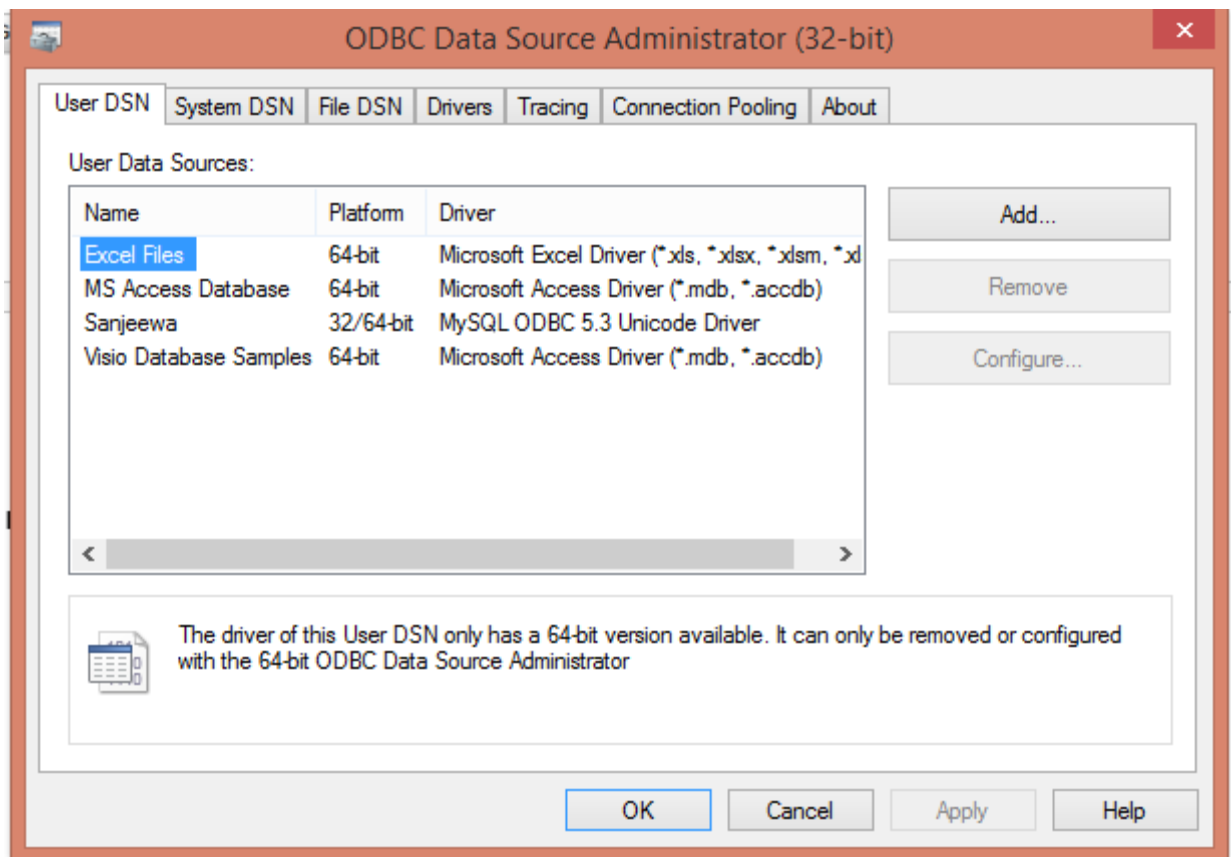
Figure 25-ODBC Configuration

✓ Specify a name and select the appropriate server.

✓ Once you have finished configuring your data source, you should see your new DSN (Data Source Name) in the list shown in the ODBC Data Source Administrator "System DSN" tab.

3. Installation of SAP Crystal Report version for Visual Studio 2012

✓ Run "Setup.exe" from the SAP Crystal Report version for Visual Studio 2010 directory.

✓ Select a language for the setup application.

✓ Accept the license agreement in the "License Agreement" dialog. Click "Next"

✓ The "Start Installation" Dialog will appear. Then click "Next"

✓ Click "Finish" to complete the installation process.

4. Database Backup

✓ Go to phpmyAdmin and go to export tab

✓ Then select the database and click Go button

Figure 26-Exporting the database

5. System Setup

✓ Run the "HMIS setup" inside the CD - ROM.
✓ Finally click finish of the setup.
✓ Double click the icon on the desktop and run the system

APPENDIX B - DESIGN DOCUMENTATION

B.1 Use Case Diagram

Administrative use case
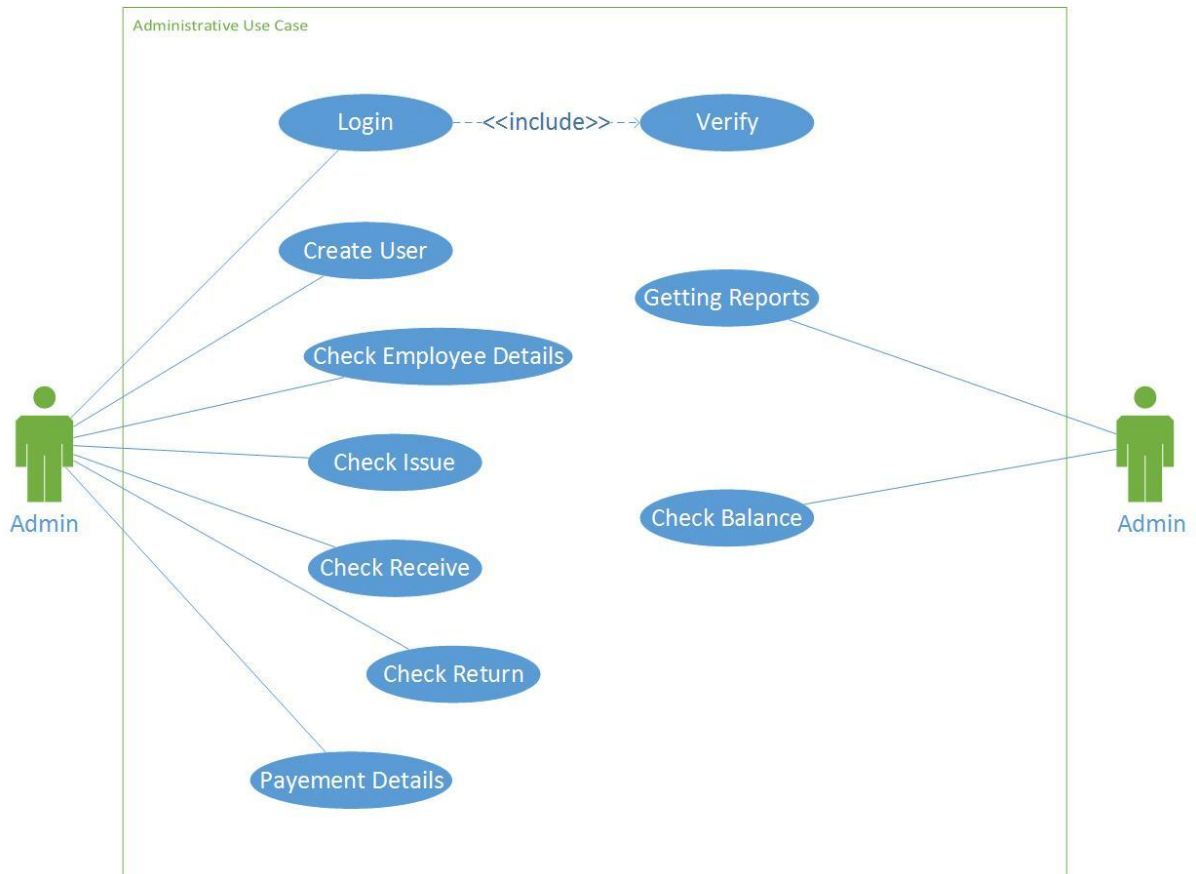
Figure 27: Administrative Use Case

Login use case
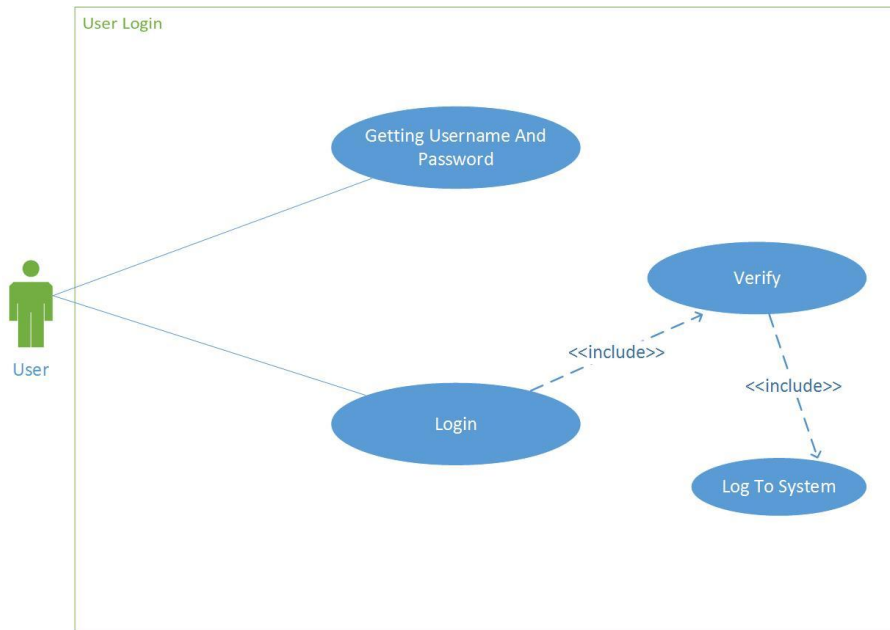
Use-Case	User Login
Actor	System Administrator, Normal Users, Manager
Overview	
Users can log to system by providing correct usernames & passwords.	
Pre-conditions	
The users should register with the system.	
Flow of events	
1. User enters the username and password 2. System does authentication 3. Main screen is displayed	
Post conditions	
Users able to log to system	

Figure 28: Login Use Case

Create user use case

Use-Case	Create User
Actor	Admin, Manager
Overview	
Creating users for log to system and do their tasks through the system	
Pre-conditions	
Users must work with the system	
Flow of events	
1. Log to system 2. Provide username & passwords 3. Create user accounts 4. Provide user accounts for users	
Post conditions	
User log in to the system	

Figure 29: Create user use case & narrative

Reporting use case

Figure shows a use case diagram titled "Reporting Module" with actors Admin and Manager connected to use cases: Get Reports Module, Select Reports, and Check Income And Expence (with <<extend>> relationship to Select Reports).

Use-Case	Reporting
Actor	Admin, Manager
Overview	

Check the reports of the system

Pre-conditions

Users must include all the details of stocks

Flow of events

1.Go to report section
2. Click the report that needs.
3.Check the report

Post conditions

Must get all the reports that top level management's needs.

Figure 30: Reporting use case & narrative

B.2 Activity Diagram

User Login Activity Diagram

Following activity diagram shows about the user login
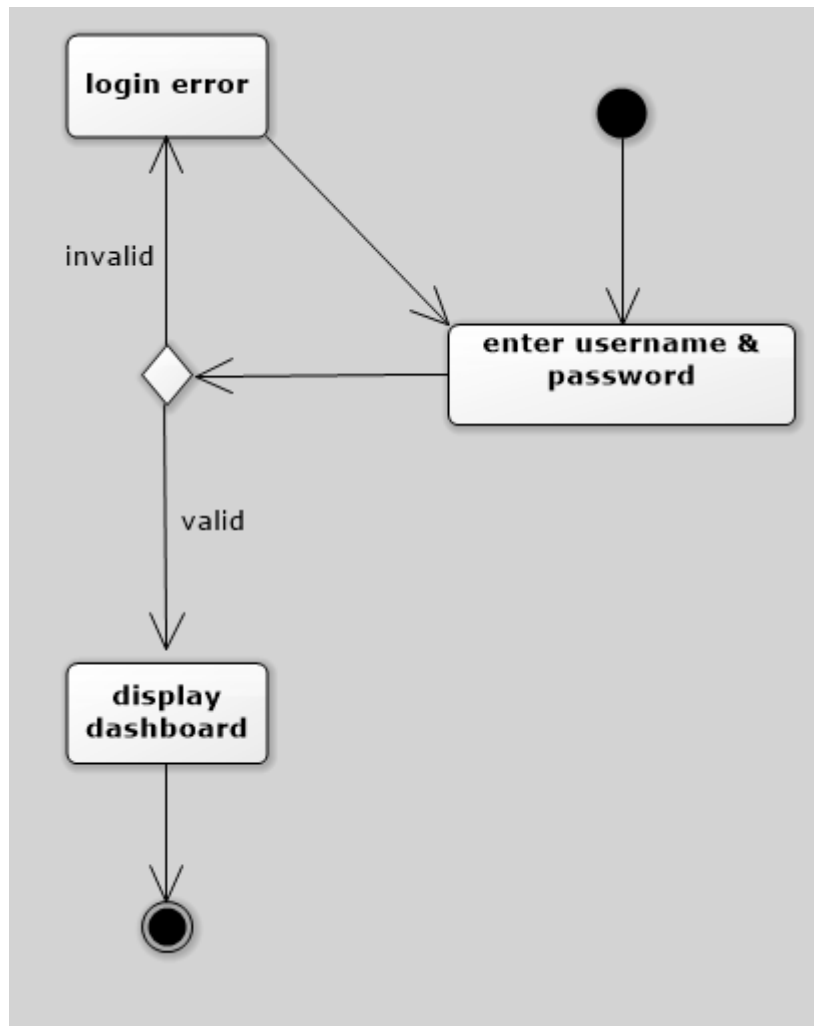
Figure 31: Login activity diagram

Item issue Activity Diagram

Following activity diagram shows about the user login
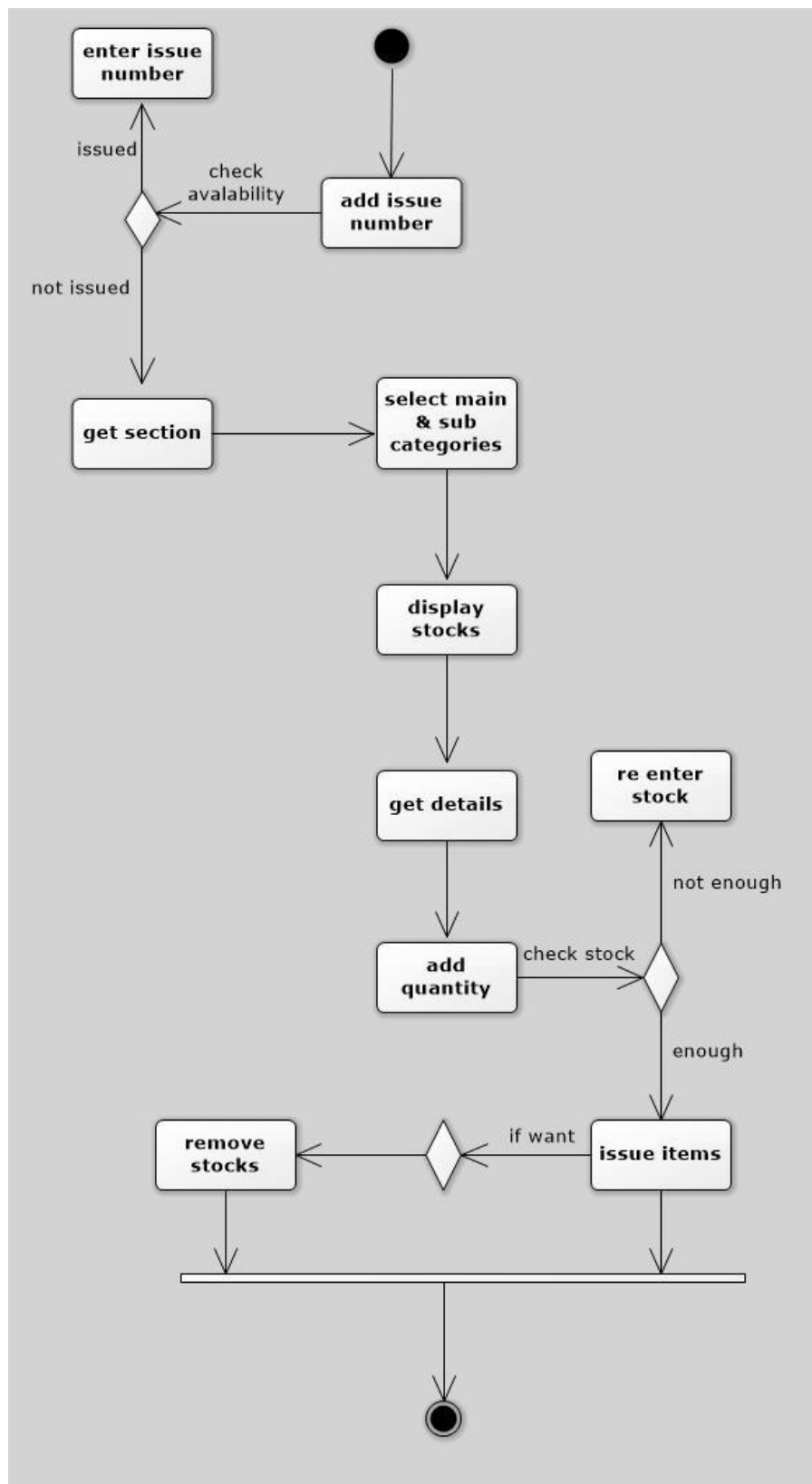
Figure 32 : Item issue activity diagram

Add Item Activity Diagram

Following activity diagram shows about the user login
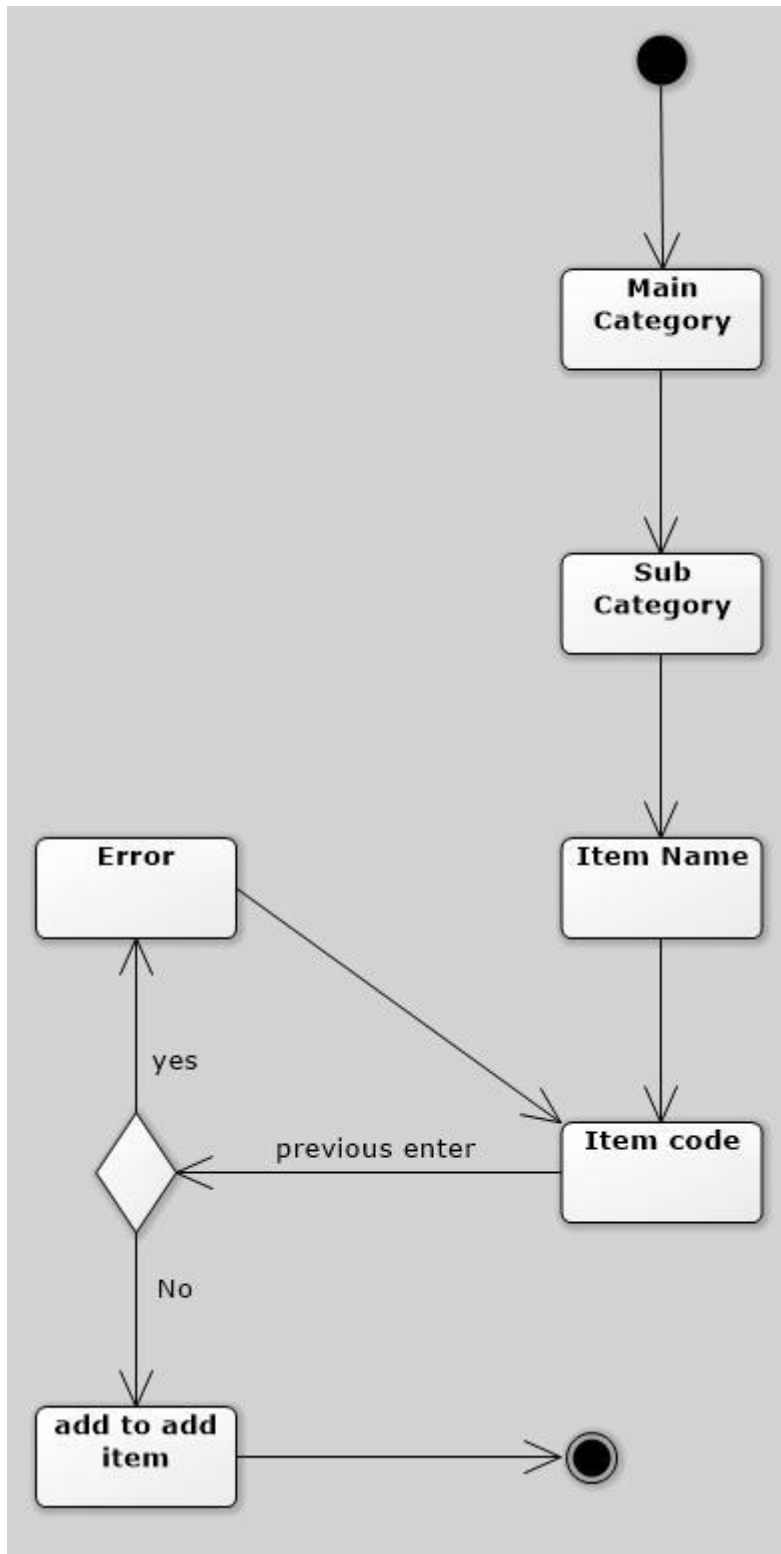
Figure 33 : Add item activity diagram

B.3 Sequence Diagram

Login Sequence Diagram

Following sequence diagram shows about the user login
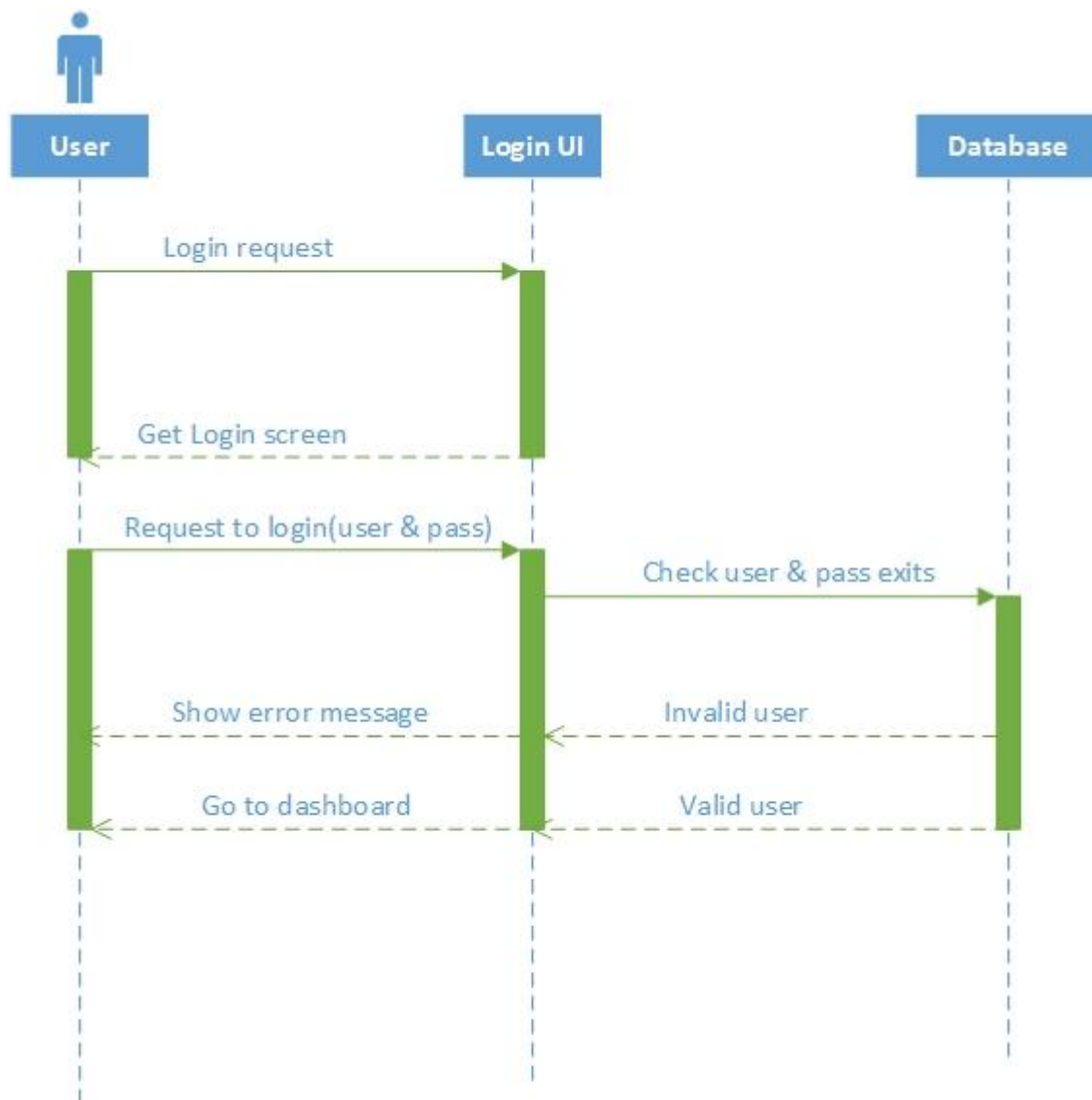
Figure 34-Login sequence diagram

Item issue Sequence Diagram

Following sequence diagram shows about the item issue
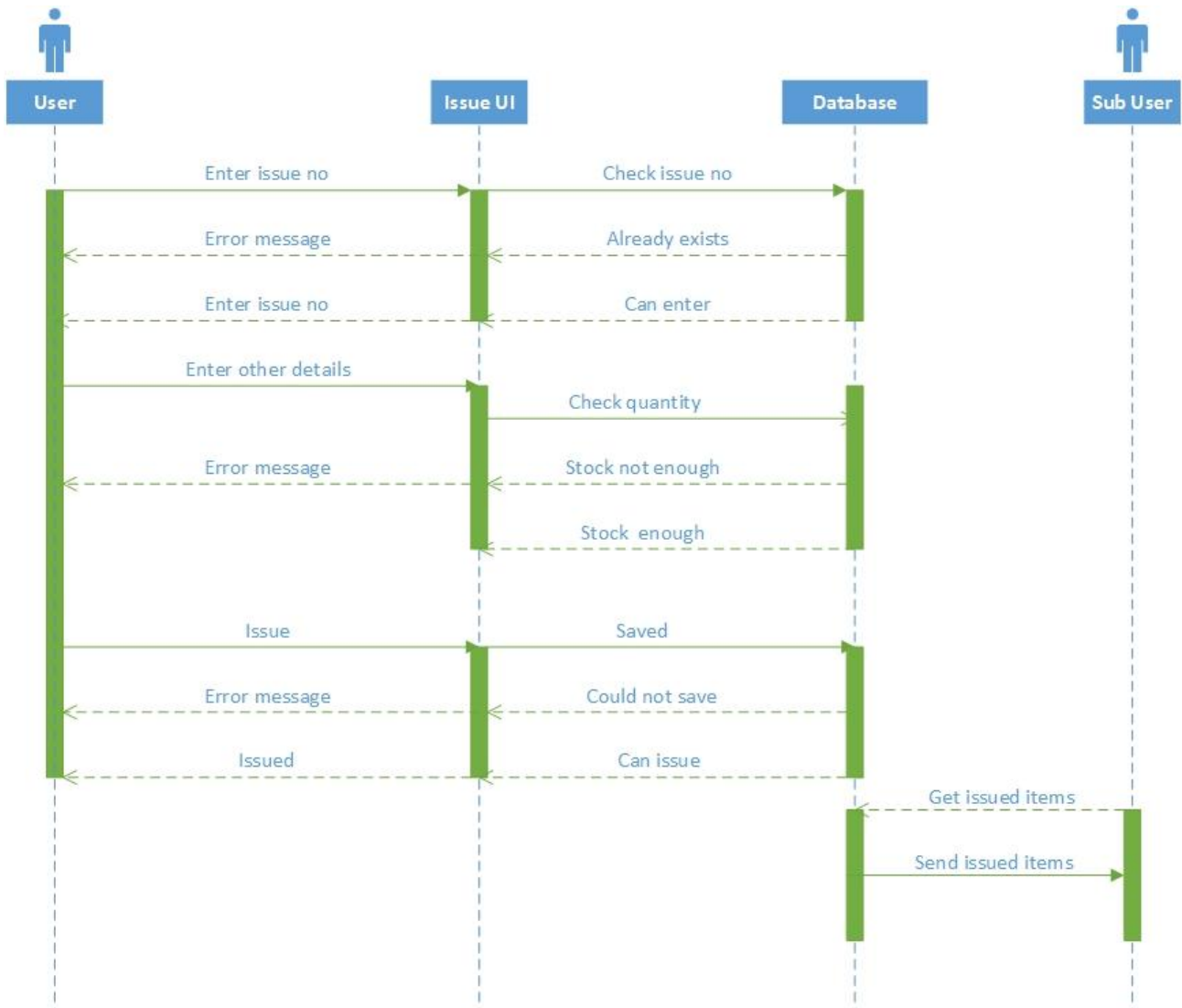
Figure 35-Item issue sequence diagram

Report view Sequence Diagram

Following sequence diagram shows about the report generating of the system
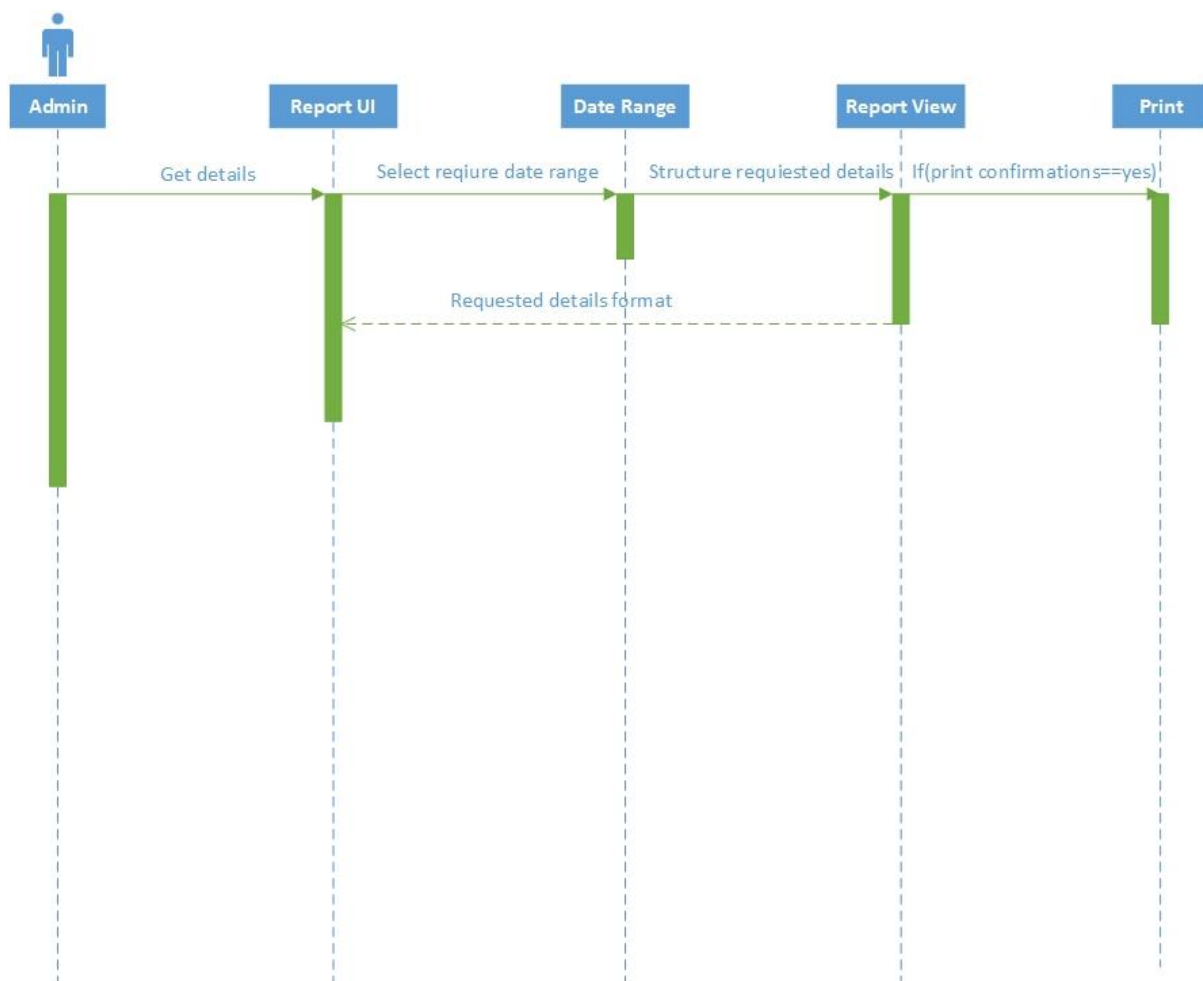
Figure 36-Report view sequence diagram

APPENDIX C – USER DOCUMENTATION

User manual

User login

First you should login to the by providing correct username and password. If you 1st time log to the system enter the username and password in the CD.

Figure 37-User login interface

Home page

If you enter correct username and password then display the home page.

There are various menu items listed inside each categorized functional section of the "Home Page"

Figure 38-Home dashboard interface

Categorized Functional Sections

Main category – Can manage main categories in this section

Sub Category- Can enter sub categories according to main categories.

Add Item- You add the item in this section

Item Receive – When item received to the main stock include here

Item Issue- Item issued by in this section

Item Return- Item return by this section

Report- All the reports include in this section

Usage of Functional Section Menu Items

Main category

Can enter main categories of the hardware. Mainly use items in the hardware is enter in this section.

➤ Enter the main category name and click "Save" button.
➤ All the saved details display in the table.

61

- When clicking the items on the table can update, delete main category.
- By clicking "Clear" button can clear the textboxes.
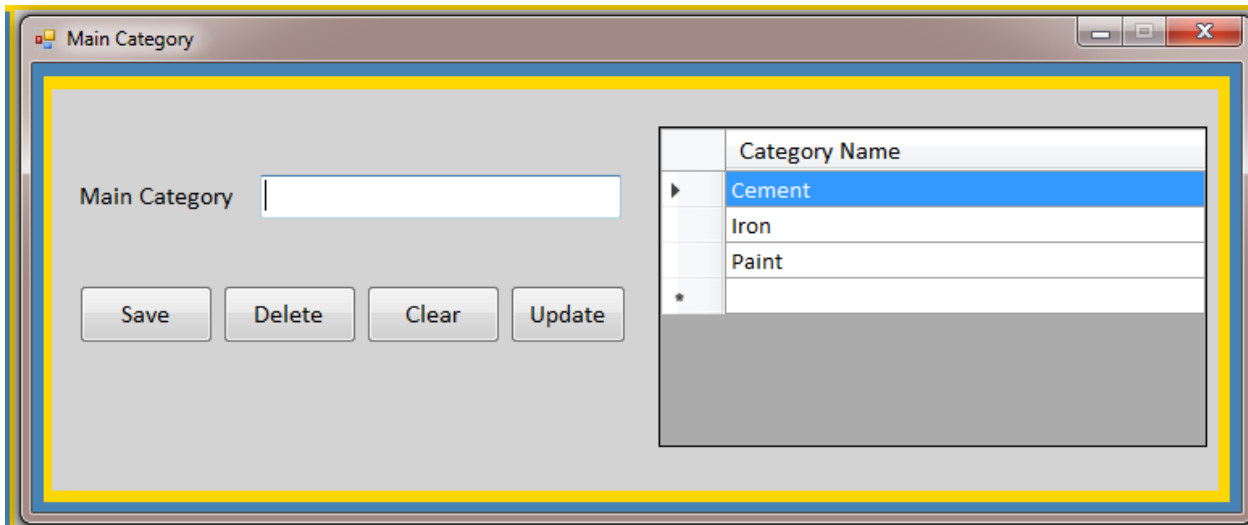
Figure 39-Main category interface

Sub Category

According to previously enter main categories can enter sub categories.

- Select the main category & then enter the subcategory according to main category.
- All the saved details display in the table.
- When clicking the items on the table can update, delete sub category.

Add Item

In this section can add the items that have in the hardware.

- Select the main category & subcategory.
- All the saved details display in the table.
- Enter the item code and press "Enter" button. If item already entered it will display the error message.
- Then enter measurement & re-order level and save the items.
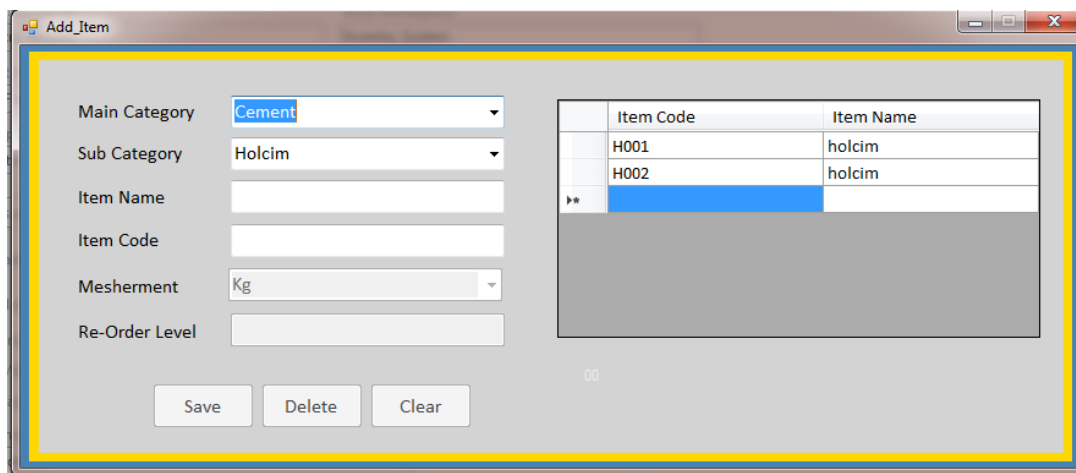
Figure 40-Add item interface

Sections

All the sections that have in the hardware can enter in this section.

➢ Enter the section name & click "Save" button.

Suppliers

The suppliers that provide items to the hardware can register their details in this section.

➢ Enter the supplier name, email, address & telephone number.
➢ When clicking the items on the table can update, delete sub category.
➢ By clicking "Add Item" can enter items according to the suppliers.
➢ Select the details from the tables and click the "Save" button.

Item Receive

All the items received from the suppliers can enter in this section.

➢ When form loading all the fields disabled.
➢ Click the "New Bill" button.
➢ Enter date, bill no, order number & select the supplier.
➢ Select man and sub category. Then display the table according that select the item code and item name.
➢ Then enter item information & quantity. Available quantity at the main stock will display the in front of the textbox.
➢ Enter the other information and click "Save" button.

- ➢ If click "Complete Bill" you cannot enter the same bill number again.

Item Issue

All the received items issued by this section

- ➢ Enter issue number and click "Enter".
- ➢ If issue number already entered display the error message.
- ➢ Select the date, section, main category & subcategory.
- ➢ Display the received item on the table and then click the item want to issue.
- ➢ Then display the balance of the item. If issued quantity is more than the balance quantity then display the error message.
- ➢ Then click the "issue" button.
- ➢ If click the "Complete" button you couldn't issue the same issue number again.
- ➢ You can removed the issue items by clicking the items in the table.

Item Return

After issue the items you can return items by this section.

- ➢ Enter return number and click "Enter".
- ➢ If return number already entered display the error message.
- ➢ Select the date & section. According to that display the issued item on the table.
- ➢ Then click the "return" button.
- ➢ If click the "Complete" button you couldn't return the same return number again.
- ➢ You couldn't remove the return items.
- ➢ So carefully return the items.

Item Depreciate

After some years items are depreciate. You can depreciate items by this section.
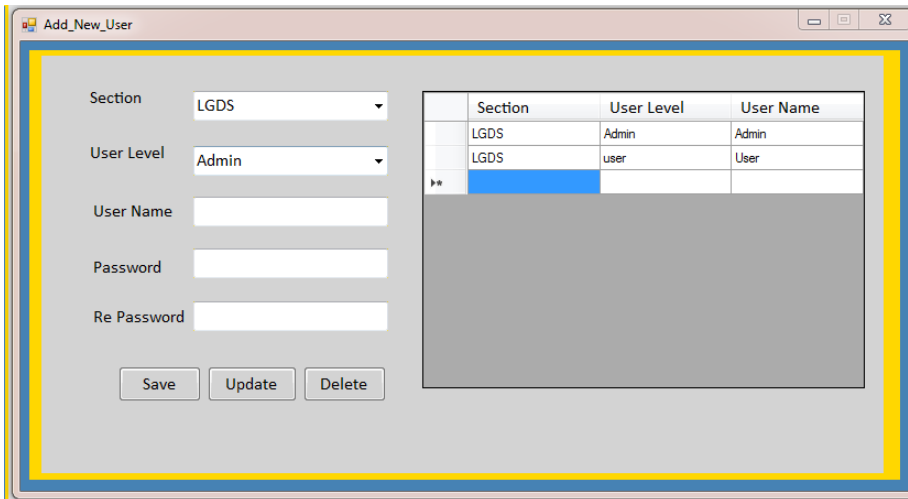
- ➢ Enter dip number and click "Enter".
- ➢ If dip number already entered display the error message.
- ➢ Select the date & enter reason. According to main category display the issued item on the table.
- ➢ Then enter other details.

➢ Then click the "Depreciate" button.

➢ You couldn't remove the Depreciate items.

➢ So carefully depreciate the items.

Add New User

First you should log to the system by enter the username and password that provide in the CD.

➢ Select the section & user level.

Figure 41-Add new user interface

➢ Then enter username, password & reenter the password.

➢ Then click the "Save" button.

Reports

In this section include the all the reports that requested to be want.

➢ First click the "Report" section.

➢ Then display the report dashboard.

- You can select whatever report by clicking the relevant report. Ex: issue report, receive report etc.
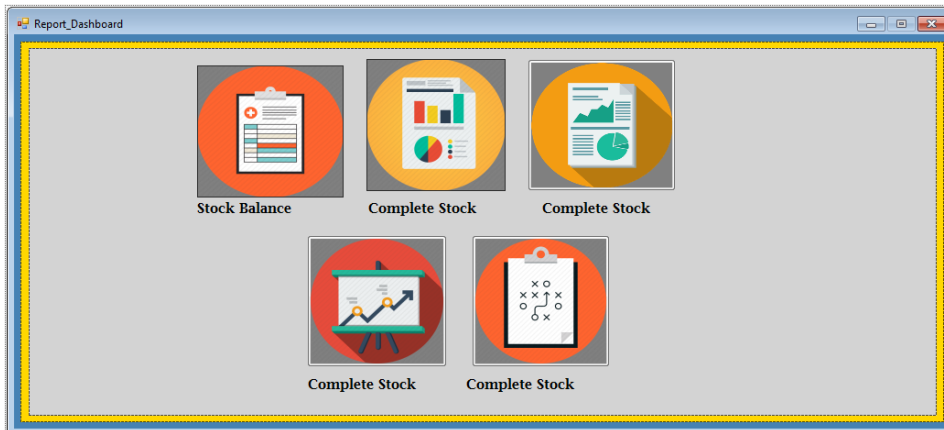
Figure 42-Report dashboard

Barcode

- Select the items from the table or enter item code.
- Then click the button"Genarate".
- Barcodes generate in "F" drive "barcode" folder.
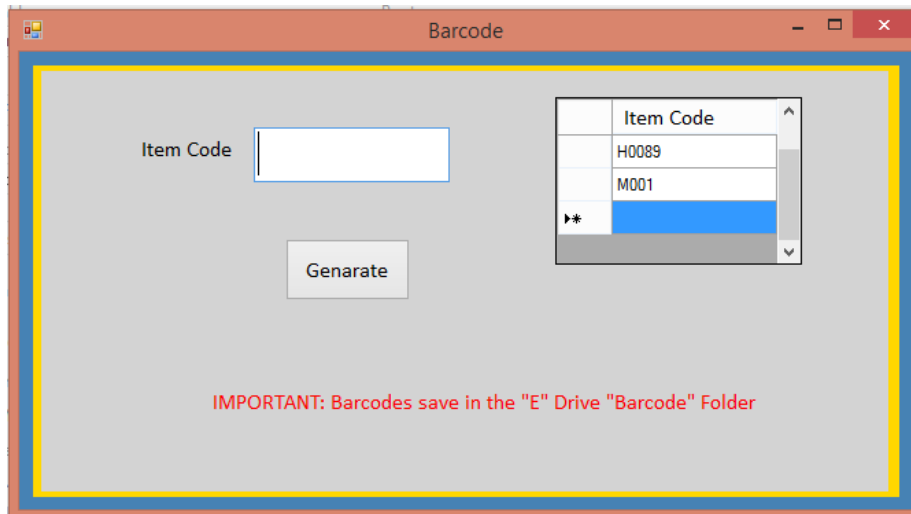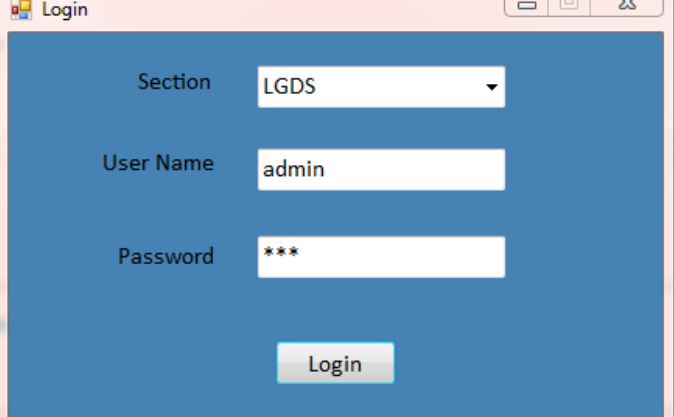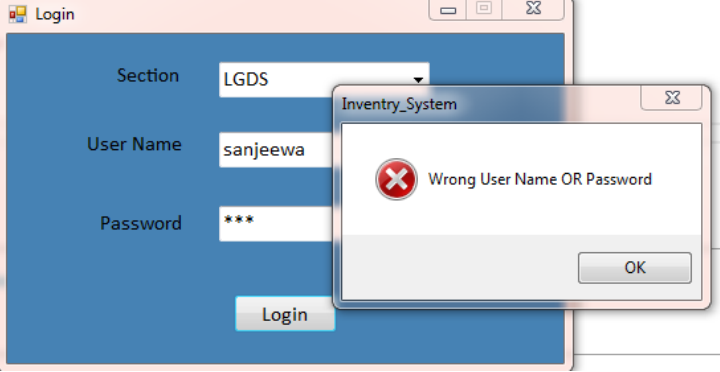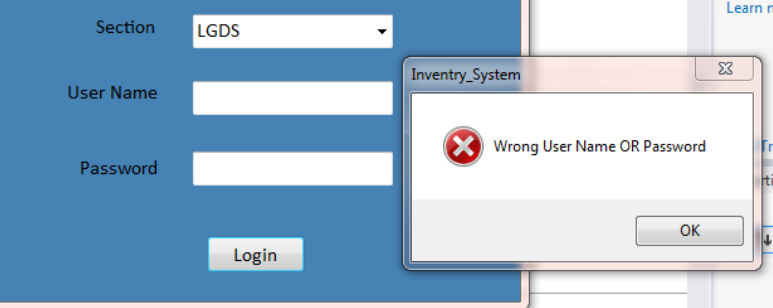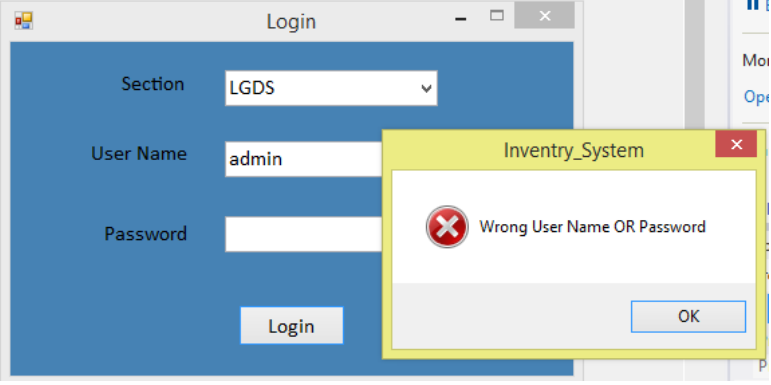
Figure 43-Barcode generation interface

APPENDIX D – TEST RESULTS

Login Module
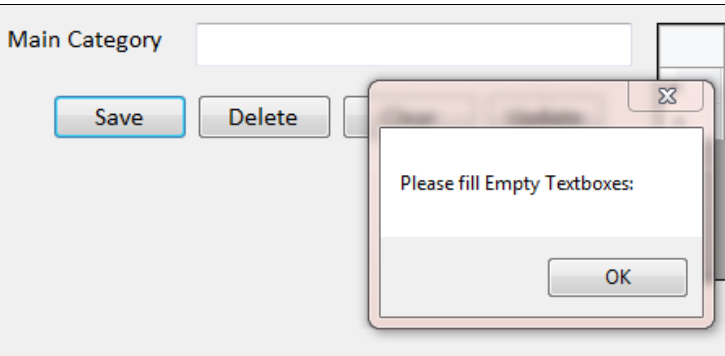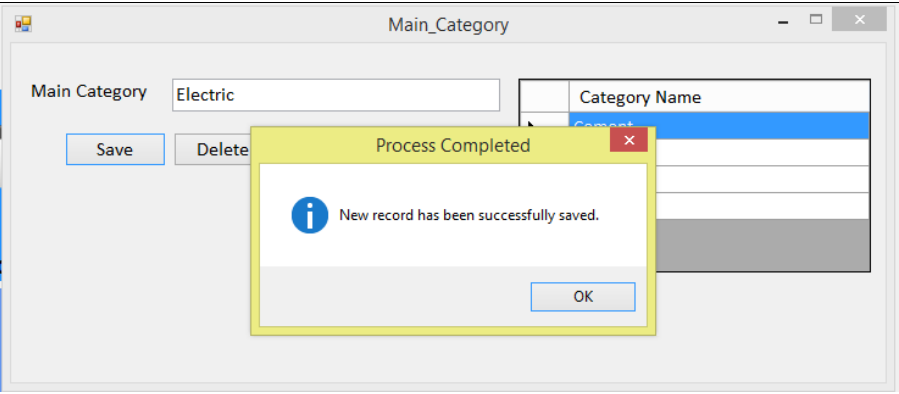
Table D-1: Login module test results
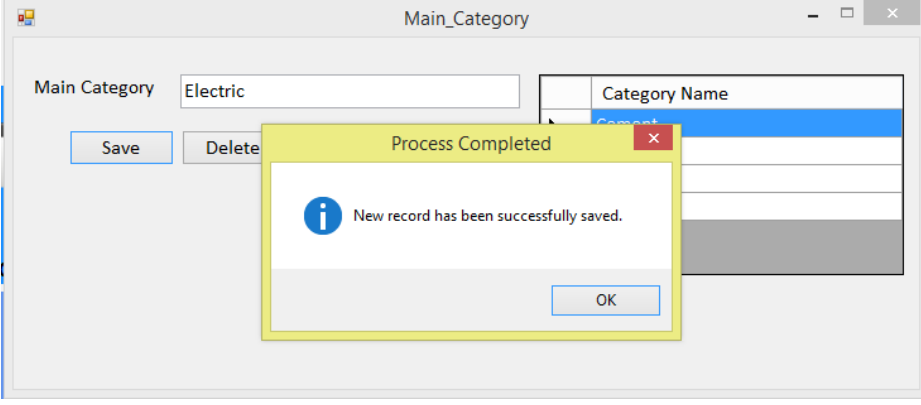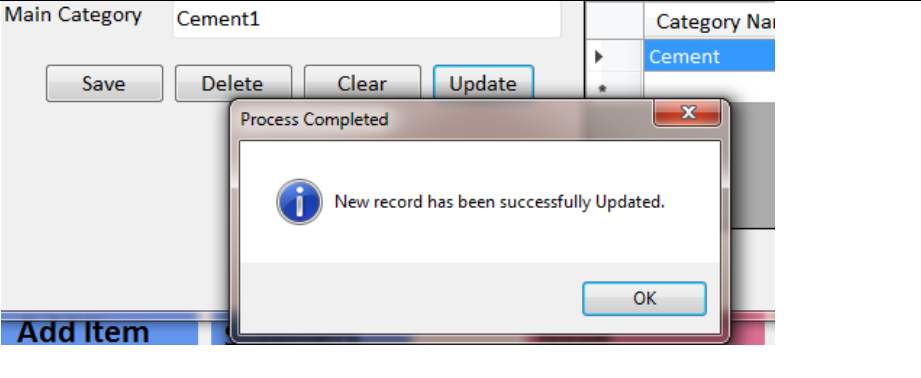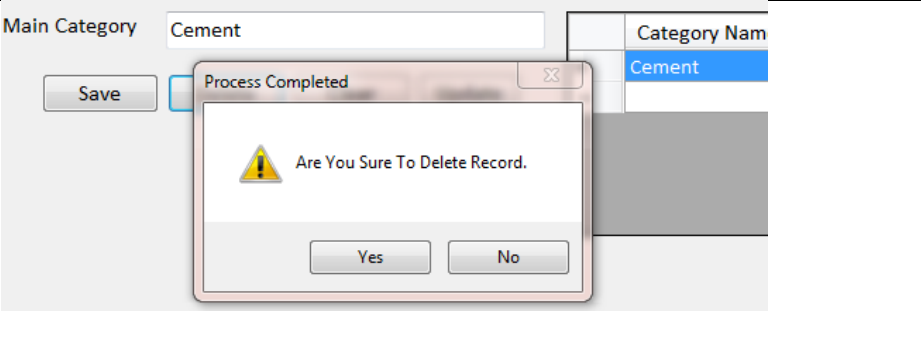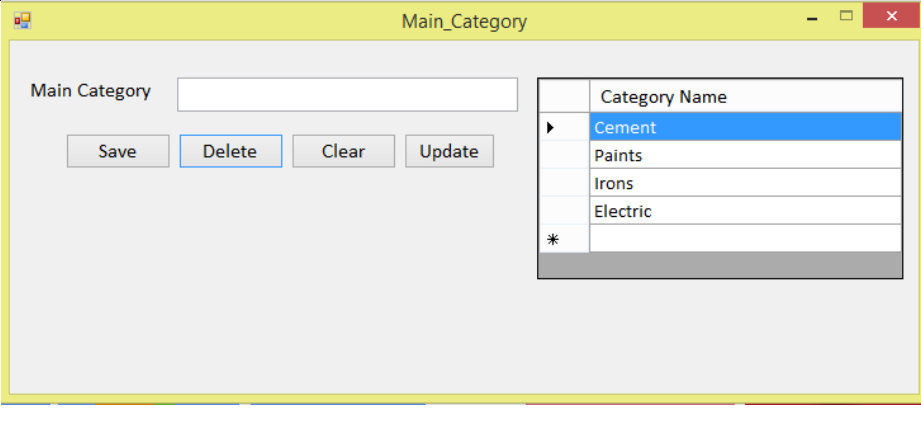
Test	Results	Comments
1		Succfully log to system
2		Enter invalid username, password & section
3		Empty username & password
4		Enter only username
5		Enter only password

6		Enter pressing 'Enter' key

Main Category Module
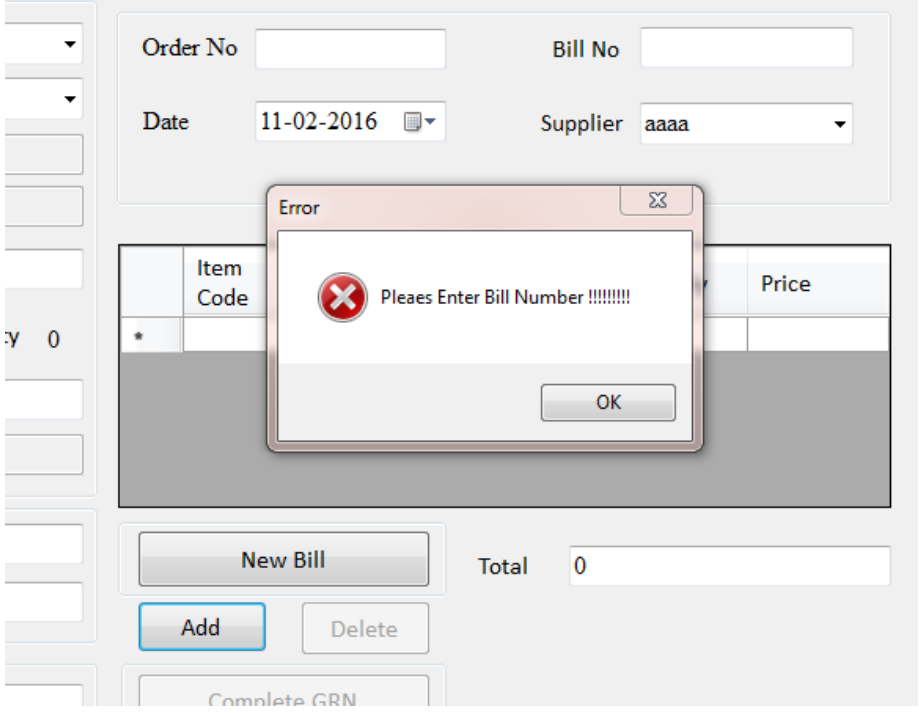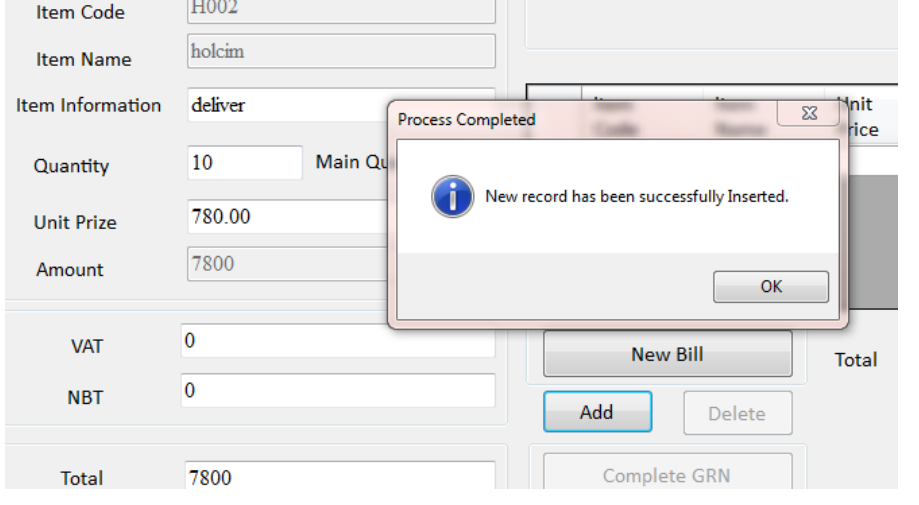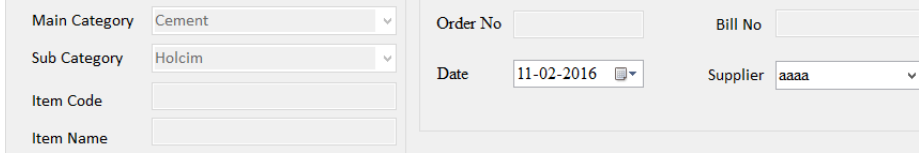
Table D-2: Main category module test results

Test	Results	Comments
1		Without filling all the require fields
2		filling all the require fields

3		Enter same category again
4		Click the main category in the table that want update.
5		Click the main category in the table that want delete.
6		Delete the main category that entered the sub category.

Item Receive Module
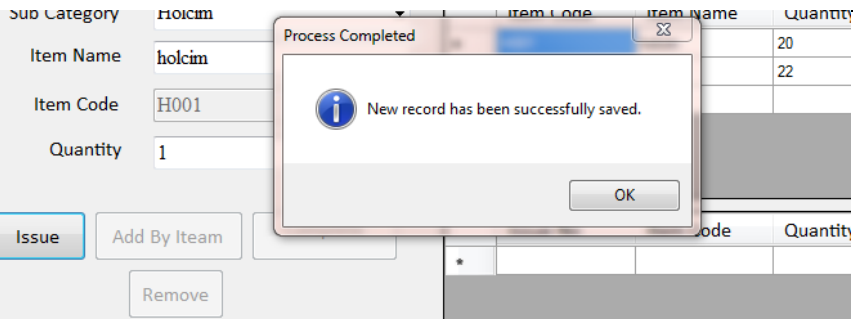
Table D-3: Item receive module test results
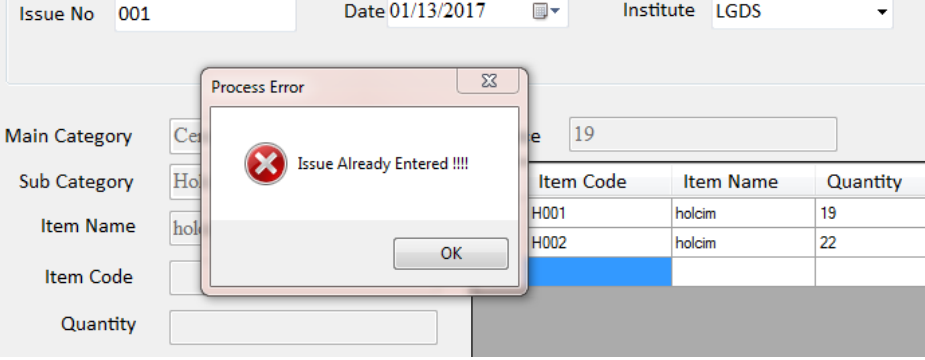
Test	Results	Comments
1		Enter some of the require fields
2		filling all the require fields
3		Click main category, subcategor

Test	Results	Comments
		y and try to edit
4	Display items according to main & sub categories	Click the main category & sub category
5	Delete the receive details	Click the row in the table that want delete.

Item Issue Module

Table D-4: Item issue module test results
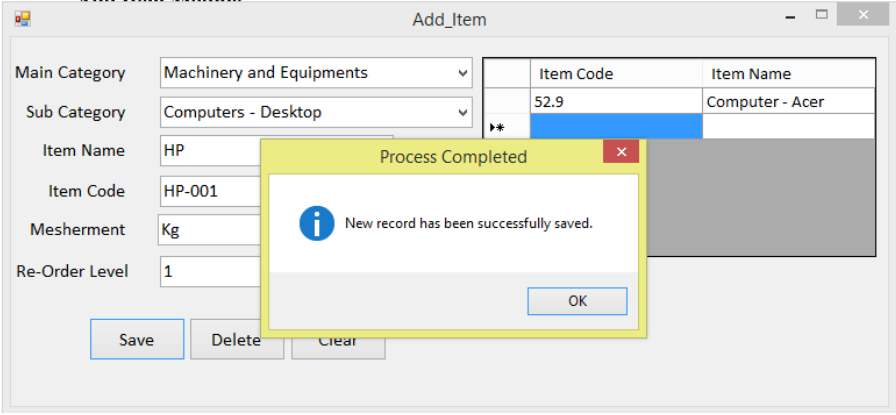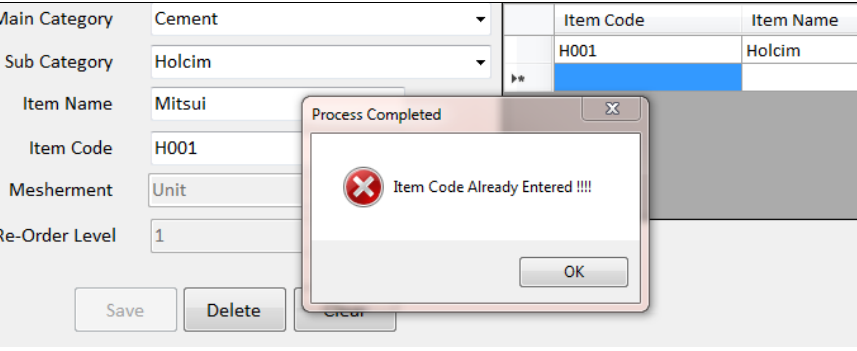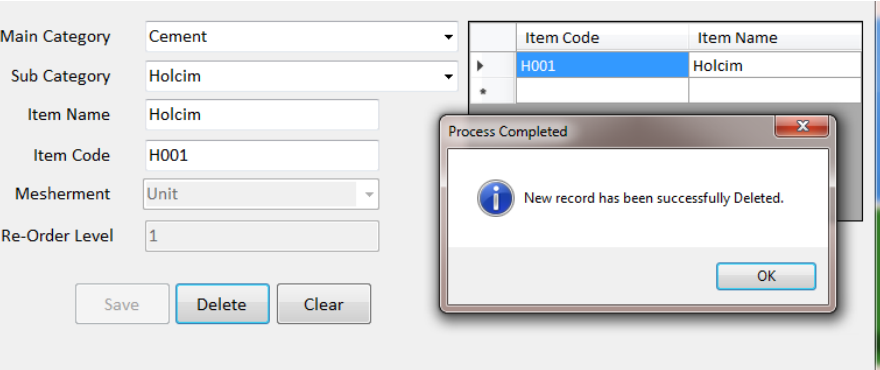
Test	Results	Comments
1	Issue the received items	Enter some of the require fields and issue
2		Filling all the require fields

3	Issue the received items	Click the record in the table that want update.
4		Enter same issue number & click enter button
5	Issue the quantity more than in the main stock	Click the main category & sub category
6	Remove the issue item	Click the row in the table that want delete.

Add Item Module

Table D-5: Add item module test results

Test	Results	Comments
1		Enter some of the require

			fields and save
2			Filling all the require fields
3			Enter same item and save
4			Select data from table and enter value that need to delete
5	Delete items		Select data from table where already issued item

APPENDIX E – CODE LISTING

This document contains important code fragments of the HMIS.

Define the variables of the vb.net as module

```vbnet
Module Variable
    Public d_conn As MySqlConnection
    Public d_cmd As MySqlCommand
    Public d_conn1 As MySqlConnection
    Public d_cmd1 As MySqlCommand
    Public d_reader As MySqlDataReader
    Public d_adapt As MySqlDataAdapter
    Public ds As DataSet
    Public dt As DataTable
    Public i As Integer
    Public dataset As DataSet
    Public Sql As String
    Public txtAddress As TextBox
    Public Zipcode As Integer = 0
    Public Adding, Editing As Boolean
    Public Products As Integer = 0
    Public Employees As Integer = 0
    Public Search As Integer = 0
End Module
```

Figure 44-Variables

This code segment is used to check the issue number already entered to the system.

```vbnet
Public Sub CheckIssue()
    connection_open()
    d_adapt = New MySqlDataAdapter("SELECT issue_no FROM `issued_no` WHERE
issue_no ='" & txtIssueNo.Text & "'", d_conn)
    ds = New DataSet
    d_adapt.Fill(ds, "search")
    If (ds.Tables("search").Rows.Count > 0) Then
        MessageBox.Show("Issue Already Entered !!!!", "Process Error",
MessageBoxButtons.OK, MessageBoxIcon.Error)
        '"Process Completed", MessageBoxButtons.OK,
MessageBoxIcon.Information
        'gridfilterprice()
        'gridReceveTotalt()
        btnIteamIssue.Enabled = False
        btnAddByIteam.Enabled = False
        cmbComIssue.Enabled = False

    Else
        cmbReMc.Enabled = True
        cmbReSc.Enabled = True
        cmbIssIteam.Enabled = True
        txtIssuQuan.Enabled = True
    End If
```

This code segment is used to check the quantity of the item when issuing the items.

```vb
Private Sub txtIssuQuan_KeyPress(sender As Object, e As KeyPressEventArgs) Handles
txtIssuQuan.KeyPress
        'btnIteamIssue.Enabled = True
        ' btnAddByIteam.Enabled = True
        connection_open()
        If e.KeyChar = Convert.ToChar(13) Then
            btnIteamIssue.Enabled = True
            'lblIssuCode.Text = txtIssuQuan.Text
            d_adapt = New MySqlDataAdapter("SELECT main_stock.quantity FROM
`main_stock` WHERE main_stock.iteam_code = '" & txtSupCo.Text & "' HAVING quantity
>='" & lblBalance.Text & "'", d_conn)
            ds = New DataSet
            d_adapt.Fill(ds, "search")
            If (ds.Tables("search").Rows.Count > 0) Then
                'If lblQuan.Text <= lblBala.Text Then
                'MessageBox.Show("Stock is Not Enough", "Invalid",
MessageBoxButtons.OK, MessageBoxIcon.Error)
                Dim balance As Integer
                Dim quantity As Integer
                balance = lblBalance.Text
                quantity = lblQuantity.Text
                If balance >= quantity Then
                    lblTotal.Text = balance - quantity
                Else
                    MessageBox.Show("Stock is Not Enough", "Invalid",
MessageBoxButtons.OK, MessageBoxIcon.Error)
                    txtIssuQuan.Clear()
                    btnIteamIssue.Enabled = False
                    btnAddByIteam.Enabled = False
                End If
            End If

        End If

        connection_close()
        '--------------------------------------------------/////
    End Sub
```

Figure 45-Check quantity code sample

This code segment is used to check the issue number already entered to the system.

```vb
        Private Sub DataGridViewIssuedList_CellClick(sender As Object, e As
    DataGridViewCellEventArgs) Handles DataGridViewIssuedList.CellClick
            Try
                Dim i As Integer
                i = DataGridViewIssuedList.CurrentRow.Index
                txtSupCo.Text = DataGridViewIssuedList.Item(1, i).Value
                txtIssuQuan.Text = DataGridViewIssuedList.Item(2, i).Value
                lblHideIssu.Text = DataGridViewIssuedList.Item(3, i).Value
                lblMainStockQuan.Text = DataGridViewIssuedList.Item(5, i).Value
            Catch ex As Exception
            End Try
        End Sub
```

Figure 46-Check issue number

This code segment is used to barcode genaration.

```vbnet
Private Sub Barcode()
        Dim barcode As OnBarcode.Barcode.Linear
        ' Create linear barcode object
        barcode = New OnBarcode.Barcode.Linear()
        ' Set barcode symbology type to Code-39
        barcode.Type = OnBarcode.Barcode.BarcodeType.CODE39
        ' Set barcode data to encode
        barcode.Data = TextBox1.Text
        ' Set barcode bar width (X    dimension) in pixel
        barcode.X = 1
        ' Set barcode bar height (Y dimension) in pixel
        barcode.Y = 60
        ' Draw & print generated barcode to png image file
        barcode.drawBarcode("E:Barcode//" & TextBox1.Text & ".png")

    End Sub
```

Figure 47-Barcode code sample

Get the balance by Search the item code segment

```vbnet
Public Sub searchBalance(ByVal txtSupCo As String, ByVal txtIssBalance As
TextBox)
        Try
            connection_open()
            Sql = "SELECT quantity FROM main_stock WHERE iteam_code = '" &
txtSupCo & "' "
            d_cmd = New MySqlCommand(Sql, d_conn)
            d_reader = d_cmd.ExecuteReader
            If d_reader.Read Then
                txtIssBalance.Text = d_reader("quantity").ToString
            End If
            ' If Sql > 0 Then
            'MessageBox.Show("bbbbbbbbbb.", "Process Completed",
MessageBoxButtons.OK, MessageBoxIcon.Information)
            ' End If
            connection_close()
        Catch ex As Exception

    End Try
  End Sub
```

Figure 48-Get balance sample code

APPENDIX F – EVALUATION QUESTIONNAIRS

Questionnaire

Table F-1: Evaluation Questionnaire

Name of Employee –	
Section –	
Designation –	
Age (Years) -	☐ 18 – 25 ☐ 26 – 30 ☐ 31 – 40 ☐ Above 40
Working Experience -	☐ 1 – 3 Years ☐ 3 – 5 Years ☐ 5 – 10 Years☐ Over 10 Years
Educational Level -	☐ G.C.E. O/L ☐ G.C.E. A/L ☐ Degree Holder ☐ Master Degree ☐ Other
Language Proficiency -	☐ Sinhala ☐ Tamil ☐ English
1. Is the Initial interface is attractive? Do you like it?	o Extremely Satisfied o Very Satisfied o Somewhat Satisfied o Not so Satisfied o Not at all Satisfied
2. Always, different interfaces are not complicated, I feel comfortable.	o Extremely Satisfied o Very Satisfied o Somewhat Satisfied o Not so Satisfied o Not at all Satisfied
3. Processes involved in the software, are not found complex. I feel comfortable.	o Yes o May Be o Not Sure

	○ No
4. How would you rate the speed of Application Software?	○ Very Fast ○ Fast ○ Moderately ○ Slow ○ Very slow
5. Message and instructions receiving from software are available where ever we need.	○ Extremely Satisfied ○ Very Satisfied ○ Somewhat Satisfied ○ Not so Satisfied ○ Not at all Satisfied
6. I am satisfied with the response and attendance to enquiries made.	○ Yes ○ No
7. I am satisfied totally with the whole software provided	○ Extremely Satisfied ○ Very Satisfied ○ Somewhat Satisfied ○ Not so Satisfied ○ Not at all Satisfied
8. I am fully satisfied with the service provided with the software.	○ Extremely Satisfied ○ Very Satisfied ○ Somewhat Satisfied ○ Not so Satisfied ○ Not at all Satisfied
9. All, in process needs within the systems of the institution are fulfilled by this software.	○ Extremely Satisfied ○ Very Satisfied ○ Somewhat Satisfied ○ Not so Satisfied ○ Not at all Satisfied

10. Titles used in the general process are similar and find no issues within the used titles of the software.	o Extremely Satisfied o Very Satisfied o Somewhat Satisfied o Not so Satisfied o Not at all Satisfied
11. No misleading guides were found within the software and Manual.	o Extremely Satisfied o Very Satisfied o Somewhat Satisfied o Not so Satisfied o Not at all Satisfied
12. Compatibility with other application software's?	o Excellent o Good o Average o Bad
13. How often does our software freeze or crash?	o Not at all often o Slightly often o Moderately often o Very often
14. Would you recommend our software to others??	o Yes o May be o Not sure o No
15. Any suggestions or comments about the system	

Questionnaire Analysis

1. Is the Initial interface is attractive? Do you like it?

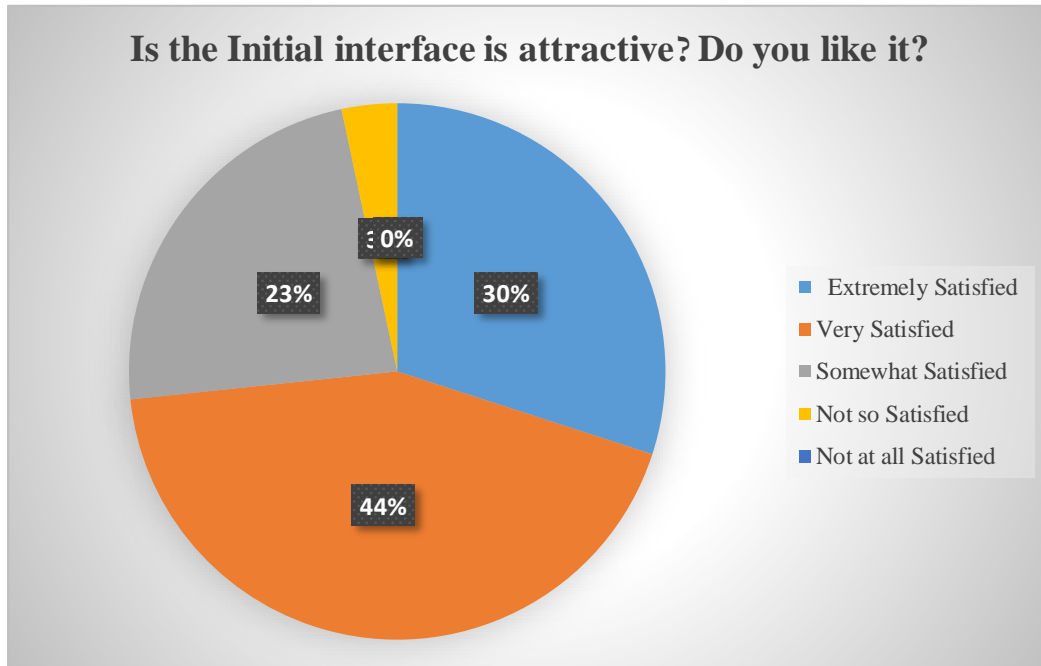   Following describe about interface attractive.

Figure 49: Is the Initial interface is attractive analyze graph

2. Always, different interfaces are not complicated, I feel comfortable.
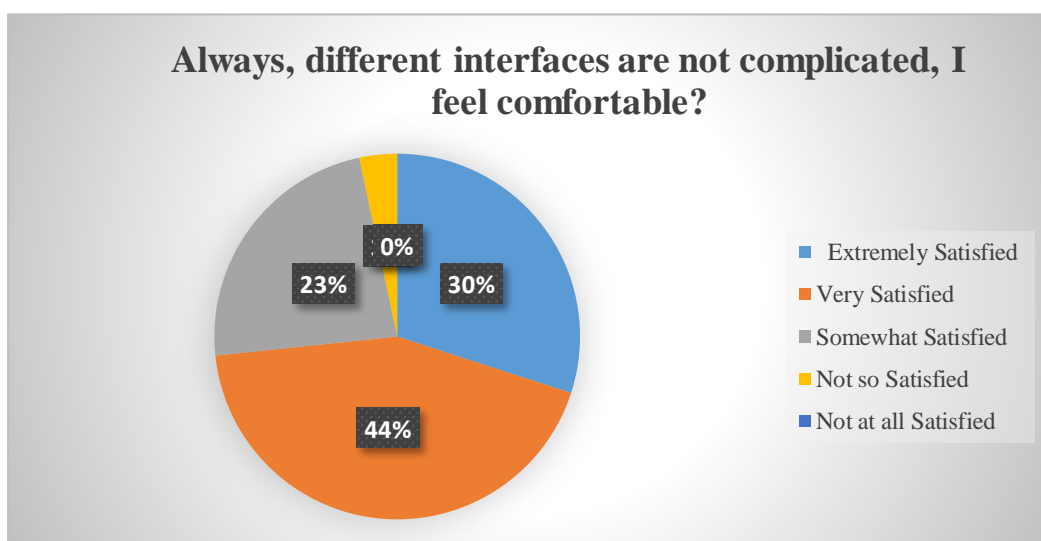
   Following describe about interface complicated.

Figure 50-interfaces are not complicated analyze graph

3. Processes involved in the software, are not found complex. I feel comfortable.
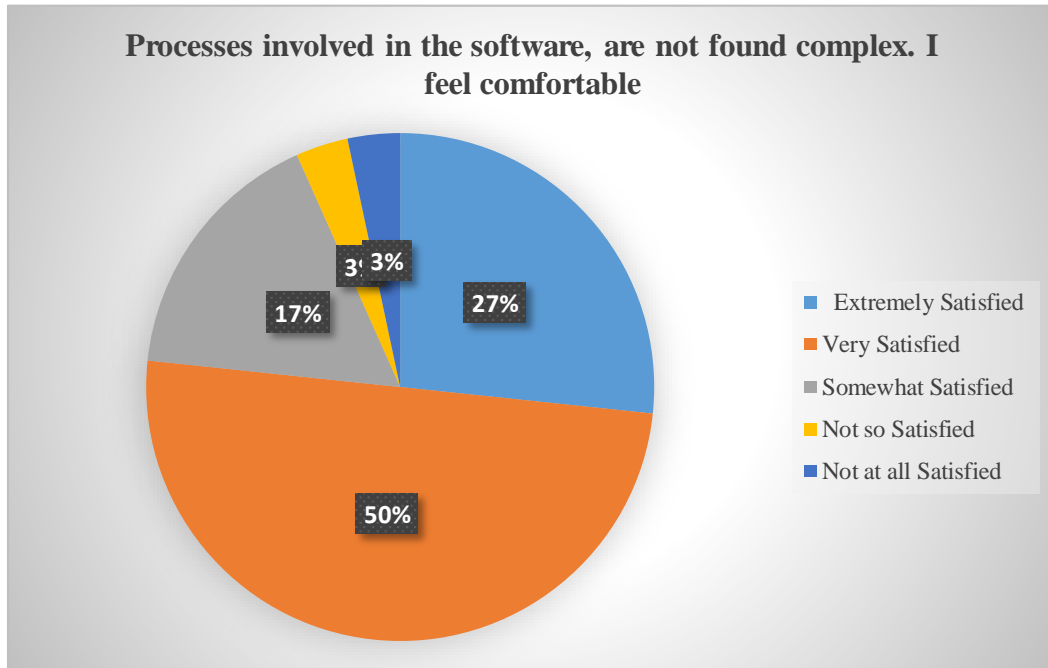
Following describe about interface complicated.

Processes involved in the software, are not found complex. I feel comfortable

- Extremely Satisfied
- Very Satisfied
- Somewhat Satisfied
- Not so Satisfied
- Not at all Satisfied

27%
50%
17%
3% 3%

Figure 51-Processes involved in the software, are not found complex analyze graph

4. How would you rate the speed of Application Software?

Following describe about interface complicated

How would you rate the speed of Application Software?

- Very Fast
- Fast
- Moderately
- Slow
- Very slow

36%
48%
13%
0%
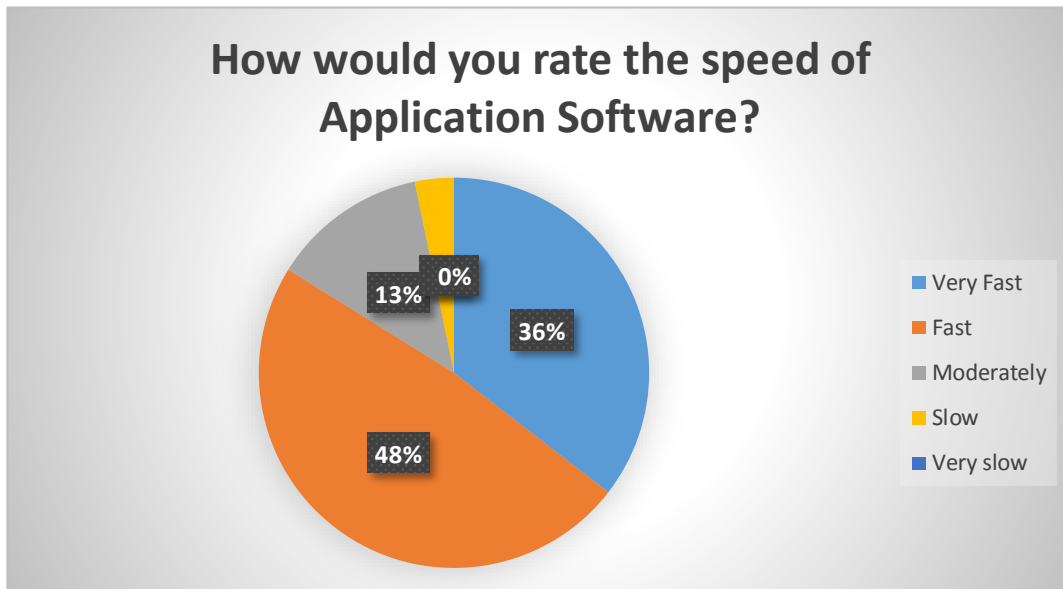
Figure 52-Speed of application software analyze graph

5. Message and instructions receiving from software are available where ever we need.

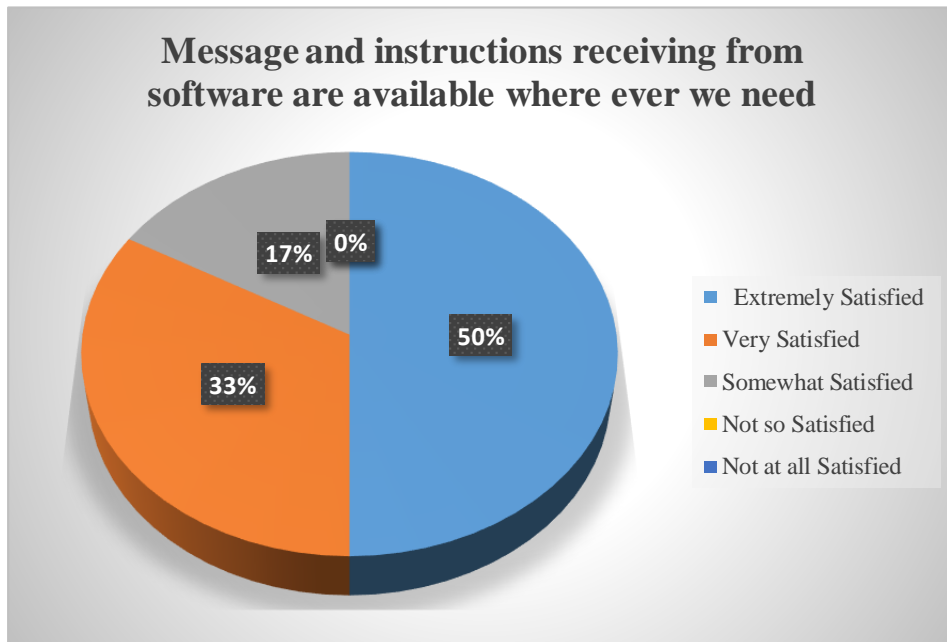Following describe about interface complicated

Figure 53-Message and instructions receiving from software analyze graph

6. I am satisfied with the response and attendance to enquiries made.
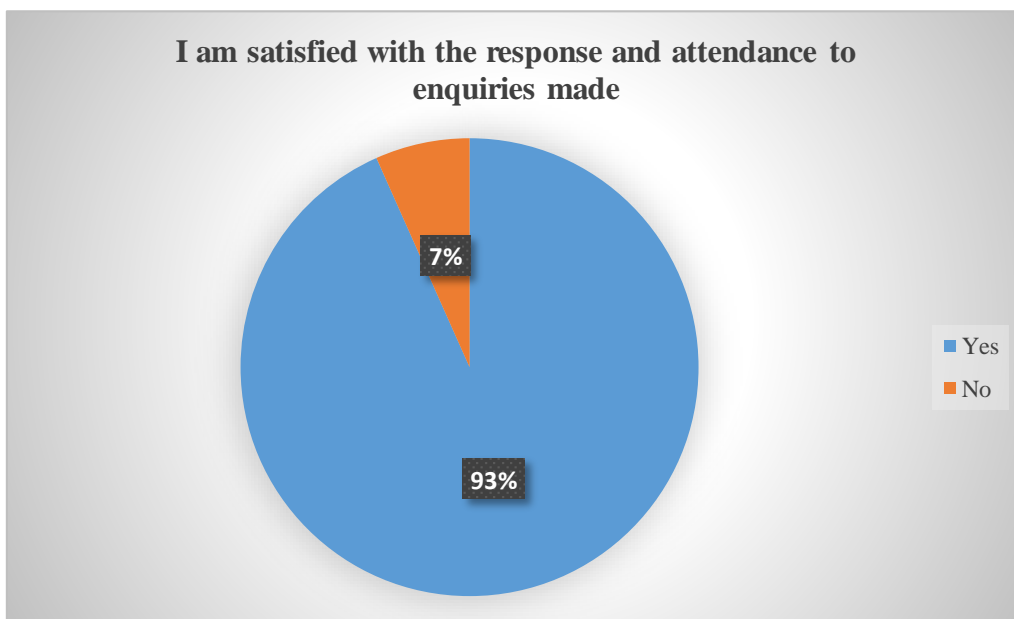
Following describe about interface complicated

Figure 54-Response and attendance to enquiries analyze graph

7. I am satisfied totally with the whole software provided

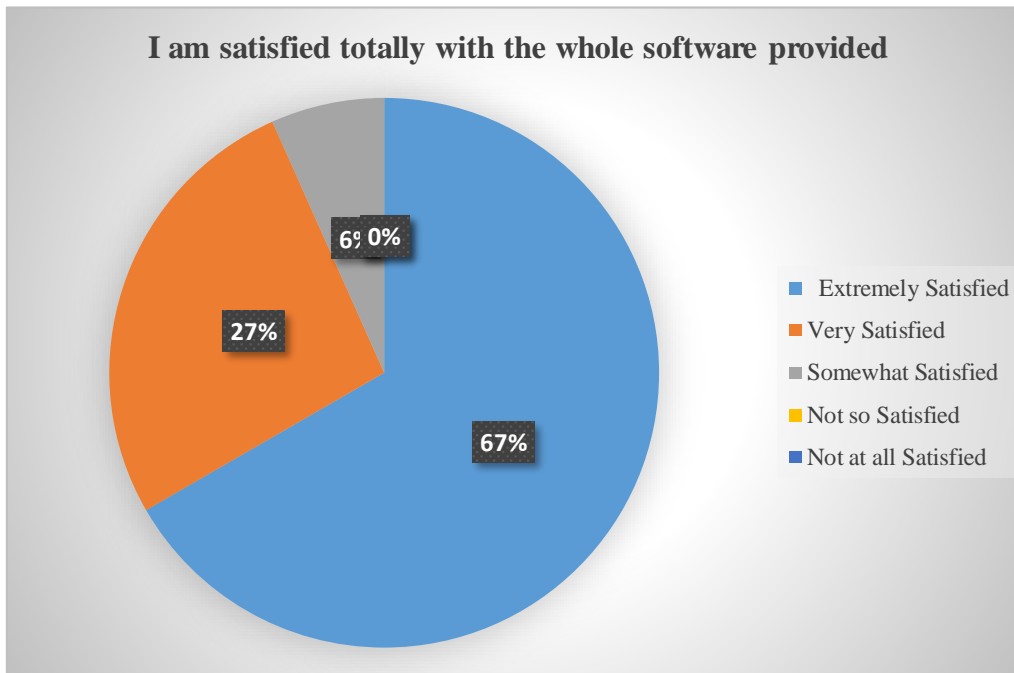Following describe about interface complicated

Figure 55-Satisfied with the whole software provided analyze graph

8. I am fully satisfied with the service provided with the software.

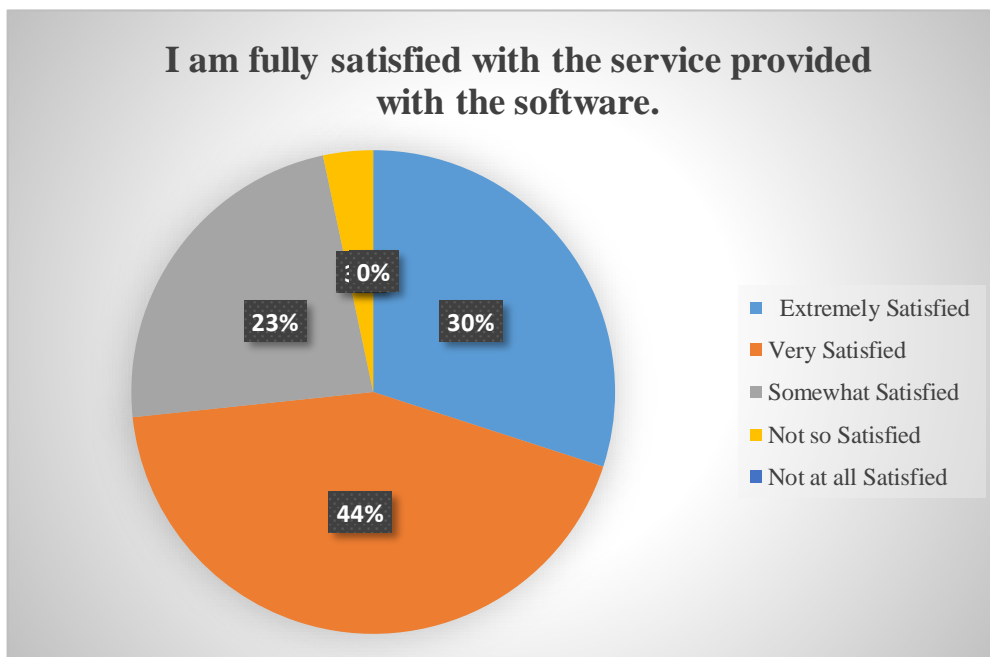Following describe about interface complicated

Figure 56-Satisfied with the service provided analyze graph

9. All, in process needs within the systems of the institution are fulfilled by this software.

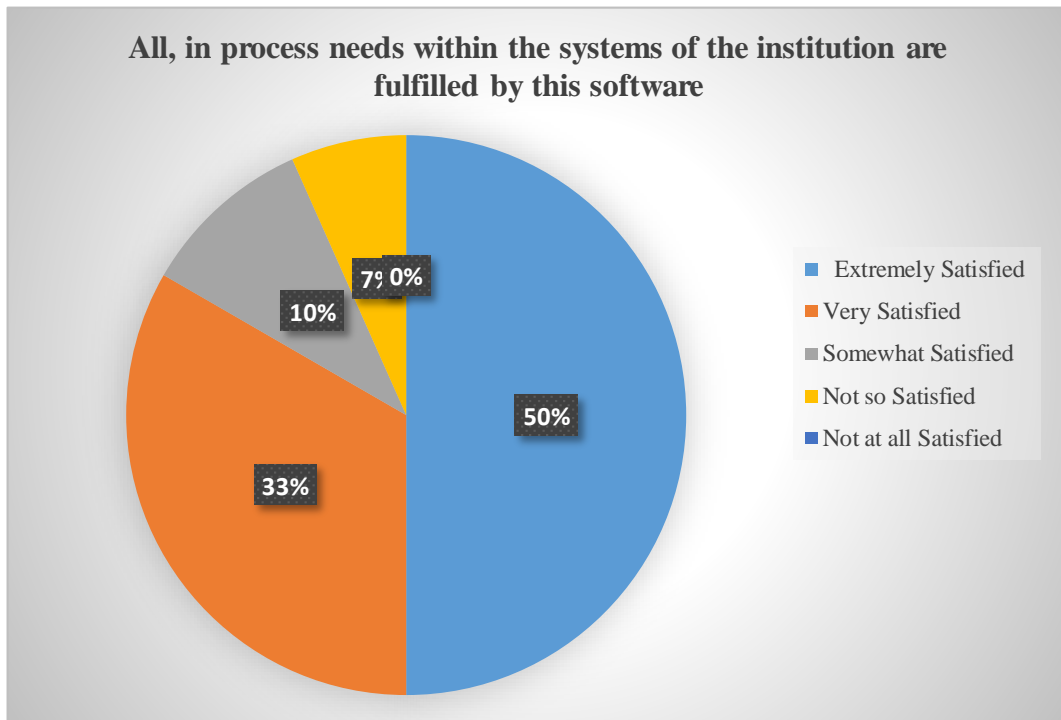Following describe about interface complicated

Figure 57-Process needs within the systems of the institution are fulfilled analyze graph

10. Titles used in the general process are similar and find no issues within the used titles of the software.
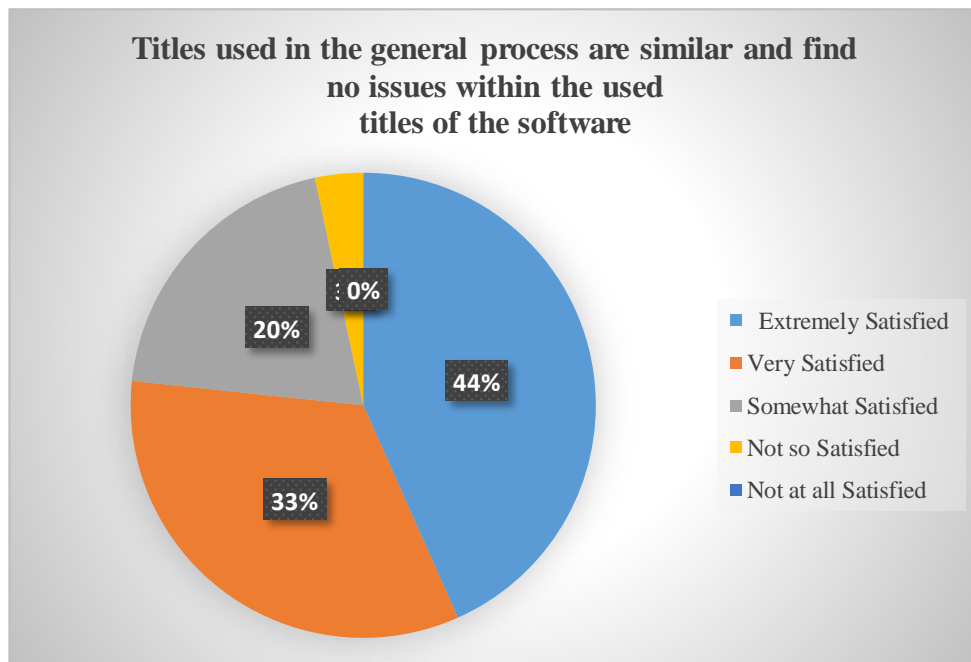

Figure 58-Process are similar and find no issues within the used titles analyze graph

11. No misleading guides were found within the software and Manual.

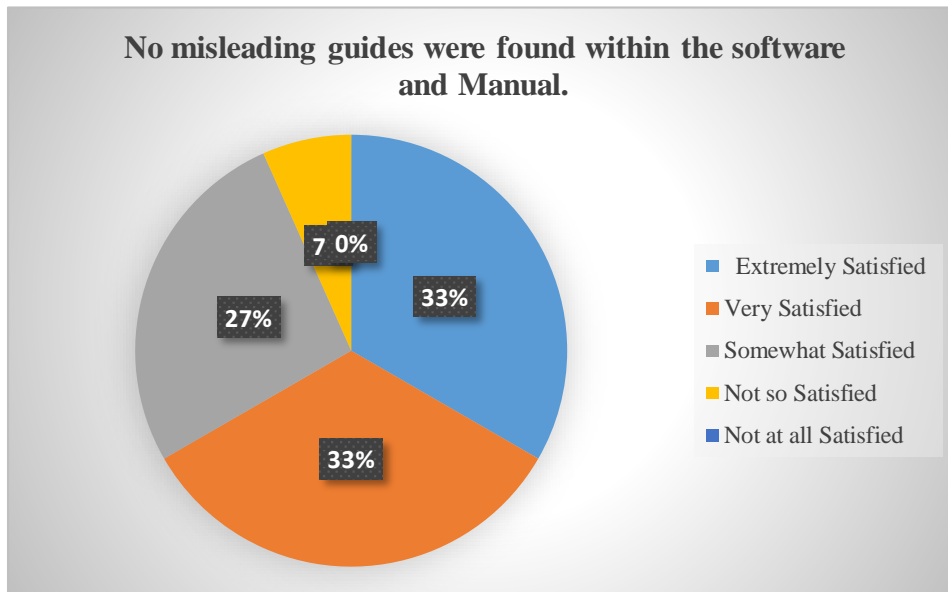Following describe about interface complicated

No misleading guides were found within the software and Manual.

- Extremely Satisfied
- Very Satisfied
- Somewhat Satisfied
- Not so Satisfied
- Not at all Satisfied

33%
33%
27%
7 0%

Figure 59-software and manual analyze graph

12. Compatibility with other application software's?

Following describe about interface complicated

Compatibility with other application software's
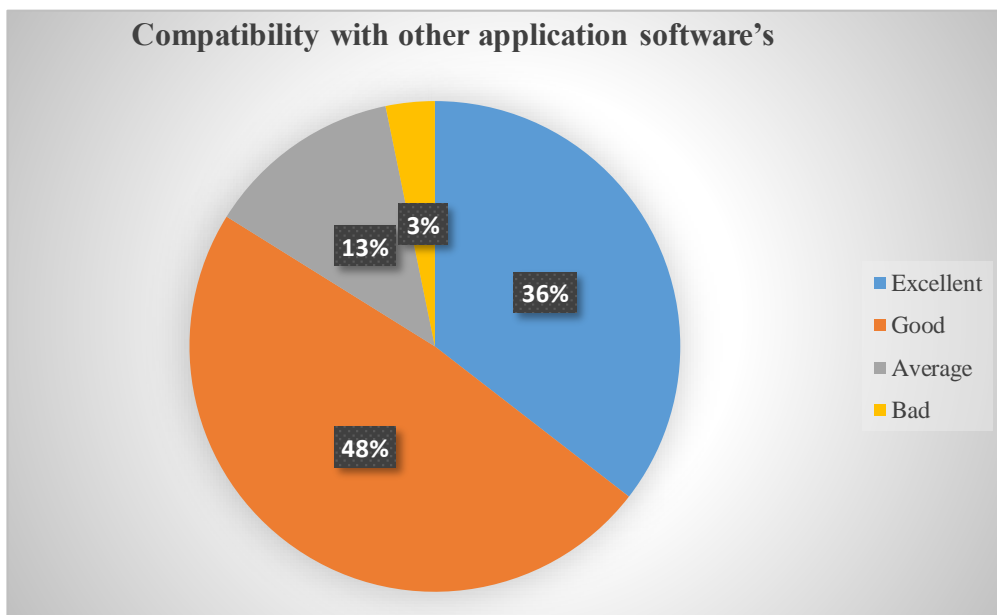
- Excellent
- Good
- Average
- Bad

36%
48%
13%
3%

Figure 60-Compatibility with other application software's analyze graph

13. How often does our software freeze or crash?

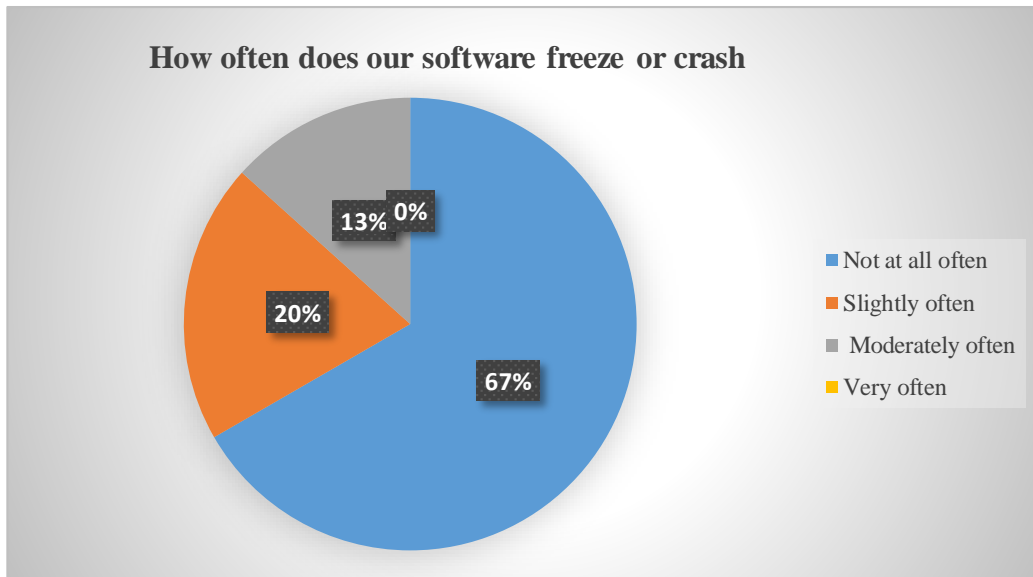Following describe about interface complicated

Figure 61-How often does our software freeze or crash analyze graph

14. Would you recommend our software to others??
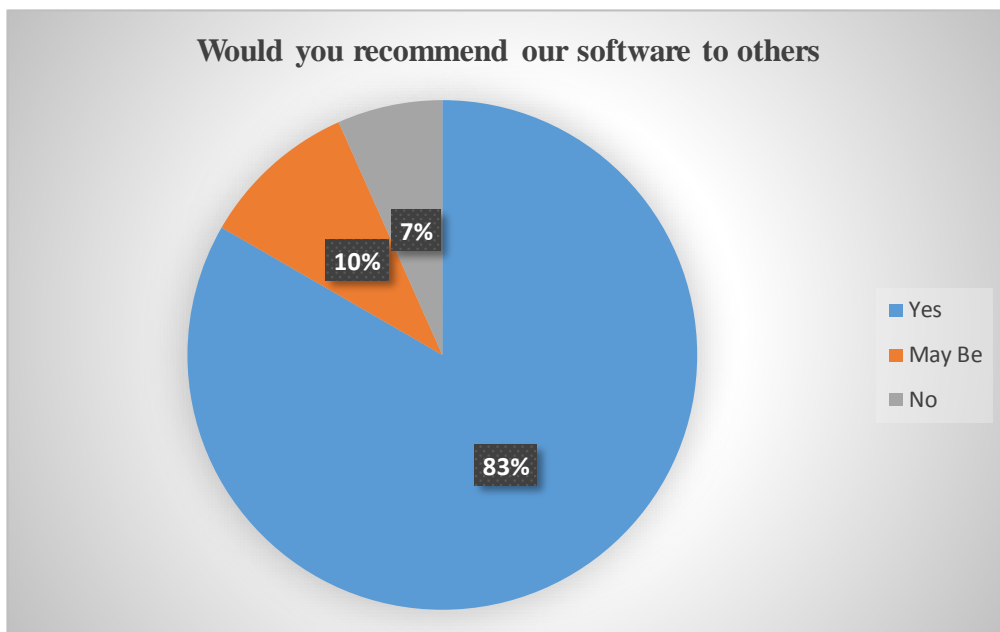
Following describe about interface complicated

Figure 62 - Would you recommend our software to others analyze graph

GLOSSARY

Use Case Diagram - Its simplest is a representation of a user's interaction with the system.

CASE (Computer Aided Software Engineering) – Complex software development projects can be assisted by organizing and controlling development processes through the use of CASE tools.

DBMS (Database Management System) – DBMS is a system software that manage storage, updating and retrieval of data in a computer system.

Activity diagram - graphical representations of workflows of stepwise activities and actions.

SQL (Structured Query Language) – SQL is a language used to communicate with a database.

UML (Unified Modeling Language) – UML provides a standard way of modeling real world objects in software engineering field.

GUI (Graphical User Interface) – A visual method of interacting with a computer through menus, icons and windows etc.

IT(Information Technology)- Information Technology is simply working with computers getting knowledge about it.