



# Masters Project Final Report

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# **Information Management System for Masha Office Automation**

**S.S Kumanayake**

**2017**



# **Information Management System for Masha Office Automation**

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

**S.S Kumanayake**

**University of Colombo School of Computing**

**2017**



## 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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Signature:

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

Mr. / Ms.

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

Certified by:

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## **ABSTRACT**

Masha Office Automation is a private business organization whose basic business operations are selling and repairing the office automation equipment, configure CCTV systems and configuring intercom phone systems. At the previous, Masha Office Automation had used a manual system to handle their business operations. It was inefficient due to increase in client base and operations which were provided by the organization. One of the major problems faced by the client was the time consuming nature of these operations.

Therefore important goals of the project were to provide an effective and efficient working environment for the employees of the organization and provide satisfactory service to the customers.

To perform the above task in efficiently, the system was adapted to a web based information management system. It was followed the Model View Controller (MVC) architecture on the Codeigniter framework. Apache was used as the web server, thus the MySql was used as the Database Management System.

According to the stated goals, the system has been executed the stock management functions, human resource management functions, transaction handling functions, report generation functions, etc.

Implemented system was useful to achieve the stated goals through a web based system environment. It was provided to the managers and the staff members of the organization to handle the organizational data in a proper manner. Thus it provided customers a pleasant experience as they involved with the organization.

At the end of the project a web based information management system was hosted on the server and deployed to the business environment to overcome the obstacles which were identified during the business analysis.

## **ACKNOWLEDGEMENT**

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I wish to express my gratitude to University of Colombo, School of Computing (UCSC) and project examination board of Master of Information Technology (MIT) for giving me the opportunity to apply the knowledge gained through the MIT degree program. Thus, I wish to thank the respected lecture panel of UCSC who taught us from start of the program to improve our knowledge to overcome the real world challenges related to Information technology.

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## **LIST OF ABBREVIATIONS**

ERD	- Entity Relationship Diagram
MVC	- Model View Controller
PHP	- Hypertext Preprocessor
UML	- Unified Modeling Language

# **CHAPTER 01: INTRODUCTION**

## **1.1 Brief Introduction to Masha Office Automation**

Masha Office Automation is a private business organization which is located in southern province, Matara. Since its establishment in 2000 Masha office automation has attempted to do their business operations in a novel manner.

It is a popular organization of the district, whose main business is selling office automation equipment such as fax machines, photocopiers, printers, etc. In addition, they also configure CCTV systems and intercom systems. They have a large customer base including government organizations such as government schools, hospitals, police stations, AG offices and private business organizations such as pharmacies, hotels and restaurants etc.

According to the owner, vision of the Masha is to be a superior and trust worthy product and service provider, delivering high quality solutions to the customers so as to set new industry standards and win the loyalty of the customers.

To achieve the above mentioned vision statement, the proposed Information Management System will be essential.

## **1.2 Project**

### **1.2.1 Motivation for the project**

Masha Office Automation is currently running on a manual system. Because of that, they are facing some difficulties in their day to day operations. Purpose of the new system is to avoid the difficulties in maintaining stock information, effectively handle transaction information, and provide information which clients expect from the organization. and also this project is a great opportunity to apply my theoretical knowledge in the real world.

### **1.2.2 Issues present in the existing system**

Novel technologies are revolutionizing the society day by day and the human are also expected to adopt these new technologies to improve their lives. Because of that, the director of the organization, expect the organization to run its operations using a web based system

and manage their day to day business activities through it. Current manual system has become inefficient and time consuming due to the increase in the number of clients and transactions handled on day to day operations. Furthermore, the following problems were identified during the preliminary discussion with the owner.

- It is difficult to keep records of personal details in a secure way and it is difficult to retrieve specific information quickly when required.
- It is difficult to maintain the details about stock information.
- It is difficult to keep records about transaction details and the customers who were involved in the transaction.
- Attendance of the staff is marked manually and it wastes time to calculate remaining leave or leave that affect the monthly salary.
- Monthly salaries are calculated manually and it may lead to wrong calculations.
- In the current system, services and maintenance are arranged over the telephone.
- There is no convenient way to analyze previous behavior of the business operations.
- The current system does not consider the selling promotions.
- Customer interaction with the organization is very poor.
- Unnecessary paper based work are done during day to day operations.

These problems would be mitigated with the introduction of a new web based system.

### **1.2.3 Objectives of the Project**

The main purpose of the web based system is to increase the efficiency and effectiveness of the organizational operations and provide an optimum service to the clients. To attain the above state, the organization wishes to achieve following objectives in the near future.

- Provide a quality service to staff members, service agents and also to the customers.
- Reduce the work load that the users have to do manually.
- Improve efficiency of organization's activities.
- Ensure the security of the critical Information.
- Introduce a web based solution for the organization and their customers to perform their activities in a flexible and easy way.
- Build good relationship among the customers, staff members and the organization.
- Encourage to use a web application while overcoming real world challenges.



- Reduce delays in attending to the customer's' requests.
- Provide faster responses through the system.
- Eliminate unnecessary paper work.

#### **1.2.4 Scope of Project**

- System member registration process.
  - System administrator should be able to register users with the system and provide different privileges to the staff members, service agents and the customers.
  - System administrator should be able to modify or delete user records.
- Manages stock information.
  - Computer operator should be able to record details about stock items via the system.
  - Computer operator should have the facility to record transaction information using a barcode scanner.
- Keeping record of details about warranty claims.
  - System maintains the warranty period information and informs whether the searched item is under warranty period or has exceeded the warranty period. This can be done using the barcode or serial number.
- Managing the attendance and leave of the staff members and service agents.
  - Computer operator enters the details of daily attendance and leave records for the purpose of calculating the salary.
- Keeping track of details about the staff members' salary.
  - System has the ability to record the salary information.
  - System has the ability to generate the salary particular letters for individuals.
- Computer operator should be able to maintain a notice board to post updates about the newly arrived office automation equipment.
- Generating different types of reports such as stock information, attendance records, transaction records, salary records etc.
- Generating different types of letters for staff members such as salary particular letters, attendance reports, and service letters.
- Sending email notifications to the registered customers.

## **1.3 Structure of the Thesis**

This thesis includes six main chapters and each chapter describes steps that are carried out to complete the information management system according to the stated goals. Structure of the thesis is as follows.

### **CHAPTER 02 – ANALYSIS**

Analysis chapter describes requirements users are expected to accomplish through the system and techniques that are used to gather the requirements. Functional and non-functional requirements are pointed out and illustrated at the abstract level. Use case diagrams show how the users interact with the system.

### **CHAPTER 03 – DESIGN**

Design chapter of the thesis describes the system design based on the user requirements. UML diagrams are used to design the system behavior and system states. Bootstrap templates are used to design the user interfaces. Some of diagrams and screenshots are illustrated in this chapter.

### **CHAPTER 04 – IMPLEMENTATION**

System implementation is the conversion of design specifications into a real world physical system. This chapter describes the way the database and programs are technically implemented.

### **CHAPTER 05 – EVALUATION AND TESTING**

This section depicts the testing strategies. Test plan and test cases are used to evaluate the overall system to ensure the system is functioning as expected. Thus the unit testing, integration testing, system testing and acceptance testing are shown on this section.

### **CHAPTER 06 – CONCLUSION AND FURTHER WORKS**

This chapter of the thesis describes the overall summary of achievements, future enhancements and the conclusion.

## **CHAPTER 02: BACKGROUND/ LITERATURE REVIEW**

This chapter is focused on the essential background information, critical review of similar systems, technological implementation and alternative technology options which are relevant for the implementations.

### **2.1 Background Information of the Project**

There have been a several kind of systems that have been developed throughout the past several years. Masha Office Automation is a system that has been focused on decision making not only at managerial but also at the operational level. Every organization maintains its own management information system either manual or computer based. Information management system developed for one organization is useless for another organization with different requirements. Besides, not only important the information which are generated by the management system but gain maximum advantages from the system is important that the knowledge, experience and judgment combine with the information system.

#### **2.1.1 What is Information Management System?**

Management information system, or MIS, broadly refers to a computer-based system that provides managers with the tools to organize, evaluate and efficiently manage departments within an organization. In order to provide past, present and prediction information, "a management information system can include software that helps in decision making, data resources such as databases, the hardware resources of a system, decision support systems, people management and project management applications, and any computerized processes that enable the department to run efficiently" [1].

### **2.2 Existing Similar Systems**

Because of the uniqueness of the system requirements, the existing similar systems are very rare to find. But if the similarities of the operations are performed by the organization, following similar system is used to apprehend the ideas throughout the system development.



*Figure 2.1 Web Interface of Similar System [2]*

Softlogic is a reputed business organization in Sri Lankan market. Under the Softlogic holdings they are performing several business activities. ICT sector of this system is focused on office automation equipment which is related to the operations. Some of the objectives are captured for the purpose of getting to understand about the ongoing process of system.

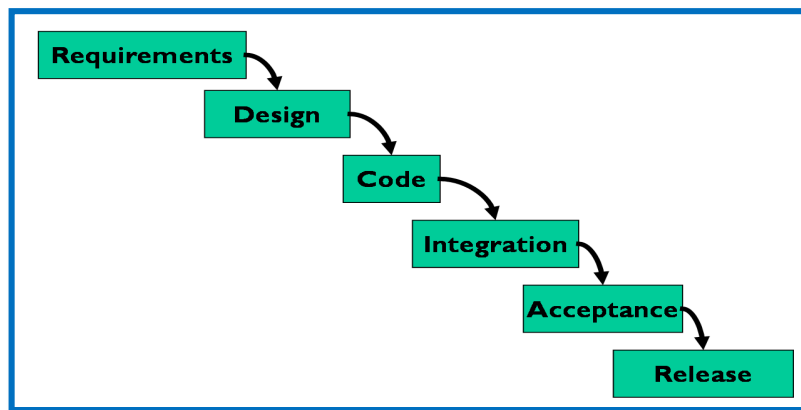
- Maintaining the loyalty of the customer through the customer relationship management.
- Generating and providing managerial reports that can help at all level in planning and controlling their current and future business operations.
- Providing the most important and indispensable information to the users.
- Capturing new market and increasing market share by promoting the product and the services.
- Protecting the data and assuring to authorize the user in a protective way by providing security procedures.

### **2.3 Technological Implementation**

Implementation of the software system can be done through the process models. Process model or lifecycle is a free defined set of activities imposed on the development of software product. Some of the popular process models can be identified as follows.

### 2.3.1 Waterfall Process Model

The waterfall Model illustrates the software development process in a linear sequential flow; hence it is also referred to as a linear-sequential life cycle model. This means that any phase in the development process begins only if the previous phase is complete. In waterfall model phases do not overlap [3].



*Figure 2.2 the Waterfall Process Model [4]*

According to the waterfall process model, requirements are required at the beginning of the process. The owner and the staff members of Masha Office Automation are novice for the computerized system and they are reluctant to provide their requirements at once. Therefore the waterfall process model cannot be used for development of this system.

### 2.3.2 Spiral Process Model

It is the combination of elements of both design and prototyping-in-stages, in an effort to combine advantages of top-down and bottom-up concepts. This model of development combines the features of the prototyping model and the waterfall model.

The spiral model is favored for large, expensive, and complicated projects. This model uses many of the same phases as the waterfall model, in essentially the same order, separated by planning, risk assessment, and the building of prototypes and simulations [5].

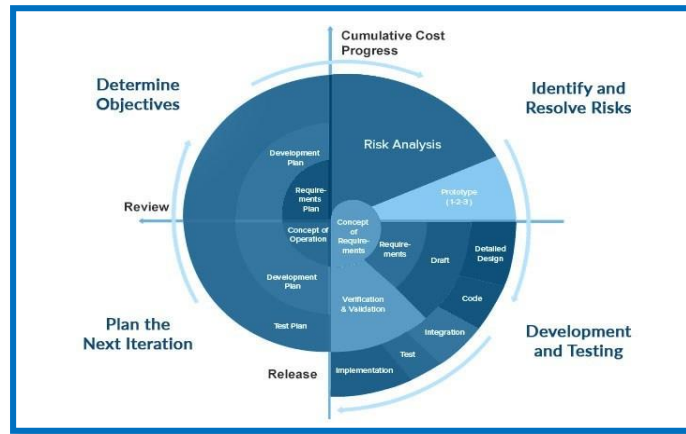


Figure 2.3 The Spiral Process Model [www6]

The spiral process model is the most suitable for the project with requirements are too complicated and requirements are changed frequently. But the proposed system is not performed critical functionalities, and it is only performed general business operations. Because of that it should not want to force the time and costly effort. Therefore the spiral process model cannot be used for development of this system.

## 2.4 Justification of Selected Implementation

Rational Unified Process (RUP) is a software development process model, which is used to develop the proposed web based system. RUP is an adoptive development process model. It provides a model for effectively implementing commercially proven approaches to system development. Besides it is an object-oriented program development methodology.

Masha Office Automation is focused to develop web based system, Technological implementations are based on object oriented approach, and Requirements are difficult to gather exactly at once. Consider about nature of the client, system and implementation methodology, the RUP is most suitable development process model for development of the proposed system.

RUP establishes four phases of development, each of which is organized into a number of separate iterations that must satisfy defined criteria before the next phase is undertaken:

**Inception phase:** developers define the scope of the project and its business case.

**Elaboration phase:** developers analyze the project's needs in greater detail and define its architectural foundation.

**Construction phase:** developers create the application design and source code.

**Transition phase:** developers deliver the system to users.

RUP provides a prototype at the completion of each iteration [6].

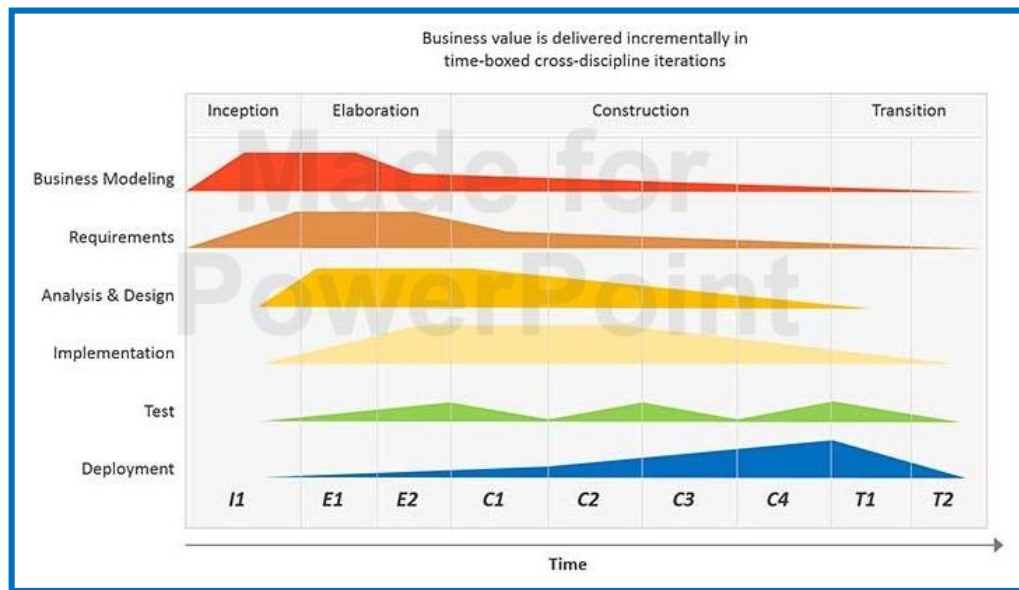


Figure 2.4 the Rational Unified Process Model [7]

## 2.5 Alternative Solutions

### 2.5.1 Standalone Software System

Standalone software systems are computer system which is not connected with any other devices via any transmission media. These system can perform their operations independently. Standalone systems are not shared any resources with others and executed their duties in isolate manner. But Masha Office Automation is a business organization it deal with different customers with different locations. Therefor the standalone system is not fit with the problem domain.

### 2.5.2 Integrated Software System

Integrates all of an organization's systems and processes in to one complete framework, enabling an organization to work as a single unit with unified objectives. Quality, Environmental, and Safety management systems are often combined and managed as an Integrated Software Systems. These type systems are not focused on individual client or single organization. Integrated systems come with number of functionalities, which some are never used but they have to pay for useless functions too. Further that integrated systems are

too complicated and there should be a special training program before apply with ongoing process of the organization. Because of that the integrated software system also is not the possible solution for Masha Office Automation.

### **2.5.3 Web Based Information System**

Web based information systems are run on the client server architecture. In this architecture software systems and databases are stored on distributed web server and clients can access the system simultaneously from remote locations. Currently most of the system are implemented as web based system and those provide phenomenal advantages to the clients and the owners. Some of advantages are as follow.

- Users are access the system via a web browser and no need to install the system on individual computers.
- Unlike standalone application, WBS can access anywhere and anytime via Internet technology.
- It is easier to update the look and feel of the application and customize the presentation of information to different user groups.
- Using the web development technologies such as bootstrap, the presentation layer can customize according to the device connected to the system such as tablets, mobile phones etc.
- WBS systems are typically runs on the dedicated web servers and the expert practitioners are monitoring the process of WBS, Therefor the safety is ensured with high security procedures.

According to the user requirements and nature of the organization, web based system is most suitable to carry out the operations of Masha Office Automation.



## **CHAPTER 03: ANALYSIS AND DESIGN**

### **3.1 Introduction**

System analysis is the one of very important phases of system development lifecycle. Quality, consistency, usability, maintainability, accuracy and furthermore qualities are depending on the system analysis.

Hence the project gives most priority to analysis phase by spending sufficient time and effort in this project.

Functional and Non-functional requirements, Facts finding techniques, analysis of current manual system and domain of the proposed system are included on this chapter.

Besides, design is also the critical activity which should implement during the system development. Design will be suggested the most proper way to finalize the proposed system. So that, design specifications are also depicted on this chapter.

### **3.2 Fact Gathering Techniques**

Facts and relevant information are required to understand the problem areas and domain of the current manual system. As well as the facts are used to transfer user requirements to the design documents. The success of any system are depended on the accuracy of requirement gathering process in analysis phase. Number of fact finding techniques are available in software development industry. The following techniques are used to gather the requirements for proposed system.

#### **3.2.1 Interview**

This method is used to collect relevant information from individual and group of people of organization with minimal conflicts. Interview is facilitated to clarify most crucial problems faced by the system users. Masha Office Automation is a private business organization and the less number of staff members are worked in the organization. Therefore it is easier to meet every staff members as well as the manager of the organization to get basic understanding about their requirements.

Even though functional and non-functional requirements were not found at the beginning, but after few Interviews are conducted with the manager and the staff, understanding of the system user requirements are increased gradually.

### **3.2.2 Document Review**

Document review is a systematic approach for evaluating documents, both printed and electronic materials. Like other analytical methods in qualitative research, document analysis requires that data can be examined and interpreted in order to expose meaning and gain understanding about the current business operations.

Masha Office Automation is currently running on manual information system and perform the huge number of document based activities. Therefore the document review technique is provided vital facts pertained with functional and non-functional requirements.

### **3.2.3 Field Observation**

Unlike the other fact gathering techniques, field observation allows to perceive the system on real environment. It allows to clarify the flow of work perform by organization, who are the users and how they interact with activities and the flow of documents of the system.

During other fact finding processes, some of requirements are difficult to refine. But by observing the current manual system, chaotic and ambiguous processes are cleared.

## **3.3 Functional Requirements**

Functional requirements are the requirements which the users are directly expected from the system. Following are the crucial functional requirements which Masha Office Automation is expected to obtain from proposed system.

### **3.3.1 System user registration**

According to nature of the system, users can be divided into several groups. Staff members and service agents are registered by the system administrator and they can access the system in accordance of their user privileges. The online registration form is used to register the customers with the system and they should have verified their email address before appearing as an active member.

### **3.3.2 Maintain transaction database**

The main purpose of Masha Office Automation is to develop a database to manage and maintain day to day transactions on distributed database management system. It helps to reduce the paper based activities and provide quick operations with information related to the organization activities.

### **3.3.3 Developing and implementing newsletter function to support customers**

There is a function to send newsletters for informing customers about new products, promotions or discounts. Further that may be important to inform official messages to staff members.

### **3.3.4 Supporting the management operations of the organization**

The system provide facility to fulfill some management operations of organization such as maintaining staff attendance, managing staff leaves, calculating monthly salary, providing information about stock etc.

### **3.3.5 Generating reports**

The system capabilities to generate some official letters for the staff members such as Attendance information letters, Service letters, Salary particular letters.

### **3.3.6 Managing Notice Board**

This module provides facilities for displaying messages on notice board and it will allow to manage notice board by editing updating and deleting the messages.

## **3.4 Non-functional Requirements**

Non-functional requirements are critical requirements, that the users are indirectly expected from the system. If it is incapable to maintain the non-functional requirements, the system may be entirely got into fail. Following are some of the non-functional requirements, which are focused to concentrate with the system development and it will capture the intended quality that the product must have in order to operate smoothly without any problems.

### **3.4.1 Reliability**

Reliability is the ability of a system to perform its required functions under the stated conditions for a specific period of time.

### **3.4.2 Performance**

Performance requirements concern the speed of operation of a system. Performance is considered on, that how quickly the system reacts to a user input, how much the system can accomplish within a specific amount of time, is the system available for service when requested by end-users.

### **3.4.3 Security**

Security requirements are included in a system to ensure that un-authorized access to the system and its data is not allowed and ensure the integrity of the system from accidental or malicious damage.

### **3.4.4 Usability**

Usability is the ease which a user can learn to operate, prepare inputs for, interpreting outputs of system or component.

### **3.4.5 Supportability**

Supportability requirements are concerned with the ease of changing to the system after deployment.

### **3.4.6 Simplicity**

The User Interfaces should be simple and intuitive. If the interfaces are complicated, the system users may reluctant to use the system.

## **3.5 Design**

After finding the functional and non-functional requirements, it is defined the scope of the project. After that, the project moves towards to the design. At the design it is intended to plan the suggested solution for the identified problems and expected to achieve the system quality and consistency elicited at analysis. The Unified Modeling Language provides standard notations to illustrate the system structure and behavior for the modeling of real world objects. It is expected to develop the proposed system on object oriented methodology and the following UML diagram are used to depict the design specifications.

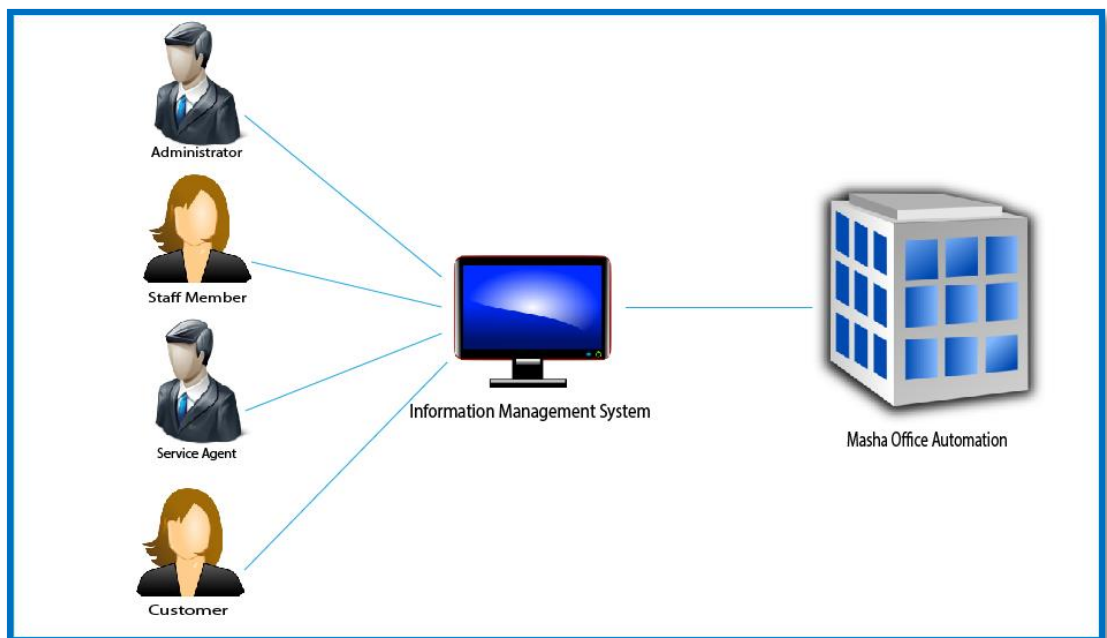
**Use Case Diagram** – Uses to depict the user interaction with the system.

**Class Diagram** – Describes the structure of the system by the class of the system.

**Entity Relationship Diagram (ERD)** - shows the relationships of entity sets stored in a database.

### 3.6 High Level Architecture of the System

According to the proposed solution, there are four high level users are interacting with the system, Administrator, Internal staff member, Service agent and Customer. Diagram in figure 3.1 depicts high level architecture of proposed system.

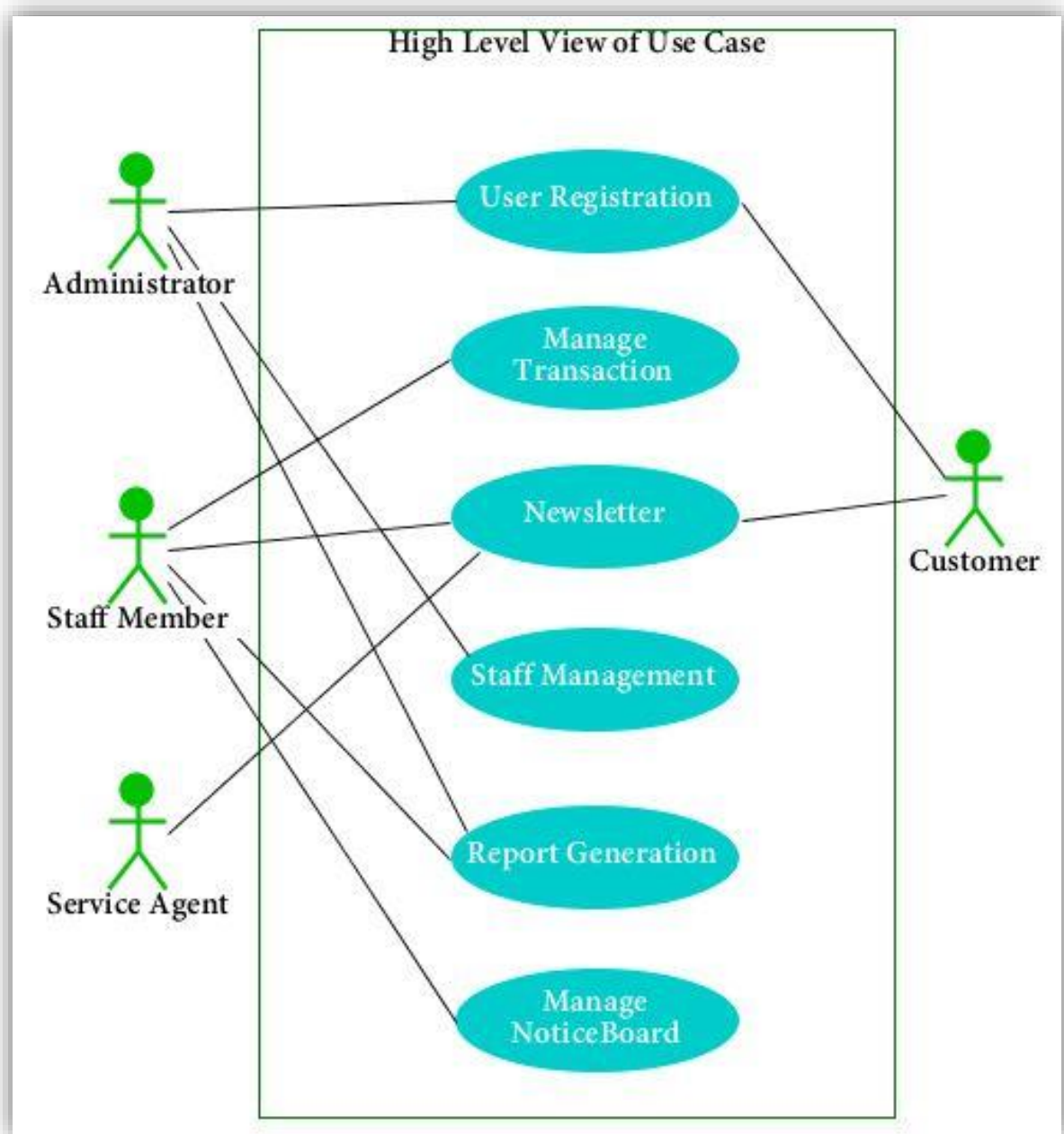


*Figure 3.1 High Level Architecture of the Proposed System*

### 3.7 High Level View Use Case Diagram of the System

The UML high level use case is a brief description of the main processes used to accomplish the system function and the user's interaction with those functions. The high level use case in each of the major processes in the system and therefore there is one high level use case for each of the major processes.

There are four types of users can be identified on Mash Office Automation and figure 3.2 depicts the high level use case diagram for the proposed system.



*Figure 3.2 High Level View of Use Case Diagram*

### **3.8 Module Design**

Following are the main modules of the system which are illustrated by the use case narratives and use case diagrams.

### 3.8.1 User Registration Module

The user registration module helps to register the users with the system. Service agents and internal staff members register by the system administrator. Customers can be registered by filling online form with valid email address. After verifying the email address, customers can be accessed the system as an active member. As well as the administrator can update, delete and deactivate the system users of system. Diagram in figure 3.3 depicts the Use-Case diagram for User Registration.

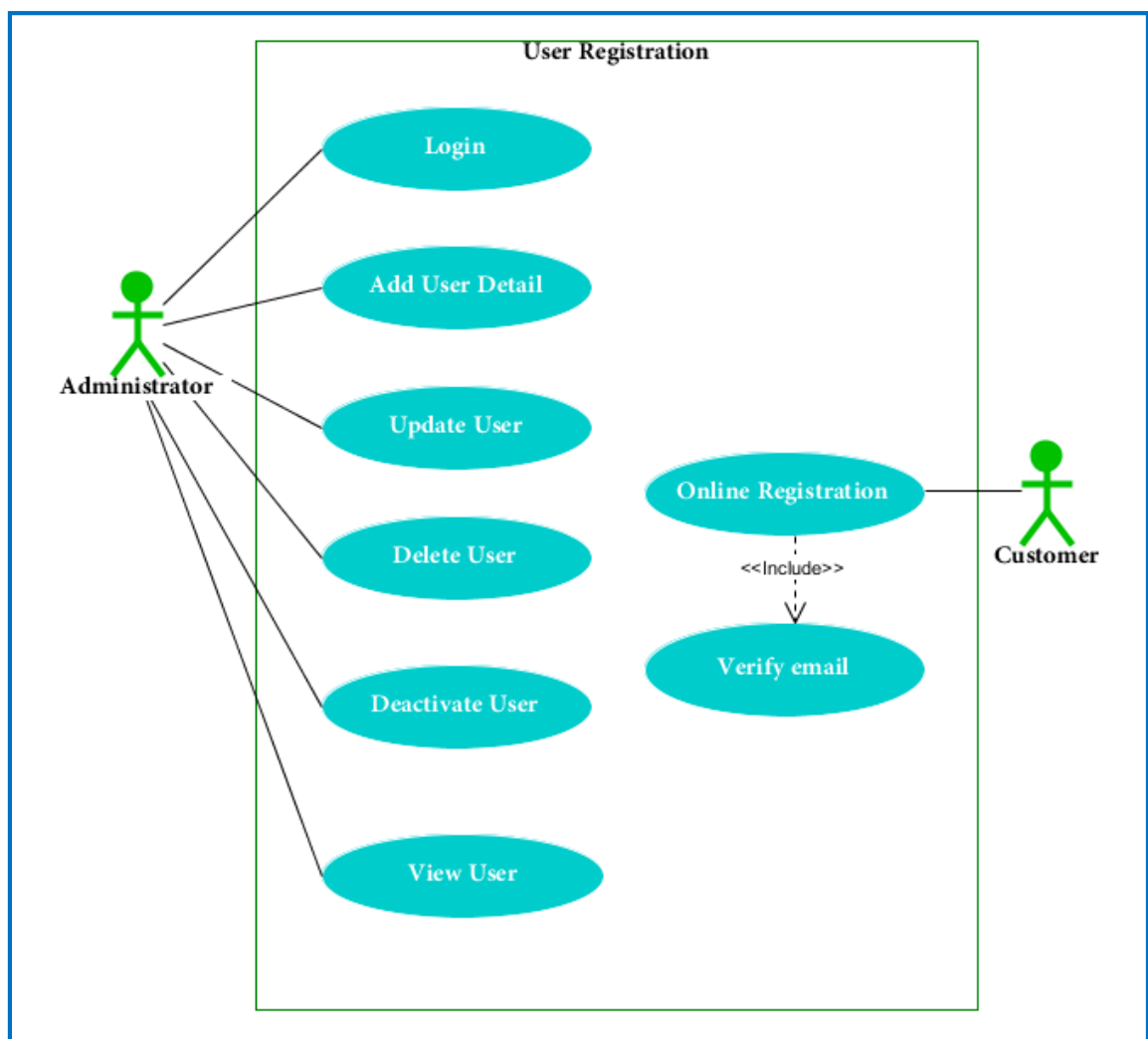


Figure 3.3 Use Case Diagram for User Registration

## Use-case Narrative for User Registration Module

Use Case	User Registration
Actors	Administrator, Customer
Description	
Register system users to the system	
Preconditions	
<ol style="list-style-type: none"> <li>1. Administrator login to the system.</li> <li>2. Staff users need to be a staff member.</li> <li>3. Customers need to provide relevant details with valid email address.</li> </ol>	
Flow of events	
<p><b>As an Administrator</b></p> <ol style="list-style-type: none"> <li>1. Administrator login to the system.</li> <li>2. Insert relevant information to the system and proceed.</li> <li>3. System checks that member has already registered.</li> <li>4. If the member is new, then register with the system, or else popup error message.</li> </ol> <p><b>As a customer</b></p> <ol style="list-style-type: none"> <li>1. Provide relevant details with valid email address through online form.</li> <li>2. Check the system that member has already registered.</li> <li>3. If the member is new, then register with the system, or else popup error message</li> <li>4. Send verification code to the email.</li> <li>5. Activate customer as a registered user, after verifying their email address.</li> </ol>	
Post Conditions	
Member registered to the system	
<i>Table 3.1 Use-case Narrative for User Registration</i>	



### 3.8.2 Transaction Management Module

Transaction management module provides facility to add stock information, update stock information with transactions, and customer with warranty expiration details. Diagram in figure 3.4 depicts the use-case diagram for Transaction Management Module.

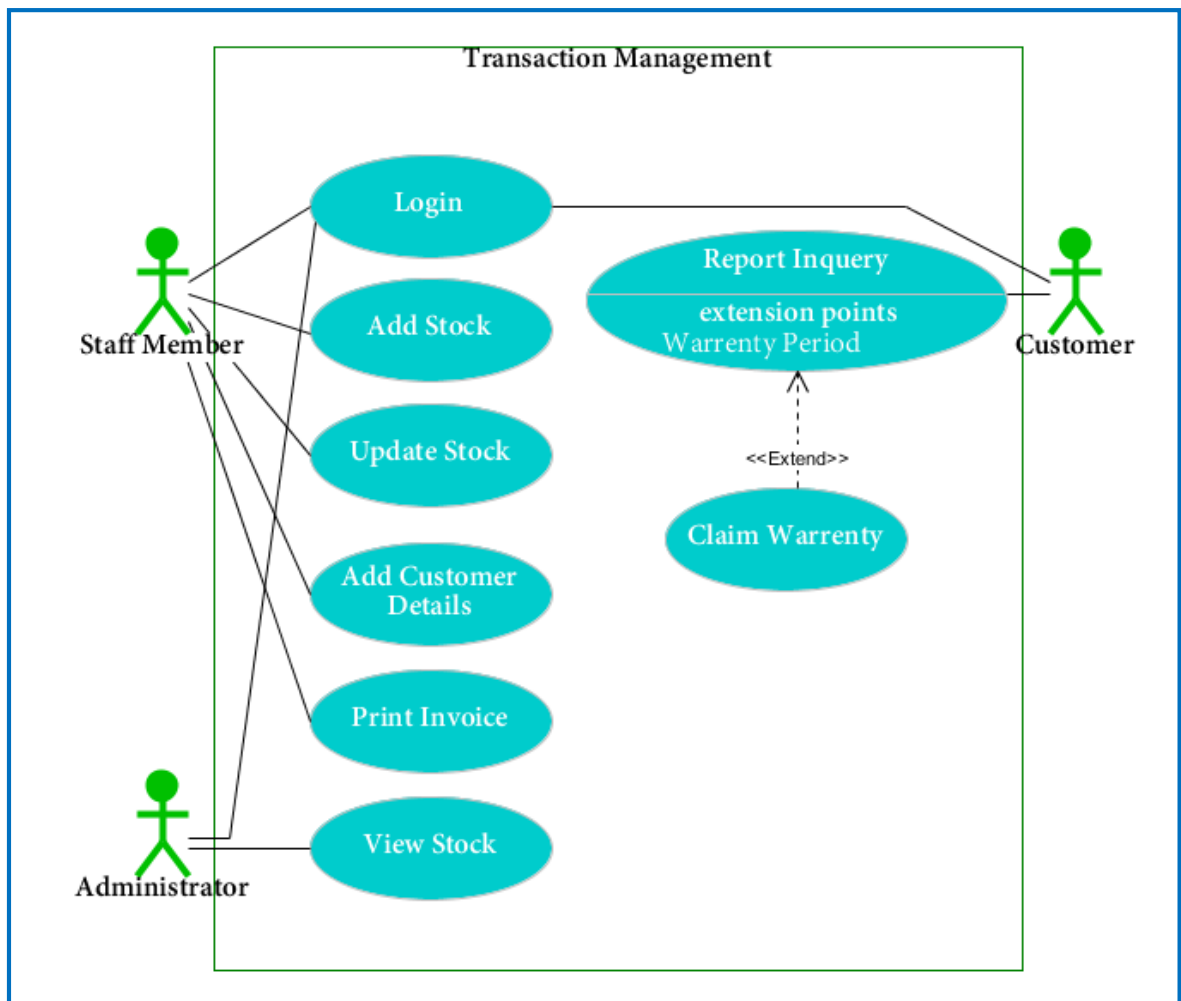


Figure 3.4 Use Case Diagram for Transaction Management

## Use-case Narrative for Transaction Management Module

Use Case	Transaction Management
Actors	Administrator, Customer, Staff member
Description	
Manage daily business transactions.	
Preconditions	
<ol style="list-style-type: none"> <li>1. Administrator should have login to the system, before view transaction information.</li> <li>2. Authorized staff member should have login to the system, before managing transaction.</li> <li>3. Customer should have login to the system, before making inquiry.</li> </ol>	
Flow of events	
<p><b>As an Administrator</b></p> <ol style="list-style-type: none"> <li>1. Administrator login to the system.</li> <li>2. Check stock information.</li> </ol> <p><b>As a staff member</b></p> <ol style="list-style-type: none"> <li>1. Login to the system as an authorized staff member.</li> <li>2. Manage stock information and customer information by adding new stock, updating stock with transactions, adding unregistered customer details and printing invoices.</li> </ol> <p><b>As a customer</b></p> <ol style="list-style-type: none"> <li>1. Login to the system.</li> <li>2. Make inquiries regarding repairs and warrant claims.</li> </ol>	
Post Conditions	
Update stock information, Receives inquiries from registerd customers.	
<i>Table 3.2 Use Case narrative for Transaction Management Module</i>	

**Note: Please refer the Appendix D for rest of the test use-case diagrams.**

### 3.9 Class Diagram for the System

A class diagram is an illustration of the relationships and source code dependencies among classes in the Unified Modeling Language (UML).

In this context, a class defines the methods and variables in an object, which is a specific entity in a program or the unit of code representing that entity [8].

Diagram in figure 3.5 depict Class diagram for the system.

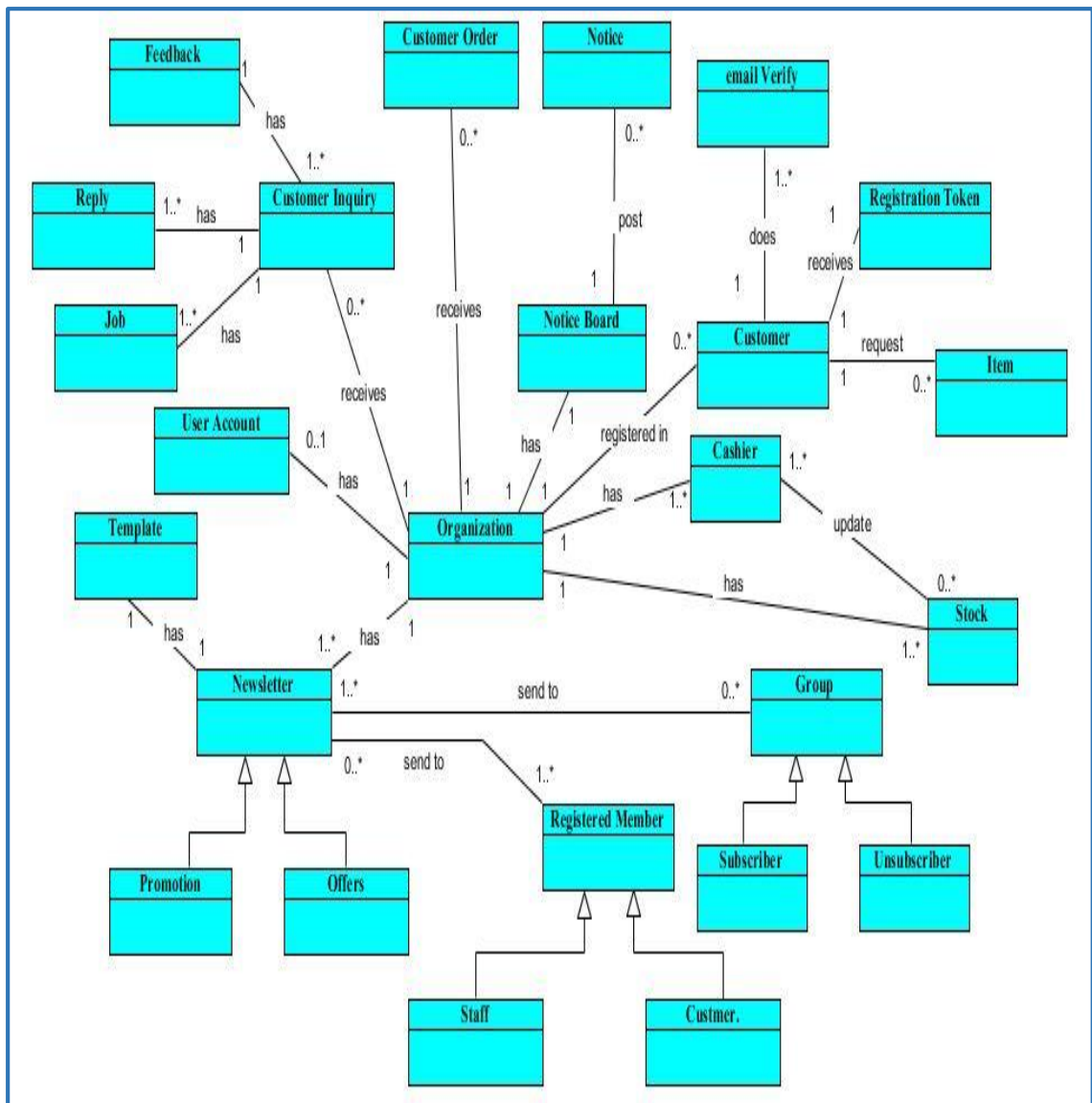


Figure 3.5 Class Diagram for the System

### 3.10 Activity Diagram for the System

The basic purpose of activity diagrams is to interpret the dynamic behavior of the system. It captures the dynamic behavior of the system and activity diagram is basically a flow chart to represent the flow from one activity to another activity. The activity can be described as an operation of the system. Following are the few activity diagrams which are drawn under the design purpose.

#### 3.10.1 Activity Diagram for the User Registration

Diagram in figure 3.6 depicts the activity diagram for Customer Registration Module. It shows that what are the activities executed during the user registration process.

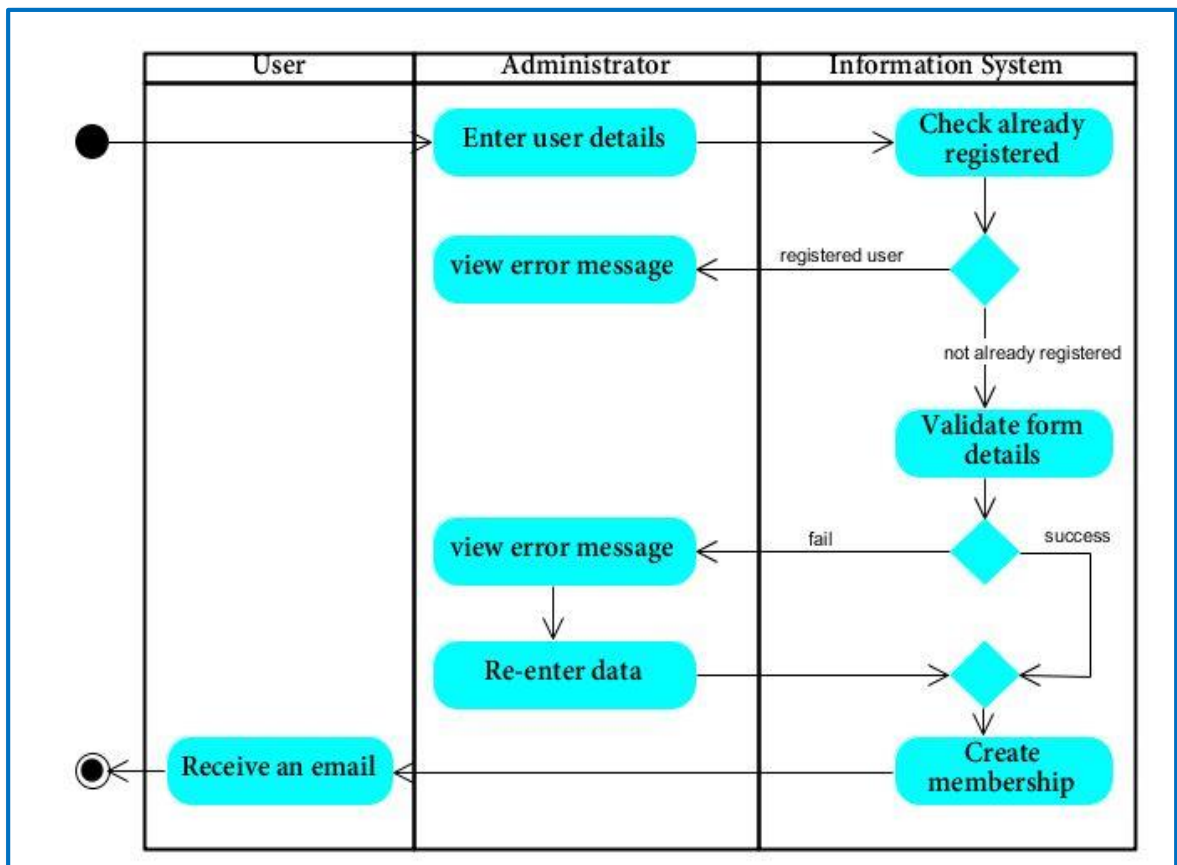


Figure 3.6 Activity Diagram for User Registration

### 3.10.2 Activity Diagram for Manage Notice Board

Diagram in figure 3.7 depicts the activity diagram for Manage Notice Board Module. It shows that what are the activities executed during the notices handling process.

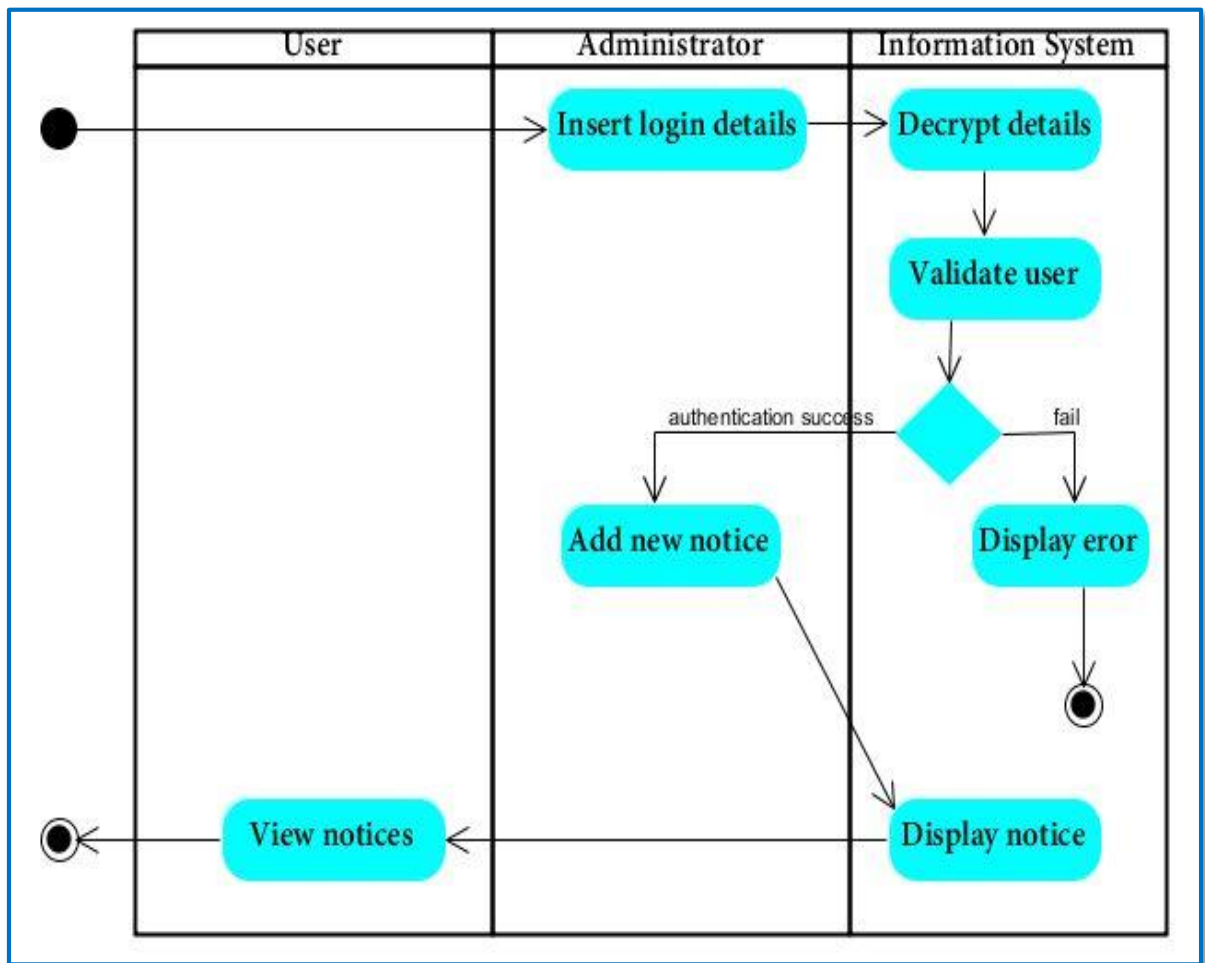


Figure 3.7 Activity Diagram for Manage Notice Board

**Note:** Please refer the Appendix D for rest of the Activity Diagrams.

### 3.11 Sequence Diagram for the System

Sequence diagram shows message interaction among the objects of the System in time sequence.

#### 3.11.1 Sequence Diagram for Apply Leave

Diagram in figure 3.8 depicts the Sequence Diagram for the Leave Application Module. It shows that the sequences of messages pass throughout the systems' objects to accomplish the leave apply function.

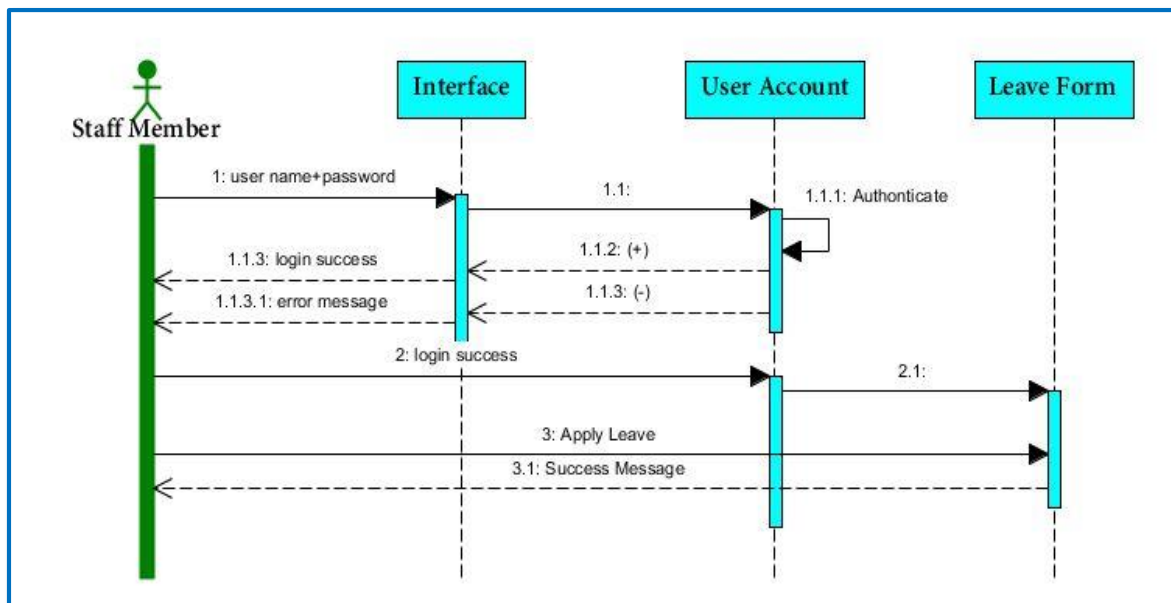
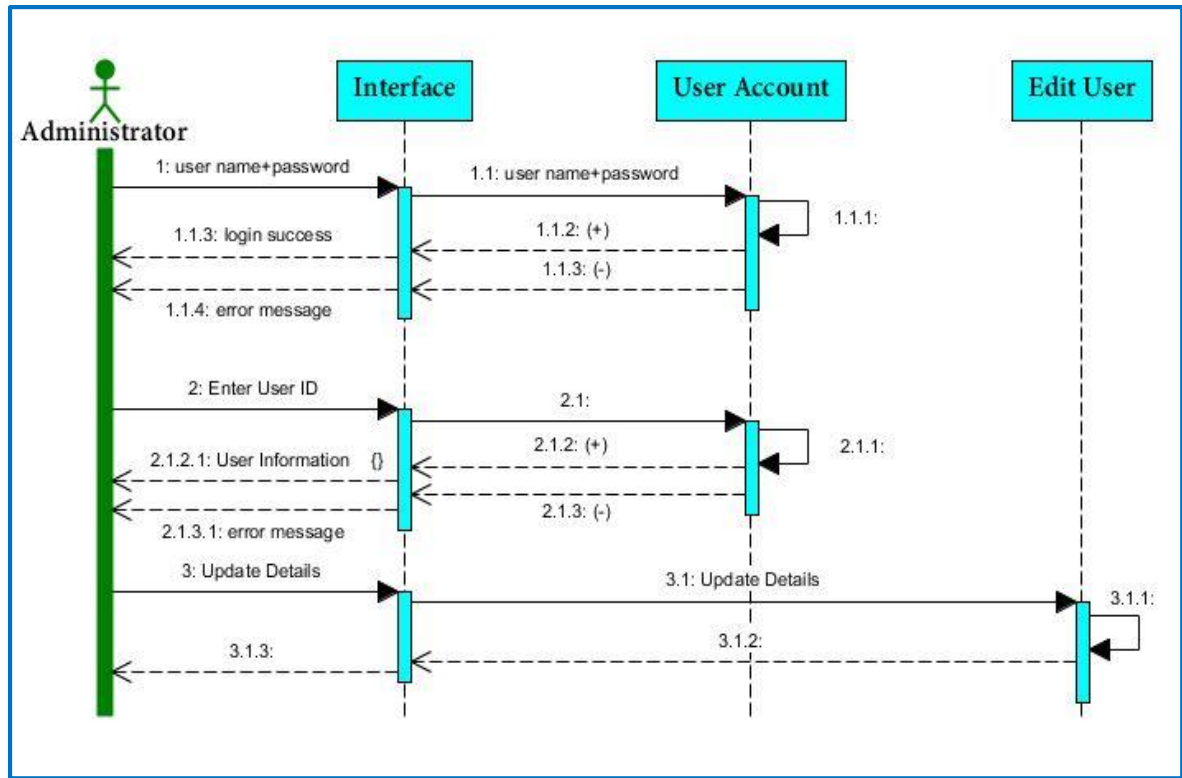


Figure 3.8 Sequence Diagram for Apply Leave

#### 3.11.2 Sequence Diagram for Edit User

Diagram in figure 3.9 depicts the Sequence Diagram for the Edit User function. It shows that the sequences of messages pass throughout the systems' objects to accomplish the user profile changing functionality.



*Figure 3.9 Sequence Diagram for Edit User Profile*

**Note: Please refer the Appendix D for rest of the Sequence Diagrams.**

# CHAPTER 04: IMPLEMENTATION

## 4.1 . Introduction

This chapter is a description of the activities that were carried out during the development of Information Management System for Masha Office Automation. In this stage some important aspects were taken into consideration when finalizing the implementation. Such as Development tools in co-operation with the application domain, and also the technology domain.

Thus, It was decided to use three tier architecture as it suits the organization's current environment, It helps to separate the business logic layer, database layer & the presentation layer and also to build up the application independently. Another advantage of adopting the three tier architecture into the scenario is that all the front end parts of this system could communicate with a single business logic layer for the different types of processing.

## 4.2 . Implementation Environment

Implementation environment is the hardware and software requirements which need to implement Information Management System on the real business environment. When implementation Masha Office Automation system, open source software is used in every possible occasions. Because the usage of proprietary software will lead to more copyright and license issues.

Following are the hardware and software requirements, which should be used in the operation environment.

Hardware Requirements	Software Requirements
Intel® Core™ 2 Duo 2.1GHz or higher processor	Apache server version 2.2 or above
4 GB of free hard disk space	PHP version 5.5 or above
2 GB Random Access Memory	MySQL version 5.5 or above
Barcode reader	Web browser
Printer	

*Table 4.1 Hardware and Software Requirements*



### **4.3 . Implementation Technology**

#### **XAMPP Controller**

XAMPP Controller is a free and open source cross platform web server, which is included mainly of the apache HTTP server, MySQL database and interpreters for scripts written in the PHP programming language.

#### **MySQL DBMS**

MySQL is also the free and open source relational database management system, which provides high performance data definition, data manipulation and data control facility to implement the organization's database effectively and safely.

#### **Codeigniter**

Codeigniter is a powerful php framework, which is more popular among php based development society. It provides facility to use the object oriented programming concept with php programming language.

#### **JavaScript**

JavaScript is a client side programming language and it has been used to perform some client side operations and some form validations.

#### **Ajax**

Ajax is based on javaScript and it has been used to perform database operations without refreshing the web pages again and again.

#### **Bootstrap**

Bootstrap is the most popular HTML, CSS, and JavaScript framework for developing responsive web sites [9].

#### **Highcharts**

Highcharts is a charting library written in pure JavaScript, offering an easy way of adding interactive charts to web site or web application. It currently supports line, spline, area, areaspline, column, bar, pie and scatter chart types [10].

## **DOMPDF**

DOMPDF is an HTML to PDF converter [11]. It is easy to convert html content to document format with its styles, for the purpose of document printing.

## **Zend Library**

Zend Framework is an open source, object oriented web application framework for PHP 5. Barcode generator is one of the most important component which is included in zend library and it has been used to implement the barcode generation function of Masha office automation.

### **4.4 . Justification for the Selected Technology**

XAMPP controller can be used as a local server instead of using remote server, It provides collection of software to perform activities related to the client server architecture such as DBMS, FTP, php processing etc. Therefore it is easy to install all the software that is needed to develop web application before hosting it on the server.

The system is developed according to the Model-View-Controller (MVC) architecture, which is an object oriented programming methodology for web application. MVC separates the application code into three segments. By separating application code into Model-View-Controller architecture, it will reduce the complexity when developing large scale application while increasing the maintainability. Because of that Codeigniter has been used to implement the MVC architecture.

JavaScript is the powerful client-side scripting language which is used for the front end processing without forcing server to perform operations. Because of that it helps to save time in operations.

Bootstrap is provided facility to develop front end of the system in an interactive manner with professional outlook.

Ajax is Asynchronous JavaScript and XML. It reduces the traffic travels between the client and the server. Furthermore that its response time is faster and increases performance and speed.

## 4.5 . Application Implementation

Diagram in figure 4.1 depicts the salary calculation form of Masha office automation. Operations of the salary calculation form are process by using JavaScript and it will be helpful for data processing on client side.

The screenshot shows a web application interface for "Staff Salary Calculation". At the top left, there is a logo with a shield and the text "Back to Masha". At the top right, there are links for "Administrator" and "Logout". The main title "Staff Salary Calculation" is centered. The form contains several input fields and dropdown menus:

- Index Number:** Text input field containing "1001".
- N.I.C Number:** Text input field containing "835503845V".
- Year:** Dropdown menu with "----Select Year----" selected.
- Month:** Dropdown menu with "----Select Month----" selected.
- Basic Salary:** Text input field containing "32500.00".
- Increments:** Text input field containing "1000.00".
- Allowances:** Text input field containing "2500.00".
- Gross pay:** Text input field, currently empty and disabled.
- STAMP:** Text input field containing "1625.00".
- E.T.F:** Text input field containing "3250.00".
- Sepecial Deduction:** Text input field, currently empty and disabled.
- Special Advance:** Text input field, currently empty and disabled.
- Festival Advance:** Text input field, currently empty and disabled.
- Total Deduction:** Text input field, currently empty and disabled.
- Net Salary:** Text input field, currently empty and disabled.

At the bottom of the form, there are two blue buttons: "Record Salary" and "Clear form".

*Figure 4.1 Salary Calculation Form*

Figure 4.2 depicts the barcode generation report of Masha office automation. It will generate barcode as a jpg file, when item is registered on system and results of the barcodes are shown on the report.

Barcode Details

Show  entries Search:







Barcode	Item Name
 2005	2005-printer-fx100.png
 2006	2006-printer-fx200.png
 2007	2007-fax machine-fx2005.png
 2008	2008-printer-fx2005.png
 2009	2009-camera-fx105.png

Figure 4.2 Barcode Generation Report

The figure 4.3 depicts the report of shopping cart. It will be presented as the summary when transaction perform with a client.

 Back to Masha
Administrator    Logout

### Shopping Cart

Item Code:

Quantity:

Item Name:

Discount:  %

Transaction ID:

Unit Price:

Amount:

Add to Cart

Item Name	Quantity	Unit Price	Amount
epson m100	1	1500.00	1425.00
epson lq500	1	4500.00	4410.00
<b>Total</b>			<b>5835.00</b>
Cash		<input type="text" value="10000"/>	
<b>Balance</b>			<b>4165.00</b>

Confirm Transaction
Print Receipt

Figure 4.3 Report of the Shopping Cart

# **CHAPTER 05: EVALUATION AND TESTING**

## **5.1 Introduction**

Once the new system has been implemented, evaluation and testing should be essential. Therefore this chapter will be focused on user evaluation and testing of the application. Evaluation is the process of ensuring a system or its components with the intent to find that whether it satisfies the specified requirements or not.

## **5.2 Evaluation Strategies**

### **5.2.1 Unit Testing**

Unit testing is a method by which individual component of system, sets of one or more computer program modules together with associated control data, usage procedures, and operating procedures, are tested to determine if they are fit for use. In Unit testing one can view a unit as the smallest testable part of an application.

### **5.2.2 Integration Testing**

Integration test is the phase in software testing, which individual software modules are combined and tested as a group. It occurs after unit testing and before validation testing. Integration testing takes as its input modules that have been unit tested, groups them in larger aggregates, applies tests defined in an integration test plan to those aggregates, and delivers as its output the integrated system ready for system testing [12].

### **5.2.3 System Testing**

System testing is a phase in the software testing cycle where a total and integrated application is tested. The focus of the system testing is to evaluate the compliance of the entire system with respect to the specified requirements.

System testing helps in approving and checking the business, functional, technical, and any non-functional requirements of the application concerning the architecture as a whole [13].

Furthermore, the system testing is focused on the following areas such as interface testing, security testing, regression testing etc.

### **5.2.4 User Acceptance Testing**

Acceptance Testing is a process of obtaining confirmation that a system meets mutually agreed-upon requirements. Specialty of this evaluation is that the client or potential users are

involved to assess the system. If the errors are occurred, that should be fixed in accordance with the user requirements.

### 5.3 Test Plan and Test Cases

The test plan of the Information management system is concerned with scheduling and estimating the system testing process, establishing process standards and describing the tests that should be carried out. A test plan includes test objectives, schedule and logistics, test strategies, and especially test cases.

A Test Case is a set of actions executed to verify a particular feature or functionality of the software application and were created after test plan was designed.

#### 5.3.1 Test Plan

No	Function	Testing procedures	Expected output	Priority
Logging Control				
01	Login to the system with wrong user name	Insert wrong user name	Display error message and redirect to the login page	High
02	Login to the system with wrong password	Insert wrong password	Display error message and redirect to the login page	High
03	Login to the system with correct user name and password	Insert administrator's user name and password	Login to the admin page	High
04	Login to the system with correct user name and password	Insert staff member's user name and password	Login to the staff member's page	High
05	Login to the system with correct user name and password	Insert staff customer's user name and password	Login to the customer's page	High
06	Logout from the system	Click on logout button from top menu	Successfully logout and redirect to the login page	High
<i>Table 5.1 Test Plan for Login Control</i>				


No	Function	Testing procedures	Expected output	Priority
User registration control				
07	Registering user without required fields	Click on Add user button without completing form	Display error message with required fields	Medium
08	Registering user with completed form	Click on Add User button	Display successfully registered message	Medium
09	Registering user with already registered email address	Click on Add User button	Display error message that email address had been already registered	High
<i>Table 5.2 Test Plan for User Registration Control</i>				

No	Function	Testing procedures	Expected output	Priority
Email confirmation for customers				
10	Login to the system without confirming email	Login to the system using user name and password	Display error message and redirect to the login page	High
11	Not confirm email	Check user registration status by registered user report	Display status as a pending user.	High
12	Login to the system after confirming the email	Login to the system using user name and password	Login to the customer's page	High
<i>Table 5.3 Test Plan for Customer email Confirmation</i>				

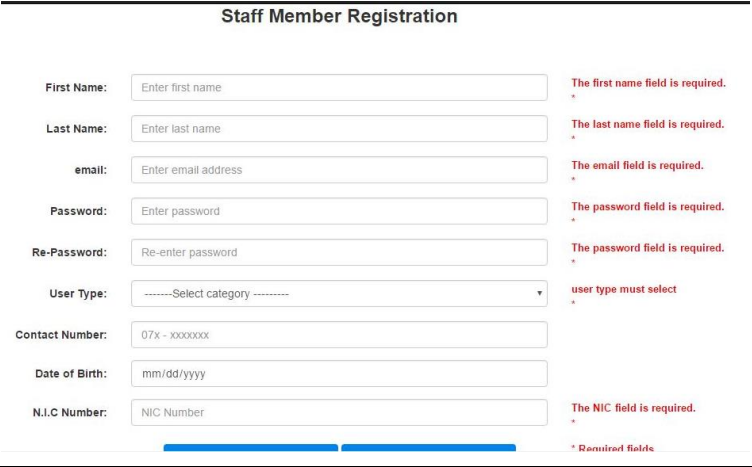
No	Function	Testing procedures	Expected output	Priority
Adding items to the stock				
13	Registering items without required fields	Click on Add item button without completing form	Display error message with required fields	Medium
14	Registering item with completed form	Click on Add item button	Display successfully registered message	Medium
<i>Table 5.4 Test Plan for Stock Registration Control</i>				

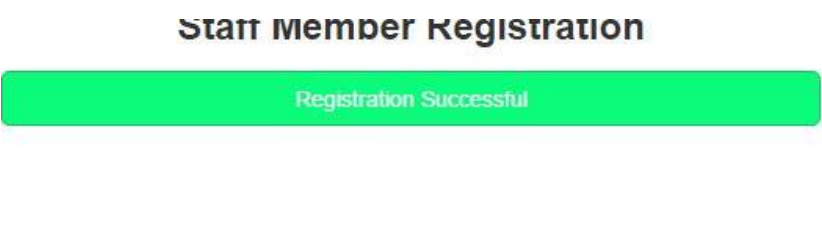
**Note: Please refer Appendix C for rest of the test plans.**

### 5.3.2 Test Case

<b>Test case ID</b>	01	
<b>Tested Component</b>	Login page	
<b>Module Name</b>	Login control	
<b>Test Case</b>	Login with wrong user name and password	
<b>Expected Output</b>	Error message will indicate that login details are incorrect.	
<b>No</b>	<b>Actual Output</b>	<b>Status</b>
01		Pass
<i>Table 5.5 Test Case for the Login Control</i>		



<b>Test case ID</b>	07	
<b>Tested Component</b>	User registration form	
<b>Module Name</b>	Manage user	
<b>Test Case</b>	Registering users without filling required fields	
<b>Expected Output</b>	Error message will indicate that there should be required fields	
<b>No</b>	<b>Actual Output</b>	<b>Status</b>
02	 <p>The screenshot shows the 'Staff Member Registration' form. It includes fields for First Name, Last Name, email, Password, Re-Password, User Type (dropdown), Contact Number, Date of Birth, and N.I.C Number. Red error messages are displayed next to the First Name, Last Name, email, Password, Re-Password, and N.I.C Number fields, indicating they are required. A legend at the bottom right states '* Required fields'.</p>	Pass
<i>Table 5.6 Test Case for the User Registration Form</i>		

<b>Test case ID</b>	08	
<b>Tested Component</b>	User Registration Form	
<b>Module Name</b>	Manage User	
<b>Test Case</b>	User registration with required fields.	
<b>Expected Output</b>	Message will indicate that successfully registered the user.	
<b>No</b>	<b>Actual Output</b>	<b>Status</b>
03	 <p>The screenshot shows the 'Staff Member Registration' form with a large green banner at the bottom that reads 'Registration Successful'.</p>	Pass
<i>Table 5.7 Test Case for the User Registration Form (Registration Success)</i>		

**Note: Please refer Appendix C for rest of the test cases.**

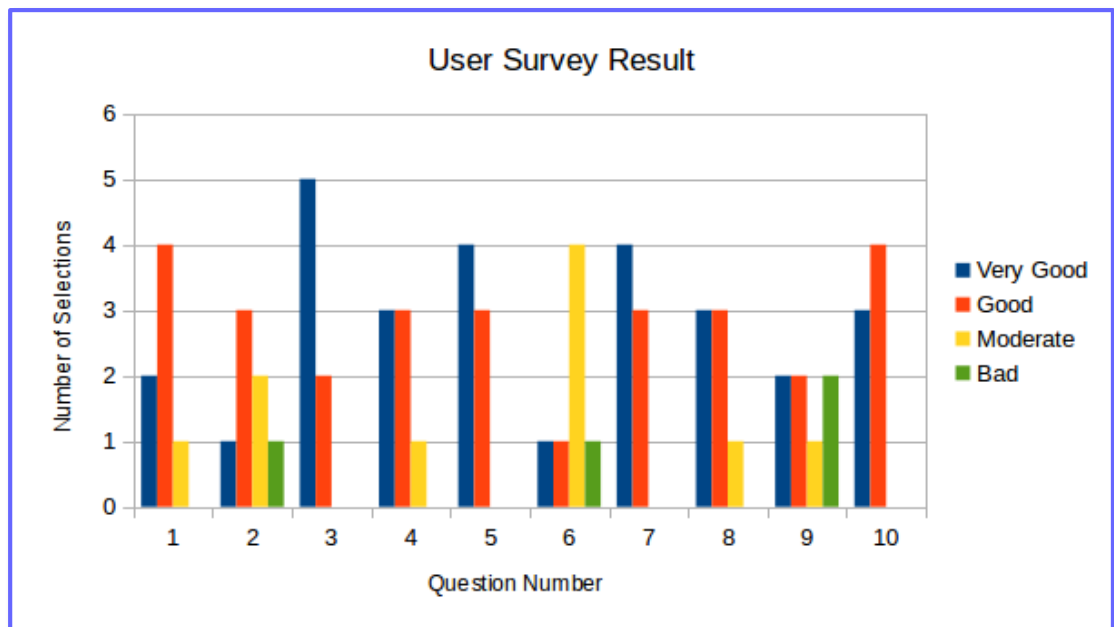
## 5.4 Usability Testing

Usability testing can be used to understand how real user experience the application. To perform this task, every staff member of a business organization is selected and user feedback form as shown on the appendices is provided. Following are the results which derived from the user survey.

### 5.4.1 Usability Test Result Analysis

Following figure 5.1 represents the survey result of seven staff members. According to the given result, the system has been accepted by the users for the future use without any resistance.

Questioner is depicted on figure B.1 in APPENDIX B.



*Figure 5.1 User Survey Result*

# **CHAPTER 06: CONCLUSION AND FUTURE WORK**

## **6.1 Introduction**

The vision of the Masha office automation is to be the leading office automation equipment seller and service provider in Matara district to provide gainful service to their clients, whilst protecting rights of workers and ensuring their welfare and protection and also without breaching business ethics and policies.

To achieve the above vision, Organization had used the manual system. By using a manual system, they couldn't achieve the expected efficiency. Due to the lack of a computerized system, Masha Office Automation implement the Information Management System newly to increase the efficiency of the expected output from the business operations.

The functional and non-functional requirements which were discovered during the analysis phase, can be reveal that the better part of the user requirements have been satisfied. Basic organization profile has been implicated through the Information Management System such as information which are about organization, profile of employees, contact details and current operations etc. and those were used to build the better understanding about the organization among the community. Thus the simple and intuitive interfaces were used to provide the better understanding about how the system should be handled. Security feature of the system is ensured to safeguard the critical information of the system activity. As well as the ability of mange stock calculations, calculate revenue and expenditure statements, generation of summary reports are quickly allowed the administrator and staff members to make their decisions systematically. Furthermore that the new system is helped to manage staff members' attendance, leaves and salary information. In addition to that the system was built using latest technologies, such as MVC, OOP, BOOTSTRAP etc.

## **6.2 Limitations of the Current Work**

One of the major limitation faced during the system development was the lack of skills regarding the knowledge to apply programming concepts for the real world scenarios.

Another was that lack of knowledge to handle the object oriented programming concepts to realize the design specifications and develop the interfaces in interactive manner.

To overcome the above obstacles, On-line video tutorials, forums, eBooks and support of the supervisors were used.

Furthermore that it was difficult to gather requirements due to that the client has not enough experience about web applications. Prototype and similar systems were used to ensure trust in web applications

### **6.3 Lessons Learnt**

This application doesn't only fulfill the requirement of the final year of the Master program. However it assists me to apply practically the knowledge learnt throughout the past two years.

Typically an Information system is developed by a team consists of 4-7 members in an industry. Nevertheless this individual project had to be completed by myself from the feasibility study to the implementation phase and it was a great opportunity for my future career.

Since the implementation of this project, I was able to practically apply the theories, concepts which I learnt in my lectures and able to ascertain the new technologies in the industry. The new technologies used for this project were such as Codeigniter web framework, Bootstrap with HTML, JavaScript, AJAX, MySQL with MVC architecture. The above technologies helped to increase the performance, efficiency and usability of the Masha Office Automation.

Writing the dissertation was another interesting task of the project. It provided an opportunity to write a report in a professional manner. It helped me to develop my skills on writing and designing technical reports.

### **6.4 Further Improvements**

Developed system can be improved further for the aspects such as online payments, finger base attendance marking, service jobs manage by mobile application etc. When improving the system with on-line payments, it will allow the organization to sell items for the remote customers, it will be the greatest opportunity to increase market share and it will affect to increase revenue of organization rapidly. And also system improvement for the attendance marking with finger print will be allowed effectively to maintain the attendance of employees and will be managed human resources efficiency.

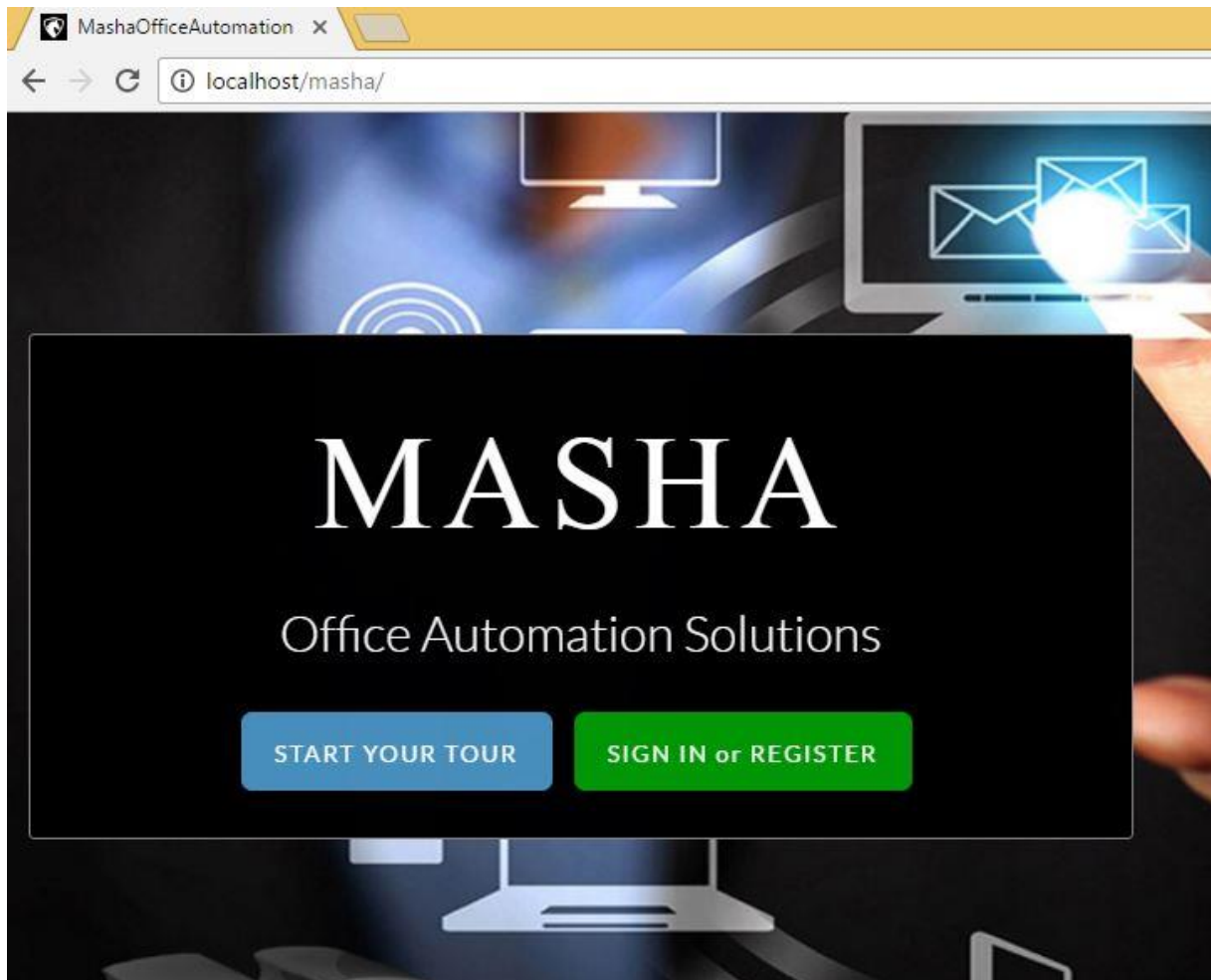
Furthermore that it is planning to develop mobile application as a part of the web application. It will support service agents to do their stuff in efficiently by showing job locations and updating database after completing the assigned tasks. And also planning to introduce encryption algorithm to enhance the security of the Information Management System, thereby every confidential information will exchange into encrypted format and it will improve database security in most exalted way.

## 07. REFERENCES

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## 08. APPENDIX A – USER MANUAL

### Home page of Masha Office Automation



*Figure A.1 Home page*

### Login Page

The figure A.2 shows the login control of Masha Office Automation. Four types of users are involved with this system, According to their user types they are redirected to the system after authenticate.

Use your email address for the user name and insert correct password for the login.

**Login to Masha**

[Having trouble logging in?](#)

*Figure A.2 Login page*

### **Password Recovery Process**

The figure A.3 shows the password recovery form. It will help to recover registered user account, when login details are lost.

Insert your email address and new password for setup new details instead of previous login details. Email should be already registered with Masha Office Automation. After submitting relevant details, user should confirm email address by login to the email account.

**Password Recovery**

*Figure A.3 Password Recovery Form*

## Customer Registration Form

The figure A.4 shows the customer registration form. Required fields should be completed before submit the form. After submit the registration details, user should confirm their email address for activate the created account.

The screenshot shows the 'Customer Registration' form. At the top left is a 'Back to Masha' link with a shield icon, and at the top right is a 'Login' link. The form title is 'Customer Registration'. A pink message box says 'Please check your Internet connection'. The form contains the following fields:

- First Name: Enter first name
- Last Name: Enter last name
- email: Enter email address
- Email Confirmation Code: Enter some string hear to authenticcate your email
- Password: Enter password
- Re-Password: Re-enter password
- Contact Number: 07x - xxxxxxxx
- Date of Birth: mm/dd/yyyy

At the bottom of the form are two buttons: 'Sign up' and 'Clear form'. Below the form is a footer with the text: 'new Masha office automation copyright © 2016'.

Figure A.4 Customer Registration Form

## Administrator Panel

The figure A.5 shows the admin pannel of Masha Office Automation. It will allow administrater to do the operations that he has to accomlsh in organization.

Logout button use to successfully logout from the system.

The screenshot shows the 'Administrator Panel'. At the top left is a 'Back to Masha' link with a shield icon, and at the top right is a 'Logout' link. The main heading is 'Welcome to Administrator'. On the right side, there is a user profile picture and the text: 'Hi **sampath** ! You are logged as an Administrator'. The panel is divided into three columns of blue buttons:

- Left Column:** Staff Registration, Add Items to Stock, Shopping Cart, Salary Calculate, Mark Attendance, Mark Signout, Publish Notices, Manage Salary.
- Middle Column:** Stock Information, Update Stock, Staff Information, Customer Information, Barcode Information, Attendance Information, Statistical Charts, Upload Images.
- Right Column:** Leave Requests (3), Service Letter Requests (1), Salary Letter Requests (2), Password Requests (0), sales Reports, Re-Order Alerts (3), Backup, Q & A (1).

Figure A.5 Administrator Panel



## Stock Registration Form

The figure A.6 shows stock registration form. Stock details should be inserted to the system when stock items are received from the suppliers.

Required fields must be completed before click on Add item button.

Barcode corresponding to the item code will be generated automatically and save on the directory specified by the system.

The screenshot displays a web application interface for stock registration. At the top, a dark header contains a logo and the text 'Back to Masha' on the left, and 'Administrator Logout' on the right. The main content area is titled 'Stock Registration' and contains a form with the following fields:

- Item Code:** Text input field with placeholder 'Enter item code' and a red asterisk indicating it is required.
- Item Name:** Text input field with placeholder 'Enter item name' and a red asterisk.
- Item Type:** Dropdown menu with placeholder '-----Select category -----' and a red asterisk.
- Quantity Price:** Text input field with placeholder '1200.00' and a red asterisk.
- Quantity:** Text input field with placeholder 'Enter item quantity' and a red asterisk.
- Supplier:** Text input field with placeholder 'Enter supplier name' and a red asterisk.
- Warranty Period:** Text input field with placeholder 'Enter warranty period in months' and a red asterisk.

Below the form are two blue buttons: 'Add item' and 'Clear form'. To the right of these buttons is a legend: '\* Required fields.' At the bottom of the page, a grey footer contains the text: 'new Masha office automation copyright © 2016'.

*Figure A.6 Stock Registration Form*

## Stock Details Report

The figure A.7 shows stock details report. User can check item information by searching item name, item code or item category.

### Stock Information

Show 10 entries

Search:

Item code	Item name	Item type	Quantity	Price	Supplier	Warranty	Date	Time		
1000	epson m100	printer	5	1500.00			2016-12-08	05:49:15	Delete	Edit
1001	epson lq500	printer	5	4500.00			2016-12-08	05:50:26	Delete	Edit
1002	lexmark 200	printer	4	5000.00			2016-12-08	06:26:22	Delete	Edit
2000	epson 330	computer equipment	5	3500.00			2016-12-08	06:31:26	Delete	Edit
2005	fx100	printer	5	2000.00			2016-12-11	07:26:37	Delete	Edit
2006	fx200	printer	5	2000.00			2016-12-11	07:26:52	Delete	Edit
2007	fx2005	fax machine	5	2000.00			2016-12-11	07:27:04	Delete	Edit
2008	fx2005	printer	5	2000.00			2016-12-11	07:27:12	Delete	Edit
2009	fx105	camera	5	2000.00			2016-12-11	07:27:27	Delete	Edit
2010	epx 100	camera	5	200.00			2016-12-11	07:29:07	Delete	Edit

Showing 1 to 10 of 11 entries

Previous **1** 2 Next

Figure A.7 Stock Details Report

### Staff Member Registration

The figure A.8 shows staff member registration form. Required fields must fill, when new member is registering with system.

### Staff Member Registration

**First Name:**  \*  
**Last Name:**  \*  
**email:**  \*  
**Password:**  \*  
**Re-Password:**  \*  
**User Type:**  \*  
**Contact Number:**  \*  
**Date of Birth:**  \*  
**N.I.C Number:**  \*

\* Required fields.

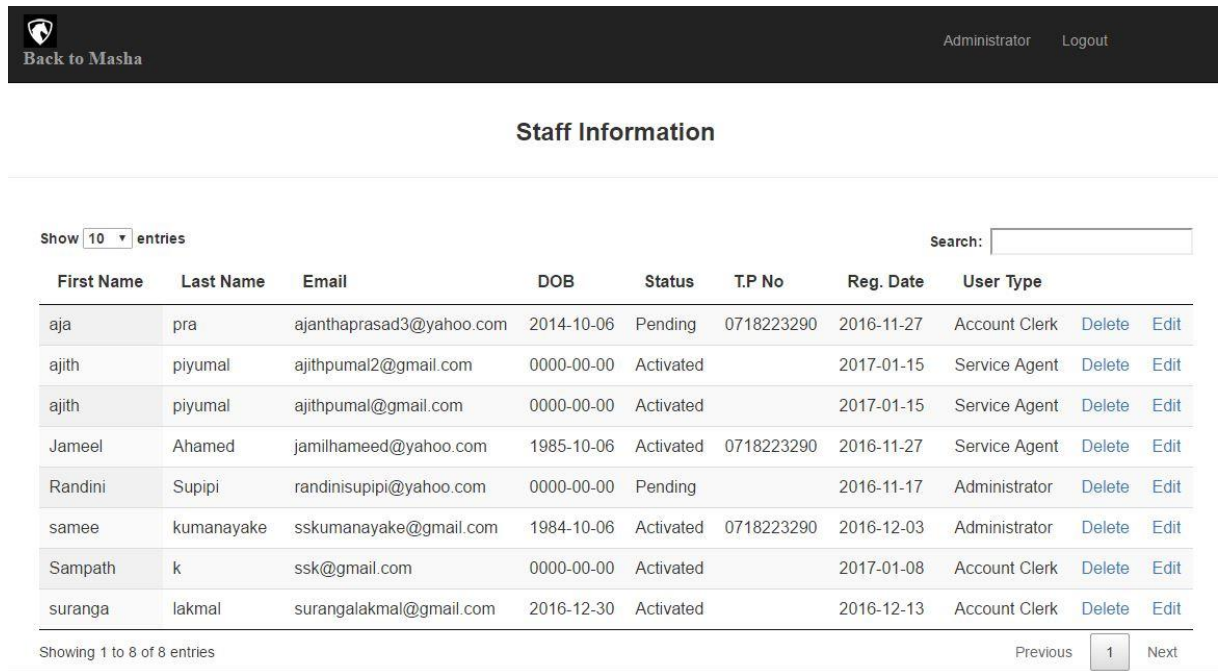
Figure A.8 New Staff Member Registration Form

## Registered Member Information Report

Figure A.9 shows registered member information report. It will allow administrator to search registered user by user's ID, NIC number or Name.

Delete button can be used to remove user from the database.

Edit button can be used to edit user details by clicking on it.

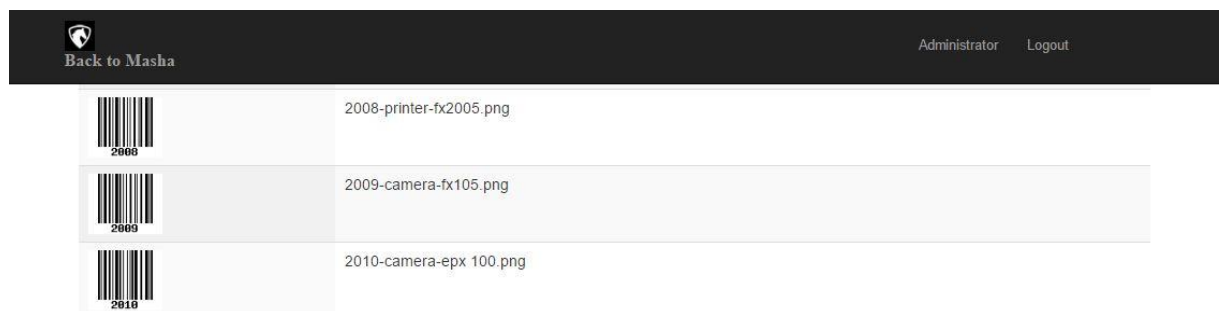


First Name	Last Name	Email	DOB	Status	T.P No	Reg. Date	User Type	Delete	Edit
aja	pra	ajanthaprasad3@yahoo.com	2014-10-06	Pending	0718223290	2016-11-27	Account Clerk	Delete	Edit
ajith	piyumal	ajithpumal2@gmail.com	0000-00-00	Activated		2017-01-15	Service Agent	Delete	Edit
ajith	piyumal	ajithpumal@gmail.com	0000-00-00	Activated		2017-01-15	Service Agent	Delete	Edit
Jameel	Ahamed	jamilhameed@yahoo.com	1985-10-06	Activated	0718223290	2016-11-27	Service Agent	Delete	Edit
Randini	Supipi	randinisupipi@yahoo.com	0000-00-00	Pending		2016-11-17	Administrator	Delete	Edit
samee	kumanayake	sskumanayake@gmail.com	1984-10-06	Activated	0718223290	2016-12-03	Administrator	Delete	Edit
Sampath	k	ssk@gmail.com	0000-00-00	Activated		2017-01-08	Account Clerk	Delete	Edit
suranga	lakmal	surangalakmal@gmail.com	2016-12-30	Activated		2016-12-13	Account Clerk	Delete	Edit

Figure A.9 Staff Member Information Form

## Barcode Detail Report

The figure A.10 shows barcode details of registered items. Barcode details will be displayed, by clicking on “Show Barcode” button of admin panel.






	2008-printer-fx2005.png
	2009-camera-fx105.png
	2010-camera-epx 100.png

Figure A.10 Barcode Detail Report

## Staff Salary Calculation Form

The figure A.11 shows the staff salary calculation form, which will provide facility to calculate salaries of staff member.

Net salary can be calculated automatically by inserting relevant amounts to the correct fields.

“Record Salary” button will allow user to record salary on the database.

“Clear Form” button will allow user to clear form for the new process.

The screenshot shows a web form titled "Staff Salary Calculation". At the top left, there is a logo and the text "Back to Masha". At the top right, there are links for "Administrator" and "Logout". The form itself is centered and contains the following fields:

- Index Number:
- N.I.C Number:
- Year:
- Month:
- Basic Salary:
- Increments:
- Allowances:
- Gross pay:
- STAMP:
- E.T.F:
- Sepecial Deduction:
- Special Advance:
- Festival Advance:
- Total Deduction:
- Net Salary:

At the bottom of the form, there are two blue buttons: "Record Salary" and "Clear form".

*Figure A.11 Salary Calculation Form*

## Shopping Cart

The figure A.12 shows shopping cart view. Transaction ID will generate when placing the new transaction.

Item details will display, when item code is placed on the form.

Click on “Add to Cart” button for calculate the total amount.

Click on “Confirm Transaction” button to confirm the transaction.

Click on “Print Receipt” button to print the detail bill.

### Shopping Cart

<b>Item Code</b>	<input type="text" value="item code"/>	<b>Item Type</b>	<input type="text" value="item type"/>	<b>Transaction ID</b>	<input type="text" value="312756"/>
<b>Quantity</b>	<input type="text" value="quantity"/>	<b>Item Name</b>	<input type="text" value="item name"/>	<b>Unit Price</b>	<input type="text" value="item price"/>
<b>Discount</b>	<input type="text" value="discount"/> %	<b>Current Qty. :</b>	<input type="text" value="stock available"/>	<b>Amount</b>	<input type="text" value="amount"/>

Edit Shopping Cart Items:

ID	Item code	Item name	Quantity	Unit price	Discount	Amount	
991277	1001	m1001	2	3000.00	300.00	5700.00	Delete
<b>Total</b>						<input type="text" value="5700.00"/>	
<b>Cash</b>						<input type="text" value="6000.00"/>	
<b>Balance</b>						<input type="text" value="300.00"/>	

Figure A.12 Shopping Cart Form

## 09. APPENDIX B – USER EVALUATION TOOLS

The figure B.1 is a questionnaire which is provided to the staff members for the purpose of collecting data. User survey will allow administrator to assess usability of the new system for the organizational operations.

### User Survey Questionnaire

(1) Name with initials : .....

(2) Designation : .....

\* Please mention which the satisfaction of the system by using following symbols.

(Please mark on relevant cage)



Very Good



Good



Moderate



Bad



i. Trustworthiness of the system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ii. Accessibility to the functions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
iii. Report generation facility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
iv. Support for the decision making	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
v. Easiness of the calculations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
vi. Previous experience about web based systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
vii. Support to maintain good relationship with customers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
viii. Support to maintain good relationship with administrator	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ix. Easiness of the work without paper based works.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
x. Protection of personal information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Figure B.1 User Survey Form

## 10. APPENDIX C – TEST PLAN AND TEST CASES

### Test Plans

No	Function	Testing procedures	Expected output	Priority
Manage stock information				
15	Retrieve existing stock details	Click on “show stock” button	All available stock details display on grid view	Medium
16	Edit existing stock information	Click on edit button after updating details	Updated details are displayed on the grid view	Medium
17	Delete existing stock record	Click on delete button	Pop up confirmation message	High
18	Cancellation of delete command	Click on “Cancel” of delete confirmation message	Grid is showing previous item list	Medium
19	Performing the delete action	Click on “Ok” button to confirm the delete action	Grid is showing without deleted item	Medium
<i>Table C.1 Test Plan for the Manage Stock Information</i>				

No	Function	Testing procedures	Expected output	Priority
Search stock details				
20	Search stock using item code	Search item by wrong item code	Display message that there is no item related to the search term	Low
21	Search stock using item code	Search item by item code	Display item details related to the search term	Low
22	Search stock using item name	Search item by wrong item name	Display message that there is no item related to the search term	Low
23	Search stock using item name	Search item by item name	Display item details related to the search term	Low
<i>Table C.2 Test Plan for the Search Stock Details.</i>				

No	Function	Testing procedures	Expected output	Priority
Manage user information				
24	Retrieve registered user details	Click on “show staff member” button	Registered user details display on grid view	Medium
25	Edit registered user information	Click on edit button after updating details	Updated details are displayed on the grid view	Medium
26	Delete registered user record	Click on delete button	Pop up confirmation message	High
27	Cancellation of delete command	Click on “Cancel” of delete confirmation message	Grid is showing user details without deleting	Medium
28	Performing the delete action	Click on “Ok” button to confirm the delete action	Grid is showing without deleted member details	Medium
<i>Table C.3 Test Plan for the Manage User Information</i>				

No	Function	Testing procedures	Expected output	Priority
Salary calculations				
29	Login to the salary calculation module	Use customer’s or staff member’s login to access the salary calculation module	There is no link to access salary calculation module	High
30	Login to the salary calculation module	Use administrator’s login to access the salary calculation module	There is a link to access salary calculation module	High
31	Calculate salary	Insert non numeric data to the fields	Not calculate with the net salary	High
32	Calculate salary	Insert numeric data to the deductions fields	Deduct by net salary	High
33	Calculate salary	Insert numeric data to the allowances fields	Adding to the net salary	High
<i>Table C.4 Test Plan for the Salary Calculation</i>				



No	Function	Testing procedures	Expected output	Priority
Shopping cart				
34	Select item for the cart	Insert item by using item code	Automatically display unit price on the cart	High
35	Calculate item amount	Insert quantity to the relevant cage	Automatically calculate item amount	High
36	Calculate item amount	Insert discount rate to the relevant cage	Automatically deduct discount by item amount	High
37	Add item to the cart	Click on “Add” button to add item to the cart	Display selected items on the receipt	High
38	Print receipt	Click on “Print” button	Print pdf bill according to the selected items	High

*Table C.5 Test Plan for the Shopping Cart*


No	Function	Testing procedures	Expected output	Priority
Password recovery				
39	Request the password recovery.	Request with not existing email in registered user list	Display error message that there is no user registered under this email	Medium
40	Request the password recovery.	Request with existing email in registered user list	Allow user to create new password	Medium
41	Login to the system using new password	Login to the system before verify email account with new password	Display error message and redirect to the login page	High
42	Login to the system using new password	Login to the system after verifying email address	Successfully login to the customer page	High

*Table C.6 Test Plan for the Password Recovery*

No	Function	Testing procedures	Expected output	Priority
Manage Notice Board				
43	Access to notice editor page	Access only through administrator's panel	Allow access only through administrator's panel	Low
44	Add notices to the notice board	Add notice through notice editor panel	Display on the notice board	Low
45	Delete notices from the notice board	Delete notice through notice editor panel	Delete from the notice board	Low
46	Logout from notice editor panel	Click on logout button	Redirect to the login page	High
<i>Table C.7 Test Plan for the Manage Notice Board</i>				

No	Function	Testing procedures	Expected output	Priority
Manage Comments				
47	Send the comment	Click on send button without any text	Display error message	Medium
48	Send the comment	Click on send button with the comment	Display delivery report	Medium
<i>Table C.8 Test Plan for the Manage Comments</i>				

## Test Cases

<b>Test case ID</b>	09	
<b>Tested Component</b>	User Registration Form	
<b>Module Name</b>	Manage User	
<b>Test Case</b>	User registration with already registered email address.	
<b>Expected Output</b>	Message will indicate that email is already registered with system.	
<b>No</b>	<b>Actual Output</b>	<b>Status</b>
<b>04</b>		Pass
<i>Table C.9 Test Case for the User Registration (Already registered email)</i>		

<b>Test case ID</b>	11	
<b>Tested Component</b>	Email confirmation	
<b>Module Name</b>	Manage User	
<b>Test Case</b>	Status of the user without confirming email address.	
<b>Expected Output</b>	Report will indicate that user is still pending.	
<b>No</b>	<b>Actual Output</b>	<b>Status</b>

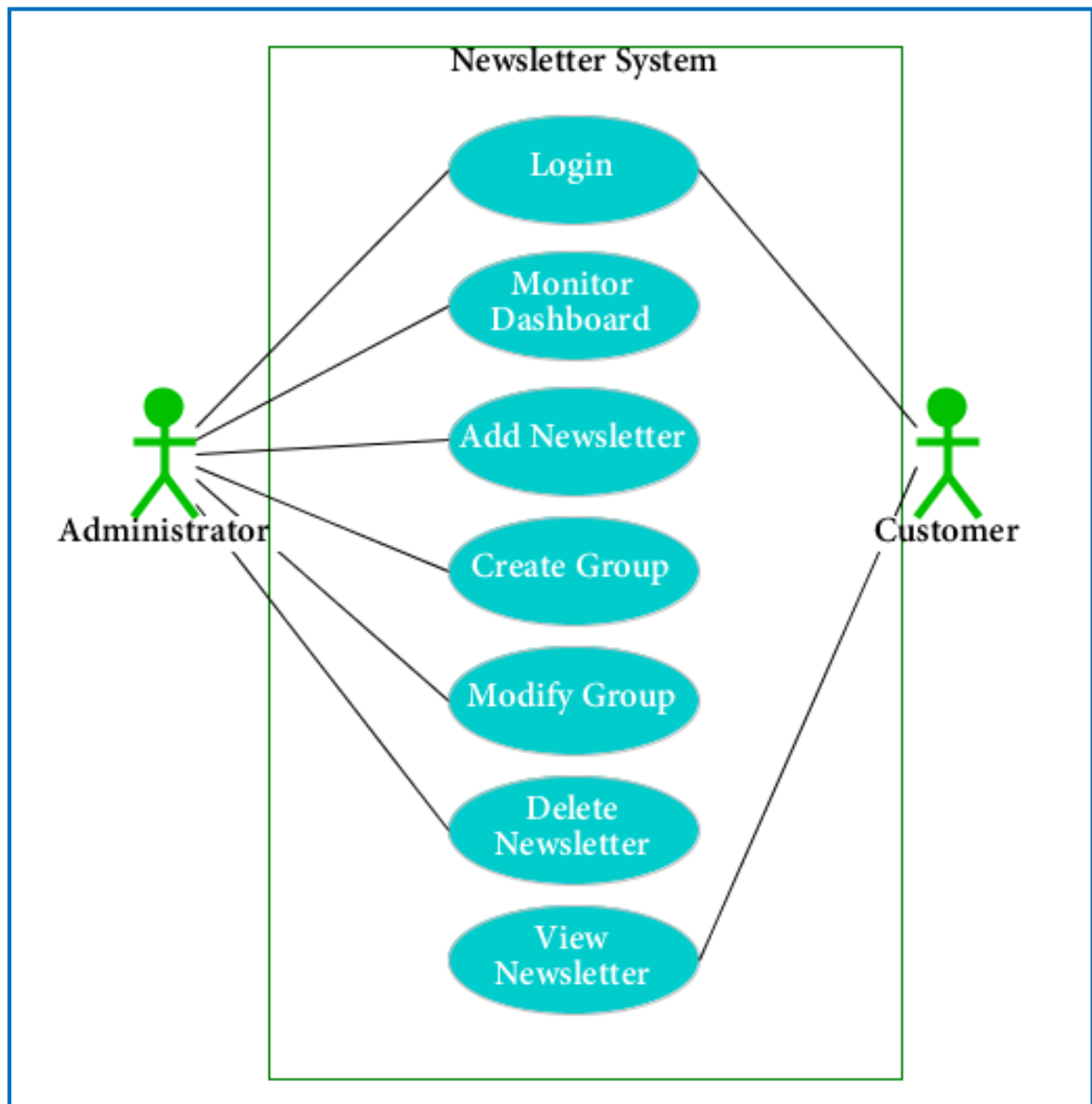
<b>05</b>	Show <input type="text" value="10"/> entries <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 20%;">First Name</th> <th style="width: 20%;">Last Name</th> <th style="width: 30%;">Email</th> <th style="width: 30%;">DOB</th> </tr> </thead> <tbody> <tr> <td>aja</td> <td>pra</td> <td>ajanthaprasad3@yahoo.com</td> <td>2014-10-06</td> </tr> </tbody> </table> <div style="text-align: right;">Search: <input style="width: 100px;" type="text"/></div> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Status</th> <th style="width: 15%;">T.P No</th> <th style="width: 15%;">Reg. Date</th> <th style="width: 55%;">User Type</th> </tr> </thead> <tbody> <tr> <td>Pending</td> <td>0718223290</td> <td>2016-11-27</td> <td>Account Clerk <a href="#">Delete</a> <a href="#">Edit</a></td> </tr> </tbody> </table>	First Name	Last Name	Email	DOB	aja	pra	ajanthaprasad3@yahoo.com	2014-10-06	Status	T.P No	Reg. Date	User Type	Pending	0718223290	2016-11-27	Account Clerk <a href="#">Delete</a> <a href="#">Edit</a>	<b>Pass</b>
First Name	Last Name	Email	DOB															
aja	pra	ajanthaprasad3@yahoo.com	2014-10-06															
Status	T.P No	Reg. Date	User Type															
Pending	0718223290	2016-11-27	Account Clerk <a href="#">Delete</a> <a href="#">Edit</a>															
<i>Table C.10 Test Case for the email Confirmation</i>																		

<b>Test case ID</b>	29	
<b>Tested Component</b>	Salary Calculation form	
<b>Module Name</b>	Salary Calculation	
<b>Test Case</b>	NIC number of employee.	
<b>Expected Output</b>	Error message will indicate that NIC should be in correct format.	
<b>No</b>	<b>Actual Output</b>	<b>Status</b>
<b>06</b>	N.I.C Number: <input style="width: 150px;" type="text" value="842803845"/> <span style="color: red;">NIC Number must valid</span>	<b>Pass</b>
<i>Table C.11 Test Case for the Salary Calculation Form (Valid NIC Number)</i>		

## 11. APPENDIX D – DETAILED DESIGN DIAGRAMS

### Newsletter Module

The newsletter module provide function to inform the customers about product promotion of Masha Office Automation and also send wishes for customer birthdays. This will strengthen the bond between customers and Masha Office Automation. Diagram in figure 3.5 depicts the use-case diagram for newsletter module.



*Figure D.1 Use Case Diagram for Newsletter Module*

## Use-case Narrative for Newsletter Module

Use Case	Newsletter
Actors	Administrator, Customer
Description	
Manage newsletters and wishes that should sen to customers from the organization.	
Preconditions	
<ol style="list-style-type: none"> <li>1. Login to the system as an administrator</li> <li>2. Customers accesses the system as registered mambers.</li> </ol>	
Flow of events	
<p><b>As an Administrator</b></p> <ol style="list-style-type: none"> <li>1. Administrator login to the system.</li> <li>2. Create a new newsletter.</li> <li>3. Select target group of customers.</li> <li>4. Send newsletter.</li> </ol>	
Post Conditions	
Receives newsletter and wishes from the system.	
<i>Table D.1 Use Case Narrative for News Letter Module</i>	

## Staff Management Module

This module is used to make attendance, calculate salary and manage leave for registered staff members. As well as assign jobs for service agent accordance of the customer inquiry. Those activities are performed by authorized staff member. Diagram in figure 3.6 depicts the use-case for staff management module.

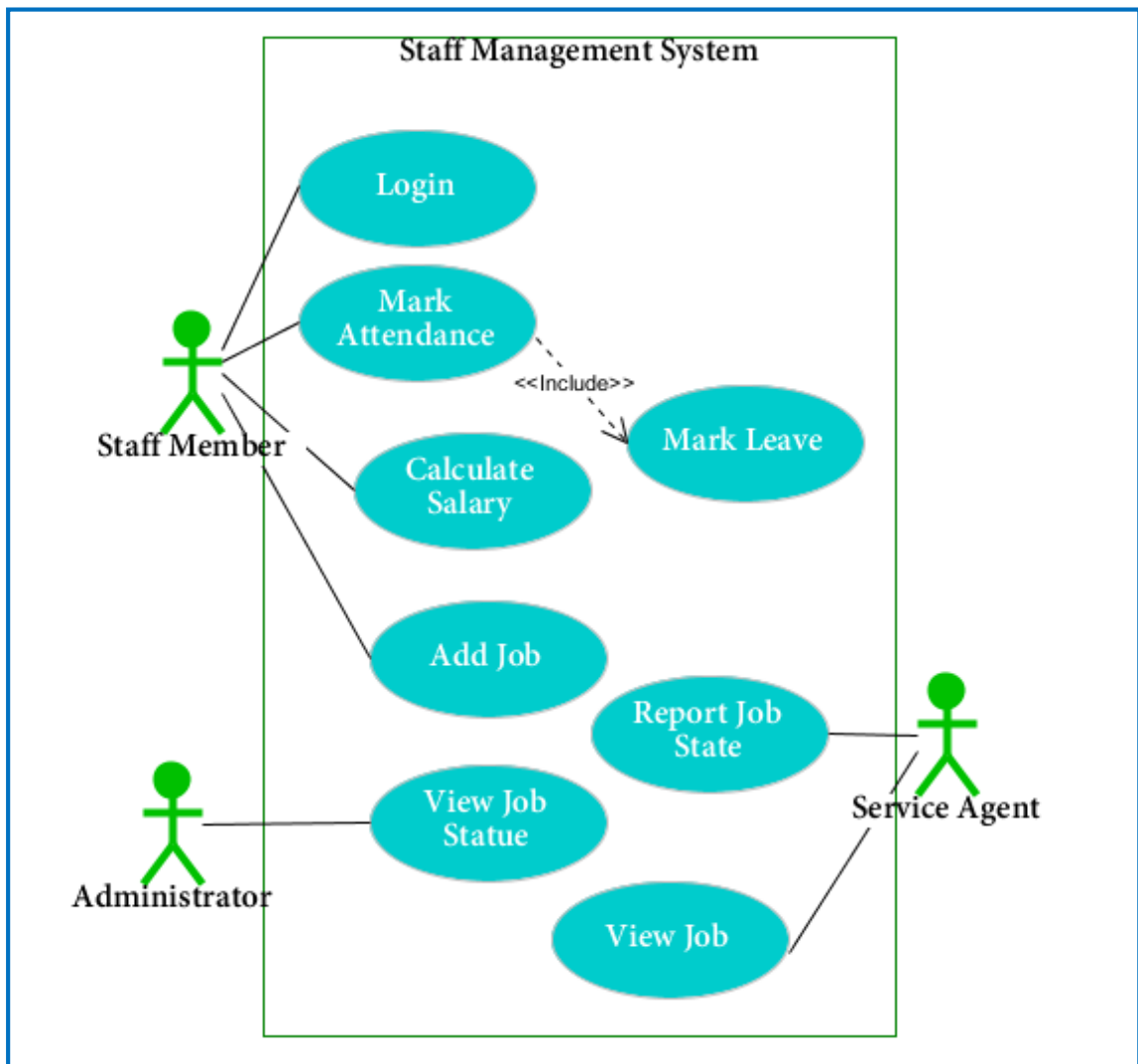


Figure D.2 Use Case Diagram for Staff Management Module

## Use-case Narrative for Staff Management Module

Use Case	Staff Management
Actors	Administrator, Staff Member, Service Agent
Description	
Manage staff member attendance, salary, leave and jobs.	
Preconditions	
<ol style="list-style-type: none"> <li>1. Login to the system as a valid user</li> <li>2. Assign jobs only for present staff members.</li> </ol>	
Flow of events	
<p><b>As a Staff member</b></p> <ol style="list-style-type: none"> <li>1. Login to the system as an authorized staff member.</li> <li>2. Mark attendance.</li> <li>3. Calculate salary for individuals.</li> <li>4. Assign jobs accordance of customer inquiries.</li> </ol> <p><b>As a Service agent</b></p> <ol style="list-style-type: none"> <li>1. Login to the system by their mobile application.</li> <li>2. View jobs assign by the authorized person.</li> <li>3. Report job status to the system</li> </ol> <p><b>As an Administrator</b></p> <ol style="list-style-type: none"> <li>1. Login to the system</li> <li>2. View currently open job and their status.</li> </ol>	
Post Conditions	
Complete staff management tasks that should be handled by the organization.	
<i>Table D.2 Use Case Narrative for the Staff Management Module</i>	



## Report Generation Module

Reports are vital outcome, which are provided by information system. This module of proposed system provides some essential reports that are expected from Masha Office Automation such as stock information report, sales report, staff attendance report, staff salary report, salary particular report, attendance letter, service letter etc. The administrator or authorized staff member should involve to perform above tasks. Diagram in figure 3.6 depicts the use-case for report generation module.

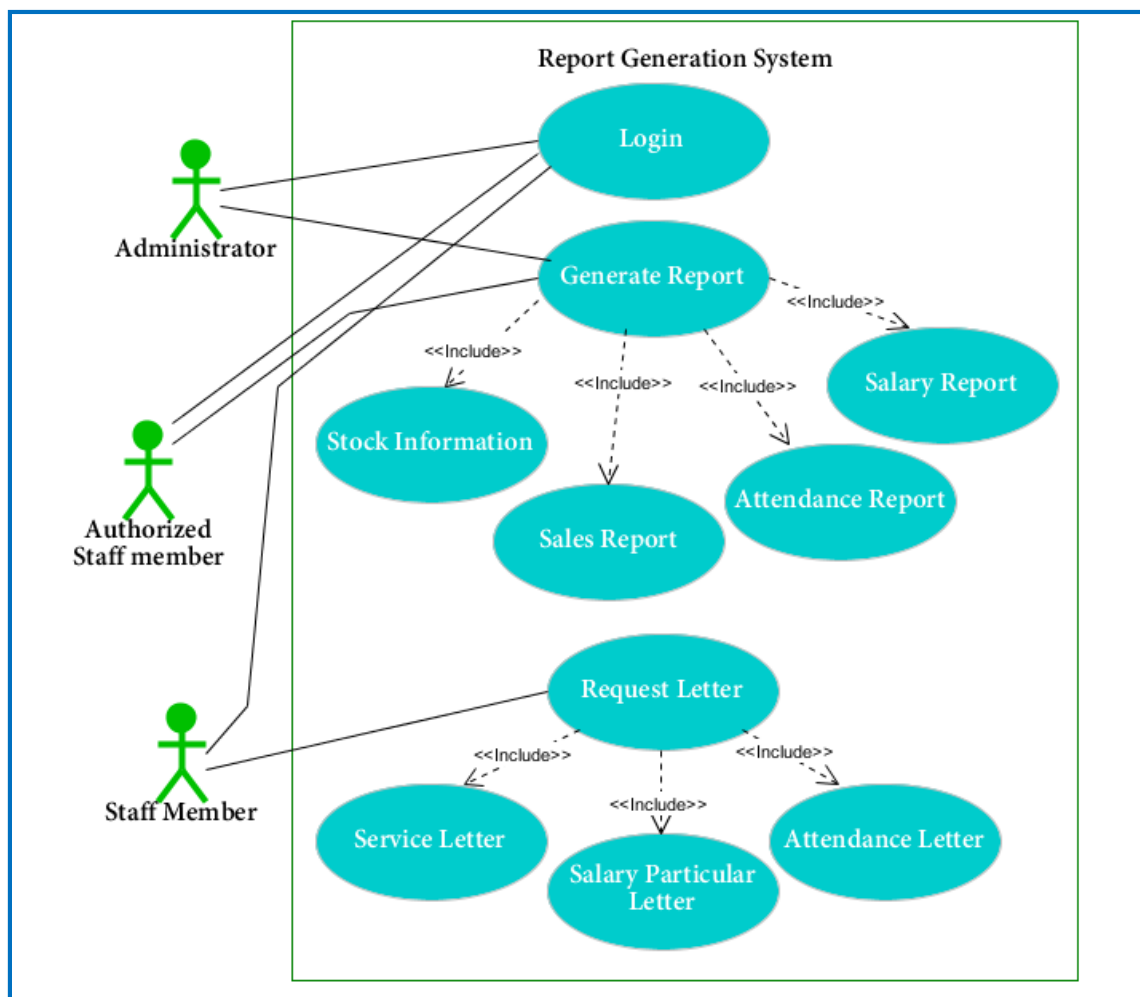


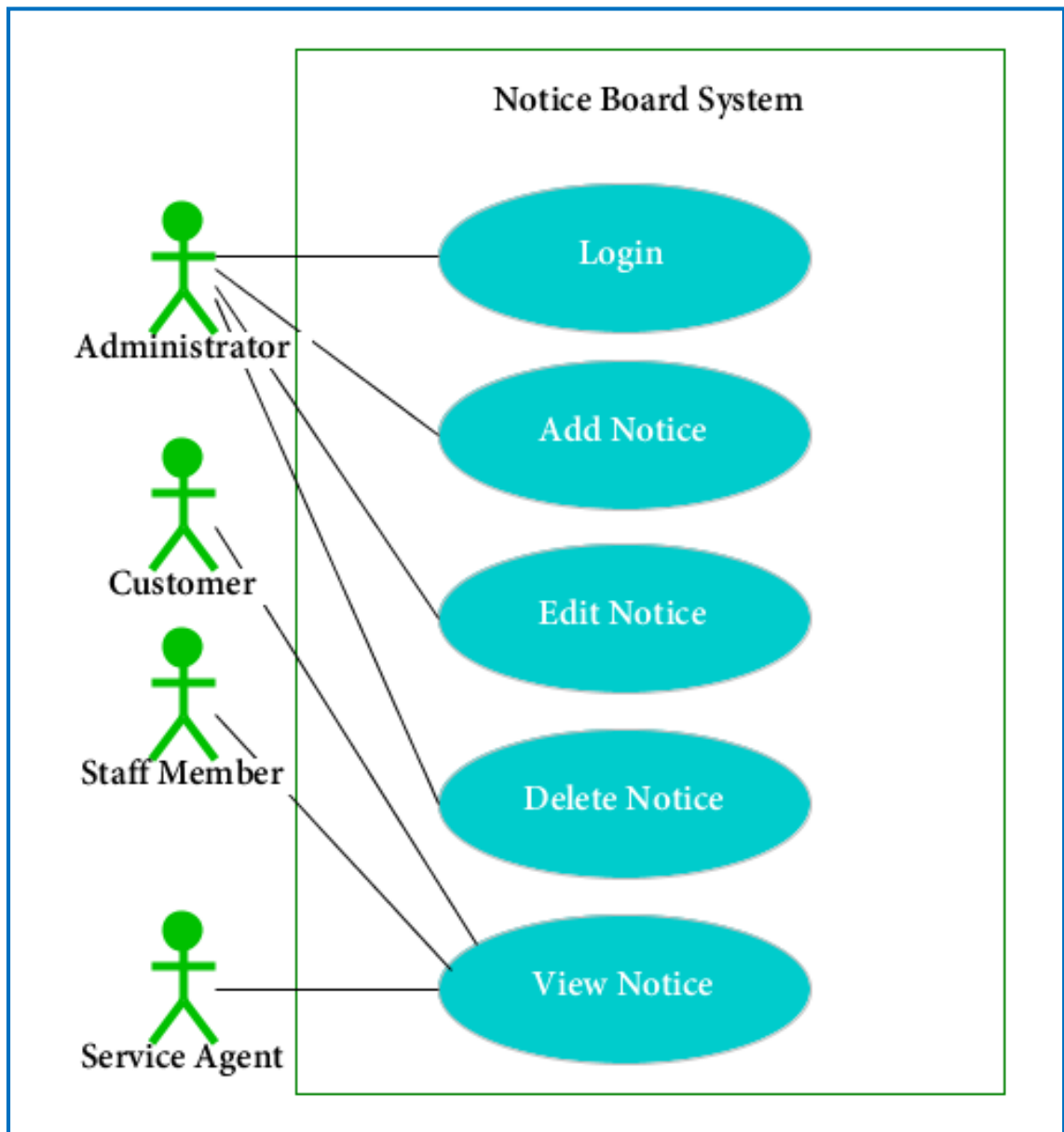
Figure D.3 Use Case Diagram for Report Generation Module

## Use-case Narrative for Report Generation Module

Use Case	Report generation
Actors	Administrator, Staff Member
Description	
Provide some essential reports which organization is expected to prepare by system.	
Preconditions	
<ol style="list-style-type: none"> <li>1. Login to the system as a valid user</li> <li>2. Generate report only on predefined criteria and defined structure.</li> </ol>	
Flow of events	
<p><b>As an Authorized staff member</b></p> <ol style="list-style-type: none"> <li>1. Login to the system as an authorized staff member.</li> <li>2. Generate report such as stock details, sales report, salary report and attendance report.</li> </ol> <p><b>As a Staff member</b></p> <ol style="list-style-type: none"> <li>1. Login to the system as a valid member.</li> <li>2. Request letter(Service letter, Salary particular letter, Attendance letter).</li> <li>3. Send request to administrator through the system</li> </ol> <p><b>As an Administrator</b></p> <ol style="list-style-type: none"> <li>1. Login to the system</li> <li>2. View requested letters by staff member.</li> </ol>	
Post Conditions	
Prepare reports and letters necessity to requirements .	
<i>Table D.3 Use Case Narrative for Report Generation Module</i>	

## Notice Board Module

This module uses to manage notices, which should be informed to regular users of the system. Administrator of the system can manage noticeboard by adding, updating and deleting notices. Diagram in figure 3.8 depicts the use-case for notice board module.



*Figure D.4 Use Case Diagram for Notice Board Module*

## Use-case Narrative for Notice Board Module

Use Case	Notice Board
Actors	Administrator, Staff Member, Service Agent, Customer
Description	
Presents notice on the notice board, which should be informed commonly to the stakeholders.	
Preconditions	
<ol style="list-style-type: none"> <li>1. Anyone can refer notice which display on notice board.</li> </ol>	
Flow of events	
<p><b>As an Administrator</b></p> <ol style="list-style-type: none"> <li>1. Login to the system as an administrator.</li> <li>2. Manage notice board by adding deleting or editing notices.</li> </ol>	
Post Conditions	
Display notices that are witin validity period.	
<i>Table D.4 Use Case Narrative for Notice Board</i>	

## Activity Diagram for Salary Calculation Module

Diagram in Figure D.5 depicts the activity diagram for salary calculation process of the organization.

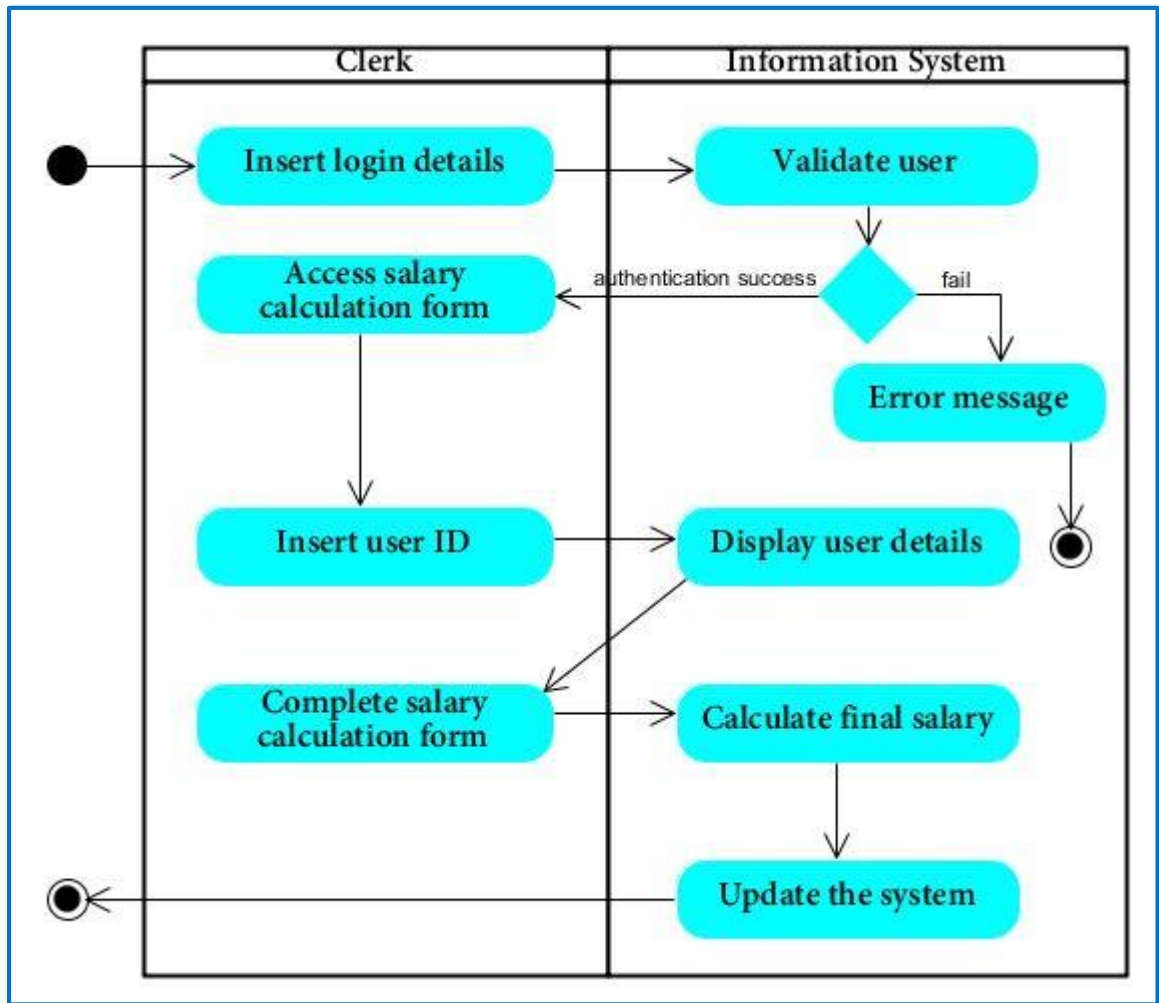


Figure D.5 Activity Diagram for Salary Calculation Module

## Activity Diagram for Attendance Mark Module

Diagram in Figure D.6 depicts the activity diagram for attendance mark process of the organization.

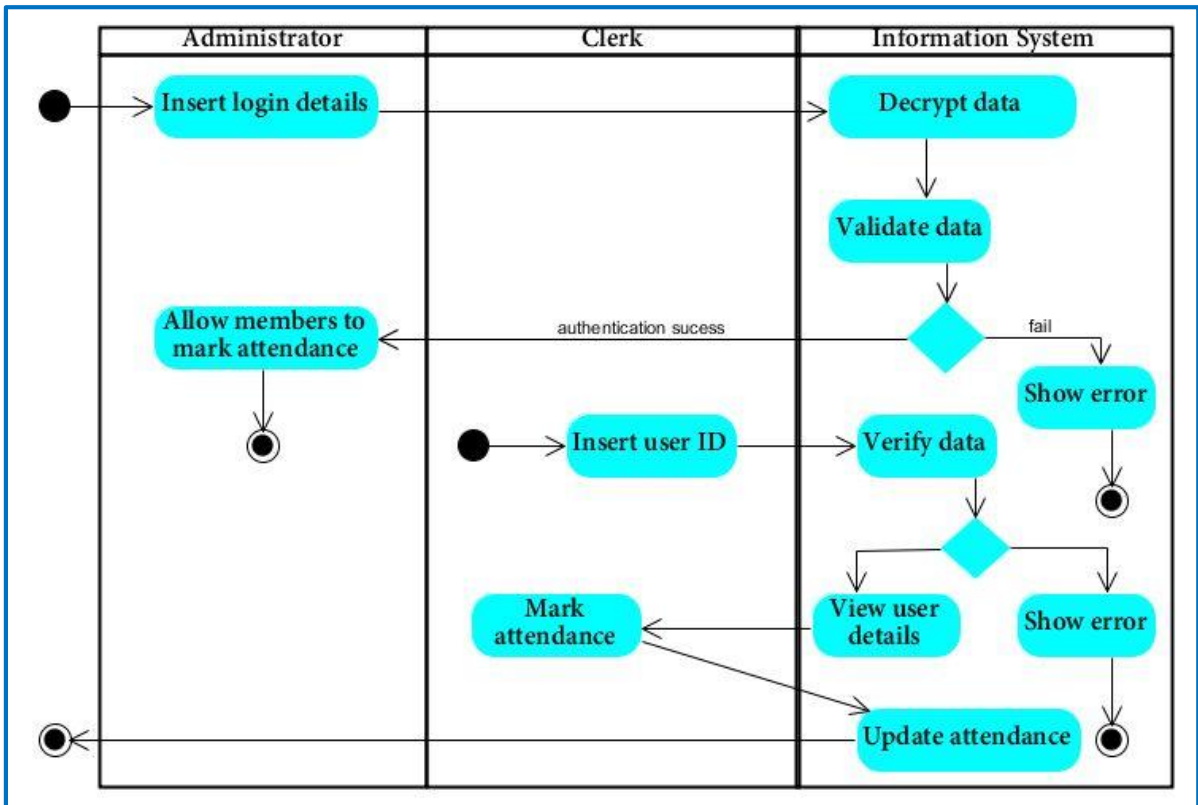


Figure D.6 Activity Diagram for Attendance Mark Module

## Activity Diagram for Customer Registration Module

Diagram in Figure D.7 depicts the activity diagram for customer registration process of the organization.

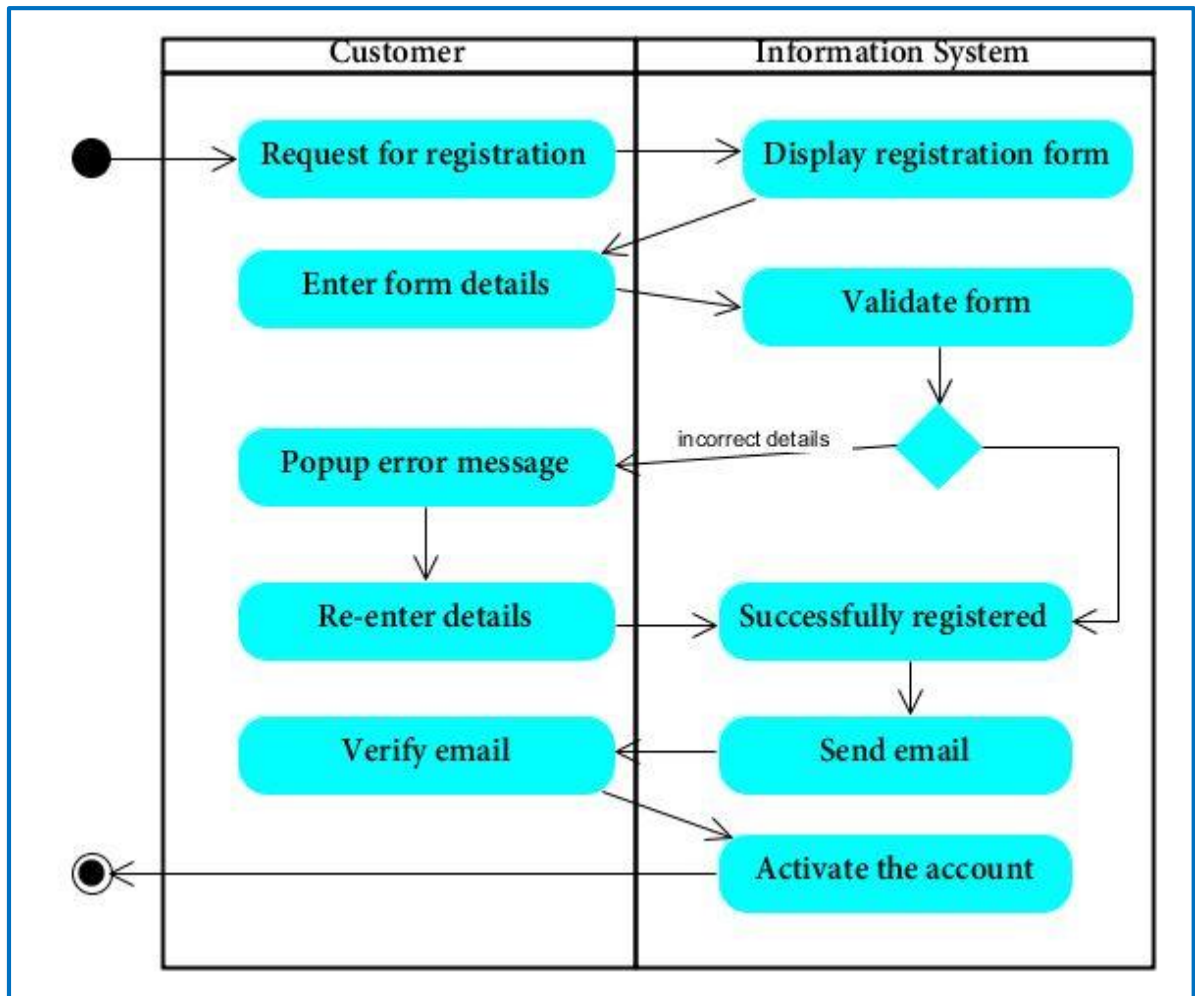


Figure D.7 Activity Diagram for Customer Registration Module

## Sequence Diagram for Attendance Mark Module

Diagram in figure D.8 depicts the sequence diagram for attendance mark process of staff members.

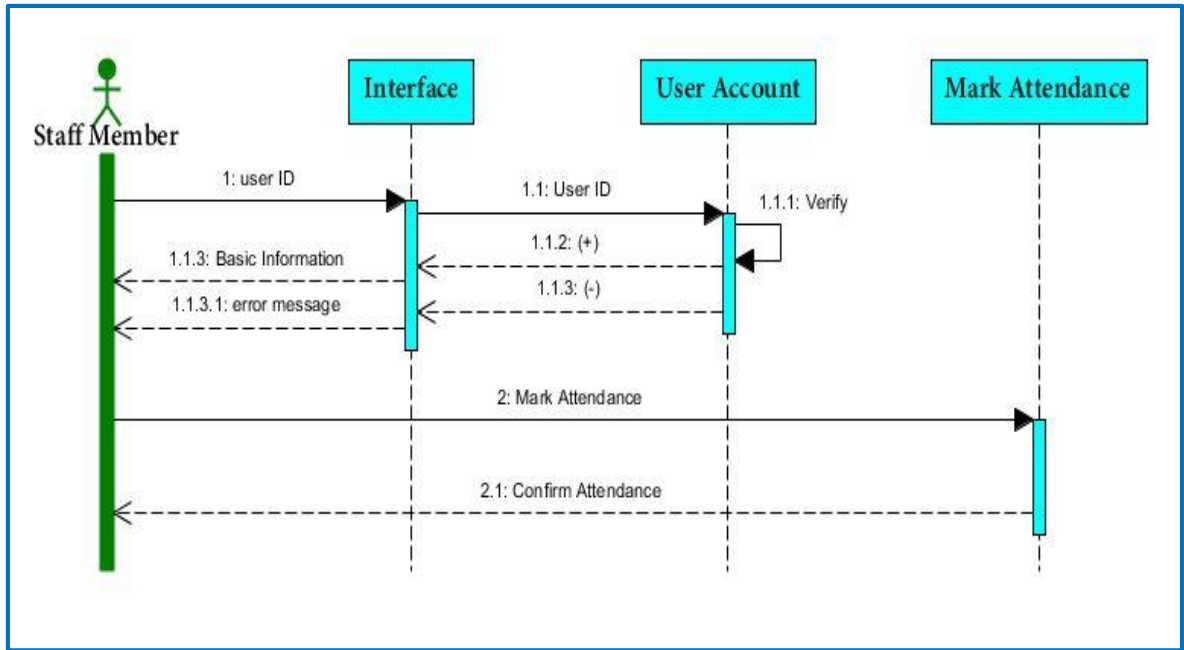


Figure D.8 Sequence Diagram for Attendance Mark Module

### Sequence Diagram for Delete User

Diagram in figure D.9 depicts sequence diagram for delete the registered user from the Information System.

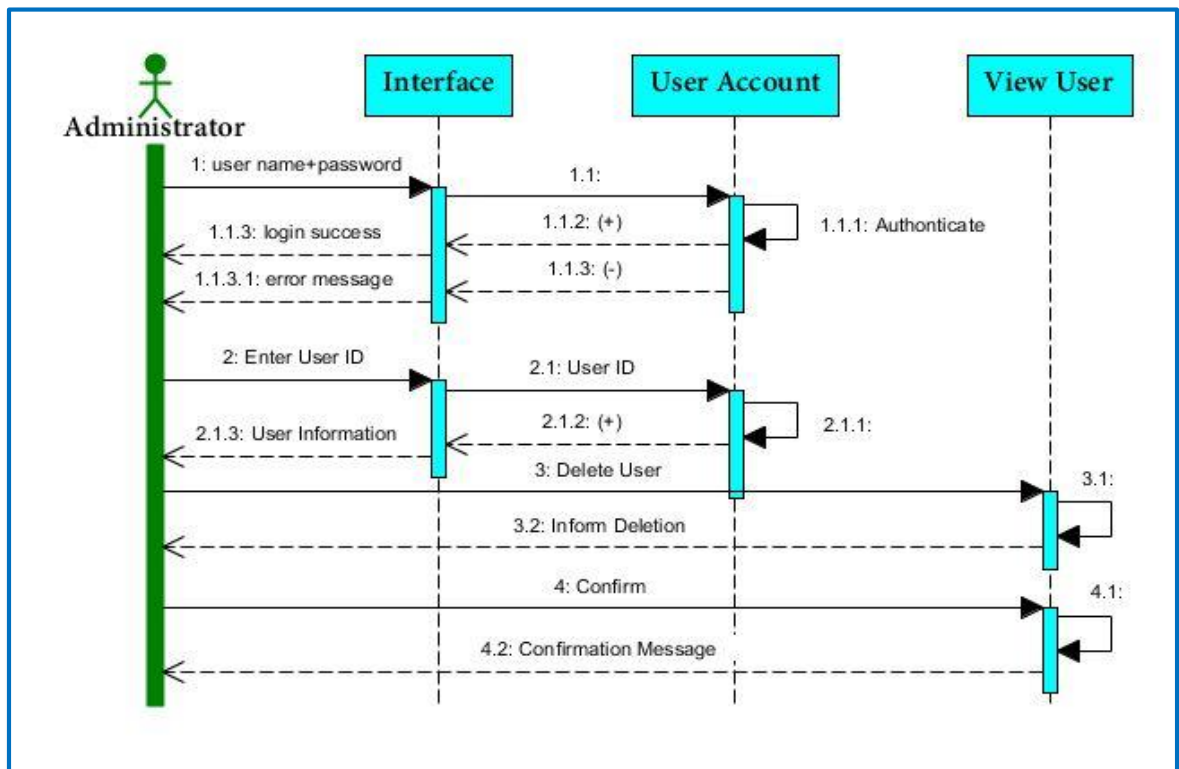


Figure D.9 Sequence Diagram for Delete User

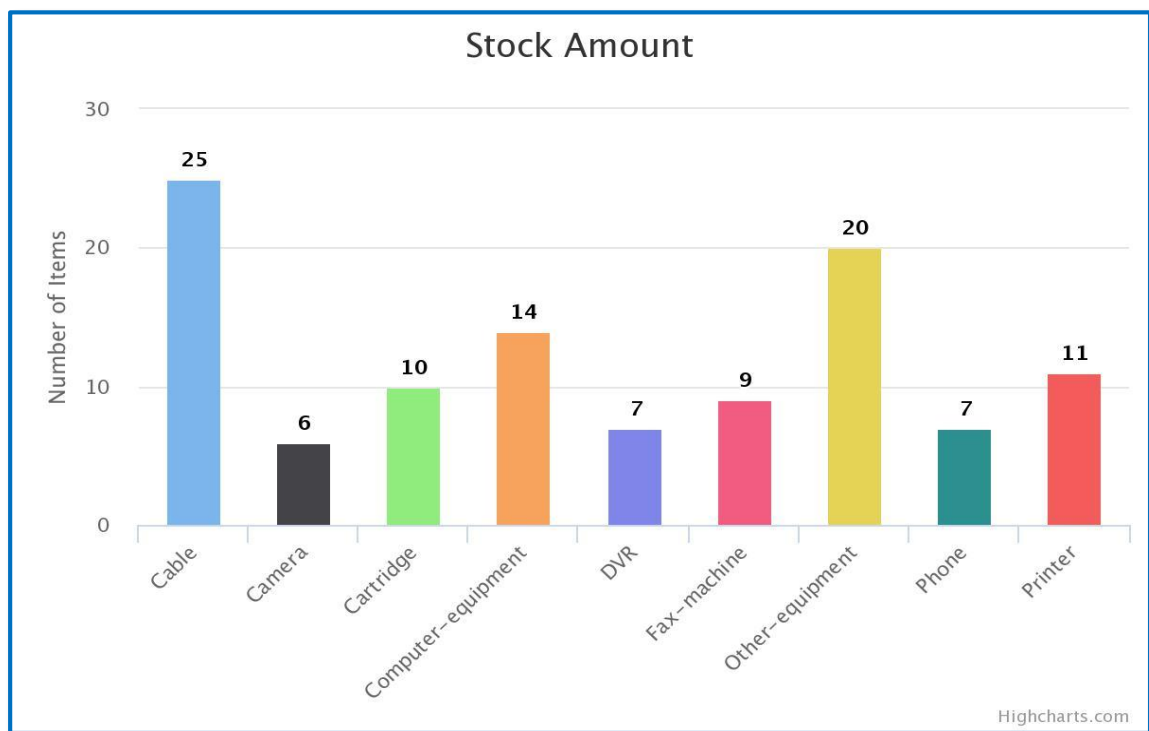


## 12. APPENDIX E – MANAGEMENT REPORTS

Management reports are the vital part of Information Management System. Management reports show the summary of the organization over a specified period of time. By using the management reports, managers can make decisions accurately and effectively. Various kind of management reports can be seen in the industry. Following are the graphical reports which are generated from the Masha Office Automation.

### Column Chart for Stock Details

Chart in figure E.1 is the column chart which illustrates the stock status of the Masha Office Automation.



*Figure E.1 Column Chart for Stock Status.*

## Pie Chart for Total Sales in Percentage

Chart in figure E.2 is the pie chart which illustrates the percentage of total sales of the Masha Office Automation in item vice.

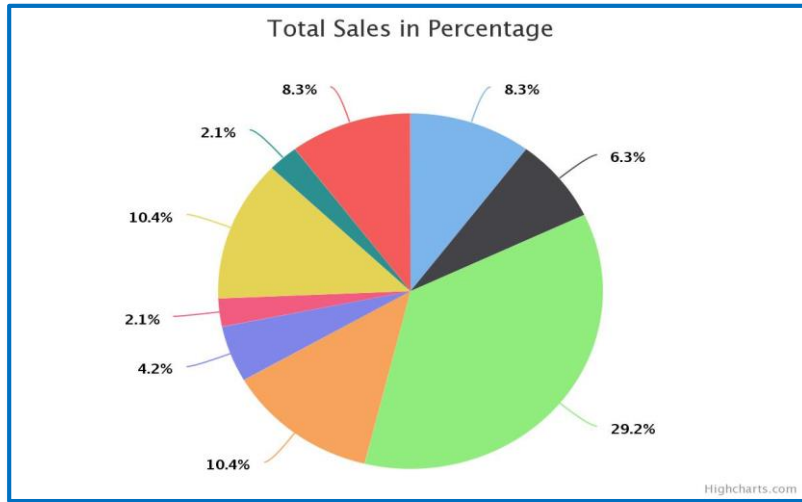


Figure E.2 Pie Chart for Percentage of Sales.

## Column Chart for Total Sales vs Item Type

Chart in figure E.3 is the column chart which illustrates the total sales of the Masha Office Automation in items.

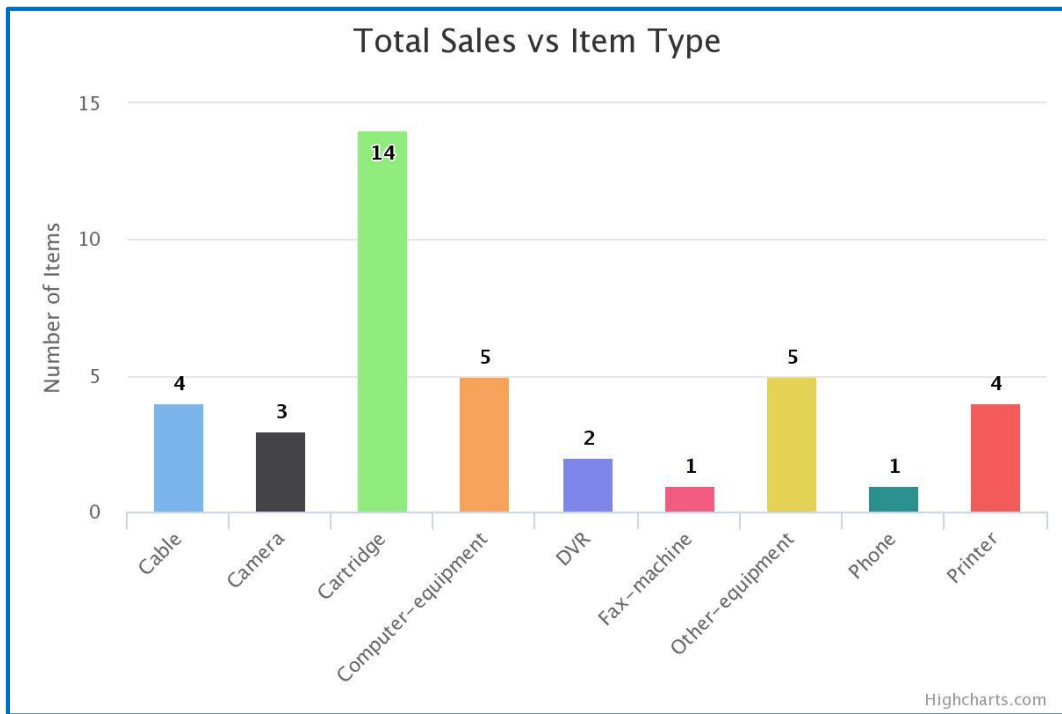


Figure E.3 Column Chart for Sales in Items.