

TRILINGUAL IT GLOSSARY MANAGEMENT SYSTEM

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TRILINGUAL IT GLOSSARY MANAGEMENT SYSTEM

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

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ABSTRACT

We have a limited number of Trilingual (Sinhala, Tamil and English) web based Dictionaries. Mostly, these Dictionaries also do not contain proper Sinhala and Tamil translations of the particular all English IT technical Terms. Therefore, these web based “Trilingual IT Terms Management System” is more useful not only for the students and teachers but also for the State and non-state officers to carry out the government policy (In Sri Lanka, the national policy of the Government is to develop first language (mother tongue), second language (Sinhala or Tamil) and the international linking language English at the same time).

The system allows different tasks for different users. They are Administrator and registered user, who can log the system as different user roles to perform their functions separately. Administrator has all privileges of the system.

Registered users can search, vote, comment and listen to the particular term for already available in the database. They can suggest the new term or different meaning of the already available term. They can view the suggestion already available in the system and can vote, comment the particular suggestion. They can add their feedback. Registered users can comment and view others comments for the particular forum already created by the administrator.

Administrator can upload the CSV file (bulk term addition) and add the new terms (single term addition). Administrator can view the users’ suggestion (term) with the Sinhala & Tamil meaning. If the particular suggestion is good then the administrator automatically adds the term in to the database. Administrator can read and understand the user’s feedback and according to their feedback administrator can add new terms. Administrator can view the user’s details and can change the ‘user type’ (Secondary Admin/ User). Administrator can remove and update the particular term already available in the database. Administrator can create a new forum session.

All the functional, non-functional and system requirements of the system were properly analyzed. All the critical functionalities have been thoroughly tested using black box and white box testing.

The system is developed open source PHP programming language and MySQL has been used as the database language. CSS, Html, Java Script are some other technologies used to develop this system.

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

Certified by:

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LIST OF ABBREVIATIONS

IT - Information Technology

SQL - Structured Query Language

CSV - Comma Separated Values

UML - Unified Modeling Language

UAT- User Acceptance Testing

BST- Binary Search Tree

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Most importantly, I praise my god for all the blessings has given to my life.

CHAPTER 1: INTRODUCTION

This chapter provides a general introduction of the project with a clear description of what the project is about, problem domain and motivation for this project, need of this project, scope, clear and appropriate aims and objectives that are to be achieved, brief of using this system and the structure of the dissertation.

The proposed “Trilingual IT Glossary Management System” developed as a web based system. Interact with the users to access the system and collect the valuable data & information from the linguists’ experts available in the world. This system will be developed for the target of the below mentioned customers benefit.

- 1) Students (School students who are sitting for O/L and A/L exam in the mother language and some ICT related competitive exam conduct in mother language)
- 2) Teachers
- 3) Translators
- 4) College of Education students (teacher students)

1.1 PROBLEM DOMAIN AND THE MOTIVATION FOR THIS PROJECT

In Sri Lanka, the national policy of the Government is to develop first language (mother tongue), second language (Sinhala or Tamil) and the international linking language English at the same time. In addition, the Government officers are required to pass the second language proficiency test. Bilingual teaching is also now being carried successfully in schools and higher education institutes.

Most of the computer related books are in English medium and IT related higher studies are also conducted in English medium. Most of the students face the Ordinary Level, Advanced Level or some ICT related competitive exams (Eg. ICT service exam) in the first language (Sinhala or Tamil). So the students and teachers face difficulties for not knowing the proper meaning of the particular English IT technical terms.

Presently all the Government Ministries and Departments are required to submit documents like cabinet papers, performance report, circulars in the all three languages (Sinhala, Tamil and English). Translators find it difficult to find the Sinhala or Tamil words for the particular IT technical (English) terms.

Unfortunately it is to be noted limited number of Trilingual (Sinhala, Tamil and English) web based Dictionaries. Mostly, these Dictionaries also do not contain proper translations of all IT terms. Therefore, these web based “Trilingual IT Terms Management System” is more useful not only for the students and teachers but also for the State and non-state officers to carry out the government policy.

1.2 OBJECTIVES OF THIS PROJECT

Implement the national Policy to develop and encourage the first and second languages (Sinhala and Tamil) and the linking language English at the same time.

The objective of this system includes:

- ✓ Any user can search any trilingual word and find out the meaning of the particular word in any of the languages, wanted or according to the requirement with their ranking.
- ✓ Facilitate to optimize searching.
- ✓ Interact with the users (like social media) and get the feedback or a better word from the users.
- ✓ Computerized the IT terms for easy update and minimized data retrieving time.
- ✓ Reduce data redundancy and storage.

1.3 THE SCOPE OF THE PROJECT

The scope of the project can be listed as follows:

- ✓ Any user can search English, Sinhala or Tamil word and find out the meaning of the particular word in any of the language, wanted or according to the requirement with their ranking.
- ✓ Search bar will check the spelling. That means if the user type the wrong spelling in the searching bar, the correct word and relevant meaning words will display in the search bar below site.
- ✓ Users can comment their opinions of the particular word.
- ✓ Users can vote (like) the particular word.
- ✓ User (account available user) can suggest the similar meaning of the already available word in the glossary.
- ✓ User (account available user) can suggest the new word.
- ✓ Any user can view the user's suggestion and status of the particular suggestion.
- ✓ The suggestion for the similar word or new word will appear in the web site after the administrator's approval.
- ✓ User (account available user) can vote and comment the particular user's suggestion.
- ✓ Any user can listen sound of the particular word or Sinhala meaning or Tamil meaning.
- ✓ User (account available user) can add their opinions and discussion (like forum) into the feedback site. The administrator can read and understand the forum and according to the form administrator can add the new word.
- ✓ Administrator can view the registered user details and can change the user type (user / secondary admin).
- ✓ Only administrator can upload the CSV file (bulk term addition) and add new single term (single term addition).
- ✓ Only administrator can edit/update or delete the particular term already available in the database.

- ✓ Only administrator can create a new forum session. User (account available user) can view others comments and can update their comment to the particular forum created by the Administrator.

1.4 SYSTEM SECURITY

User wise security levels are been applied. These levels are been defined based on function wise for each and every process. They are administrator and account available user, who can logging the system as different user roles to perform their functions separately. Administrator has all privileges of the system. So that unauthorized users are restricted to execute irrelevant process.

1.5 BENEFITS OF USING A WEB BASED TRILINGUAL IT GLOSSARY MANAGEMENT SYSTEM

- ✓ It saves time, money & storing space
- ✓ High reliability of valuable data
- ✓ Improved data sharing
- ✓ Improved data integrity
- ✓ Reduce data redundancy
- ✓ Improved security (both data and process)

1.6 THE STRUCTURE OF THE DISSERTATION

The dissertation contains five main chapters to provide an overall knowledge of the online Trilingual IT Glossary Management System. These chapters are focused on the work carried out during various stages of the project. Each chapter will consist of the required details in order to understand the project with the help of the relevant figures, graphs and reports. This document is written to facilitate both non-technical and technical users of the system.

Chapter 2 - Background

This chapter provides the details of the similar prior projects and research carried out by different people and group to understand the drawbacks and limitations of those projects.

Chapter 3 - Methodology

This chapter consists of the requirements gathering techniques and the functional and the non-functional requirements which help to design and develop the system.

This chapter defines the structured methodological approaches and the object oriented approaches and the tools and techniques used for the system design. This chapter also includes the use case diagrams and Graphical user interface (GUI), which help the users to interact with the system.

This chapter describes the development procedure of the system. Further the implementation environment, software tools and technologies used at the time of the development are explained.

Chapter 4 - Evaluation

This chapter describes how the system was tested by using various testing methods, sample data and the outcome of the assessment. This included the evaluation procedures and the evaluation results.

Chapter 5 - Conclusion

This is the final chapter which include the all summarize details of the projects, results of the project, lessons learnt, problem encounter and the suggestions for future improvements.

CHAPTER 2: BACKGROUND

2.1 LITERATURE REVIEW

Author in [1] elaborate how this can apply the “BTREE” concept in the MySQL database for speedup the data retrieval operations in a large dataset.

A database index is a specialized data structure that allows us to locate information quickly. MySQL supports two different index types such as BTREE and HASH. This is an organized a binary tree structure, with smaller values to the left and larger values to the right, rather than scan of the entire table. An index can compare row values in the tree-like structure to locate desired data faster. In most cases, we can find data faster using an index than by searching sequentially through the database. If we expressed this in a formula with t =time, then $t_{\text{using-index}} < t_{\text{sequential-search}}$.

Algorithm complexity determines how much time is needed to perform an operation. Consider our database contain “n” number of records. The sequential process is called a full table scan, and the algorithm complexity $O(n)$ is directly related to the size of the database. If we use Indexes with BTREE, we can find out our record much faster. The complexity of such an algorithm is expressed as $O(\log(n))$.

BTREE

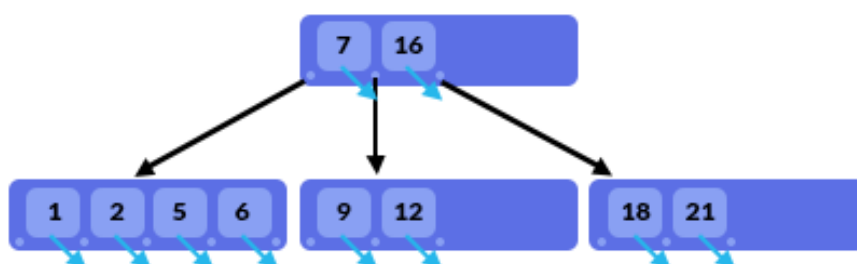


Figure 2.1: Btree

The B-Tree is the basic index structure for most MySQL storage engines. Each node in a B-Tree has between d and $2d$ values. Values in each node are sorted. Each node has between 0 to $2d+1$ child nodes. Each child node is attached before, after, or between values. (In the above graphic, values “9” and “12” come between values “7” and “16”).

The values in B-Tree are sorted in a similar way to those in a binary search tree. Child nodes to the left of value “X” have values smaller than X; child nodes to the right of the value “X” have values greater than X (see the picture).

In contrast to a BST, a B-Tree is a balanced tree: all branches of the tree have the same length.

Searching for values in a B-Tree also corresponds to searching in a BST. First we check if the value is present in the root node. If it isn't, we select the appropriate child node, and look for the value in that node.

Adding and removing values from a B-tree usually does not create new nodes: the number of values in each node can vary. Of course, that means we'll have some empty space, so a B-tree will require more disk space than a denser tree would.

Adding a value has to maintain both the order of value and the balance of the tree. First we'll find the leaf node where the values should be added. If there is enough space in the leaf node, we'll simply add the value; the structure and the tree depth won't change.

When we want to delete a value from the B-Tree, we'll locate that value and remove it. If that deletion caused underflow (the number of values stored in a node is too low) we'll have to merge nodes together. This is exactly the opposite from what happens when we're adding values. We'll merge that node with the neighboring node that contains the most values. If the newly merged node contains too many values (overflow) we'll split it to the left, middle, and right and re-arrange the tree structure.

This technique was used to speed up the search in the "Trilingual Glossary Management System".

Figure 2.2 describe how to apply BTREE in the MySQL .

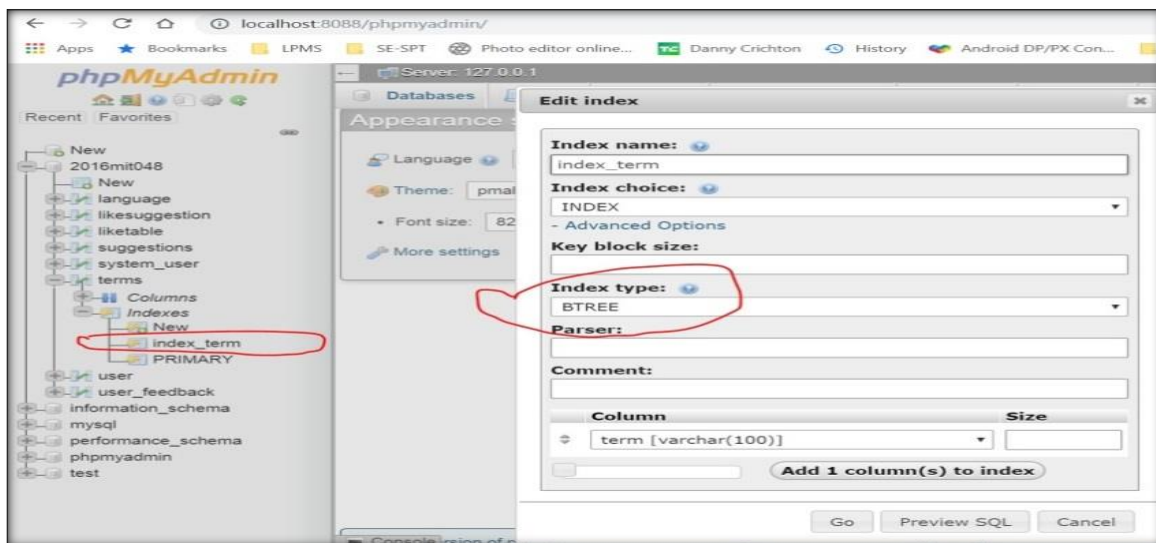


Figure 2.2: How to apply BTREE in the MySQL

2.2 CRITICAL REVIEW OF SIMILAR SYSTEMS AVAILABLE

Department of official Languages (Reference [2]) website have the glossary terms with searching facility. But I observed the following features are not in that Glossary system.

- 1) It could be search only for English word. We can't search for Sinhala or Tamil word.
- 2) The searching term related suggestion word or relevant word is not displayed in the searching bar below site.
- 3) Users can't comment their opinions of the particular word.
- 4) Users can't like the particular word.
- 5) Users can't view the user's suggestion and status of the particular suggestion.
- 6) Users can't vote or comment the particular user's suggestion.
- 7) Users can't listen sound of the particular term or Sinhala meaning or Tamil meaning.

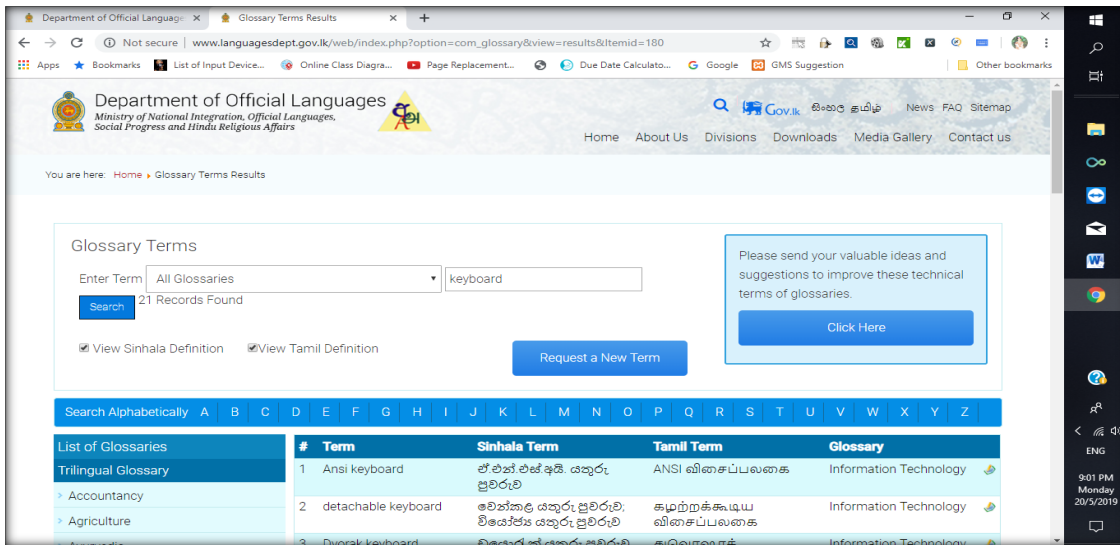


Figure 2.3: Similar system

CHAPTER 3: METHODOLOGY

3.1 ANALYSIS

Analysis can be considered as a very important stage of the system development which will help to identify the role of the proposed system, how it does interact with external entities and it will provide the input to the system design by identifying the requirements. Since the objective of this phase is to study the current process, a sufficient amount of time was allocated and several fact finding techniques were used accordingly in order to gather all the requirements for the system. This analysis section will elaborate the techniques used for analysis and all the requirements including functional and non- functional requirements expected from the system.

3.1.1 USE OF FACT FINDING TECHNIQUES

In order to gather the requirements questionnaires, observation of the environment, sampling the existing documentation, interviewing the users and PACT analysis were used. First few interviews were conducted with the translators to gather basic information about this system. Also observation of the working environment was really helpful to identify the functional & non-functional requirements of the system. A questionnaire was also prepared for the users to gather some requirements.

3.1.2 REQUIREMENTS OF THE SYSTEM

The project requirements mainly consist of the requirements related to the development of project and those which will affect the overall project. This will cover the functional requirements and non- functional requirements gathered through system analysis.

3.1.2.1 Functional Requirements

Table 3.1 provides detailed functional requirements of the Trilingual It Glossary Management System

Login Requirements	<ul style="list-style-type: none">- System should allow the users to log-in to the system by entering relevant username and password- System should identify the user logged-in and should allow the particular functionalities to be performed according to their privileges and user level.
Sign-up/Create new account	<ul style="list-style-type: none">- Public should be able to register in this system.- After registering this system, they can access this system.
Search	<ul style="list-style-type: none">- This facility is provided for all registered users- Easy to search Sinhala/Tamil/English word

Suggestion	<ul style="list-style-type: none"> - Only registered users (user-type=user) to add the new suggestion - Administrator and User can view the suggestion status - Users can Like and Comment particular suggestion - Only Administrator can change the suggestion status - After the administrator approval the suggestion is automatically added to the dictionary.
Term	<ul style="list-style-type: none"> - Only administrator can add the New Term - Only administrator can upload new bulk of Term - Only administrator can edit or delete the particular term (already available in the database). - Administrator and User can Like/Comment particular Term.
Feedback	<ul style="list-style-type: none"> - Users can add their opinions to the system. - According to the users opinion the administrator can add the new term
User Details	<ul style="list-style-type: none"> - Users can view the user details - Only administrator can change the user type.
Sound	<ul style="list-style-type: none"> - Any registered user can hear the particular Sinhala/Tamil/English term for already available in the database.
Post a Question for Forum	<ul style="list-style-type: none"> - Only administrator can create new forum session
Forum	<ul style="list-style-type: none"> - Users can view others comments and can put their comment for a particular forum.

Table 3.1: Functional Requirements

3.1.2.2 Non-Functional Requirements

1. Security

Login requirements- access levels must be defined in order to allow functions to the authorized users.

Password requirements- system should allow user to change the password when required.

Password stored in the database in an encrypted format. By doing this a high level of system security can be achieved.

	email	first_name	last_name	gender	date_of_birth	country	language	qualification	linked_in	short_bio	password
Delete	kumuthini@yahoo.com	kumuthini	Jeganthan	Female	1979-10-12	Sri Lanka	Tamil	B/A degree			df4535f9ed64915bc0d19ad9ef913e2
Delete	smnarmatha@yahoo.com	narmatha	murugaiah	Female	1988-08-07	Sri Lanka	English	B.SC(special) computer science	https://www.linkedin.com/in/narmathamurugaiah/	 <p> I am a computer programer </p>...	c2e8b5426dfc3603e9dbfd81ae332611

Figure 3.1: Password stored in the Database - encrypted format

2. Capacity

Storage – system should be provided with a sufficient capacity of storage.

3. Usability

Look and feel standard – interfaces should be developed in a user friendly manner and standard screen layouts and colors must be used.

4. Response time

Response time of the system should be in minimum. After requesting a result by the user, the outcome should be received soon.

5. Documentation

User documentation with screen shots and simple guidelines must be provided for the user's support.

3.1.3 SYSTEM USERS

Different users who will be using the “Trilingual IT Glossary Management System” will be described here.

Any customer can register in this system. After registered the system, they can login.

1. Admin – Administrator of this system.
2. Users– Collect the valuable information/data from the users. They can suggest, like and comment the term.

According to the processes of this system, the privileges of each user group can be further explained as per Table 3.2.

Process	User Role	
	Admin	Users
Change user password	✓	✓
Change Account Setting	✓	✓
Add New Words	✓	×
Edit or delete the particular word	✓	×
Suggest the Words	×	✓
Add the Comments	✓	✓
Change the user status	✓	×
Add the correct suggestion word in to the dictionary	✓	×
Upload bulk of word	✓	×
Add feedback	✓	✓
Hearing the particular word	✓	✓
Optimize searching	✓	✓
Like	✓	✓
Create new forum session	✓	×
Add the comment to the particular forum	✓	✓

Table 3.2: Privileges of each User group

3.1.4 SUMMARY

This section summarizes the techniques used for analysis and all the requirements including functional, non-functional and documentation requirements expected from the system. Detailed design solution for the system will be explained in the next section.

3.2 SYSTEM DESIGN

3.2.1 ARCHITECTURAL DESIGN

Architectural design involves identifying the major components of the system and the communications between these components. The system is designed to implement as a standalone application which will be operated in a single computer.

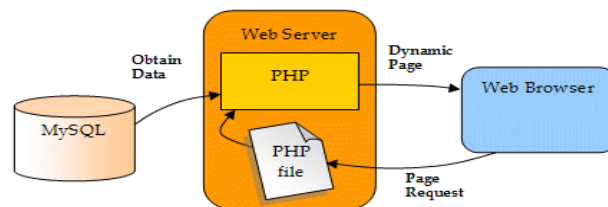


Figure 3.2: Architectural Design

3.2.2 FUNCTIONAL DESIGN

Requirements identified at the system analysis phase will be represented using Unified Modeling Language (UML). Different diagrams will be used to describe different views in high level system definition. Several diagrams will be demonstrated under component design including use case diagram, class diagram and activity diagram.

3.2.2.1 Use case diagram

High level use case diagram provides a basic idea of the main functionalities of this system and some will demonstrate how the system will be organized.

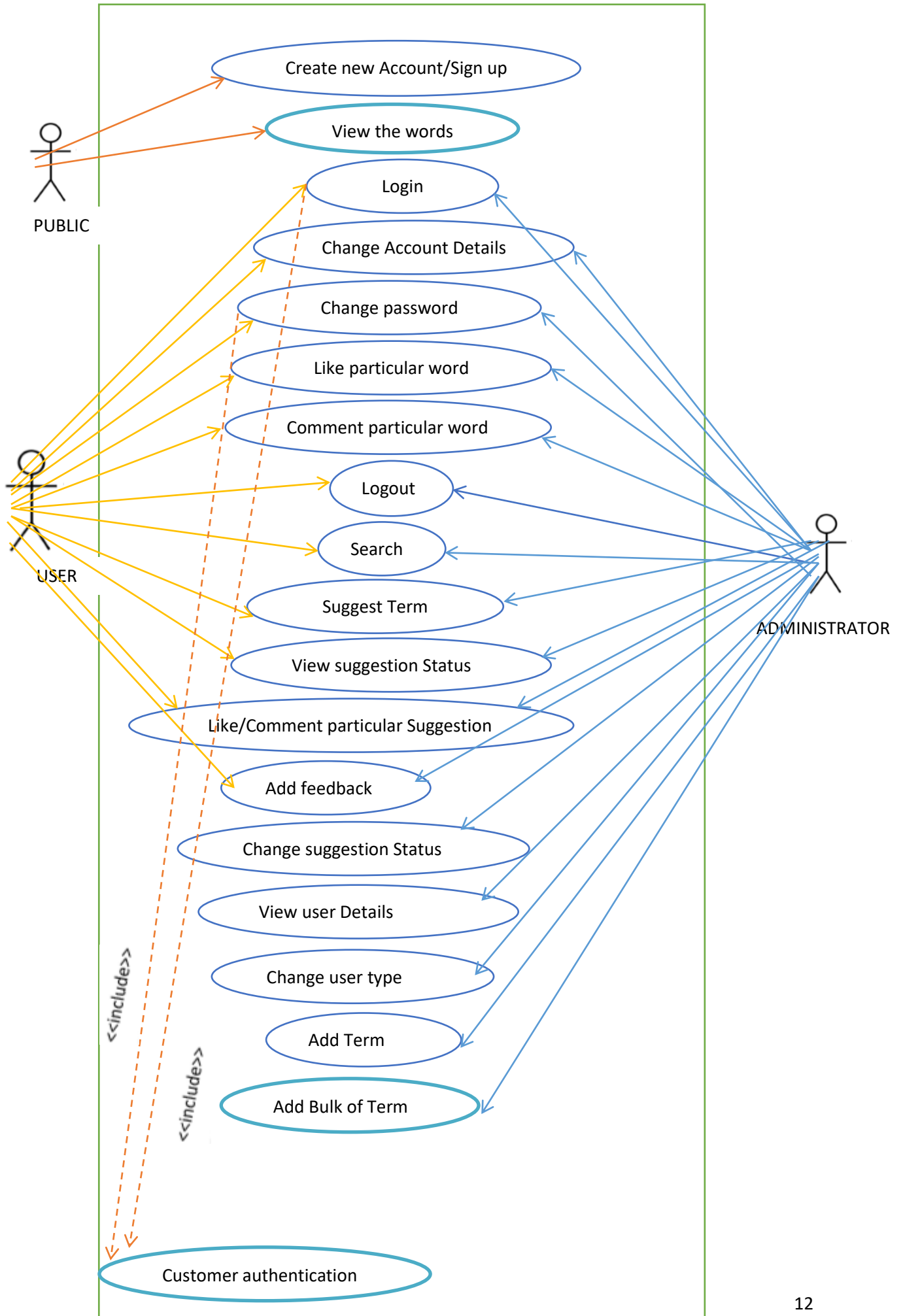
Use case diagrams use to analyze the system requirements and identify the actors in the system. Use case provides the interaction between users (actors) and the system. Actors can be anyone or anything that interact with the system. Also, the use case diagram shows the relationship between the actors.

Considered three primary actors directly involve with the system.

- 1) Administrator
- 2) User
- 3) Public

Figure 3.3 describes the use case diagram of the “Trilingual It Glossary Management System”

Figure 3.3: Use Case Diagram



3.2.2.2 Class Diagram for this system

Class diagram represents the static view of a system and it describes the attributes and operations (Methods) of a class and also the constraints imposed on the system. The class diagram will analyse and design of the static view of a system and describe responsibilities of a system.

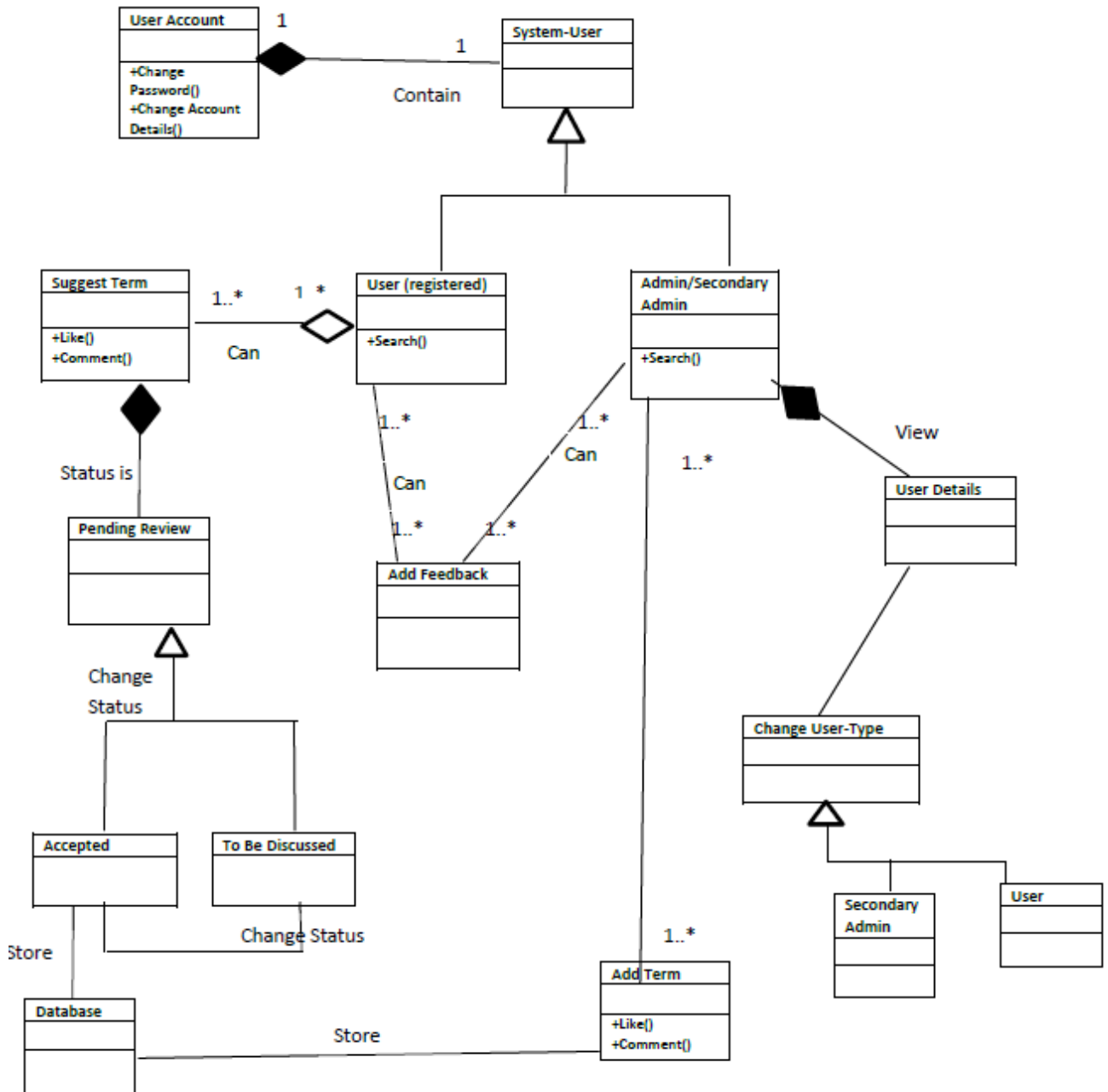


Figure 3.4: Class Diagram

3.2.2.3 Activity Diagram

An activity diagram visually presents a series of actions or flow of control in a system. Activity diagrams describe the actual state of activities of a system by showing all the sequence of activities performed. Also these diagrams can show activities that are conditional or parallel.

Figure 3.5 depicts the activity diagram for the login use case:

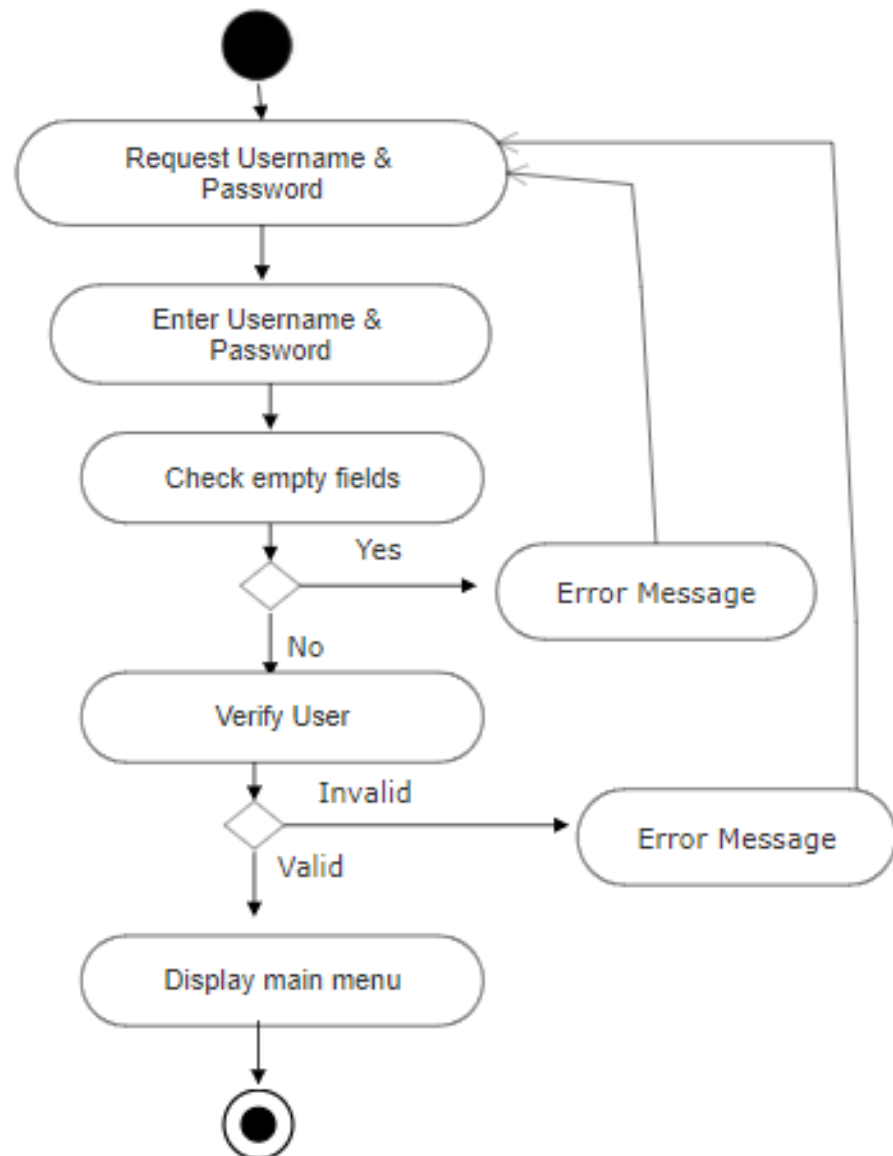


Figure 3.5: Activity diagram for the login use case.

Figure 3.6 depicts the activity diagram for the search use case:

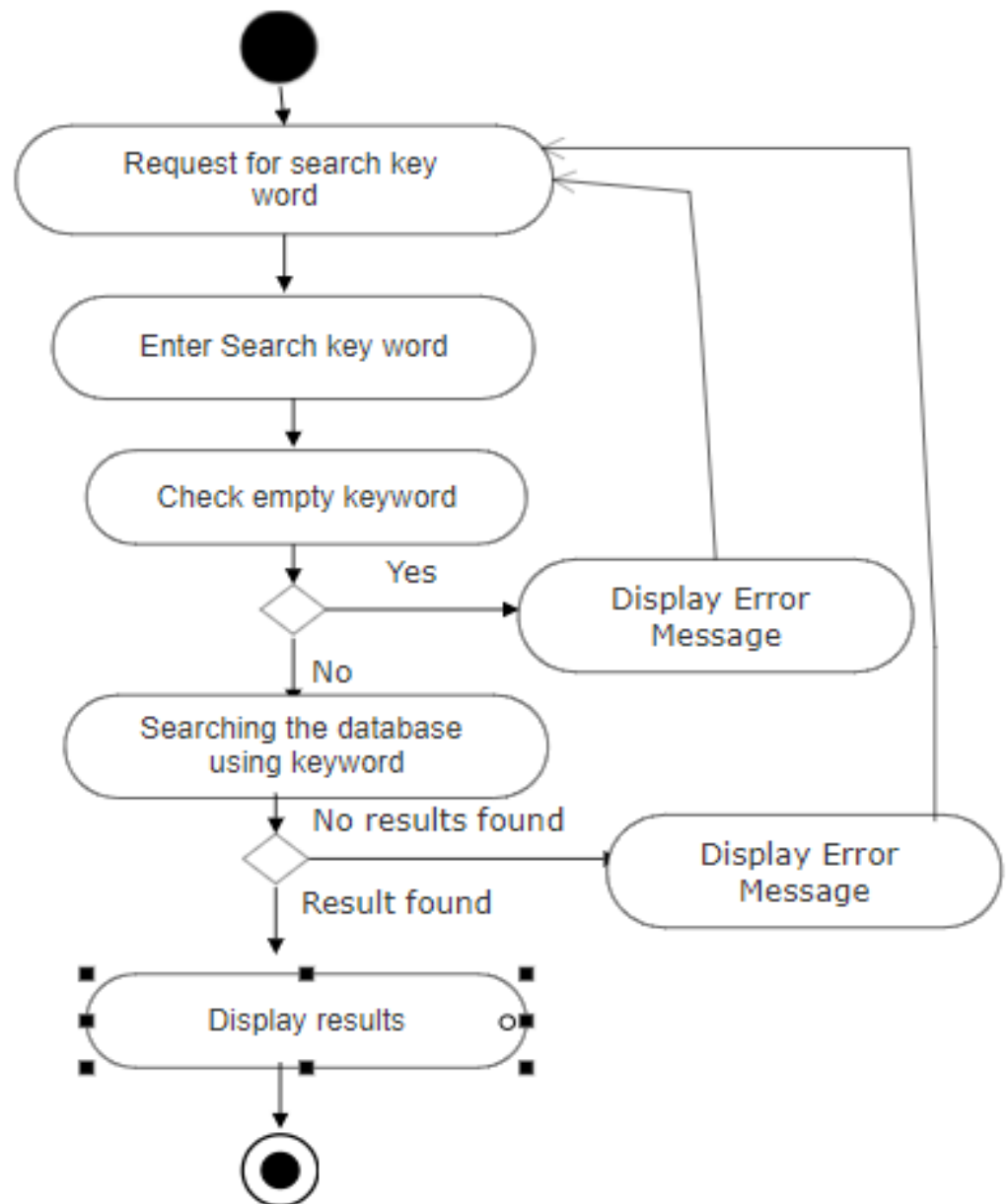


Figure 3.6: Activity diagram for the Search use case.

Figure 3.7 depicts the activity diagram for Admin use case:

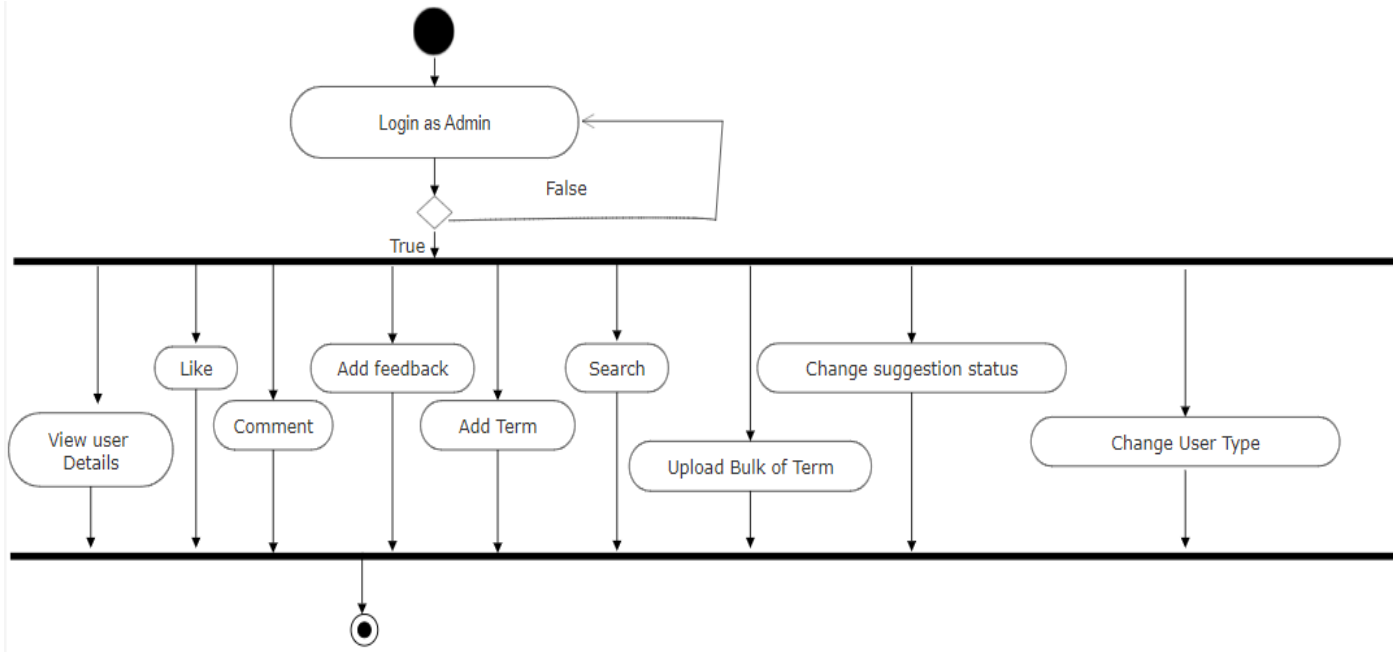


Figure 3.7: Activity diagram for admin use case

Figure 3.8 depicts the activity diagram for user use case:

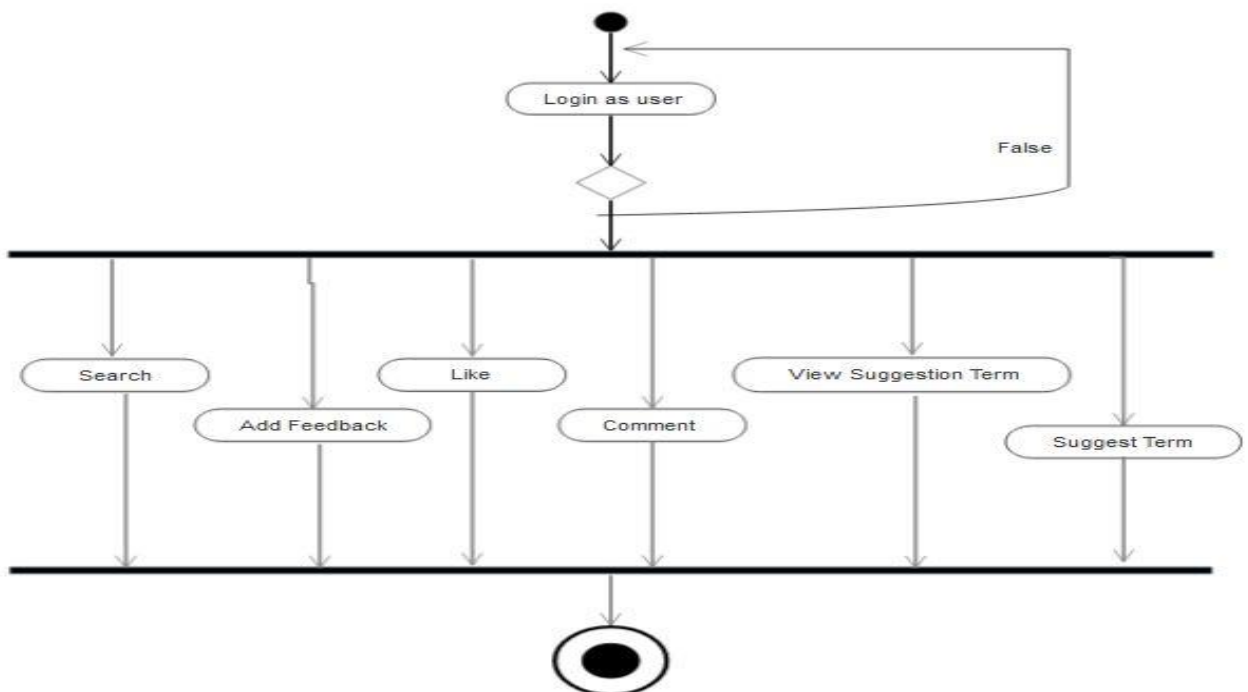


Figure 3.8: Activity diagram for user use case

3.2.2.4 Sequence Diagram

A sequence diagram is an interaction diagram which shows how processes operate with one another in which order and it shows how the messages are pass to the system.

Figure 3.9 diagram describes the use case communication between user and database (login and search).

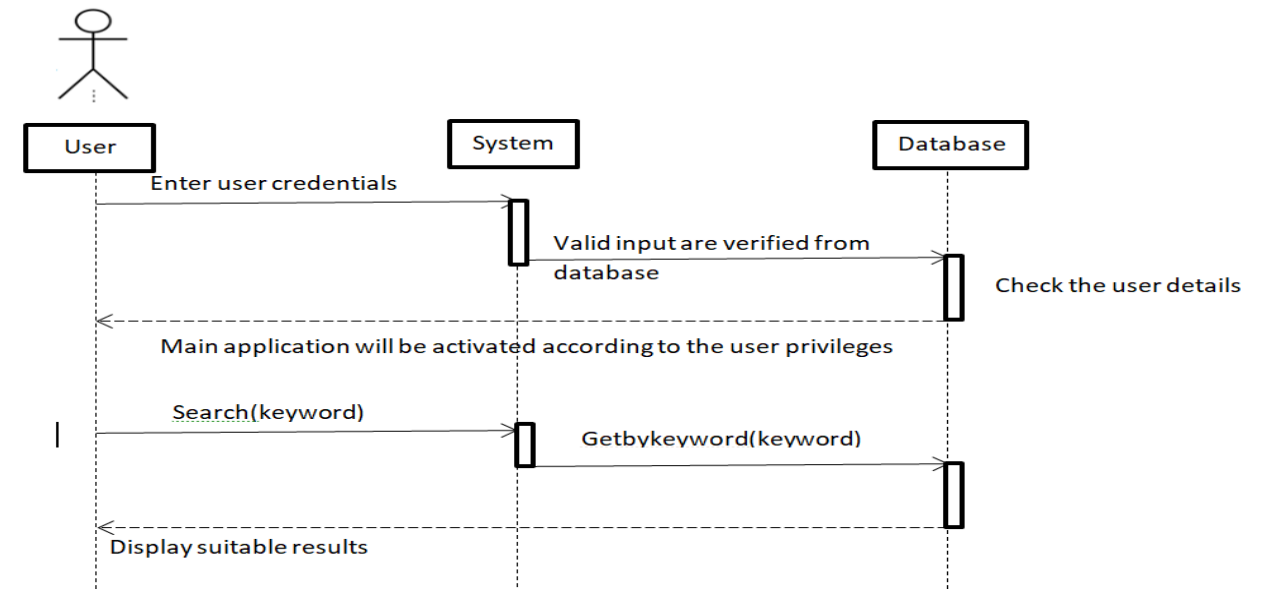


Figure 3.9: Sequence diagram

3.2.3 DATABASE DESIGN

Database design is completed through data modeling. Database design is used to specify the structure of business objects used in the client/server system. The database tables were normalized to 3rd normal form to avoid redundancies.

Database table structure explained as per table 3.3 to 3.11

Terms	
id (Primary Key)	Bigint (20)
Term	Varchar (100)
tamil_meaning	Varchar (100)
sinhala_meaning	Varchar (100)
suggested_by	Varchar (70)
suggested_date	Date
checked_by	Varchar (70)
accepted_date	Date
Votes	Int (11)
Comments	Text

Table 3.3: Terms – database table

User	
email (Primary Key)	Varchar(50)
first_name	Varchar(70)
last_name	Varchar(70)
Gender	Varchar(20)
date_of_birth	Date
Country	Varchar(50)
Qualification	Text
linked_in	Varchar(50)
short_bio	Text
Password	Text

Table 3.4: User – database table

Suggestions	
id (Primary Key)	Bigint(20)
Term	Varchar(50)
tamil_meaning	Varchar(50)
sinhala_meaning	Varchar(50)
suggested_by	Varchar(70)
suggested_date	Date
Status	Varchar(30)
Votes	Int(11)
Comments	Comments

Table 3.5: Suggestions – database table

Likesuggestion	
email (Primary Key)	Varchar(70)
term(Primary Key)	Varchar(100)
tamil_meaning(Primary Key)	Varchar(100)
sinhala_meaning(Primary Key)	Varchar(100)

Table 3.6: Like Suggestion – database table

Liketable	
email (Primary Key)	Varchar(70)
term_id (Primary Key)	Bigint(70)

Table 3.7: Like Table – database table

system_user	
email (Primary Key)	Varchar(50)
user_type	Varchar(30)

Table 3.8: System User – database table

user feedback	
id (Primary Key)	Bigint (11)
Date	Date
Feedback	Varchar (255)
Email	Varchar (50)

Table 3.9: User Feedback

tblcomment	
Comment_id (Primary Key)	Int (11)
Comment	Varchar (255)
Post_id	Int (11)
datetime	Date time
User_email	Varchar (50)

Table 3.10: Forum comments

tblpost	
post_id (Primary Key)	Int (11)
title	Varchar (100)
content	text
datetime	Date time
User_email	Varchar (50)

Table 3.11: Forum post

3.3 IMPLEMENTATION

This section consists of the implementation process of the system including implementation environment, implementation procedures, and structure of the system with selected user interfaces. Any reused modules will also be discussed here.

3.3.1 IMPLEMENTATION ENVIRONMENT

Development of the system was carried out using a personal laptop and the software were carefully chosen as in the Table 3.12. Most of the software and tools used during implementation were free and open source.

Main Language	
Programming Language	PHP
Database	MySQL
Software used for the implementation	
Code Development	Notepad ++
Database Management	XAMPP
Image editing software	Adobe Photoshop
Other	Notepad, Microsoft office (excel, word)

Table 3.12: Implementation Tools

3.3.2 IMPLEMENTATION PROCEDURE

All functional and non-functional requirements of this system were gathered at the first stage of the process. Considering the selected scope of the system and ‘Agile’ software development life cycle methodology was selected to implement this system.

3.3.3 USER INTERFACES

User interfaces of the system have been designed in a user friendly manner so it will help users to learn and understand the system fast and use it efficiently.

3.3.3.1 Sign Up

If any users not have any account in the system, they can register in to this system. Figure 3.10 shows the interface which will register new user to the system.

Welcome to Library Management System

First Name :

Last Name :

Gender:

Birth of date:

EMail :

Password: *Six or more characters*

Confirm Password:

Country :

Language:

Qualification:

linked In :

SHORT BIO:

Source

Styles

Format

Font

Size

d75nh8

Enter the code above here :

Can't read the image? [click here](#) to refresh

Figure 3.10: User registration interface

3.3.3.2 Login page

Users can login to the system by entering username and password. System can be accessed by two user types who are 'Admin/Secondary Admin' and 'Users'. According to the user type the privileges of this system will be enabled. Separate user names and password will be allocated to each user. When log in to the system user should provide the credentials in correct format. System will check username and password and if they are accurate the main menu of the system will be presented to user. If users provide invalid credentials, necessary error messages will be prompt by the system. Figure 3.11 shows the login page of the system.



Figure 3.11: Login page

3.3.3.3 Home Page

The home page provides the links to navigate easily through the system according to user privileges. Any user (after login) can vote, comment and listen the particular term available in the home page. Figure 3.12 shows home page of registered user.



Figure 3.12: User Home Page

Figure 3.13 shows home page of Administrator.



Figure 3.13: Administrator Home Page

3.3.3.4 Change user password

Users can change their password once they are successfully logged in to the system. Once the password changed user can use this new password from the next log-in session.

3.3.3.5 Change Account Setting

Users can change their account details once they are logged in to the system. Figure 3.14 shows the Account setting.

Change Password	
First name:	<input type="text" value="narmatha"/>
Last name:	<input type="text" value="murugaiah"/>
email:	<input type="text" value="smnarmatha@yahoo.com"/>
Gender:	<input type="text" value="Female"/>
Language:	<input type="text" value="English"/>
Country:	<input type="text" value="Sri Lanka"/>
Date of Birth:	<input type="text" value="1988-08-07"/>
Qualification:	<input type="text" value="B.SC(special) computer science"/>
Linked_In:	<input type="text" value="https://www.linkedin.com/in/narmathamurugaiah/"/>
Short_bio:	<input type="text" value="
<p> I am a computer programmer</p>"/>
<input type="button" value="Save Changes"/>	

Figure 3.14: Account Setting

3.3.3.6 Search

Search the words available in the database will be covered by this function. Searching is allowed to all type of users. Any user can search English, Sinhala or Tamil word and find out the meaning of the particular word in any of the language, wanted or according to the requirement. Search bar will check the spelling. That means if the user type the wrong spelling in the searching bar, the correct word and relevant meaning words will display in the search bar below site. Figure 3.15 shows the searching function.

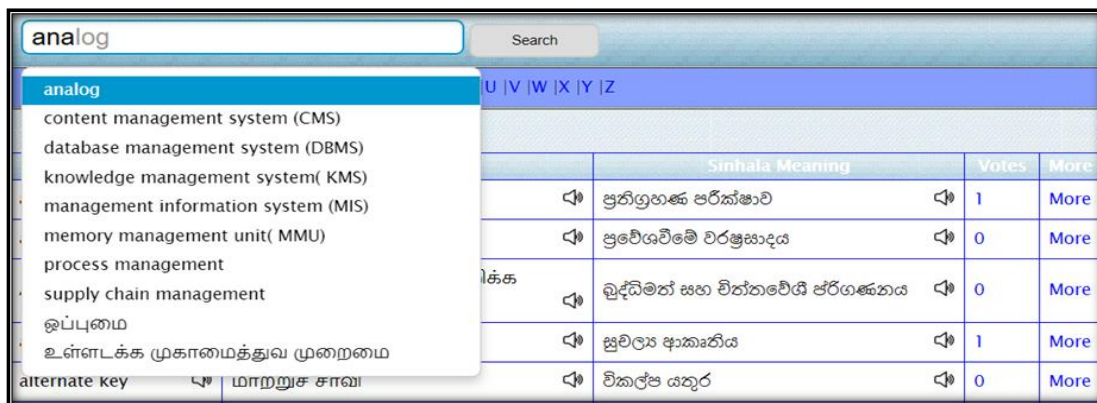


Figure 3.15: Optimize Search

3.3.3.7 Suggest Term

Registered users can suggest the similar meaning of the already available word in the glossary or can suggest the new word. Any registered user can view the user's suggestion and they can vote or comment the particular suggestion. Figure 3.16 shows the users suggestions.

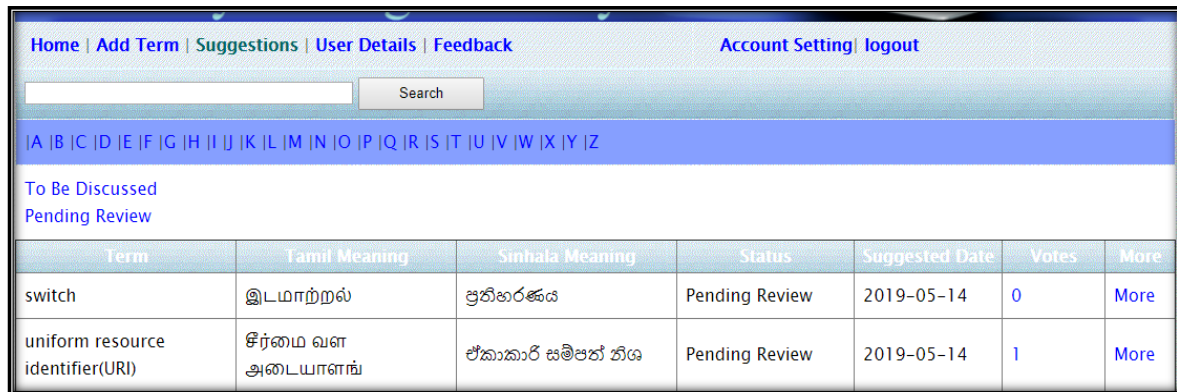


Figure 3.16: Users Suggestion

The suggestion word will appear in the website after the administrator's approval. That means only the administrator can change the status of the particular suggestion. If the status is accepted then the particular suggestion will add in the terms database. Figure 3.17 shows the administrator's approval.

To Be Discussed
Pending Review

0 votes like

Term:	switch
Tamil Meaning:	சுவிட்ச்
Sinhala Meaning:	සවිච්චය
Status:	Pending Review
Suggested by:	kumuthini
Suggested Date:	2019-05-14
Comments:	
Add Comments:	<div style="border: 1px solid #ccc; padding: 5px;"> <div style="border-bottom: 1px solid #ccc; margin-bottom: 5px;"> Source Format Font Size </div> <div style="border-bottom: 1px solid #ccc; margin-bottom: 5px;"> Styles Format Font Size </div> <div style="border-bottom: 1px solid #ccc; margin-bottom: 5px;"> </div> </div>
Change Status:	<div style="border: 1px solid #ccc; padding: 2px;"> To Be Discussed accepted Change status </div>

Figure 3.17: Administrator's approval

3.3.3.8 Feedback

User (account available user) can add their opinions and discussion into the feedback site. The administrator can read and understand the forum and according to the forum administrator can add the new word.

A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z

Add your feedback here:

Date	Feedback	
2019-07-08	This system is very useful for translatorsby kumuthini	
2019-07-09	goodby Sritharan	More

Logged in as Sritharan Murugaiah

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Figure 3.18: Feedback

3.3.3.9 Term Addition

Only administrator can add the new terms. Administrator can upload the bulk of term in a CSV file format.

When you upload a csv file...values must be in this order:-Term,Tamil_meaning, Sinhala_meaning.

Filename: No file chosen

Term :	<input type="text"/>
Tamil Meaning :	<input type="text"/>
Sinhala Meaning :	<input type="text"/>
	<input type="button" value="Add Term"/>

Logged in as narmatha murugaiah

Figure 3.19: Term Addition

3.3.3.10 Reasons for the selection of CSV format

- 1) Multi language is used in this project. So easy for store multi language without any trouble
- 2) This is widely used file format that stores tabular data as plain text.
- 3) Its popularity viability are due to the fact that a great deal of programs and applications support for the CSV files, specially import/export format.
- 4) CSV keeping all special characters and foreign symbols.

3.3.3.11 Procedure/step for convert Excel to CSV UTF-8 (Multi Language) - According to Reference [3]

- 1) In your Excel worksheet, go to *File > Save As*.
- 2) Name the file and choose **Unicode Text (*.txt)** from the drop-down list next to "Save as type", and then click *Save*.

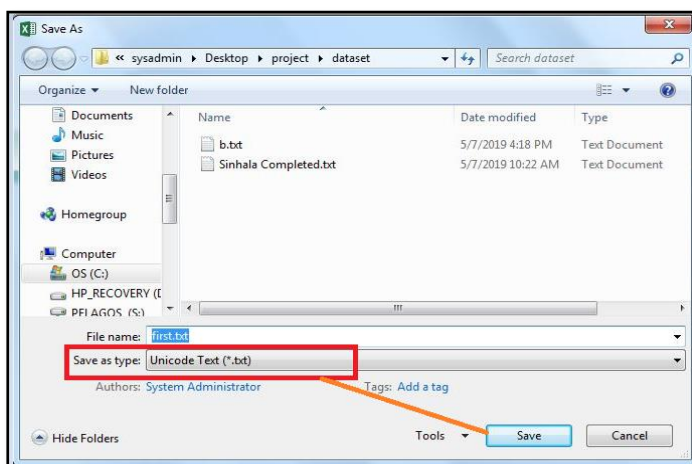


Figure 3.20: Save excel work sheet – Unicode format

Then Click yes

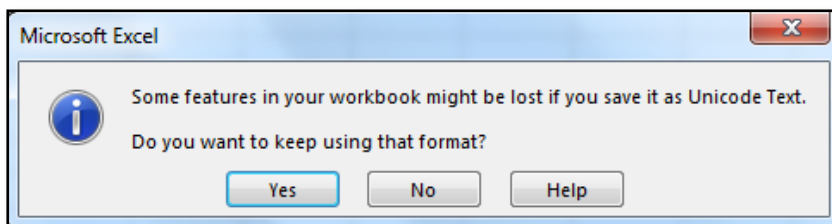


Figure 3.21: Confirm save

- 3) Open the unicode .txt file using preferred text editor, for example Notepad.
- 4) Since our unicode text file is a tab-delimited file and we want to convert Excel to CSV (comma-separated) file, it is need to replace all tabs with commas. Select a tab character, right click it and choose **Copy** from the context menu, or simply press CTRL+C as shown in the screenshot below.

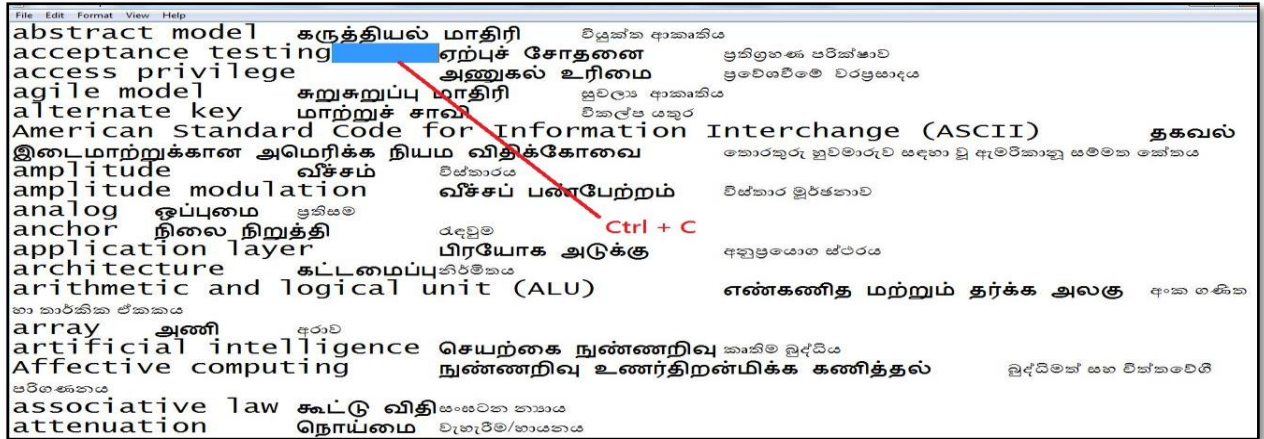
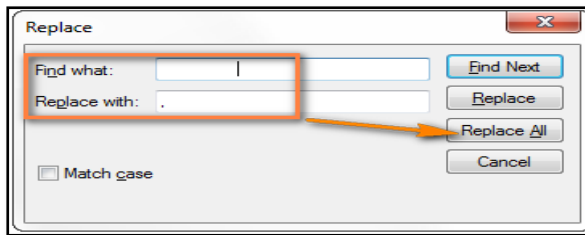


Figure 3.22: Convert tab delimited file to comma separated file

- 5) Press CTRL+H to open the *Replace* dialog and paste the copied tab (CTRL+V) in the *Find what* field. When done this, the cursor will move rightwards indicating that the tab was pasted. Type a comma in the *Replace with* field and click **Replace All**



After replace all tabs with commas, In Notepad, the resulting file should look similar to this:

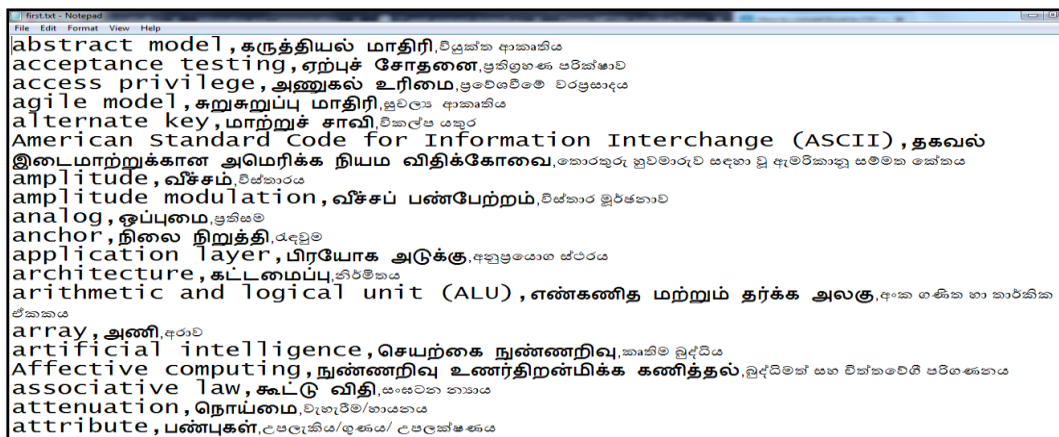


Figure 3.23: Comma separated file

- 6) Click *File > Save As*, enter a file name and change the encoding to **UTF-8** and change the .txt extension to **.csv**. Then click the *Save* button

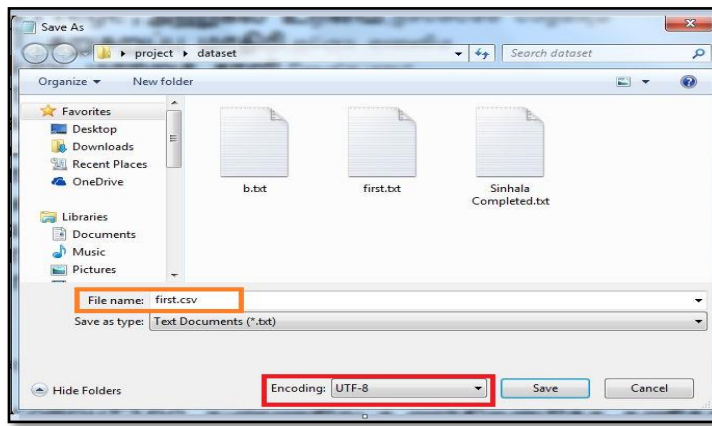


Figure 3.24: CSV file

- 7) Now the data is converted in to CSV format.
- 8) Import the CSV file data into MySQL database using PHP.

3.3.3.12 Users Details

Administrator can view the registered user’s details and can change the user type (user / secondary admin). Figure 3.25 shows the user’s details.

FirstName	LastName	Email	Country	Language	Qualification	Add User_Type
kumuthini	Jeganthan	kumuthini@yahoo.com	Sri Lanka	Tamil	B/A degree	More
narmatha	murugaiah	smnarmatha@yahoo.com	Sri Lanka	English	B.SC(special) computer science	More

Logged in as [narmatha murugaiah](#)

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Figure 3.25: User Details

Click the ‘more’ link then administrator can change the user type. Figure 3.26 shows the change user type.

First name:	kumuthini
Last name:	Jeganthan
email:	kumuthini@yahoo.com
Gender:	Female
Language:	Tamil
Country:	Sri Lanka
Date of Birth:	1979-10-12
Qualification:	B/A degree
Linked_In:	
Short_bio:	
User Type:	user
Change User_Type:	<input type="text" value="Secondary Admin"/> <input type="text" value="User"/> <input type="button" value="Change type"/>

Logged in as [narmatha murugaiah](#)

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Figure 3.26: Change User Type

3.3.3.13 Forum

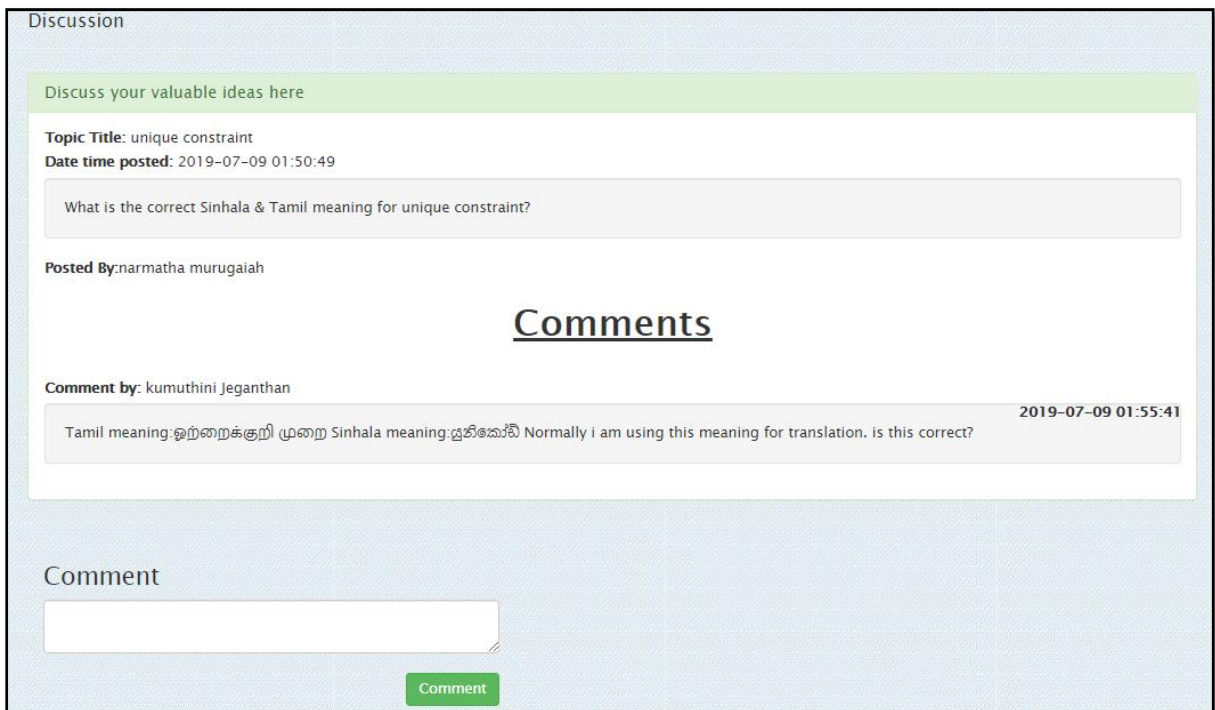
Only administrator can post (create) a Question (title) for Forum. Registered users can show others comments and they can put a comment for a particular forum. Figure 3.27 shows post a question for forum.



The screenshot shows a form titled "Terms for discussion". It contains two input fields: "Add Terms" and "Content". Below the "Content" field is a green "Post" button and a blue "Close" link.

Figure 3.27: Forum creation

Figure 3.28 shows post a comment for a particular forum.



The screenshot shows a forum discussion page. At the top, it says "Discussion" and "Discuss your valuable ideas here". The topic title is "unique constraint" and the date time posted is "2019-07-09 01:50:49". The question is "What is the correct Sinhala & Tamil meaning for unique constraint?". The post is by "narmatha murugalah". Below the question, there is a section titled "Comments". A comment by "kumuthini Jeganthan" is shown, dated "2019-07-09 01:55:41". The comment text is "Tamil meaning:ஒற்றைக்குறி முறை Sinhala meaning:සුද්ධකෝට්ඨි Normally i am using this meaning for translation. is this correct?". At the bottom, there is a "Comment" input field and a green "Comment" button.

Figure 3.28: Forum Discussion

CHAPTER 4: EVALUATION

Evaluation and Testing of a software product includes testing the whole system by developers and end-users to make sure the system provides the required functionality and the system meets all the client's requirements.

4.1 TESTING PROCESS AND TEST PLAN

A test plan is an approach which contains the scope, resources and schedule of planned testing activities. This is a practice used to analyze and find the defects in a software system. Test items, features to be tested, the testing tasks and any risks requiring contingency planning will be identified by a test plan. This is used to make sure that a unit can function both effectively and efficiently.

This system was tested thoroughly and a four-stage testing plan was conducted to make sure the accuracy of functionalities. Verification & validation was also done at every stages of system development.

4.2 TESTING STAGES

Throughout the development life cycle of the software, there are different levels of testing methods to be used to ensure the software is working without any issue.

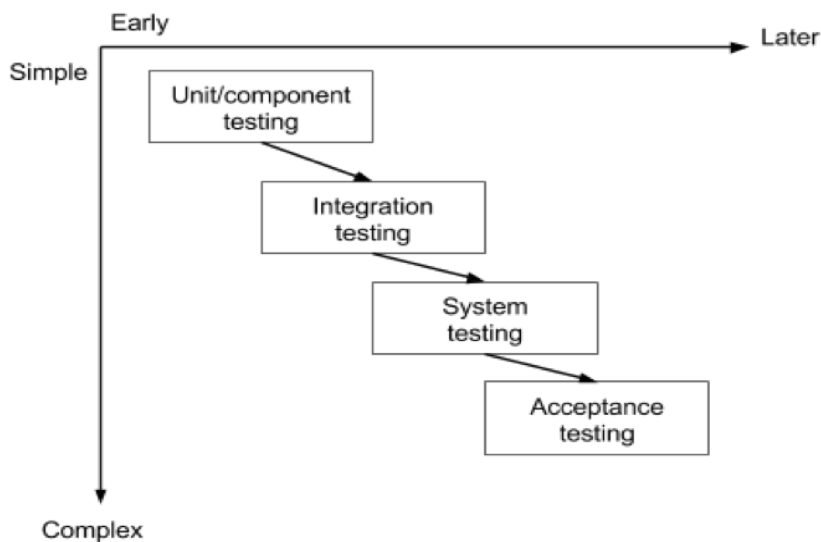


Figure 4.1: Testing Stages

4.2.2 UNIT TESTING

In this stage each individual component of the system will be tested. The purpose of unit testing is to separate each component of the system and check whether the individual units are performing accurately. Test execution happens after the module completion and all of those should meet the particular area of software requirements.

4.2.3 INTEGRATED TESTING

Once two or more modules are integrated, then test execution happens and those should make sure integrated modules are working as aspect after the integration. The main purpose of integration testing is to check for any errors after integrating individual units and to confirm the expected functionality of the modules.

4.2.4 SYSTEM TESTING

System testing happens after the completion of the system. System testing is a stage where the complete, integrated system is tested to evaluate the system’s fulfillment with the requirements.

4.2.5 ACCEPTANCE TESTING

This is the final stage in the testing process before the system is accepted for operational use in real environment. Acceptance testing is also known as user acceptance testing (UAT). Acceptance testing is performed by the actual users. This is performed to obtain the confirmation that the system meets all the requirements as agreed. Acceptance testing will be useful to identify any problems which may occur while running in the actual environment using actual data. This will help to ensure whether the performance of the system is acceptable for the real use.

Client certification letter is attached Appendix D

4.3 TEST DATA AND TEST RESULTS

Test data can be defined as a set of data used to test the functionality of the system. Test data were selected based on specific requirements to check the accuracy of the functions and to check the system’s ability to validate data and prompt suitable error messages. Table 4.1 shows the test case for Test case ID-1 which was used to test the login form when performed with valid credentials.

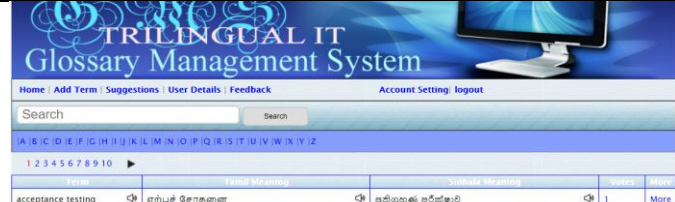
Test case ID		1	
Tested Component		Login Page	
Module Name		Login Module	
Test Case		Login with valid credentials	
Test case Description		Enter valid username and allocated password to login	
Expected Output		User should be allowed to access Home page	
Step	Actions & test data	Actual Output	Status
1	Access login page		Pass
2	Enter a valid username & password		
3	Click on login button		

Table 4.1: Login with valid credentials- test case

Table 4.2 shows the test case for Test case ID-2 which was used to test the login form when performed with invalid E-Mail address format.

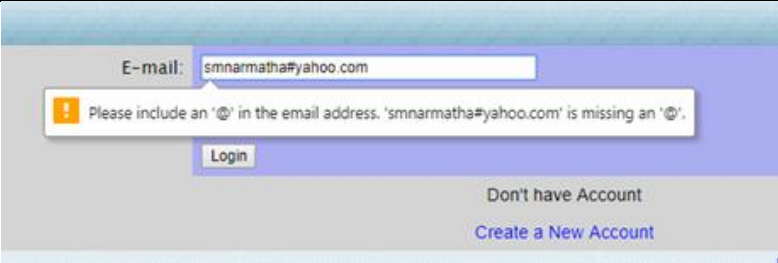
Test case ID	2		
Tested Component	Login Page		
Module Name	Login Module		
Test Case	Login with Invalid E-Mail Address format		
Test case Description	Enter incorrect username (e-mail) and allocated password to login		
Expected Output	System should provide a suitable error message		
Step	Actions & test data	Actual Output	Status
1	Access login page		Pass
2	Enter an incorrect (e-mail)username & a valid password		
3	Click on login button		

Table 4.2: Login with invalid username- test case

Table 4.3 shows the test case for Test case ID-3 which was used to test the login form when performed with blank username field.

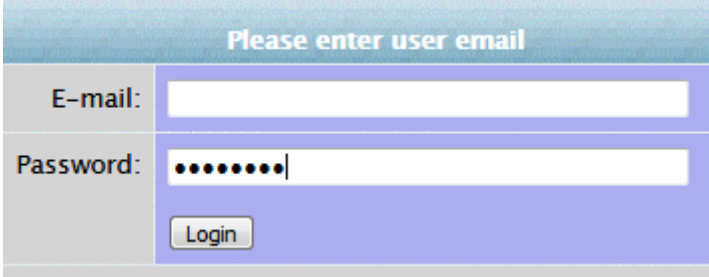
Test case ID	3		
Tested Component	Login Page		
Module Name	Login Module		
Test Case	Login with Blank username		
Test case Description	Keep username field blank and enter password and login		
Expected Output	System should provide a suitable error message		
Step	Actions & test data	Actual Output	Status
1	Access login page		Pass
2	Keep username field blank and only enter a valid password		
3	Click on login button		

Table 4.3: Login with invalid password- test case

Table 4.4 shows the test case for test case ID – 4 which was used to test the login form when performed with invalid username or password.


Test case ID	4		
Tested Component	Login Page		
Module Name	Login Module		
Test Case	Login with invalid username or password		
Test case Description	Enter incorrect username or password		
Expected Output	System should provide a suitable error message		
Step	Actions & test data	Actual Output	Status
1	Access login page		Pass
2	Enter incorrect username or password		
3	Click on login button		

Table 4.4: Login with invalid username or password

Table 4.5 shows the test case for test case id – 5 which was used to test the login form when performed with blank password field.


Test case ID	5		
Tested Component	Login Page		
Module Name	Login Module		
Test Case	Login with blank password		
Test case Description	Keep valid username and blank password field		
Expected Output	System should provide a suitable error message		
Step	Actions & test data	Actual Output	Status
1	Access login page		Pass
2	Enter a valid username and keep the password field blank		
3	Click on login button		

Table 4.5: Login with blank password

Please refer appendix – B for more test cases with test results.

4.4 EVALUATION

Evaluation is a process that critically examines whether the project was satisfying the potential user's objectives or not. It involves collecting and analyzing information about a programme to improve its effectiveness and make judgments about a programme.

There are several methods of perform an evaluation. For this project a questioner was used to gather user evaluation of this system. The system has two different users. 1) Admin 2) users (registered users).

The system was demonstrated to the system users and feedback was gathered using the following questionnaire. This questionnaire is focused key areas, concept, interfaces and usefulness of the system.

4.5 USER EVALUATION

User evaluations are conducted to evaluate a system by testing it with actual users and actual data. User Evaluation focuses on how well users can study and use a system to achieve their goals. Acceptance testing which is the last stage of the testing process will be done during user evaluation.

A user evaluation form was provided to each of them to capture user's experience on the system and to gather any comments which were very help in improving the system.

Results obtained through the user evaluation were satisfactory analysis of each scenario is given below.

Please refer Appendix – A for user evaluation form.

4.5.1 ANALYSIS OF THE QUESTIONNAIRE

4.5.1.1 User friendliness of the system interfaces

Figure 4.2 demonstrates the user friendliness of this system according to the actual user's feedback.

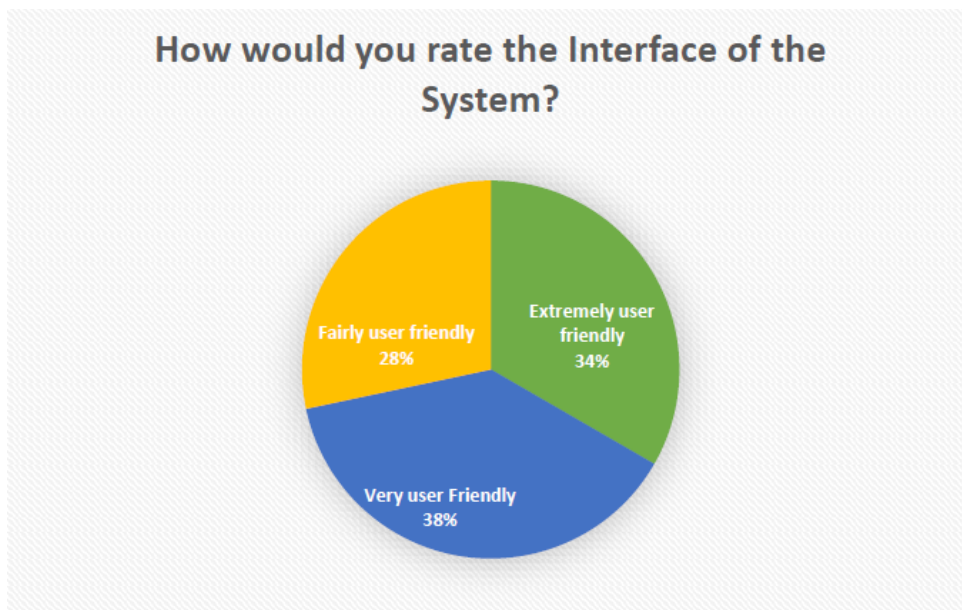


Figure 4.2: Rate the Interface

According to the above evaluation on the friendliness of user interfaces it could be realized that interfaces are built in a user friendly manner.

4.5.1.2 Speed of software

Figure 4.3 demonstrates the speed of this system according to the actual user's feedback.

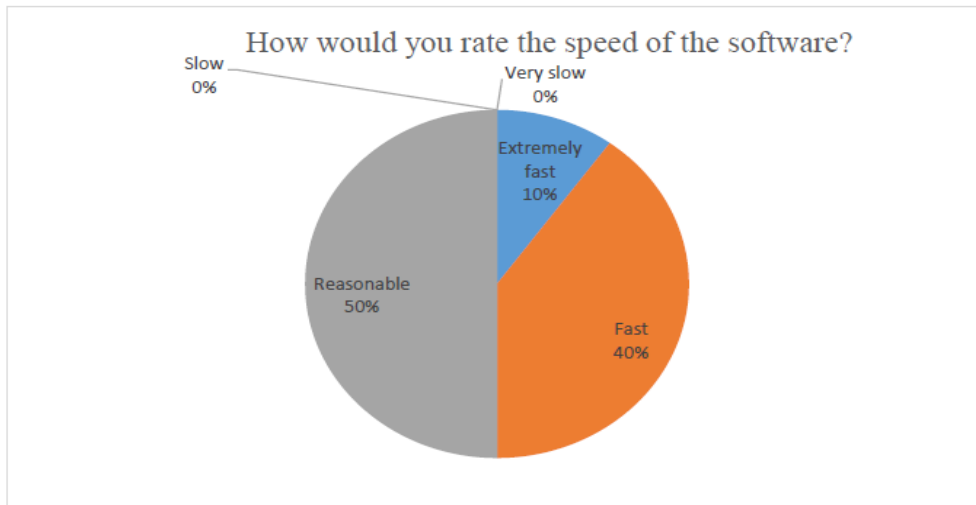


Figure 4.3: Speed of The Software

According to the above evaluation on the speed of user system it could be realized that the system is performing well enough.

Please refer Appendix C for further analysis on questionnaire given to users.

CHAPTER 5: CONCLUSION

Introduction

This last chapter will review the objectives of the system, how they have been achieved and the future enhancements of the developed system.

5.1 RESULT IN RESPECT OF THE OBJECTIVES

When revising the objectives of “Trilingual IT Glossary Management System”, the following all scope mentioned objective have been achieved in the project.

This project was to provide an online platform to store and retrieve the data in an effective way. The system allows different functions separately for different users according to their privileges of the system.

Interact with the users to like, comment, add feedback and listen the particular term (like social media) and collect the valuable data and information from expert users - linguist.

Optimize searching is a useful feature has been developed in this system. Users can search any IT related trilingual word and find out the meaning of the particular word in any of Sinhala, Tamil and English languages according to their requirements.

The user wise security levels are being applied to this system. Unauthorized users are restricted to execute irrelevant process/functions. Password stored in the database in an encrypted format. By doing this the high level of system security can be achieved.

If the users provide invalid credentials, necessary error message will be prompt by the system. A variety of notifications, error and warning messages will be displayed as pop up screens to the users between the processes of this system.

In summary, “Trilingual IT Glossary Management System” provides a computerized and a centralized system. By analyzing the overall test results and the user feedback gathered at the user evaluation, the developed “Trilingual IT Glossary Management System” can be considered as a satisfactory level project which meets all the expected requirements of our client as well as the standards of the MIT degree program.

5.2 PROBLEMS ENCOUNTERED

Few issues encountered during the ‘requirements gathering’ process as it was bit difficult to speak to each user during their working time. It is to be stated that more days and time taken to gather all necessary details and requirements than the allocated period.

The system was initially discussed to implement in a centralized system. But due to limitations in providing resources it was decided to provide one personal computer. Then the system was designed and implemented to work as a standalone application which will operate in a single computer.

Few issues encountered during the development process, the lack of knowledge regarding the selected development tools and languages such as PHP, MySQL, CSS and Java script. Further, more time utilized for learning the technology to complete the task. Online video tutorials and books were used to capture the essential level of knowledge.

5.3 LESSONS LEARNT

Implementing an individual project with the guidance of the MIT degree was actually valuable. Achieve the practice in developing a system as an individual and acquired a clear and confident knowledge of all phases. Starting from the feasibility studies, to the end of development this process gave incomparable experience in many ways. I have obtained experience for selecting a suitable project, preparing proposal, gathering all functional and non-functional requirements from different stake holders, preparing questionnaires, conduct interview, analyzing the feasibility etc. could be achieved with this project.

This project gave a chance to test and implement most important theories and technologies learnt throughout the MIT degree programme. It also facilitated to learn very interesting new and updated technologies in order to improve the system performance. Furthermore working on the project encourages me to improve technical skills as well as intellectual skills by collaborating with many individuals from collective fields. Proper time management and planning is very important aspects to learn out during this project and to carry out the work according to the schedule and deadline. Also this project guided me on writing a report in a standard manner to develop technical and non-technical documents for a system.

5.4 FUTURE ENHANCEMENTS

The “Trilingual IT Glossary Management System” was completed according to the scope and the time. However the system can be improved further for a greater product. Due to the limitations of the time and the scope of the individual project of the MIT degree program only a considerable scope was accepted covered but future improvements for this product can be suggested as follows for anyone who will be interested in expanding the system.

This system is working as a standalone system due to the resource limitation. But this is developed as a web based system which can be accessible from anywhere. So this system needs to centralize (hosting facility) for easy to access by all the people. In addition a mobile version of a system (a mobile app) can be suggested as another improvement.

5.5 SUMMARY

This chapter summarizes the critical analysis of the work carried out throughout the process and identifies learnt, limitations of the current work and future improvements.

LIST OF REFERENCES

- [1] E. Drkušić, "All About Indexes, Part 2: MySQL Index Structure and Performance," *vertabelo*, 04-Aug-2016. [Online]. Available: <https://www.vertabelo.com/blog/technical-articles/all-about-indexes-part-2-mysql-index-structure-and-performance>.
- [2] "Department of Official Languages." [Online]. Available: <http://www.languagesdept.gov.lk/>.
- [3] S. Cheusheva, "How to convert Excel to CSV and export Excel files to CSV UTF-8 format," *Excel tutorials, functions and formulas for beginners and advanced users - Ablebits.com Blog*, 24-Apr-2014. [Online]. Available: <https://www.ablebits.com/office-addins-blog/2014/04/24/convert-excel-csv/>.

APPENDIX A: USER EVALUATION FORM

User evaluation form/Questionnaire

Designation:

Please tick on the appropriate box

Age in years:

18-25 26-30 31-40 40-50 Above 50

Education Level:

G.C.E O/L G.C.E A/L Degree Holder
 Master Degree Other

Working Experience:

Less than 1 year 1-2 Years 2-5 years
 Over 5 years

1. How would you rate the interfaces of the system?

- Extremely user friendly
- Very user friendly
- Fairly user friendly
- Less user- friendly
- Not at all user friendly

2. How would you rate the speed of the software?

- Extremely fast
- Fast
- Reasonable
- Slow
- Very slow

3. Were the error messages helpful while using the system?

- Yes they were very helpful
- Sometimes they were helpful
- No

4. Were the error messages displayed at the appropriate places?

- Yes
- Sometimes
- No

5. How would you feel about accuracy of given information through the system?

- Very accurate
- Not accurate

6. Was the information in the software application well organized?

- Yes
- Up to some extent
- No

7. How would you rate the reading of characters on the screen

- Good character size
- Small
- Too small
- Too large

8. How would you rate the colors used in the system? Were the used colors disturbing or helpful?

- Colors are ok
- Colors are not ok
- Need to improve
- No idea

9. Is it easy to navigate through the system?

- Yes
- No
- No idea

10. Are you satisfied with the performance of software?

- Extremely satisfied
- Very satisfied
- Fairly satisfied
- Slightly dissatisfied
- Very dissatisfied

11. How would you rate the entire system?

- Excellent
- Very good
- Good except few issues
- Need to improve
- Poor/difficult to use

12. Any suggestions to improve our software?

Date:

APPENDIX B: TEST DATA AND TEST RESULTS

Table 5.1 shows the test case for test case id – 6 which was used to test the Sign up form when performed with blank Name field.


Test case ID		6	
Tested Component		Sign up	
Module Name		Sign up Module	
Test Case		Sign up with Blank username	
Test case Description		Create new account with blank username	
Expected Output		System should provide a suitable error message	
Step	Actions & test data	Actual Output	Status
1	Access Sign up page		Pass
2	Create new account with blank username		
3	Click on submit button		

Table 5.1: Create new account with blank username – Sign Up form

Table 5.2 shows the test case for test case id – 7 which was used to test the Sign up form when performed with Invalid E-Mail field.

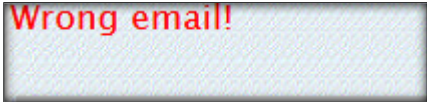
Test case ID		7	
Tested Component		Sign up	
Module Name		Sign up Module	
Test Case		Sign up with Invalid E-Mail address	
Test case Description		Create new account with Invalid E-Mail address	
Expected Output		System should provide a suitable error message	
Step	Actions & test data	Actual Output	Status
1	Access Sign up page		Pass
2	Create new account with Invalid E-Mail address		
3	Click on submit button		

Table 5.2: Invalid E-Mail address – Sign Up form

Table 5.3 shows the test case for test case id – 8 which was used to test the Sign up form when performed with the password and confirm password is not much.

Test case ID		8	
Tested Component		Sign up	
Module Name		Sign up Module	
Test Case		Sign up with the password and confirm password is not much	
Test case Description		Create new account with password and confirm	

		password is not much	
Expected Output		System should provide a suitable error message	
Step	Actions & test data	Actual Output	Status
1	Access Sign up page		Pass
2	Create new account with password and confirm password is not much		
3	Click on submit button		

Table 5.3: Password and confirm password is not much – Sign Up form

Table 5.4 shows the test case for test case id – 9 which was used to test the Sign up form when performed with Invalid captcha code.

Test case ID		9	
Tested Component		Sign up	
Module Name		Sign up Module	
Test Case		Sign up with Invalid captcha code	
Test case Description		Create new account with Invalid captcha code	
Expected Output		System should provide a suitable error message	
Step	Actions & test data	Actual Output	Status
1	Access Sign up page		Pass
2	Create new account with Invalid captcha code		
3	Click on submit button		

Table 5.4: Invalid captcha code – Sign Up form

Table 5.5 shows the test case for test case id – 10 which was used to test the Change Password form when performed with Invalid old password.

Test case ID		10	
Tested Component		Change Password	
Module Name		Account Setting Module	
Test Case		Change Password with Invalid old password	
Test case Description		Change the Password with Invalid old password	
Expected Output		System should provide a suitable error message	
Step	Actions & test data	Actual Output	Status
1	Access Account setting page		Pass
2	Change Password with Invalid old password		
3	Click on submit button		

Table 5.5: Invalid old password -Change Password form

Table 5.6 shows the test case for test case id – 11 which was used to test the Change Password form when performed with the new password and confirm password is not much.

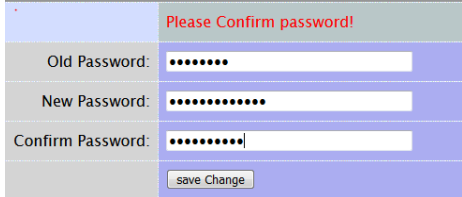
Test case ID		11	
Tested Component		Change Password	
Module Name		Account Setting Module	
Test Case		Change password with the invalid new password	
Test case Description		Change password with new password and confirm password is not much	
Expected Output		System should provide a suitable error message	
Step	Actions & test data	Actual Output	Status
1	Access Sign up page		Pass
2	Create new account with password and confirm password is not much		
3	Click on submit button		

Table 5.6: Invalid new password- Change Password form

APPENDIX C: ANALYSIS OF THE QUESTIONNAIRE

Figure 5.1 demonstrates the helpful of error messages while using the system according to the actual user's feedback

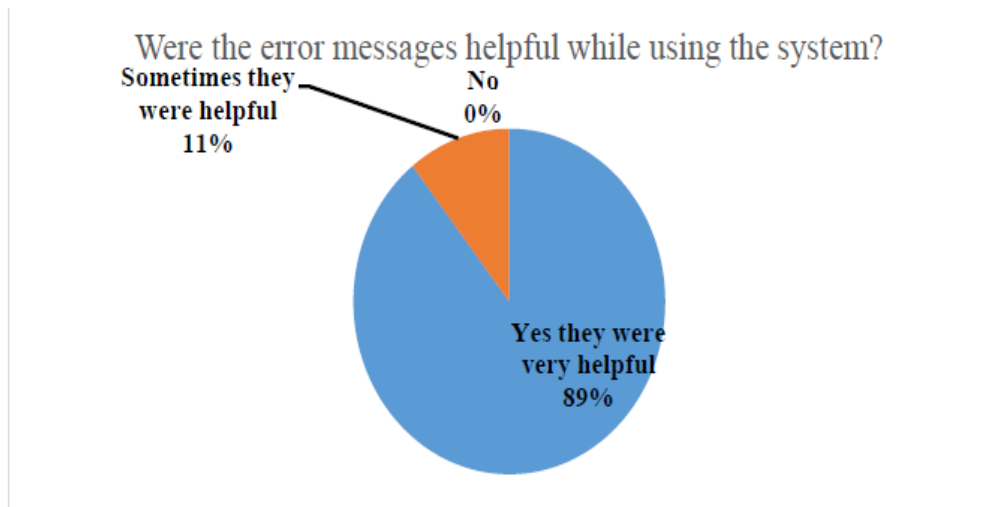


Figure 5.1: Helpful of error message

Figure 5.2 demonstrates the error messages displayed at the appropriate places while using the system according to the actual user's feedback

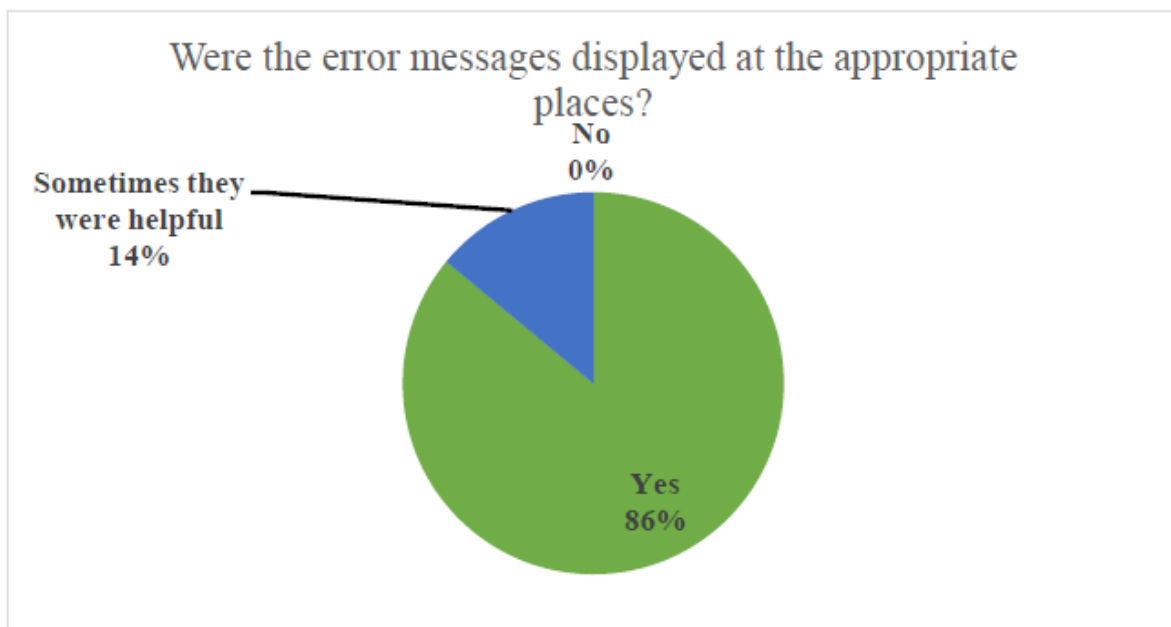


Figure 5.2: Error messages displayed at the appropriate places

Figure 5.3 demonstrates the accuracy of given information through the system according to the actual user's feedback.

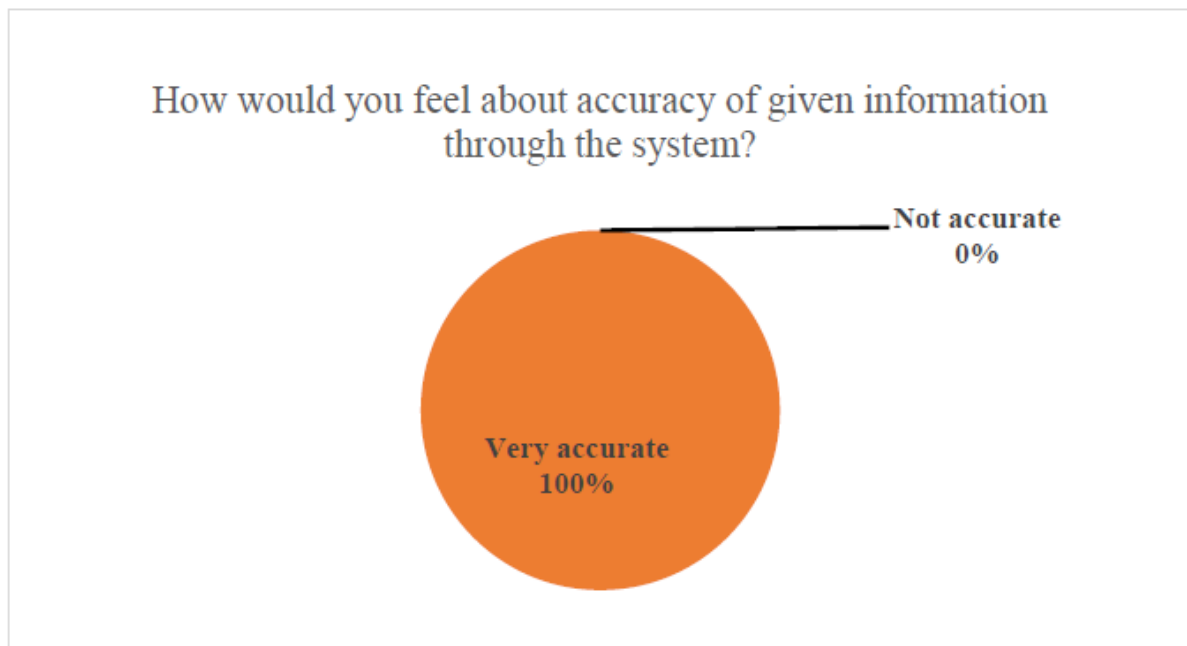


Figure 5.3: Accuracy of information

Figure 5.4 demonstrates the information in the software application according to the actual user's feedback.

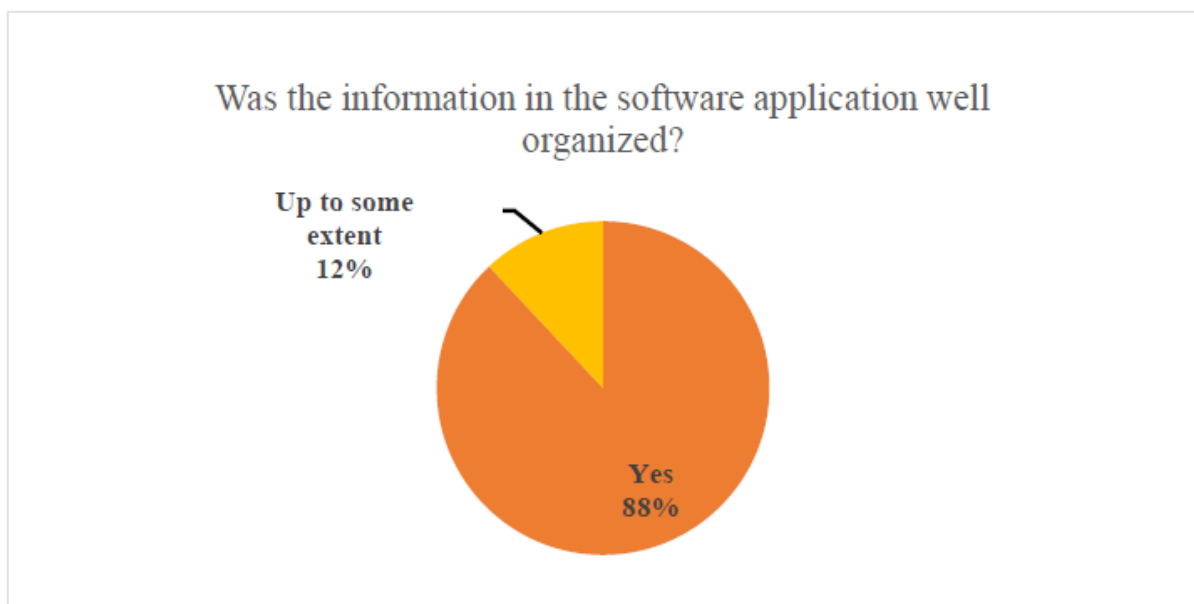


Figure 5.4: Information in the software application

Figure 5.5 demonstrates the reading of characters on the screen according to the actual user's feedback.

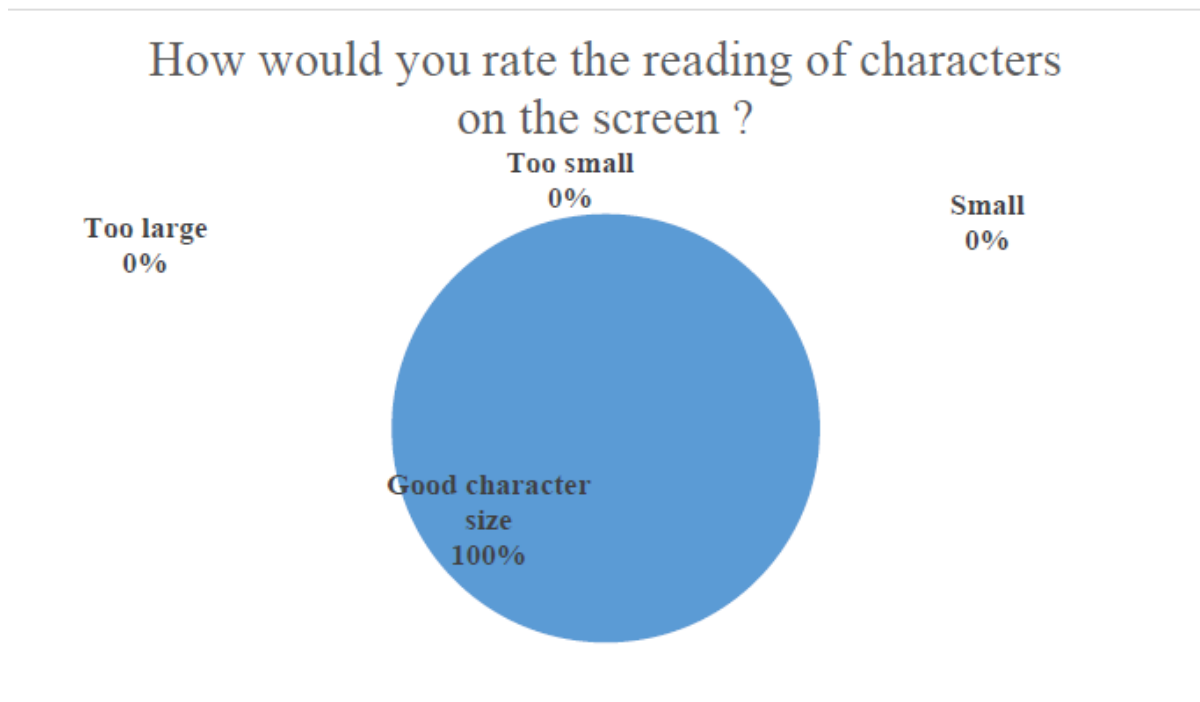


Figure 5.5: Reading of characters on the screen

Figure 5.6 demonstrates the colors used in the software according to the actual user's feedback.

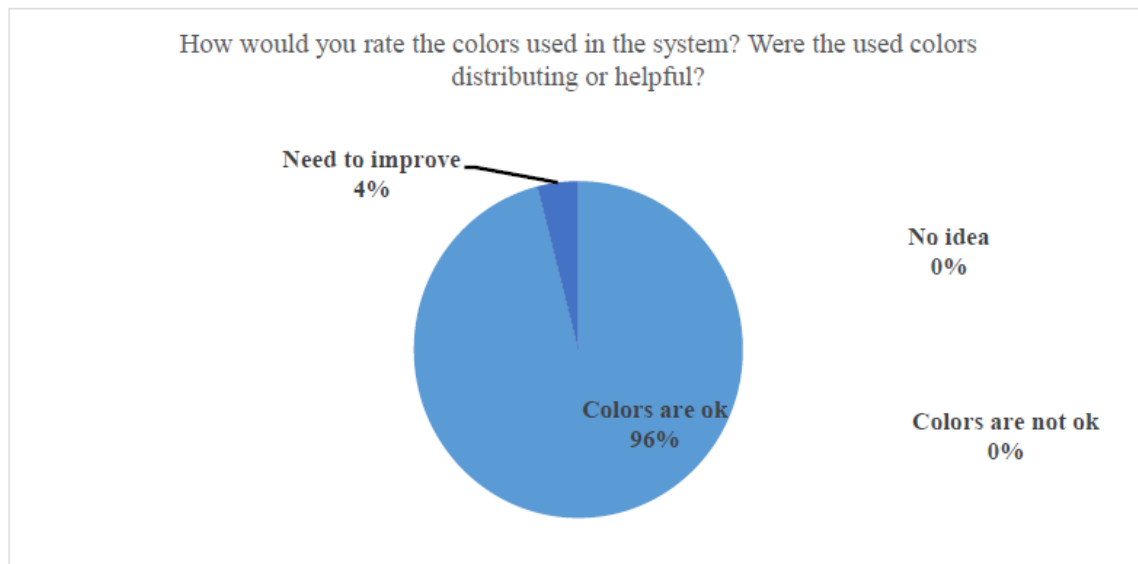


Figure 5.6: Colors used in the software

Figure 5.7 demonstrates navigation of this system according to the actual user's feedback.

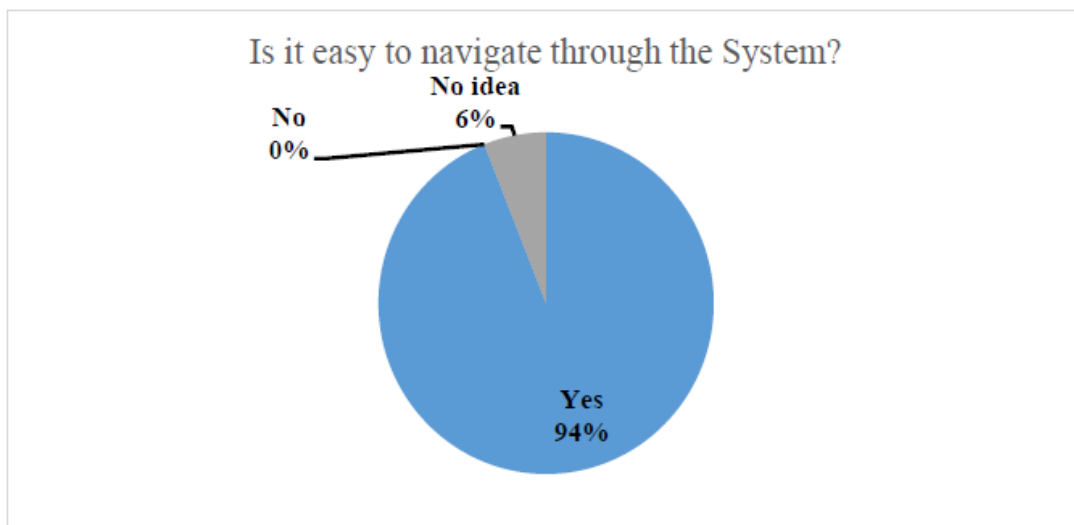


Figure 5.7: Navigation of this system

Figure 5.8 demonstrates the performance of software according to the actual user's feedback.

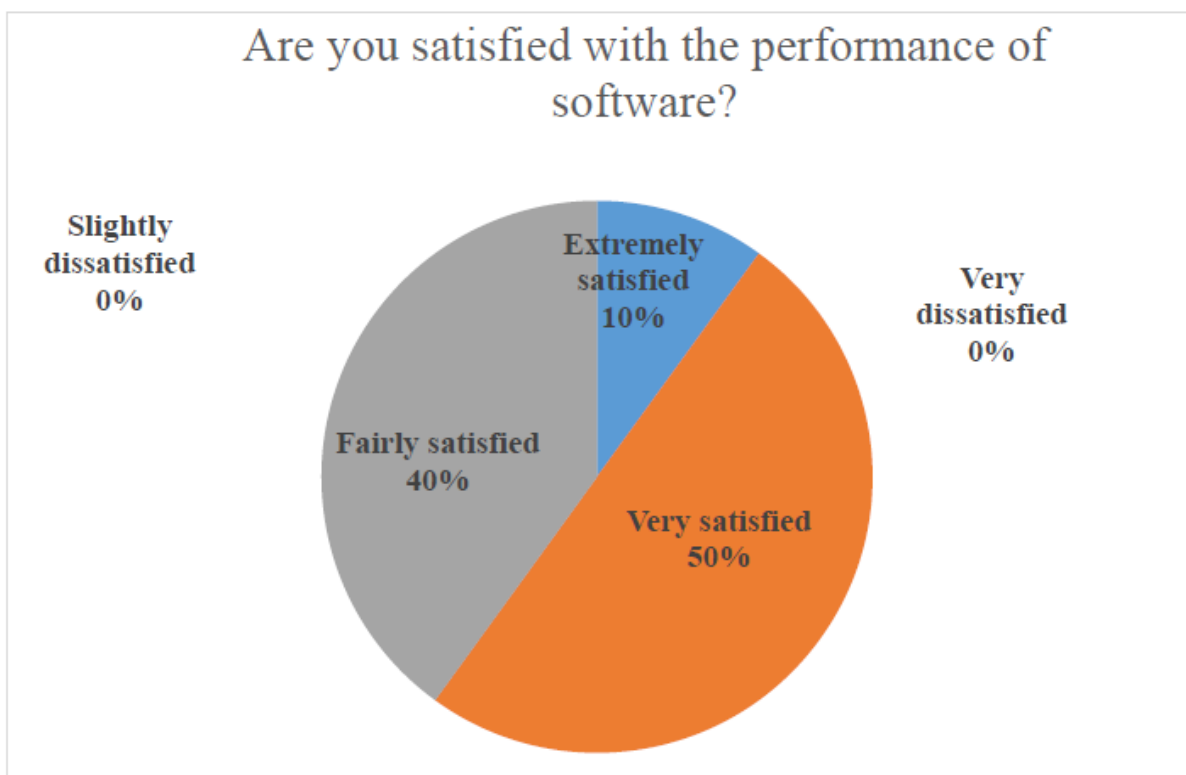


Figure 5.8: Performance of software

Figure 5.9 demonstrates the rate of the entire system according to the actual user's feedback.

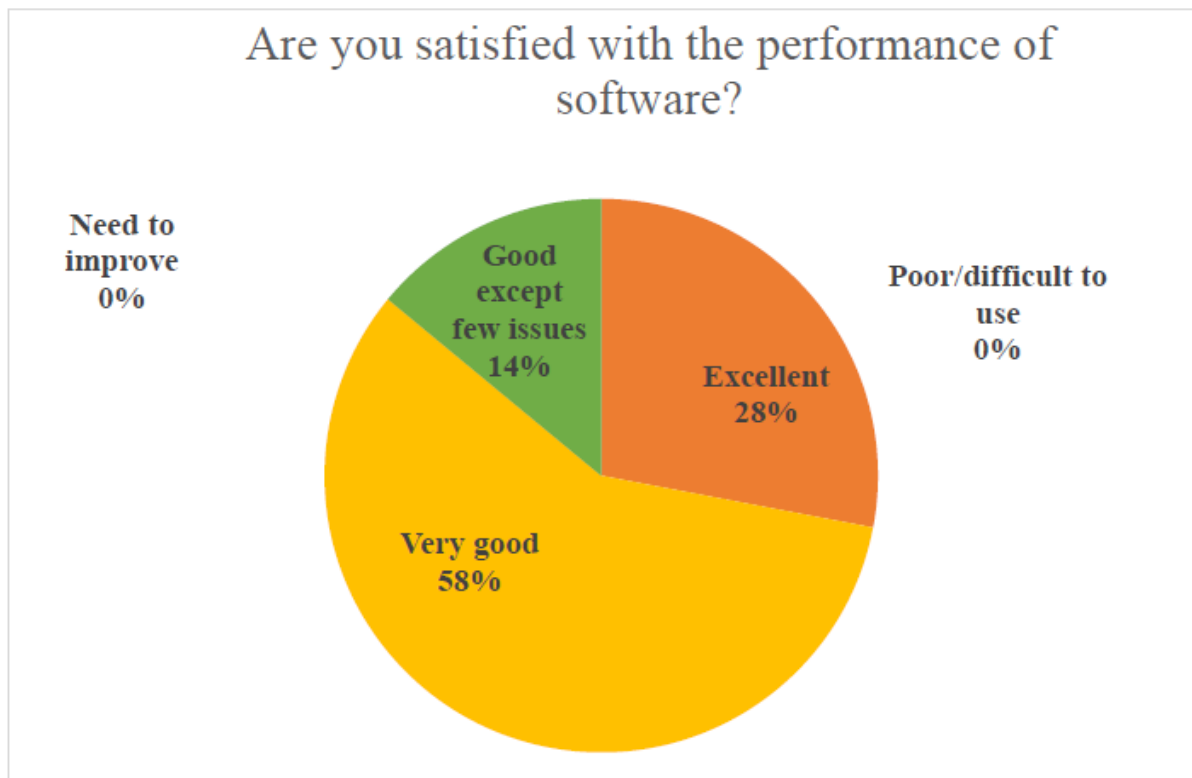


Figure 5.9: Rate of the entire system

APPENDIX D : CLIENT CERTIFICATION LETTER



யா/ இடைக்காடு மகா வித்தியாலயம் J / IDAIKKADU MAHA VIDYALAYAM

அச்சுவலி,
இலங்கை.

Atchuvally,
Sri Lanka.

Website: www.idaikkadu.sch.lk

e-mail: j.idaikkadumv@gmail.com

Telephone: 021 205 8380

Date: 28.1.2019

To whom it may concern,

Client Certification Letter

This is to certify that, "Trilingual IT Glossary Management System" developed by Murugaiah Narmatha is valuable for teachers & students. Our students are participating Ordinary level & Advance level examinations in Tamil medium. But most of the IT related books are in English medium. So, this web based system is more useful for students & Teachers to learn proper meaning of the particular IT technical Terms (English).

Most of the necessary details were provided from our side for the establishment of this project. In future, we have an idea to use this system in our school library.

K.V.
Principal,
J/Idaikkadu Maha Vidyalayam,
Atchuvally.

K.VAKEESAN
Principal
J/ Idaikkadu Maha Vidyalayam
Atchuvally