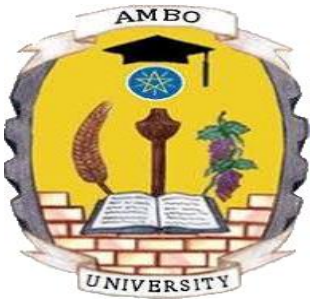


Ambo University Woliso Campus

School of Technology and Informatics

Departments of Information Technology

Title: Develop Web-based rural land management system for South-west Shewa zone

Compiled by group two: those are:

STUDENT NAME	ID
1. HUSEIN ADEM HUSEIN	IT-RW-013/08
2. RAHMET FELEKA	IT-RW-018/08
3. KEDIR KEMAL	IT-RW-014/08
4. GUDINA GUTU	IT-RW-011/08
5. GADISE KEBEDA	IT-RW-009/08

Advisor: - Mr. Diriba M

Submitted to the Department of Information Technology, school of Technology and Informatics, at AMBO UNIVERSITY WOLISO CAMPUS, for the partial contentment of Bachelor degree of Science (BSc) by Information technology.

July, 2019
Woliso, Ethiopia

IMMATERIAL (Abstract)

A web based rural land management's system project developed for South-West Shewa Zone, Oromia region, Ethiopia, to optimize and enhance the efficiency of systems thriving as make the system extra valuable and further manageable for the management team. In an existing system a number problem statement covers the running system due to nature of manual system. By changing manual rural land management system to web-based land management system we are going to handle those problem in a system. this include land registration and manipulate land information-based web technique. Not only this the project include expert, manager of an organization can manages hierarchal to each other. Groundwork of certificate is main topic of the office job is built-in in the project based on the scope of the project that we are going to develop. Land information apprising based on proclamation of land formulated by Oromia state innate land and updating main job of cite is also included. Tallying to this most function of the office touched under this project to overcome challenges of paper-based job that threat office to manage the system as more well-suited with human being to perform properly.

Acknowledgments

Over all, we would like to thanks our **Allah**, Allah giving for us the ability to think, analysis idea and health for patients, as well as strength and us to complete our project on time. Next to this we would like to thanks our Department Information Technology for gave us the brilliant opportunity to do this project on the topic to develop web based Rural Land managements for South west Shewa zone land administration offices. We would like express our special thanks of appreciativeness for our advisors Instructor Mr. Diriba M for his valuable and constructive suggestions during the planning and development of this project work. His willingness to give his time so generously has been very much appreciation. Thirdly, we would like to thanks south-west Shewa zone rural land Administration office manager and experts those who gives all needed information about the office and other related written materials and the procedures of the landholders as well as visualize to us how the process of office accomplish function. We would like to extend our thanks to our friends who have been supporting us in advice, moral or pray their god for completion of the project. To all others who helped us in completing this project, we are equally grateful.

In conclusion, we wish to thank our parents for their support and encouragement throughout our study.

Commitment-certificate

This is to pronounce that the project work done under the supervision of **Mr. Diriba and** having the title of web based rural land management system for south-wet Shewa zone land administration office by contribution of team:

1. Husein Adam
2. Rehmet Feleka
3. Kedir Kemal
4. Gudina Gutu
5. Gadise Kabade

No part of this project work has any reproduced illegal job, which can consider as Plagiarism. All referenced properly. We will be responsible and liable for any consequence if violation of this declaration is occurred.

Date _____

Team Name	signature
1. Husein Adam	_____
2. Rehamet Feleke	_____
3. Kedir Kemal	_____
4. Gudina Gutu	_____
5. Gadise Gebade	_____

This project submitted to the examiner within the countersignature of advisor.

_____ _____

Advisor's name Advisor's Signature

ENDORSEMENT MASS

This venture is entitled as “Web based Rural Land management system for the South-West Shewa Zone Land Administration Office” have been read and approved as the requirement of the department of Information Technology for partial fulfillment of the honor of Bachelor Degree in Information Technology, at Ambo University.

Approved by examination committee

_____	_____
Chairperson /dept.’s head name	Dept.’s signature
_____	_____
Project Coordinator’s name	Coordinator’s signature
_____	_____
Advisor’s name	Advisor’s signature
_____	_____
Examiner’s name	Examiner’s signature

Acronyms

- **SWSZ_RLMS**: - south-west Shewa zone rural land management system
- **DOB**: - Date of birth
- **XAMPP**: - name given for collection of MySQL, Apache service, FileZilla and mercury
- **MYSQL**: - My Structured query language
- **EDRAW MAX**: - Electronic draw maximum
- **CD/DVD**: - Compact Disk/ Digital video disk
- **USB**: - Universal serial bus
- **PC**: - personal computer
- **LAS**: - Land Administration system
- **IP**: - internet protocol
- **BR**: - Business Rules
- **SWOT**: - Strength, weak, opportunities and threats
- **DFD**: - data flow diagram
- **ER**: - Entity relationship
- **CSS**: - cascading style sheet
- **HTML**: - hypertext multiple languages
- **JS**: - JavaScript
- **USC**: - use case
- **Emp**-ID: - Employee ID

Table of Contents

List of Tables

List of figures

CHAPTER ONE

1. INTRODUCTION

1.1. Overview

Over the whole, this project envisioned for the south-west Shewa zone rural land management's system to optimize and enhance efficiency of land registration and make manageable by using web-based system.

Rural land management system of south-west Shewa zone is a sector, which contribute high income for zone as well as for region. In case of this, we are going to make the system automate from manual because now a day technology dominates the world in all side and in automated system it is more profitable than before. Under this chapter we are going to conclude as follow. In a background of the system, brutally depict background of the office like establishment year, functionality that performed by system geographical area of the system and so on. Under statements of the problems, we are going to depict about the problem that found in the system details within example. In addition, under this chapter we going to describe about objectives like general objectives and specific objectives briefly. Next to that, there is limitation and scope of the project. Limitation of the system function that we cannot accommodate in the project like system that has a relation within our project like agricultural issue. Scope area of our project. Significance of the project depicted in this chapter within full description and project budget, team composition all depicted under this chapter. Generally, this chapter deals about main issue of the system that we are going to handle under this project.

1.2. Background of the organization

Ethiopia is one of the famous countries in Africa and it has nine regional state. Among that, regional state Oromia regional state is one of biggest region. Oromia regional state has a number of zones. From that zone, southwest Shewa zone is an independent zone that contain a number of sectors, which has their own specific role in a zone. Among that sector, rural land management system Administration is independent sector, which perform their own role and function. After the establishments of southwest Shewa zone, rural land management system Administration established in 2005 E.C by the help southwest Shewa zone Administration and Oromia regional state and entered into function in 2005 E.C. This sector stands for rural land management, they

perform some basic function for minimize conflicts between landholders and maximize land usage by giving landowners certificate for owners of land. Moreover, system manipulate basic function like prepare landowner certificate for each landowner, prepare investment land for investor to increase zone income at agricultural zone. In addition, register land accord to land usage or land type like private land, societal land and governmental land in another hand according to its usage like residential land, social service land, buffer zone land, agricultural land, mineral land and wet land will be register.

1.3. Background of the system

Grounded on organizational status, such project has not developed for organization even not try to develop any system, which used to make the system automated. Nevertheless, organization has a database that used to record and store land information in detail. The office has the intended to develop such like system or has the aim to their system online-based system to minimize effort needed to complete some function in a time and within less effort. Based on organizational need we are going to ripen office manual system to web-based (online-based).

1.4. Statements of the problem

In South-West Shewa Zone, the current situation of rural land management's office is a manual system so it is difficult to know the overall of information of land types like, private, societal land and governmental land. In addition, to specify land depend on usage such as residential land, buffer zone, agricultural land, wet land and forestland is too much difficult to handle. The manual system is time consuming and boring naturally. It also makes the estimation more complicated. Nowadays, automated system plays a vital role for managing and administer organizational and personal information efficiently. So as, the land holding profile management system is one of the people's services that needs to have a computerized system in order to organize the data and retrieve easily when required. The goal of this project is to develop web-based system for land Administration Office of South-West Shewa Zone to overcome the limitations of the current manual system. For conducting this project, the identified limitations or factors from the existing systems are the unavailability of file. Moreover, misplacement (regarding places) creates difficulty in searching, loss of land holding files during manual file transferring in different location. If the holding book is lost from the people, update and retrieve are very difficult and complex in manual system and lack of file security, immediate information storage, data integrity that leads to information redundancy, unavailability of accurate and up-to-date information that result wrong decision in the

management. It requires more labor to manage the data content in every area of the process, physical damage of file due to dust, moisture and other cause, low accuracy, large storage space and time consumption for searching and retrieving land holders record manually. In a manual system there is wasting of resource like paper, pen, ruler, man power, transport service because in manual system that equipment is a backbone to run the system, so to buy those equipment organizations need a cost daily. In addition, system not secured enough unlike computerized that we are going to develop. Manual system is prone to error and not efficient naturally.

1.5. Objectives

The project would have the following general and specific objective

1.5.1. General objective

The general objective of this envisioned project is to develop web-based rural land management's system for south-west Shewa zone.

1.5.2. Specific objective

In order to achieve the stated general objectives this project includes the following specific objectives:

- To study the existing system in details, this embrace workflow of the current system, function of system that done in organization, structure of current system and performance of the system in penetration.
- To analysis the existing systems problem, it encompasses after understand the existing system in detail we going to isolate the problem that found in system especially which consider with organization function.
- Next activity that we are going to find the solution for the problem that are founded in existing system study.
- To develop design model that are used in rural land management's system.
- To develop the system that perform creation of certificate for landowner and update the land information according to land proclamation of region.
- Creating user-friendly environments for particular clients to react and use the system in a good manner by making our system, which can understand local language, Oromo language addition to English languages.

- To Conducting system test and analysis testing at the end of project we conduct system testing in detail as needed both design test and operation of the system.

1.6. Scope and limitation

The project that we are pregnant in our mind has the following scope and limitation.

1.6.1. Scope the projects

The coverage of this study is to develop a web-based rural Land Management for South-West Shewa Zone Land Administration, Oromia region, Ethiopia. Thus, the study covers about rural land of South-West Shewa Zone, focus to register land information, focus to generate report, focus to prepare land certificate preparation. This study going to concluded in 8 months from December/2018 to July/2019-time frame. This project developed for south-west Shewa zone rural land managements' system only because it limited to this zone rural land management's system office.

1.6.2. Limitation of the projects

- System cannot support Amharic language for the user of the system because nature of office support Oromo languages and in some place, it supports English languages.
- As a researcher, we limit the system as it cannot give any privilege for an individual land user to access the system and modify any data. Nevertheless, the landowner can give feedback based on certificate misgiving.
- The researcher limited this project to rural land management in case of south-west Shewa zone only.
- The study doesn't concern agricultural office but specify land type according to its type like agricultural land, wet land. However, if the system were automated, we link to system.
- The study doesn't cover about urban land, it only concerned about rural land as its name implied.

1.7. Risks, constrain and Assumption

1.7.1. Risks of the projects

- **Virus attack**: Due to the virus, attack may the project attacked by virus and need redevelopments. Moreover, project may face with failure.

- **Failures of electric power**: During the work, time if the electric power may fail what we done may not save and need redo and put the project risk of completed in a given time.
- **System failure**: - due to unknown reason may system letdowns happen to machine that we are using to develop project, if that is occur project also crashed within a system.
- **Problems of team health: -** if team may face problem of health, project may cannot visible in all function as targeted.
- **Problem of peace in a campus**: - same time in our campus there is a problem of peace; if such problem may face rapidly the project has risk to fail.

1.7.2. Assumption

Assume that expert employees are not knowledgeable about computer and cannot use it to register personal data, land information within its owners. Due to this may, the system not visible to all expected organizational employee. Therefore, the system is needing more training for organizational employees to teach system with employers. If internet is not available, system is not work because system is internet dependent due to our intentional software is web-based application.

1.7.3. Constrain of the project

Some of the constraints during the development of our project are touched as follows: -

- **Unwillingness of some respondents**: to give a correct answer. May not meet all function of organization perform.
- **Lack of full information:** lack of obtaining full information from expected body in a time may put the project under fully unfunctional.
- **Lack of electric power**. Due to lack of electric power may we cannot conclude as expected the project because in our city there is a lack of electric power especially in our campus pen.
- **Lack of internet connection**. May we cannot do every function as we planned because one of our resource is internet connection. Due to this lack internet may face project failures and make far away from all function successfully implemented.
- **Unrest in our campus**. To conclude in a given time, we need some rest or free time, if that not obtained May we be busy. Be busy bin project reason for failures

- **Lack of necessary equipment**. Lack of necessary equipment's to develop a project, and lack of obtaining material in given time to complete project with full function or put the project in failures garbage.

1.8. Significant of the project

The outcome of this project used for Rural Land Administration office and workers to solve the major problem that occur in registering land hold information, searching the individual land user information easily, updating the land information in short time and generating report. The project has a number of significant for the south-west Shewa zone rural land management's administrator office.

- Increase system performance
- Save a lot of time
- Increase zone annual income.
- Minimize social clashing over the land
- Minimize expert effort to manipulate land information.
- Maximize land usability

1.9. Beneficiary and benefit of the project

1.9.1. Beneficiaries of the project

This project is important for user such, those are - landholder, South-West Shewa Zone Land Administration office, expert and our country is also the most beneficiary.

- **Expert:** the system reduces time wasting activity. The system supports the work of expert employees by providing access to all information of land holding easily to perform activities. This project avoids redundant data entry and management, and facilitating natural data flow without unnecessary repetition. It can also provide reduction of paper work, fostering speedy and efficient work processes with accuracy. The project has interactive, user friendly and easy for expert employees to perform the land information. Therefore, expert employer of an organization is a beneficiary of wished-for project as described above.
- **Landholder:** the landholder's full information recorded exactly within their land. Any landholder can get accurate, secured and fast service of their holding right. So that the

proposed system can save the time, cost and energy of land holders by providing get service in short time

- **Manager**: The system provides and stores correct, accurate, and timely data and information and got rid of time consuming, errors reduction and registers of land or landholder has related activities. It provides an easy-to-use and timely delivery of information. The manager can manage all information and employees in one manager computer. Moreover, manager can announce announcement in simply way.
- **RLMS Bureau:** The proposed system facilitates the working environment of the office, it can facilitate automated file handling system, it can reduce paper consumption cost, it can reduce human labor, and the office can be more manageable and more profitable.

1.9.2. Benefits of the Project

This project provides many services to South-West Shewa Zone rural Land's Administration office. Such as:

- It can save time and reduce work overload of the expert worker.
- The system can provide easy of storing, processing and organizing, and administer huge amount of land holding data of peoples.
- It can reduce many errors, large storage space, money expense, time consumption and related resource requirements to the organization
- It can improve the long-time data processing of land holding book provision**.**
- It can make the holding data more accessible and manageable
- It gives security on the data inputting, data storing, data processing and data result.
- Increase system performance and increase organizational income per year.
- Make the office more profitable than manual.

1.10. Team composition, budget and schedule

1.10.1. Team composition

In our project, we have five (5) member in our group; all of us has specified task in the project to complete in a time and to make the project more profitable with awesome function. The following are the types of tasks; each of us can have in a project. Those are detail described in the following table within their task

Table 1.10-1-team composition table

No	Tasks	Members name	Members ID
1	Project's data analysist	Husein Adam	IT-RW/013/08
2	Data gathering effectively	Rahmet Feleke	IT-RW/018/08
3	To Design project	Kedir Kemal	IT-RW/014/08
4	To implement project	Gudina Gutu	IT-RW/011/08
5	Testing	Gadise Kebede	IT-RW/009/08

1.10.2. Meeting plan and communication tools

While we are working on our project, we use the following techniques in order to meet one another and then exchange our suggestions or ideas to make the system more valuable and completed in a given time. Those tools that we are using to communicate; Mobile Phone, Email, Facebook, Viber, Telegram, team viewer and some other social media techniques to communicate with each other. In addition, we have a plan to meet each other four days per week, those days are Monday night start from 2:00 local time, Wednesday afternoon at 8:00 local time, Friday night start from 2:00 local time and Saturday morning start from 2:30 local time. Place meeting is in AUWC old classroom 201 or Lab class 201. For those breaking our communication plan from team member we have punishing plan also. In addition, we plan to meet our advisor per week in Tuesday afternoon at 8:00 local time.

1.10.3. Project life time

The timetable or schedule as a basic time management tool consists of a list of time at which possible tasks, actions and events intended to take place or the sequence of events in the chronological order in which such things intended to take place in a project. The tasks that will done in this project properly done in the given period bellow.

ID	Task Name	Start	Finish	Duration	Complete
1	Proposal	2018/12/6	2018/12/19	1.4 w.	100%
2	Planning	2018/12/20	2018/12/24	0.4 w.	100%
3	Data Gathering	2018/12/19	2018/12/31	1.3 w.	100%
4	Designing	2018/12/31	2019/2/1	3.6 w.	100%
5	Implementation	2019/2/1	2019/3/15	4.4 w.	100%
6	Testing	2019/3/15	2019/3/21	0.7 w.	100%
7	Documentation	2019/3/22	2019/4/15	2.4 w.	100%
8	Prepare presentation	2019/4/16	2019/5/1	1.7 w.	100%

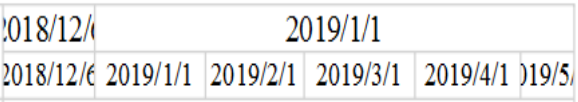


Figure 1.10-1-schedule of the project

1.10.4. Project budget

In a project budget, we are going to develop cost plan to conclude project in a given timeframe effectively and efficiently by using cost needed to overcome budget expenditure problem for a project.

a. Software requirement's cost for project development

For this particular project, we will be using different software but some software we are getting from the university and other is free source and also some of them are free trial version. Totally concluded in the following table.

Table 1.10-2-software cost to develop project table

Software cost to complete intended software			
No	**Software Name**	**Version**	**Software cost**
1	Microsoft Word 2016	V 16.0.4756.1000	Free
2	Adobe Photoshop CS5 edition	CS5 V12.0.0.0 final	Trail version
3	EDRAW MAX	Version 9.3 realized	Trail version
4	XAMPP	5.2.0 version	Open source, so it is free
5	MYSQL server	5.0.0 Version	Open source, it is free
6	Microsoft Visio	V 15.0.4569.1504	From university
7	Sublime Text 3	V 3.1.1 build 3176	Trail version

8	Shampoo Burner 13	V 11.0.6.0 final	Free version
9	Notepad ++	V 7.5.6	Free
10	Mozilla Firefox	V 63.0.1.6877 b	Free
11	Snipping Tools	V 10.0.10586.0	Free
13	Microsoft power point 2016	V 16.0.4266.1001	Free
14	Windows x	10pro	Trial version
Total		0.0 or no any payment	

b. Hardware requirement's cost for project development

For this particular project, we will be using a different Hardware. Those hardware costs are totally concluded in the following table.

Table 1.10-3-Hardware cost to develop projects

Hardware cost to develop targeted software			
No	**Hardware name**	**Quantity**	**Price in birr**
1	USB flash	1	150.00 birr
2	CD/DVD	1	17.00 birr
3	Pc	2	12000.00*2=24000 birr
4	Hard disk	1	1500.00 birr
5	Mobile phone	5	550.00 *5 =2750.00 birr
6	Totally	10	28417 birrs

Other material that may need costs are Pen 10*7.00 birr = 70.00-birr, pencil = 5*2.00-birr, paper one packet 250.00 birr and transport cost during data gathering 100.00 birr. Other cost is print cost questioner print cost 13.50-birr, proposal printing cost 12.00 birr and first drift print 50.00 birr and total document print cost 70.00 birr. Those are totally need around **575.5** birr. Total cost needed for developments of project is=**28,992.5 birr** is general cost.

CHAPTER TWO

2. SYSTEM REQUIREMENTS SPECIFICATION (SRS)

2.1. Overview of the existing system

Existing system is a manual system, to employ function of the system, all activity done by human hand. Function of the system is like prepare landowner's specification book or certificate for owner of land, registering land according to its usage like investment land, residential land, buffer zone land, agricultural land, wet (land that covered by water) land, social services land, mineral land and separate land logically according to its type like private, social land and governmental land. Therefore, the existing system manipulate such function effectively by human hand that means the system not based on automate system or computerized system.

2.2. Description of the existing system

Under this topic, we are going to describe over whole system description briefly and some rule and regulation land owner briefly to visualize the system before automated what it looks like and service that available in a system clearly.

Land Administration: - Land Administration System (LAS) is concerned with social, legal, economic and technical framework within which land managers and planners operate. Since, LAS has the ability to influence societal and institutional behavior (including individuals), professional competence and human resource development are an important component of LAS [1].

2.2.1. Introduction of an existing system

Land holding is the way in which the rules of land tenure applied and made operational. Land Administration, whether formal or informal, comprises an extensive range of systems and processes to manage. The processes of land Administration include the transfer of rights in land from one party to another through sale, rent, loan, gift and inheritance (bequeath); the regulating of land and property development; the use and conservation of the land; and the resolving of conflicts concerning the ownership and the use of land. The organization uses land registration book or manuscript in order to register the holders land, update when the holder the land in the form of bequeath to his/ her children, donation or transfer the holders land in the form of rent to other land users. The land tenure manuscript has many pages and large in height, width so that if the land Manager wants the profile of the specific land holders it is too difficult and time consumer. In addition, if they want to do any work for one's landholder such as update, search, delete the

landholder profile when death, or other specific work. Generally, they use manual system in order to manage land related works. The currents system has problems including lack of security of data, time consuming and requires more cost, consumes large volume of paper work, manual work. It requires a greater number of employees, loss of data, data duplication and requires large storage space as well as it need a lot of time to complete one job or to serve a customer, it need many shelves to put many documents into catalog and so on [2].

2.3. Major functions of the existing system

The major function of an existing system is to prepare land for investment, prepare landowners specification book or certification, manage land according to land usage and land type. Land registration within its type and usage. Giving training for landowner how to increase land benefit to make land produce more product. Specify land according to its size. Generally, major function of existing system is going describe in a subtitle blow [3].

2.3.1. Business process of the existing system

There are two types of rural land registration: non-conventional and conventional ways of registration. Traditional/non-conventional way of registration: In this type of registration information recorded in estimation method. These are like land size, and general boundary (meaning not fixed). Non-conventional way of registration is simple, needs less skilled persons and doesn't need too much time, as a result, is not costly. It has relatively less input to solve land Administration activity like boundary dispute resolution when compared to the conventional way of registration. Also updating is limited here [4].

Conventional/ modern way of registration: In to a conventional way of registration, it is the way of getting genuine land information like land size, fixed boundary and map. It is somewhat complex, needs skilled persons and needs too much time. As a result, its input for further land Administration activity like boundary dispute resolution or reducing litigation and update is high [5].

Potential Benefits of Land Titling/Certification: - Land registration and certification have several benefits. The benefits of an effective land registration system are that it will guarantee ownership and security tenure. Moreover, reduce land disputes, provide security for credit, facilitate the management and protection of state lands, facilitate rural land reform, support for land and property taxation, develop and monitor land markets, improve rural land planning and

infrastructure development, protect land resources and support environmental management and Produce statistical data [5].

Importance of Securing Access to Land: - Access to land and security of tenure are necessary for people to raise and stabilize their incomes and to participate in economic growth. They are also essential prerequisites for diverse land-based livelihoods, sustainable agriculture, and economic growth, poverty elimination, for achieving power in markets, managing natural resources sustainably, and preserving a people's culture. Secure access to land and productive resources is a viral link between food security, sustainable resource management, peace and security, and consequently the reduction of poverty. It is not so much a technical challenge but a political process of negotiation, conflict resolution and managing stakes [4].

2.3.2. Player in existing system (Actors of the existing system

Using player, we will depict, only those persons involved in services or persons who have responsible for manipulate the system function. Players of the system are list as follow: -

- **Landholders**: -people those who has landowner certificate or those get landowner's identity card from office as land proclamation of region.
- **Rural Land administration officer**: - Manager of the land management system that dominate over all the system performance and an employer can have managed by this body.
- **Expert Employers**: - those employed in an organization to fulfil the system requirement to run properly without any error, and those employed at zone and Woreda called as an employer of an organization.

2.3.3. Use case for a currents system

By using Use case diagrams, we analysis a graphic overview of the actors involved in a system. Different functions needed by different actors and different functions interacted by actors. In order to visualize the existing system, use case needed for us due to that issue, we conclude existing system actors with their expected role or function in a system.

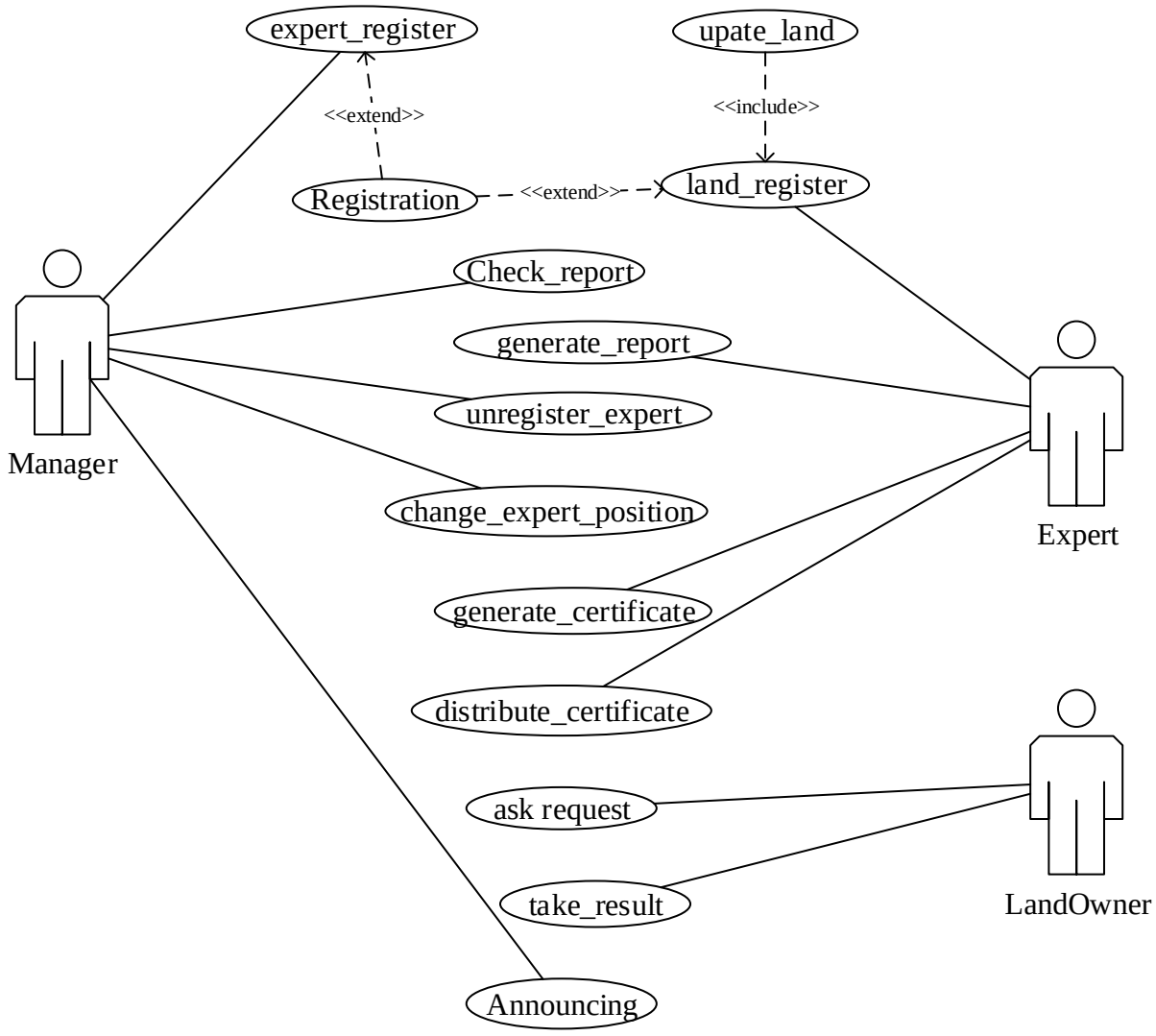


Figure 2.3-1 use case for current system

Use case description for current system

- ***Use case Number*: -** Represents identification number that enables us to make the use case traceable.
- ***Use case name*: -** Represents the name that we have used in the business's use case model.
- ***Actor*: -** Represents who interacts with the system either internally or externally.
- ***Precondition*: -** Represents what is the expected situation before the use case can started.
- **Basic course of action**: what action done or what function implemented at the level.
- **Description**: describe the process and action taken during this use case.

Table 2.3-1 use case description for register expert

Use case number	**USC 1**
Use case name	Register expert
Actor	Manager of the organization
Description	Add expert employee for an organization or hire new employees, if organization need to hire new expert, he/she registered to database, they have.
Pre-condition	Lack of expert in an organization, exist expert has not enough to manipulate the system performance. The employee must fulfill the pre-request to registered or recruit.
Basic course of action	➢ The competitor for recruit sends request or employment request to manager. ➢ Take exam to evaluated them, by organization. ➢ Based on evaluation select the winner for employee by manager and recruit to employment member. ➢ The manager registers the new staff information in database.

Table 2.3-2 use case description for unregister expert

Use case number	**USC 2**
Use case name	Unregister Expert
Actor	Manager
Description	Manager check all data of the expert employee to unregister
Pre-condition	Manager must have clear reason to change employee. Alternatively, remove expert employee manager deeply understand reason behand expert employee.
Basic course of action	Manager remove all data of the removed staff from manual manuscript.

Table 2.3-3 use case description for update land information

Use case number	**USC 3**
Use case name	Update land
Actor	Expert employee

Description	Update land information based on ➢ Inherent ➢ Rent land ➢ Social service land ➢ Investment land etc.
Pre-condition	Expert Employer must have clear and accurate information to change land's information from the manuscript. Need deeply understand reason behand, before updating land information and should be clearly understand the land proclamation.
Basic course of action	➢ Gathering land information ➢ Check land proclamation for updating or upgrading to the latest information of land. ➢ Update land information ➢ Update certificate to the latest information.

Table 2.3-4 Use case description for Register land

Use case number	**USC 4**
Use case name	Land registration
Actor	Expert employee
Description	Registering land, land has classified based on type ➢ Agricultural land ➢ Wet land ➢ Grazing land ➢ Forest land ➢ Mineral land ➢ Social service land Based on this type land registered within its full description accordingly.
Pre-condition	Land specified by expert according to its type and measured clear within its bounder information based on enough evidence.
Basic course action	➢ Expert Specify land information ➢ Measure land area ➢ Specify land owners ➢ Register land in detail

Table 2.3-5 Use case description for change expert position

Use case number	**UCS 5**
Use case name	Change expert position
Actor	Manager
Description	Expert employees have their own position, manager of the organization does change from one position to another position of expert employees.
Pre-condition	Manager first analysis his/her employees' capability, activity, punctuality and some issue to differentiate, then give high power to whom work hardly.
Basic course of action	➢ Manager checks and validate the employee details ➢ Manager gives the warning paper for respected employer ➢ Manager check again ➢ Manager changes or amend the employee position
Alternative course of action	If the manager wants to change without any warning, he/she amend the employee

Table 2.3-6 Use case description for check report

Use case number	**USC 6**
Use case name	Check report
Actor	Manager
Description	Report that written by expert employees checked by manager of an organization.
Pre-condition	First expert generate report than submitted to manager of the organization. To generate the report expert, specify the report to according to report type. Those are weekend report, month report, quarter report and year report as well as five-year report.
Basic course of action	➢ Collecting report paper from expert ➢ Then check it

Alternative course of action	In case of some issue expert, informally tell the status of the job orally to manager.

Table 2.3-7 Use case description for distribution of certificate

Use case number	**USC 7**
Use case name	distribution of certificate
Actor	Expert Employees
Description	After preparation of certificate, it should deliver to the landowner; due to this distribution of certificate is main issue.
Pre-condition	➢ Land should be specified clearly ➢ Based on land specified ➢ certificate should generate grounded on land proclamation. ➢ Announcing generated certificate before print and give to the land holders ➢ Check error again based announcement
Basic course of action	Generated certificate, deliver to landowner according to indicated. Alternatively, simply distribute certificate for landowner.

Table 2.3-8 Use case description for generate report

Use case number	**USC 8**
Use case name	Generate report
Actor	Expert employee
Description	Expert employees generate report be contingent on its type to their manager.
Pre-condition	Expert employees should organize what has be done or what will be do.
Basic course of action	Generate report, Submit to their manger on time.

Table 2.3-9 Use case description for Receive result by holders

Use case number	**USC 9**
Use case name	Receive result
Actor	Landholders
Description	Landowners receive result from expert employees, that he/she send to expert employees
Pre-condition	First landholders send request to expert employees than process and response answer to landholders.
Basic course of action	➢ Send request to expert employees ➢ Employees process it and send to landholders ➢ Landholders take or receive.
Alternative course of action	Landholders can take or receive directly from manager. Less probability.

Table 2.3-10 Use case description for Ask request

Use case number	**USC 10**
Use case name	Ask request
Actor	Landholder
Description	the landholder send request to expert employee
Pre-condition	The holder ask request to employee
Basic course of action	Landholder ask request to expert employee,

Table 2.3-11 Use case description for posting announcement

Use case number	**USC 11**
Use case name	Announcement
Actor	Manager
Description	Posting announcements ashore on new issue like hire new employment and like announcing certificate to land owner.
Pre-condition	To announce announcements paper should has manager sign and sill.
Base course of action	Generating the announcement and

	notify to the notification board.

2.3.4. Business rule of the existing system

In a business rule we are going describe effectively an operating principle or polices that we try to stipulate for both the existing system and the new system must satisfy.

The main business rules or principles of the existing system are -

BR1: - Anyone to manipulate the system should be member of the organizational employees.

BR2: - Landowner should be resident of the Woreda or Zone to get landowner certificate.

BR3: - Landowner should have landowner's book that given by Government or rural land administration office.

BR4: - Land information should be stored permanently within its owner information respectively.

BR5: - Administrator hire new staff if the space is available to manipulate the system correctly.

BR6: - Employees give the service for landholder exactly.

BR7: - From Other Zone somebody can change to this Zone to resident in a zone and to get the service he/she should live in a zone at list three year.

BR8: - Any one cannot live or resident out of residential land given for society.

BR9: - Land should be give the service according to its usage, that means residential land should be use for residential not for agricultural or forest. All should be accordingly.

BR10: - landowner can rent land according to negotiation within his/her family. Nevertheless, it should be half or 0.5 of his/her land to rent. However, if the landowner elder can rent all land is possible.

BR11: - land can be inherit according to the proclamation of land from father or mommy to child.

2.3.5. Reports generated, form, documents etc. of the existing system

Report generated - in this section we are going to describe the over view of report generated form and contents of report. The brief description of this report generated by expert employees as well as generated by manager of office to Oromia concerned office. Expert employees generate report from many positions like Woreda expert and zone expert to the concerned office like manager of office and so on.

Table 2.3-12 report generated form

Woreda	kebele	Number of field map	Number demarcated	Parcel in dispute	Parcel Without Full Information	Number committed to IMASSREG	Number uncommitted to IMASSREG	Parcels Digitized	PD Not Started	PD Started	PD Completed	Number of Certificates Approved	Number of Certificates Printed	Number of Certificates Collected	% of Demarcate vs Approved
Woliso	Abbaadhoo Leemman	43	3,414	12	22	3,445	0	3,437	0	0	1	3,334	3334		97.66%
Woliso	Abbaadoo Jawwee	50	4,329	11	146	3,309	0	3,288	0	0	1	3,110	3110		93.99%
Woliso	Baddaa Qeerroo	37	1,233	2	143	1,219	1	1,233	0	0	1	1,102	1102	681	89.38%
Woliso	Baddessa Qorichaa	50	3,811	4	190	4,031	0	4,014	0	1	0				0.00%
Woliso	Birbirsa Qanteeroo	45	2,345	1	266	2,347	0	2,329	0	0	1	2,065	2065		88.06%
Woliso	Buqqaasaa Kattaa	46	3,500	3	132	3,575	0	3,608	0	0	1	3,330	3330	2247	95.14%
Woliso	Caffee Makkaanaa	37	3,621	15	35	3,603	0	3,519	0	0	1	3,487	3487		96.30%

Form: -under this section, we going to describe the form of certificate for landowner that prepared by rural land management's office at south-west Shewa zone of Oromia region. This form done by Oromo languages; it is more modernized form than the oldest form. Due to this, we are going to make the system form as it looks like


BIIROO BULCHIINSA FI ITTIFAYYADAMALAFA BAADIYYAA NAANNOO OROMIYAA
WARAQAA RAGAA QABIYYEE LAFA BAADIYYAA
KAARTAA QABIYYEE LAFAA LAKKOOFSA ADDAA

Lakk.
Guyyaa

Naannoo Oromiyaa
Godina
Aanaa
Ganda
Maqaa Abbaa Qabiyyee/soora

Fooyyessuu/edition/_____

Hubachiisa

Ibsa
Lafa W/Bagaa itti kennamee
Daangeessota

Kan Qopheesse:
Maqaa
Mallattoo
Guyyaa

Kan Raggaasise:
Maqaa
Mallattoo
Guyyaa

Datum: Adindan UTM Zone 37N

Figure 2.3-2 land owner certification form

2.3.6. SWOT analysis of the existing system

Table 2.3-13 Strength and weakness table

Strength	**Weakness**
Based on a given services complain becomes less.	Problems with a good administration till not resolved as it needed.
Participators together more for developments.	Unable to remove antidemocracy attitude and action from the root.
Water, electric power and road to move everywhere, office has enough.	Office no has software, which develop for this purpose or for land management's system.
Office has enough number office to survive expert employees.	Fighting and be free from corruption is not fully enough.
In addition, they have second certificate level, means some modernized system for preparing certificate is also available.	Lack expert to accomplish the mission of the organization.

They have total number of Server 69 for 204 Woreda, so it too enough.	They have not enough human power to manipulate the system.

Table 2.3-14 opportunity and threats table

Opportunities	**Threats**
In rural social life, corruption is not common at all.	Attitude and action of corruption in case of land renting, illegal settlement, get certificate on one land as well as gift and inherent land may have a problem.
Availability of developing team in a rural area.	Undemocratic action and ideology some time reflected.
Availability of some valuable technology.	Ideology, action and supply for developing team not constant at all.
Availability of systematical participation of youth and women and women empowerment.	No peace between land owner because they are fight each other for a land boarder
Social has good satisfaction on investments participation.	Turnover, means not equal salary for the same position worker at Zone and low level like Woreda when equate with another zone of Oromia region.
Augmentation contribution of wealthier on investment.	Usability of land problem became increase.
Near to the capital city of country, so office can buy necessary equipment with less transport cost and can get more equipment as needed.	As common before women and youth may not deeply participate in investment for development as needed.
Office employments has the opportunities to get education in a country and in foreign country.	Increment of the population affects natural resource.

2.4. Problem of an existing system

Due to the manual means been used by the South-wet Shewa zone, keeping information about landowners' land information, message transmission has many problems are encountered which includes:

- The absence of electronic data storing mechanism it requires huge storage space.
- The current process requires high human-power.
- Difficult to manipulate landowner information.
- Need high cost to manipulate because information transmission via mobile phone or my transfer from zone to Woreda by messenger or by prophet by using transport cost, in addition to this organization need another human labour because messenger also needed between office to office for transmission of information.
- Data redundancy is also the problem of an existing system as we analysis from questioner.
- Time consuming is another problem that found in an existing system.
- In a manual of an existing system to solve customer problem, customer should queue to get solution due to system need dig out a number of documents.
- Difficult to know one land direction in simple ways.
- Difficult to know one land information within its owners
- Difficult to calculate task with exactly depending on land area.
- Receipt given to landowner after paying task done by human hand in that case redundancy available
- Loss of data are available in many cases

2.5. Alternatives solution for an existing problem

In order to overcome the current system problems that are exist in the functioning of rural land management's system, our project team members have put down alternative options. Those are -

- Changing the structure of manual system in to organized manner
- Completely change manual system in to computerized and automated system without affecting the structure of an organization.
- Make the function performed by computer rather than by human power.

The new system designed to solve problem affecting the manual system in use. It is design to be used online thereby get landowner certificate from much stress as experienced from the manual system. This will do the analysing and storing of information either automatically or interactively,

it will make use of online access to internet. The new system gives full system functionality that needed by system user to perform system functionality. Among that system functionality, online communication form for the Woreda to zone via SMS and give complain to system.

The proposed system will also have some other features like.

- Accuracy in handling of data
- Fast rate of operation and excellent response time
- Flexibility (i.e.) it can be accessed at any time, any where
- Better storage and faster retrieval system.
- Accessibility from anywhere in the zone.

2.6. New Proposed system

A Proposed system has needed a smaller number of computer intelligent employees who can perform any automated related works. The system is user-friendly, easy, fast and secured database in order to store all information of land. The proposed system can perform activity using by automated system in order to provide fast, efficient and effective services to the users and it saves cost, time, and human labor of the office and the users. It can search, update, delete and record land information using ID (i.e. land book number). Proposed system increases system performance by making the system to prepare landowner certificates in simple ways. And also proposed system increase system performance, minimize human effort, make the system more valuable than before, more satisfy land owner by minimizing time to get service.

2.7. Methodology and tools

In this section, we are going to brutally, depict the methodology of data gathering and tools that we are going to use to analysis gathered data. In addition, implementation tools that we are going to use are brutally, depicted here within full description. Very crucial method listed as follows.

2.7.1. Data collection methodology

Under this topic, we are going to describe data collection methods and analysis collected data. We use two major fact-finding techniques those are primary source and secondary source. In primary source, we use empirical approach such as interview and observation. In secondary source, we obtain data from different document.

Fact-finding & analysis: - The specific methods analysts use for collecting data about requirements called *fact-finding.* These include:

- Interviews
- Observation

Usually these techniques used in combination during a study to ensure an accurate and comprehensive study are undertaken.

Interviews: - We use interviews to collect information from individuals or from groups. The respondents are generally current users of the existing system or potential users of the proposed system.

- Manager
- Expert employers
- Landowner's

Questioner: -under this section, we prepare some question based on both open-ended and closed-ended question and distribute to the officer and expert employers of an organization.

Documents Analysis: - To conduct this project we use document analysis method as an essential in order to analyze different documents that found in the office, which contains information related to the office, problems found in the manual system, the services that the office provides to the users and the number of employees.

Observation: - Observation allows the team of project to gain information they cannot obtain by any other fact-finding method. Through observation, the team can obtain firsthand information about how activities carried out. This method is most useful when the team need to actually, observe how documents handled, how processes carried out and whether specified steps actually followed. While the team has observed the existing system, there have been improper handling of files that are too difficult to access it, and these make the decisions invalid. The teams know the way of managing landowner information form during needed, at that time the team understands how much the process is tedious and require high human power to accomplish the process.

Analysis methodology: - After gathering different information from stakeholders of a system, we analyze requirements by using Unified Modeling Language (UML) models like use case diagram, sequence diagram and class diagram, activity diagram, collaboration diagram and other.

Design methodology: - We select object-oriented approach to design the system because it has best feature than other approach due to this, we select object-oriented based approach to make more valuable and simpler for to conclude in a time.

2.7.2. Hardware and software tools

After having all the required data to conduct this project, different software and hardware tools that we are going to use in order to design and implement the system as intended are as follow.

a. Software requirements

The software tools that are required to accomplish this project as expected and with high user-friendly interface for both front-end development and back end, developments included in the followed table: -

Table 2.7-1 Software requirement to accomplish project

No	**Software Name**	**Software version**	**Descriptions**
1	Microsoft Word 2016	V 16.0.4756.1000	We are used it for documentation purposes because this tools more better than other tools for documents processing and this version has the ability to help grammar.
2	Adobe Photoshop CSS5 edition	CSS5 V12.0 final	To edit different pictures to make system more amazing and visible, because these tools has high ability to edit picture as we like and support most extension.
3	XAMPP	5.2.0 version	To manage the Database store records in the database and used at server side because this version is a better and XAMPP is most popular than other tools like WAMPP and other.
4	MYSQL server	5.0.0 Version	To record information in a data base and manipulated online or available online. Because MYSQL used most for online database services processing rather than another database.
5	Microsoft Visio	V 15.0.4569.1504	To draw some diagram like Gantt chart, ER diagram and data follow diagram (DFD) because this tool easy to for this drawing and better than other does.

6	Sublime Text 3	V 3.1.1 build 3176	We write PHP extension on to sublime text 3 in order to separate .PHP with .CSS, .JS and other we write .PHP extension on Sublime Text 3 and these tools better for this extension and help us.
7	Shampoo Burner	V 11.0.6.0 final	To burn essential data to DVD/CD and from CD/DVD to pc in simple ways because it is nice for burning data to CD/DVD.
8	Notepad ++	V 7.5.6	We used it to Write and edit on it those has extension like .CSS, JS and HTML. Because in order to separate this extension from other and these tools helpful for us as well as minimize effort.
9	EDRAW MAX	Version 9.3 realized	To design diagram like Use case, Activity diagram, sequence diagram, component diagram, class diagram, collaboration diagram, Deployments diagram and other diagram that make the project visualized to reader we used it because this tool is so easy than other like visual Paradigm and other to draw diagram.
10	Mozilla Firefox	V 63.0.1.6877 b	To search different information at the time of doing the system from the Host. Because this web-browser free browser and it is types of browser that we are using.
11	Snipping Tools	V 10.0.10586.0	To cut images and graphs when necessary. Due to some software like EDRAW MAX and other tools is trail version, it is difficult to copy the diagram in case of this, we are going to use cut some diagram and past it.
12	Microsoft power point 2016	V 16.0.4266.1001	Used for presentation purpose, because it nicely developed for presentation purpose and we familiar with this tool.

13	Windows x	10pro	Primary requirement because it 90% user friendly so any windows can used to develop aimed software completely. Nevertheless, we are using 10pro windows that we have.

b. Hardware Requirements

The hardware tools that are required to accomplish this project includes following types:

Table 2.7-2 Hardware requirements to complete project

No	Item Name	Type	Item Quantity	Description
1	Laptop/desktop	Any type of brand computer	2	To overcome the system failures, we need two computers to get the back up of file.
2	USB Flash	HP flash	1	To take store data on it because to copy data from one computer to other it needed in same case, so to copy data from pc to pc we are going to use it.
3	CD/DVD	Sony	1	Data on CD/DVD cannot damage by virus simply. CD/DVD is unlike other storage device it is not house of virus, so we are going to use it to put crucial data on it to overcome failure.
4	Hard Disk	Any type	1	To Store data permanently. Any hard disk is possible to put data on it.

2.7.3. Minimum software and hardware requirements

Under the topic we are going to describe, those tools should be available after project accomplished and going to run in real world or office need to use the software. A minimum software and hardware requirements listed as follows: -

a. Minimum software requirements

After project has completed, other tools that are required to implement or install this intended software to detect from damage or from virus and to run the software those are as follows:

No	Tools name	Version	Description
1	360 total security	V 10.2.0.1197	For detection of Malware, SQL injection and other virus system virus that damage system
2	SMADV pro	V 2018 12.3.2	For file protection from damaged by file virus
3	Windows Server X	Server 2012 R2	Used for server side to give online services for clients, server all time be ready to give service for client so need windows server to format with server computer.
4	XAMPP	5.2.0 version	Used at the server side or at back end service to enhances service
5	MYSQL server	5.0.0 Version	Used at server side to record data and make accessible to the client used at back end service server

b. Minimum hardware Requirements

In the section we are going to describe, minimum hardware requirements to implement the software after project complete or to run in a real world and with minimum resource should listed as follows: -

No	Equipment Name	Type	Amount of Item	Description
1	Server pc	Any server pc	2	To overcame with system failures two server is needed
2	Printer	Any printer	As needed	Printer is also needed to print information of land owner and land information

3	Internet/Intranet	Both		In order to client access information from server and put data on its internet/intranet is needed
4	Any pc/mobile phone	Any type	More needed	To access the server information client can use any pc and also mobile those has Android, Apple based OS is needed

In addition, other like this: -

- Operating System (i.e. Windows XP, SP 2 or Mac OS X 10.3.8)
- Processor Speed (i.e. Pentium 4, 3.2 GHz or Power PC G5, 2.0 GHz)
- Memory, a.k.a. RAM (i.e. 512 MB)
- Graphics Card (i.e. ATI Radeon 9800 w/ 256 MB video memory)
- Hard Disk Space (i.e. 80 GB available)

All of this should be available at list minimum of those tools to run our system for the office.

2.8. System analysis tools and techniques employed

To develop this project, we are going to use object-oriented system analysis models. The case to select object-oriented model is it depend on the object rather than other model unlike structured model, so used object oriented which more power full and dominate the world of programing model. From object-oriented system analysis method, we have used the following designing diagrams listed below: -

- Use case diagram
- Sequence diagram
- State chart diagram
- Activity diagram
- Collaboration diagram
- Class diagram
- Components diagram
- Deployment diagram

2.9. Requirements specification

Determining requirement specification of an aimed automated application detail determined under the following subtitle. Those are:

2.9.1. Functional requirements

Under the functional requirement, a pointed software can perform a number of tasks. Because first, our aim is to minimize human effort and minimize system error, consequently most of functional requirement is depend on a challenges and error that found in a system when it is manipulated in manual ways. Those are:

- The system records land information according to land types within its owner. When registering land clearly, land information can register and specify land direction, land type, landowner.
- Generate report by expert employees and approved by manager based on report type like week report, month report, quarter report and year report then sends to manager.
- Generate landowner certificate for the landowners as needed immediately.
- Generate announcement constructed on types of proclamation like certificate announcing and other announcing then posted, by manager of an organization as well Administrator like to announce investments land for investor.
- Systematically manipulate land information grounded on land proclamation.

2.9.2. Non-functional requirements

Non-functional requirements of this project are to specify the system's quality characteristics or quality attributes and specifies how the system should behave or how a system should do. The new system can perform the following activities statically.

- **Performance**: -Response Time, Throughput: The proposed system can perform any activities in short time and the performance percentage should be high to provide best services to the user easily in short time.
- **Scalability**: -The proposed system is to make the system automate and it can disseminate to all South-west Shewa zone Woreda and Keble to perform all activities of the land users in automated based form and store all information of the Zone in secured database.
- **Capacity**: -The capacity of the new system is high because information of zone is huge. So that to store the huge amount of the zone information the proposed system has large capacity to store and perform any activities.
- **Availability**: - The new system is available to all the users and the employees of the office, the manager of the office and available to everyone who uses the application of the proposed system.

- **Security**: -The proposed system requires user name and password to perform any specific activities and it is secured from any data alteration, unauthorized access, data theft, and loss because it has login requirement to perform any activities. If someone try to access the system with error password the system after four faults disable the account and send report to the Administrator.
- **Manageability**: -The proposed system managed by one system Administrator to manage all the activities performed in every specific office by using one computer of the Administrator and the manager can manage all employees' activity.
- **Effectiveness and efficiency**: - the new system is effective by providing quality services, storing data in the database, updating information if necessary, deleting information in some emergencies or registering new information to the database in short time and everywhere.
- **Languages**: -two languages to increase system user understandability will implement in a software that we pregnant in our mind. Those languages are Oromo's language and English language.
- **Hardware consideration**: -The Software product to be developed should run on existing standard computers. The system will be portable to run on any type of computer, Android, iPhone mobile and it supports any type of browsers to browse.
- **User interface and human factors**: - Since users of the system will interface with the software to be deployed on a personal computer. When we consider the user interface on the personal computer since there is going to be different type of users. Generally, it will include the necessary features for each user with a user friendly and attractive interface.
- **Physical environment: -**The server must put on a place that has high security room. In addition, the client must put in the local area it must connect with server.
- **System modifications: -**The System modification can be achieving easily because the system is going to be design using an object-oriented approach. If there is change on the process of land, the system can be modify based on change criteria by the developers or any trained person that knows the code behind the system.

2.10. Feasibility analysis

A feasibility study evaluates this project potential for success. The feasibility of this web-based system application is for Rural Land Administration usage to improve the quality of data storing,

saving of cost, reduce time consumption, user friendly, easy and simple for use. This project determines the best solution for the existing manual system and the proposed system is reliable.

2.10.1. Technical feasibility

The system is technically feasible; the existing system requires human power and detailed understanding of paper-based work and this is not easy to perform any landholder profile. However, the new system is very easily understandable by the workers in land Administration office because of graphical interface is friendly, easy to use by beginner and senior employees as well as the manager can manage, register, update, delete and search the land-holder profile in easy way. This satisfies the landholder's requirement to working; as they want in short time to save the time, cost, and energy of both landholders and the organization of South-West Shewa Zone Land Administration. Moreover, organization has ICT center that has the ability to maintain if the system may have failed as well as implement the system in a good manner.

2.10.2. Operational feasibility

The system is operational feasible as it very easy for the end users to operate it. It only needs basic information about windows platform. The proposed system offers effective controls to protect data and information accuracy and security of the organization against any theft. The changes of the new system are using automated based system to perform rural Land Administration work in easily way and the organization structure is changed from manual to automated based; the employees must take training about the new system. Moreover, the system is operationally feasible because it uses less knowledge of computer.

2.10.3. Economic feasibility

The proposed system provides a choice of services with efficient and reliable web-based system. The cost of the new system is less as compared to the current paper based manual system in which it requires small number of employees and it reduces costs for buying of paper. In a manual system the system needs a number of costs for buying paper, transport cost for information exchange between zone and Woreda, need much labor to run the system properly, and etc. However, the proposed system unlike manual no need high cost needless labor. As part of this, the costs and benefits associated with the proposed system compared and the project is economically feasible only if tangible or intangible benefits outweigh costs.

Tangible benefits: includes **e**rror reduction, cost reduction, increased service, decrease uses of paper other materials, reduce number of employers and reduce wastage of time.

Intangible benefits: The following are intangible benefits: improved employer's moral, motivate the staff, **l**ittle job burden to employers of South-West Shewa Zone Land Administration office, better service to South-West Shewa Zone Land Administration office, better decision making, speed of activities and services, work flow is efficient. So proposed system is economical more feasible than manual one.

2.10.4. Behavioural feasibility

People are inherently resistant to change, and computers has been a known one to facilitate changes. An estimate should be made of how strong a reaction the user staff is likely to have towards the development of a computerized system. Therefore, it is understandable that the introduction of a candidate system requires special efforts to educate and train the citizen. Our proposed system works to minimize the human errors, take less time, easy interaction with user and infection free. This project shall expand further by connecting various interrelated companies. The basic questions that should be raise in behind this feasibility include the following:

- Is there sufficient support for the users?
- Will the proposed system cause harm?
- Is it changing the organizational structure?

This project would be beneficial because it satisfies the objectives when developed and has installed correctly. All behavioral aspects consider careful and conclude that the project is behaviorally feasible.

2.10.5. Schedule feasibility

Most of the project's failures occur due to the project has not schedule feasible around 90% in a world. For this reason, we are deeply focus on schedule feasibility to overcame project failures at this side. To overcome that we raised some question and answered it: -

1. How complete this project in a given time? Answer; we should have awesome plan that cannot clashed within an academic class schedule.
2. What shall we do at meeting? Answer, start and continuous from where the project status is.
3. How we contact our Advisor? Answer, on a scheduled time to contact our advisor that we planned with our advisor.
4. What the time given for our project? Answer, one year and project has two-part first part documentation and as well as part two is implementation in a second semester.

This project has a feasibility of schedule because project team has a good plan to complete in given time with full function as expected. In addition, project has feasible within a finance schedule because economically our project is feasible due to cost needed for our project as we scheduled is too less and no need another additional cost. Generally, project schedule feasibility is fully feasible in all side.

CHAPTER THREE (3)

3. SYSTEM DESIGN AND ARTIFACTS

3.1. Overview

Under this topic we are going to brutally depicts over all of the system design, artifacts of the system like system architecture and unified model languages like use case, sequence diagram, using the System design process as well as focuses on decomposing the system into manageable parts. During requirements analysis, we concentrated on the purpose and the functionality of the system. During system design, we focus on the processes, data structures, and software and hardware components necessary to implement it. The challenge of system design is that many conflicting criteria and constraints need to meet when decomposing the system. The analysis model describes the system completely from the actors' point of view and serves as the basis of communication between the client and the developers. The analysis model, however, does not contain information about the internal structure of the system, its hardware configuration, or, more generally, how the system should realize. System design results in the following products:

- List of design goals, describing the qualities of the system that developers should optimize.
- Webpage architecture, describing the subsystem decomposition in terms of subsystem responsibilities, dependencies among subsystems, subsystem mapping to hardware, and major policy decisions such as control flow, access control, and data storage.

3.2. System architecture

According to intended software, we are going to develop three-tier system. Three-tier means one is client side, webserver-based system and the third one is database server, so our system is three tier-based system. The case that force us as we make the system to three-tier system our system is web-based system, in web system client is one tier and also web server is another second tier as well as database server is third tier. Diagrammatically illustrated as follows based on three tier-based system and all architecture included in the diagram clearly.

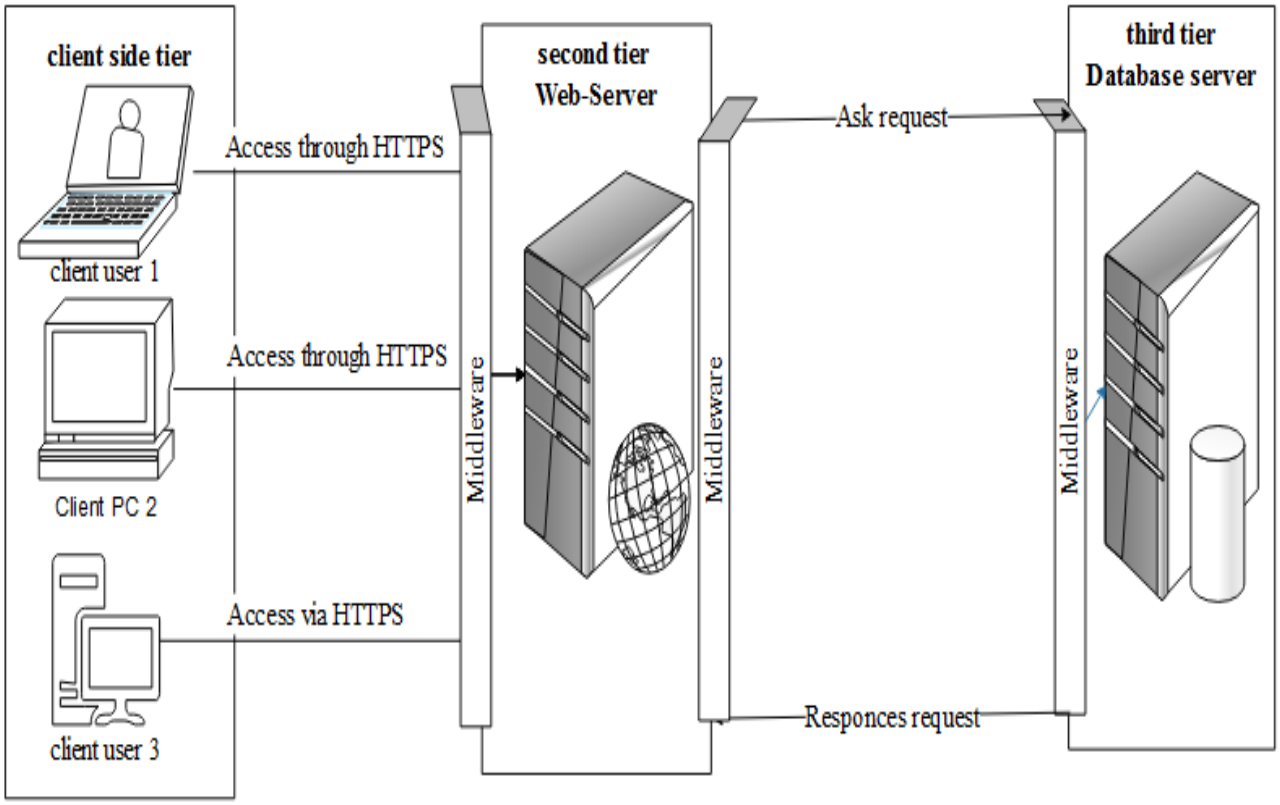


Figure 3.2-1-system tier architecture

3.2.1. System architecture layer

Under this topic, we are going deeply visualize class architecture software. There are many layers available, the most common are: -

3.2.2. User interface layer

In our system user, interface layer is the available at end user of software. Provide awesome interaction face for the user.

3.2.3. Process layer

By using this layer, we are going to visualize the implementation of business logic that involves collaborating with several domain classes or even other process classes.

3.2.4. Domain layer

Under this, we are going describe this layer for the usage of transfer data from application layer or presentation layer to data layer. By using the layer, we also used when a class variable is declared corresponding to the fields of the database which can be required for the application and make the properties. So that, the team can get or sets the data using these properties into the variables.

3.2.5. Persistence layer

By using, a layer we are encapsulates the capability to store, retrieve, and delete objects/data permanently without revealing details of the underlying storage technology. Set data to the database queries back and forth.

3.2.6. System layer

By using this layer, we provide operating system software from the operating system (OS) by wrapping OS portability of our application. Diagrammatically all layers look like the following: -

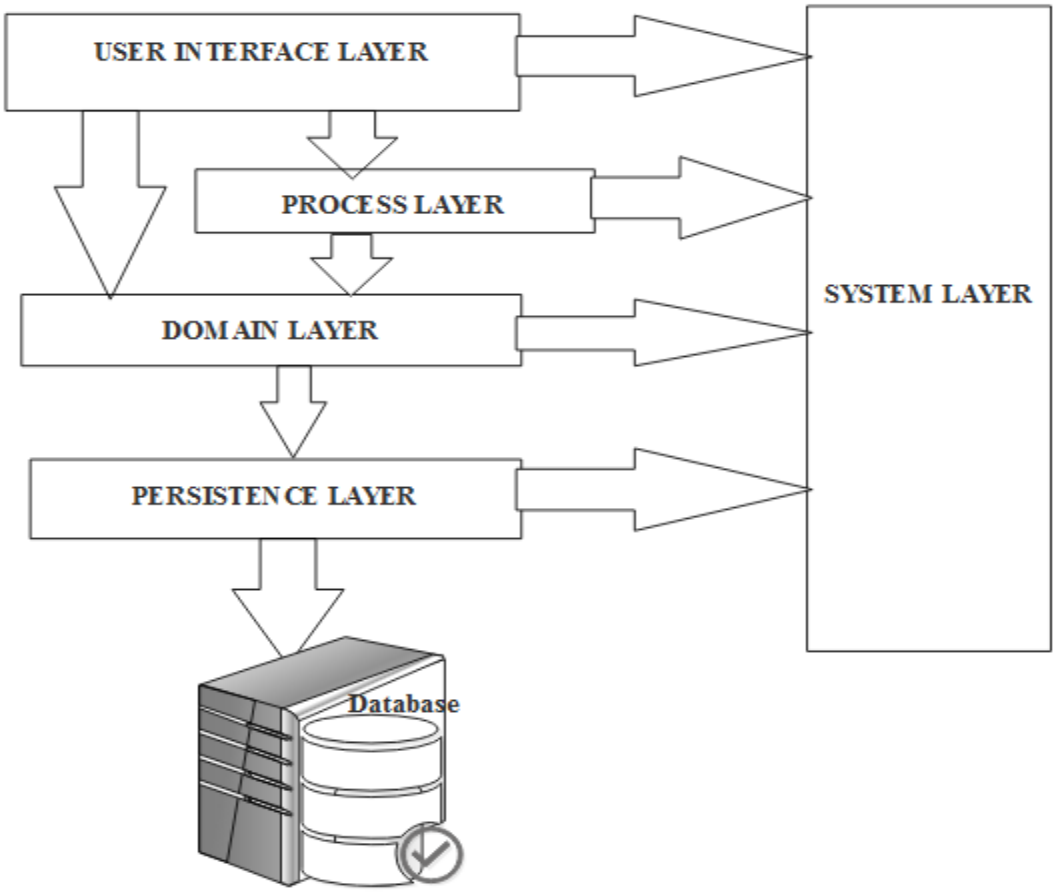


Figure 3.2-2 system class's architecture diagram

3.3. UML of proposed system

The new proposed system has some modification than that of oldest system because when some new system born or developed it has the ability to add some feature due to this this system add like system Admin that obviously not known in existing system and has a bounder unlike oldest system. Therefore, new proposed system visualized by using use case diagram, because as we portrayed above, we are using object oriented based system due to this by using unified modelling languages

we depict more about function relation to an actor of the system illustrated here. Basic UML diagram we are going to design are-

- Use case diagram
- Sequence diagram
- Collaboration diagram
- State chart diagram
- Class diagram
- Component diagram
- Deployment diagram

3.3.1. Use cases and use case description

- **Actor of proposed system: -** team using actor to depict those out of the system bounder and interact to the system. Those are:
  - **Administrator**: has full privilege (full authority) over all system.
  - **Manage**r: has almost more privilege to manipulate over the function.
  - **Expert**: has some authority specially concern to land issue.
  - **Landowner**: almost has no privilege to the system manipulation.
- **Use case of system**: we are using a use case to illustration the interaction flanked by system users and a system. Its apprehensions the goal of the users and the blame of the system to its users. Those are:

- Login
- Land registration
- Expert registration
- Generate report
- View report
- Update account
- Update land info
- Disable account
- Enable account
- View land profile
- Post announcement
- Give Feedback
- View feedback
- Generate certificate
- Update certificate
- Approve certificate
- View certificate
- Read announcement
- Create account
- View account profile
- Searching things
- Writing message
- Reading message

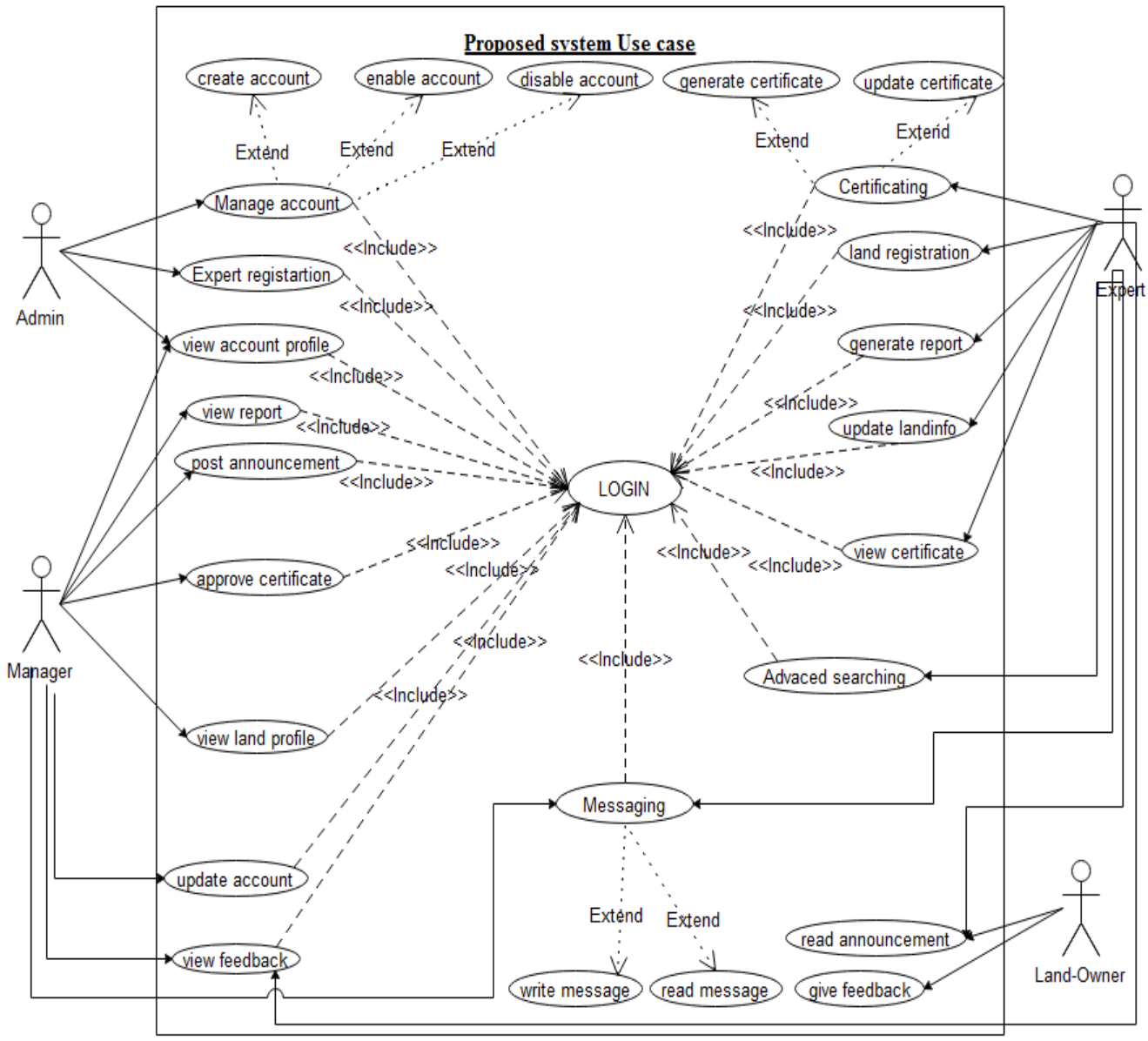


Figure 3.3-1 use case diagram for proposed system

Use Case explanation (Description).

Table 3.3-1 use case description for manipulate user profile

Use case number	**USC 1**
Use case name	Manage account
Actor	Admin

Description	Admin has a privilege to disable account, enable account status and if there is a new employment create new account for newcomer.
Pre-condition	System Admin, entomb by his/her username and password as an Admin of the system.
Basic course of action	➢ Browse website by using any browser. ➢ System display Home page ➢ From home page click on login link. ➢ From system, login form immediately displays ➢ Insert user name and password correctly in login form. ➢ System identify user type based inserted user name and password direct to the Admin page if the inserted data is correct. ➢ From the Admin main page, at left side when hover the mouse over exactly on manage, account there is drop dawn list like disable, enable, and create account and other. ➢ Select from list manipulate as needed. ➢ Uses ended.
Post condition	Account enabled, disabled, or newly created successfully.

Table 3.3-2 use case description for register expert employees

Use case number	**USC 2**
Use case name	Register expert
Actor	Admin and Manager
Description	Admin register expert immediately after hired to office and create account for new expert that registered to organization.
Pre-condition	➢ Human resource hired new expert for office. ➢ Admin and Manager login as Admin and manager to do
Basic course of action	➢ Login as an Admin first ➢ Admin main page will display immediately. ➢ From go to left and click on register link ➢ System display registering form ➢ Fill full information on a form correctly because form can check withstand inserted data is correct or not.

	➢ Then press or click on register ➢ Use case ended.
Post condition	Expert registered after that account can created for him.
Alternative course of action	Manager can register if an Admin is not existing for the time manager can register newcomer expert employees.

Table 3.3-3 use case description for logout

Use case number	**USC 3**
Use case name	Logout
Actor	Manager, Admin and expert employees
Description	Admin, manager and Expert should be logout the account because for the security reason.
Pre-condition	To be logout first should be in an account.
Basic course of action	➢ To logout in all page logout, button available at the right-side top. ➢ Click on that button than wait until the process will complete. ➢ System go back to Home page of the system ➢ Use case ended.
Post condition	User work place closed or page closed and return to home page.

Table 3.3-4 use case description for view feedback

Use case number	**USC 4**
Use case name	View feedback
Actor	Manager and Expert
Description	Manager and Expert employees view feedback that write by landowner or other who see website.
Pre-condition	First manager and expert employees inter by their account to view comment that written for them. Specially comment that written by landowner concern expert should replay as soon as to minimize dispute overland. System has the capability to indicate if there is new feedback.

Basic course of action	➢ Expert and manager inter to their account exactly. ➢ System display main page of each of them. From their main page, there is feedback at the left hand on page. ➢ Click on it ➢ System display a list of feedback. ➢ User select one of it. ➢ System display full of written feedback to user. ➢ Read and close or replay to other. ➢ Use case closed.
Post condition	Existing feedback viewed.
Admin	If there is incorrect issue, admin can access the feedback or simple Admin can view feedback.

Table 3.3-5 use case description for Post announcements

Use case number	**USC 5**
Use case name	Post announcement
Actor	Manager and Admin
Description	Manager post new announcement to anyone on home page of the SWSZ-RLMS web site. In addition to this if there a new certificate generated and want to deliver to the certificates owner first it announced than certified owner check it withstand it correct or not and write feedback.
Pre-condition	Admin and Manager first enter into his/her account as manager and goes to post announcement page.
Basic course of action	➢ Manager, login as manager correctly within his/her account ➢ Go to left side of the main page ➢ Click on the announcement ➢ System display form provided for writing announcement. ➢ Writing announcement and press post button. ➢ System save it in database and display on home page based on date time it posted. ➢ Use case closed.

Post condition	Announcement posted on Home page and available on home page according to posted date.
Alternative course of action	Sometime system Administrator can post new issue as needed. In addition, if manager not available to post news Admin can post.

Table 3.3-6 use case description for check report

Use case number	**USC 6**
Use case name	Check report
Actor	Manager
Description	Report written by any expert employees saved in a database than deliver to manager, manager check the report according to its types and according to deliver date.
Pre-condition	Manager first login as manager to see report written by any expert employees.
Basic course of action	➢ Manager login as manager to his/her main page than go to left hand to listed menu. ➢ Click on report check menu. ➢ System display list of report according to its written time ➢ Manager select among that list needed report to view. ➢ System display in detail selected report. ➢ Then press, close button after finish reading. ➢ Use case closed.
Post condition	Report checked by manager.

Table 3.3-7 use case description for view certificate

Use case number	**USC 7**
Use case name	View certificate
Actor	Expert employees

Description	Expert view certificate because certificate has expert date based on type. Therefore, to view certificate is one activity that performed in a system.
Pre-condition	Expert employees inter as expert employees to access check certificate page and based on the information if it has error can amended.
Basic course of action	➢ Over the whole expert, inter as expert to access this page. ➢ Go to left hand on expert main page click on certificate menu. ➢ System display a list of certification action. ➢ Select view certificate page among listed menu. ➢ System display list of available certificates than read it. ➢ Close ➢ Close use case.
Post condition	Certificate checked to amend (corrected).
Alternative course of action	Manager has a privilege to view a list of certificates. Based on needed time to see (view) certificate.

Table 3.3-8 use case description for read message

Use case number	**USC 8**
Use case name	Reading
Actor	Admin, Manager and Expert employees
Description	Admin, Manager and expert employees reading message written for them by another body. Messaging written for specific body reach only that person.
Pre-condition	Login by their an account and goes to concerned page Message written by another body and send to them to see message.
Basic course of action	➢ First each user login to their page ➢ Go to top page on message box. ➢ System indicate if there is a message as new message available to the user on message box. ➢ Click on Box ➢ System display list of available messages to the user.

	➢ User select needed message to read ➢ System display message detail to user ➢ Read and press close button under message. ➢ Use ended.
Post condition	Read Message and message catalog will be empty.

Table 3.3-9 use case description for update certificate

Use case number	**USC 9**
Use case name	Update certificate
Actor	Expert
Description	Expert employees update certificate incase land may rent, inherent for family to child, from investor to another investor and from IMX team to another IMX team and for any case.
Pre-condition	To update certificate should be based on land proclamation updating and to update first inter as expert employees.
Basic course of action	➢ Expert login to his/her account to access this page. ➢ Go to left on main page of expert than click on certificate. ➢ System display list of certificate option. ➢ Select update certificate menu. ➢ System display search form. ➢ Insert land code in the provided place than press enter from keyboard. ➢ Based on land code selected certificate form display. ➢ Then amended as needed. ➢ Press save button from bottom of form. ➢ System save it in database. ➢ Uses ended.
Post condition	Certificate upgraded to recent information

Table 3.3-10 use case description for write message

Use case number	**USC 10**
Use case name	Writing message
Actor	Expert, manager and Admin

Description	Each user can write message with each other for specific issue to discuss with each other.
Pre-condition	To write message login equally expert, manager, admin of the system write message. Then goes to message page and select write.
Basic course of action	➢ Login to their account than go to message menu. ➢ Press message menu ➢ System display list of option for message. ➢ Among that, select write message link. ➢ System display message form to write. ➢ Write message and press send button to specified body. ➢ Closed uses cases.
Post condition	Written message and Sent.

Table 3.3-11 use case description for view land profile

Use case number	**USC 11**
Use case name	View land profile
Actor	Expert and Manager.
Description	Expert and manager have an authority to view the detail of the registered land information within its owner and certificate.
Pre-condition	Manager and Expert employees enter as an expert and manger than go to the page select specific land by land code.
Basic course of action	➢ Login to their page ➢ Go to left and select land menu ➢ System display list of land option. ➢ Select view land profile. ➢ System display list of land profile ➢ Select one or search by land code. ➢ Use case close.
Post condition	Land information and owner of land information viewed by Expert and by manger.

Table 3.3-12 use case description for generate report

Use case number	**USC 12**

Use case name	Generate report
Actor	Expert employees
Description	Expert employees generate report, what they done in a week, month and year and send to their manager.
Pre-condition	Expert must have some job done by them to write and login as expert employees.
Basic course of action	➢ Login to their main page. ➢ Go to left hand on main page ➢ Select generate report menu ➢ System display list of type of report ➢ Select needed menu. ➢ System display form based selected type ➢ Fill form provided according to its type ➢ Press sends ➢ Use case closed.
Post condition	Generated report sent to manager successfully.

Table 3.3-13 use case description for updating land information

Use case number	**USC 13**
Use case name	Updating land info
Actor	Expert employees.
Description	Expert employees change information of land or update to the latest information in case land rented, inherent land, investment land and IMX land.
Pre-condition	Expert login and goes into update land information page.
Basic course of action	➢ Expert login to his/her main page. ➢ Go to left and select land menu. ➢ System display list land option ➢ Select land information update menu. ➢ System display list of land registered ➢ Select one among that and update ➢ Press saves ➢ Use case closed.

Post condition	Land information updated to new information, reregistered, and upgraded within new information.

Table 3.3-14 use case description for see announcement

Use case number	**USC 14**
Use case name	Check announcement
Actor	Expert employees and landholders'
Description	Expert and landholder can see announcements written by either Admin or Manager of the system and posted on system notification board.
Pre-condition	Either manager or Admin inter as manager or admin and post notification to read.
Basic course of action	➢ Browse SWSZ-RLMS website. ➢ From displayed Home page go to latest news. ➢ Press latest news menu ➢ System display list of news according to posted date. ➢ Select one from listed news and press read more button ➢ System display full news ➢ Use case closed.
Post condition	Viewed announcements according to posted date.

Table 3.3-15 use case description for give feedback

Use case number	**USC 15**
Use case name	Give feedback
Actor	Landholder and other.
Description	The holder give feedback to the expert employees based on certificate prepared and notified on a board. After certificate is prepared it posted on system board than if it has error landowner write feedback to expert.
Pre-condition	Landowner read notified notification especially about their certificate.

Basic course of action	➢ First browse SWSZ-RLMS website ➢ Go to Feedback link and click on it. ➢ System display form provided for this case. ➢ Fill information and write message than click on send message button. ➢ System save it in database ➢ Use case closed.
Post condition	After write and press send feedback, it will reach to expert feedback catalog.

Table 3.3-16 use case description for login

Use case number	**USC 16**
Use case name	Login
Actor	Admin, Manager and Expert employees'
Description	Admin, Manager and expert employees' login or inter into system to do some function they should login to their page.
Pre-condition	Each user has an account to login a system by using their own user name and password each user inters into their own specified dashboard.
Basic course of action	➢ Browse website using nay browser. ➢ Home page display ➢ Go to login link at top of right ➢ Click on it ➢ System display login form provided ➢ Fill user name and password. ➢ System check user name and password in DB if invalid responses incorrect retry for three times, ➢ If correct system specifies user type and direct to correct page. ➢ Main page display based on user type. ➢ Use case ended.
Post condition	Goes into main page or dashboard of user.

Table 3.3-17 Use case description for prepare certificate

Use case number	USC 17
Use case name	Generate certificate
Actor	Expert employees
Description	Preparing certificate for landowner to specify one from another. Expert employees do this process of preparing certificate.
Pre-condition	Land should be register first within its owner. After that certificate can prepared from registered land.
Basic course of action	➢ Expert login and go to certificate and click on it. ➢ System display list of option ➢ Select generate certificate menu. ➢ System display form ➢ Fill correctly. ➢ Save and printed ➢ Use case ended.
Post condition	Prepared certificate will be print and distributed for owner.

3.3.2. Sequence diagram

In sequence diagram, we are going to try to describe sequence of starting to finish each function. By using Sequence diagram, we define event sequences, which would have a desired outcome. The focus is more on the order in which messages occur than on the message per second. However, the majority of sequence diagrams will communicate what messages sent and the order in which they tend to occur.

Sequence diagram for login

In this diagram team going to describe how the sequence needed for login by using sequence diagram and make visualize the step to login sequence action.

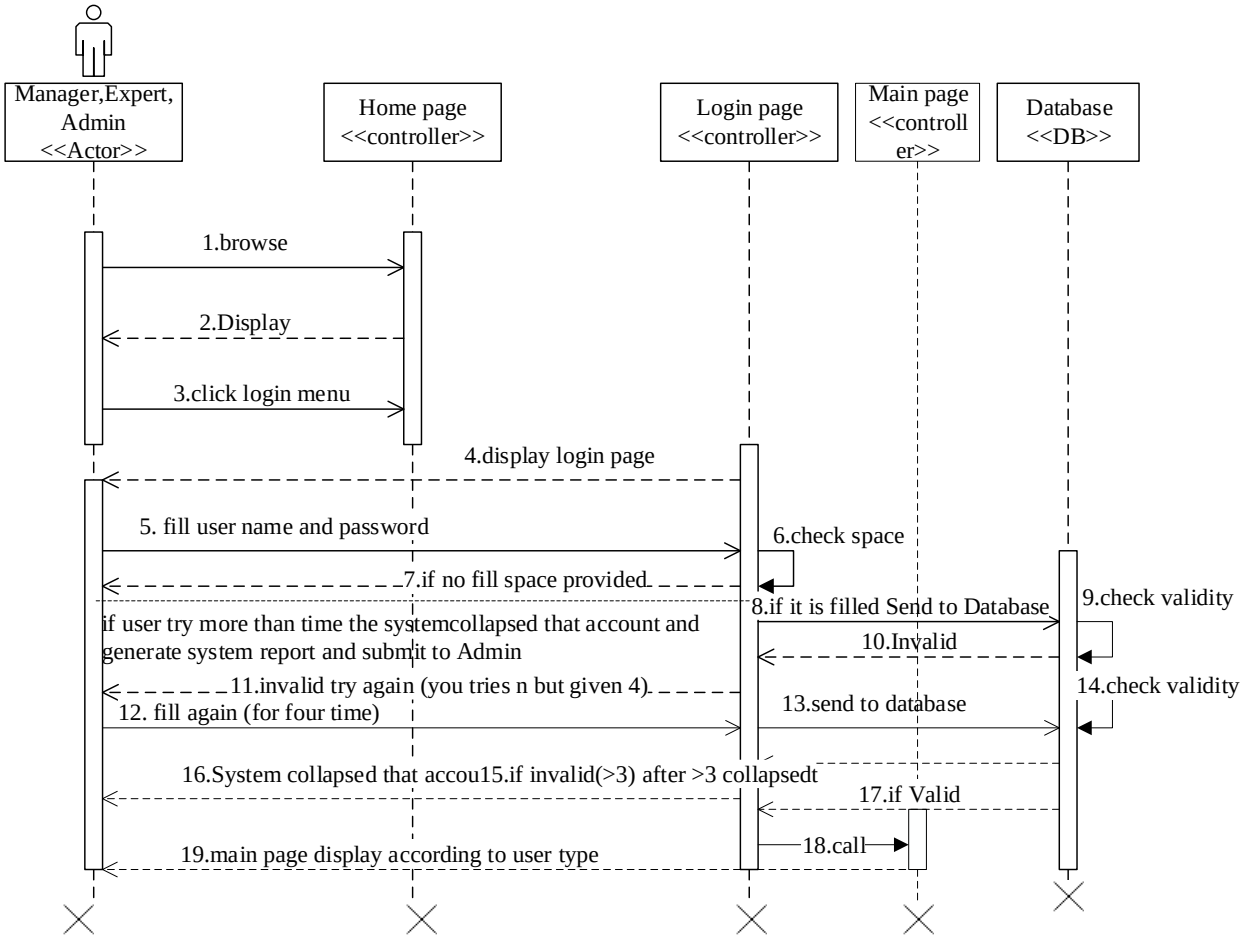


Figure 3.3-2 sequence diagram for login

Sequence diagram for land registration

Under this issue, we are going to depict brutally about land registration system by sequence diagram. Land registration performed by expert employees but checked by manager.

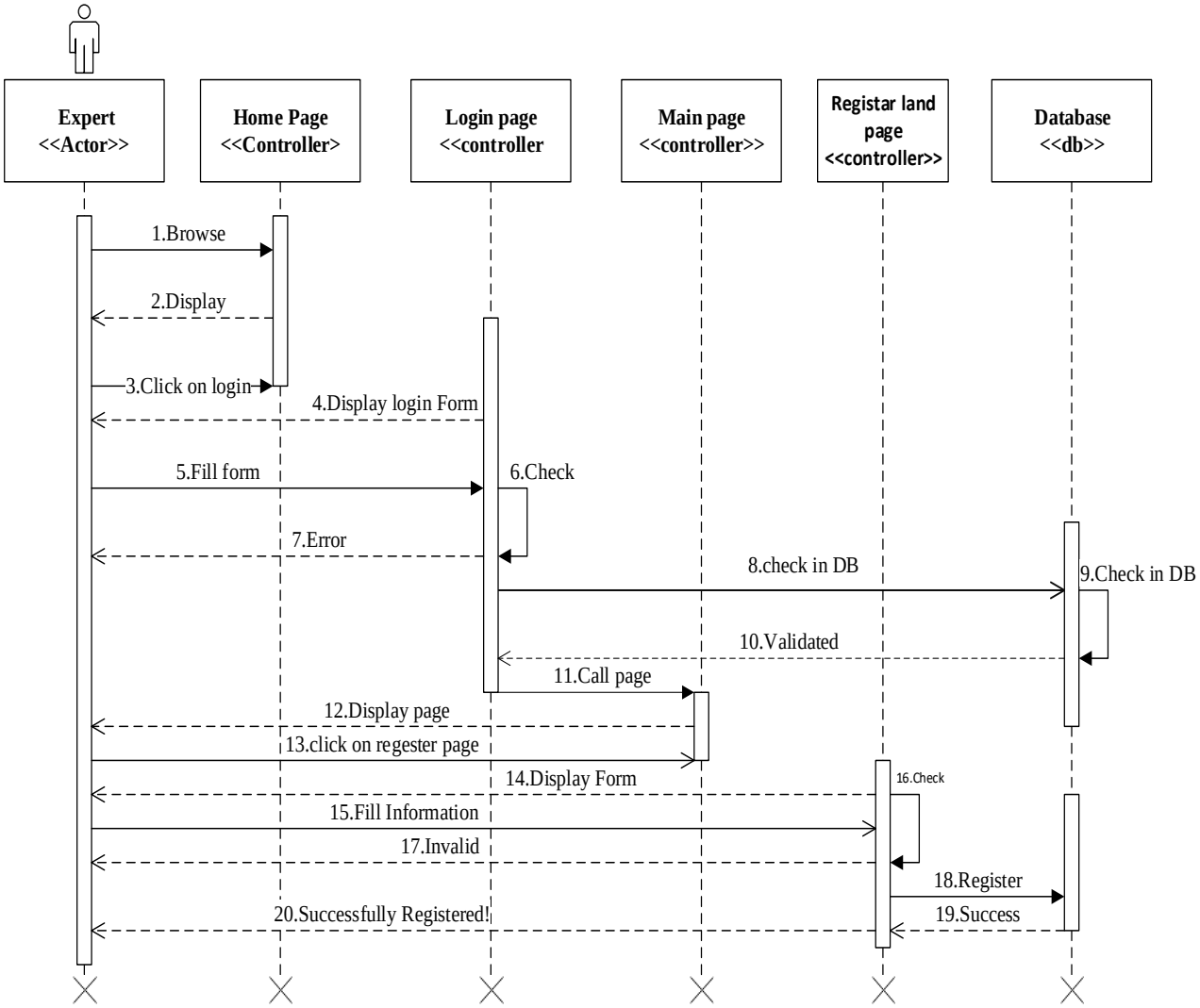


Figure 3.3-3 Sequence diagram for land registration

Sequence diagram for Register Expert employees

Registration for expert done by Admin of the system, so according to the system team going to describe expert employee registration system sequence by sequence diagram with full description diagrammatically.

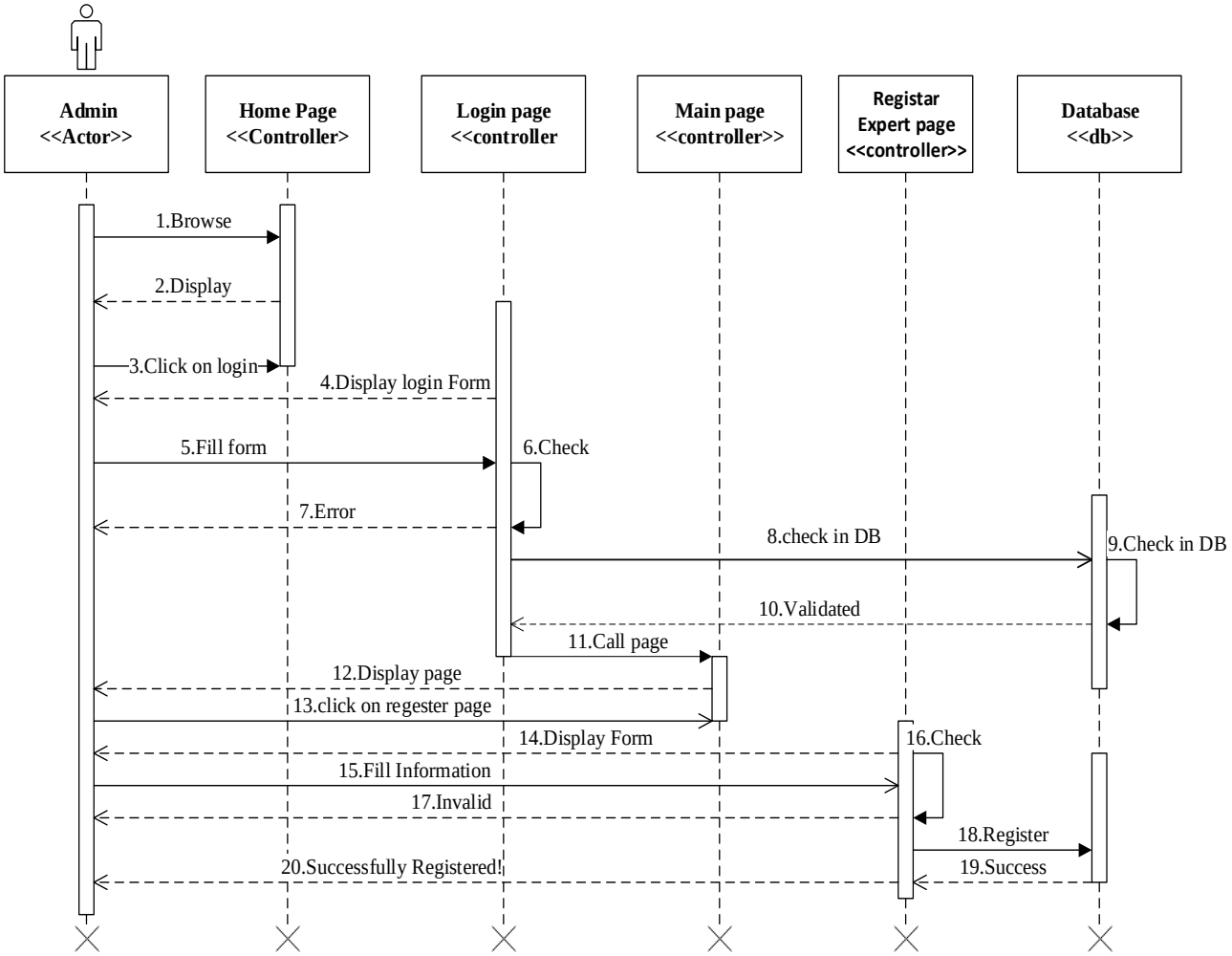


Figure 3.3-4 sequence diagram for registration of expert employees

Sequence diagram for prepare owner certificate

By using this diagram, or sequence diagram team going to describe how the system going to, to prepare certificate for landowner. More over preparing the certificate done into two ways, one is oldest one and the next based on modernized certificate system. Due to this, we are going to depict modernized based certification preparation system.

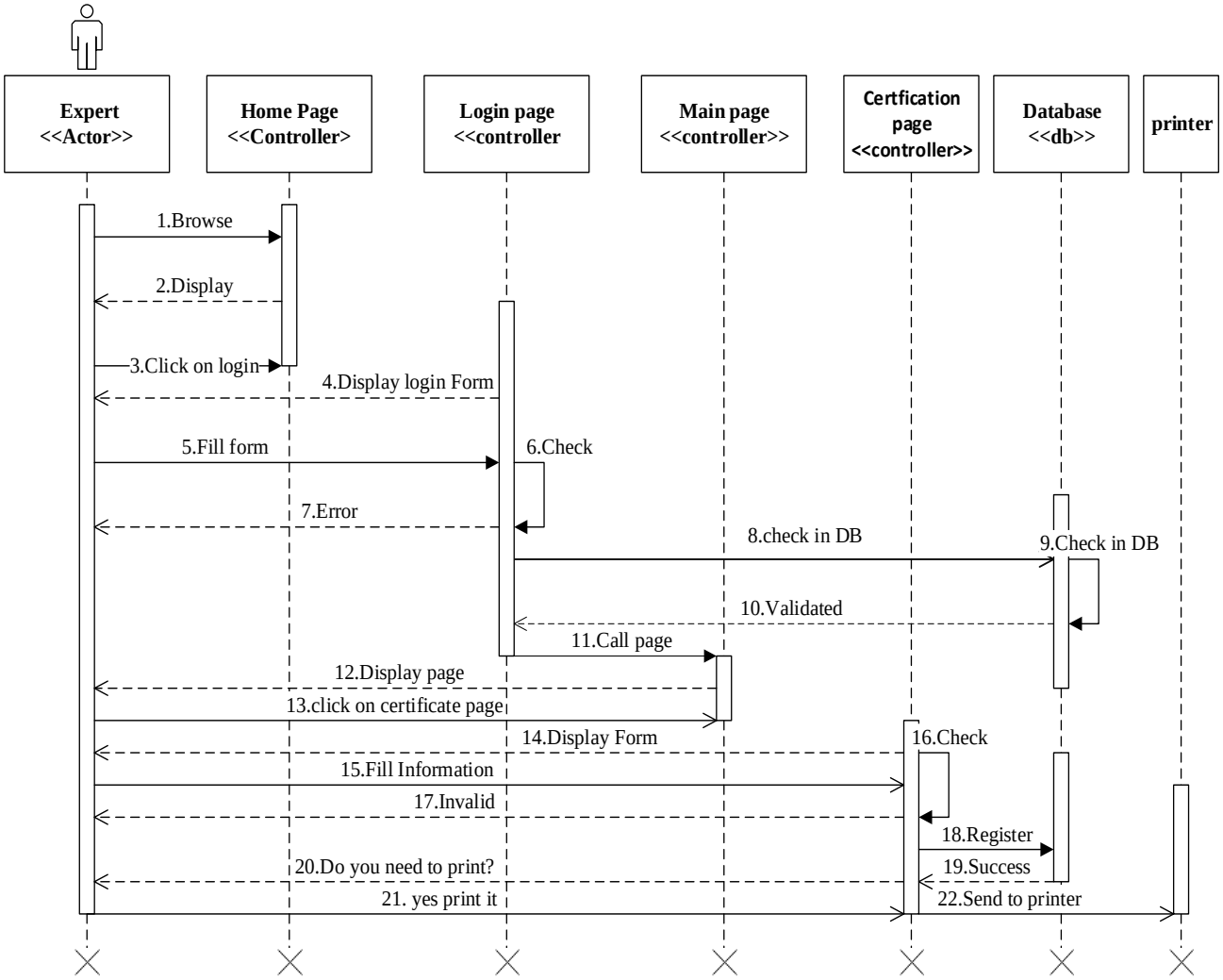


Figure 3.3-5 sequence diagram for prepare land owner certificate

Sequence diagram for announcing announcements

How the system notifies the notification on a board? Team are going to describe sequence of notification on a system board by using sequence diagram.

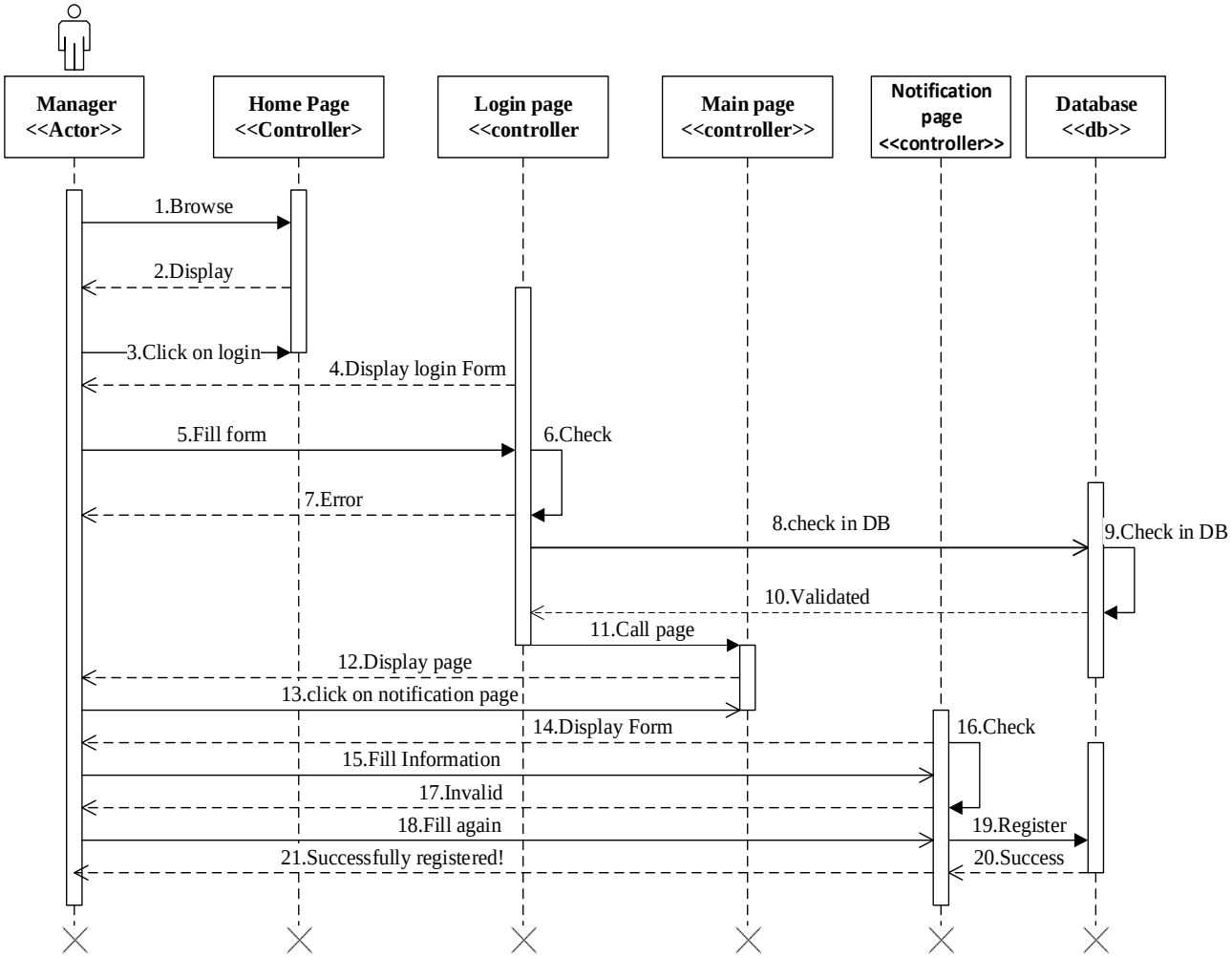


Figure 3.3-6 sequence diagram for posting announcements

Sequence diagram for generate report

By sequence diagram, how step of writing report going too depicted by sequence diagram. There are many types of report writing in our system, so we are going to depict them by using sequence diagram each sequence clearly.

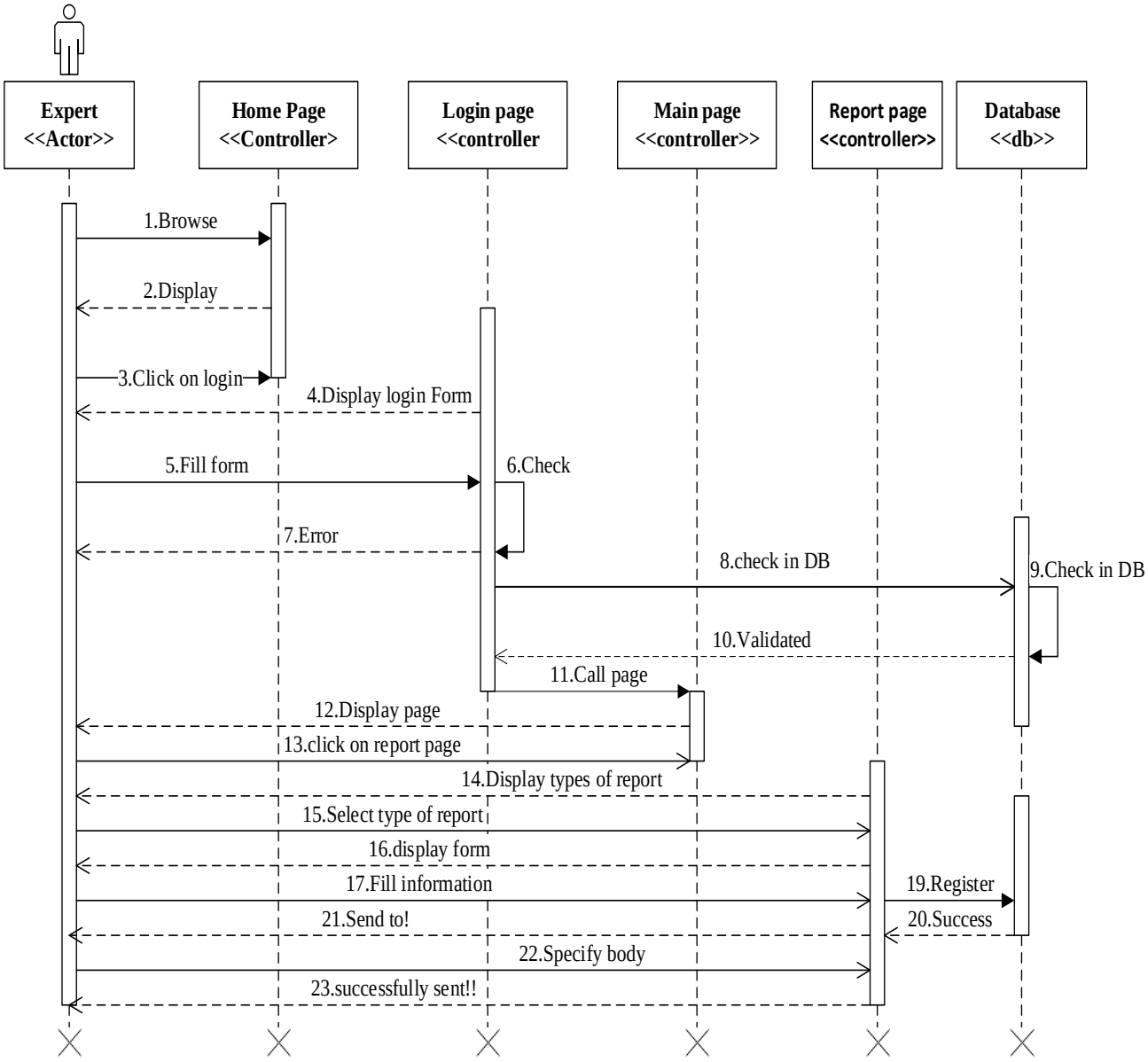


Figure 3.3-7 sequence diagram for generate report

Sequence diagram to write message

How the message written in sequence step is describe by using sequence diagram, within full description here.

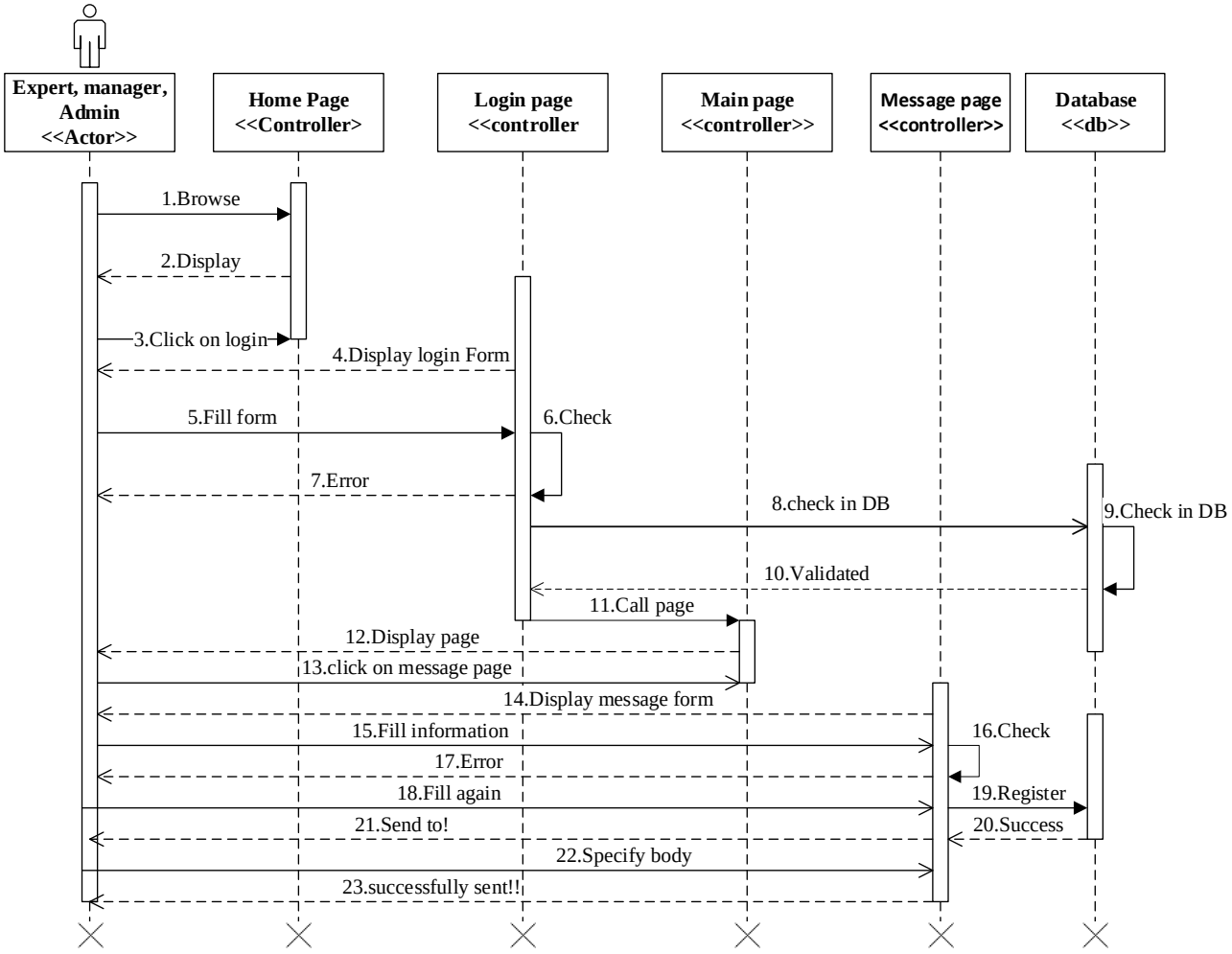


Figure 3.3-8 sequence diagram for write message

Sequence diagram to see announcements

Seen notification no need any account because it displays on home page link, so no need any account. Anyone can see notification board due to this the sequence needed to see announcements is written here by using sequence diagram.

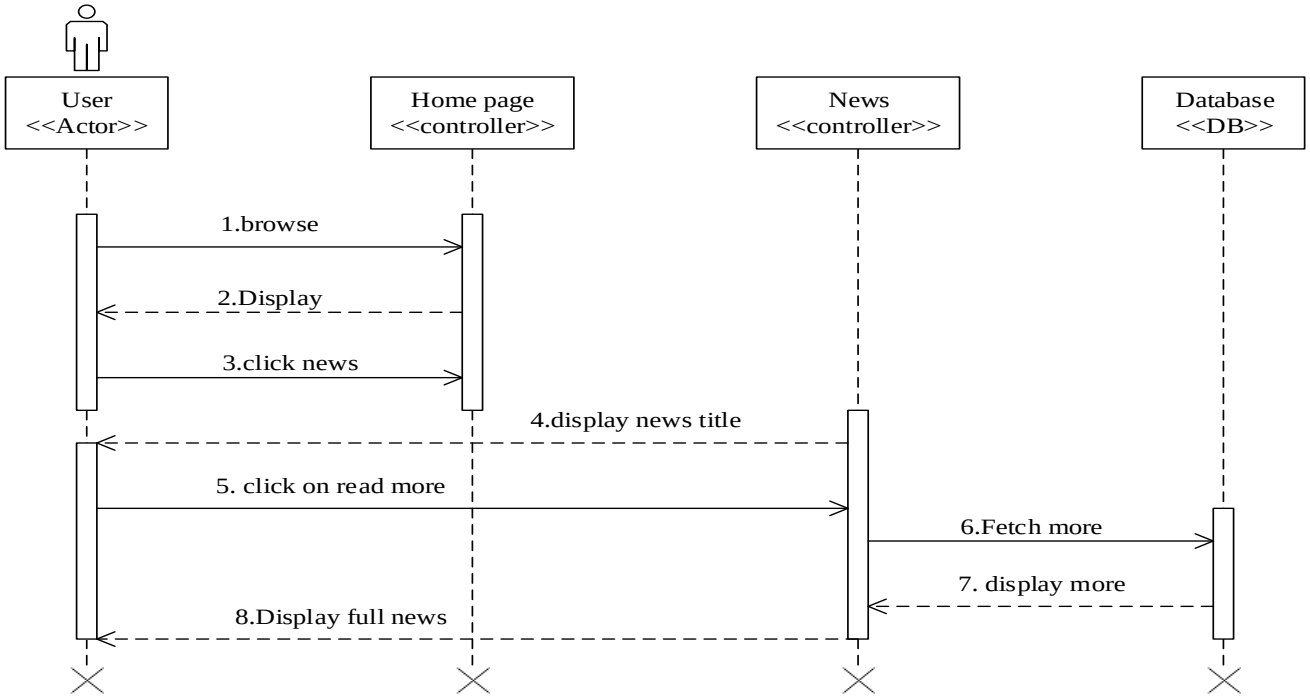


Figure 3.3-9 sequence diagram to see announcements

Sequence diagram to send feedback

Write feedback can performed by anybody and landowner write feedback depend on certification announcements if the certification has error that notified on a system board. To write feedback system no need any account but you should write your name and phone number.

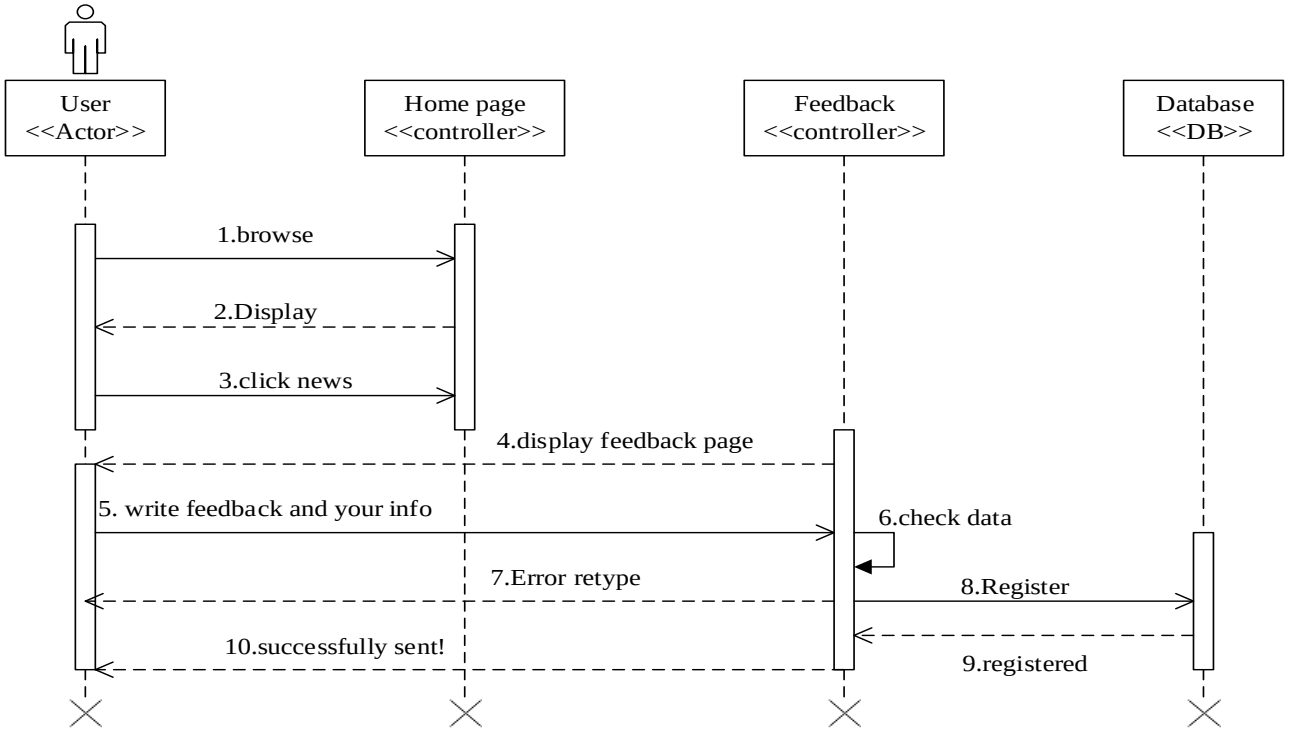


Figure 3.3-10 sequence diagram to send feedback

Sequence diagram for update user account

By using sequence diagram team going to describe sequence to update user account. Each sequence to update account will done here.

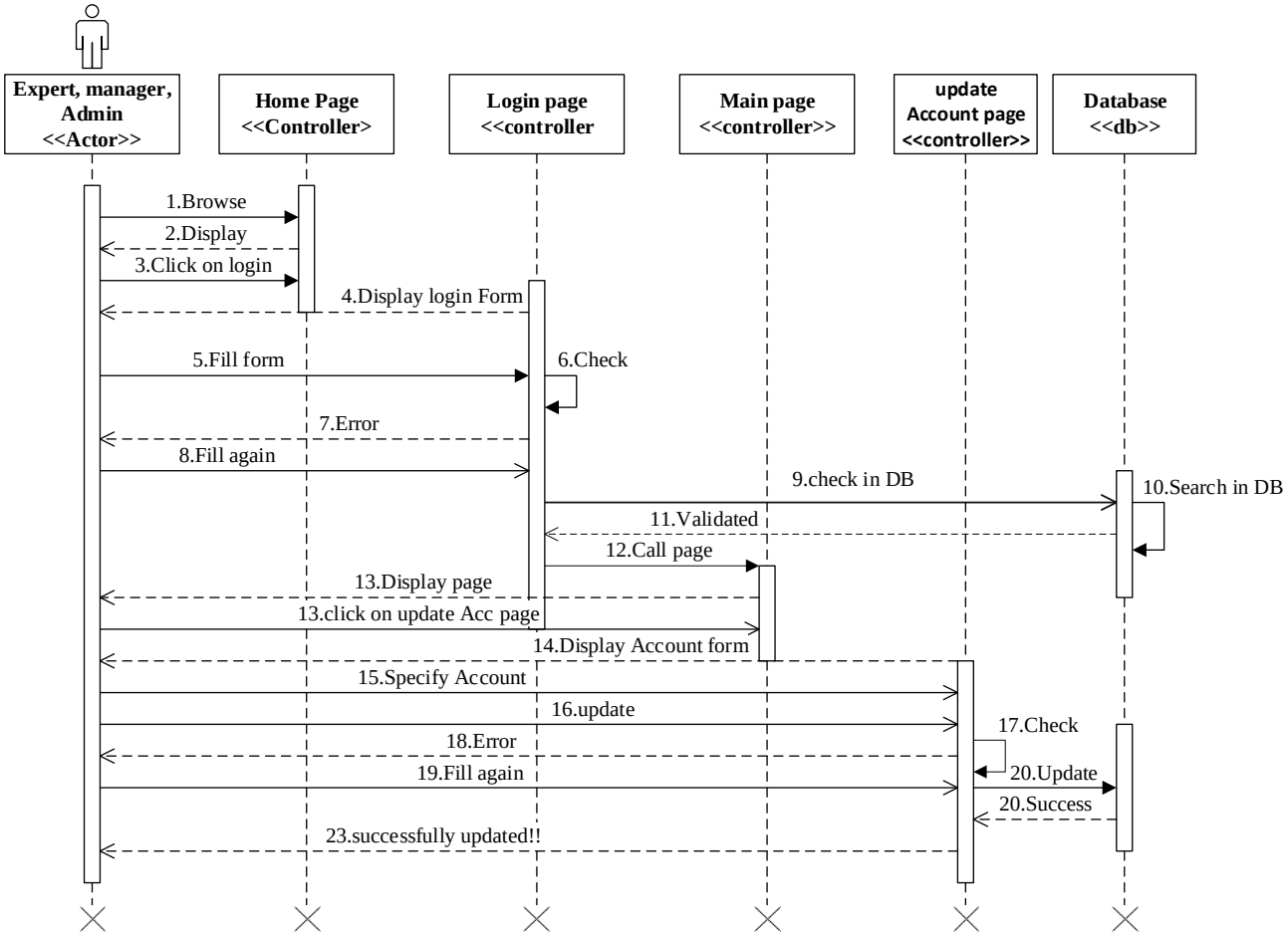


Figure 3.3-11 sequence diagram for update account

Sequence diagram for read message

Message written for specific body by specific body, so to read a message that written for someone by someone step done by using sequence diagram as follow.

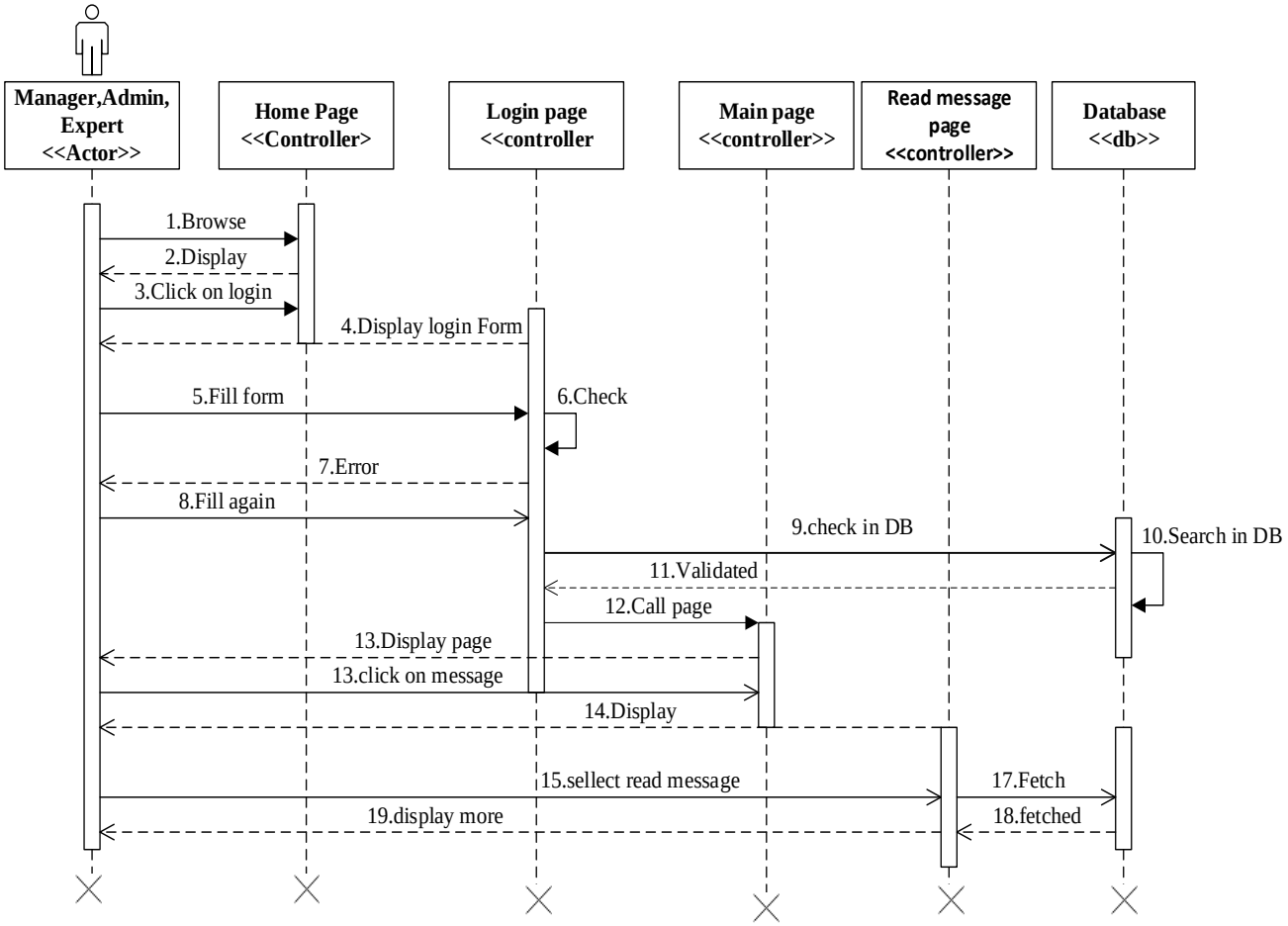


Figure 3.3-12 sequence diagram for see message

Sequence diagram for view report

How the sequence to check report will be depict here by using sequence diagram and clearly describe each step for view or check report by using sequence diagram. View report is manager and system admin job so, they have the privilege to see or view a report.

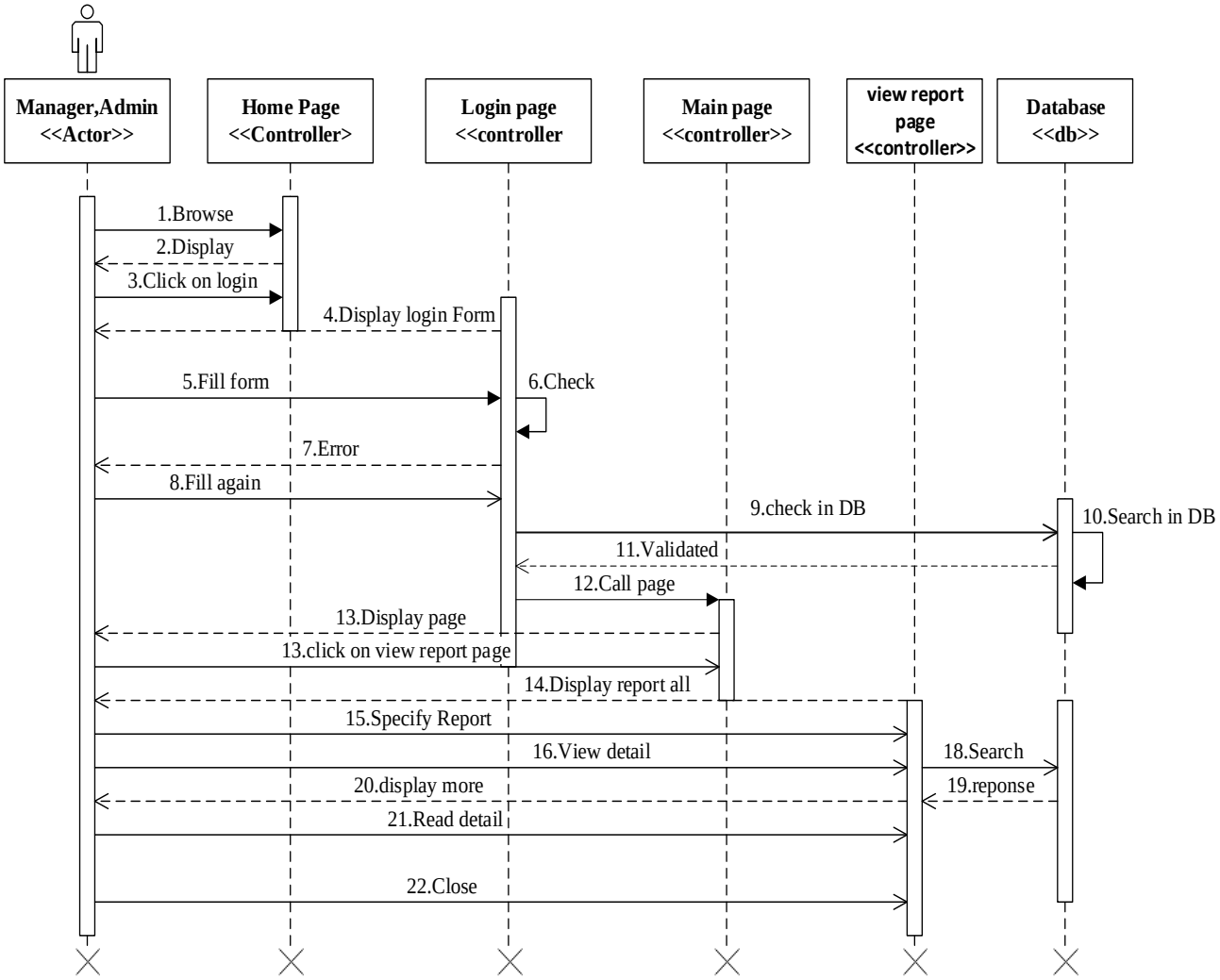


Figure 3.3-13 sequence diagram to view report in detail

Sequence diagram to view expert detail information

System Admin and manager has the privilege to see detail about expert employees, so the sequence to see expert information depicted here by using sequence diagram.

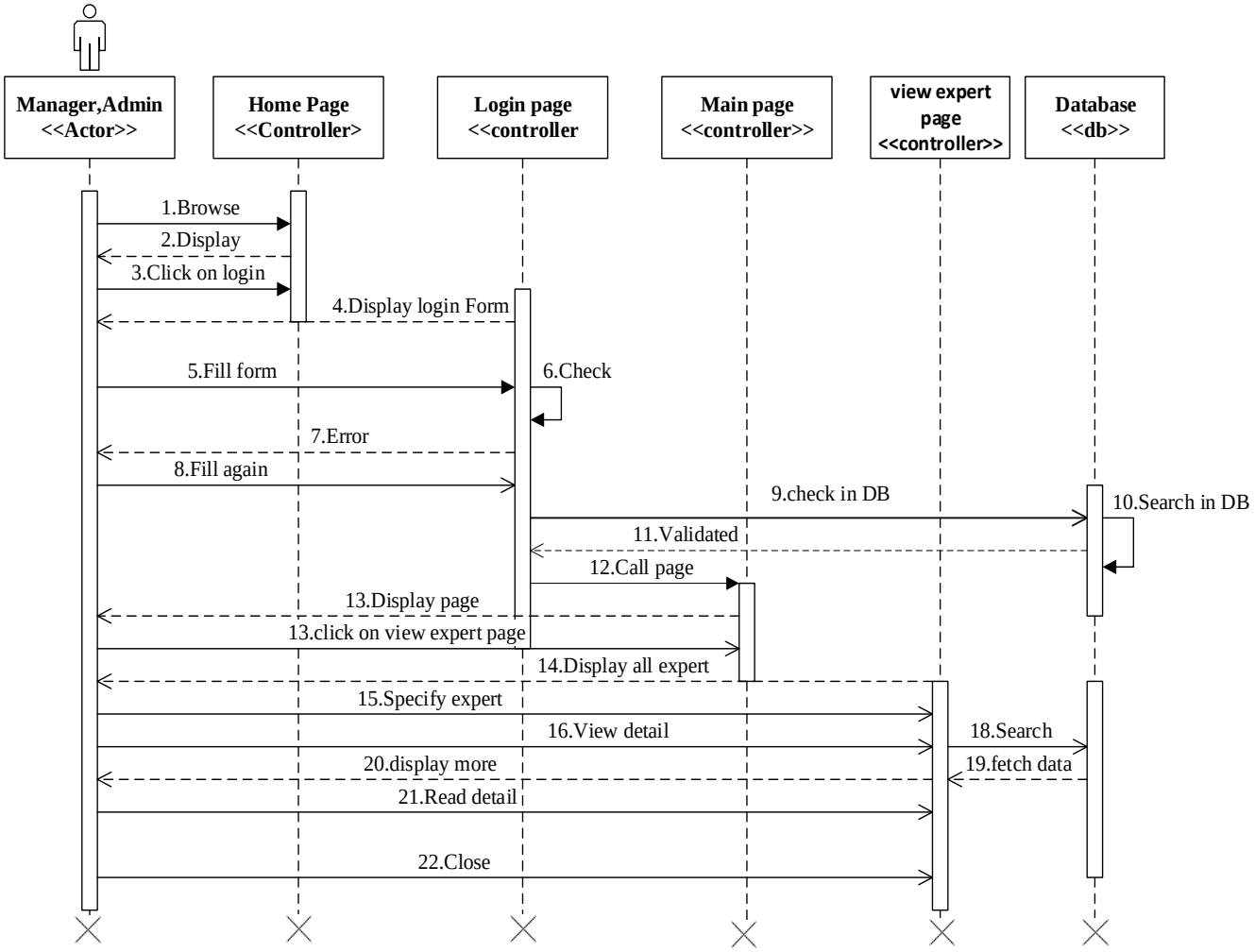


Figure 3.3-14 sequence diagram to view expert detail information

Sequence diagram for view comment

Comment is the feedback that written by anybody will display to manager, System Admin and expert because if the feedback concern about land certification error it concerns to expert to update certification information and also if the written feedback concern to manager or system admin, they can perform that activity. How the system does this activity sequence done here by using sequence diagram.

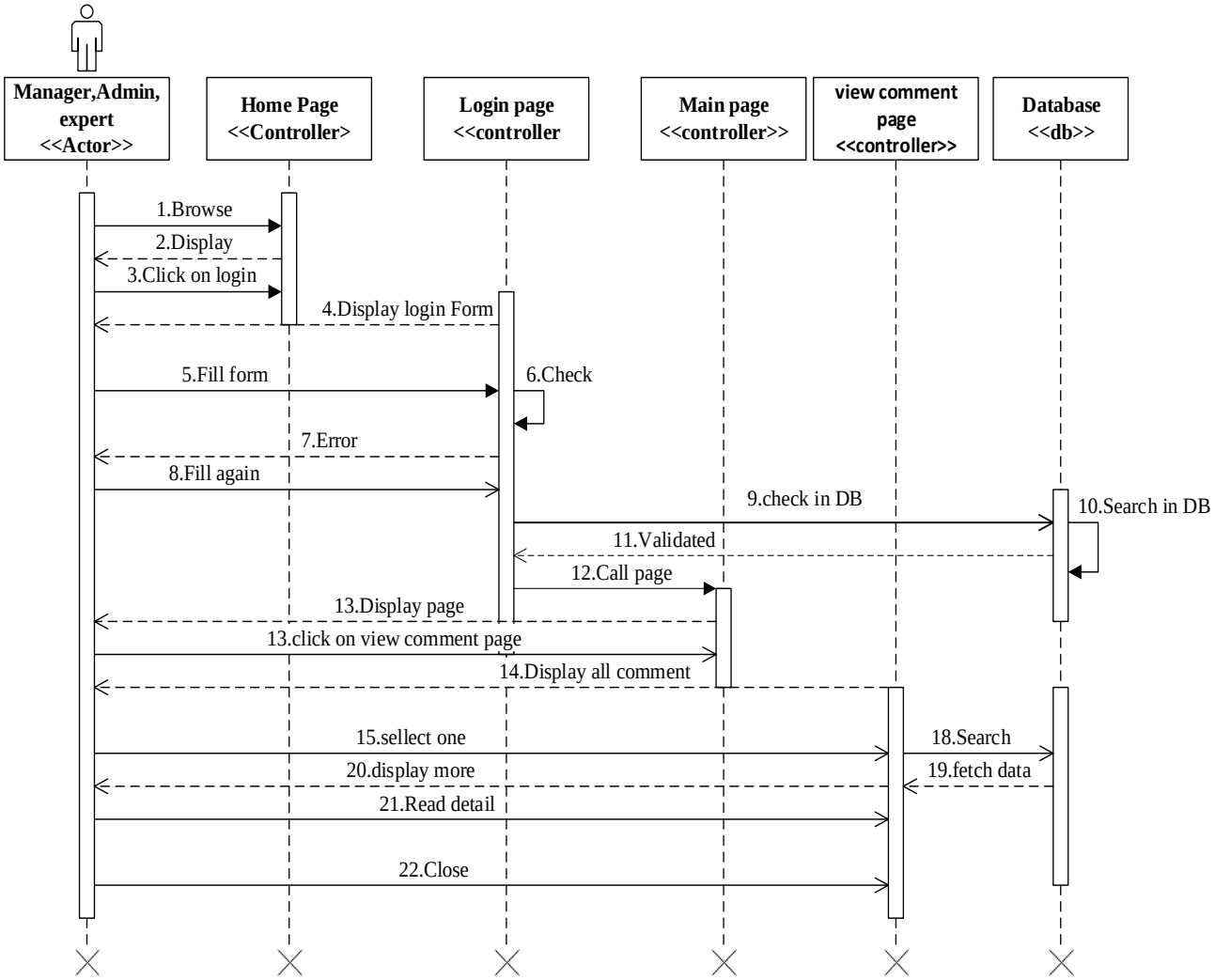


Figure 3.3-15 sequence diagram for view comments

Sequence diagram for view land information in a detail

Show sequence activity of land information in detail by sequence diagram, all sequence activity going to depict here.

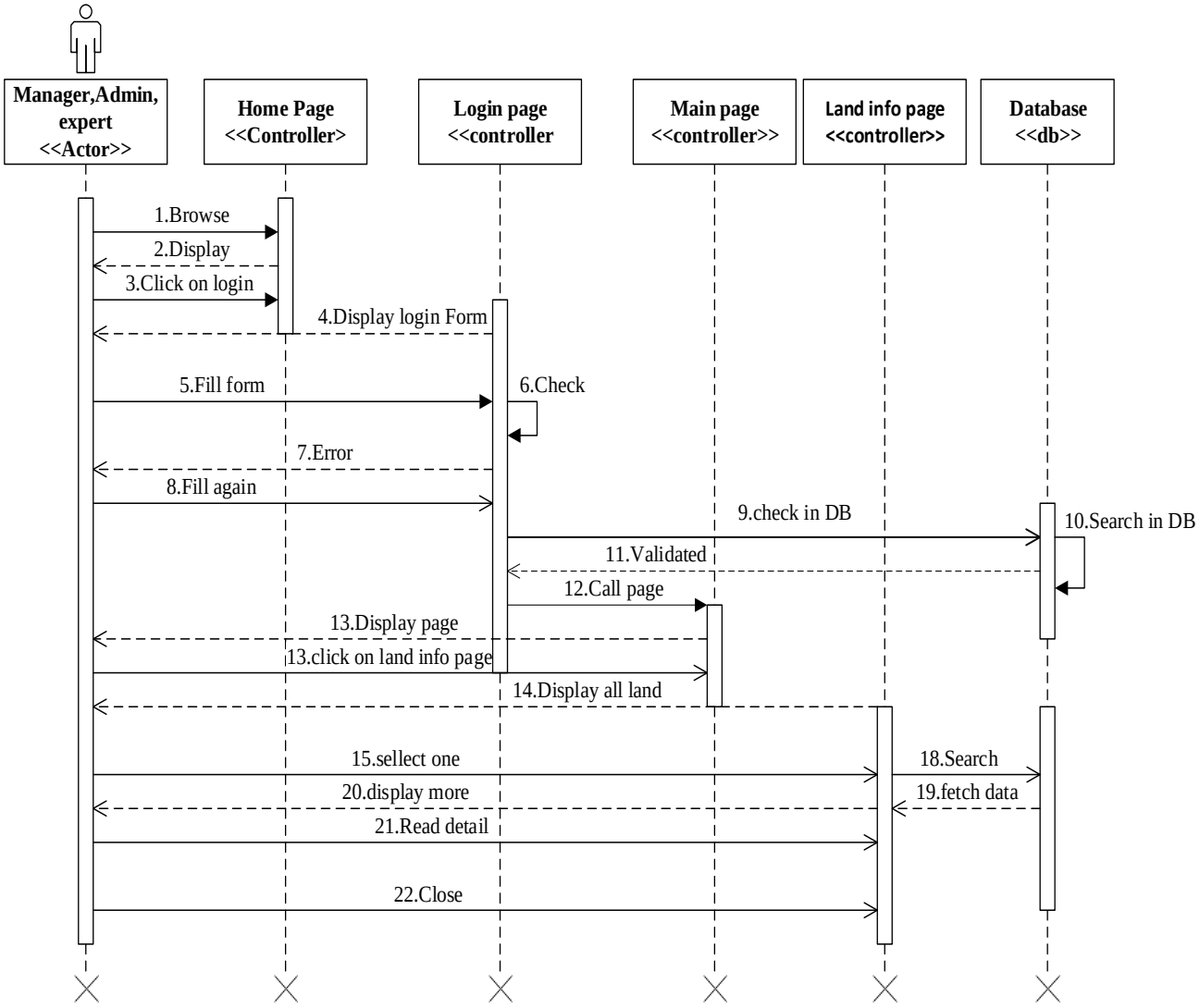


Figure 3.3-16 sequence diagram for view holder's information detail

Sequence diagram for land updating information

Land updating is the most common issue in a system, to update land information done by expert employees according to a system. Therefore, how the system performs the activity of updating land information done here by using sequence diagram.

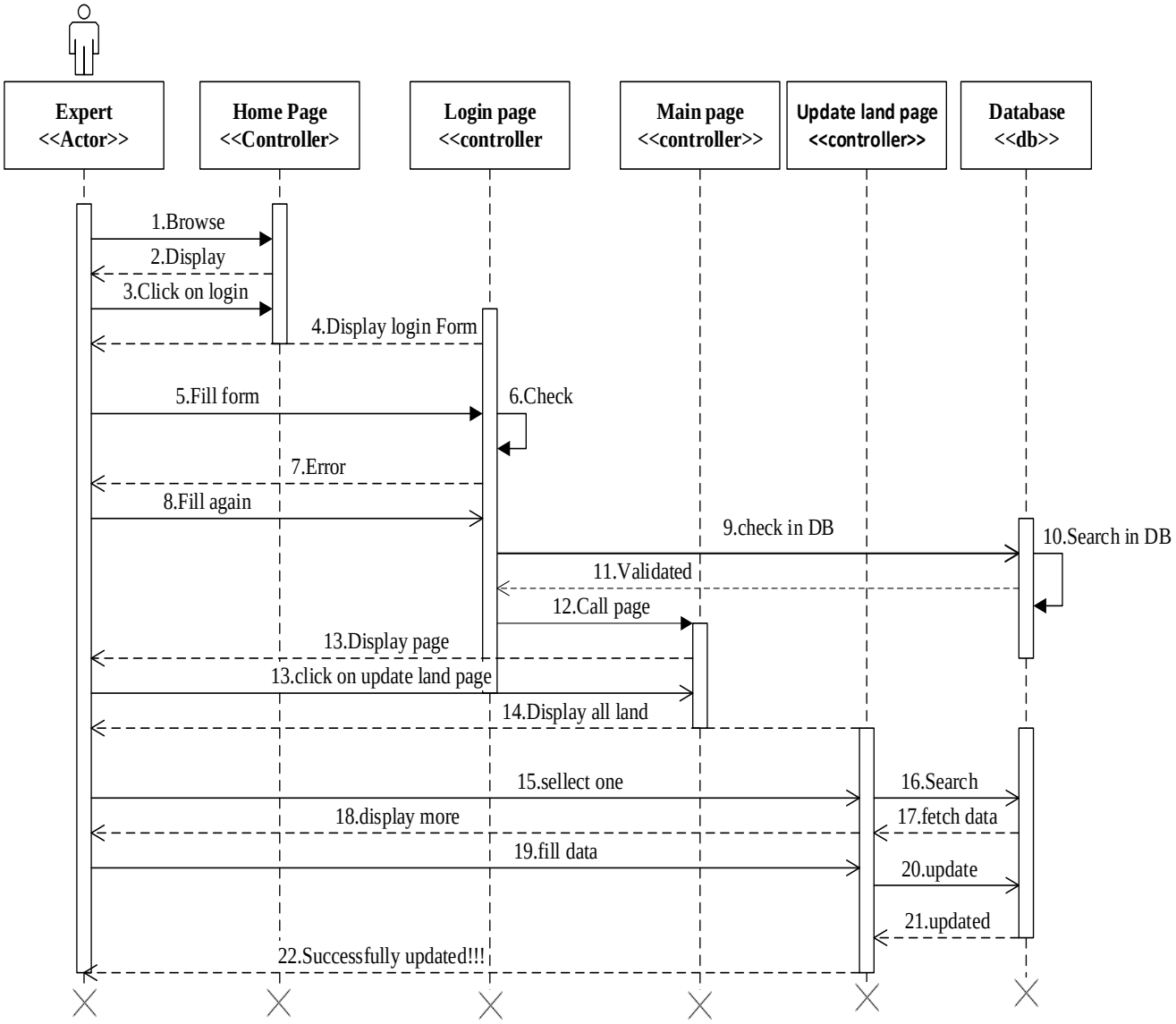


Figure 3.3-17 sequence diagram for update land information

Sequence diagram for unregister expert employees

Registering and unregistering expert employees is job of system Admin and Manager because after hire new employee it needs to register in a database to perform expected activity. There to unregister if the employee leaves the organization also needed. The step to do is depict by using sequence diagram here.

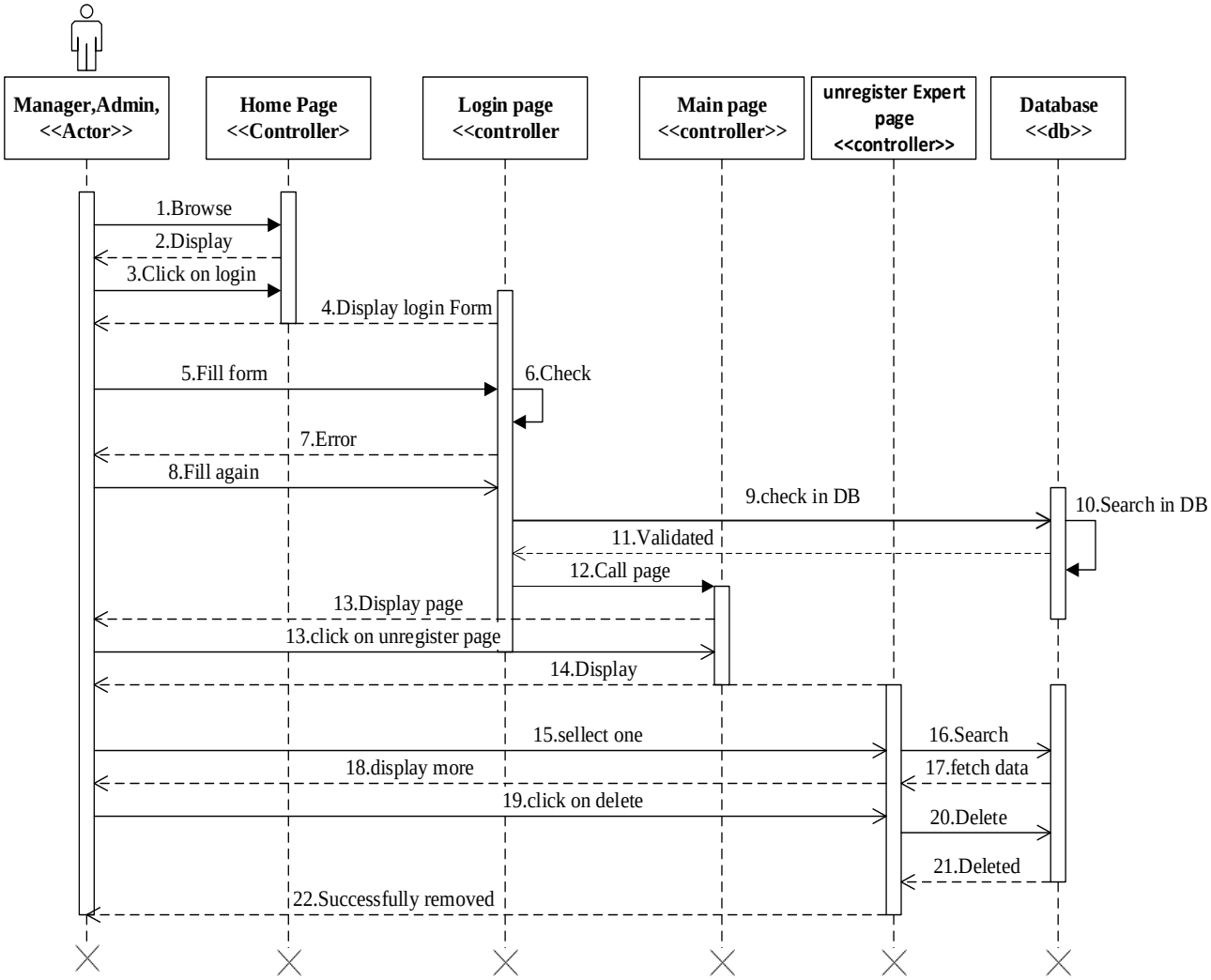


Figure 3.3-18 Sequence diagram for delete expert employees

3.3.3. Collaboration diagram

By using collaboration, diagram or interaction describe represents the structural organization of a system and the messages sent/received. Under this issue, structural organization consists of objects and links. The purpose of we using collaboration diagram is similar to sequence diagram. Nevertheless, the specific purpose of collaboration diagram is to visualize the organization of objects and their interaction. By using this, diagrams aim at showing the communications that happen between objects, by defining messages that flow between each other. It looks like as follows: -

Collaboration diagram for login

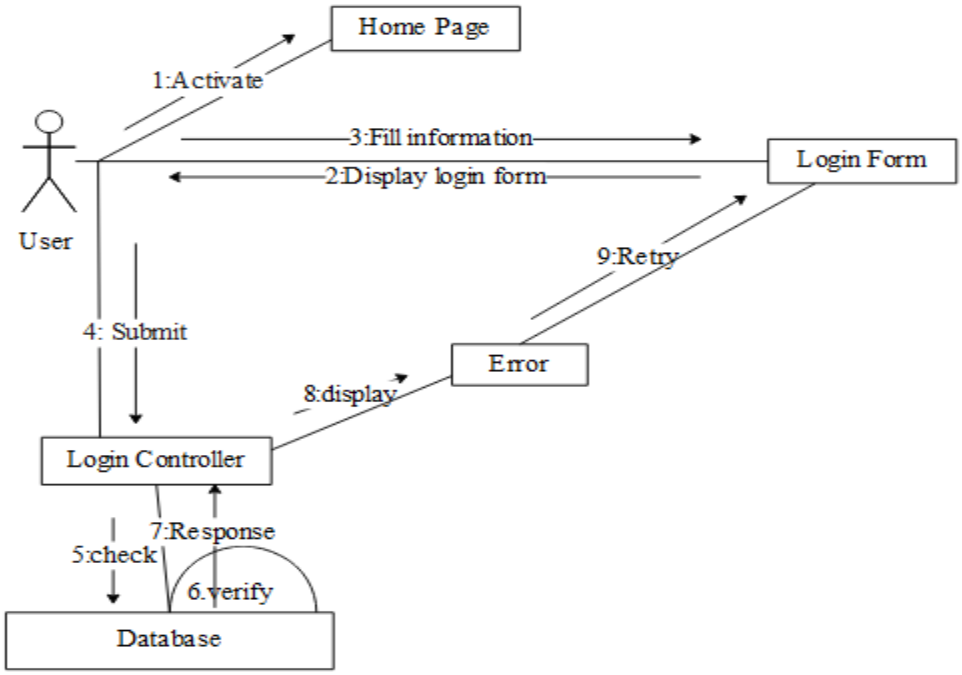


Figure 3.3-19 Collaboration diagram for login

Collaboration diagram for prepare certificate for landowner

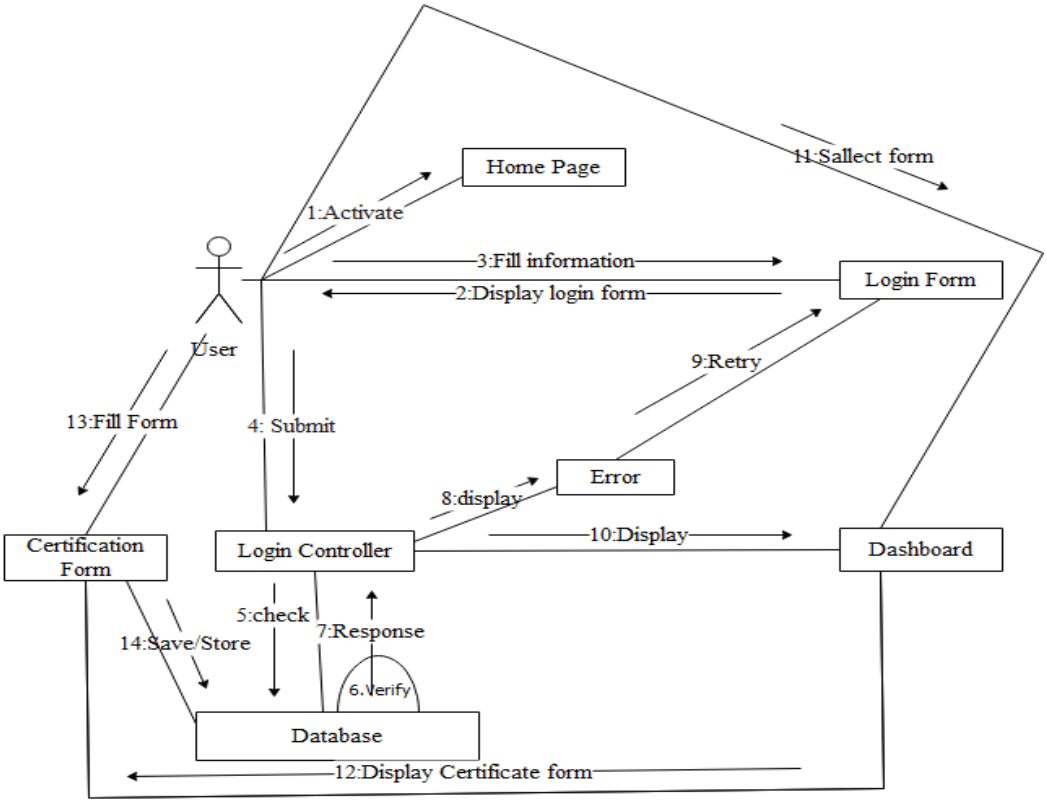


Figure 3.3-20 Collaboration diagram for prepare certificate

Collaboration diagram for registration for all registration

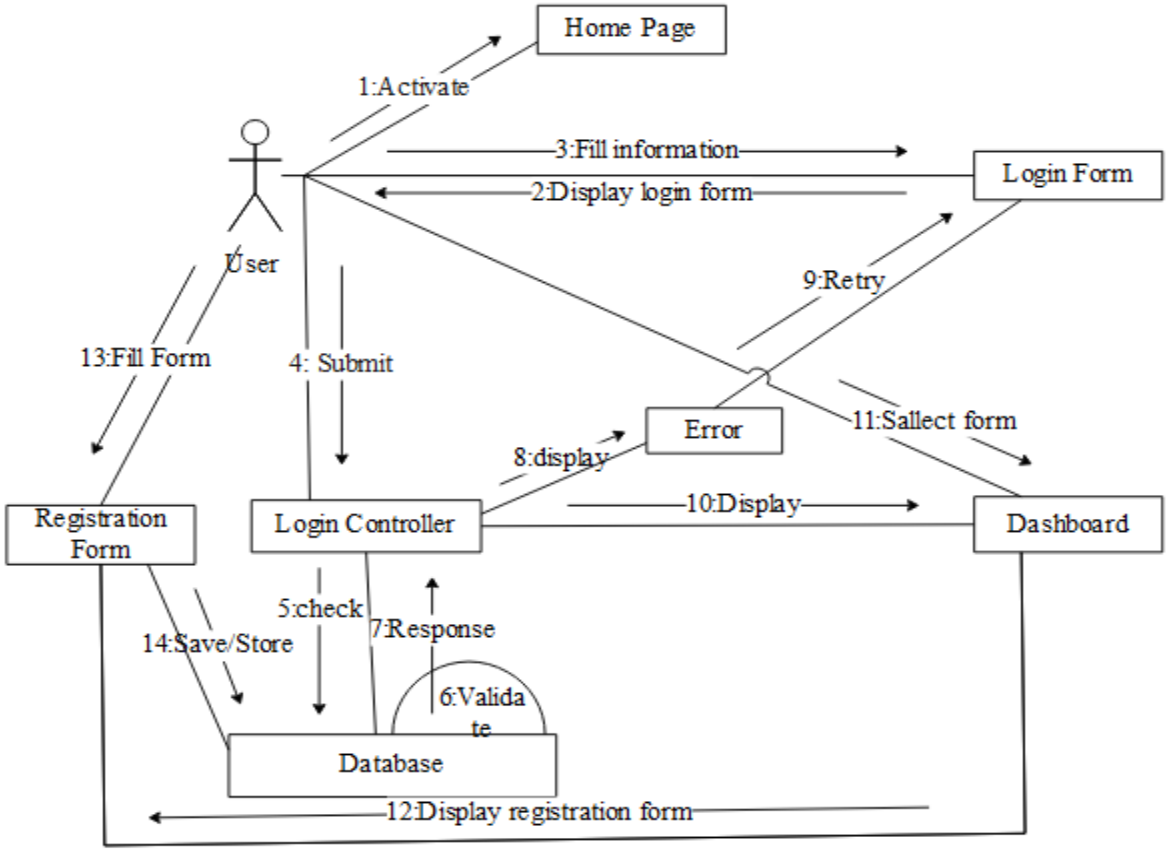


Figure 3.3-21 Collaboration diagram for registration

3.3.4. State chart diagram

By using State chart diagram, we are going to describes sequence of states that an object or a system goes through, the events that cause the action of a state, the transition from one state to the other and the actions. The following are the main purposes of we are using State chart diagrams:

- To model dynamic aspect of a system our system.
- To model lifetime of a reactive system of our system.
- To describe different states of an object during its lifetime.
- Define a state machine to model states of an object.

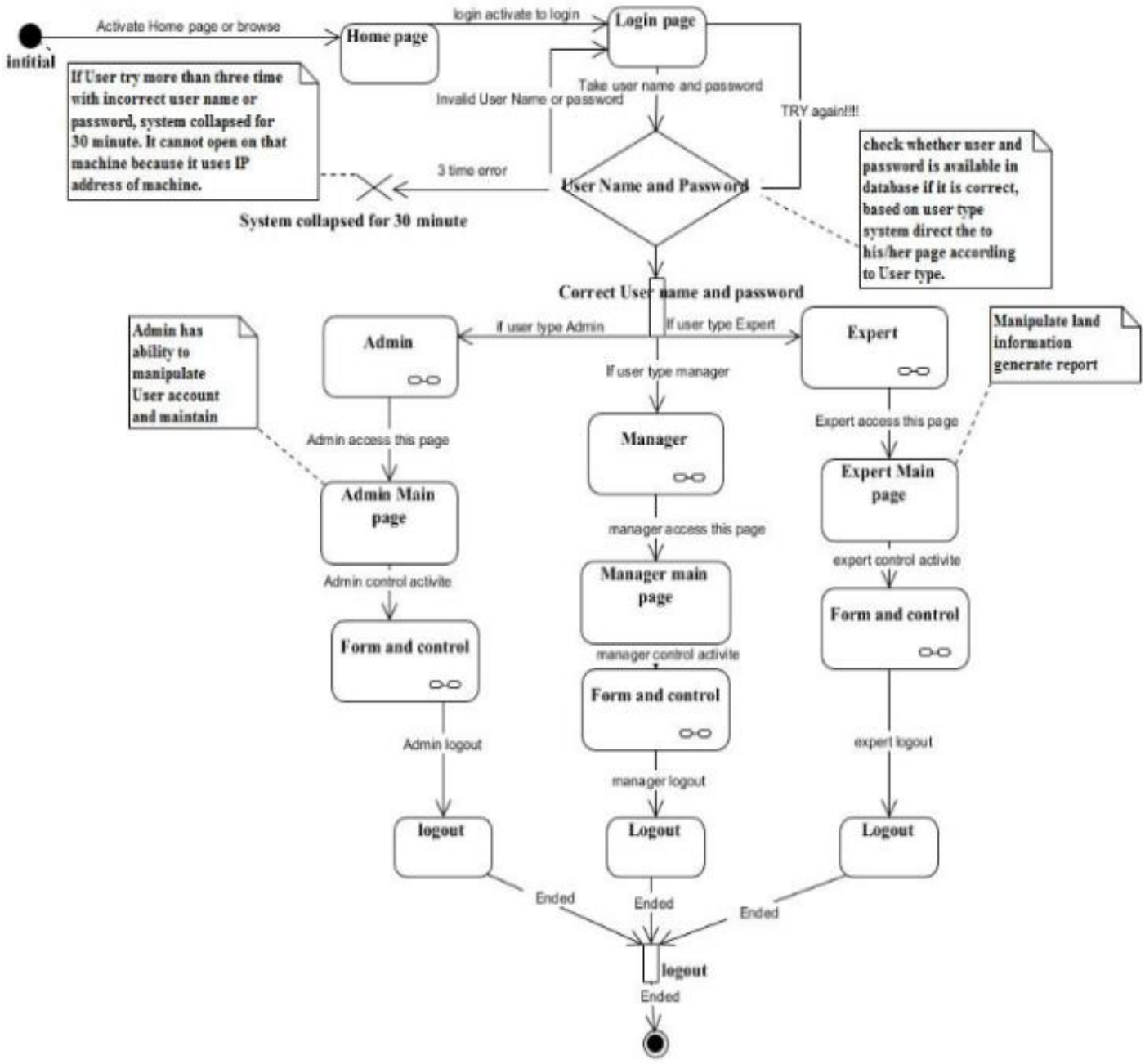


Figure 3.3-22 State chart Diagram

3.3.5. Activity diagram

By using activity diagram, we used to model process, steps and activity in the system. The following activity diagram shows the overall major activities of the proposed system.

Activity diagram for Login

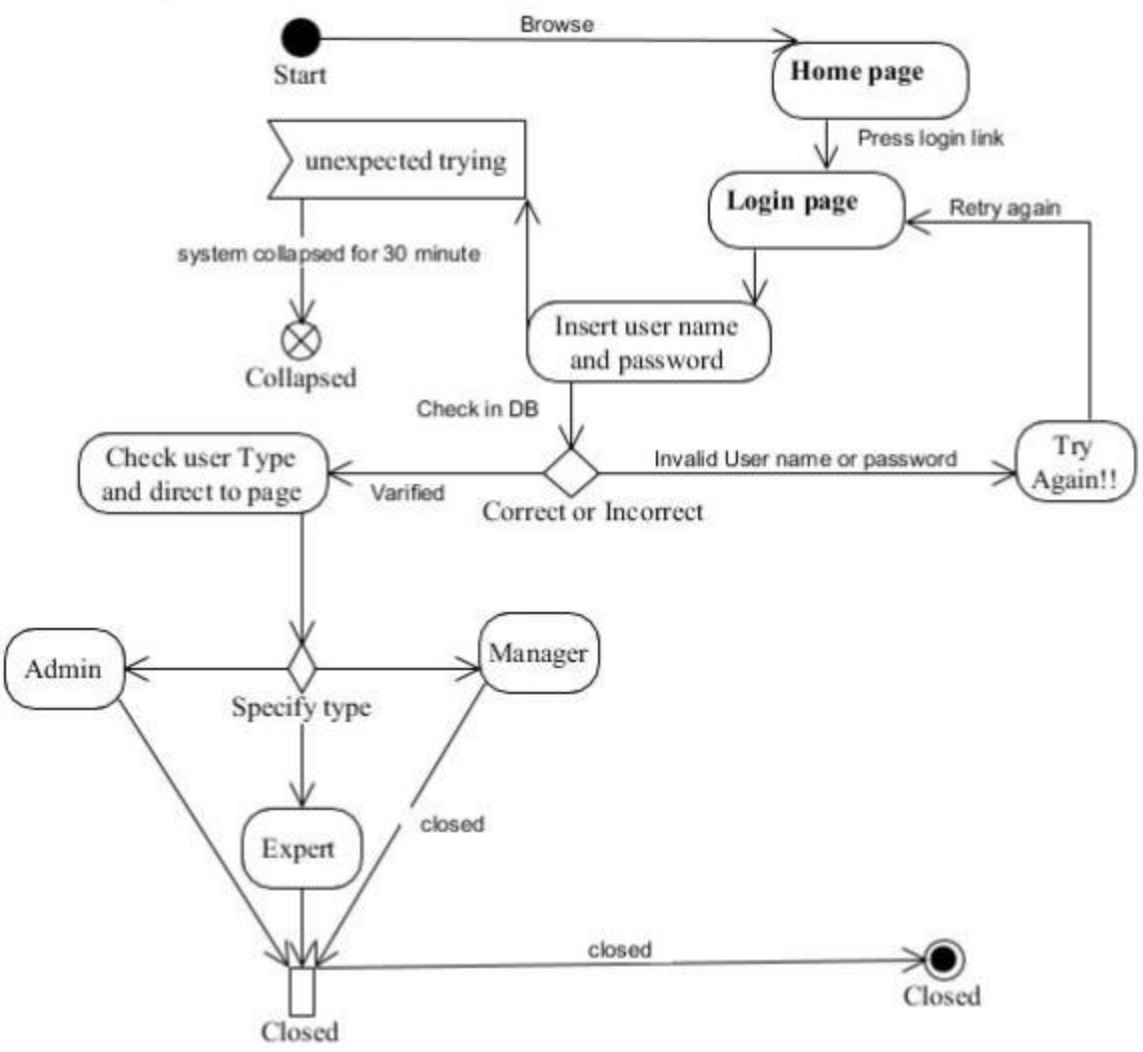


Figure 3.3-23-activity diagram for login

Activity diagram for prepare certificate for landowner

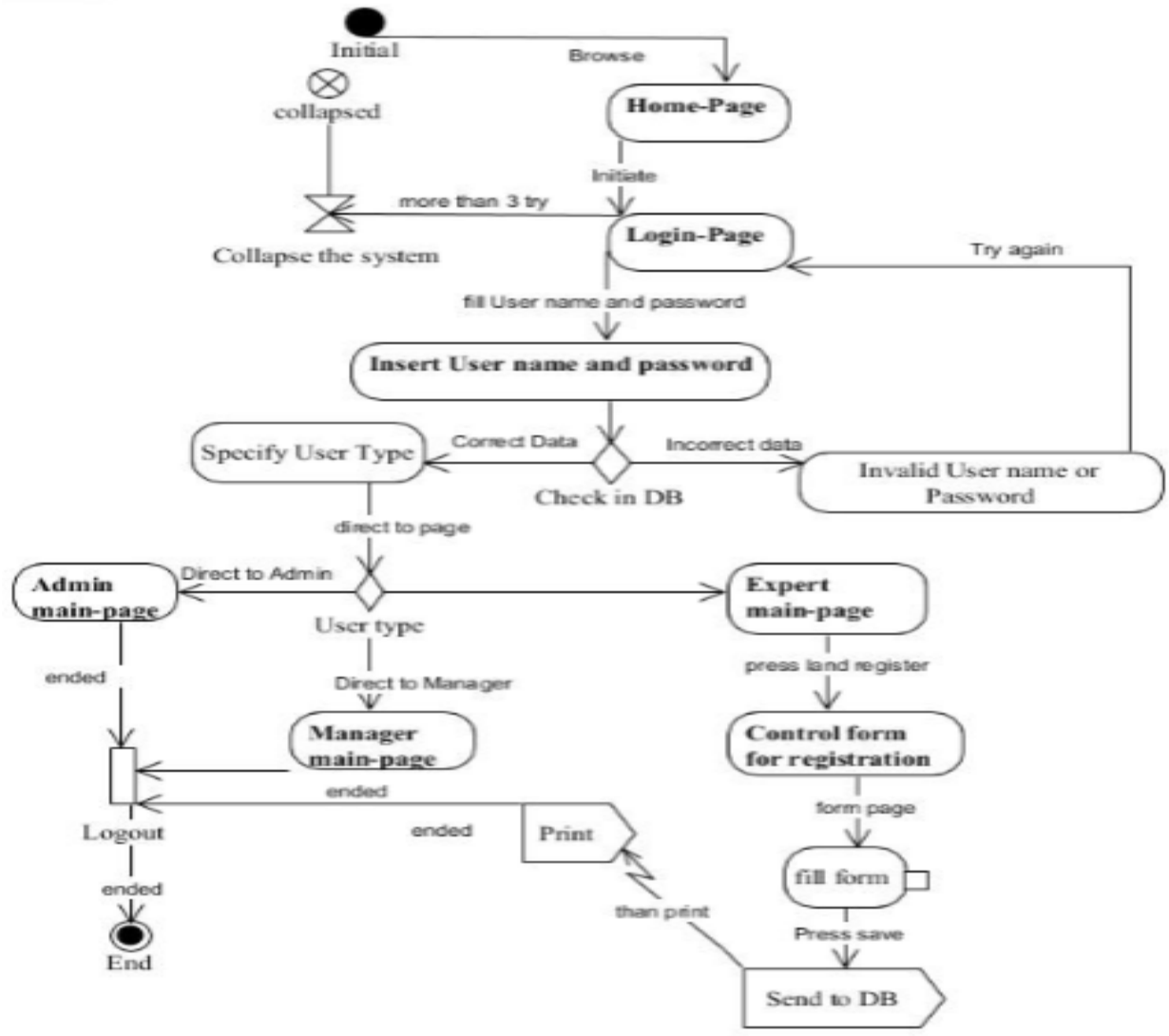


Figure 3.3-24 Activity diagram for prepare certificate

3.3.6. Class diagram

By using Class diagram, brutally we depict the system's object structure. In addition, show object classes that the system is composed of as well as the relationships between those object classes. The nature of UML class diagram shows the classes of the system, their inter-relationships, and the operations and attributes of the classes. Moreover, by using this diagram model we comprised of one or more class diagrams and the supporting specifications that describe model elements including classes, relationships between classes, and interfaces. Classes shown as boxes with three sections – the top for the name of the class, the middle for the attributes, and the bottom for the operations. Associations between classes depicted as lines between classes. Associations should include multiplicity indicators at each

end, for example, one representing "1" and * represent many and zero...* as well as one...* represents optionally to many and mandatory to many respectively. A design class model would show detail. For example, it is common to see the visibility and type of attributes depicted on design class diagrams as well as full operation signatures.

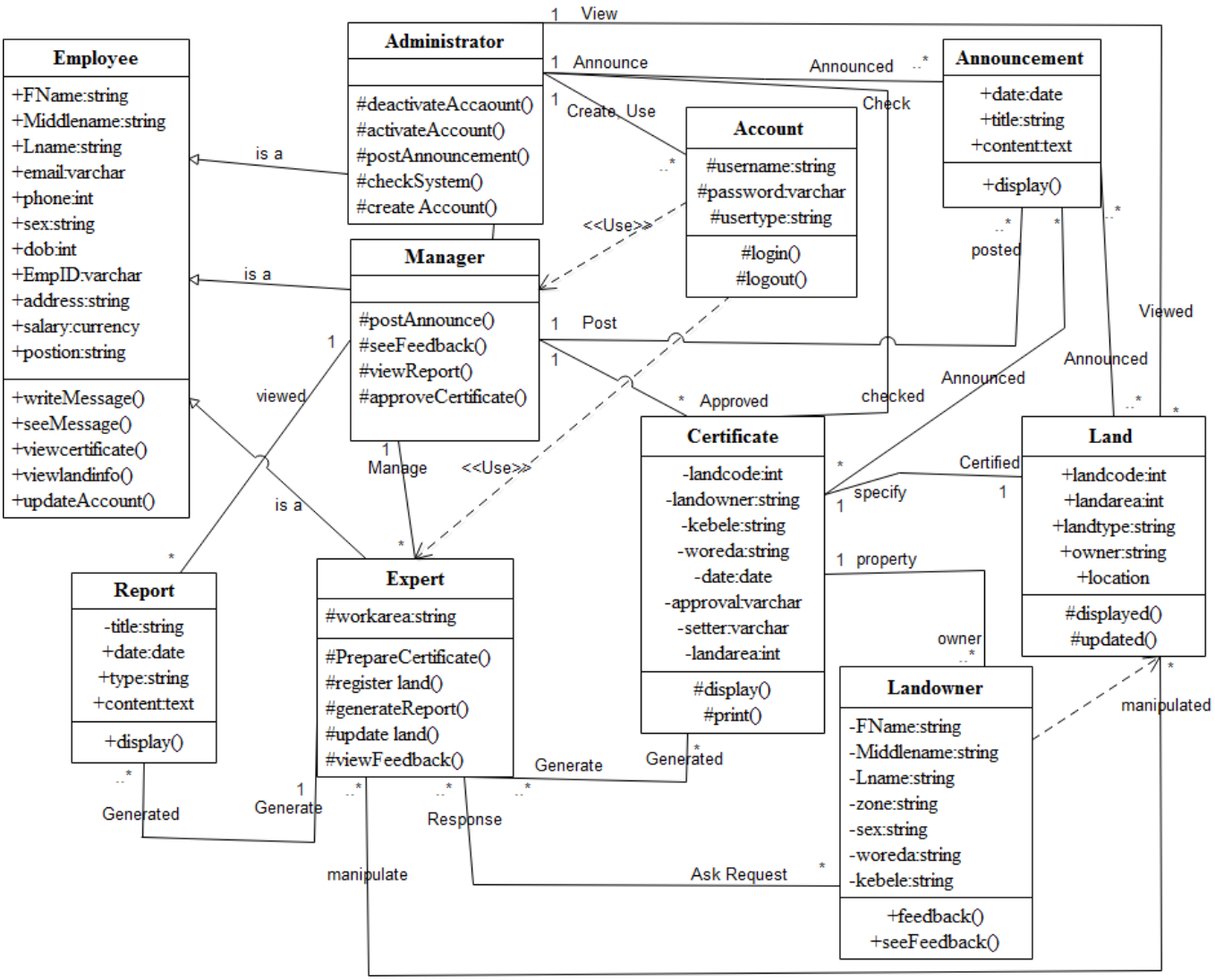


Figure 3.3-25-class diagram for SWZ_RLMS

3.3.7. Component diagram

By using, this components diagram, will be wired showing that there is relation among components; management of the system, database and operations performed on databases such security issue. This in some extent shows who will access which component or objects and what type of security infrastructures it is using. The diagram simulated as below.

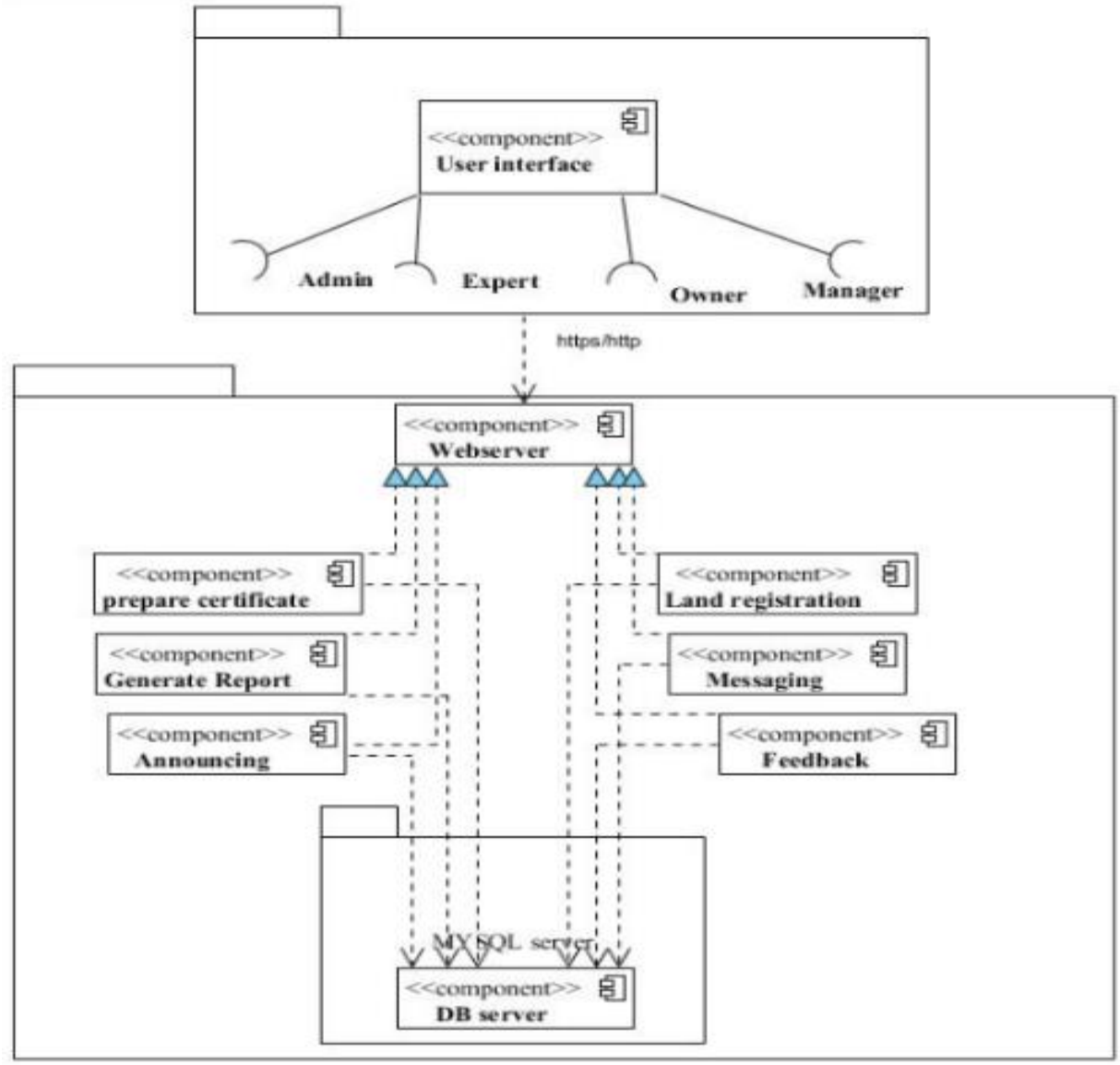


Figure 3.3-26-component diagram

3.3.8. Deployments diagram

By using Deployment Diagrams, we brutally depict the hardware for our system and the software that installed on that hardware, and the middleware used to connect the disparate machines to one another.

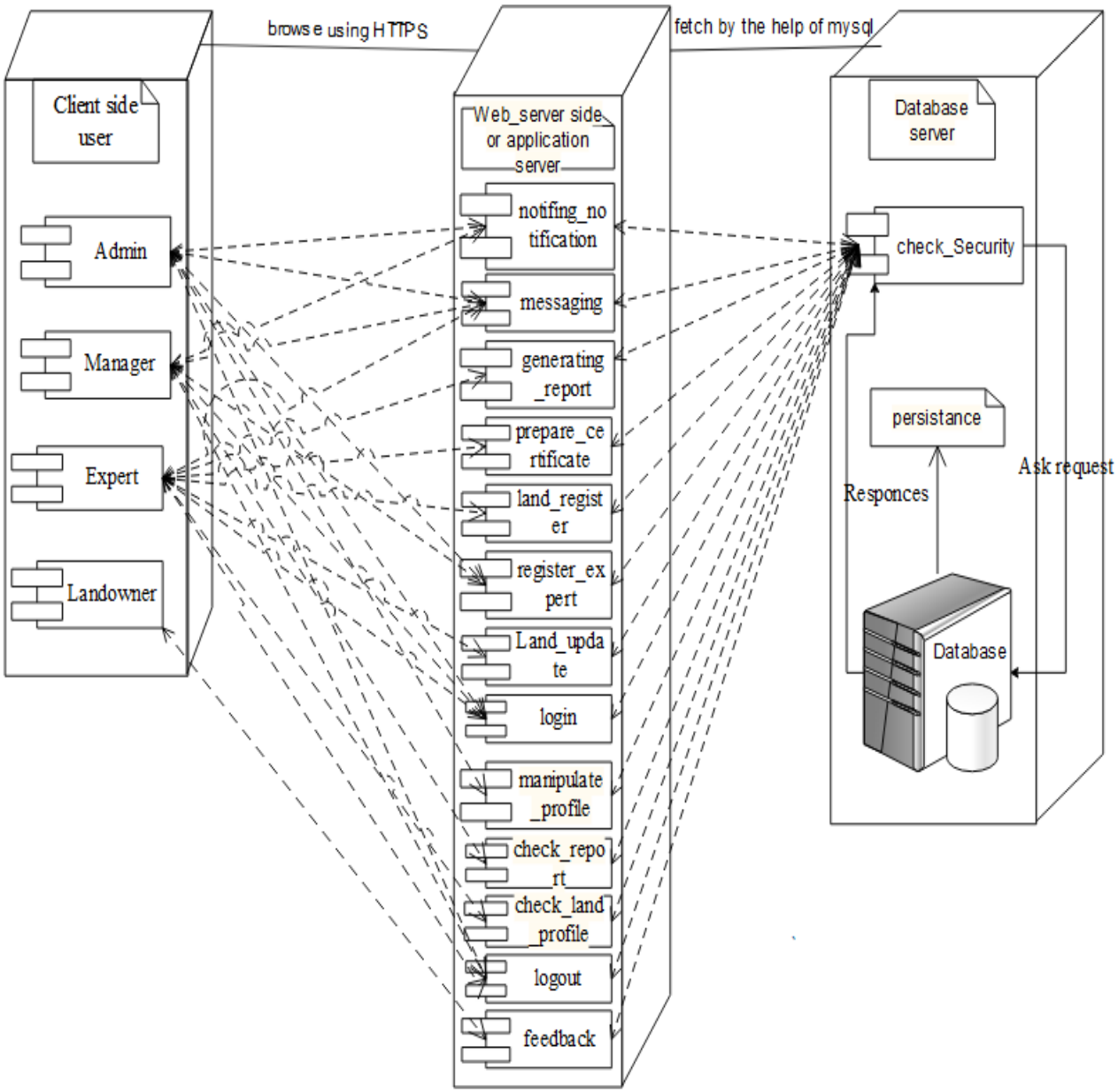


Figure 3.3-27-Deployment diagram

3.4. Data persistence modelling

Development Team identifies tables that are present in the Data Base for describing the data stored on the database. By using Database design, we depict the process of producing a detailed data model of a database. This logical data model contains all the needed logical and physical design choices and physical storage parameters needed to generate a design in a Data Definition Language, which can used to create a database. A fully attributed data model contains detailed attributes for each entity.

3.4.1. Entity, attribute, schema and other

Entity: - by using basic building block of data, modeling or we are going to model ER diagram.

Attribute: - using the attribute, we depict details about an entity because attribute marshal and make the entity visualize to the reader. Therefore, team using attribute to visualize and specify entity from other entity briefly.

Table 3.4-1-entity and attribute table

Entity	**Attribute of entity**
Admin	emp-ID, F-Name, M-Name, L-Name, Username, DOB, sex, salary, user-type, email, phone, address, account-status, state,
Manager	emp-ID, F-Name, M-Name, L-Name, Username, DOB, sex, salary, user-type, email, phone, address, account-status, state,
Expert	emp-ID, F-Name, M-Name, L-Name, Username, DOB, sex, salary, user-type, email, phone, address, account-status, state,
Land	Land code, Woreda, Keble, area, border (north, south, west, and east), type, and owner.
Landowner	F-name, M-name, L-name, kebele, location, phone.
Report	RIPID, Date of generate, RIPID, content, title, type
Announcement	ANID, title, content, date of posted, type
Feedback	FID, title, content, date, written by, type
Mail	Msg-id date, send-from, send-to, subject, contents, status-from, status-to

3.4.1. ER diagram

Therefore, Entity relationship diagram for our project contain the above things means entity with its attribute and relation between them as below within full description of their relation.

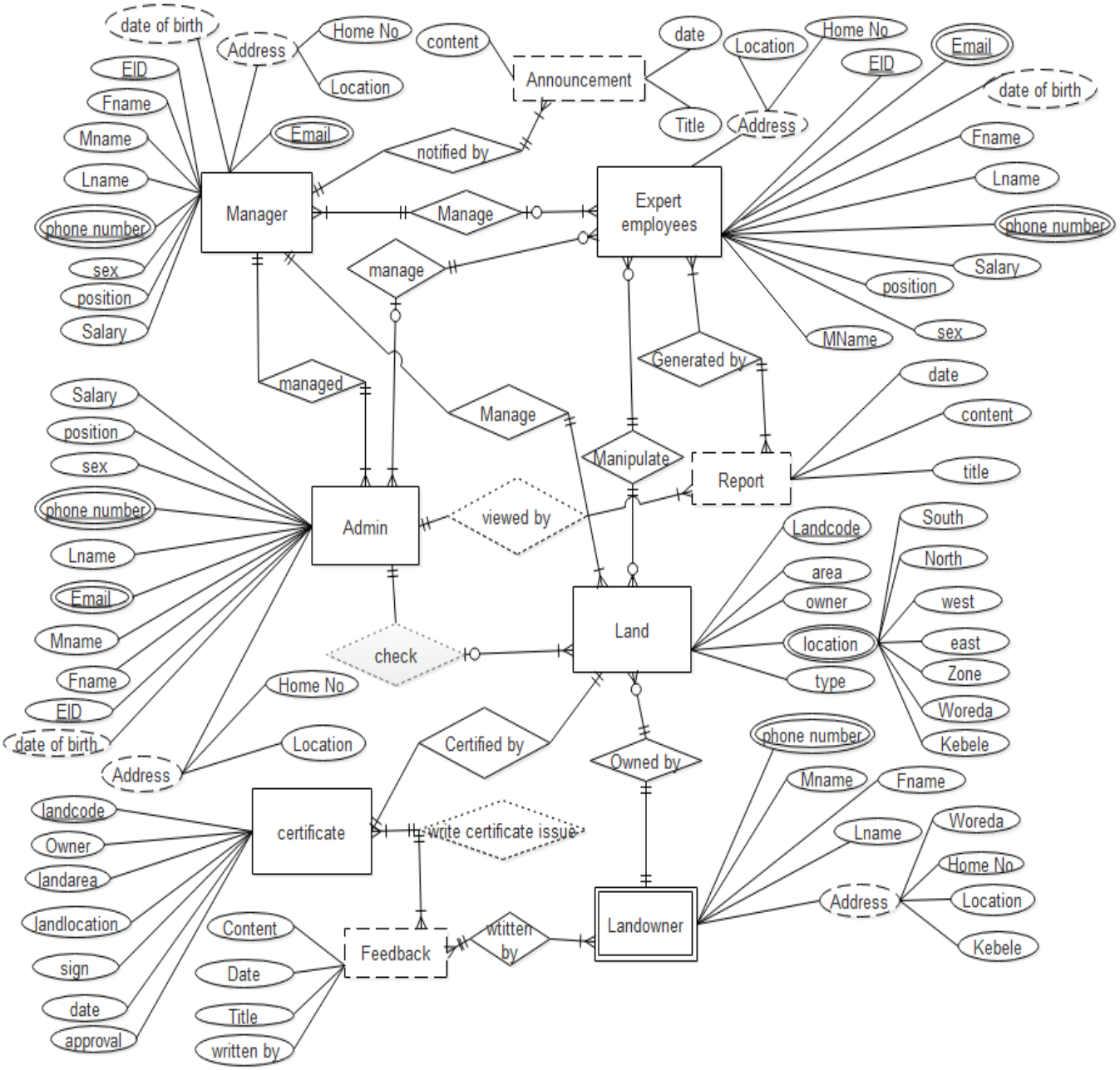


Figure 3.4-1-ER diagram (Entity Relationship diagram

3.4.2. Referential integrity and constraints

Team uses Referential integrity which depicts the relational database concept in which multiple tables share a relationship based on the data stored in the tables, and that relationship must remain consistent.

Table 3.4-2-Users table referential integrity

EMPID	F-name	M-name	L-name	username	Password	User type	DOB	salary	address	sex	email	phone	Land code	RIPID

Table 3.4-3-land table referential integrity

Land code	Type	Woreda	Keble	Zone	owner	area	north	west	east	south	image	status	renting	Inheritance

Table 3.4-4-report table referential integrity

RIPID	Title	Content	Date of written	Type	Generator	status	Inherited land	No of certificate	Rented land	Printed certificate

Table 3.4-5-News table referential integrity

News ID	Title	Post	Post by	status	Post date	Deadline	Evidence

Table 3.4-6-Mail table referential integrity

Msg-ID	Date	Send from	Send to	Subject	Contents	Status from	Status to

Table 3.4-7-login attempts table referential integrity

IP	Attempts	Take Date	Emp-ID

Table 3.4-8-feedback table referential integrity

FID	Title	Content	Date	Written by	Emp-ID

Table 3.4-9-Certificate referential integrity

Cert-ID	Land code	Type	Woreda	Kebele	Zone	Area	North	East	West	East	Status	Image	Generato r	Edition	Own pho	Approve d by

Table 3.4-10-Woreda referential integrity

code	Name	Zone

Table 3.4-11-kebele table referential integrity

Code	Name	Woreda

3.4.3. Database table schema

A team using database table schema to skeleton structure that represents the logical view of the entire database and defines how the data is organized and how the relations among them are associated. It formulates all the constraints that are to be applies on the data.

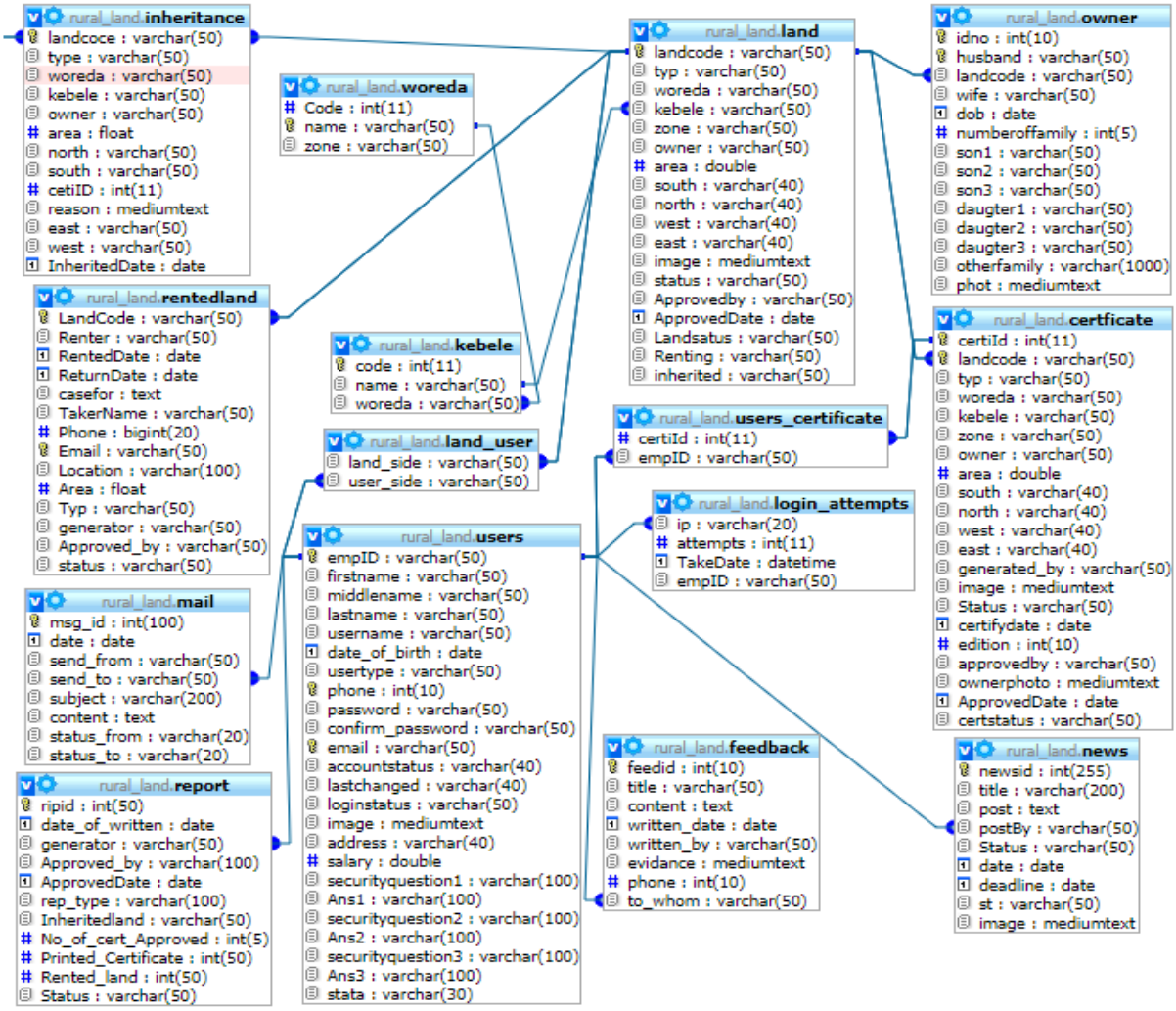


Figure 3.4-2- database table scheme

Database table schema description

Table 3.4-12-User table schema

User: used to store all user's information					
Field name	**Data type**	**Null**	**Primary key**	**Foreign key**	**Unique**
Emp ID	String	No	Yes	-	Yes
First Name	String	No	No	-	No

Middle Name	String	No	-	-	No
Last Name	String	No	-	-	No
User name	Varchar (20)	No	-	-	No
User type	Varchar (20)	No	-	-	No
Date of birth	Date	No	-	-	No
Salary	Currency	Yes	-	-	No
Address	Varchar (20)	Yes	-	-	No
Image	Medium text	No	-	-	No
Password	Varchar (50)	No	-	-	No
Phone	Integer (10)	No	-	-	Yes
Email	Varchar (50)	No	-	-	Yes
Stata	varchar (20)	No	-	-	No
Account status	Auto number	No	-	-	No
Last changed	Date	No	-	-	No
Login status	Int 10	No	-	-	No

Table 3.4-13-land table schema

Land: used to store all about land information					
Field name	**Data type**	**Null**	**Primary key**	**Foreign key**	**Unique**
Land-code	Integer (10)	No	Yes	-	Yes
Type	String	No	-	-	No
Woreda	String	No	-	-	No
Keble	String	No	-	-	No
Zone	String	No	-	-	No
Owner	String	No	-	-	Yes
Area	Integer (100)	No	-	-	No
South	String	No	-	-	No
West	String	No	-	-	No
East	String	No	-	-	No
North	String	No	-	-	No

Image	Varchar (20)	No	-	-	No
Status	Varchar (50)	No	-	-	No
Approved-by	Varchar (50)	No	-	-	No
Approved Date	Date	No	-	-	No
Land status	Varchar (50)	No	-	-	No
Renting	Varchar (50)	No	-	-	No
Inherited	Varchar (50)	No	-	-	No

Table 3.4-14-report table schema

Report: used to store report information					
Field name	**Data type**	**Null**	**Primary key**	**Foreign key**	**Unique**
Inherited land	Int (10)	No	-	-	-
Printed certificate	Varchar (10)	No	-	-	No
REPID	Auto number	No	Yes	-	Yes
Status	Varchar (20)	No	-	-	No
Date	Date	No	-	-	No
Generator	Varchar (50)	No	-	-	No
Type	Varchar (50)	No	-	-	No
No-cert-Approved	Varchar (20)	No	-	-	No
Rented land	Varchar (50)	No	-	-	No

Table 3.4-15-News table schema

News: used to store news information					
Field name	**Data type**	**Null**	**Primary key**	**Foreign key**	**Unique**
Title	Title	No	-	-	No
News-ID	Int Auto number	No	Yes	-	Yes
Post	Text	No	-	-	No
Post Date	Date	No	-	-	No

Deadline	Deadline	No	-	-	No
Post by	Varchar (50)	No	-	-	No
Status	Varchar (50)	No	-	-	No
Evidence	Medium text	No	-	-	No

Table 3.4-16-Mail table schema

Mail: used to store message information					
Field name	**Data type**	**Null**	**Primary key**	**Foreign key**	**Unique**
Subject	Varchar (100)	No	-	-	No
Msg-id	Int auto increment	No	-	-	No
Content	Text	No	-	-	No
Date	Date	No	-	-	No
Status-from	Varchar (50)	No	-	-	No
Status-to	Varchar (50)	No	-	-	No
Send-to	Varchar (50)	No	-	-	No
Send-from	Varchar (50)	No	-	-	No

Table 3.4-17-login attempts table schema

Login attempts: used to store login attempt information					
Field name	**Data type**	**Null**	**Primary key**	**Foreign key**	**Unique**
IP	Varchar (20)	No	Yes	-	Yes
Attempts	Count (4)	No	-	-	No
Take-Date	Date time	No	-	-	No
Emp-id	Varchar (50)	No	No	Yes	No

Table 3.4-18- feedback table schema

Feedback: used to store feedback information					
Field name	**Data type**	**Null**	**Primary key**	**Foreign key**	**Unique**
Feed-id	Int Auto increment	No	Yes	-	Yes

Title	Text	No	-	-	No
Content	Text	No	-	-	No
Date	Date	No	-	-	No
Written by	Varchar (50)	No	-	-	No
Evidence	Medium text	No	-	-	No
Phone	Int (10)	No	-	-	No
To-whom	Varchar (50)	No	No	No	No

Table 3.4-19 Certificate table schema

Certificate: used to store all about certificate information					
Field name	**Data type**	**Null**	**Primary key**	**Foreign key**	**Unique**
Cert-Id	int auto increment	No	No	No	Yes
Land-code	Varchar (50)	No	No	Yes	Yes
Type	Varchar (50)	No	-	-	No
Woreda	Varchar (50)	No	-	-	No
Keble	Varchar (50)	No	-	-	No
Zone	Varchar (50)	No	-	-	No
Owner	Varchar (50)	No	-	-	Yes
Area	Float	No	-	-	No
South	Varchar (50)	No	-	-	No
West	Varchar (50)	No	-	-	No
East	Varchar (50)	No	-	-	No
North	Varchar (50)	No	-	-	No
Image	Varchar (20)	No	-	-	No
Status	Varchar (50)	No	-	-	No
Approved-by	Varchar (50)	No	-	-	No
Approved Date	Date	No	-	-	No
Edition	Int 10	No	-	-	No
Renting	Varchar (50)	No	-	-	No
Cert-status	Varchar (50)	No	-	-	No

Generated-by	Varchar (50)	No	-	-	-
Certify date	Date	No	No	No	No

Table 3.4-20- woreda table schema

Woreda: used to store all about Woreda information					
Field name	**Data type**	**Null**	**Primary key**	**Foreign key**	**Unique**
Code	Int auto increment	No	Yes	No	Yes
Name	Varchar (50)	No	No	No	No
Zone	Varchar (50)	No	No	No	No

Table 3.4-21- kebele table scheme

Kebele: used for store all about kebele information					
Field name	**Data type**	**Null**	**Primary key**	**Foreign key**	**Unique**
Code	Int auto increment	No	Yes	No	Yes
Name	Varchar (50)	No	No	No	No
Woreda	Varchar (50)	No	No	No	No

Table 3.4-22- owner table scheme

Owner: used to store all about land owner information					
Field name	**Data type**	**Null**	**Primary key**	**Foreign key**	**Unique**
Id-No	Int auto increment	No	Yes	No	Yes
Husband	Varchar (50)	No	No	No	No
Wife	Varchar (50)	No	No	No	No
DOB	Date	-	-	-	-
Number of family	Int 10	-	-	-	-
Son 1	Varchar (50)	-	-	-	-
Son2	Varchar (50)	-	-	-	-
Son3	Varchar (50)	-	-	-	-
Daughter 1	Varchar (50)	-	-	-	-

Daughter 2	Varchar (50)	-	-	-	-
Daughter 3	Varchar (50)	-	-	-	-
Other family	Varchar (50)	-	-	-	-
Photo	Medium text	-	-	-	-

Table 3.4-23- Inherited land table schema

Inherited-land: used to store all about inherited land information					
Field name	**Data type**	**Null**	**Primary key**	**Foreign key**	**Unique**
Land-code	Varchar (50)	No	No	Yes	Yes
Type	Varchar (50)	No	-	-	-
Woreda	Varchar (50)	No	-	-	-
Kebele	Varchar (50)	No	-	-	-
Owner	Varchar (50)	No	-	-	-
Area	Float	No	-	-	-
North	Varchar (50)	No	-	-	-
East	Varchar (50)	No	-	-	-
West	Varchar (50)	No	-	-	-
South	Varchar (50)	No	-	-	-
Cert-ID	Int	No	No	Yes	Yes
Reason	Medium text	No	-	-	-

3.4.4. Normalization

We are going to brutally, depict decomposition of the entities attribute from high to low level of entities attribute. Because Normalization is a database design technique, which organizes tables in a manner that reduces redundancy and dependency of data. So, we use normalization to divides larger tables to smaller tables and links them using relationships

3.4.4.1. First normalization

By using first normalization we are mentions an atomic value because this normalization naturaly focus on an atomic value of an etities. Moreover each cell should contain atomic value of the entities to depict and vizualise the entities. so it look like this:-

Table 3.4-24 user table's first normalization

Emp-id	F-name	M-name	L-name	username	salary	User-type	password	phone	BOD	address	Email	Account status	Last Login status	Image	Stata

Table 3.4-25-landowner table's first normal form

Id-no	Husband	Wife	Son1	Son2	Son 3	Daughter 1	Daughter 2	Daughter 3	No family	Other family	photo

Table 3.4-26-land table's first normal form

Land-	Type	Area	North	South	East	West	Owner	Keble	Woreda	Zone	Image	Status	Land	Renting	Inherited	Approved by	Approved Date

Table 3.4-27- Report table's first norm form

Rep-ID	Date	Generator	Type	Inherited land	Approved Cert	Printed cert	Rented land	Status

Table 3.4-28- News first normal table form

News-ID	Title	Post	Status	Date	Deadline	Evidence	Post by

Table 3.4-29-Mail table's first normal form

Msg-id	Date	Send-from	Send-to	Subject	Contents	Status-from	Status-to

3.4.4.2.Second normalization

In second normalization we depict each attribute fully functionaly dependent on primary key, means that non key attribute should be ful functionaly dependent to primary key, so the feature of second normalization is to ful fill this property. And also it should be first normalization to come with secod norm.

Table 3.4-30-User table's second normal form

Emp-id	F-name	M-name	L-name	username	salary	User-type	password	phone	BOD	address	Email	Account status	Last Login status	Image	Stata

Table 3.4-31- landowner table's second form norm

Id-no	Husband	Wife	Son1	Son2	Son 3	Daughter 1	Daughter 2	Daughter 3	No family	Other family	photo

Table 3.4-32-land table's second norm form

Land-	Type	Area	North	South	East	West	Owner	Keble	Woreda	Zone	Image	Status	Land	Renting	Inherited	Approved by	Approved Date

Table 3.4-33-Report table's second normal form

Rep-ID	Date	Generator	Type	Inherited land	Approved Cert	Printed cert	Rented land	Status

Table 3.4-34-News table's second normal form

News-ID	Title	Post	Status	Date	Deadline	Evidence	Post by

Table 3.4-35-Mail table second normal form

Msg-id	Date	Send-from	Send-to	Subject	Contents	Status-from	Status-to

3.4.4.3.Third normalization

By using third normalization team illustrate relation is in third normal form if it is in 2NF and non-key attribute is transitively dependent on the primary key.

Table 3.4-36-third normalization for user table

Emp-id	F-name	M-name	L-name	username	salary	User-type	password	phone	BOD	address	Email	Account status	Last Login status	Image	Stata

Table 3.4-37-third normal form for land table

Land-	Type	Area	North	South	East	West	Owner	Keble	Woreda	Zone	Image	Status	Land	Renting	Inherited	Approved by	Approved Date

Table 3.4-38-third normal form for report table

Rep-ID	Date	Generator	Type	Inherited land	Approved Cert	Printed cert	Rented land	Status

Table 3.4-39-third normal form for news table

News-ID	Title	Post	Status	Date	Deadline	Evidence	Post by

Table 3.4-40-third normal form for Mail table

Msg-id	Date	Send-from	Send-to	Subject	Contents	Status-from	Status-to

Table 3.4-41-third normal form for login attempts table

IP	Attempts	Take date	Emp-Id

3.5. User interface of the prototype

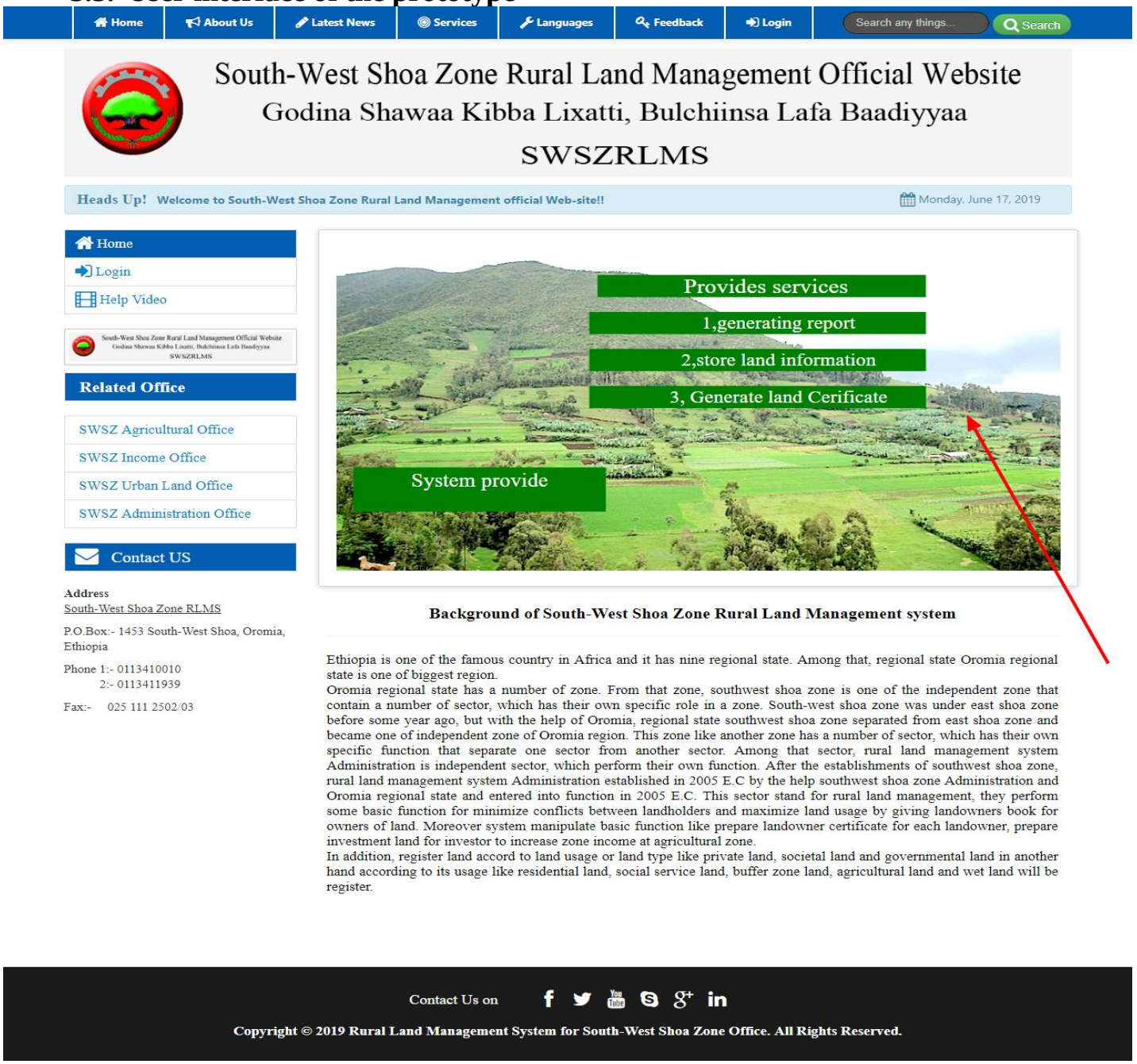


Figure 3.5-1-Home Page User-Interface prototype

Login User interface

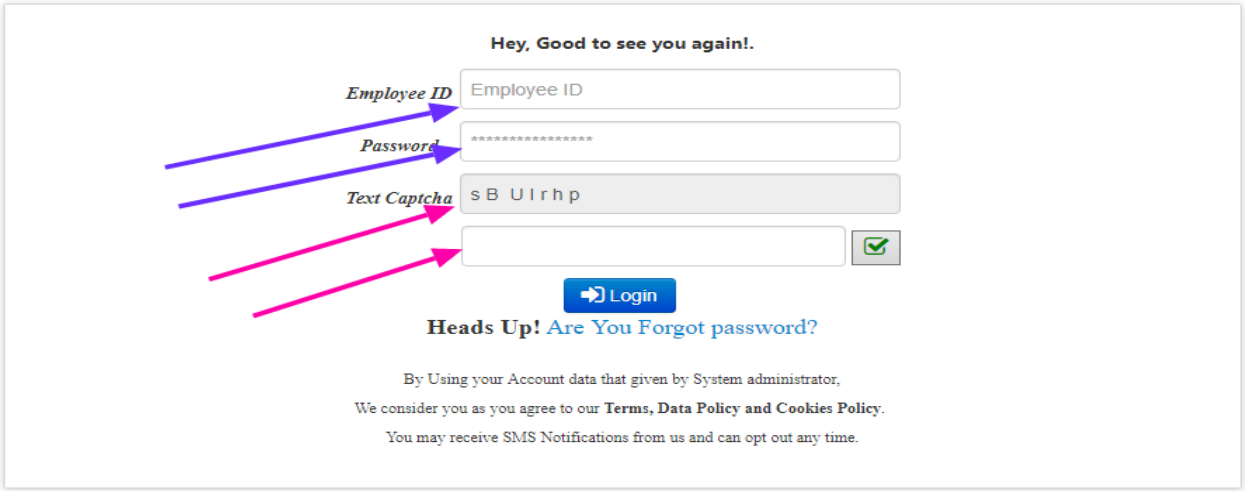


Figure 3.5-2- Login User Interface Prototype

Error password or Employee ID user interface

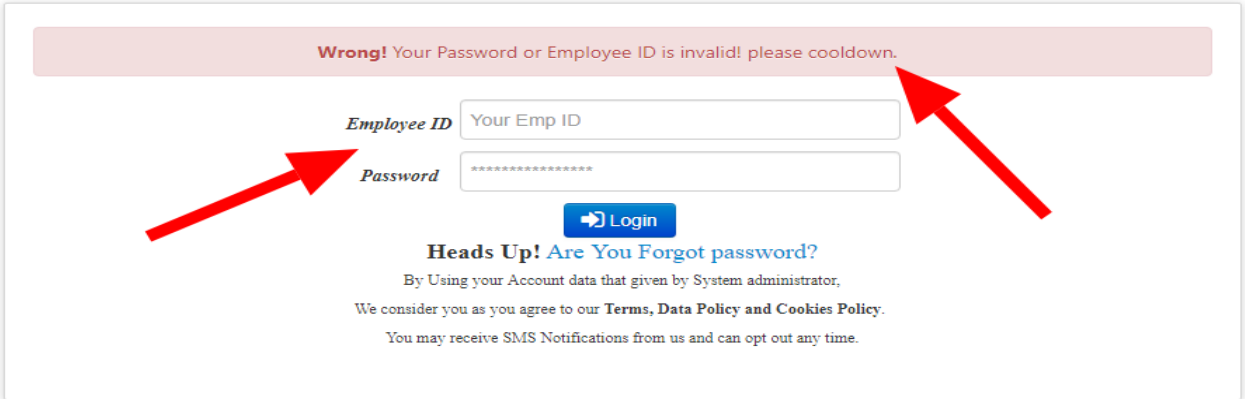


Figure 3.5-3-User Name or Password error display message

User interface for forget password

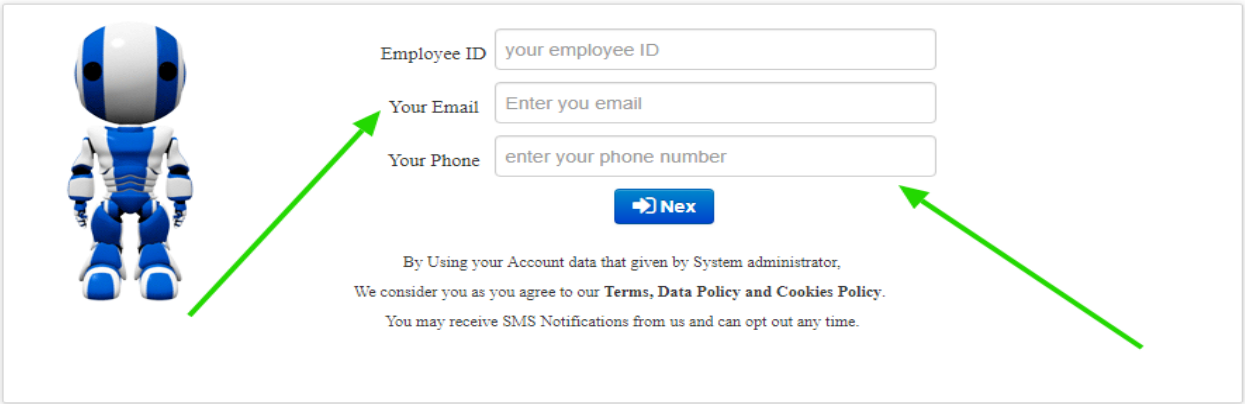


Figure 3.5-4-user interface for Forget password

CHAPTER FOUR (4)

4. CODING AND IMPLEMENTATION

4.1. Overview

Under this chapter Coding and Implementation phase is backbone of chapter that we are going to describe. The result of this phase consists of source code, together with documentation to make the code more readable. This is what we call software implementation. The purpose of these activities is to convert the final physical system specification into working model with reliable software and hardware, document the work that has been done, and provide help for current and future users and take care of the system.

This chapter included under second part of manufacturing development on championship of Rural land management system for South West Shewa Zone. Under these chapter we are explain coding and implementation in detail within its selected algorithm.

4.2. Selected Algorithms and flowcharts

As a developer we consider critical attention due to Algorithm is a step-by-step procedure to solve a given problem and select the better algorithm is solving a problem in better ways. There are so many different modules in our scheme, but we selected very few of them to justify the way of algorithm the system follows.

4.2.1. Selected algorithms

Due to the system so much, vast we are going display two simple algorithm which is simple to understand by user or reader of the documents.

Algorithm for login

Login face has space provided for user of the system, Emp-ID, Password, captcha text provided

Method

Is Valid (account): checks the validity of the Emp-ID, password as well as captcha text?

Precondition: - User information should be registered by the System Administrator.

Post condition: - user information will be validated and direct to specified page.

Accept: - Emp-ID, password and captcha text

Check: - Emp-ID and Password as well as captcha text check with generated one.

If valid: - check in database is the account is available and status is active?

If Available: - direct the user into his or her provided page

Else

Display: - error message and count number of errors tried for login with error password and Emp-Id if try up to four disable account and report to the system.

Algorithm for Create user account

Creating user account is done by system Admin

Methods

Record (Register): is used to record the user's information.

Precondition: - To create user information, System Admin login as Admin.

Post condition: - user's information should be created (recorded) in database.

Accept: - user full information completely

Validate: - user's information valid and check Emp-ID in database {

If-Unavailable: - register into database completely. {}

Else: - Response as ID is registered for another user {}

If valid: - submit to the database

ELSE {display error message}

End if}

4.2.2. Selected Flow Chart

Flow chart login

Step 1: input:

- Land-code: a
- Land-type: b
- Select Woreda: c
- Select Kebele: d
- Land Area: e
- North Bounder: f
- West Bounder: g
- South Bounder: h
- East Bounder: I
- Land photo: j

Step 2: if (a, b, c, d, e, f, g, h, I and j space provided is empty or not full fill correctly) {

System response "This field is required"}

Else if (land code is registered before in a table) {system response "this land is registered before"}

Else (land information has been registered into database rural land table land).

process: - Directs any type of internal operation inside the Processor and Memory

Data (input/output): - Designates that the machine is to acquire data or output results.

Predefined Process: - Used to invoke a subroutine or an interrupt program.

Decision: - Cast-off for verdict format (Yes/No, True/False)

Display: - display message indicators

Terminators: - terminated condition indicators.

Stored Data retrieve: - stored data retrieved from data base

Flow chart for land registration

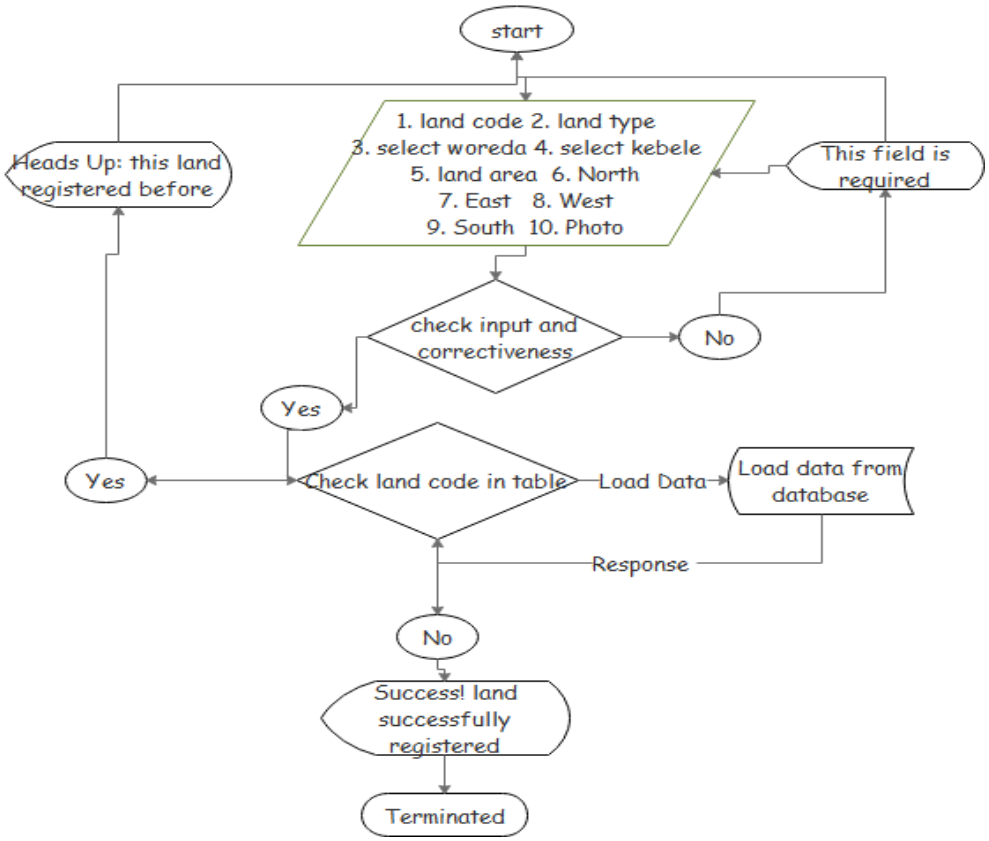


Figure 4.2-1-Flow chart for land registration

Flow Chart for owner registration

Step 1: input:

- Select Land-code: a
- Owner Name: b
- Wife Name: c
- Date of Birth: d
- Number of Family: e
- Son one: f
- Son two: g
- Son three: h
- Daughter one: I
- Daughter two: j

- Daughter three: k
- Other family: l

Step 2: if (a, b, c, d, e, f, g, h, I, j, k and l space provided is empty or not full fill correctly) {

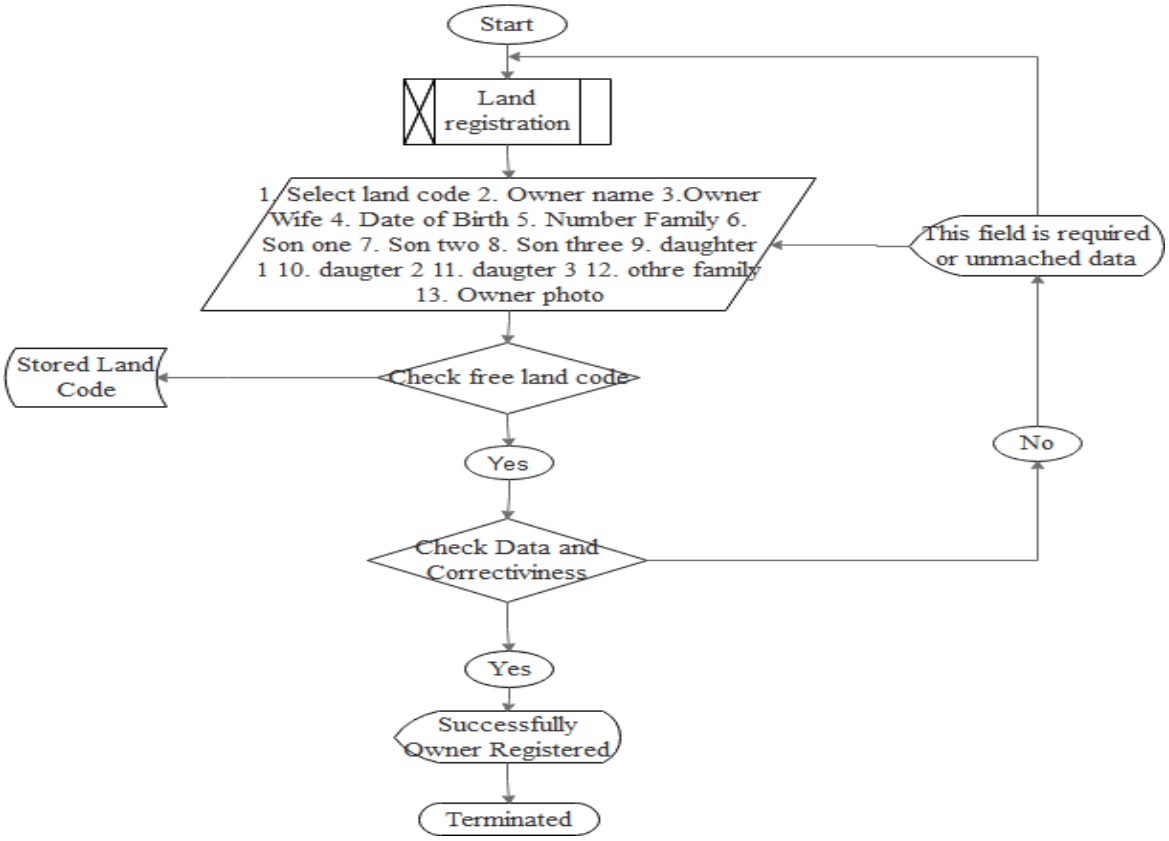
System response “This field is required” or “inserted data is invalid”}

Else if (free land code is not retrieved from database land owner cannot registered)

Else (land owner is registered to the selected land code as specified)

{Success! Land owner successfully registered}

Flow chart for land owner registration



4.3. Code Samples

Due to vastity of the system we cannot put all part of code. However, we put some code sample here.

Sample code for login

For generate captcha text for login.

```
<script type="text/javascript">
```

```
Function Captcha(){var alpha = new Array('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','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');
  var i;
  for (i=0;i<6;i++){
    var a = alpha[Math.floor(Math.random() * alpha.length)];
    var b = alpha[Math.floor(Math.random() * alpha.length)];
    var c = alpha[Math.floor(Math.random() * alpha.length)];
    var d = alpha[Math.floor(Math.random() * alpha.length)];
    var e = alpha[Math.floor(Math.random() * alpha.length)];
    var f = alpha[Math.floor(Math.random() * alpha.length)];
    var g = alpha[Math.floor(Math.random() * alpha.length)];}
  var code = a + ' ' + b + ' ' + ' ' + c + ' ' + d + ' ' + e + ' '+ f + ' ' + g;
  document.getElementById("mainCaptcha").value = code}
 function ValidCaptcha(){
    var string1 = removeSpaces(document.getElementById('mainCaptcha').value);
    var string2 = removeSpaces(document.getElementById('txtInput').value);
    if (string1 == string2) {
      return Button1();}
    else {
      return false;}}
 function removeSpaces(string) {
  return string.split(' ').join('');}
</script>
```

Login checker condition and to redirect to specified page based on given condition.

```
<?php
include('dbcon.php');
$error=0;
if (isset($_POST['Login'])) {
session_start();
```

```
$empID = $_POST['empID'];
$password = $_POST['password'];
$ecode = sha1($password);
$query = "SELECT * FROM users WHERE empID='$empID' AND password='$ecode'";
$result = mysql_query($query) or die(mysql_error());
$num_row = mysql_num_rows($result);
$row=mysql_fetch_array($result);
$row_id=$row['empID'];
$login=$row['loginstatus'];
$usertype =$row["usertype"];
$accountstatus =$row["accountstatus"];
$row=mysql_fetch_array($result);
if ($num_row > 0) {
if ($accountstatus =="deactive”) {
header('location:blocked.php');
$_SESSION['id’] =$row_id;}
else if ($login! ="1”) {
header('location:setnew.php');
$_SESSION['id’] =$row_id;}
else {if($usertype=="Admin”) {
header ('location: 1Admin/index.php');
$_SESSION['id’] =$row_id;
mysql_query("UPDATE users SET stata='Online' WHERE empID='$empID'")or die("Husein, error is occured".mysql_error());}
else if($usertype=="Expert”) {
header ('location: 1Expert/index.php ');
$_SESSION['id’] =$row_id;
mysql_query("UPDATE users SET stata='Online' WHERE empID='$empID'")or die("Husein, error is occured".mysql_error());}
else if($usertype=="Manager”) {
```

```
header ('location: 1Manager/index.php');
$_SESSION['id’] =$row_id;
mysql_query("UPDATE users SET stata='Online' WHERE empID='$empID'")or die("Husein, error is occured".mysql_error());}}}
else{header('location:access_denied.php');
$_SESSION['id’] =$row_id;}}? >
```

Sample code for initiate land renting processes and send request for approval from manager.

```
<?php
$get_id = $_GET['id’] ;>
<?php $query=mysql_query("select * from land where landcode='$get_id'")or die(mysql_error());
$row=mysql_fetch_array($query);
$idno=$row['landcode'];
$area=$row['area’] ;>
 <?php $Adem=mysql_query("select * from owner where landcode ='$idno'") or die("Sorry! Husein, Error is occured!”. mysql_error());
$Husein=mysql_fetch_assoc($Adem);
 $do=$Husein['dob’] ;>
<?php $au=mysql_query("select * from users where empID ='$session_id'") or die("Sorry! Husein, Error is occured!”. MySQL error ());
$qalanxaayi=mysql_fetch_assoc($au);
$qala=$qalanxaayi['empID’] ;>
 <?php $dob='$do';
$diff = (date('Y') - date('Y',strtotime($dob)));?>
<div class="modal-header" style="height:80px; margin-top: -28px;">
        <a href="Renting.php">
   <button type="button" class="close" ><span aria-hidden="true">&times;</span><span class="sr-only">Close</span></button></a>
<h6 class="modal-title" style="font-family: times new roman; font-size: 18px;">Initiate Land Renting process</h6>
</div><div class="modal-body" style="width:">
```

```
<form role="form" class="form-validation-2" method="POST" action="approved.php"
style="margin-top: -8px";>

<h5 ><font color="green"style="font-family: times new roman;">You are Initiating this: <?php
$lan=$row['landcode']; $la=base64_decode($lan); echo "$la" ;>'s   Land</font></h5>

<div class="form-group"><label style="font-family: times new roman;">Land Code:</label>

<input class="form-control input-sm validate[required,custom[number]]" name="landcode"
value="<?php $lan=

$row['landcode']; $la=base64_decode($lan); echo("$la") ;>" readonly name="landcode"></div>

<div class="form-group"><label style="font-family: times new roman;">Land Reneter:</label>

<input class="form-control input-sm validate[required]" readonly="" name="renter"
value="<?php echo $row['owner'] ;>" type="text"></div>

<div class="form-group"><label style="font-family: times new roman;">Land Type:</label>

<input class="form-control input-sm validate[required]" readonly name="typ" value="<?php
echo $row['typ'] ;>" type="text"></div>

<div class="form-group"><label style="font-family: times new roman;"> Total Land
Area:</label>

<input class="form-control input-sm validate[required]" readonly value="<?php echo
$row['area'] ;>"></div>

<div class="form-group"><label style="font-family: times new roman;">Possable Rental
Area:</label>

<input class="form-control input-sm validate[required]" name="area" type="" value="    <?php
if ($diff<60) {

echo ($area/2);}

 else {echo $area;

   }?> "></div>

<?php   $date = date ('Y/m/d', time ()) ;>

<div class="form-group"> <label style="font-family: times new roman;">Rent Date:</label>

<input class="form-control input-sm validate [required, custom[date]]" readonly name="date"
value="<?php echo "$date" ;>" ></div>

<div class="form-group"> <label style="font-family: times new roman;">Rent for: </label>

<input class="form-control input-sm validate[required]" name="taker" type="text"
placeholder="Who is going to take Rent"></div>

<div class="form-group"> <label style="font-family: times new roman;">Phone Number:
</label>
```

```
 <inputn class="form-control input-sm
validate[required,custom[phone],minSize[10],maxSize[10]]" name="phone" type=""
placeholder="Phone number of taker"></div>

<div class="form-group"> <label style="font-family: times new roman;">Email Address:
</label>

<input class="form-control input-sm validate[required,custom[email]]" name="email"
type="email" placeholder="Email address of land taker"></div>

<div class="form-group"> <label style="font-family: times new roman;">Return Date:</label>

<input class="form-control input-sm validate [required, custom[date], future [NOW]]"
name="retdate" type="date" ></div>

<div class="form-group"> <label style="font-family: times new roman;">Border:</label>

<input class="form-control input-sm validate[required]"   name="location"  value="<?php echo
$row['north'];?>,<?php echo $row['south']?>,<?php echo $row['east'];?>,<?php echo
$row['west'];?>"  type="readonly" placeholder="..."></div>

<div class="form-group">

<input class="form-control input-sm validate[required]" name="empl" type="hidden"
value="<?php echo($qala)?>" placeholder="......"></div>

<div class="form-group"> <label style="font-family: times new roman;">Case for Renting:
</label>

  <input class="form-control input-sm validate[required]" name="case" type="textarea"
placeholder="Reseoning for renting"></div>

<div style="margin-left:88px";>

<a href="renting.php"> <input type="button" name="reject" value="Cancel" class="btn btn-
danger" style="margin-top: -10px";> </a>

<input type="submit" name="Rent" value="Initiate" class="btn btn-primary" style="margin-top:
-10px";></div>     <! -- btn btn-sm btn-primary m-t-n-xs demo2-->

    </div> </div></form>
```

Sample code for database backup

```
<?php

include("config.php");

?><script type = "text/javascript" >

function preventBack()

{window.history.forward();}

setTimeout("preventBack()", 0);
```

```
window.onunload=function(){null};
        </script> <?php
        $tables = array ();
        $query = mysql_query('SHOW TABLES',$con);
        while ($row = mysql_fetch_row($query)) {
        $tables [] = $row [0];} $result = "";
        foreach ($tables as $table) {
        $query = mysql_query('SELECT * FROM '.$table,$con );
        $num_fields = mysql_num_fields($query);
        $result. = 'DROP TABLE IF EXISTS ‘. $table.';';
        $row2 = mysql_fetch_row(mysql_query('SHOW CREATE TABLE '.$table,$con ));
        $result. = "\n\n”. $row2[1].”; \n\n";
for ($i = 0; $i < $num_fields; $i++) {
while ($row = mysql_fetch_row($query)) {
$result. = 'INSERT INTO ‘. $table.' VALUES (';
for ($j=0; $j<$num_fields; $j++) {
$row[$j] = addslashes($row[$j]);
$row[$j] = str_replace("\n","\\n”, $row[$j]);
if(isset($row[$j])) {
$result. = "'‘. $row[$j]."'‘;}
else {
$result. = """; }
if($j<($num_fields-1))
{$result. = ',';}} $result. = "); \n";}}
$result. ="\n\n";}
//Create Folder
$folder = 'F:/rural_land/';
if (! is_dir($folder))
mkdir($folder, 0777, true);
chmod($folder, 0777);
```

```
//$date = date('m-d-Y-h-m-s');
$filename = $folder."rural_land DB";
$handle = fopen($filename.'.sql','w+');
fwrite($handle,$result);
fclose($handle);
echo"<h1 align='center'>Database Backed Up Successfully!        ";
echo "Path: “. $filename."“;>
```

4.4. Interface Samples /snapshots

Home page interface

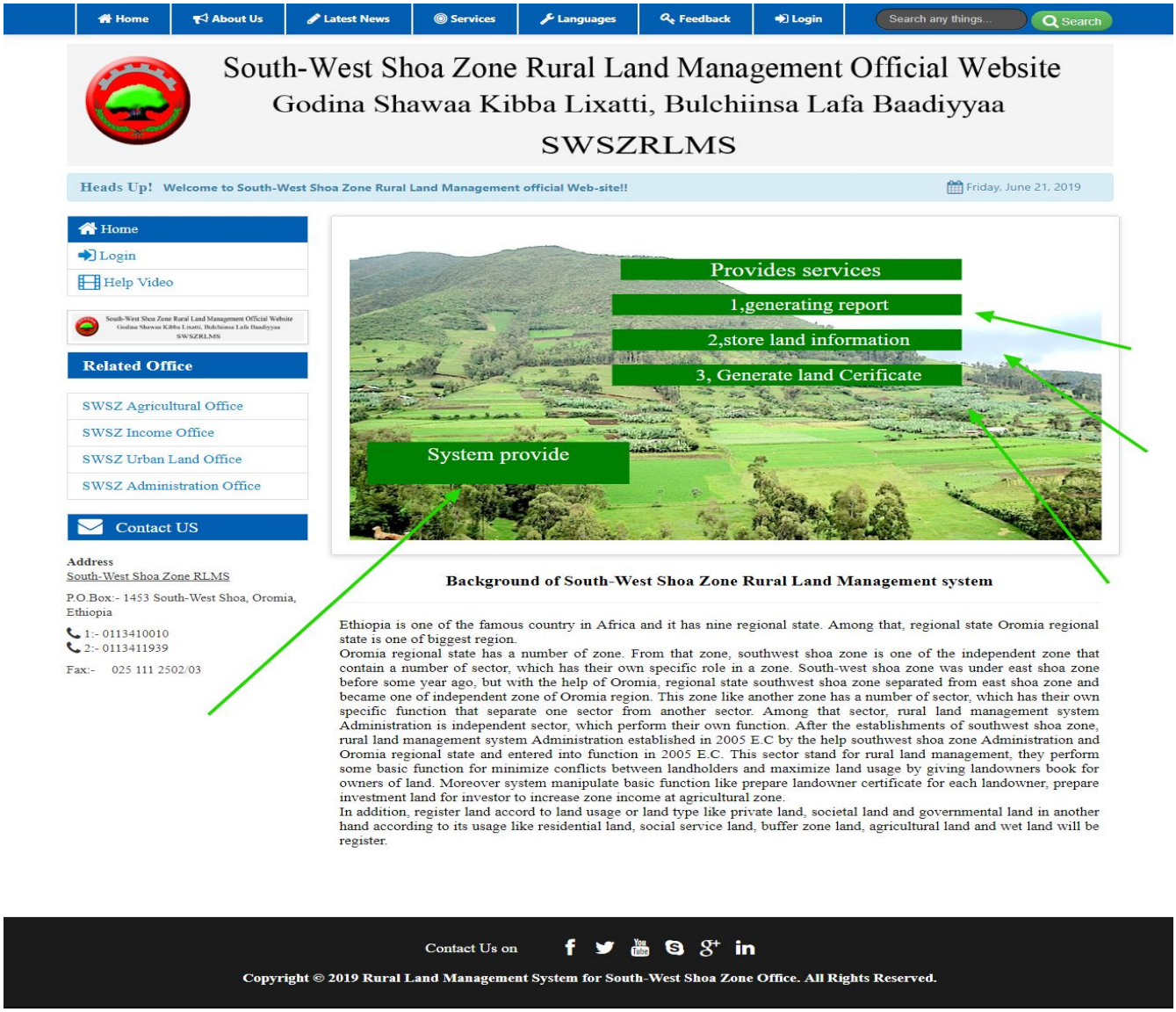


Figure 4.4-1 Home page for SWSZ RLMS official website

User interface for login page

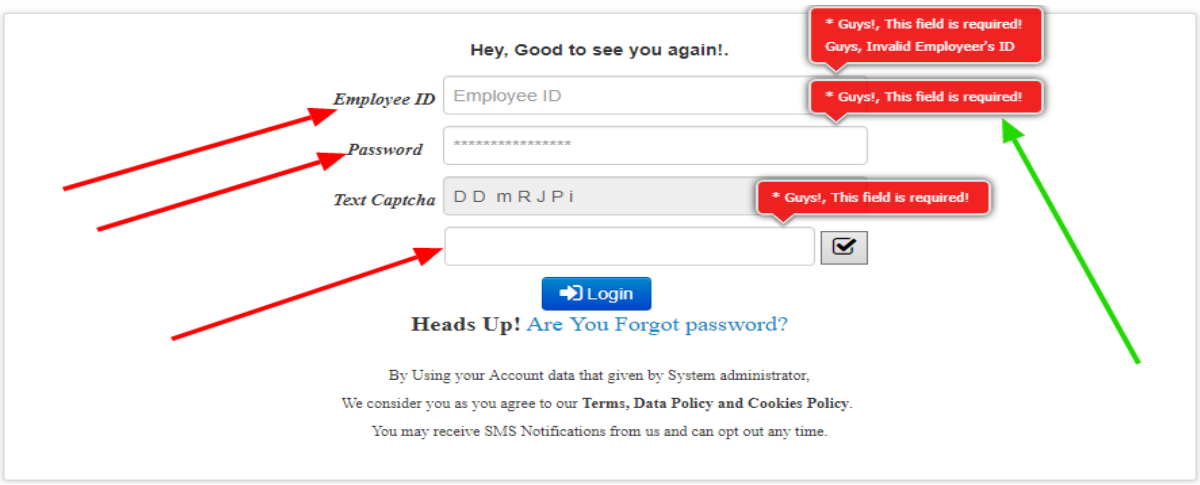


Figure 4.4-2- user interface for login

User interface for login attempts count

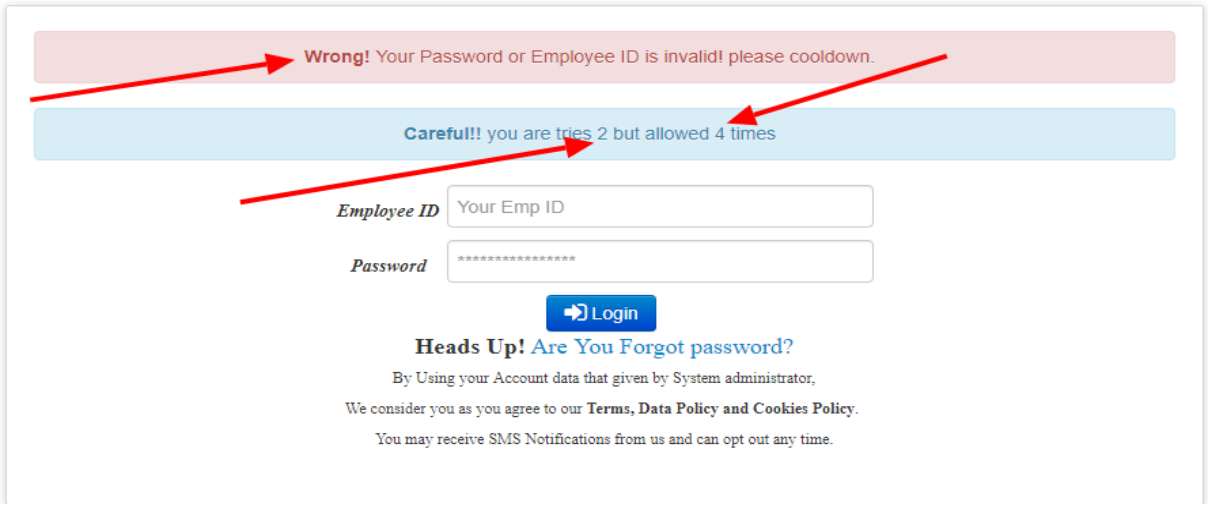


Figure 4.4-3-login attempts count user interface.

System Recorded Report

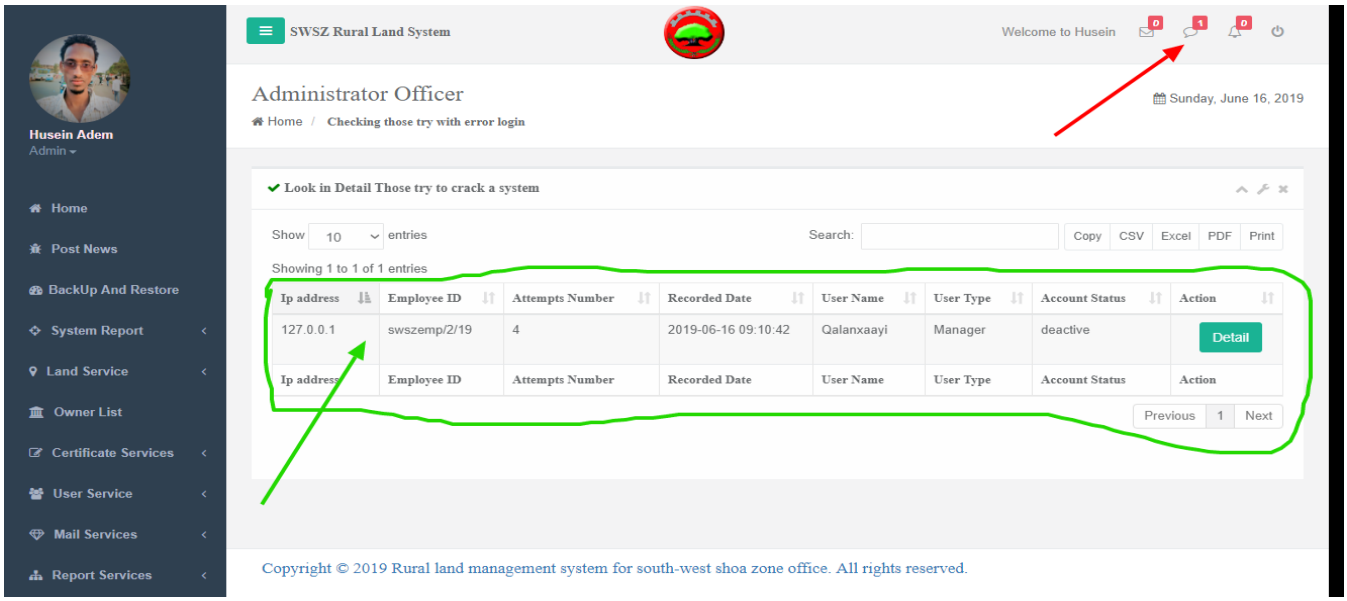


Figure 4.4-4- user interface for System record report

User interface system record report in details

Figure 4.4-5- user interface record report in details

Generated Certificate

Figure 4.4-6-Generated certificate

User interface Header

Figure 4.4-7- user interface header and language selection.

User interface for language selection

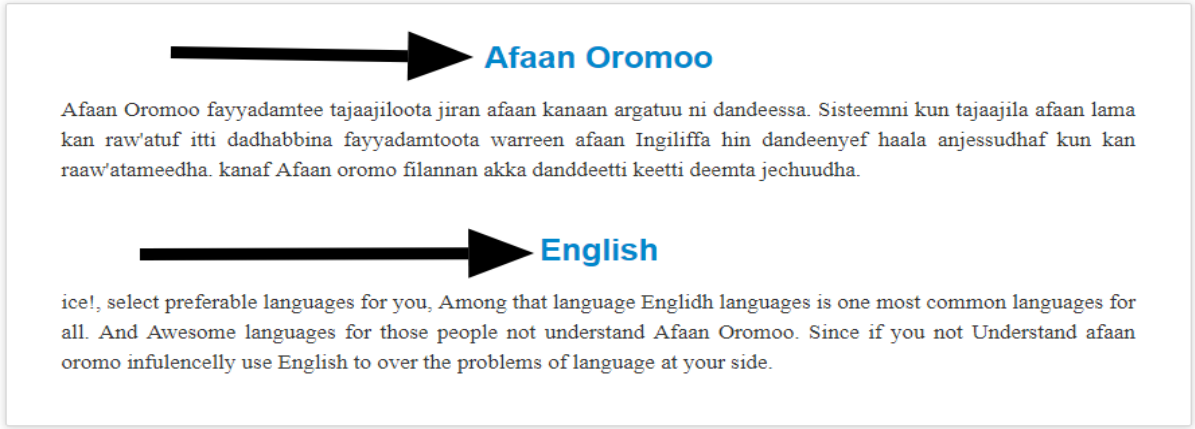


Figure 4.4-8-user interface for language selection

User interface for Oromo languages

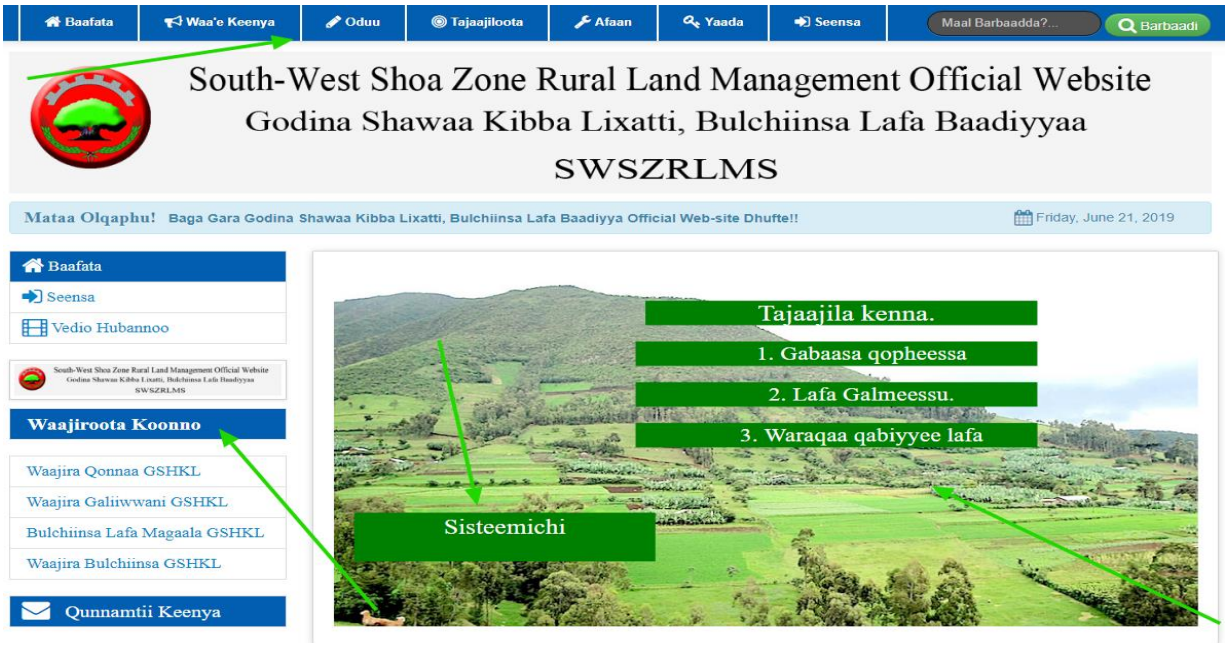


Figure 4.4-9- user interface for Oromo languages

4.5. Deployments issues

Rural land management system for south west Shewa zone project was employed successfully using the Apache Server with MySQL database running as the back-end database and we used PHP as the server-side script language. Additionally, for front-end we use html, CSS and JavaScript as well as ajax to make the system more beauty and more valuable. For this reason, it is mandatory to install Apache server to deploy the system. When deploying the system, the problem such as failure of server may arise so think to overcome such problems. And it available in everywhere by any device like Android based mobile, iPhone based mobile, tablet and other computer.

4.6. Start-up's strategy

This Rural Land management system proposed project developed as web-based application. Therefore, it will be accessed through internet, intranet by using web browser. The system needs to activated on server which has connected to internet and deploy XAMPP/Apache server. And user need to have access internet to access the system by using web browser (Opera, Firefox, google chrome, internet explorer and safari etc.) then brows by domain. After that access the main page of the system or home page of the system. Next to that user can walk through the system as needed. But to login the system he/she should have a given account from system Administrator. System specify user type no need to specify user type by user.

CHAPTER FIVE (5)

5. SYSTEM TESTING

5.1. Testing Overview

Due to the software is an investigation, testing is conducted to provide users within information about the quality of the product or service under test. so, we are going to test as commonly known. By using Software testing methods, we are parallel testing within coding, not only that we can provide an objective of project is touched or not, independent view of the software to allow the business to appreciate and understand the risks of software implementation. As it commonly known test techniques include the process of executing a program or application with the intent of finding software bugs.

5.2. Testing strategies employed

A most commonly known testing strategy is White-Box test methodology and Black-Box testing methodology, based on commonly common testing strategy we are used both of testing strategies in our system.

5.2.1. White-Box testing strategy

White-box testing is the exhaustive examination of internal judgement and structure of the code as it commonly known. It is the developer side or who know the system in detail testing. Since we are developer of the system, we have used this testing technique to verify and validate our system either it works as aimed or not. By using white-Box testing strategy we have detailly looks into the source code again and again for finding out which unit/chunk of the code is inappropriately work.

5.2.2. Black-Box testing strategy

A Black-Box testing is not the developer or who know detail of developing algorithm testing side. Since this technique of testing is need the tester has no any familiarity of the inner workings of system, we take it to SWSZRLMS Expert and Manager employee for testing either system is full fill all requirements according to manual system or not. While accomplishment of black-box test, officer employees interact with the system's user interface by providing inputs and investigating outputs without knowing how and where the inputs are worked upon. And they test as system is secured as needed.

Example of Black-box testing (login)

- Test number……...…. 1
- Test Case Name……...…Login
- Test case description…….…. To test login form validation
- Precondition……. User must have Employee ID and password to login
- Post condition……...System authenticate user and direct to the authorized page based on user type by verifying employee ID.
- Test priority……. High for security purpose.

5.3. Testing types employed

A most common testing type that we were used during system testing are like Unit testing, system testing and Integration testing. How we used each of this testing described here.

5.3.1. Unit testing

During this testing style team tests software units or groups of related to units. It is important for warranting the code is solid before it is integrated with other code. Once the code is integrated into the code base, the cause of an observed failure is more difficult to find. Consequently, we have cast-off unit testing to test each and every module of the system's apparatuses solely.

5.3.2. Integration testing

We are test the system during integrating either completely integrated or not. Because integration testing applied during amalgamation of combined parts of an application to determine if they function correctly combined or not. It can be done in two ways: bottom-up amalgamation and top-down amalgamation. To exam our system, we have been using both bottom-up integration testing and top-down integration testing to ensure system correctly united together.

5.3.3. System testing

This is the final step of testing**.** In this, system is tested the complete whole system as one with all forms, code, modules. Accordingly, team using this test type to test system after the system is integrated together either it entirely works with each other or not. In this we tested all the functionalities in the System. All errors in the forms, functions, modules have been tested. Finally, by the system testing we had warranted that the entire integrated software system lights the anticipated requirements.

5.4. Testing tools employed (Junit, Mercury etc)

Under this section we are pronounces the types of testing tools that used to test a web-based application during SDLC. During the developments of SWSZ RLMS official web-site we have been used Mercury Test Director tools: because this tool is allowing us to deploy high-quality applications quickly and effectively by providing a consistent, repeatable process for gathering

requirements, planning and scheduling tests, analyzing results, and managing defects and issues. By using Mercury Test Director, we are making single testing, used for Web-based application for all essential aspects of test management. Requirements Management, Test Plan, Test Lab, and Defects Management. We can leverage these core modules either as a standalone solution or integrated within a global Quality Center of Excellence environment. Due to this we take mercury testing tools for employed testing strategy in SWSZ RLMS official web-site development time.

5.5. Testing Cases and Testing descriptions

Test case name: -Login

Table 5.5-1-Test case for Login and its description

Specification			
Input	**Expected output**	**Output Result**	**Pass/Fail**
Empty Emp ID and Password place.	Guys! This field is required!	Error message display	Fail
Valid Emp ID and Invalid Password.	Display Error message	Error message display	Fail
Invalid Emp ID and Valid password.	Display Error Message	Guys! Invalid Employee's ID	Fail
Valid Emp ID, valid password, not new user and active account.	Authorized page display.	Success Login	Pass
Empty Emp ID and valid password.	Guys! Invalid Employee's ID	Cursor on provided space	Fail
Valid Emp ID and Empty password.	Display Error Message	Guys! This field is required	Fail
Valid Emp ID and Valid Password but new Users.	Display Password Reset page.	Direct user to Password Reset page.	fail
Valid Emp ID and Valid Password but deactivated account.	Tell as account is de active to the users.	Your account has been deactivated Message	Fail

Valid emp-id, password and active user but invalid captcha text	Error message	Error message	Fail

Example

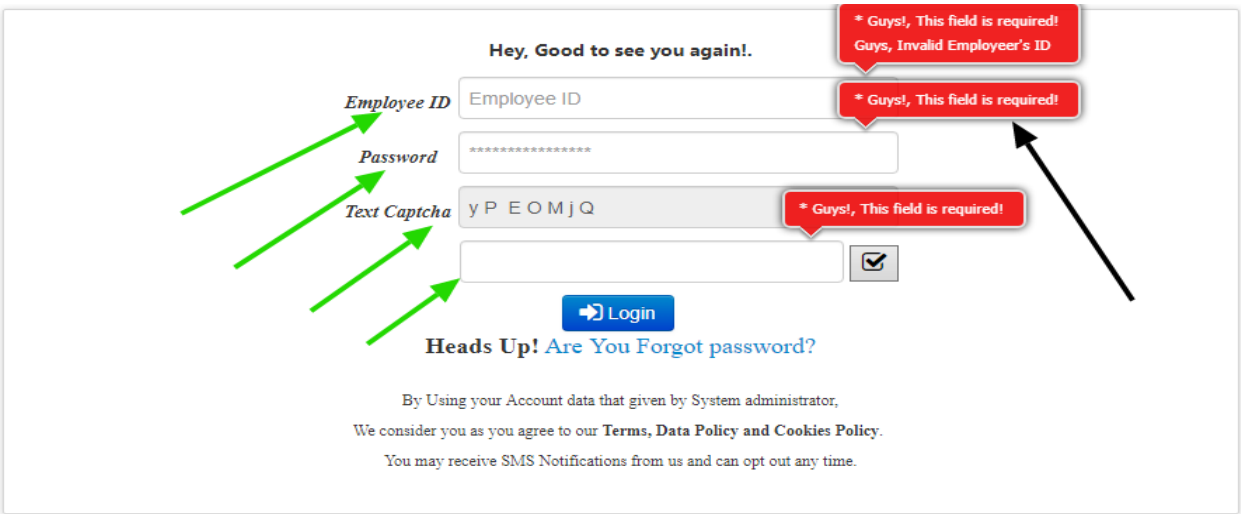


Figure 5.5-1- login testing description

Test case name: - Reset user account

Table 5.5-2- Test case for new user and its description

Specification		
Input	**Expected result**	**Output**
Valid Emp ID and password but new user in login page	Display password reset page	Yes, it provides password reset form for new Emp.
Empty given password, new password and confirm password.	Display error message. This field is required.	This field is required! Message has been displaying.
Valid given password and less than 6 new passwords characters	Error message.	Minimum 6-character is allowed
Invalid given password, more or equal to 6-character	Error message	Wrong! You have insert incorrect given password.

new password and much confirm-password to pass		
Valid given password, more or equal to 6-character new password but confirm is not much to new password.	Error message	Confirm password is not much to password.
Valid given password, more or equal to 6-character new password and much confirm-password to pass.	Password successfully set to new password.	Password have been resettled. And display login page.

Example diagrammatically looks like this

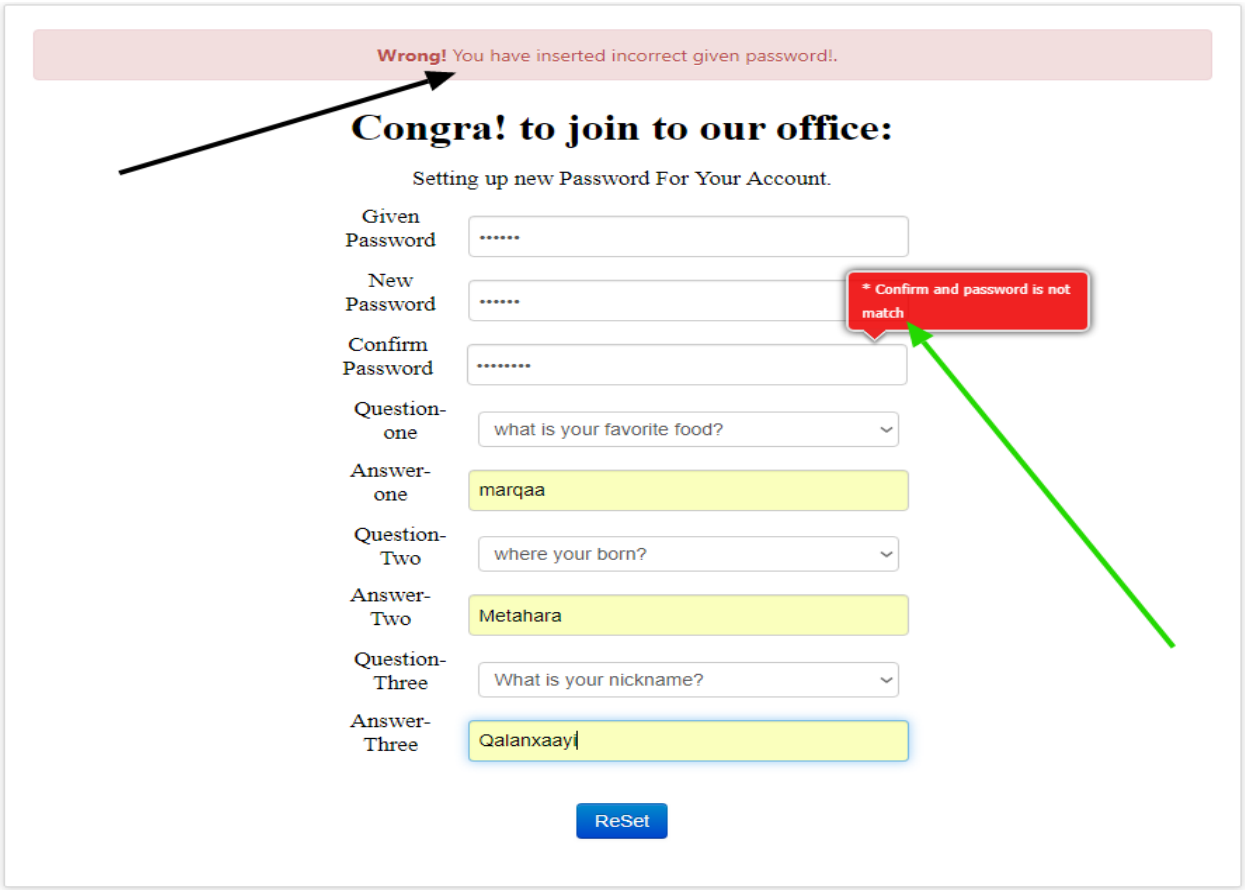


Figure 5.5-2- new user reset account testing

Test case name: - for land registration

Table 5.5-3- testing case for land registration.

Specification		
Input	**Expected result**	**Output**
Valid (land code, land type, woreda, kebele, area, all border and land image) but land code is registered before.	This land is registered before.	As land is exist in database response.
Valid (land code, land type, woreda, kebele, all border and land image) but invalid land area.	Invalid message	"Invalid land area" message is displayed
Valid (land code, land type, woreda, kebele, all border and land area) but empty land photo.	Invalid message	"please select phot" message will be display
Valid (land code, land type, woreda, kebele, border, land image and land area) but missing some border.	Invalid message	"This field is required" message displayed as soon as user click register button.
Valid all input data correctly	Correct	Successful! This land has been registered.

Example: - diagrammatically looks like this

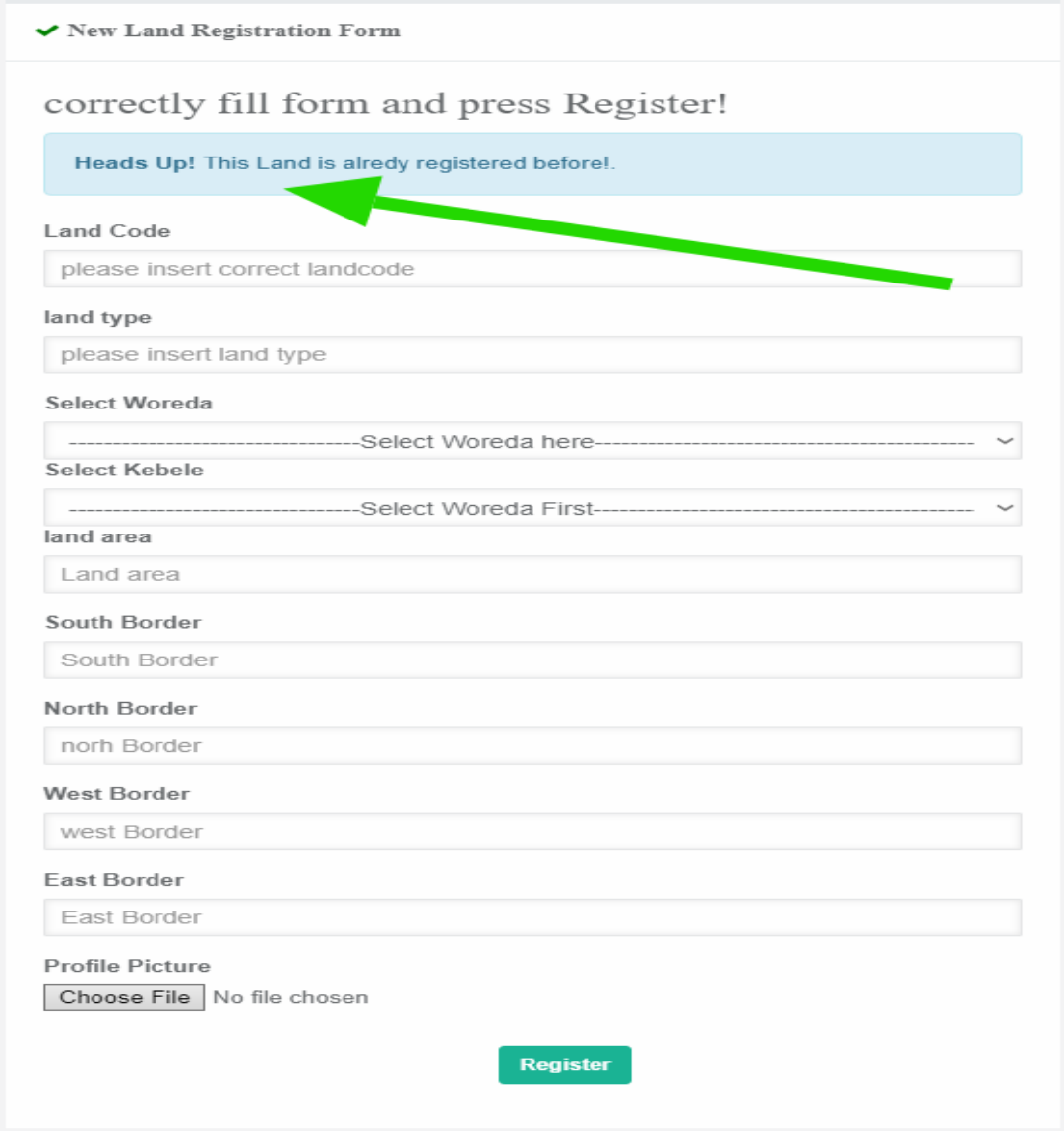


Figure 5.5-3-land registration slip (form) testing

5.6. Performance criteria

(throughput, response time, memory consumption and security).

While we consider system performance criteria, we check it a number of dimension either it has awesome performance for user or not. Meanwhile system is premeditated to be retrieved by different users with different aim, it is accomplished of treatment and processing their queries within a minute because it a web-based application. Habitually it is hard to tell exactly how many users will be using the system at a time due to it is a web-based application it accessible by a number of end users within good performance.

The system performs all desired application efficiently and thoroughly without waste of resource. It will be reliable, perform every work area should use it with a good performance. The choice of windows form is not matter for this system to access; through applicable by every window flat form, android and other operating system.

5.6.1. Maintenance criteria

Since maintenance is a powerful for any system**,** our system also has habit of maintainable during failures is occurred and needed for adding new features to system. we mean that it can be maintained easily when changes arise from the user and designer/developers it is not only when changes arise but also when we consider the non-functional requirement.

5.6.2. Response time criteria

Since the system is a web-based application, web-based application is as commonly known it available within an internet, so it need internet to be accessible within a minute. Nevertheless, within less internet or intranet speed our application is accessible for end used in everywhere within a minute for a number of users at time.

5.6.3. Memory consumption criteria

Based on project scope, we limit the system to its scope. Meanwhile no redundancies of any data in a database and no unnecessary data available in a database. Because we normalize each and every table within third normalization. In another-hand, data is available at the database side, no need it to save any data in end user computer. This means no need another space except database memory. Generally, it has extremely awesome memory consumption.

5.6.4. Security (End user criteria)

Team give high priority for security during develop this system; due to the office we are developing for is perform a critical data about land issue, we give high priority for security. To say this, our system is collapsed if the user tries more than three time with error password or emp ID. In other ways if the users open the system and not use for ten minutes, the system logout and return back to the home page. No creation of account by any one, it created by system Administrator and new user should change password for first login to the system for security purpose. not allow unauthorized users to access the system since it is inner office application. To enter into the application area the user should use a correct Emp ID and password unless it is not possible to take any single operation. The whole activity is controlled by system Administrator, account is disabled or enabled by system admin.

CHAPTER SIX (6)

6. CONCLUSION AND RECOMMENDATION

6.1. Conclusion

This project has been developed for SWSZ Rural Land Administration to change from manual system to web-based automated system. We are developing a web-based system to make the system more valuable and more available to everywhere by everyone. Case that initiate us as we select this title and develop web-based application for this office, manual system is prone to error, in an existing system finding file is too much tedious, loose of file during take documents from one place to other. Redundancy of file, due to nature of manual system. Need more human power to manipulate land administration task. Based on above mentioned problem we have been selected this title to solve problem issue faced the office officer daily during the work official task. System that we have developed perform task like generate report, generate owner book certificate, control renting land, control land inheritance. Register land information within its owner, register system user according to its position. System increase system performance, make system simpler unlike manual system because developed software support two languages Oromo languages and English languages, system has support video to make system more understandable. By using this web-based appli9cation software RL Office increase land benefit, maximize land usage, increase Zone income per year, handle social dispute over the land and maximize social relation by minimizing dispute over land.

6.2. Recommendation

Developed software has may touch all expected system available function due to questioner respondent may not respond as needed, so some functional that not fully competed as expected, so we recommend next researcher to make system complete such function and make the system fully valuable than this. System not support all mobile like java based mobile and other small mobile, so we recommend next researcher as make the system support all small mobile like java based mobile. Developed software not support Amharic languages and other languages except Oromo language and English language, in case of that we recommend as add feature to support other languages.

6.3. Future work

This web-based application only concerned about rural land management system for south west Shewa zone, it not for other, so if the system developed within income office is more advanced than this one. So, for future the site needs to connected or developed web-site should include income office function as well as should include all land type not only rural land. Rather than stands for south-west Shewa zone if the system matured for all Ethiopia land management's system, the system has more valuable than this one. To make the system more secure than now implemented is better for the future because as the technology run forward for more advantage, number of system hackers and cracker for attacking is rising also. As the number of attackers is rising system security should also rising frequently.

References

[1] Abera.W. view of rural people on land registeration and taxation in North Shewa Zone, Amhara Region Ethiopia. Stockolm, Sweden: the case of kewot district, 2008.

[2] Barrows and Michael. Land tenure and Invvetment in Africa theory and Evidence. Maidison: Land tenure center, University of Wisconsin: Adventure work for all, 1989.

[3] Solomon.A. "*Land Registration system in Ethiopia: Comprative Analysis of Amhara, Oromia, SNNP and Tigray Regional state*". Standardization of Rural Land Registration and Cadasteral , vol. ii, no. 15, pp. 165-188, 2006.

[4] Husein.J. Debate over rural land tenure policy option in Ethiopia. Addis Abebe: Contending views, 2001.

[5] Dessaleng .R. Searching for tenure securing? the land system on new policy intiative in Ethiopia. Addis Abebe: forum for social study, 2004.

Appendix

Ambo university woliso campus

School of technology and informatics

Information Technology Departments

This questioner paper is organized by **information technology** 4th year student for conducting final (industrial) project towards collecting crucial information from expected body of Rural land management system for south-west Shewa zone office.

Interview question: -While collection of requirements for the development of south-west Shewa zone rural management's system we use interview to get over view of existing system. Some interview question that we asked to concerned body based on both open-ended question and closed ended question are like follows:

1. How you can prepare landowners' certificate?
2. Please could you help us the work flows of your system?
3. Can you list players of an existing system?
4. What each player contributes to the system?
5. Would you tell me types of land according to land categories?
6. What the types of land according to land usages?
7. What is the basic business process?
8. What data used or produced during that process?
9. What are the limits imposed by time and the volume of work?
10. What performance controls are used?

Questioner: -under this section, we prepare some question based on both open-ended and closed-ended question and distribute to the officer and expert employers of an organization. Some of that question are as follows: -

1. When the south-west Shewa zone rural land managements were established?
2. What types of service it provides for landholders?
3. Is the landholders satisfy from which the system provides?
4. Is the system need more employers to run properly?
5. How you can identify one landholder from another person?

6. How you can work with your expected Woreda office?
7. Can you estimate cost that you are expenditure per year to give the service?
8. Is there any secured database to store landholder's information?
9. Do need to change your system to computerized based system?
10. What types of the problem experienced with when manipulated landholders' information?

Other open-ended question

1. When south-west Shewa Zone Land Administration was established?

_____

2. Is it the same established with rural land management especially for agricultural sector?

a. Yes

b. No, if it is no, when rural land management was established in southwest Shewa zone?

_____

3. What type of services it provides to land holders?

_____

4. Is Landholders satisfied from the service which system provide?

a. Yes

b. No, if it is no, why?

_____

_____

5. Depending on the above question (#4) incase if your selection is B, how to satisfy landowner or make the system more valuable than before?

_____

_____

6. Is the system need more employers to run properly?

a. No

b. Yes, why it needs more employers?

_____

_____

7. How you are identified one landowner from another landowner person?

_____

_____

8. How you are work with your Woreda expected office?

_____

_____

9. Can you estimate cost that you are expenditure per year to give the service?

_____

_____

10. Is there anyone try to make your system automate before us?

a. No

b. Yes

11. Is there any secured Databases to store landholder's information?

a. Yes

b. No

12. How you can store landholder's information?

_____

_____

13. How you can manipulate land information?

_____

_____

14. Do you need to change your system to computerized based?

a. No

b. Yes, if it yes, please list awesome expectation that you are expected from automated one._____

_____

_____

_____

15. What types of problems experienced when manipulate the landholder's information?