Online Teacher Transferring Management System

In Case of West Gojjam Zone Educational Office

Submitted by:

NAME OF THE STUDENTS	ID
Metadel Amogne……...…..…….	TER/244/11
Mehari Temesgen…….	TER/247/11
Mulugeta Walle…….....	TER/249/11
Tadesse Tilahun……...…….…..	TER/254/11
Wdneh Worku…… …….	TER/256/11
Yadelew Lewoye…….	TER/257/11

In partial fulfilment for the award of the degree of

BACHELOR OF SCIENCE IN COMPUTER SCIENCE

Under the guidance of:

Atalo Habtie (M.Sc.)

……

ADVISOR SIGNATURE

DEPARTMENT OF COMPUTER SCIENCE

BURE CAMPUS

DEBRE MARKOS UNIVERSITY

BURE

BURIE, ETHIOPIA

Jun 2022

Abstract

This project entitled with “online teacher transfer management system” is designed to keep records of teachers, schools and make retrieval of their information easier. This project examines teacher transfer system stored in the database and Capable of easy retrieval of information. The system is very interactive and useful for the educational office workers (MERSU), teacher. The main idea of the system lays in the need for a system which the MERSU, teachers and System administrators communicate each other for improving teachers transfer system. The project has been designed with PHP technology. PHP (PHP with HTML) and MySQL Version: 5.6.12 database for the development of the project. For this project, the team member used object-oriented software development methodology.

All the data needed for the application is stored in the form of tables in the phpmyadmin. The report contains the details of all the tasks carried out during the entire website development life cycle of the online teacher transfer.

Generally, the main goal of online teacher transfer management system is to assign the teacher online, to reduce errors, to reduce redundancy of data, to improve the accuracy of input and also reduce labor pains of the MERSU officer.

Acknowledgment

In the presence world of competition there is a race of existence in which those are having a will to come forward succeed.

First of all, we would like to thank the supreme power the Almighty God who is obviously the one has always guided us to work on the right path of life.

Next to him we are feeling oblige in taking the opportunity to sincerely thanks to our Advisor Atalo Habtie (MSc.). We would like to show our greatest appreciation to him. We cannot say thank you enough for this tremendous support and help. We feel motivated and encouraged any time we attend his meeting. Without his encouragement and guidance this project would not have materialized.

Our sincere thank also goes to bure woreda educational office MERSU officer for offering us by giving the appropriate information about the work of the existing system.

Last but not the least; we would like to thank all our instructors for their contribution in the completion of our first chapter of life and supporting us spiritually throughout our life.

Table of contents

List of figures

List of tables

List of Acronyms

ACA: - Alternative Course of Action

CPU: - Central Processing Unite

CSS: - Cascading Style Sheets

GB: -Giga Byte

HDD: -Hard Disk Drive

HTML: - Hypertext Markup Language

MYSQL: -My Structural Query Language

OS: -Operating System

PHP: -Hypertext Preprocessor

RAM: - Random Access Memory

TTMS: - Teacher Transfer Management System

UC: -Use Case

UML: -Unified Modeling Language

XAMPP**:** cross-platform, Apache, MySQL, PHP and Perl

CHAPTER ONE

1. INTRODUCTION

1.1. Introduction

Now a days Technology is being used in almost every company to accomplish specific tasks. Many businesses are using various business communication technologies to change the way their employees interact and communicate while at work. Employees can use various communication tools to interact or exchange information at work such us developing website for online communication. Web application is one parts of information technology in which applications and information's are stored on servers and users can access that information or application remotely using web browsers is therefore accessible from anywhere in the world via the Web.

The project title is online teacher transferring management system for west Gojjam education office. This project is preferred to improve the load of existing manual system by automation or computerization. Still now the existing teacher transfer management system exchange information through manually. Therefore, this work that manually performed needs to be automated or computerized to reduce the problems that happened. For this project, the team member used object-oriented software development methodology.

1.2 Background of the project

West Gojjam Education office is one non-profit organization dedicated to coordinate the education process among 16 Woreda's of west Gojjam administrative zone. The main aim (goal) of this educational office is to improve the quality of education in west Gojjam.

In addition to this educational organization, there is also another sub office which is called MERSU office. These organizations perform concurrently for quality of education and give different services for the zone learning teaching process. Some of the services which are performed by the organizations is: - transfer of teachers in different schools, managing educational materials for different schools. From this service which is listed above the project team specifically deals about teachers transferring management system in west Gojjam zone that is performed by MERSU office.

In transferring process, the system record details information about teacher. The system provides transferring of teachers from woreda to woreda and school to school in short period of time. In the

current situation the teachers transferring management systems are done manually, but to improve a good quality of education the project team could develop online teachers transferring system.

1.3. Statement of the Problem

The problem of the existing teachers transferring management system currently is done by manually. Due to this reason the manual method is: -

- Poor Data Storage: -When the number of teachers becomes huge (increase) storing of their data is difficult and needs more cost.
- Existence of data duplication: - teacher may submit transfer form more than once.
- Loosing of the stored document: - because the system uses paper to store student information, so data can be lost.
- It is difficult to find and modify existing records.
- Lack of immediate data retrievals: - Information retrieval of teacher detail is difficult and time consuming because there is no way to search teacher information.
- Overburden work for the MERSU officer, school director and teacher during providing the service

Generally, it takes more time to perform actions due to all actions are performed using human labor.

Therefore, these were the current problems that initiate the project team members to design the automated teachers transferring system.

1.4. Objective of the project

1.4.1. General objective

The main objective of this project is to develop automated teachers transferring system for west Gojjam zone educational office.

1.4.2. Specific objective

To achieve the above general objective, the project has done the following specific objectives.

- To understand the existing transfer's process.
- To analyze the gathered requirements.
- To allows the system updating information.
- To create well-organized database.
- To design a user-friendly GUI.
- To develop a mechanism for a report generation feature.

1.5. Scope of the project

The scope of this project is teachers transferring management system from woreda-to-woreda and school-to-school in west Gojjam zone. In this project, the following activities are made:

- Register teacher information
- Register school information
- Register Woreda information
- Sort teachers' information based on services
- Assign teachers to school all in one
- Set transfer deadline
- manage user account (create, update, activate/deactivate accounts)
- Generate report

1.6. Limitation of the project

Due to time and budget constraint, our project does not include the whole management system of the teacher transfer related work in West Gojjam zone. There are many constraints within our proposed system that limit their effectiveness of performance. Our system is limited only in the process of web based TTMS of the West Gojjam zone educational office but does not include about whole management system. The system depends on electric power and network connection. The above activities or subsystems are proposed system limitations because of the following reason: -

- ✓ Time is the main factor of limitation our proposed systems that limit its performance because while we are developing the system it takes more time and we may not get enough time to automate the system. So, do not expect fully functional system.
- ✓ The system does not support marital status and heath problem of the teacher.

1.7. Significance of the project

The project system benefits the following users.

For teachers: -teachers are more beneficial by this system because of,

- ✓ It reduces transport cost
- ✓ It provides available information easily
- ✓ It saves time

For MERSU officer: -

- ✓ It provides good management system

- ✓ Easy to filter or search records
- ✓ It keeps records data safely
- ✓ It assigns teachers within a short period of time easily
- ✓ It updates information accurately
- ✓ Reduce resource wastage
- ✓ Increase teacher's satisfaction.

For School director:-

- ✓ It provides easy communication with MERSU officer.
- ✓ It reduces the overload of the school director
- ✓ It provides an easy mechanism to send and receives request
- ✓ It solves the scarcity of teachers easily.

For The Developers

While developing the system

- ✓ Developer's team skills improved knowledge how to conduct and prepare online system.
- ✓ Developer's team problem solving skill increase.

Those which are listed above are the significance of the project.

1.8. System requirements

1.8.1. Hardware requirement tool

- ➢ 32 GB Flash Disk: - used to store data as backup.
- ➢ Pen: - used to write the drafting of the idea on the paper.
- ➢ A4 Sized Paper: -used to organize the idea before writing to computer. This is used to draft all, the idea on the paper and to collect different information from any sources.
- ➢ Computer (having the following specifications)- used to develop the system
  - ➢ 1 TB HDD: - used to store data long term.
  - ➢ 8 GB RAM: - used to cache the data nearer to the processor to reduce the latency in accessing the data from the hard disk (very slower to access).
  - ➢ 3.60GHZ CPU: -used to process data quickly.

1.8.2. Software requirement tool

- XAMPP Server version 8.1.6**:** XAMPP is an abbreviation for cross-platform, Apache, MySQL, PHP and Perl, and it allows us to build WordPress site offline, on a local web server on our computer. This simple and lightweight solution works on Windows, Linux, and Mac – hence the "cross-platform" part.

  Reasons for choosing this tool: -

  - It is free and easy to use and easily available for Windows, Linux and Mac OS.
  - It is a beginner's friendly solution package for full stack web development.
  - It is an open-source software package which gives a easy installation experience

- Editor: - Visual studio (version 17.1) used to write codes.

  It is easy to use and supports, scripting and markup languages

- Edraw Max (version 8.4)**: -** used to draw unified modeling diagram Such as sequence diagram, activity diagram etc.
- Browser like chrome and Microsoft Edge: - used to display webpages of the project
- Window 10 OS**: -**used to access, manipulate, update and manage files easily by searching on the start menu.
- Adobe Photoshop CS6: -it used to edit photo.
- Microsoft office word and Microsoft PowerPoint 2010**: -**For writing documentation and presentation.

1.8.3. Programming Language

- Client side: - HTML, JavaScript and CSS.
  - CSS: using for static part of the website and for the style of the website.
  - HTML: is a language which used to create electronic documents (called webpages).
  - JavaScript: is very interesting language used to validate data and develop different messages.
- Server side: **-**
  - PHP (Version: 5.3.4) is one of the most popular server-side scripting languages running today. Reasons for choosing this tool are the following.
    - Cost: Open source.
    - Usability: is human-friendly language.

- Ease of Use: PHP is easy to learn compared to many other scripting languages.
- Embedded: PHP can be easily fixed directly into, HTML and CSS
- Compatibility: PHP is platform independent.

- MYSQL database (version 5.7.36): use to store, retrieve, update, and delete data easily.

1.9. Methodology

For the successful completion of this project, a number of data gathering, analysis, and programming tools and techniques are put into use. The data collected focuses on issues like, what is expected from the system? What are the inputs of the system? What are the outputs of the system? What are the rules of processing the input data? How are they processed? Who requires which data in what form?

1.9.1. System development methodology

System development methodology in system developing refers to the frame work that is used to structure plan and control the flow of developing an information system.[1] For this project, the team used object oriented software development methodology.

The reason for selecting object -oriented system development is: -

- Objects/classes or models are used to represent real world problems in simplified form.
- Object based models appeal to the working of human cognition and hence the human input in to the development of a system is likely to be more natural and less error prone.
- These techniques have usability features (it allows to use codes repeatedly on other system). Re-use not only modules but also entire design.
- Allow full exploitation of the power of object based and object-oriented programming languages.

Project team uses iterative system development life because of: -

- ✓ It is flexible to change the user requirement and scope to get full requirement.
- ✓ Errors are easily to be identified
- ✓ Simple to manage risk because of it handles during its iteration.

Iterative processes involve refining and improving a software project or product based on received feedback or new information. The goal is to achieve continuous improvement by incorporating changes in a trial-and-error fashion.

1.9.2. Data Collection Methodology

Data collection is one of the important tasks in determining and analyzing the existing system. It is the most important part in this project to find the main requirement of the system and to understand how the system does. The following are the methods that the project team uses to collect data.

Observation: - We have observed physically by going to the education office to analyze the MERSU and teacher associations work processes.

Document analysis: - To get information about the background of the educational office the project team review necessary documents, manual that supports for this project.

Interviews: The project team use interviews to gather direct information from MERSU managers and teachers' association managers getting over all current system process.

- What kind of system the organization has used?
- Have they any computerized system?
- How the existing system works?
- During transfer, are there any problems? If there, what are they?
- Who is a responsible person in this transfer process?

1.10. Feasibility study

Feasibility study is essential to evaluate the cost and benefits of the new system. On the basis of the feasibility study decision is taken on whether to proceed or to cancel the project. Need of the feasibility study:

- It determines the potential of the existing system.
- It used to determine/finds out the problem of the existing system.
- To determine all goals of the new system.
- It finds all possible solutions of the problems of the existing system.

1.10.1. Technical feasibility

The system has been technically feasible because, the system is powerful to be applied by low skilled users' as much as possible means that it does not require any cultured knowledge. The system to be developed by using technologically system development techniques such as PHP, Java script, CSS and MYSQL database without any problems and the group members have enough capability to develop the project.

The system has user friend interface that allows the users of the system to perform the action they want without confusion. So, the system will be technically feasible.

1.10.2. Operational Feasibility

This is a standard that ensures interoperability to the benefit of the public both in terms of cost and service quality. The system is acceptable to users.

- No direct or indirect resistance from user.
- It is also true that reduces the effort of users.
- The implementation is user friendly.

So, the system is operationally feasible or operationally acceptable to users.

1.10.3. Economic Feasibility

Our system is economically feasible, because it reduces the time needed to perform certain actions such as teacher and school registration, generate report, paper and pen, which they are using for manual work. The system which we are going to develop will have economic benefit. Those economic benefits may be tangible or intangible benefits.

Tangible Benefits: - This means the concrete benefit that can be expressed in terms of dollars or birr. Since this project is going to computerized system, there is: -

- Reduced cost for material that used for manual operation; like paper and pen.
- Save time.

Intangible Benefits

- Better decision making
- Better service to the MERSU office managers
- Easily access information
- Increased flexibility
- Increase speed of activity,
- Increase the satisfaction of system users
- Improves the security mechanism.
- Makes a comfortable working environment for the users.

1.10.4. Legal feasibility

The system to be developed is not conflict with any government directives, and with any cultural aspects, because it gives services for MERSU, all the MERSU and teacher workers also agreed before the system developed. So, the government and peoples are profitable and the system legally feasible.

CHAPTER TWO
2. SYSTEM ANALYSIS

2.1. Overview of the existing system

In the current situation the system is done manually. If the teacher wants to transfer from one place to another place, he/she must require moving to the MERSU office and submits the application letter to responsible person who works in MERSU office. And also, the MERSU take the teacher's application letter and validate the letter whether it is correct applicant or not based on different criteria. Some of the criteria taken into considerations are: -

- Whether the teacher has 2 years and above services for woreda to woreda transfer and for school-to-school transfer teacher has 1 year and above service.
- Whether the teacher has married or unmarried.
- Whether the application letter is due to the problem of health or social problems.

In general, the transferring is performed hierarchically, that means if the teacher's transferring is from woreda to woreda, the task is performed by zone MERSU. Otherwise transferring is from school to school the transferring task is performed by woreda MERSU.

The teacher who wants transferring from woreda to woreda or from school-to-school fills form and they send their form to zone MERSU or woreda MERSU. The form which is sent by the teacher is compute with other teacher's form who wants to transfer in the same level. The responsible persons who work in zone MERSU or woreda MERSU evaluates the transferring form depend on the above listed tasks.

The evaluation is also performed based on the work place of the teacher like; the school is comfortable or not based on air condition, road and the like. Based on this condition there is bonus service for teachers who works in uncomfortable school. The teacher who works in comfortable place or school like city town etc. has no bonus service or his/her service is counted as it is. If the teachers have equal service and they have in different work place, the transferring is performed based on place of the school. That means the teacher who works in uncomfortable place is transferred first. If the school they want to transfer is the capacity of accepting both of them, both of them can be transferred.

The classification of giving a bonus service is:-

» Classification one: - Finote Selam town.

» Classification two: - All woredas and towns that found in west Gojjam except finote selam town.

Fig 2.1: - Bonus service classification

If the service is equal and the difference is gender, first priority is given for female teacher. The bonus service is given based on classifications like: -

- ✓ Classification one: there is no bonus
- ✓ Classification two: one month added per year
- ✓ Classification three: two months added per year
- ✓ Classification four: three months added per year
- ✓ Classification five: four months added per year
- ✓ Classification six: five month per year.

Transfer based on service year.

Service year is the main consideration of transferring process. If one who wants to transfer from school to school or woreda to woreda, a person he/she has high year of service transferred first. If two teacher's service is equal to with the other teacher's service, the marital status is considered and the married teacher is transfer first.

Transferring based on married or unmarried

In this task the transferring is performed like:-

If the average of two married teacher's service is equal to with the average of the other two married teacher's service, the place is considered and the teacher who works in uncomfortable place is transferred first. In addition to this the school which they want to transfer is the capacity of accepting both of them all of them can be transferred.

From the two married teachers he/she is transferring to the other place by different reasons like due to enhancement of education or into different sectors or offices, if it is possible, they can be transferred in the same place. Otherwise, he/she can be transferred to the nearest work place.

Transferring based on problem of health

This transferring method is based on health. That means if the teacher has problem of health and the place, he/she works is not comfortable, he/she can be transfer based on evidence.

Users of the existing system

The existing system has the following users:

Teacher: - The teacher fill transfer form and sends requests to MERSU officer.

School director: - reports the vacant spaces of the school for MERSU officer.

MERSU officer (WMERSU and ZMERSU): - officers perform, like check types of transferring system either school to school or woreda to woreda, assign teachers to schools, response the result of the requested application letter for teachers and the school directors.

Supervisor: - a person who facilitates teacher transfer by acting as a bridge between school director and woreda MERSU in order to enable communication between them.one supervisors should communicate with 4 or 5 schools.

2.1. System requirement specification

2.1.1. Functional requirements

The functional requirement is the services that are provided by the system.

The following are the work that our system does.

- Register teachers' information
- Register the school information.
- Register woreda information
- System allows to manage user (activate/deactivate)
- The System set transfer deadline

- The system generates report.
- The system allows to send request
- The system assigns teacher to school all in one.
- The system allows teachers to view their result.
- The system contains archive history.
- Catch backup

2.2.2. Nonfunctional requirement

Non- functional requirement describes user visible aspects of the system that are not designed to the functional behavior of the system. Some of the non- functional requirements are:

Performance:

Performance is characterized by the amount of useful work accomplished by the system compared to the time and resources used. The system performs its task efficiently and effectively because of project team use a light weighted code in HTML, PHP, CSS and JavaScript.

Usability:

Our system designed to have user-friendly interfaces and easy navigate from one link to other. It is also designed in such a way that users can easily learn and operate.

Portability:

This system is portable, since it runs on different desktop platforms. The system is made using HTML, CSS, PHP, etc. which are platform independent and can be transported to other servers with minimum effort.

Availability: The users can access the system at any time as he/she needs. So, the users of system can access the system successfully.

Security: Every user can access the system after authenticated by user name and password.

Extendibility: The system should be readily extendable and modifiable when user requirement

Response time: The system gives automatic response for any action that can be performed by users.

Error Handling: When a user interacts with the system errors may occur. To control this kind of inaccuracies the application will generate different user-friendly messages.

2.2.2.1. Technical requirements

Technical requirements are the technical issues that must be considered to successfully complete a project. These are aspects such as performance, reliability, availability that the project must meet on in order to proceed with a project.

Generally, these are technical requirements to complete the project.

- The interface of the system is user friendly (easy to use).
- The interface display error message if it detects invalid input.
- The system denies unauthorized accesses to the system domain.
- The system provide help for the user.

2.2.3. Business rule

A business rule is effectively an operating principle or policy the software must satisfy. It often pertains to access control issues, business calculations, or operating polices and principles of the organization.

The new system has the following business rules.

BR1. The system administrator should administer the system and give accesses to those users as per their priority to the system.

BR2. The system user should have their own account and should login with correct user name and password.

BR3.The teacher must have 1 or more services when he/she needs to transfer from school to school.

BR4.The teacher must have 2 or more services when he/she needs to transfer from woreda to woreda.

BR5. The teacher should select only 3 schools.

BR6. The teacher should select only 2 woreda.

BR7. The school director should request that the school needs how much teachers based on vacant space.

2.2.4. Change cases

In the proposed system we have said that we use WAMP server as a system requirement tool. But now we got XAMPP server simple and lightweight solution works on Windows, Linux, and Mac – hence the "cross-platform" part. More applicable and plat form independent software tool, on a

local web server on our computer. Due to this reason our working platform is changed from WAMP server to XAMPP server.

2.3. System Requirement analysis

2.3.1. Actor and Use case Identification

» Actor

In the use cases an actor interacts with the system to perform a piece of meaningful work that helps them to achieve a goal and has access to define their overall role in the system and the scope of their action.

An actor in the unified modeling language (UML) "specifies a role played by a user or any other system that interacts with the system. An actor represents a type of users of the system or external systems that the system interacts with. An actor is a user of the system playing a particular role. When identify the actors of the system the team developer should consider the following questions:

- Who will supply, use, or remove information from the system?
- Who will use the system?
- Who is interested in a certain feature or service provided by the system?
- Who will support and maintain the system?
- What are the system's external resources?
- What other systems will need to interact with the system under development?

The actors that interact with online teacher transferring system are identified in the following table.

Table 2.1: Actor identification

NO.	Actor Name
1.	Teacher: a person who fill transform form.
2.	*WMERSU OFFICER* (Woreda MERSU officer): a person who are placed in woreda level and they are responsible for school-to-school teacher transferring system.
3.	School director: reports the vacant spaces of the school for MERSU officer
4.	Admin: -a person who controls the system
5.	ZMERSU OFFICER (Zone MERSU officer): - a person who works in zone MERSU office. Control works for teacher, woreda MERSU and director in west Gojjam zone.

Use case

A use case is a methodology used in system analysis to identify, clarify, and organize system

requirements. The use case is made up of a set of possible sequences of interactions between systems and users in a particular environment and related to attain particular goals.

There are three basic elements that make up a use case:

- ✓ Actors: Actors are the type of users that interact with the system.
- ✓ System: Use cases capture functional requirements that specify the intended behavior of the system.
- ✓ Goals: Use cases are typically initiated by a user to fulfill goals describing the activities and variants involved in attaining the goal.

The use case should contain all system activities that have significance to the users. The identification of use cases is one key issue in the development of interactive systems.[2] Online teacher transferring management system involves the following use cases.

Table 2.2: Use case Identification

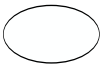
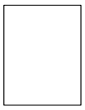
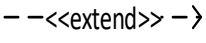
ID	Use case Name
Uc1	Log in
Uc2	Register teacher
Uc3	View teacher record
Uc4	Update teacher record
Uc5	Register school
Uc6	View school record
Uc7	Update school record
Uc8	Register woreda
Uc9	Update woreda
Uc10	View woreda
Uc11	Add user
Uc12	Update user
Uc13	Set transfer deadline
Uc14	View request
Uc15	Send request
Uc16	View transfer result
Uc17	activate/deactivate system user
Uc18	Fill transfer form
Uc19	Update transfer form
Uc20	Generate report
Uc21	Register MERSU
Uc22	View transfer form
Uc23	Logout

Use case diagram

Use Case diagrams show the various activities the users can perform on the system. The System is something that performs a function. They model the dynamic aspects of the system. A use case diagram illustrates a set of use cases for a system, the actors of these use cases, the relations between the actors and these use cases, and the relations among the use cases. A line between an actor and a use case represents that the actor initiates and/or participates in the process. A use case describes the sequence of events of some types of users, called Actors, using some part of the system functionality to complete a process.

When we draw use case, we use the following shapes.

Table 2.3: Use case representations

No	Shapes	Representation
1		It represents the users of systems known as **actors**. It represents a role that a user can play but not specific user.
2		It represents a user goal that can be achieved by accessing the system or software application.
3		It represents scope of systems. Known as system boundary. The use case of a system is placed inside this, while the actors who interact with the system are put outside the system.
4		It represents that a use case contains the behavior defined in another use case.
5		It represents how and when the behavior defined in the extending use case can be inserted in to the behavior defined in the extended use case.
6		It is used to associate actor and use case to indicate that the actor participates in that use case. Therefore, an association corresponds to a sequence of actions between the actors and use case in achieving the use case.

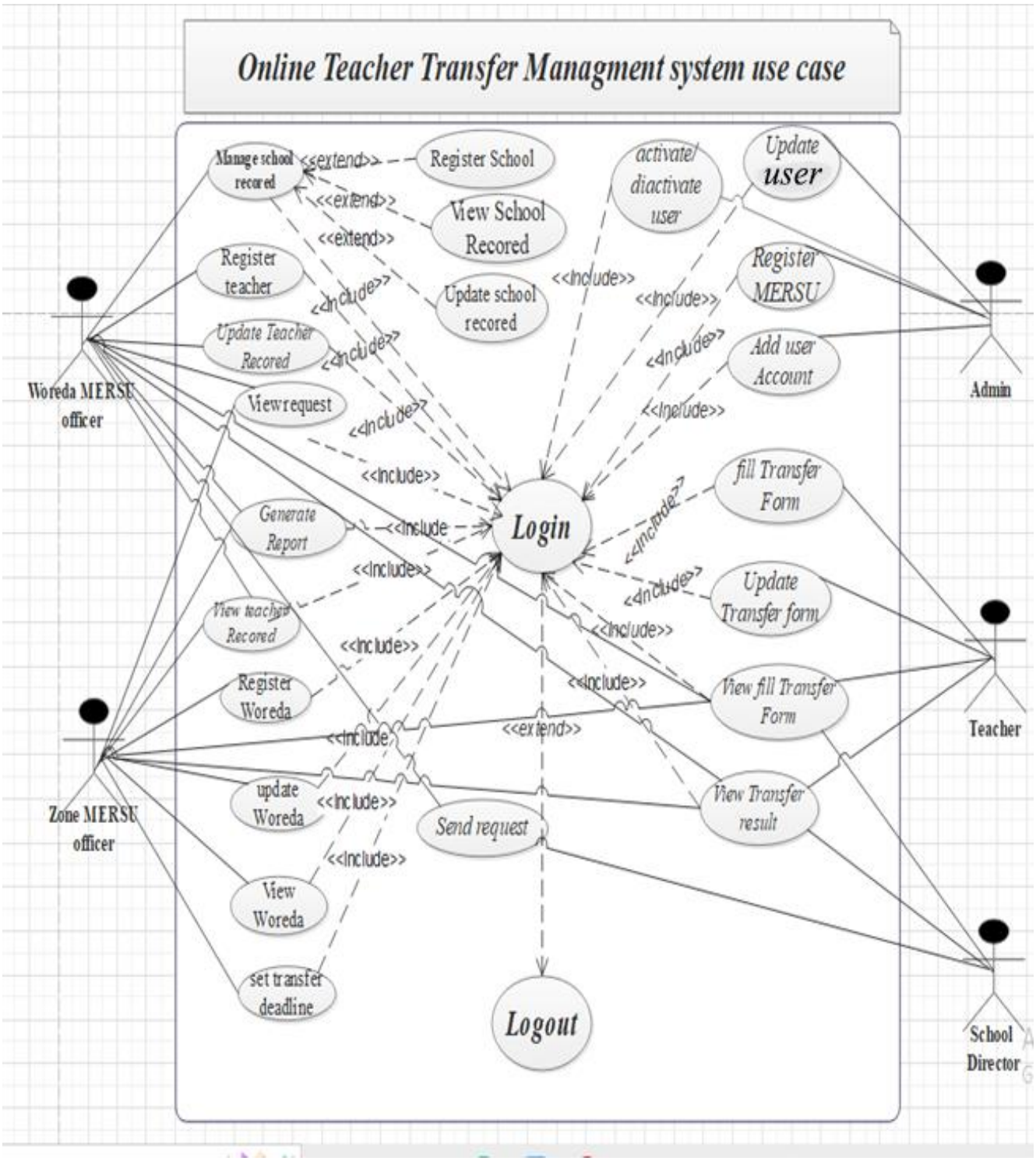


Figure 2.2: Use case diagram

Use case description

The following tables describe some of the use cases that are stated above in this system.

Table 2.3: Use case descriptions for login

Name	Log in
ID	UC1
Actor	System user (WMERSU officer, ZMERSU officer, Teacher, School Director and Administrator.)
Description	In order to login into or access the system.
Precondition	The home page currently displayed on the screen, the actor is ready to log in and having valid username and password.
Basic Course of Action:	1. Open the system. 2. Login form displayed. 3. Enter user name and password. 4. Click on the login button. 6. System verifies in the account database. 7. If username and password is valid. 8. User authenticated and gets access to the system. 9. End of use case.
Alternative Course of Action:	If the username and password is incorrect. A1: The system displays you entered wrong Username and Password try again message. A2: The system redirects to go step 3 i.e.to enter the username and password Use case ends.
Post condition:	Login to the system successfully and gets access to the system according to their predefined system privileges.

Table 2.4: Description of register teacher use case

Name	Register teacher
ID	UC2
Includes	Login
Actor	WMERSU OFFICER
Description	The WMERSU OFFICER adds teachers and then the teacher selects woreda or school that they want to transfer.
Precondition	The WMERSU OFFICER must gain a username and password from the Administrator and then after can login and add teachers.
Basic Course of Action:	1. WMERSU OFFICER logins to the system. (A1) 2. The WMERSU OFFICER click add link. 3.The system re-direct to Add teacher Form 4.The WMERSU OFFICER fills all the required data in the Add teacher form and Submit [ACA: A2] 5.The system displays" teacher successfully Added"
Alternative Course of Action:	A1. The system returns the user to login form to reenter valid data. A2. The system returns the WMERSU OFFICER to add teacher form to fill missed required fields.
Post Condition:	The teacher can select the available woreda or schools

Table 2.5: Description for View teacher record use case

Name	View teacher record
ID	UC3
Includes	Login
Actor	ZMERSU and WMERSU
Description	This use case describes ZMERSU AND WMERSU view list of record teacher from the system.
Precondition	The teacher should be register to the system.
Basic Course of Action:	1. WMERSU and ZMERSU logins to the system (ACA 1). 2. WMERSU and ZMERSU click view registered teacher link. 3. System display registered teacher.
Alternative Course of Action:	A1. The system returns the user to login form to reenter valid data.
Post Condition:	Registered Teacher will be viewed.

Table 2.6: Description for Update teacher record use case

Name	Update teacher record
ID	UC4
Includes	Login
Actor	WMERSU
Description	This use case describes WMERSU update record teacher information.
Precondition	The teacher should be register to the system and WMERSU must have user name and password.
Basic Course of Action:	1. WMERSU logins to the system. (A1) 2. WMERSU click update teacher record link. 3. The system directs to update teacher record form. 4. The WMERSU fills data that he wants to update in the update teacher record form and Press update button (A2). 5. The system displays" Teacher successfully Updated"
Alternative Course of Action:	A1. The system returns the WMERSU to login form to reenter valid data. A2. The system returns the WMERSU to update Teacher record form to fill missed correct data.
Post Condition:	Teacher record information is update.

Table 2.7: Description for register school use case

Name	Register school
ID	UC5
Includes	Login
Actor	WMERSU OFFICER
Description	The WMERSU OFFICER add school that are available in woreda that the WMERSU OFFICER lives
Precondition	The WMERSU OFFICER must gain a username and password from the Administrator and then after can login and add schools.
Basic Course of Action:	1. WMERSU OFFICER receives user name and password from the admin and login to the system [ACA: A1] 2. The WMERSU OFFICER presses Add school Link Under school Management module 3. The system Re-direct to Add school Form 4. The WMERSU OFFICER fills all the required data in the Add school form and Press Submit button [ACA: A2] 5. The system displays" school successfully Added"
Alternative Course of Action:	A1. The system returns the user to login form to reenter valid data. A2. The system returns the WMERSU OFFICER to add school form to fill missed required fields.
Post Condition:	The school registered successfully on the database

Table 2.8: Description for view register school use case

Name	view register school
ID	UC6
Includes	Login
Actor	WMERSU OFFICER
Description	The WMERSU OFFICER view registered school that are available in woreda that the WMERSU OFFICER lives
Precondition	The WMERSU OFFICER must gain a username and password from the Administrator and then after can login and school should register.
Basic Course of Action:	1.WMERSU OFFICER receives user name and password from the admin and login to the system [ACA: A1] 2.The WMERSU OFFICER presses view register school Link Under school Management module 3.System display registered school page.
Alternative Course of Action:	A1. The system returns the user to login form to reenter valid data
Post Condition:	Registered Teacher will be viewed.

Table 2.9: Description for Register woreda use case

Name	Register woreda
ID	UC8
Includes	Login
Actor	ZMERSU OFFICER
Description	The ZMERSU OFFICER registers woreda that is available in West Gojjam zone.
Precondition	The ZMERSU OFFICER must gain a username and password from the Administrator and then after can login and.
Basic Course of Action:	1. ZMERSU OFFICER receives user name and password from the admin and login to the system [ACA: A1] 2. The system displays ZMERSU page. 3. The ZMERSU OFFICER presses Add woreda Link. 4. The system display Add woreda Form. 5. The ZMERSU OFFICER fills all the required data in the Add woreda form and Press Submit button [ACA: A2] 6. The system displays" woreda successfully Added"
Alternative Course of Action:	A1. The system returns the ZMERSU to login form to reenter valid data. A2. The system returns the ZMERSU OFFICER to add woreda form to fill missed required fields.
Post Condition:	The woreda added successfully on the database

Table 2.10: Description for update woreda use case

Name	update woreda
ID	UC8
Includes	Login
Actor	ZMERSU OFFICER
Description	The ZMERSU OFFICER updates woreda that is available in West Gojjam zone.
Precondition	The ZMERSU OFFICER must gain a username and password from the Administrator and then after can login and.
Basic Course of Action:	1. ZMERSU OFFICER receives user name and password from the admin and login to the system [ACA: A1] 2. The system displays ZMERSU page. 3. The ZMERSU OFFICER presses update woreda Link. 4. The system displays updates woreda Form. 5. The ZMERSU OFFICER fills all the required data in the update woreda form and Press Submit button [ACA: A2] 6. The system displays" woreda successfully update"
Alternative Course of Action:	A1. The system returns the ZMERSU to login form to reenter valid data. A2. The system returns the ZMERSU OFFICER to add woreda form to fill missed required fields.
Post Condition:	The woreda updated successfully on the database

Table 2.11: Description for add user use case

Name	Add user
ID	UC11
Includes	Login
Actor	Admin
Description	The system admin adds users in order to interact with the system.
Precondition	The system admin must login with username and password
Basic Course of Action:	1.System admin login into the system by him/her user's name and password [ACA: A1] 2.The admin presses Add user Link 3.The system re-direct to Add user Form 4.The admin fills all the required data in the Add user form and Press Submit button [ACA: A2] 5.The system displays" user successfully Added"
Alternative Course of Action:	A1. The system returns the admin to login form to reenter valid data. A2. The system returns the admin to add user form to fill missed required fields.
Post Condition:	The user can have user name and password and they can interact with the system.

Table 2.12: Description of update user use case

Name	Update user
ID	UC12
Includes	Login
Actor	Admin
Description	The system admin update users that are register before
Precondition	The system admin must login with username and password.
Basic Course of Action:	1. system admin login into the system by him/her user name and password [ACA:A1] 2. The admin presses update user Link Under user Management module 3. The system direct to update user profile Form 4. The admin fills data that he wants to update in the update user form and Press update button [ACA: A2] 5. The system displays" user successfully updated"
Alternative Course of Action:	A1. The system returns the admin to login form to reenter valid data. A2. The system returns the admin to update user form to fill missed correct data.
Post Condition:	The user can interact with the system based on their updated information and system admin manages the new or updated information of the user.

Table 2.13: Description of fill transfer form use case

Name	fill transfer form
ID	UC19
Includes	Login
Actor	Teacher
Description	The teachers fill transfer form in order to transfer woreda to woreda or school to school.
Precondition	Teacher must login with username and password.
Basic Course of Action:	1. Teacher login into the system by him/her user name and password [ACA:A1] 2. The system displays teacher page. 3. The teacher presses fill transfer Link Under transfer form module 4. The system displays teacher transfer Form. 5. The teacher fill requires information and press submit button. [A2] 6. The system displays" form successfully Added"
Alternative Course of Action:	A1. The system returns the admin to login form to reenter valid data. A2. The system returns the teacher to fill transfer form to fill missed correct data.
Post Condition:	The teacher filled teacher transfer form to transfer.

2.3.2 Sequence diagram

A UML Sequence diagram shows the sequence of interactions among objects and used to represent or model the flow of messages, events and actions between the objects or components of a system. Sequence Diagrams are also used primarily to architecture and interfaces of the system by describing the sequence of actions that need to perform to complete scenario.[3]

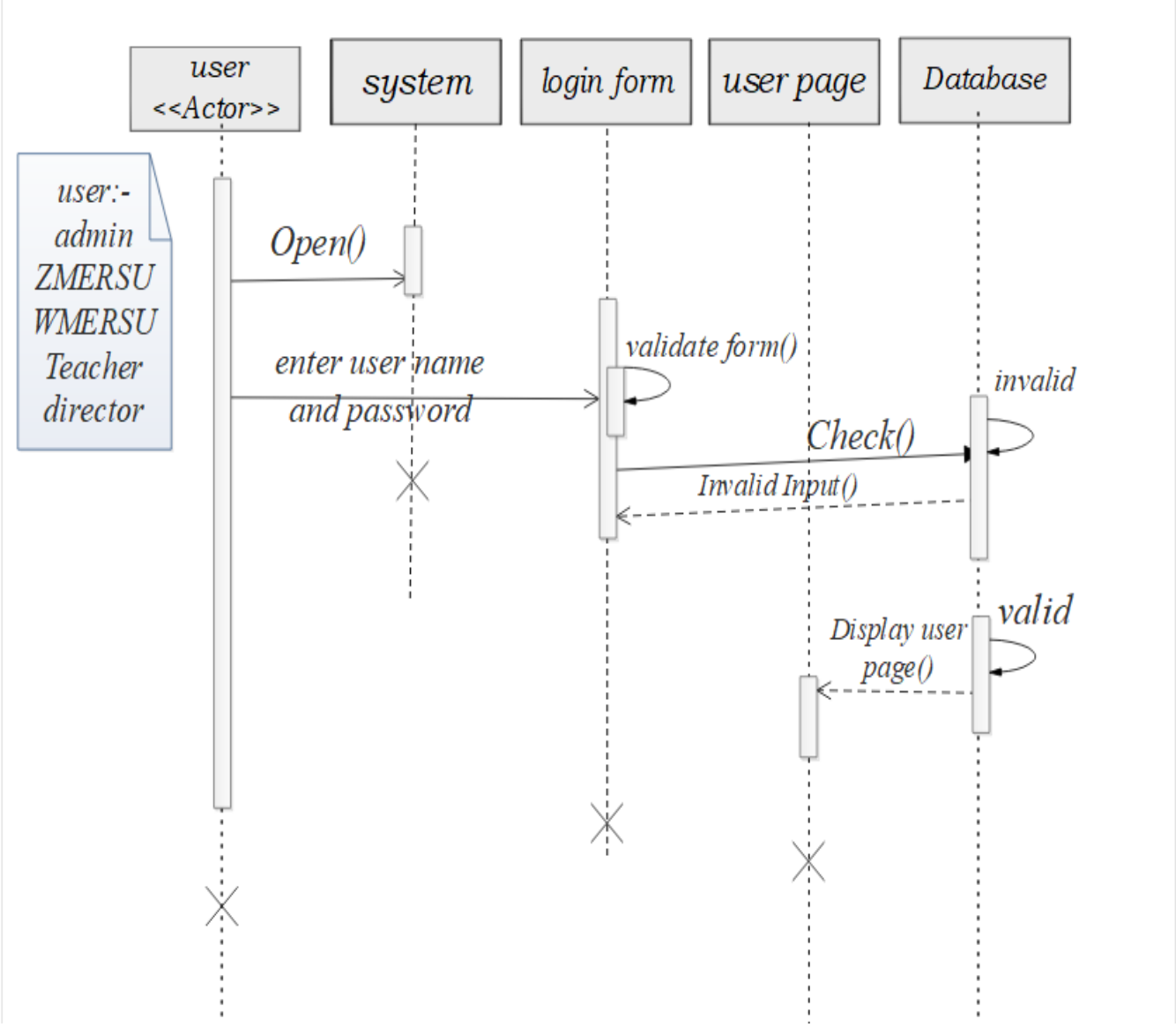


Figure 2.3: Sequence diagram to login

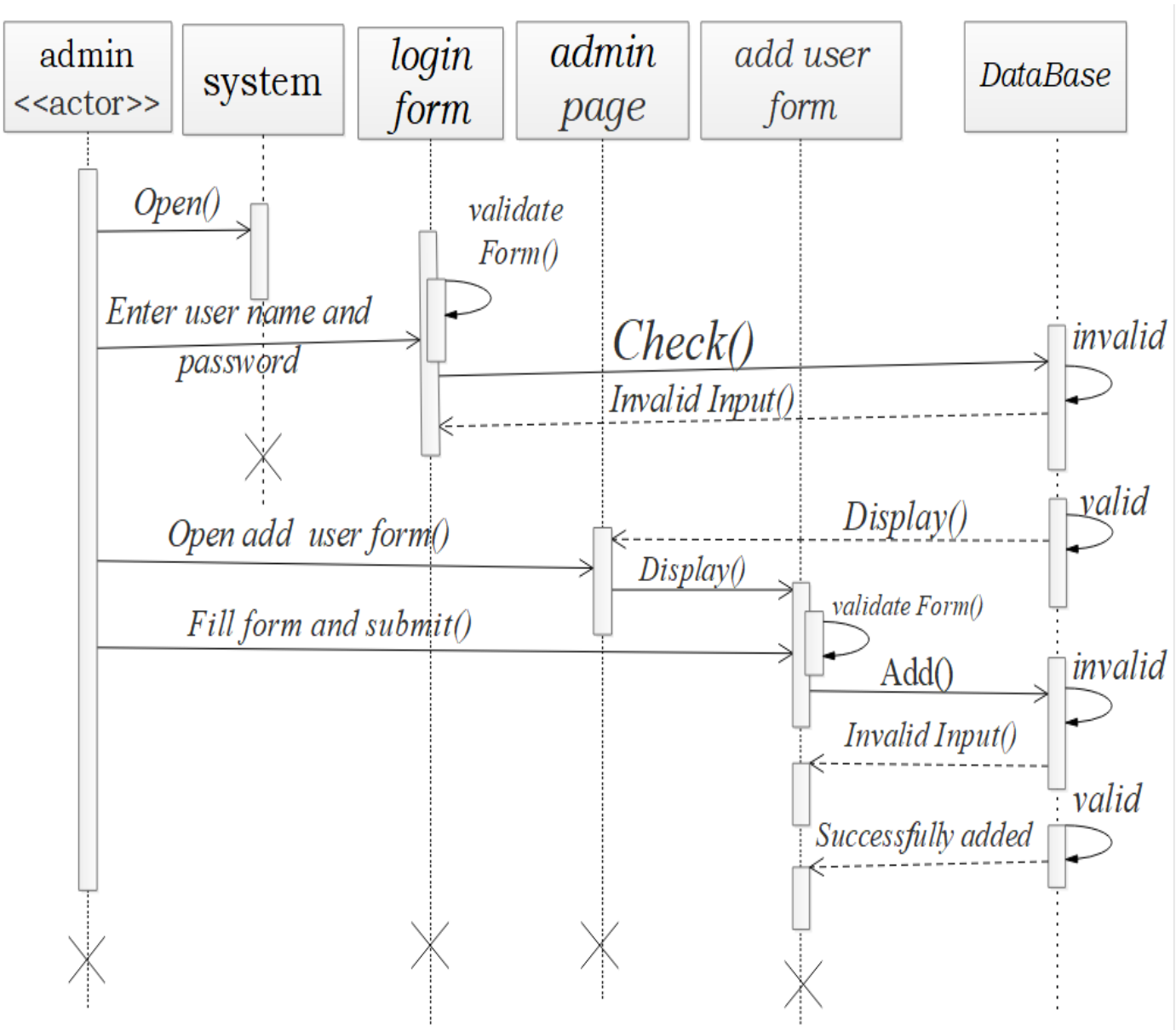


Figure 2.4: Sequence diagram to add users

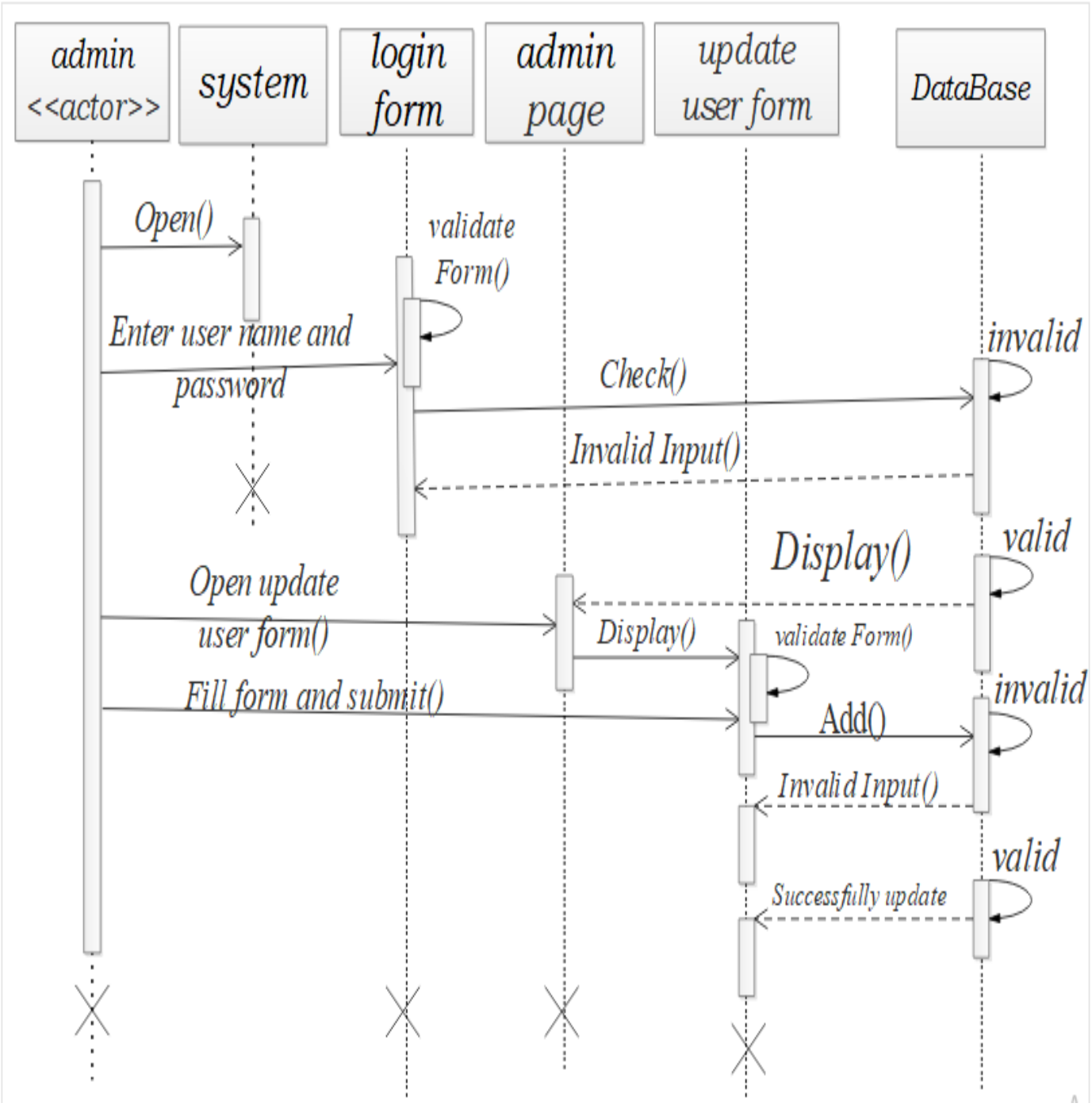


Figure 2.5: Sequence diagram to update users

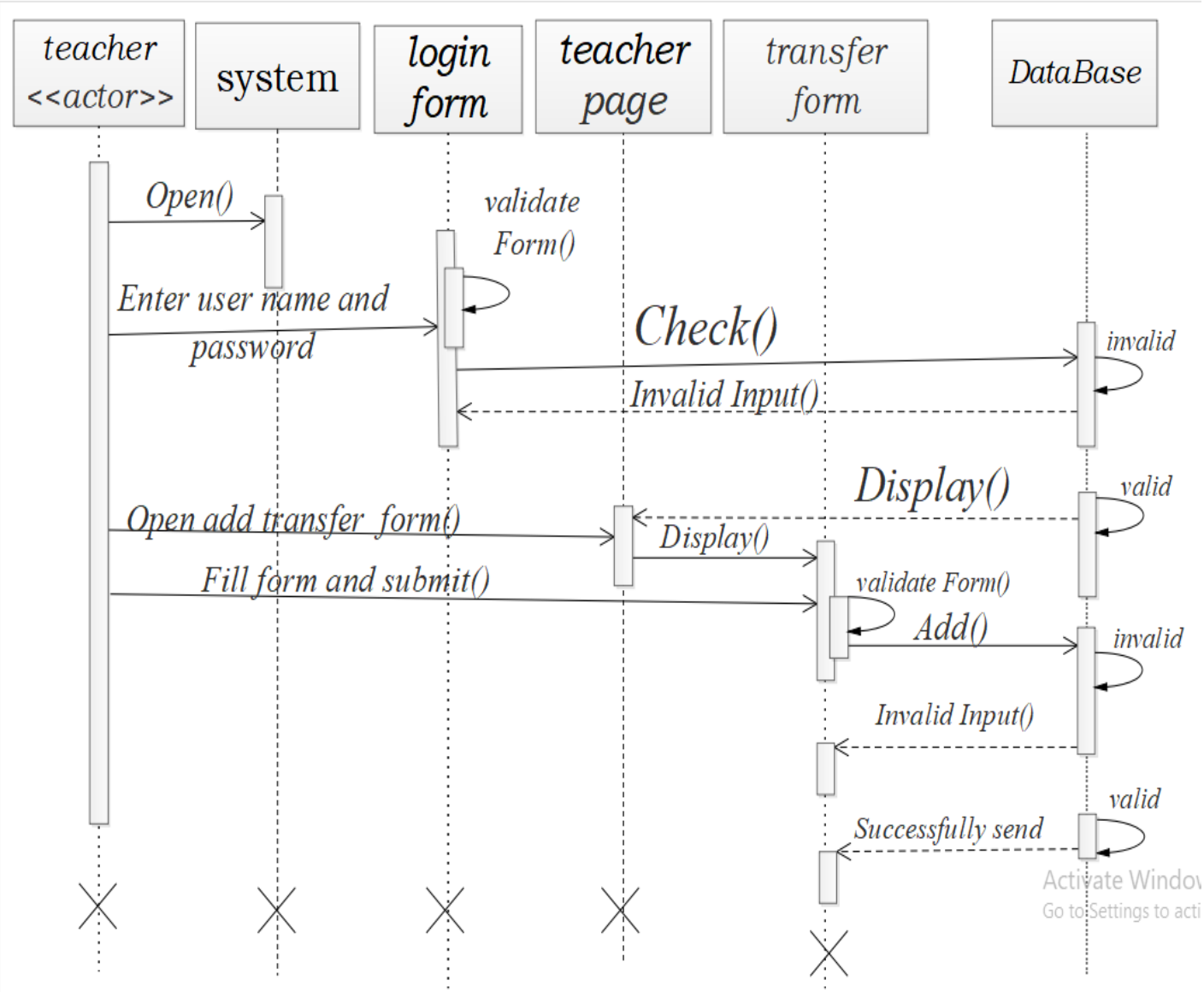


Figure 2.6: Sequence diagram for teacher fill transfer form

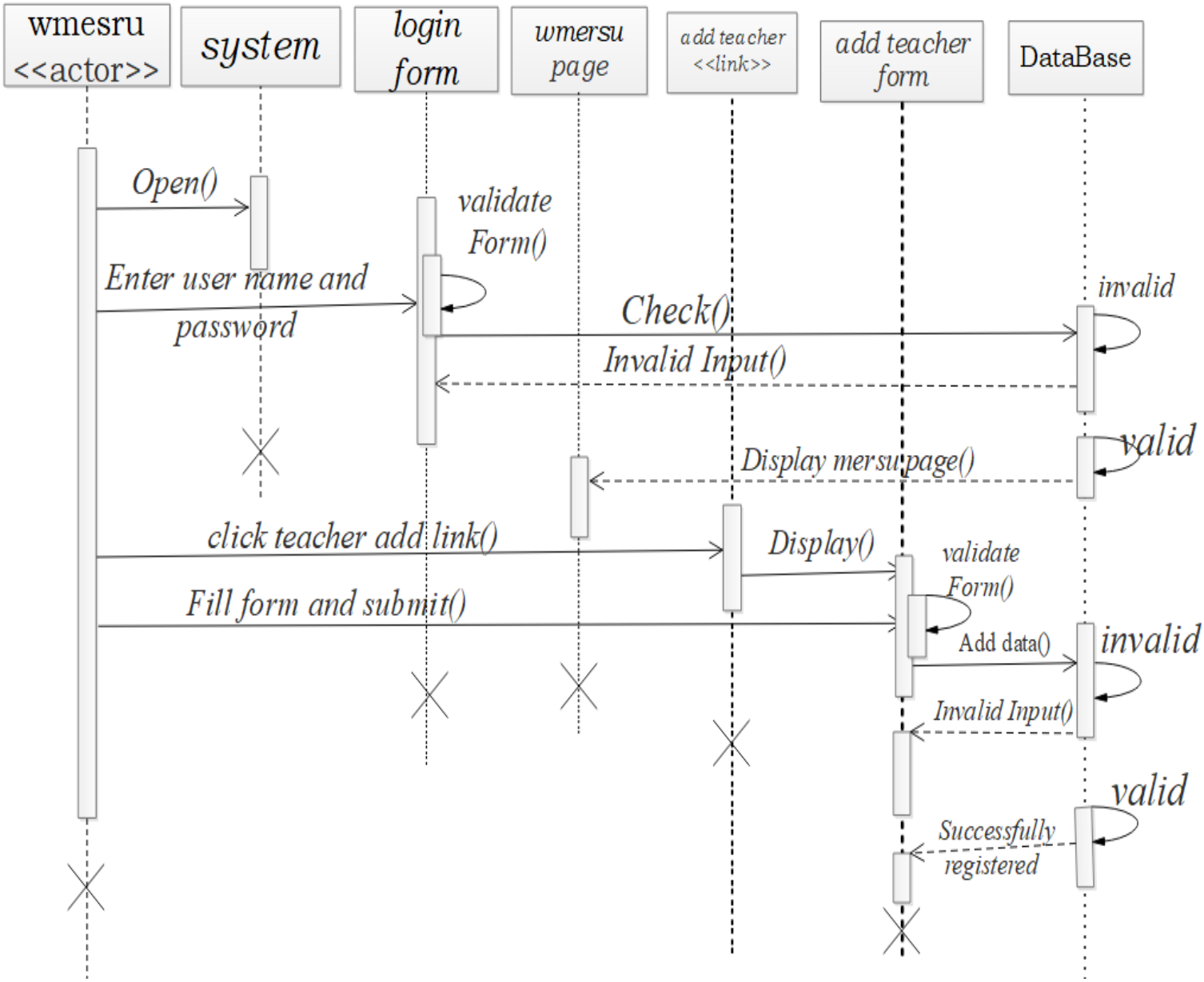


Figure 2.7: Sequence diagram to add teachers

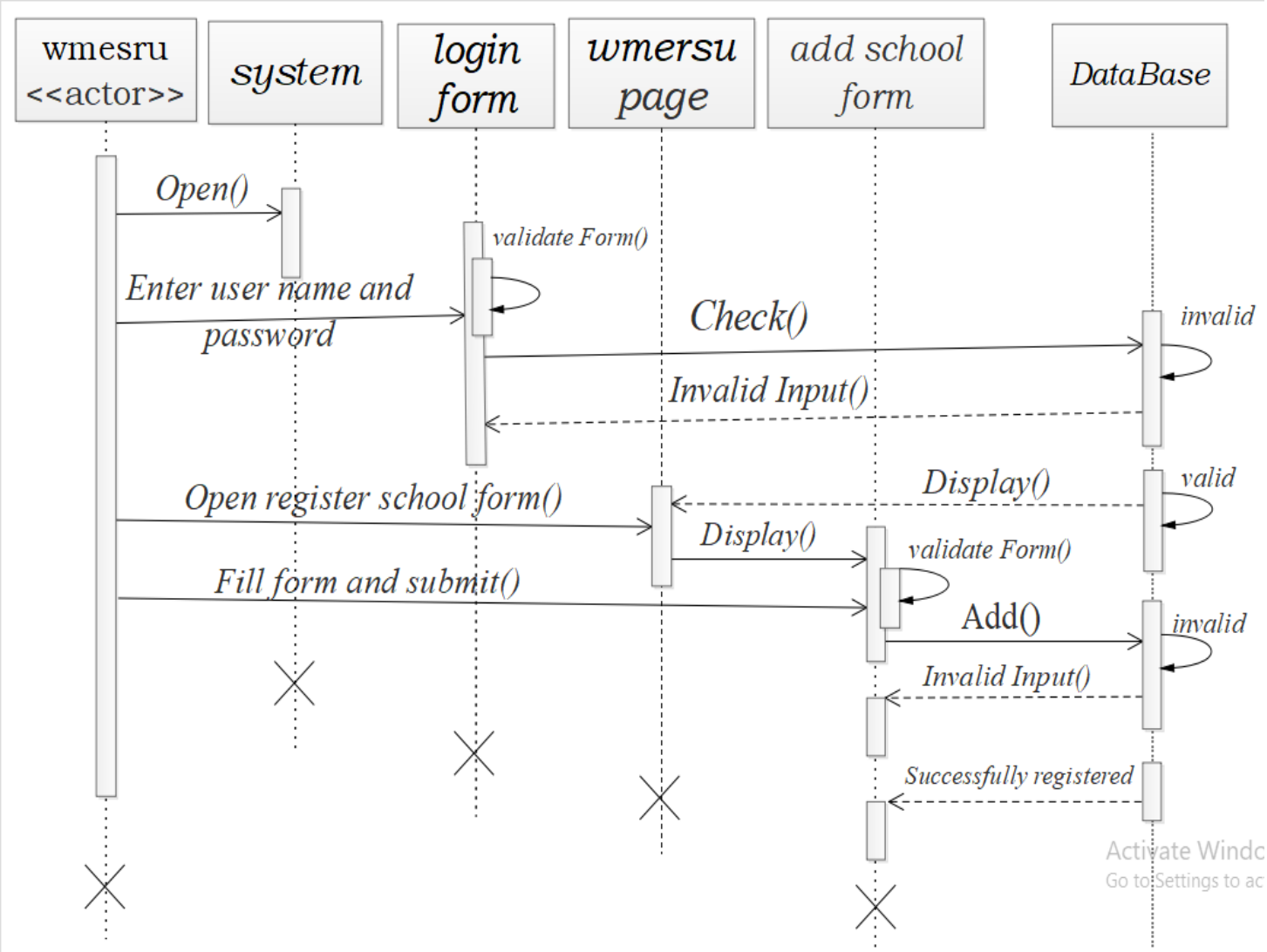


Figure 2.8: Sequence diagram to add schools

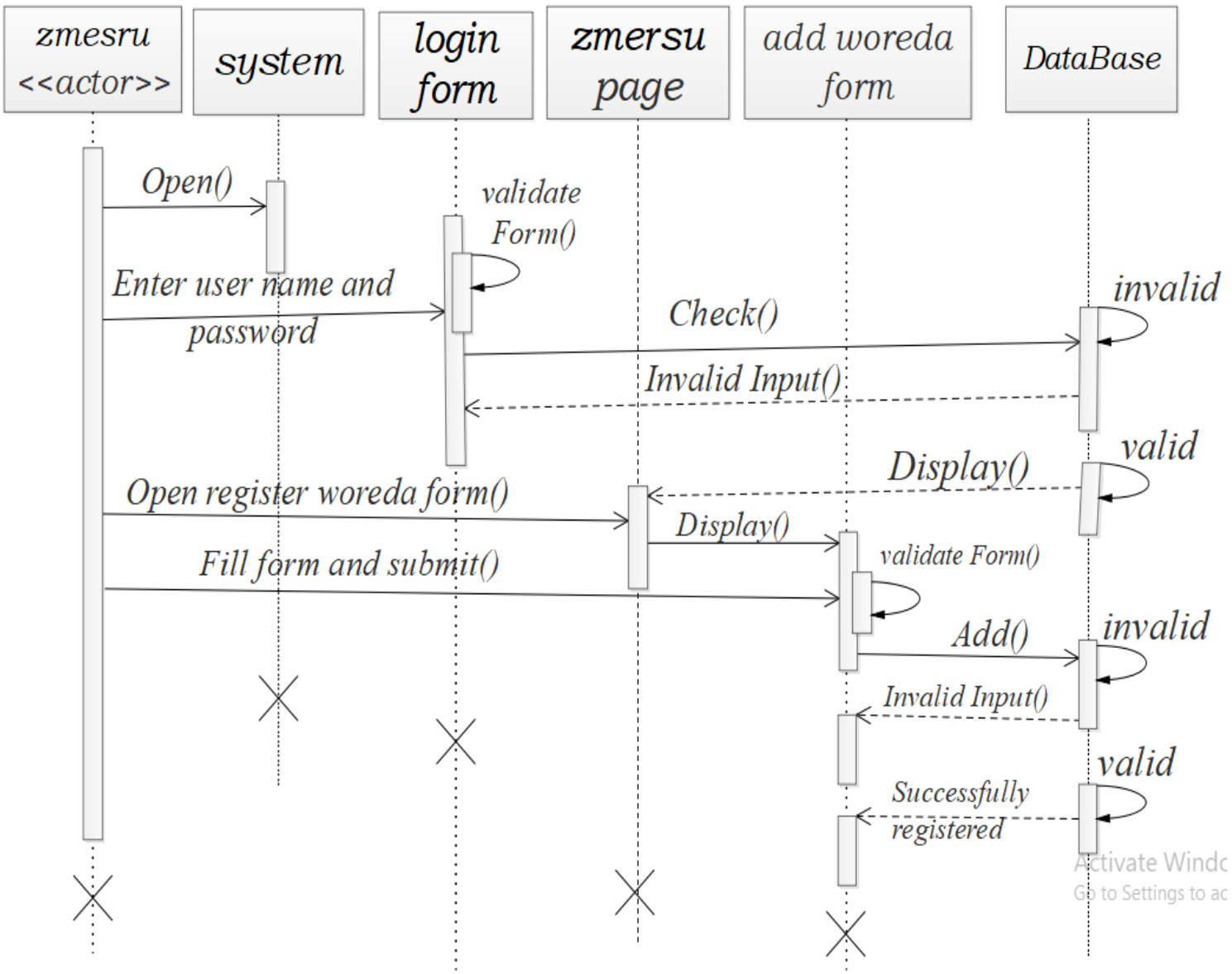


Figure 2.9: Sequence to add woreda

2.3.3. Activity diagram

Activity diagrams are used to document the logic of a single operation/method, a single use case, or the flow of a business process. Activity diagrams essentially a flowchart showing flow of control from activity to activity. It includes modeling the sequential process. It also includes modeling the flow of an object as object as it moves from one state to another state at different points in the flow of control.

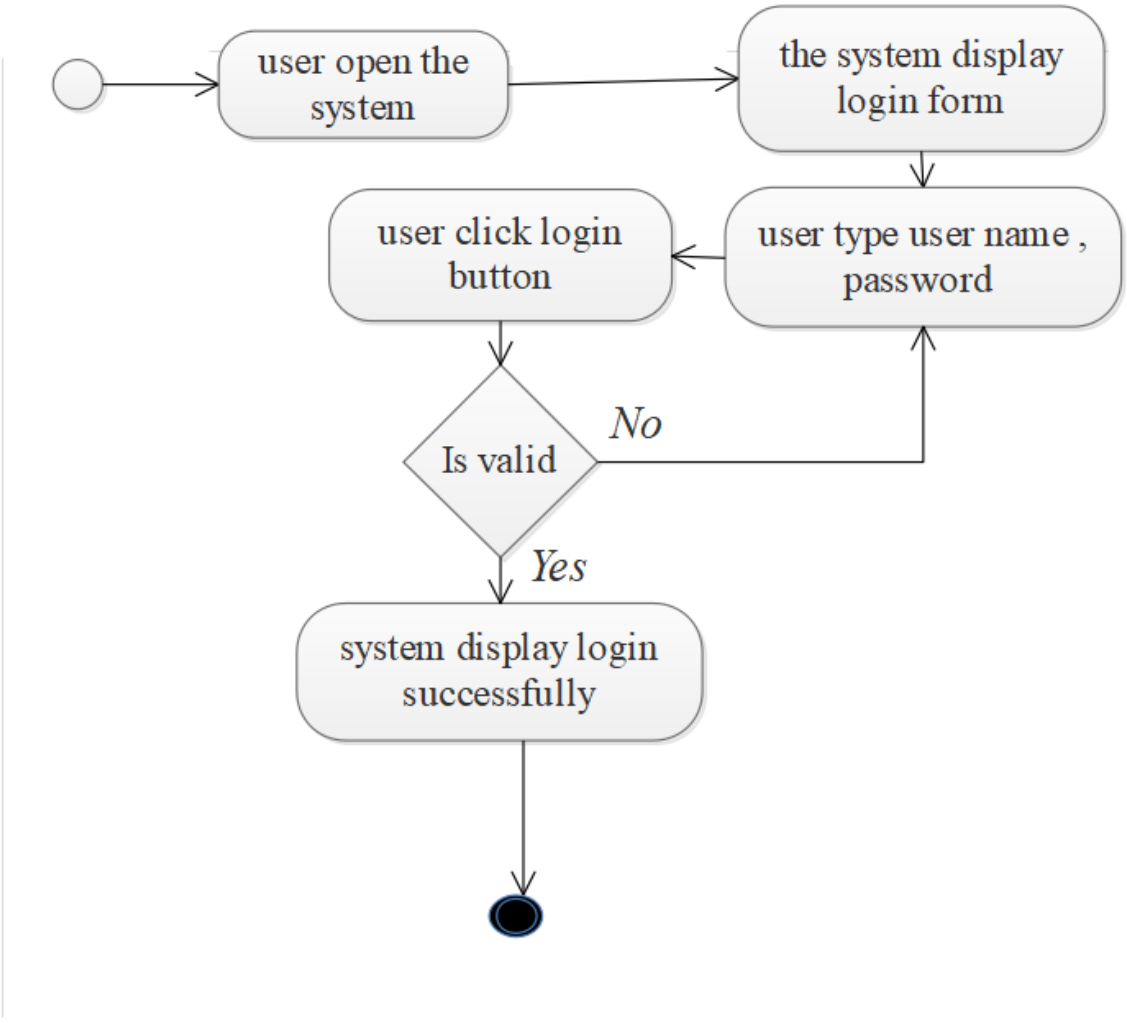


Figure 2.10: Activity diagram for login

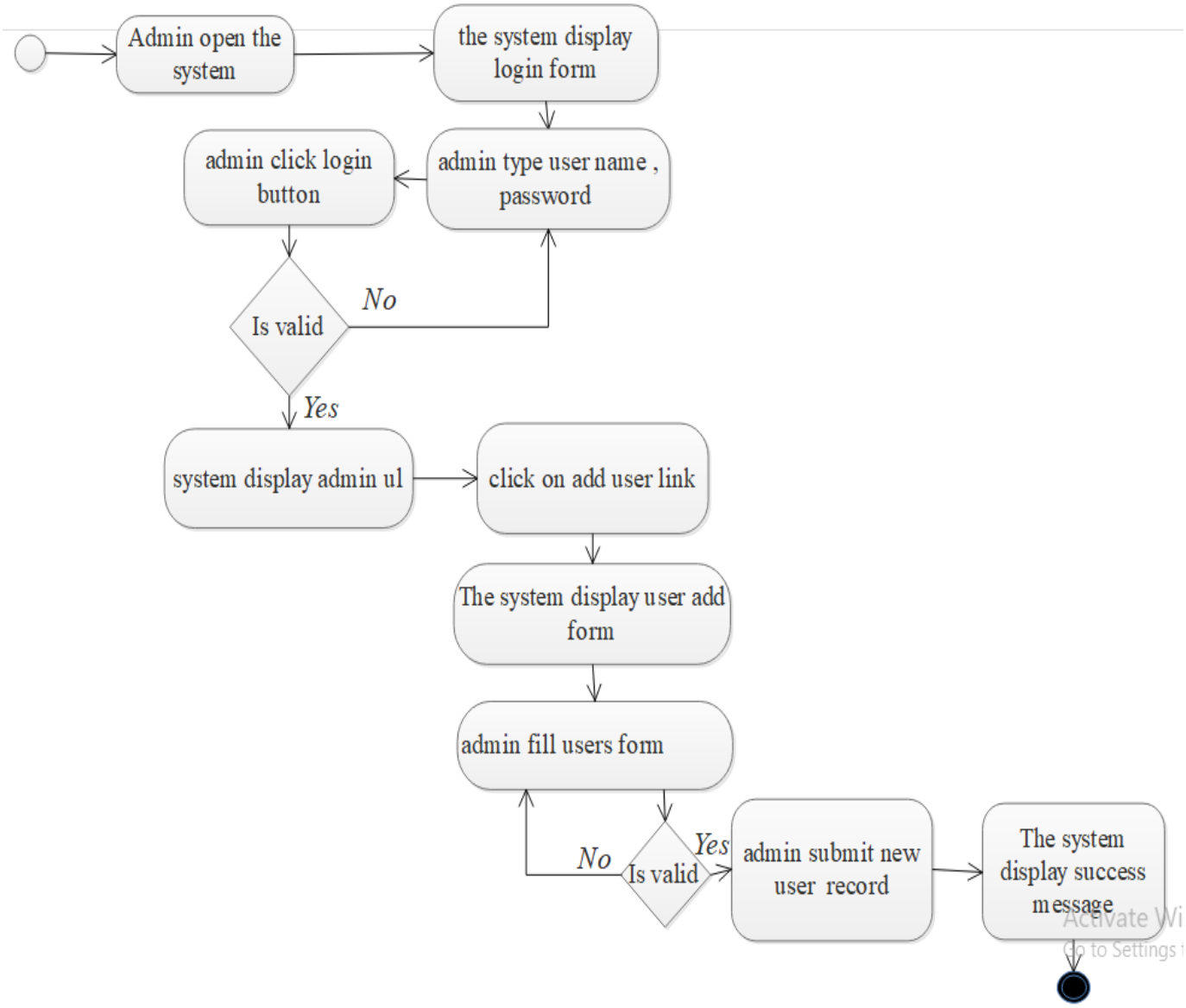


Figure 2.11: Activity diagram for admin to add users

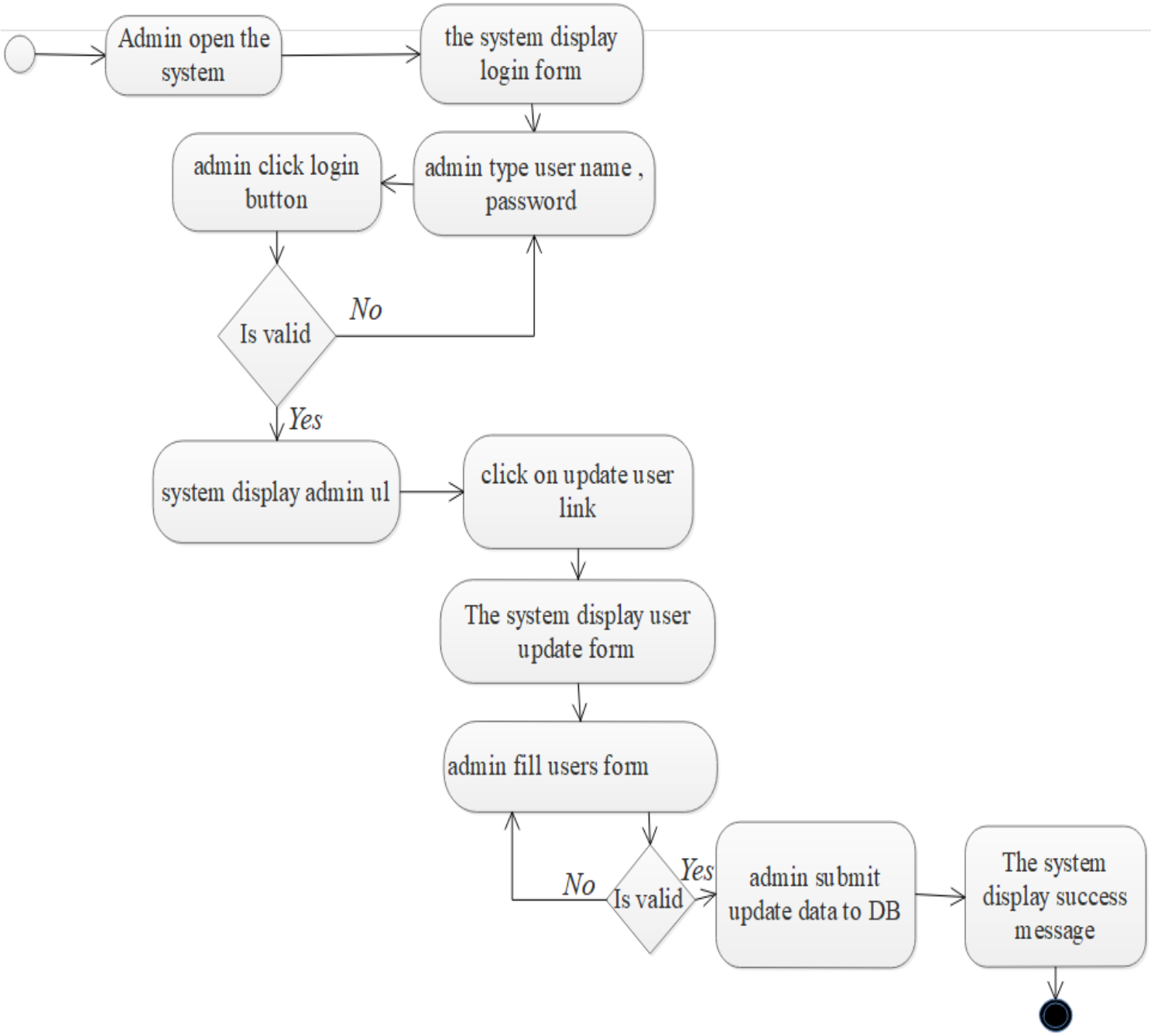


Figure 2.12: Activity diagram for admin to update users

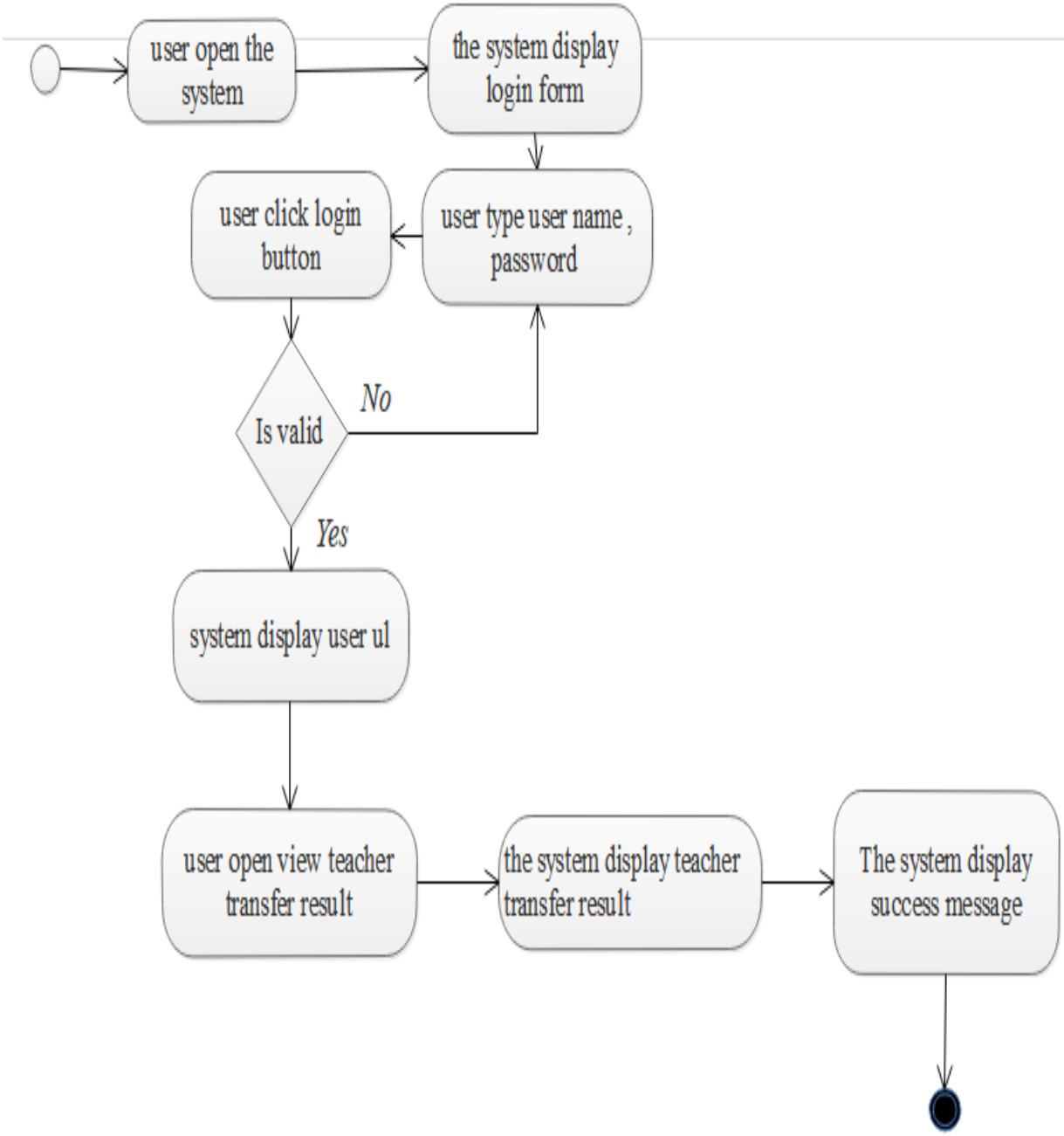


Figure 2.13: Activity diagram for view transfer result

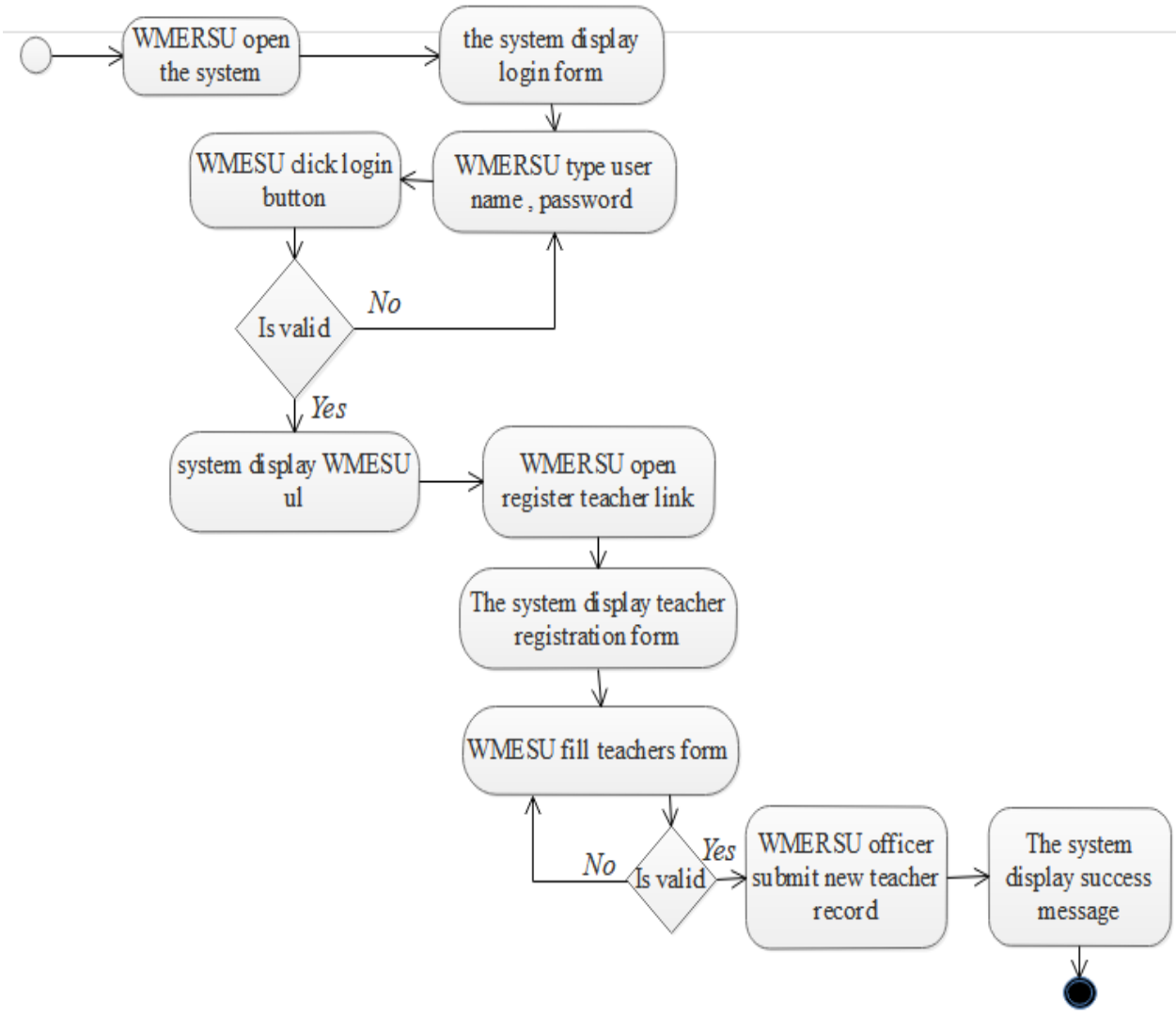


Figure 2.14: Activity diagram for WMERSU officer to register teacher

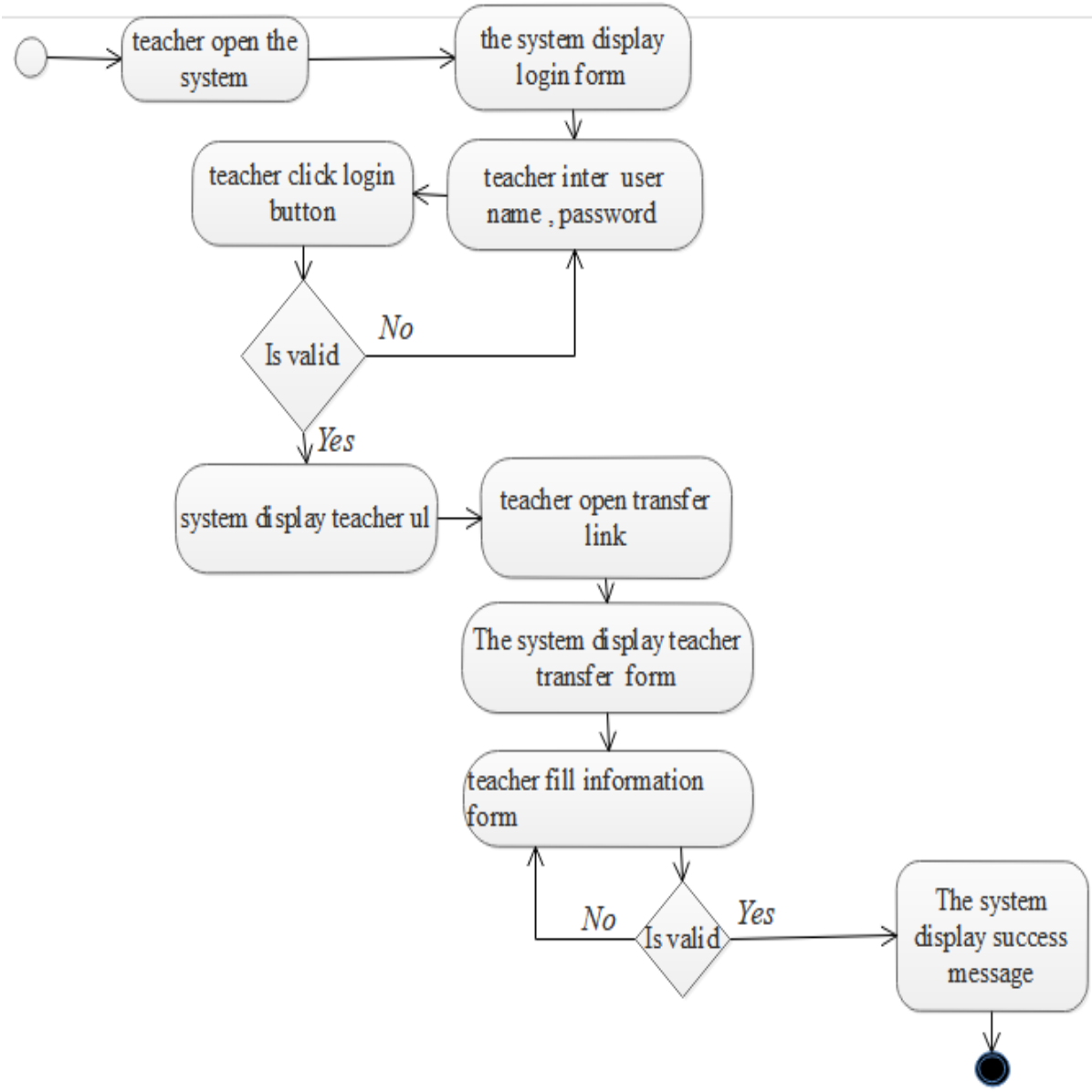


Figure 2.15: Activity diagram for teacher to fill transfer form

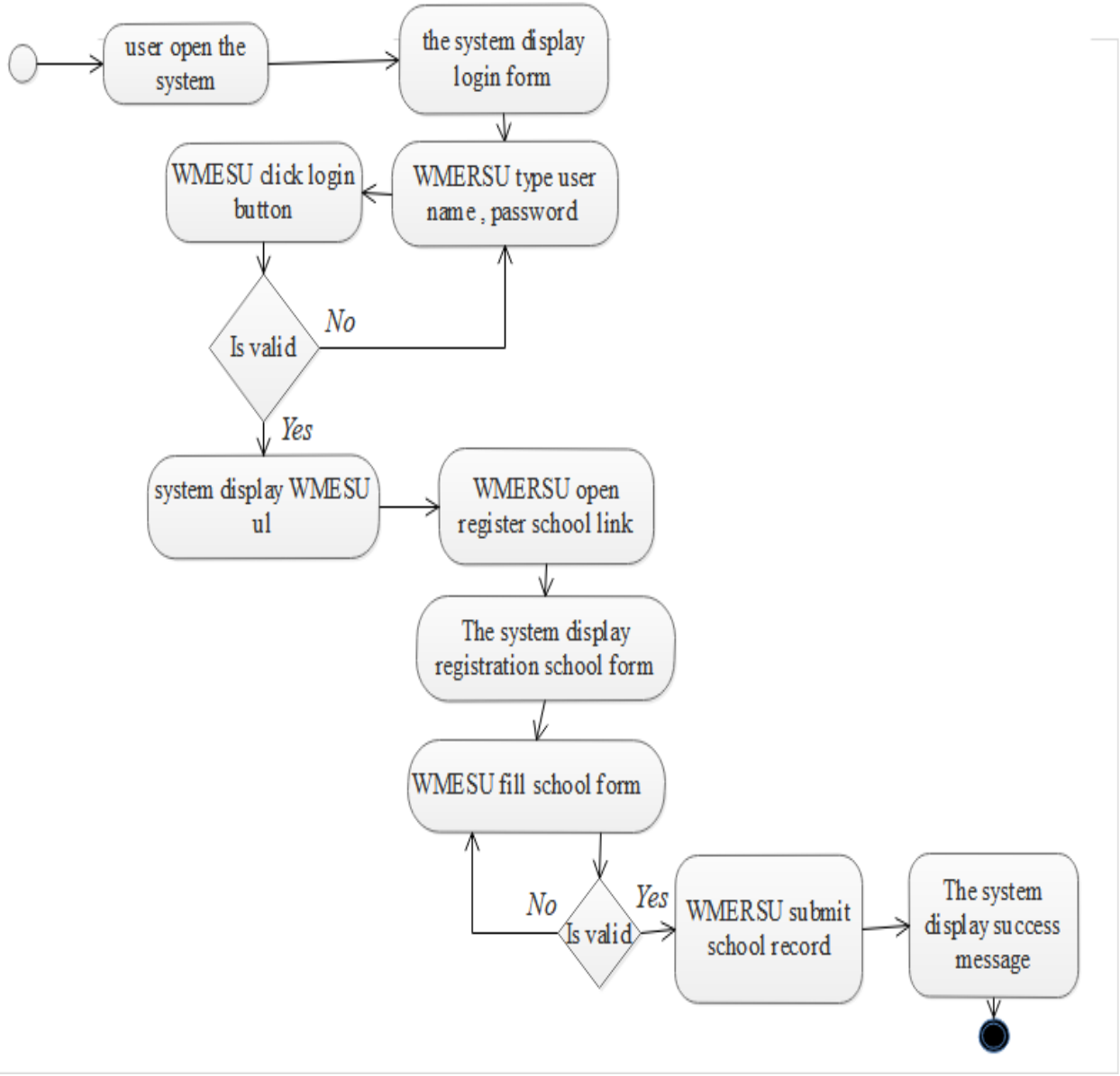


Figure 2.16: Activity diagram for WMERSU to register school

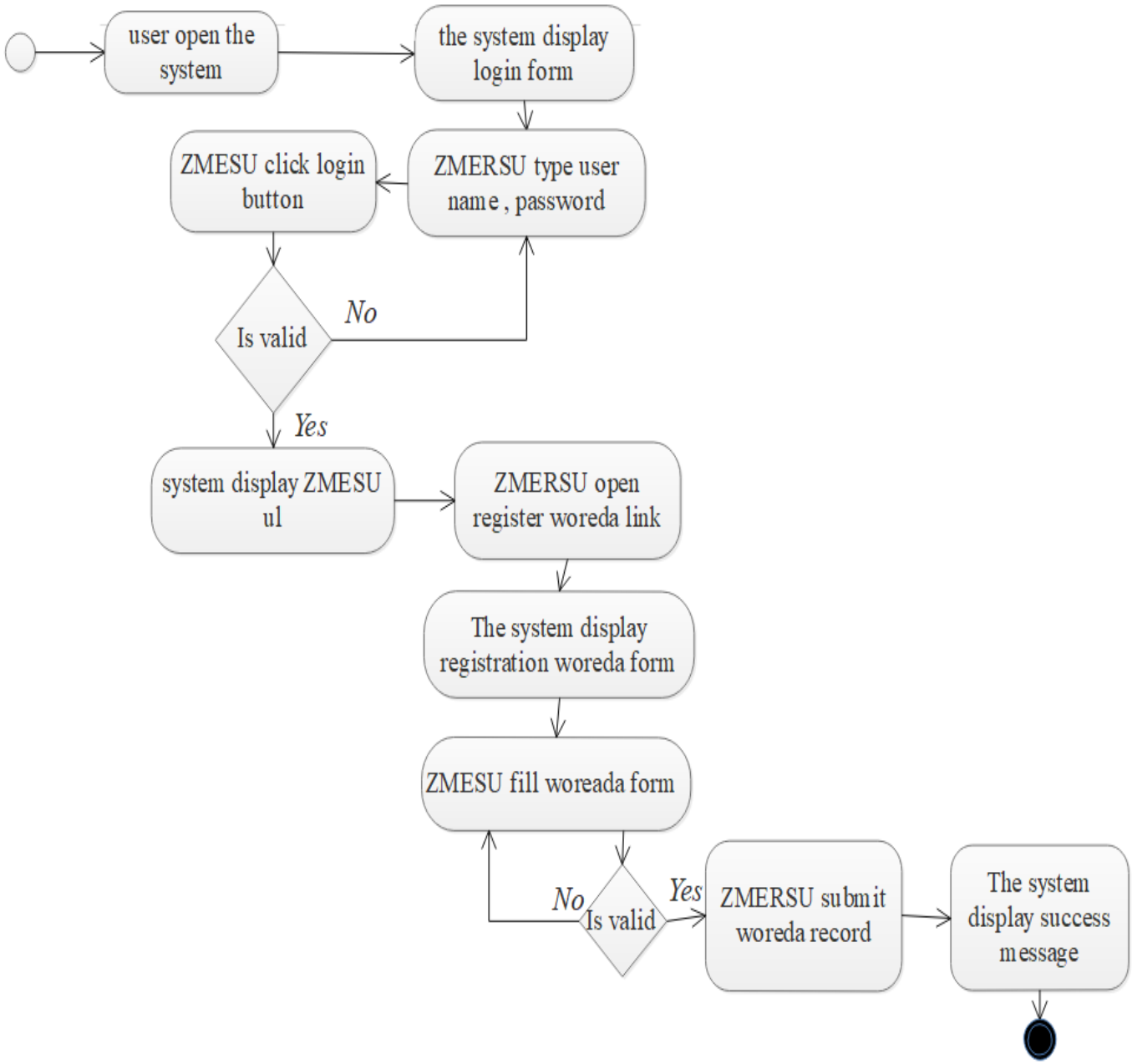


Figure 2.17: Activity diagram for zmersu to register woreda

2.3.4. Analysis class diagram

A class diagram in the Unified Modeling Language (UML) is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among objects. [4] For this project the project team develops the following class diagrams. In this system the project team integrates MERSU officers, director and teacher by user class.

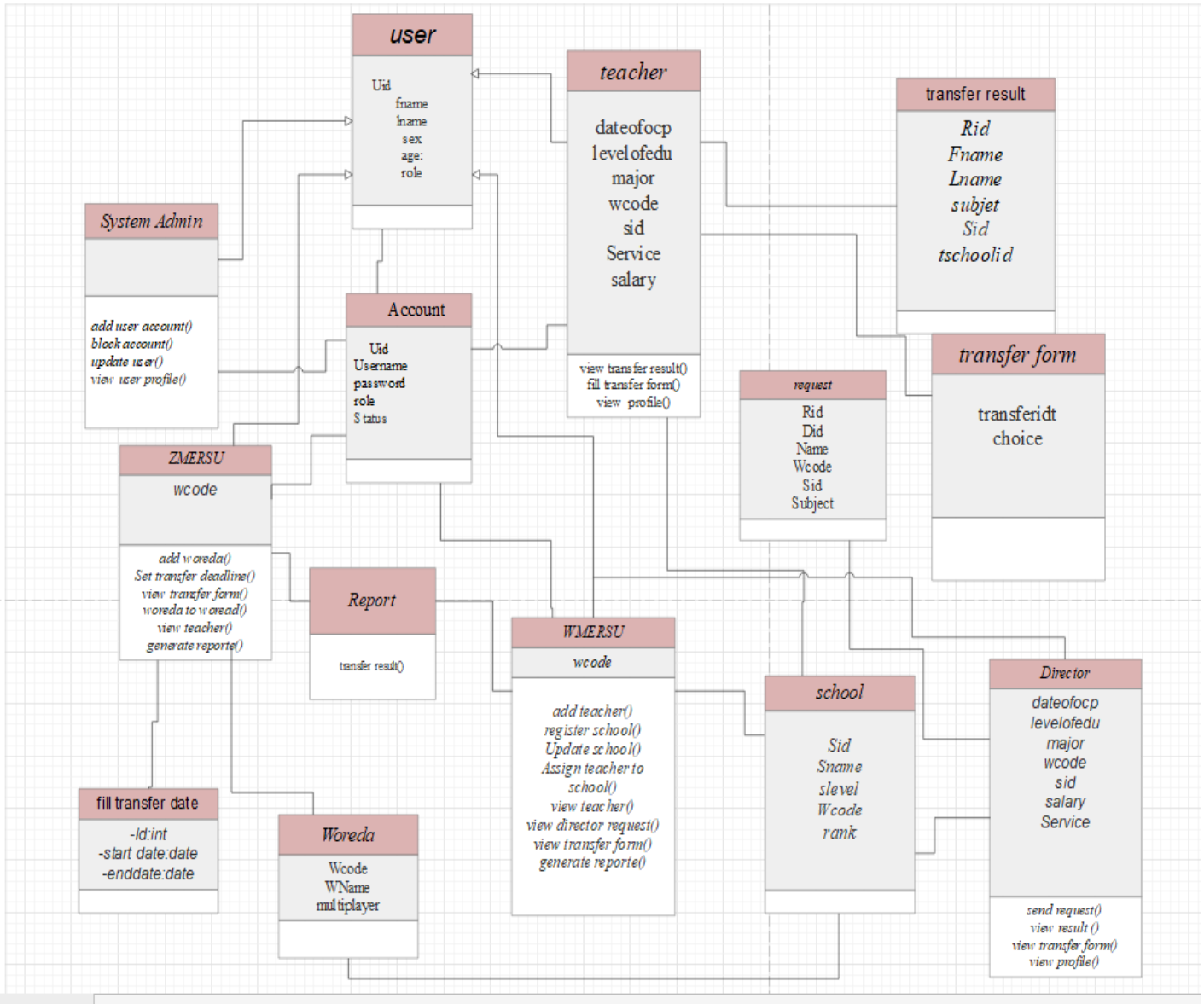


Figure 2.18: Analysis class diagram

CHAPTER THREE

3. System design

System design is the transformation form of the analysis form into implementation or the actual work of the project. The system design leads to perform the actual work of the system that will be activated on the real work of the project. Its advantage is to lead the direction to do or to implement the system. The system design also helps to get real information or data easily to drive the implementation form.[5]

It is based on analyzing the actual work in real world and changes it into design form to implement the system. The main aim of the system design is to model or to implement the system in to the standard way of the system.

System design is the process of defining the elements of a system such as the architecture, modules and components, the different interfaces of those components and the data that goes through that system.[6] Systems design is simply the design of systems. It implies a systematic and rigorous approach to design—an approach demanded by the scale and complexity of many systems problems.

3.1. Design class diagram

Class diagrams model the static structure of a system. They show relationships between classes, objects, attributes, and operations. Class Diagram provides an overview of the target system by describing the objects and classes inside the system and the relationships between them.

It is a type of diagram and part of a unified modeling language (UML) that defines and provides the overview and structure of a system. The purpose of a class diagram is to depict the classes within a model. In an object-oriented application, classes have attributes (member variables), operations (member functions) and relationships with other classes. Class diagram is a static diagram. It represents the static view of an application. Class diagram is used for visualizing, describing, and documenting the system.

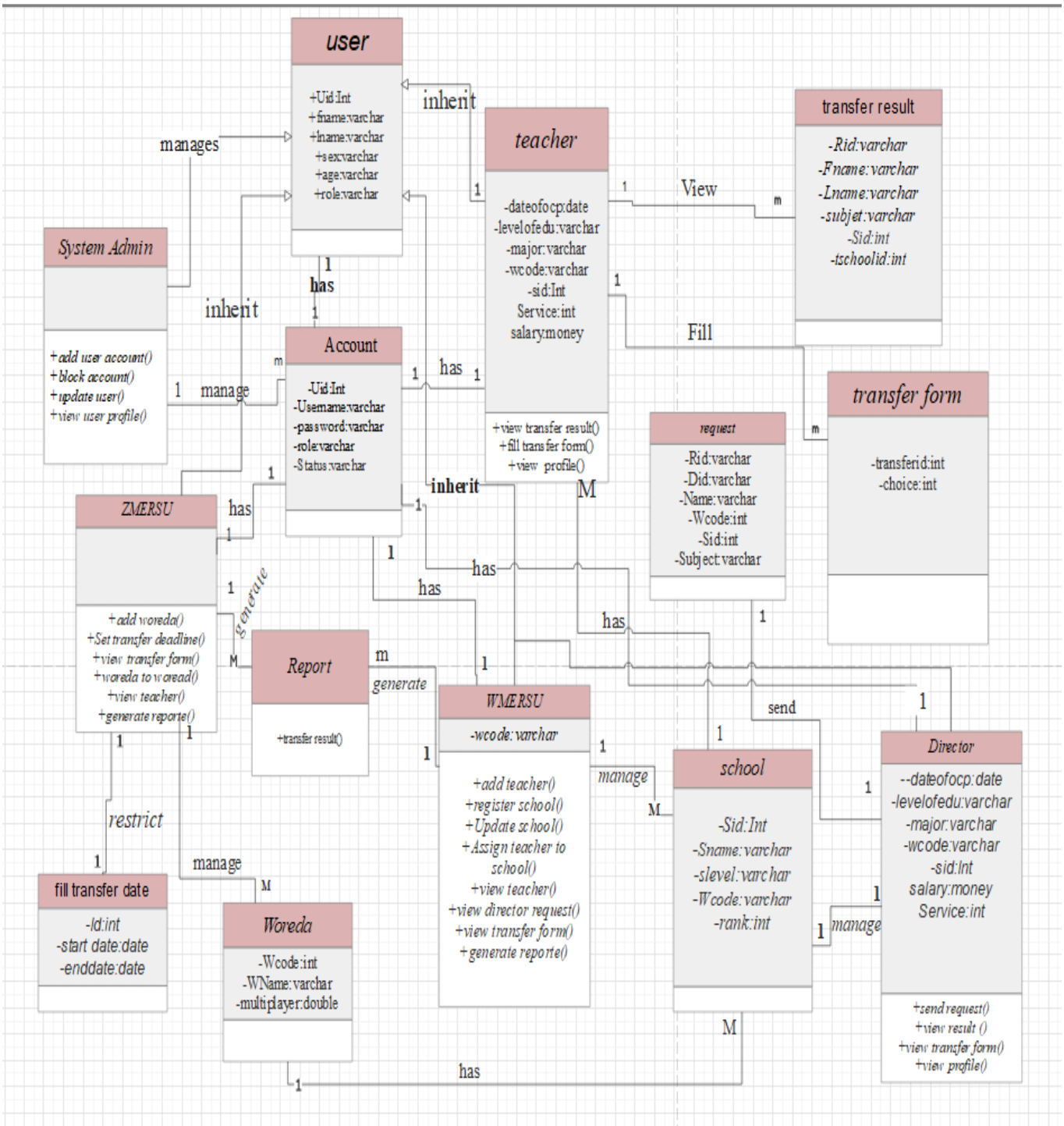


Figure 3.1.1 design class diagram

3.2. Physical data model

A physical data model primarily defines all the relational data models and objects of the database. It is created using the native database language of the database. A physical data model (or database design) is a representation of a data design as implemented, or intended to be implemented, in a database management system. A physical database model shows all table structures, including column name, column data type, column constraints, primary key, foreign key, and relationships between tables.

- ✓ Entities are tables in the physical database.
- ✓ Attributes are columns in the physical database.
- ✓ Unique identifiers are columns that are not allowed to have NULL values.
- ✓ Relationships are modeled by foreign keys.

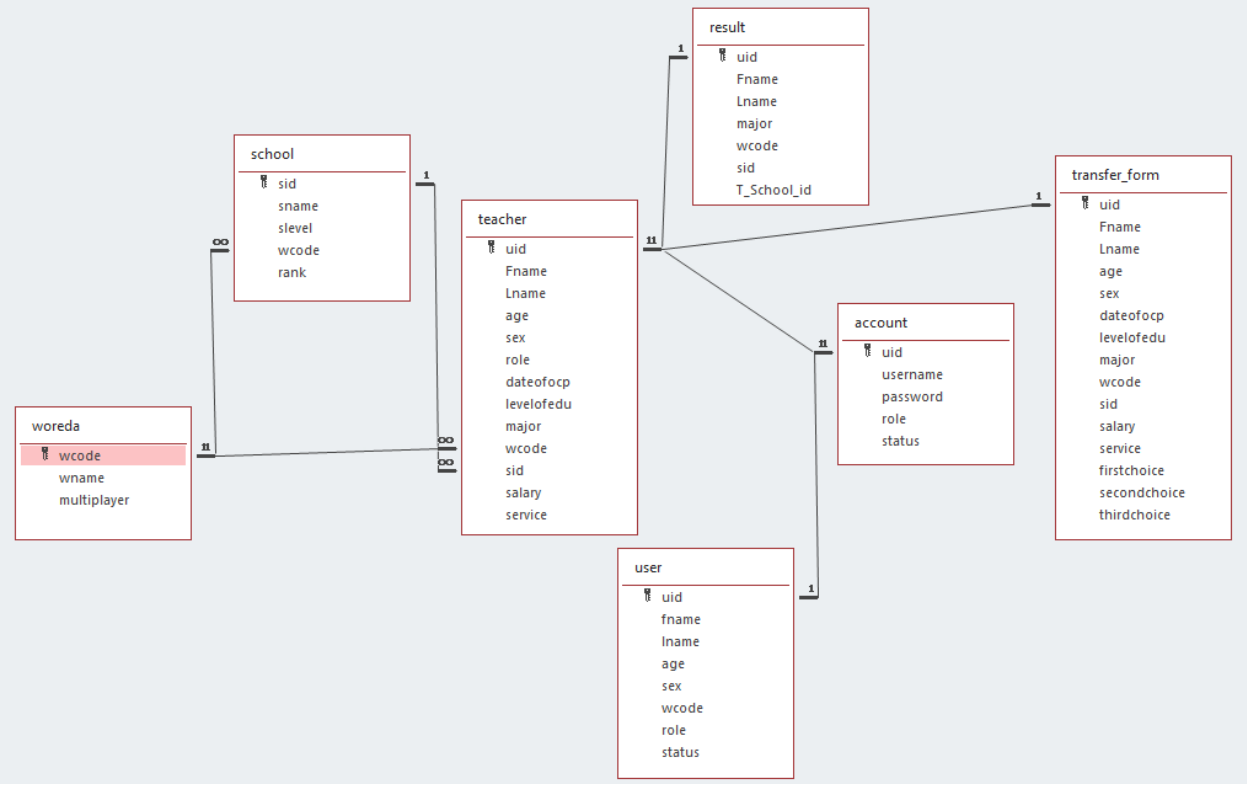


Figure 3.2.1 Database design diagram

3.3 User Interface Design

Figure 3.3.1. home page user interface

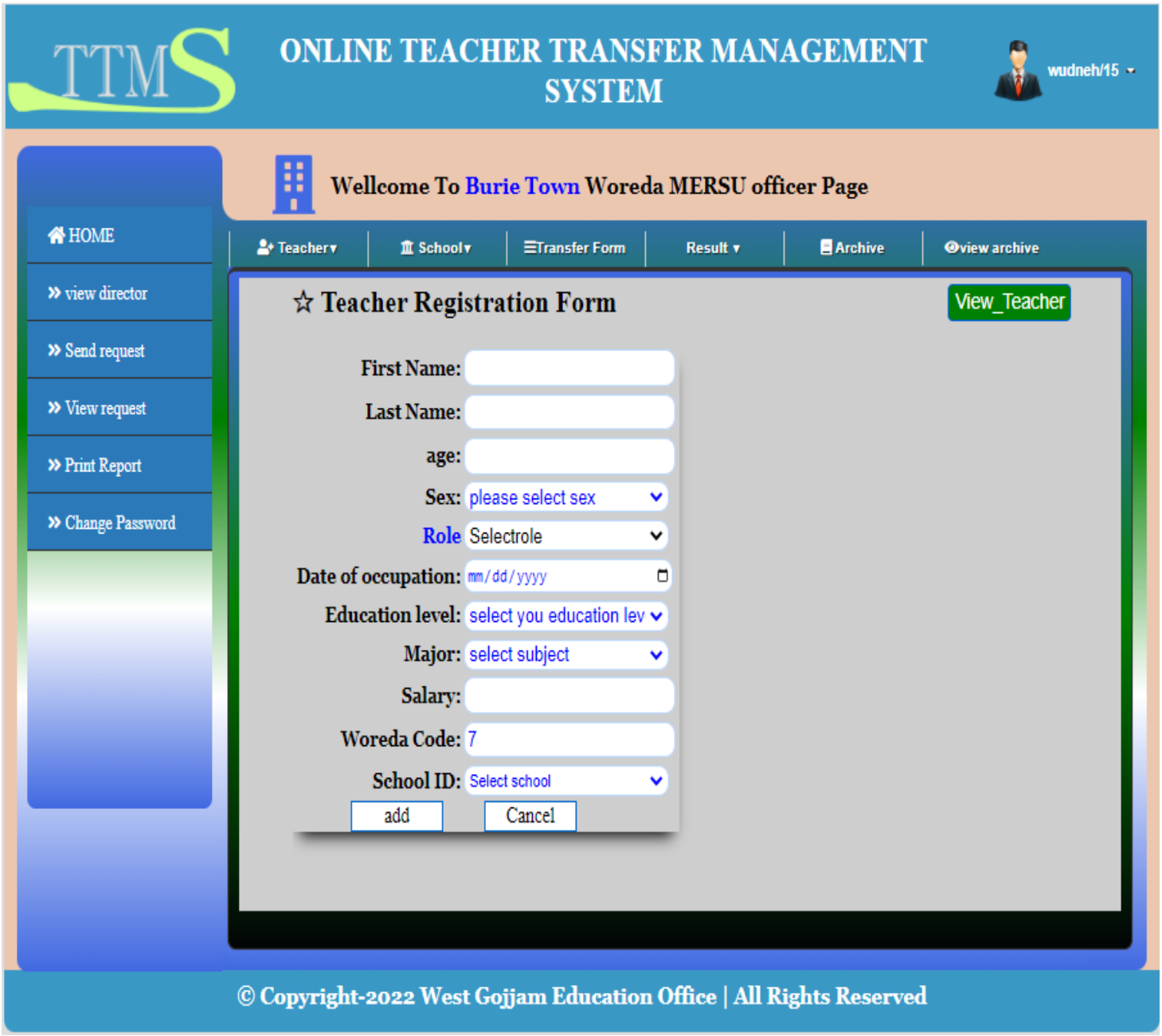


Fig 3.3.2. user interface WMERSU add teacher.

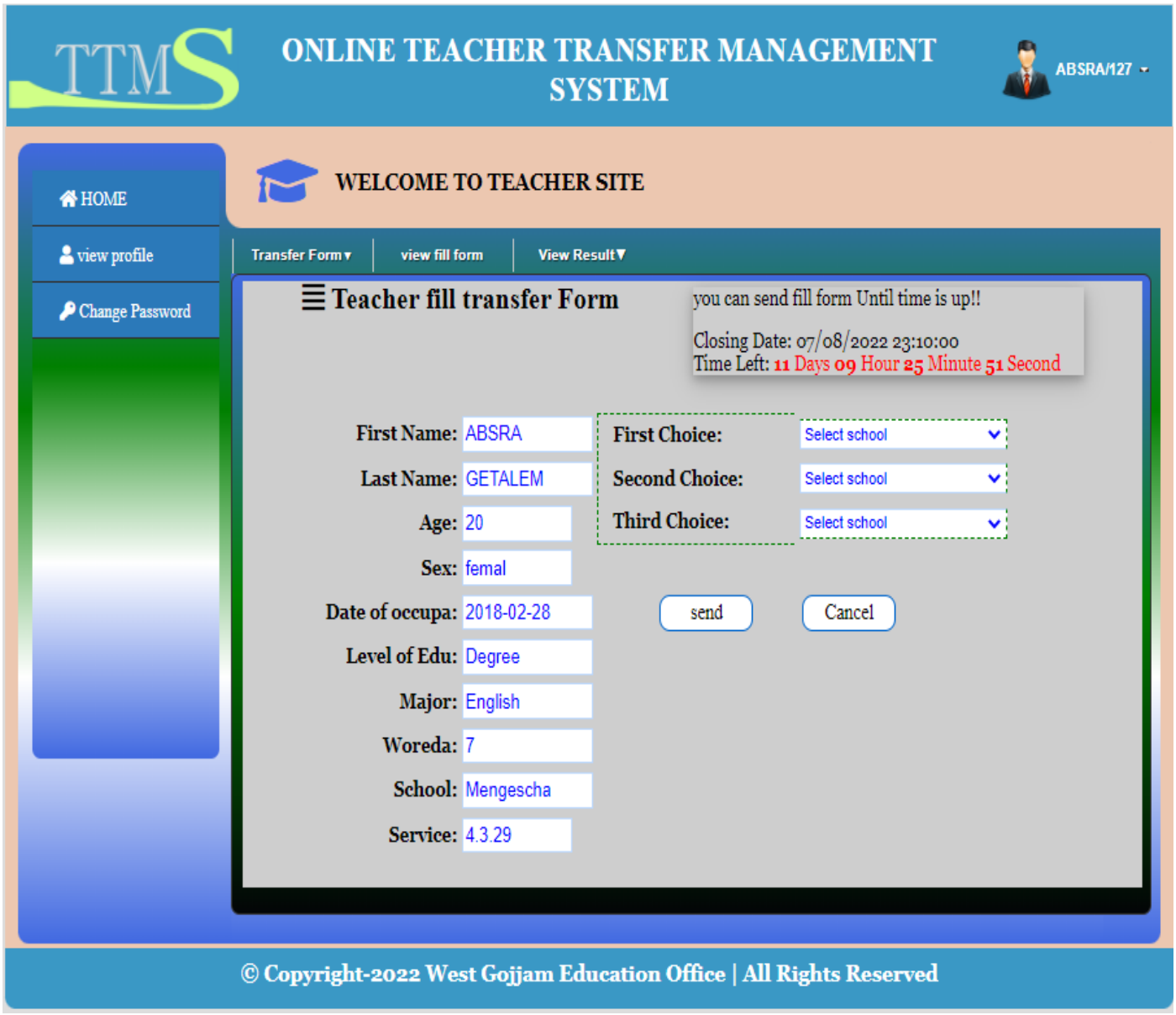


Fig 3.3.3. teacher fill transfer form.

3.4. Deployment diagram

Deployment diagram is a structure diagram which shows architecture of the system as deployment or distribution of software artifacts to deployment targets. Deployment diagrams model the physical architecture of a system. It also shows the relationship between the software and hardware. A deployment diagram shows how and where the system is to be deployed; that is, its execution architecture.

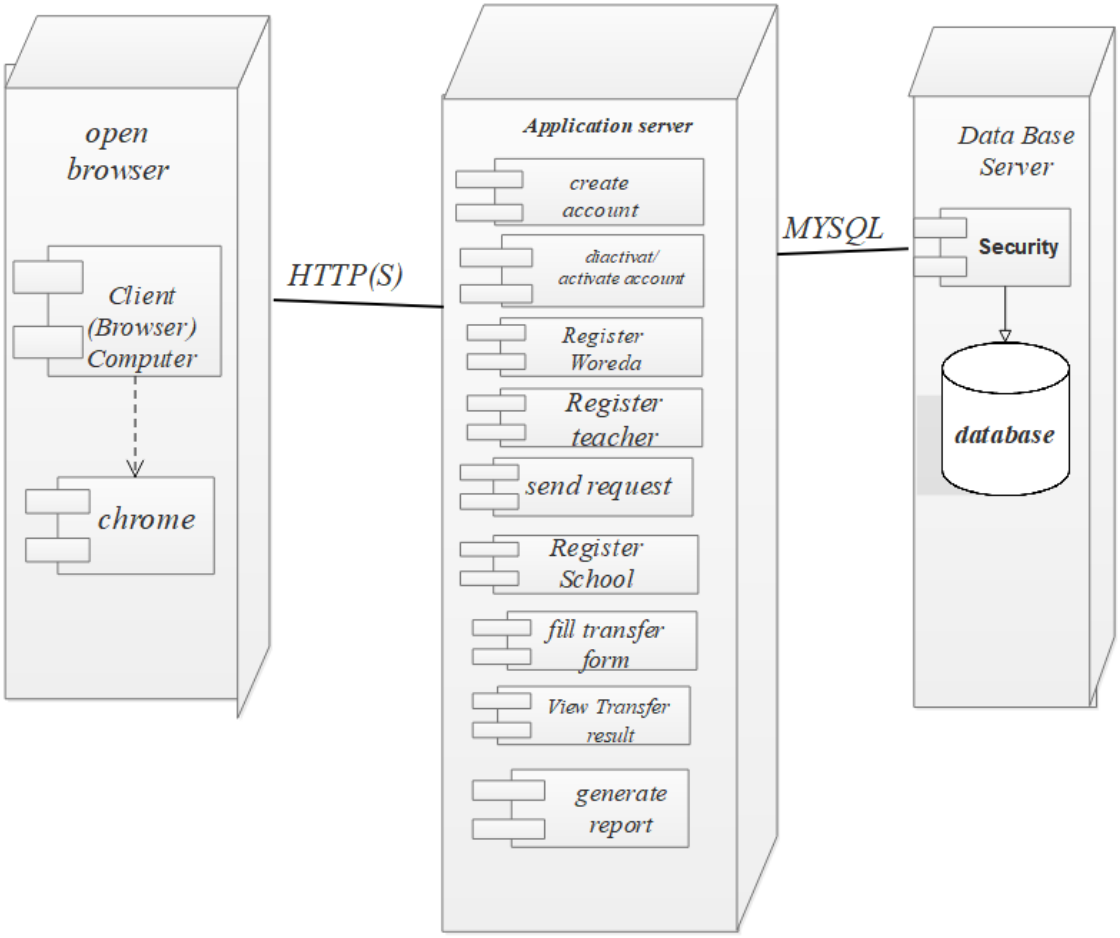


Figure 3.4.1. deployment diagram

CHAPTER FOUR
4.Implementation

Implementation is defined as a specified set of activities designed to put into practice an activity or program of known dimensions. *It* is the carrying out, execution, or practice of a plan, a method, or any design, idea, model, specification, standard or policy for doing something. It is also a realization of a technical specification or algorithm as a program, software component, or other computer system through computer programing and deployment.

4.1. Overview of the Programming Language used

This project used PHP server-side programming technology integrated MySQL database with a programming language. It also used other scripting language like CSS, JavaScript.

In general PHP is a widely-used open-source general-purpose scripting language that is especially suited for web development and can be embedded into HTML.

4.2. Algorithm Used

We use md5 with crypt key encryption algorithm.MD5 (technically called MD5 Message-Digest Algorithm) is a cryptographic hash function Whose main purpose is to verify that a file has been unaltered? The MD5 function is a cryptographic algorithm that takes an input of arbitrary length and produces a message digest that is 128 bits long. The digest is sometimes also called the "hash" or "Fingerprint" of the input. MD5 is used in many situations where a potentially long message needs to be processed and/or compared quickly.

4.2.1. Pseudo code

Pseudo code is a detailed yet readable description of what a computer program or algorithm must do, expressed in a formally-styled natural language rather than in a programming language.

Pseudo code is sometimes used as a detailed step in the process of developing a program. It allows designers or lead programmers to express the design in great detail and provides programmers a detailed template for the next step of writing code in a specific programming language.

The purpose of using pseudo code is that it is easier for people to understand than conventional programming language code, and that it is an efficient and environment-independent description of the key principles of an algorithm.

Pseud code for login

Fill the Login Form

Click the Login button

If (Form is filled)

If (valid)

Generate SQL select queries

Connect to database

Pass queries to database

If (any query fails)

Display error message

Else

Read session

If session exists on database, user is already logged in, Display the page

Else

If they're correct

Create session ID

Store session ID on database

Display the page

End if

End if

Else

Display error message

Ask the user to refill the form

4.3. Sample Codes

```
<form action="" method="post" class="form">

                <div class="username">

  <input type="text"  id="username" name="un"  placeholder="Enter username" required class="input">

                  <i class="fa fa-user" aria-hidden="true"></i>

                  </div>

                  <div class="password">

  <input type="password" id="myInput" name="pass" placeholder="Password" required class="input" autocomplet="off">

                  <i class="fa fa-key" aria-hidden="true"></i>

<input type="checkbox" onclick="passFunction()" title="show password" class="pass">

                  </div>

                  <div class="login">

<input type="submit" id="submit" class="btn" name="login" value="Login" style="height: 34px; margin-left: 15px; width: 82px; padding-left:21px; border: 3px double rgb(204, 204, 204);"/>

  <i class="fa fa-sign-in-alt" aria-hidden="true"></i>

</div>

<input type="reset" id="reset" class="btn" name="reset" value="Reset" style="height: 34px; margin-left: 15px; width: 80px; padding: 5px; border: 3px double rgb(204, 204, 204);" />

<br><br><br><br>

</form>

<?php

if(isset($_POST["login"]))

{

      $un=$_POST["un"];
```

```
        $pass=$_POST["pass"];
        $un=stripcslashes($un);
        $pass=stripcslashes($pass);
        $un=mysqli_real_escape_string($conn,$un);
        $pass=mysqli_real_escape_string($conn,$pass);
        $pass=md5($pass);
 $sql="select * from account where username='$un' and password='$pass' and status='1'";
        $matchfound=mysqli_query($conn,$sql);
        $userexist=mysqli_num_rows($matchfound);
        if($userexist>0){
        while($row=mysqli_fetch_assoc($matchfound))
        {
$u_id=$row["u_id"];
$pw=$row['password'];
$un=$row['username'];
$role=$row['role'];
$status=$row["status"];
        }
        $sqll="select * from user where u_id='$u_id'";
$matchfound1=mysqli_query($conn,$sqll);
        while($row1=mysqli_fetch_assoc($matchfound1))
        {
$u_id=$row1["u_id"];
        }
           $_SESSION['id']=$u_id;
```

```
                $_SESSION['sun']=$un;
                $_SESSION['spw']=$pw;
                $_SESSION['srole']=$role;
      $_SESSION['status']=$status;
                if($role=="admin" &&  $status=="1")
                echo "<script>window.location='admin/main.php'</script>";
                else if($role=="zmersu" && $status=="1")
                echo "<script> window.location='zmersu/main.php'</script>";
          else if($role=="wmersu" && $status=="1")
           echo "<script> window.location='wmersu/main.php'</script>";
          else if($role=="director" && $status=="1")
          echo "<script> window.location='director/main.php'</script>";
          else if($role=="teacher" && $status=="1")
         echo "<script> window.location='teacherT/main.php'</script>";
                }
    else{
          echo "<script>alert('Invalid Username and Password! Try again.');window.location='index.php'</script>";
}
}
?>
```

CHAPTER FIVE
5.Testing

Testing is the final phase implementation. It is also used to check the functionality of the system. The testing method of the system is important for test the correctness of the system that means it determines the interaction between the user and the system. The testing checks the performance, accuracy, security and availability of the system.

Testing's should systematically discover different classes of errors in a minimum amount of time with a minimum amount of efforts.

Testing procedures

Before directly deploying this system, the team performs different testing for its functionality and meeting customers need. First the team tested each unit at each phase. And, a problem encountered is immediately fixed. Then the team performed an integration testing to check whether the system meets all the functional requirements. System is tested using the following system testing procedures.

Unit testing

Every module of the System is separately tested. The team tested every module by applying some selection mechanism. Through this mechanism every part of the modules is tested. An error occurred in this testing takes a correction without affecting another module. We have tried to test UI screens of our system that needs to verify screen elements that appears on the screen.

Integrating testing

In this testing part, all the modules are combined together and tested it for its fitness with each other and with the systems functionality. An error occurred in combining them; the module with problem is identified and recombined. Both units testing and integrated testing are performed by all team members at the work place.

System Testing

Here we compile the whole system staring from initial and proceed testing the whole system to check out for the errors and flow control of the system. This testing is performed by our advisor and all the team members.

CHAPTER SIX
6.Conclusion and Recommendations

6.1. Conclusion

As we described in chapter one the proposal phases the current teacher transfer management system uses manual way of teacher's placement system. Due to this the current system has different Problem related with placement and data handling. So, the system we developed in this zone change in to the computerized way of teacher transfer from one woreda to another woreda and from one school to another school. It is known that developing a system for an organization is not easy. But the team has tried its best and developed interesting online teacher transfer management system. It is flexible, accurate and attractive with easy GUI approach. Generally, the team confidently can say that the software is completed successfully with negligible errors. Finally, the team expects the software will change the current system and makes it more reliable and efficient than the previous manual system.

6.2. Recommendations

According to scope of our project the team develops online TTMS. Because of the time and security problem constraint we may have limitation which should be consideration in, but in the feature the team believes that this system should be fully operationally by adding some functionality that are not included in the proposed system. We also want to recommend this project can be expanded and more automated with additional functionalities by integrating with many new technologies.

The system that we have tried to automate is not the whole system of teacher transfer management system. Because of time limitation and security problem we can't develop all parts of the system, but we tried to automate some sub systems and functionalities.

6.3. Future Enhancement

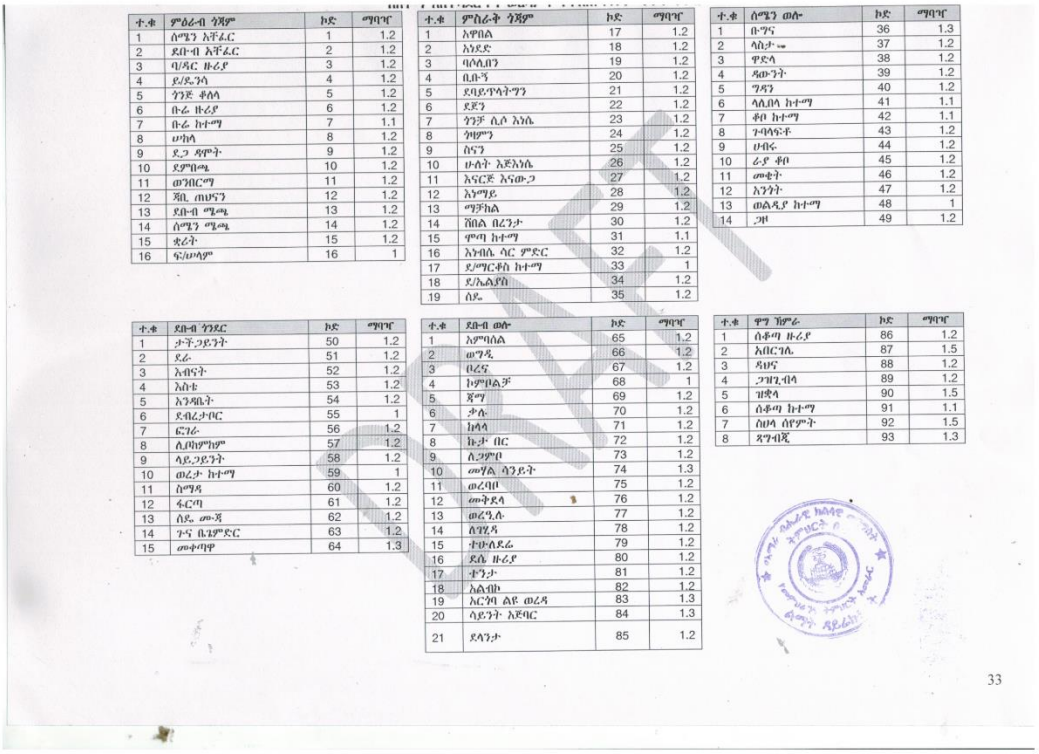
- ✓ The scope of current system is transferring teachers from woreda to woreda and school to school in West Gojjam zone for the future the system should be expand to all over the country in Ethiopia.
- ✓ The transferring result should be notified by SMS text.
- ✓ The system currently is performed only for teachers but, for the future the system should be applied for other employees.
- ✓ The programming language should be better by other new languages like:

  android and so on.

Appendix

Interview questions that we asked during requirement gathering.

- What kind of system the organization has used?
- Have they any computerized system?
- How the existing system works?
- During transfer, are there any problems? If there, what are they?
- Who is a responsible person in this transfer process?



ተ.ቁ	ምዕራብ ጎጃም	ኮድ	ማባዣ
1	ሰሜን አቸፈር	1	1.2
2	ደቡብ አቸፈር	2	1.2
3	ባ/ዳር ዙሪያ	3	1.2
4	ይ/ዱንሳ	4	1.2
5	ጎንጅ ቆለላ	5	1.2
6	ቡሬ ዙሪያ	6	1.2
7	ቡሬ ከተማ	7	1.1
8	ሠከላ	8	1.2
9	ደጋ ጻሞት	9	1.2
10	ደምቢጫ	10	1.2
11	ወንበርማ	11	1.2
12	ሻቢ ጠሀናን	12	1.2
13	ደቡብ ሜጫ	13	1.2
14	ሰሜን ሜጫ	14	1.2
15	ቋሪት	15	1.2
16	ፍ/ሠላም	16	1

ተ.ቁ	ምስራቅ ጎጃም	ኮድ	ማባዣ
1	አዋበል	17	1.2
2	አነደድ	18	1.2
3	ባሶሊበን	19	1.2
4	ቢቡኝ	20	1.2
5	ደብይጥላትጓን	21	1.2
6	ደጀን	22	1.2
7	ጎንቻ ሲሶ እንሴ	23	1.2
8	ጎዛምን	24	1.2
9	ስናን	25	1.2
10	ሁሉት እጅእነሴ	26	1.2
11	አናርጅ አናውጋ	27	1.2
12	አንማይ	28	1.2
13	ማቻክል	29	1.2
14	ሸበል በረንታ	30	1.2
15	ሞጣ ከተማ	31	1.1
16	እንብሴ ሳር ምድር	32	1.2
17	ይ/ማርቆስ ከተማ	33	1
18	ይ/ኤልያስ	34	1.2
19	ሰዶ	35	1.2

ተ.ቁ	ሰሜን ወሎ	ኮድ	ማባዣ
1	ቡግና	36	1.3
2	ላሊታ ጡ	37	1.2
3	ዋድላ	38	1.2
4	ጻውንት	39	1.2
5	ግሸን	40	1.2
6	ላሊበላ ከተማ	41	1.1
7	ቆቦ ከተማ	42	1.1
8	ጉባላፍቶ	43	1.2
9	ሀብሩ	44	1.2
10	ራያ ቆቦ	45	1.2
11	መቄት	46	1.2
12	አንትት	47	1.2
13	ወልዲያ ከተማ	48	1
14	ጋዞ	49	1.2

ተ.ቁ	ደቡብ ጎንደር	ኮድ	ማባዣ
1	ታች ጋይንት	50	1.2
2	ደራ	51	1.2
3	አብዓት	52	1.2
4	አስቴ	53	1.2
5	አንጻቢት	54	1.2
6	ደብረታቦር	55	1
7	ፎገራ	56	1.2
8	ሊቦከምከም	57	1.2
9	ላይ ጋይንት	58	1.2
10	ወረታ ከተማ	59	1
11	ስማዳ	60	1.2
12	ፋርጣ	61	1.2
13	ሰዴ መ.ጃ	62	1.2
14	ጉና በጌምድር	63	1.2
15	መተማዋ	64	1.3

ተ.ቁ	ደቡብ ወሎ	ኮድ	ማባዣ
1	አምባሰል	65	1.2
2	ወግዲ	66	1.2
3	ዐረና	67	1.2
4	ኮምቦልቻ	68	1
5	ጃማ	69	1.2
6	ቃሉ	70	1.2
7	ከሚሳ	71	1.2
8	ኩታ በር	72	1.2
9	ለጋምቦ	73	1.2
10	መሃል ሳንይት	74	1.3
11	ወረባቦ	75	1.2
12	ሙቅደላ	76	1.2
13	ወረዓሉ	77	1.2
14	ልዠጃ	78	1.2
15	ተሁለደሬ	79	1.2
16	ደሴ ዙሪያ	80	1.2
17	ቱጉታ	81	1.2
18	አልብቡ	82	1.2
19	አርጎባ ልዩ ወረዳ	83	1.3
20	ላይንት አጀባር	84	1.3
21	ደላንታ	85	1.2

ተ.ቁ	ዋግ ኽምራ	ኮድ	ማባዣ
1	ሰቆጣ ዙሪያ	86	1.2
2	አበርገሌ	87	1.5
3	ዳህና	88	1.2
4	ጋዝጊብላ	89	1.2
5	ዝቋላ	90	1.5
6	ሰቆጣ ከተማ	91	1.1
7	ስዞጓ ሰየምት	92	1.5
8	ጻግብጂ	93	1.3

33

Reference

[1] "System development methodologies." https://www.slideshare.net/KashifKhan76/system-development-methodologies-64648700 (accessed Mar. 19, 2022).

[2] "What is a Use Case? - Definition from Techopedia." https://www.techopedia.com/definition/25813/use-case (accessed Mar. 23, 2022).

[3] "Sequence diagram - Wikipedia." Accessed: Apr. 03, 2022. [Online]. Available: https://en.wikipedia.org/wiki/Sequence_diagram

[4] "Class diagram - Wikipedia," vol. 1, Accessed: Apr. 03, 2022. [Online]. Available: https://en.wikipedia.org/wiki/Class_diagram

[5] "System Analysis and Design - Quick Guide." https://www.tutorialspoint.com/system_analysis_and_design/system_analysis_and_design_quick_guide.htm (accessed Apr. 03, 2022).

[6] "What is System Design? - Definition from Techopedia." https://www.techopedia.com/definition/29998/system-design (accessed Apr. 03, 2022).