ADIGRAT UNIVERSITY

COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

TITILE PHARMACY MANAGEMENT SYSTEM FOR ADIGRAT RED CROSS

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Declaration

The Project is our own and has not been presented for a degree in any other university and all the sources of material used for the project/thesis have been acknowledged. (Name and Signature up to the number of the project group members)

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Project Title: Pharmacy management system for Adigrat Red Cross

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It is approved that this project has been written in compliance with the formatting rules laid down by the university.

Table of Contents

List of tables

List of figures

Acronyms, Abbreviation and operational terms

- **Drug**……a medicine or other substance
- **Scheduled**…….....prepared
- **Instructor**…….....Teacher
- **Offline** ……..disconnected state
- **Back end**.....not directly accessed by the user
- **SQL server** ……..…….....Structure query language
- **CSS** ……Cascading style sheet
- **JS** ……..……..Java script
- **MS** ….…….Microsoft
- **GB** ….……gigabyte
- **ASP.NET**……active server page
- **PC** ……...…….personal computer
- **Prescription**……...instruction paper
- **Invoice no**…….bill no
- **Stock card** ……a card used for control stock
- **Drug Stock**…….....used for sore drug

Acknowledgment

First and foremost and above all our biggest thanks would be to Almighty God because nothing could be possible without his free will and the completion of this project is supported by him.

Secondly we would like to thank our Advisor Mr. **Berhane Teklu,** and coordinator Mrs. **Birhan Araya** for them restless edition of our proposal, input to the quality of this proposal, heart full guidance, valuable advice, and providing to propose this project.

Thirdly we would like to thank Adigrat University Department of information technology head Mr. **Fistum**, for preparing the letters that used for interviewing our selected organization employees. We also thank for the Adigrat Red Cross Pharmacy workers. They have given the required all documents essential for the study and by giving different forms about the work flows as much as possible by devoting their time for us.

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Abstract

This system is web based drug management system. The main Idea of this project is to design and implement a web based system which will be used by any peoples for giving information and data about drug. The proposed system changes the existing manual system in to computerize by identify the existing system problem and improves it. This web based drug order management system primary aim is to improve accuracy and enhance safety and efficiency in the Red Cross pharmacy drug store. This system manages most drug related activities in the Red Cross pharmacy. The system we have proposed is going through stage of life cycles: requirement gathering, requirement analyzing, system designing, implementing, testing and maintaining. For requirement gathering we use interview and observation in the **Adigrat Red Cross pharmacy**. For requirement analyzing and design we use UML modeling and Microsoft office Visio drawing. And for implementation phase we used object oriented system analysis and design development methodology. The expected outcome of this system is ability to insert, update, retrieve records, display, and store and delete patient, drug information from the database. This system is decreasing the cost and time of data accessing process and it is going to be a user friendly system. It is very easy to use and less time consuming. The system provides authentication this helps to restrict unauthorized users.

Chapter One
Introduction

Pharmacy is a place where drugs are stored and sell for peoples and also other items like cosmetics and medical related items are sold other than drugs. Our project focuses on the drug management system of a pharmacy. This project is concerned on drugs management system of **Adigrat** Red Cross pharmacy. The web based pharmacy management system is a system that manages information about drug. Currently the pharmacy management system in **Adigrat Red Cross pharmacy** is manual which is difficult to manage information, because it causes information inconsistency and data integrity problem. To overcome this information inconsistency and integrity we need to have a web based data management system. We have taken the drug management system, to change the existing system from manually to web based application system. The efficiency of the Policing function and the effectiveness with which it tackles the improper and corrupted managing of drugs depends on what quality of information it can derive from its existing records and how fast it can have access to it

1.1 Background

Adigrat Red Cross pharmacy starts its service 1971 E.C, this pharmacy located in Tigray region, in front of the central cafe at Adigrat town, which is a pioneer humanitarian organization to help war and disaster victims as well as to assist in reducing the number of vulnerable people through improving access to health facilities, fighting HIV/AIDS, malaria, T.B and other diseases, in developing workable resource generation mechanism so as to become a self-reliant national Society.These pharmacies were unable to give sufficient service to patient because of so many handicaps; but in the recent time the new pharmacy was established by the name of special pharmacy. This pharmacy has its own budget; it sells drugs with lowest price (approximately less than 25%) to other pharmacies in the town.

1.1.1 Vision of the organization

The Adigrat Red Cross pharmacy vision is to see a transformed pharmacy where adverse effects of patients are minimized and its people are living in peace and creating healthy society.

1.1.2 Mission of the organization

The mission is to prevent and alleviate human suffering and to contribute to the wellbeing of mankind and prevalence of and satisfaction customer needs, its Additional Optional Protocols and the fundamental principles of the Red Cross Pharmacy.

1.2 Statement of the problem

As we gather the information from Adigrat Red Cross pharmacy manager, the current system of Adigrat Red Cross pharmacy is manual system. Due to this, there are lot of problems. To update the record on manual system is difficult because the record doesn't have integrated checking mechanism. Therefore to update the data we should check the inserted data available clearly that are in the paper.

General speaking the manual system of Adigrat Red Cross pharmacy drug management system has the following problems:

- There is no well arrangement of drugs.
- It's difficult to know the expired date of drugs.
- It is difficult to manage or getting quick information the exact place of the drug on the shelf.
- Data corruption due to time and place.
- Update/modification problem when new drug are register.
- Searching problem searching data's from a lot of paper are difficult.
- It takes more time to retrieve, update recorded information.
- Data inconsistency.

1.3 Objectives of the project

1.3.1 General Objective

The main objective of our project is to develop web based drug order management system for Adigrat Red Cross pharmacy.

1.3.2 Specific Objectives

The specific objectives of the project are.-

- The System must register new drug and pharmacists Item when the employer wants to add new Item.
- Fast data processing and retrieval.
- Easy way of user management.

- To minimize time and efforts needed to perform the tasks in the pharmacy.
- To give sufficient drug delivery system for the patient.
- To know easily the expired drug, less quantity of the drug with patient.
- To arrange the type of drug based on pharmacological action on the shelf.
- To provide quick information on the drug and its description and easy access on search.
- The System notifies the item at the expired date.
- The system must do like set, update, delete, insert and search drug type of the item.
- Implementing standard security that can keep the confidentiality of the data at rest as well as at communication lines.
- Designing user friendly interface.
- Advertisement of drugs for the user.

The objectives are to solve the problem in the existing system, because of the manual work, so we want to reduce the above problem we can develop computerized system.

1.4 Purpose of the project

The system helps the pharmacy to enhance the managerial works regarding its efficiency and data protection or security, and reduce paper works that in turn reduces expenditures and manage the drug effectively. It also helps the customers, staff members and organizations get necessary services in effective way. Some of the Significances of the proposed system are:-

- For pharmacist record drug and patient status
- Store drugs on database
- Retrieve information from data base
- Minimize the time it takes for searching drugs data.
- Since the system is a web-Based it widens the way of accessing the system

1.4.1 Target beneficiaries of the system

There are different bodies that can be benefited from our System Such as:

A. **Adigrat red cross pharmacy: -** in which, first the environment is changed to a web based drug management system environment, which improves the quality of internal operations as well as services given to people. Second, the problem associated with manual processing is minimized and the quality of work and services became improved.

B. **System developers: -** in order to design and implement this project, we are doing much process starting from requirement gathering to implementing the system. So we get a lot of knowledge when doing this project.

C. **Patient: -** Automation of viewing information about drug through system in order to buy drugs and checking the available drugs that are stored in the pharmacy online.

1.5 Scope of the project

The scope of the project is concentrating on how to manage the drug distribution and its inventory activities and applications of the drug in easy, efficient, and functional way. It is also interested to analyze the system in relation with customer interaction. The scope of this project is Automation of viewing information about drug online system in order to buy drugs for Adigrat city and around here. Generally we come up with this project to implement a new drug management system which can perform the entire specified task to the pharmacy with minimum time, effort and resource need in addition with great efficiency and accuracy and guarantee that the data will not lost or damaged easily.

Therefore the project is bounded on:-

- registering new drug and pharmacists
- Fast data processing and retrieval.
- To delivery drug system for the patient.
- To know expired drug, less quantity of the drug with patient that has credit remains.
- To arrange the type of drug
- To access easy by search.
- To delete the item at the expired date.
- The system must be doing like set/update/delete/insert/search drug type of the item.
- Security that can keep the confidentiality of the data at rest as well as at communication lines.
- Designing user friendly interface.
- Advertisement of drugs.

1.6 Limitations of the project

This new system that we are going to develop mostly concerned on information that required for the drugs in pharmacy that enable them to manage the drug information but our system will not include

- ✓ The system can't change in to computerized system completely, because it works hand in hand documentation.
- ✓ Our system works only when a database is active and the network is available.
- ✓ The system can't work in offline**.**
- ✓ Blind people are unable to use the system.
- ✓ The system does not support multi language.
- ✓ The system does not allow online drug shopping.
- ✓ No online payment.

1.7 Methodology for our project

1.7.1 Data gathering techniques

We gather the necessary information for our project from Adigrat Red Cross pharmacy through the following methods:

- ➢ Document review
- ➢ Observation
- ➢ Interviewing users and employee of the pharmacy.

We have preferred interviewing, because we are able to get reliable information about the pharmacy. Our data sources for interviewing: Druggist Manager **Brhane Alem**, pharmacist **Mulat Degefa.**

1.7.2 Design method

In our project, we apply the concept of object oriented system Analysis and design development methodology, because it is best way to construct, manage and assemble objects that we are going to implement in our system, and the composition of objects and collaboration between objects on the system. It Models the functions of the system (use case modeling), organize the objects and also the relationship between them and finally model the behaviour of the objects. It also shows object interactions and behaviours that support the use case and scenario, and finally update object model to reflect the implementation environment. We choose this approach because of the following advantages:

- ➢ Increased reusability: object oriented system support reusability of system.
- ➢ Increased extensibility: to add and change the existing module without affecting the rest of the program.

- Improved quality: introduces user participation which improves quality of the project.

The above advantage will make object oriented approach power full and to be used most widely.

1.7.3 Implementation Methodology

In this we discuss how the proposed system replaces the existing system. That is identifying whether it is rapid installation or parallel installation.

***Rapid installation*: -** the newly proposed system completely replaces the existing system which means existing system-s are no longer functional.

***Parallel installation*: -** here the newly proposed system functions parallelly with the existing system, so there is no complete change or replacement of system.

And since our proposed system functions parallel with existing system we go for parallel installation rather than rapid installation.

1.7.4 Development tools

1.7.4.1 Software tools

We use different software's to develop the proposed system. This software is used us for preparing the documentation and drawing the diagrams and also to design the system.

To implementation, this project we will use the following soft ware's.

Activity	Tools/Programs
Front end	ASP.NET by C# CSS (cascading style sheet), JS(java script),
Back end	Sql server 2008R2
Documentation	MS word 2007
Presentation	MS power point
Time schedule table	Ms office Visio drawing

Table 1: software tools

1.7.4.2. Hard ware tools

We use the hardware tool specifications listed below to develop our proposed system and for taking a backup. The hardware tools we will use listed below:

- PC's processor speed is 3.5 GHZ.
- System type 32 bit, operating system x64 based processor.
- RAM of pc is 4.00 GB.
- 8 GB Flash disc.
- Hard Disk is 465 GB.

1.8 Testing strategy

We used the following testing strategy to test the system.

- **Unit Testing:** to test an individual unit or group of related units in our system. It falls under the class of white box testing. It is often done by the programmer to test that the unit he/she has implemented is producing expected output against given input.
- **System testing:** to ensure that by putting the software in different environments (e.g., Operating Systems) it still works. System testing is done with full system implementation and environment. It falls under the class of black box testing.

1.9 Feasibility Analysis

Feasibility means answering questions relating to the utility and viability of the system that is going to be developed & it is the measure of how beneficial or practical of pharmacy drug information system will be to an organization. To get user acceptance and making the

system easily understandable and accessible the new system considers the following feasibilities:-

1.9.1 Economic feasibility

Economic feasibility determines the costs and benefits related to the developing project. It also identifies the resources that are needed for the project. When our system is successfully completed it will use to store data & information for drugs & patients. In case of our proposed system we divided in to two ways as follows.

1.9.1.1 Tangible benefit

One-time cost

- ✓ The cost paid for system designers and system analysts.
- ✓ The cost of Software to be acquired to build and run the system.
- ✓ The cost to buy server.

Recurring cost

- ✓ The cost to maintain computers, database and server if there is problem with them.
- ✓ Salary of system manager

1.9.1.2 Intangible benefits

The Intangible is recognized as a value that clearly exist but not quantifiable. The system we will develop has many intangible benefits that revolve around mental satisfaction of users of these systems. These are:

- ➢ Knowledge gain by project developer.
- ➢ Improving the moral of worker in the organization.
- ➢ Facilitating information processing of organization system.
- ➢ Give accurate and timely information for the user.
- ➢ Increasing the competitiveness of the individual

1.9.2 Technical feasibility

The technical feasibility will focus on gaining and understanding the present technical resources of the organization and their applicability to the expected need of the proposed system. It is also the measure of the practicality of a specific technical solution and the availability of technical resources. In technical feasibility we should notify that our new system can implement with current technology and also the user can simply use that

technology. The purpose of technical feasibility assessment is to have an understanding about the capability of users to construct a system. The question here is: "Do we have the technical and application familiarity for the construction and running of the system?". With respect to this project, the following factors should be taken in to consideration.

- ✓ **Familiarity with the application and technology**

From technical feasibility aspect to develop proposed system, we are capability to develop such project. We have experience in all aspects of technology tools to develop such project. To develop proposed system we are familiar with programming language, sql server data base, ASP.NET, CSS and Java script.

- ✓ **Compatibility:** the system will expected to be independent of any hardware or software version of any computer system, which indicates the system were supported by any operating system.

Technical feasibility addresses the following things:

- The ability to do on the technology
- Do we currently passes the necessary technology
- Is the technology practical

Generally, we can conclude that the proposed System is technically feasible.

1.9.3 Operational feasibility

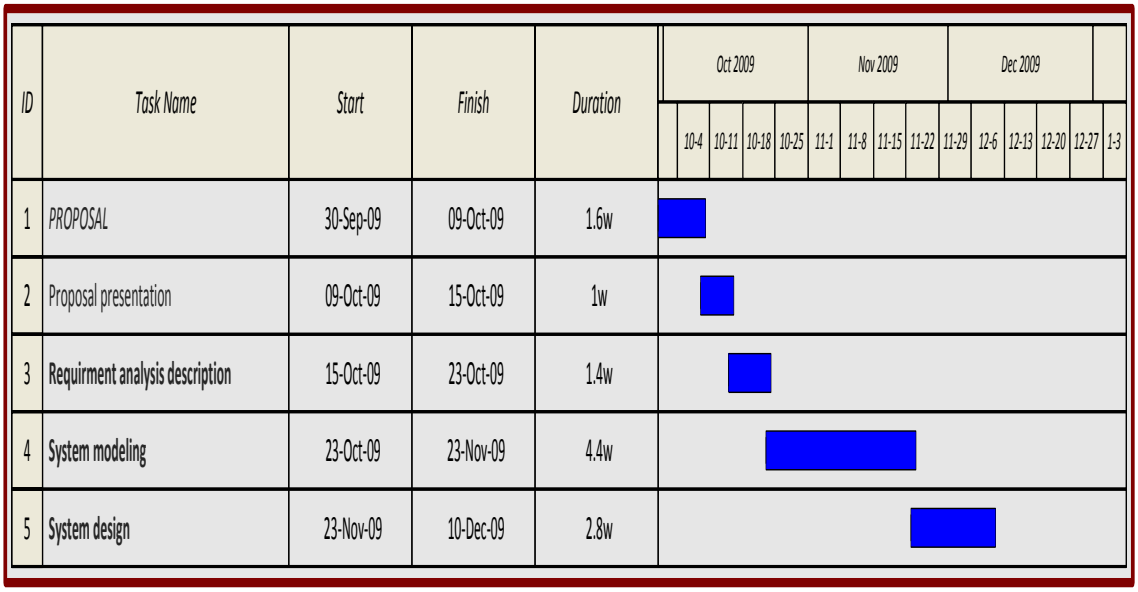
Refers to weather the proposed system can be implemented and operated with the staff the organization have and meet its intended purpose. From the user's perspective our system fully operational feasible as it just requires some knowledge of computer. There are enough validations available so operator does not require any special technical knowledge. Some factors that our system to be operational feasible:

- ➢ It is user friendly interface
- ➢ It uses web service
- ➢ It provides an easier access of drug file rather than searching drug file from the file cabinet.
- ➢ Better management of time .so, the entire team member expects the system to be operationally feasible.

1.9.4 Schedule feasibility

Schedule concerned with analyzing the expected completion date of the project and the constraints that may bring change to this date. We have so many fixed schedules to work

together. So, the project team members think that the project will be finished within the specified time. In general, the project is less risky as a result of the reasons specified in each of analysis studies. Project advisor **instructor Brhane.A and instructor Brhane T** is also responsible for monitoring & controlling the project development based on the schedule shown below.



ID	Task Name	Start	Finish	Duration
1	PROPOSAL	30-Sep-09	09-Oct-09	1.6w
2	Proposal presentation	09-Oct-09	15-Oct-09	1w
3	Requirment analysis description	15-Oct-09	23-Oct-09	1.4w
4	System modeling	23-Oct-09	23-Nov-09	4.4w
5	System design	23-Nov-09	10-Dec-09	2.8w

Table 2: Time schedule for the project

1.10 Cost break down

This describes the costs that will finish when we develop our system from initial stage up to implementation stage.

No.	Name of Tools	Quantity	Amount of cost
1	Computer	1	14,000.00 birr
2	Flash disk	1	200.00 birr
3	For printing document	-	200.00 birr
4	Paper	1/2 pack	90.00 birr
5	Internet(for reading)	-	100.00 birr
6	Utility expense	-	100.00 birr
7	Bajaj	-	100.00birr
8	GRAND TOTAL		14790.00 birr

Table 3: budget plan of the project

1.11 Team organization

It involves organization of the team and communication among each member of the team. In decentralized control team organization our project team shares the action as follows.

	Name	ID	Role in group
1	Mequanint	RET/1859/06	I have Participated in all activities
2	Yemane	RET/4240/06	I have Participated in all activities
3	Yordanos	RET/1877/06	I have Participated in all activities
4	Hayelom	RET/1847/06	I have Participated in all activities
5	Weldegiorgis	RET/1875/06	I have Participated in all activities

Table 4: Team composition

The team member is at the same level, and then can review each other's work and responsible as a group. Reason of choice:

- Our team members are on the same level and we can review each other's work
- Suitable for less understood, more complicated problem

- Higher moral among team member
- Higher quality of the product

Feel more ownership and responsible the diagram shows the communication between every member. One student can communicate with other four members. The diagram shows every title of the project and gathering information is done by every member.

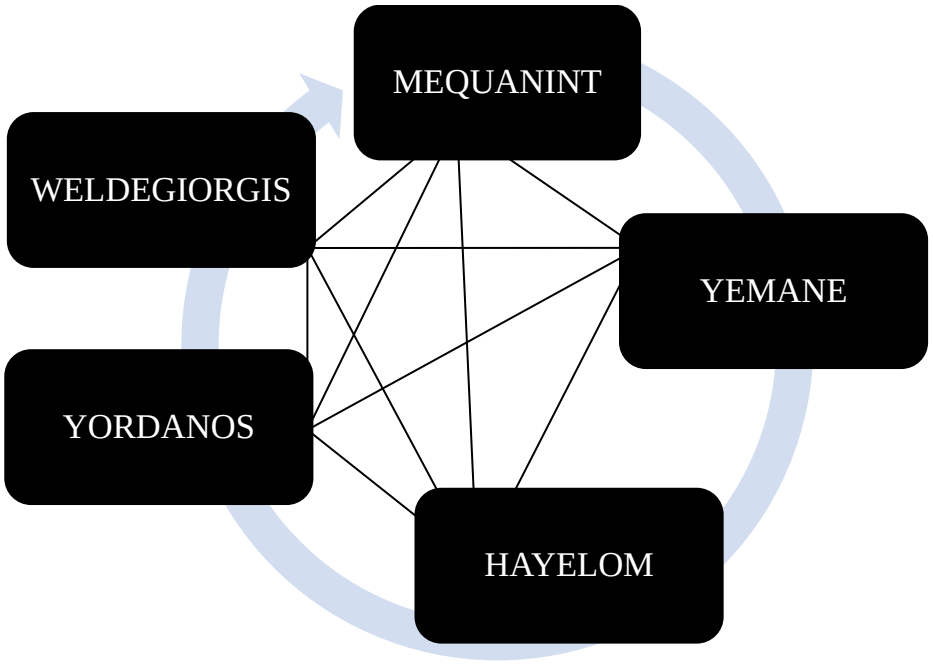


Figure 1: team member diagram

1.12 Organization of the document

In our document we have included the system details through all the chapters. In **chapter one,** we have include introduction, background, general objective, specific objective, scope of the project, the methodology we have used. In **chapter two,** we deal about system features such as; existing system description, proposed system description, functional requirement, non-functional requirement, and analysis models. In **chapter three,** we deal about the analysis of the system that the basic thing in our system development which helps the system designers (we) to find the purpose of the system and then to model it. In case of the new system we develop the purpose is to provide partial computerized information handling system. In this chapter we use **sequence diagram** shows how processes operate with one another and in what order, **use case diagram** to represent the interaction of user

with system, **class diagram** to describe the structure of a the system by showing the system's class their attributes, operations (or methods) and the relationships among objects.

In **chapter four,** we deal that the overall system design its objective is to provide an efficient, modular design that reduce the system's complexity, facilitate change, and result in an easy implementation. This is accomplished by designing a strongly cohesion system with minimal coupling or combination. In addition, this document provide interface design models that are consistent, user friendly, and provide straightforward transitions through the various system functions.

In **chapter five and six** we generally check our existed system for its implementation and functionalities aspect.

Chapter Two

Requirement Analysis Description

2.1 Overview of the existing system

Adigrat Red Cross pharmacy starts its service 1971 E.C, this pharmacy located in Tigray region, in front of the central cafe at Adigrat town, which is a pioneer humanitarian organization to help war and disaster victims as well as to assist in reducing the number of vulnerable people through improving access to health facilities, fighting HIV/AIDS, malaria, T.B and other diseases, in developing workable resource generation mechanism so as to become a self-reliant national Society. These pharmacies were unable to give sufficient service to patient because of so many problems. This pharmacy has its own budget; it sells drugs with lowest price (approximately less than 25%) to other pharmacies in the town. Even though this pharmacy gives the above benefit to the society but it has its own problems:

- The task was performed manually.
- There is no well arrangement of drugs.
- It's difficult to know the expired date of drugs.
- It's difficult to know the Drug that has less quantity.
- It is difficult to manage or getting quick information the exact place of the drug on the shelf.

Generally by doing such kind of problem the system was incur so many costs but in the new system we are trying to solve the problems by retrieving the needed information from the drugs management database system this reduced unnecessary cost incurred in the current system.

2.1.1. Main activity of existing system

There are so many types of activity in the existing system of special pharmacy from them

- Dispensing it is the process of exchanging meaning selling and buying of drug.
- Advancing counselling drug usage for patient meaning when the patient take drug the pharmacist give advice how to take drugs ,like morning one ,night one style
- Selling cosmetics for adults and children's

2.1.2. Problem of the existing system

There are different failures or weakness in existing system from them these are as follows:-

- Unable to give fast service for customers of the Pharmacy.
- absence of centralized drug management system
- They have no computerized Pharmacy system.
- It's difficult to know the expired date of drugs.
- It's difficult to know the patients that have credit remain.
- It is time taking to process Drug information
- It is difficult to manage or getting quick information about exact place of the drug on the shelf.
- They have no unified system for processing Drug information.

2.1.3. Business rules

Every Employee of the system must have an account for accessing the system, even the manager itself to increase the security of the system.

- ✓ The developers have right that is legal on the country low to develop the system or the developed system is legal on the side country rule and regulation.
- ✓ the drug which is checked its expired date by the pharmacist when the drug is sold and with a certain interval of days
- ✓ The receipt which is contains the cost of the sail drug with drug information. It is made by pharmacist and given by accountant to the patient.
- ✓ The pharmacist who is taking the drug from the store has responsibility to record and manage properly.
- ✓ The pharmacist advice patient on the drug usage methods and patient have responsible for that usage method.

2.2 Overview of Proposed System

After observing the current manual Drug Management system and understanding all the problems occurred during every activity on the existing system of Adigrat red cross pharmacy, we desired to design a system that solve the problems of the current system. The proposed system has server, database and client. The server used to fetch data from the database and store data in to the database according to the instruction of the user. Database used to store data and information about drug and patients. The client is display the pages

to the user and after the user insert input the client send the request to the server and also display the response of a server to the user. The system that we are proposed store all the details of the drug including their name, type, expired date and all the information related to it. The proposed System will also supports: handling inquiries from prospective pharmacy manager, handling the drug details. It becomes essential to make a properly managed Drug Order management System so that users can easy access drug's record and get the desired information easily. In addition to this proposed system has several advantages including: User friendly interface, Fast access to database, less error, more storage capacity, search facility, look and feel environment, Easy to handle and feasible, cost reduction, fast and convenient and accurate. The proposed system will use the major functionality of the existing system able to advance accordance with performance (the system will have faster response time and use minimal space usage), security (provides or contains user name and password for each users based on their privilege), reliability (system is reliable by analyzing each information by the organization of the system) and Speed (regarding on the speed the system will generate output).

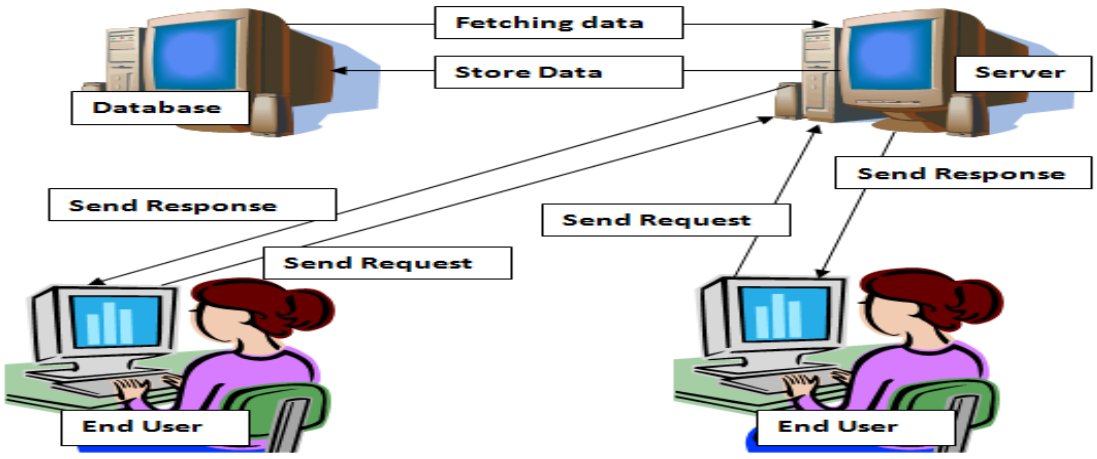


Figure 2: Proposed system process

2.2.1 Functional requirements

The functional requirement of the Project is defines a function of our System and its components. A function is described as a set of inputs, the behaviour, and outputs.

Functional requirements also describe the relations between the system and the user or the environment. Here the 'relations' means the direct or indirect interactions between the user and the system.

The functional requirement of our system is:-

- The system shall allow employee login to the system by using their username and password.
- Our proposed system includes reports that are done on the week, Receipt and other related operation.
- The system allows to know easily the quantity of the drug that are existed in the pharmacy it is used to differentiate the expired drug from unexpired because of these we can reduce the wastage of the resource (drug) and money.
- To arrange the type of drug based on pharmacological action on the shelf.
- To provide quick information on the drug and its description and easy access on search.
- The System notifies the item at the expired date.
- Allows authorized user /personnel to update the database.
- The system shall allow employee to logout by pressing log out button.

2.2.2 Non-Functional requirements

Non-Functional requirement explains and describes requirements that support the main of the system that should have but they are not part of the system functionalities. Generally non-functional requirements describe the quality of the system. The following lists states the non-functional requirements.

2.2.2.1 Performance requirements

The user can login to the system easily and can access information on a computer from database. The server is large which is to accept the request from the users and give responses after processing the request in a short period of time. The system serves all users simultaneously.

The performance of the system has short response time for a piece of work,high rate of processing work, Low utilization of computing resource, high availability of computing system or application and decreases work overload.

2.2.2.2 Security and Access permissions

The new system provides security to prevent and protect unauthorized modification of data, the new database must have a security to control the activities that can be performed by the users and determine which information can be viewed and modified. The system generates warning messages for every invalid input and secures every document in database.

2.2.2.3 Backup and Recovery

Storing data in another place for backup purpose, if the system is destroyed, then it is easy to get the lost data. This can be done by placing the data in another place. If the data is failed or lost, then the lost data can be easily recovered the database. The proposed system can store any data inserted in to the system in appropriate manner. The stored data can be kept in database permanently and can be retrieving easily when the user accesses it from database.

2.2.2.4 Resources, usability, availability

The system consumes resource that required high processer speed both for server and client and machine having more memory space as a server. We use computer, laptop, disks, paper for layout and properly using them and protecting these resources from damage. We use powerful mark-up languages which support graphical user interface friendly. The proposed system can store any data inserted in to the system in appropriate manner. The stored data can be kept in database permanently and can be retrieving easily when the user accesses it from database.

2.2.3 Assumptions

We assume the system gives the services for the needed purpose fairly, efficiently and effectively regarding to facilities and perform all of these activities needed by the organization. We assume our project will change the functions of Adigrat Red Cross pharmacy basically.

2.2.4 Constraints

There are two kinds of risk assessment in any software development life cycles. Those are Development process risks and Product risk. While developing this system, the project team may encounter different types of risks like:

- **Time constraint**: since we are students we have a shortage of time to develop the proposed system.
- **Skill constraints**: we have a skill constraint because we have not enough knowledge on programming languages.
- **Resource:** unavailability of some resources will also under consideration.

Chapter Three

System Modeling

3.1 Use case model

3.1.1. Actor specification

In the use cases an actor interact 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. Depending on this actors in this system are the following:

- Manager
- Pharmacist
- accountant
- Patient

The most important and basic use cases of this system and the actors that can use the use case are classified as follow:-

- Information about pharmacy (patient, pharmacist and manager and accountant)
- Add new medicine (pharmacist, manager)
- Update medicine info (pharmacist, manager)
- Delete medicine (pharmacist ,manager)
- Search medicine (patient, pharmacist, manager)
- Generate report (pharmacist, manager)
- Get report (Manager)
- Update account detail (manager)
- Register/Add employee (manager)
- Delete employee (manager)
- Update patient file.(accountant)
- Generate receipt(accountant)
- Login (pharmacist, manager)
- Logout (pharmacist accountant, manager)

3.1.2 Use case diagram

Use case is a methodology used in our system analysis to identify, clarify and organize system requirements. The use case of our system is made up a set of possible sequences of interaction between our system and the users of this system in Adigrat Red Cross pharmacy. In our proposed system there are 19 use cases and 4 actors. The uses cases are post information, register user, report generate, generate receipt, view drug information view posted information, and add drug information to the system. Basic component of use case diagram are listed below:-

- **Use cases**: A use case describes a sequence of actions that provide something of measurable value to an actor and is drawn as a horizontal ellipse.
- **Actors**: An actor is a person, organization, or external system that plays a role in one or more interactions with our system. Actors are drawn as stick figures.
- **Associations**: Associations between actors and use cases are indicated in use case diagrams by solid lines. An association exists whenever an actor is involved with an interaction described by a use case.

System boundary: we can draw a rectangle around the use cases, called the system boundary box, to indicate the scope of our system. Anything within the box represents functionality that is in scope and anything outside the box is not included in the system functionality.

- **Include:** In one form of interaction, a given use case may include another. Include is a Directed Relationship between two use cases, implying that the behaviour of the included use case is inserted into the behaviour of the including use case.

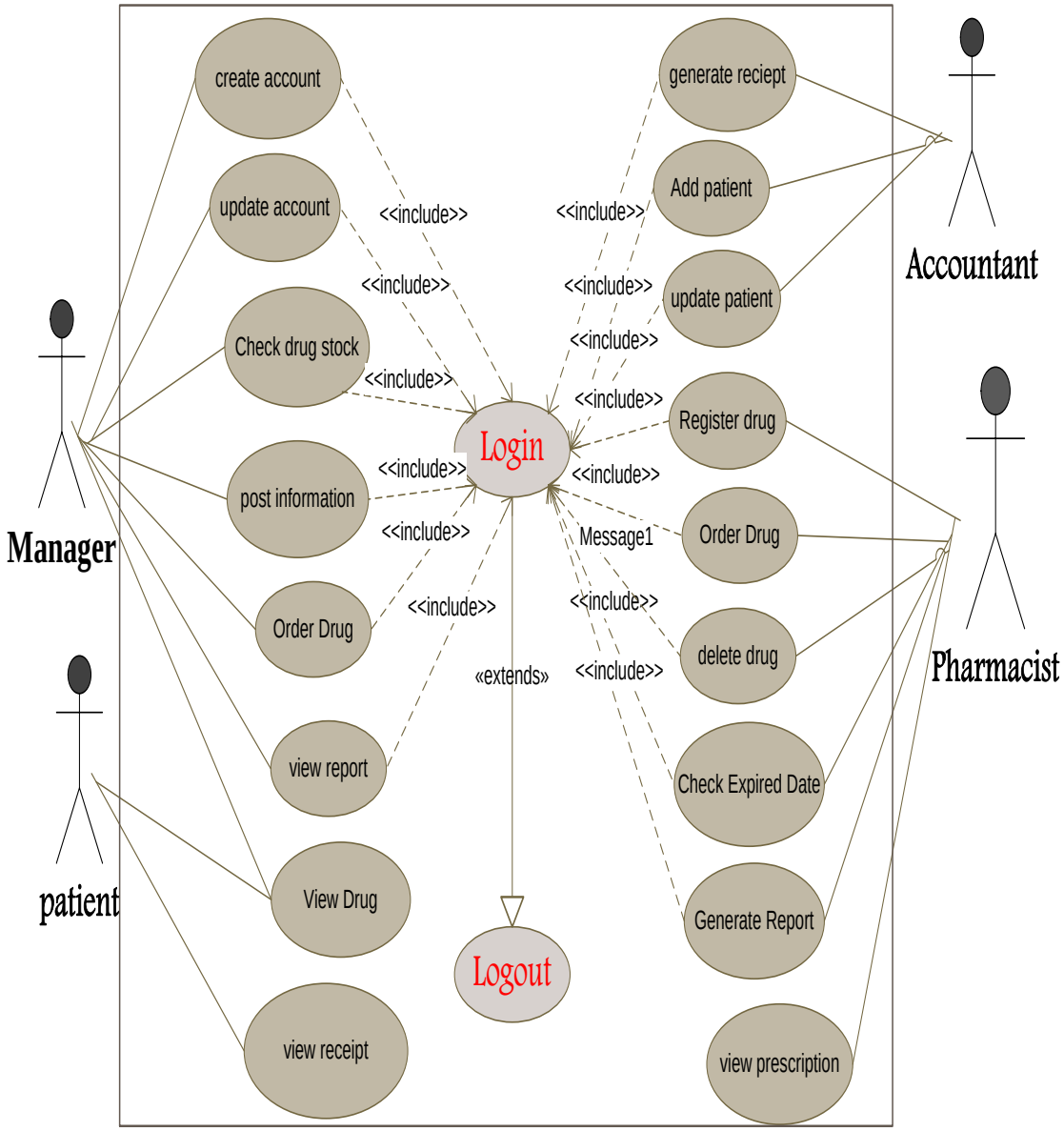


Figure 3: Use case Diagram of proposed system

3.1.3 Use case description

The actors those interact with the system are:-pharmacist, manager, patient, and accountant.

We describe each actor and use case as follow:

Use-case 1: *login*

Use case Name: Log in	
Actors: pharmacist, Manager, Accountant	
Description: how Pharmacist, Manager, Accountant are login to the System.	
Precondition: all the employees should be at the home page	
POST CONDITION: The Pharmacist, Manager, Accountant, are log in.	
Basic course of Action	
Actors action	System response
1. The pharmacist, Manager, accountant, is on the homepage and wants login to the system and press login link. **3**. The pharmacist, Manager, accountant, enters username and password, Click on Login Button. **6**. Use case ends.	**2.** The system displays the login form. **4**. The system Verify that all the filled have been filled out. **5**. The system display login confirmation is successfully.
An actor's action Alternate course of Action	**4.1**. If the system determines user name and password is not correct or not filled out the filled. Returns to step 3 of basic course of Action.

Table 5: Use case description for: login use case

Use- case2: Register drugs

Use case Name: register drug Actors: pharmacist	
Description:-This use case allows pharmacist to register drug.	
Precondition: - Pharmacist wants to register drug.	
POST CONDITION: drug registered.	
Basic course of Action	
An actor's action	System response
1. The pharmacist login to the system and go register form. 3. The pharmacist inserts all attributes of drug. 4. Then click the registered button.	2. The system displays the register page. 5. The system Verify that the name and expired date and all the filled have been filled out. 6. The system registered successfully. 7. Use case ends.
Alternate course of Action	2.1 If the pharmacist not correct user name and password back to basic course of action 2.

Table 6: Use case description for register drug

Use- case 3: Update drugs

Use case Name: Update drugs	
Actors: Pharmacist	
Description This use case allows Pharmacist to Update drugs.	
Precondition: Pharmacist has selected and wants to Update drugs	
POST CONDITION: Update drugs.	
Basic course of Action	
A Actor action	System response
1. The Pharmacist wants to Update drugs. **2**. The Pharmacist gets in the Update drugs page. **4**. The Pharmacist view drug list by search. **5**. Then Pharmacist find the specify one and clicks the Update drugs button.	**3**. The system displays the page. **6**. The system Update drugs from the list. **7**. The system display Update drugs is successful. **8**. Use case end.
Alternate course of Action	**5**.If the specified one is not in the drug list back to Basic course action of 4

Table 7:Use case description for: Update drugs

Use- case 4: Delete drugs

Use case Name: Delete drugs	
Actors: Pharmacist	
Description This use case allows Pharmacist to Delete drugs.	
Precondition: Pharmacist has selected and wants to Delete drugs	
POST CONDITION: Deleted drugs.	
Basic course of Action	
A Actor action	System response
1. The Pharmacist wants to Delete drugs. 2. The Pharmacist gets in the Delete drugs page. 4. The Pharmacist view drug list by search. 5. Then Pharmacist fined the selected one and clicks the Delete drugs button.	3. The system displays the page. 6. The system Delete drugs from the list. 7. The system display Delete drugs is successful. 8. Use case end.
Alternate course of Action	5.1 If the specified one is not in the drug list back to Basic course action of 4.

Table 8:Use case description for: Delete drugs

Use- case 5: View drugs, report

Use Case Name	view drug record
Actor	Manager, Pharmacist, accountant.
Description	to secure the information from an unauthorized access; to get full access in the activity
Pre-Condition	Allows the Manager to view new changes based on the daily record.
Main Flow	1. Manager, Accountant and pharmacist open the system and click login. 2. The system displays the login form. 3. The manager, Accountant and pharmacist enter username and password. 4. The system checks the validity of the manager and pharmacist username and password. 5. Manager, patient and pharmacist enter the main page and click on view drug record form. 6. The system display form. 7. Manager, Accountant and pharmacist display the drug record form.
Post Condition	Manager, patient and Pharmacist notify it is displayed successfully.
alternative case	1. The manager Accountant and pharmacist didn't type the correct username and password, nor do not have an account try again.

Table 9: Use case description for: view drugs, report

Use-case 6: report generate

Use case Name: report generate	
Actors: pharmacist	
Description: This use case the pharmacist to generate report.	
Precondition: the pharmacist wants to generate report.	
POST CONDITION: pharmacist generates report.	
Basic course of Action	
A Actor action	System response
1. Pharmacist open the system and click login. 2. The pharmacist wants to generate report. 3. The pharmacist click on report page. 4. The pharmacist checks all drugs and generates report, view information of drug, suggested drugs. 6. Use case end.	5. The system displays report page.
Alternate course of Action	.3.1. If there is no any drug information returns to Basic course action of 3.

Table 10:Use case description for: report generate

Use- case 7: Add patient

Use case Name	Add patient.
Description	Register patients information in the database
Actor:	Accountant
Precondition	The accountant log in to the system.
Post condition	The system saves the information of the patient.
Basic course of action	User action
	Accountant log into the system. The system display home form. Accountant selects patient registration form. The system display patient registration detail format to register patient. Select patient registration form Accountant fills the input and clicks the register button. Fill the available information Systems store the data in database End of use case.

Table 11:Use patient case description for register

Use- case: 8 Update patient file

Use case Name	Update patient file.	
Description	Modify the patient file which is recorded in the database.	
Actor:	Accountant.	
Precondition	There patient file must be recorded in the database before.	
Post condition	The modified file registers in the database.	
Basic course of action	User action	System response
	1) The accountant log into the system. 3) The accountant search patient updated form 5) The accountant fills the input and clicks the update button. 7) End of use case	2) The system display home page. 4)The system display the patient detail form 6)Systems store the data in database

Table 12:Use case description for update patient file

Use-case9: Generate Receipt

Use case Name: Generate Receipt	
Actors: Accountant Description: This use case allows Accountant to calculate cost of all drugs with their category description take from Accountant. Precondition: The pharmacist wants to receive cost of drug from Accountant . POST CONDITION: Accountant calculate cost of drug Basic course of Action	
A Actor action	System response
1. The Accountant wants to calculate drug cost 2. The Accountant checks drug attributes with cost.. 3. The Accountant register cost of drug on database 4. Use case end.	5. The system displays all information about the drug with their cost

Table 13: Use case description for Receipt cost of drug use case

Use- case 10: Post information

Use case Name: Post information	
Actors: Manager	
Description This use case allows Manager to post information.	
Precondition: Manager has selected and wants to post information	
POST CONDITION: post information.	
Basic course of Action	
A Actor action	System response
1. The Manager wants to post information. **2**. The Manager gets in the post information page. **4**. The Manager set necessary information. **5**. Then Manager clicks to the post button	**3**. The system displays the page. **6**. The system display information is post successful. **8**. Use case end.
Alternate course of Action	**5**.1 If the specified one is not in the information list back to Basic course action of 4.

Table 14: Use case description post information

Use-case 11: Order drug

Use case name	order drug	
Description	User assign and ordering drug in the database	
Actor	Manager, Pharmacist	
Precondition	The user log in to the system.	
Post condition	The user ordering and assign drug in the system	
Basic course of action	User action	System response
	1. The user login into the system. 4.select category to order the drug 4. The user fills information that used to drug ordering. 5. Click order button. 7.end of use case	2. The system displays the home page. 3. The system display the page that the drug to be ordered. 6. The system display correctly ordered message.

Table 15: Use case description ordering drug use case

Use- case: 12 Add employees

Use case Name	Add employee.	
Description	Register all workers in the pharmacy to the system.	
Actor:	Manager.	
Precondition	The manager should have an account to register the employee The manager log in to the system.	
Post condition	The employees are saved to the database.	
Basic course of action	User action	System response
	1.user login into the system 3. The manager select add employee page. 5. The manager fills all the necessary information. 6.click register button 8. End use case.	2. The system displays the home page. 4.The system display the employee form 7. The system message the manager adds successfully.

Table 16: Use case description add employee

Use case 13: Create account

Use case Name	Create account.	
Description	Give privilege to the system user.	
Actor:	Manager	
Precondition	The system Manager log in to the system.	
Post condition	The system Manager gives user name and password to the user	
Basic course of action	User action	System response
	1. Open the create account page. 3. Fill the appropriate information about his/her that listed in the form. 4. Click on create button. 7. End use case	2. Display create account page with create new account form 5. Check the filled information on the form. 6 If the filled information is correct the system saves on the system database.

Table 17: Use case description create account

Use case: 14 Update account

Use case Name	Update account.	
Description	Modify the user account for the database.	
Actor:	Manager	
Precondition	The account must be created first.	
Post condition	Updating of account in the database.	
Basic course of action	User action	System response
	1. User login into the system. 3. Select update account category. 5. Admin fill the available Information to update account. 6. Click update button. 8.end of use case	2. The system displays the page. 4. Display updates account form. 7. The system stored update account in to database.

Table 18: Use case description update account

3.2 Sequence diagram

Sequence diagrams show the interaction between participating objects in our use case. It's helpful to identify the missing objects that are not identified in the analysis object model. To see the interaction between objects we draw the sequence diagram of the use case. It also models the logic of the potential usage of the system consisting of messages, objects and classes

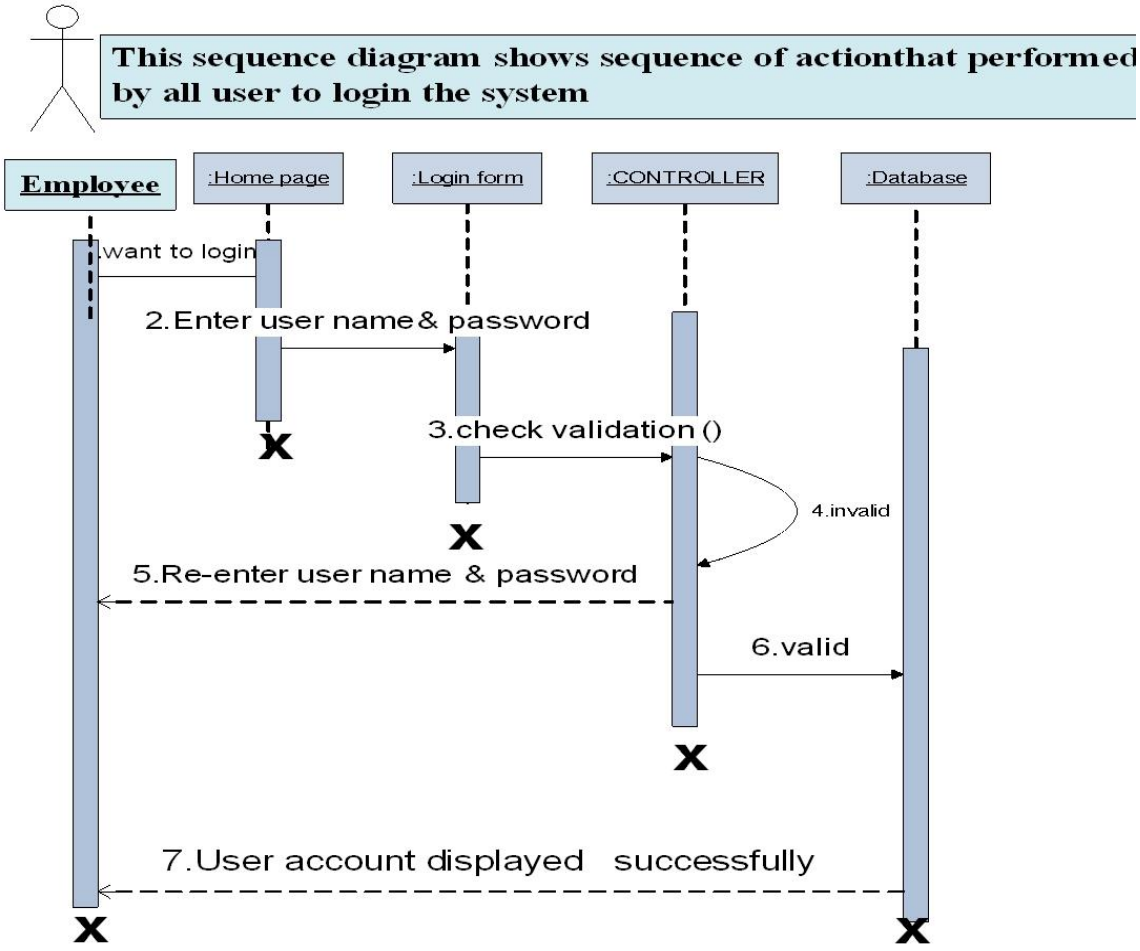


Figure 4: Sequence diagram for login use case

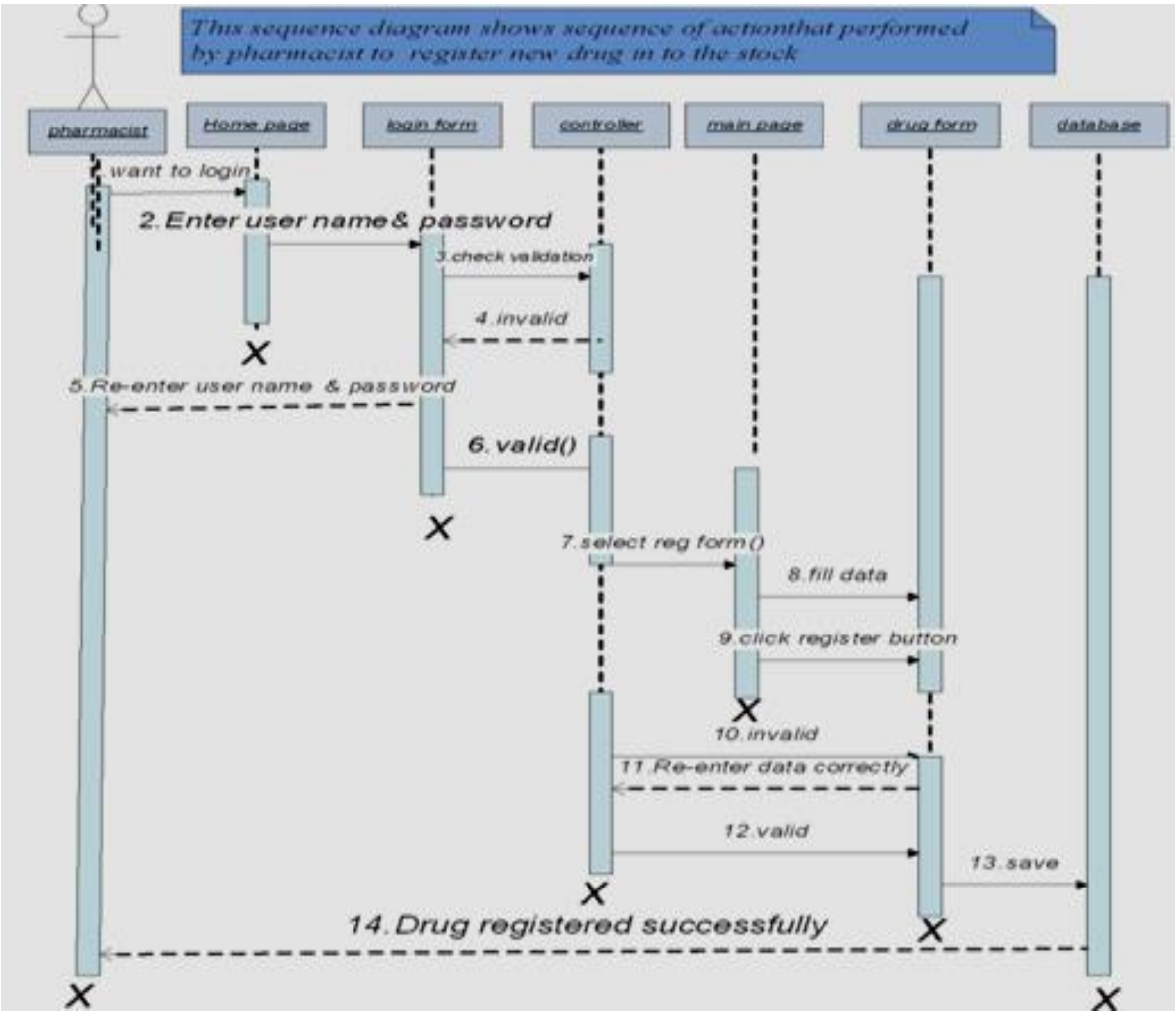


Figure 5: Sequence diagram for register drugs

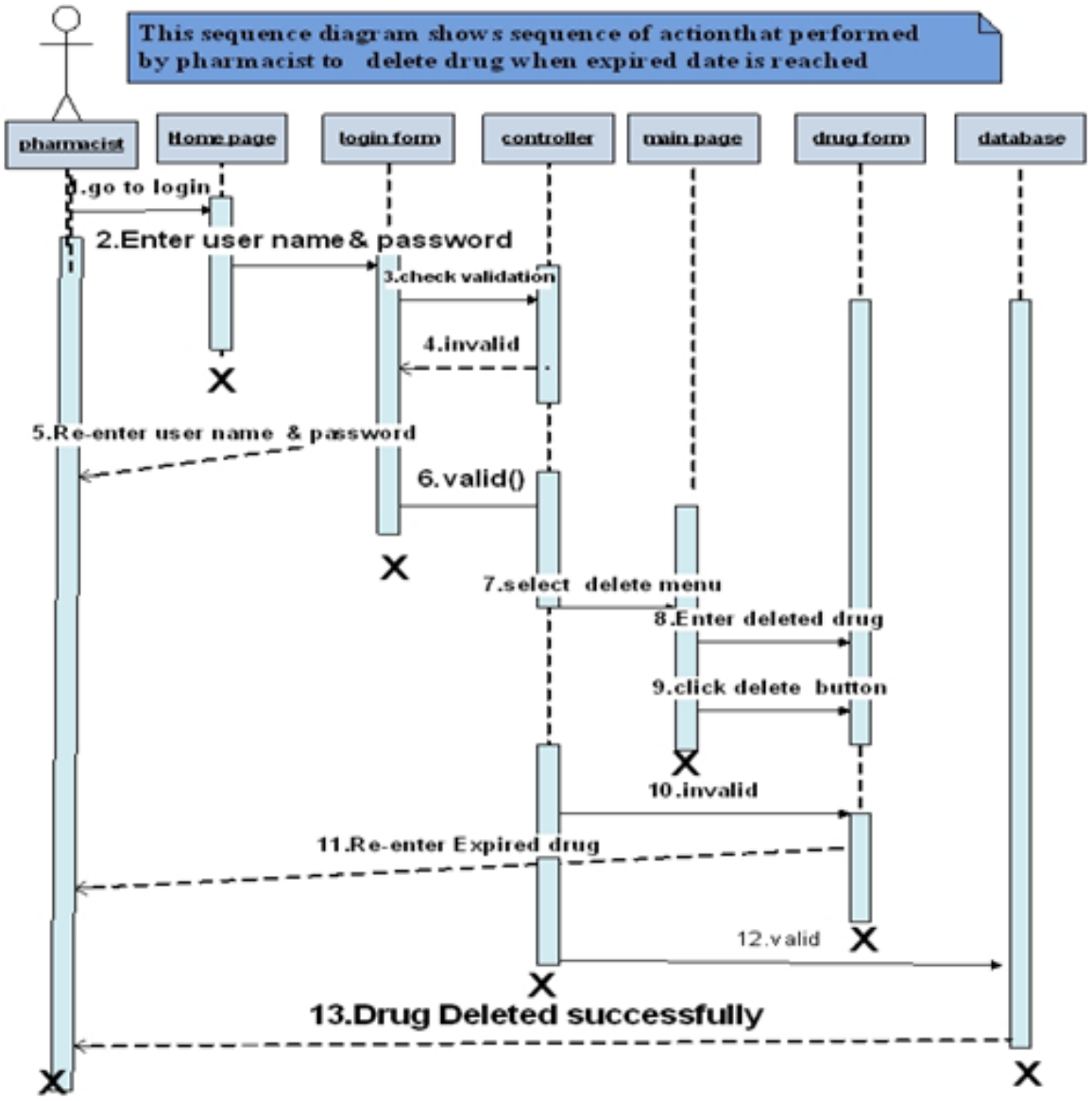


Figure 6: Sequence diagram for delete drugs

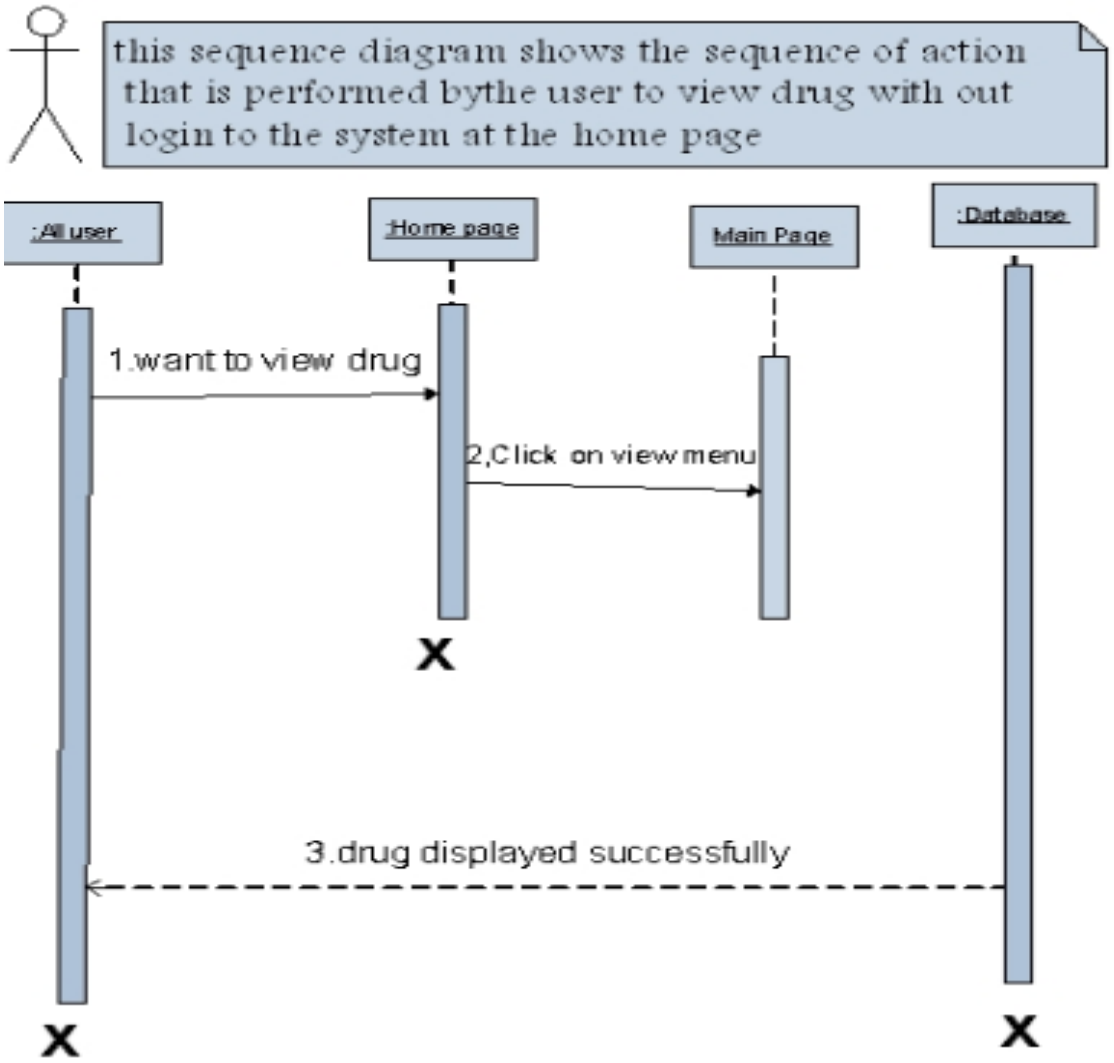


Figure 7: Sequence diagram for view drugs

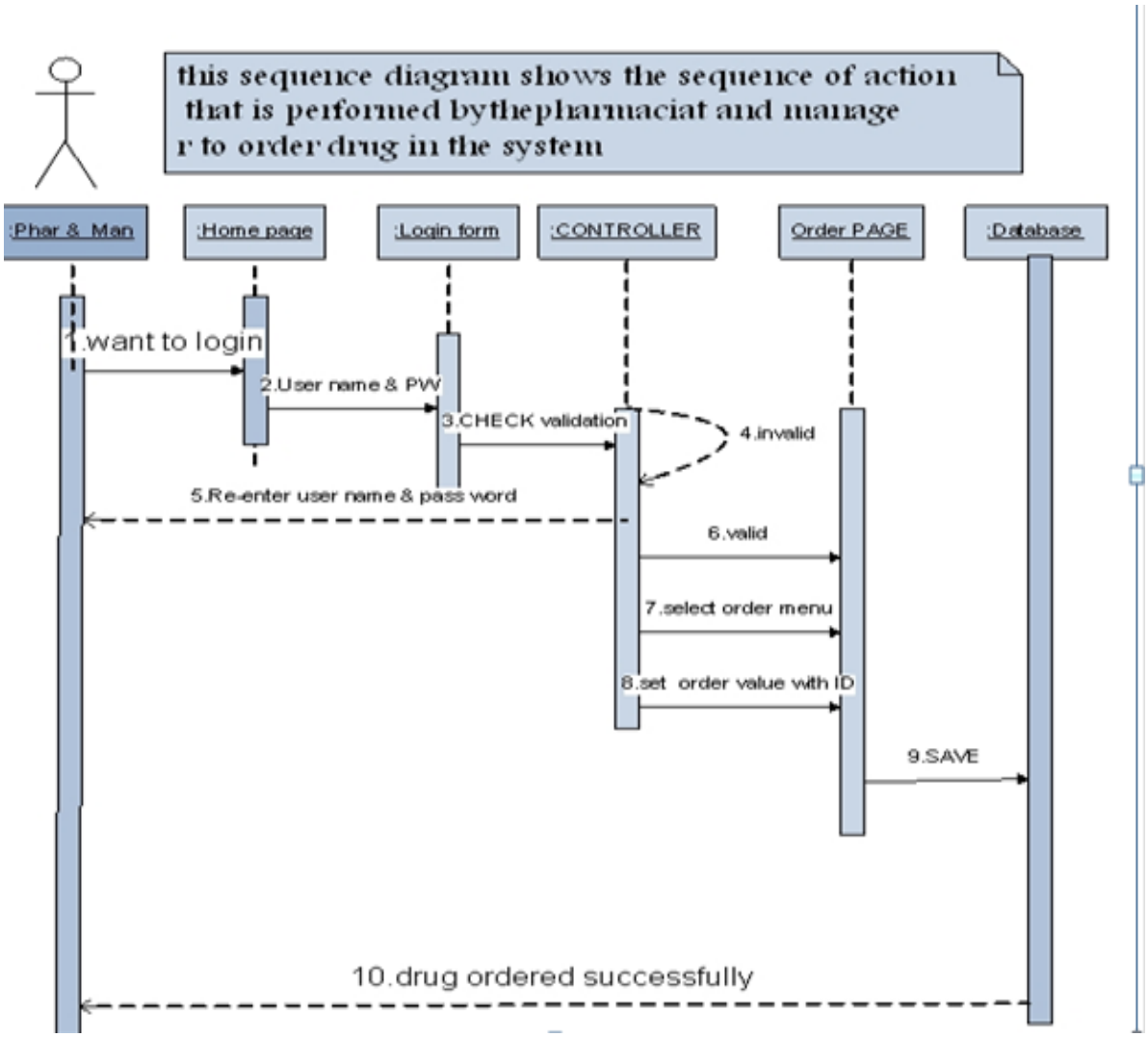


Figure 8: Sequence diagram for order drug

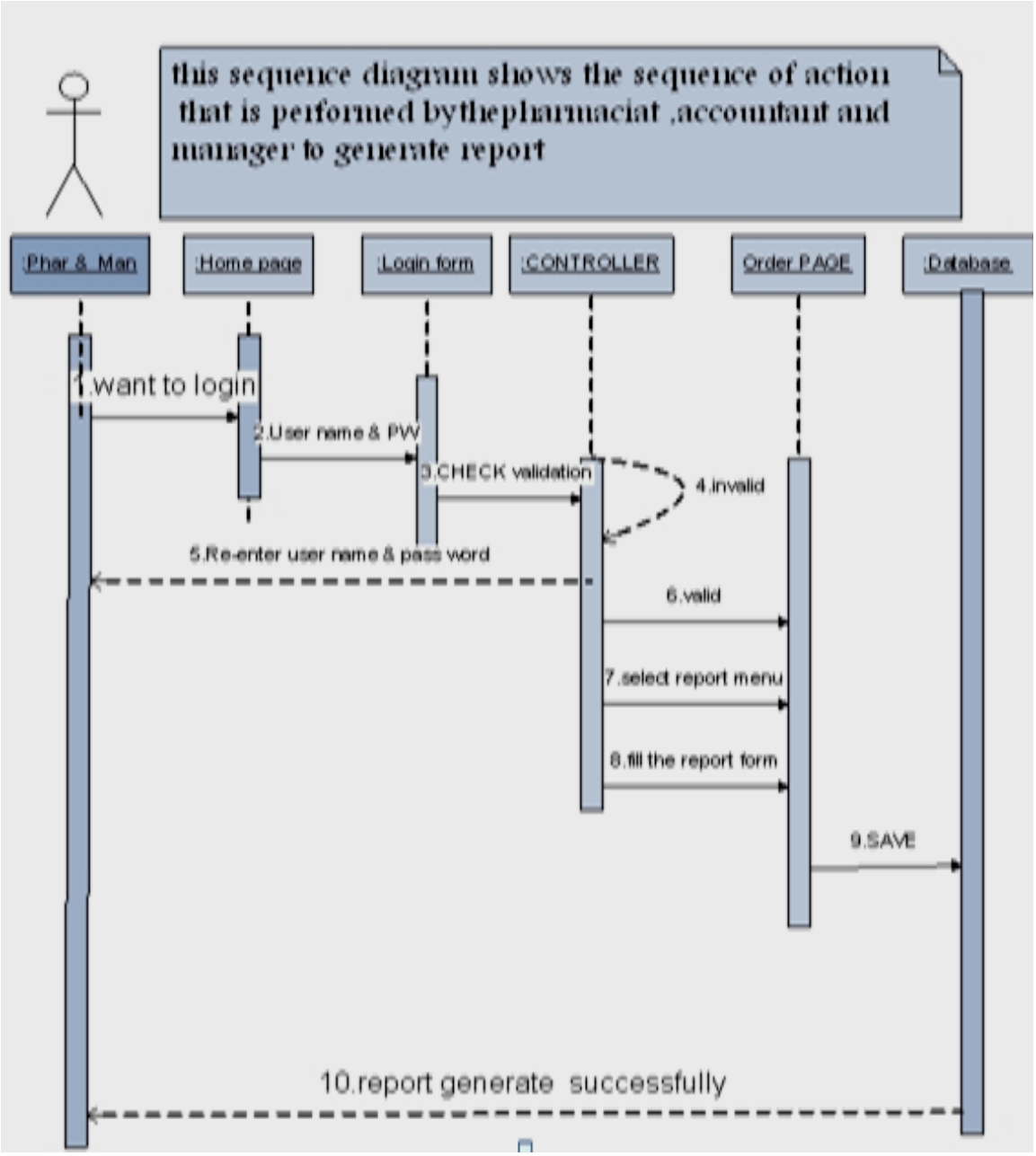


Figure 9: Sequence diagram for report generated

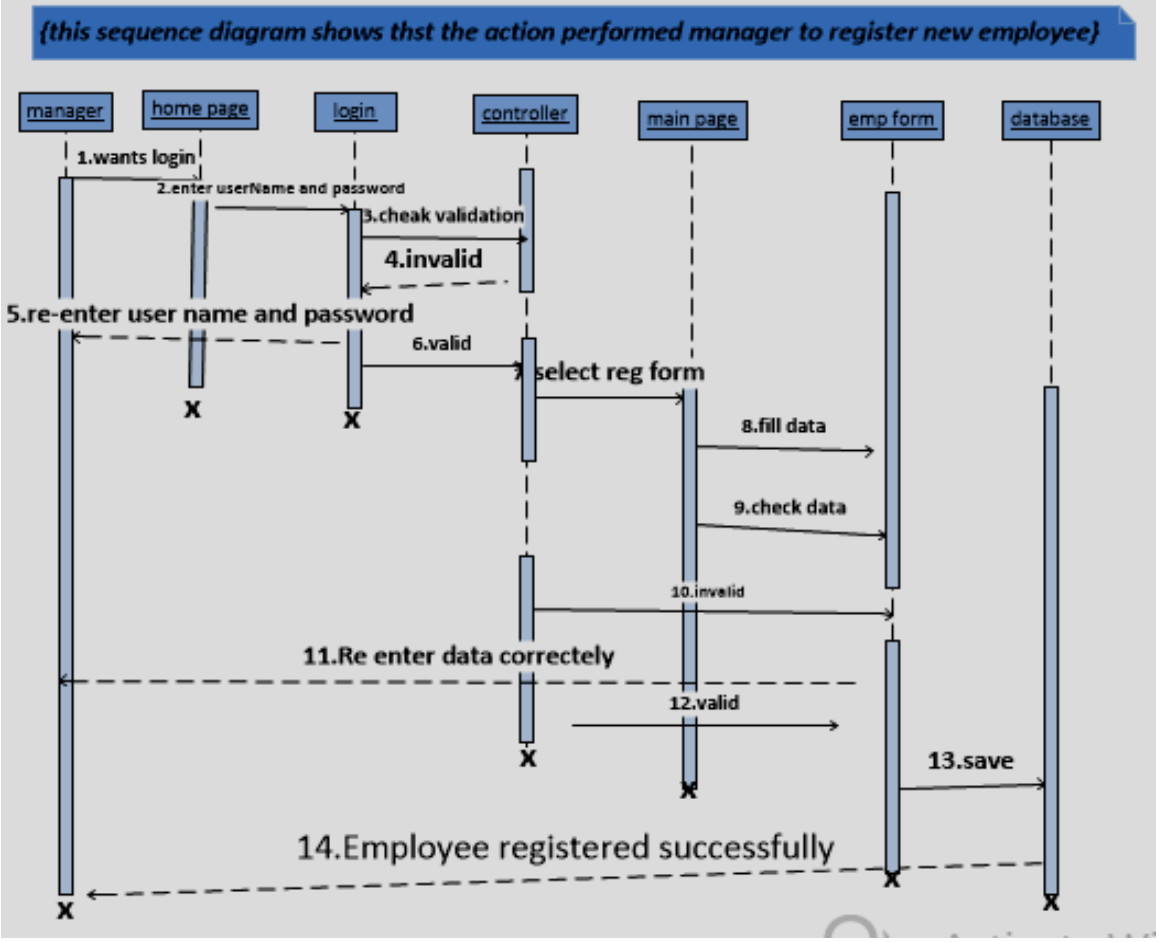


Figure 10: sequence diagram for register employee

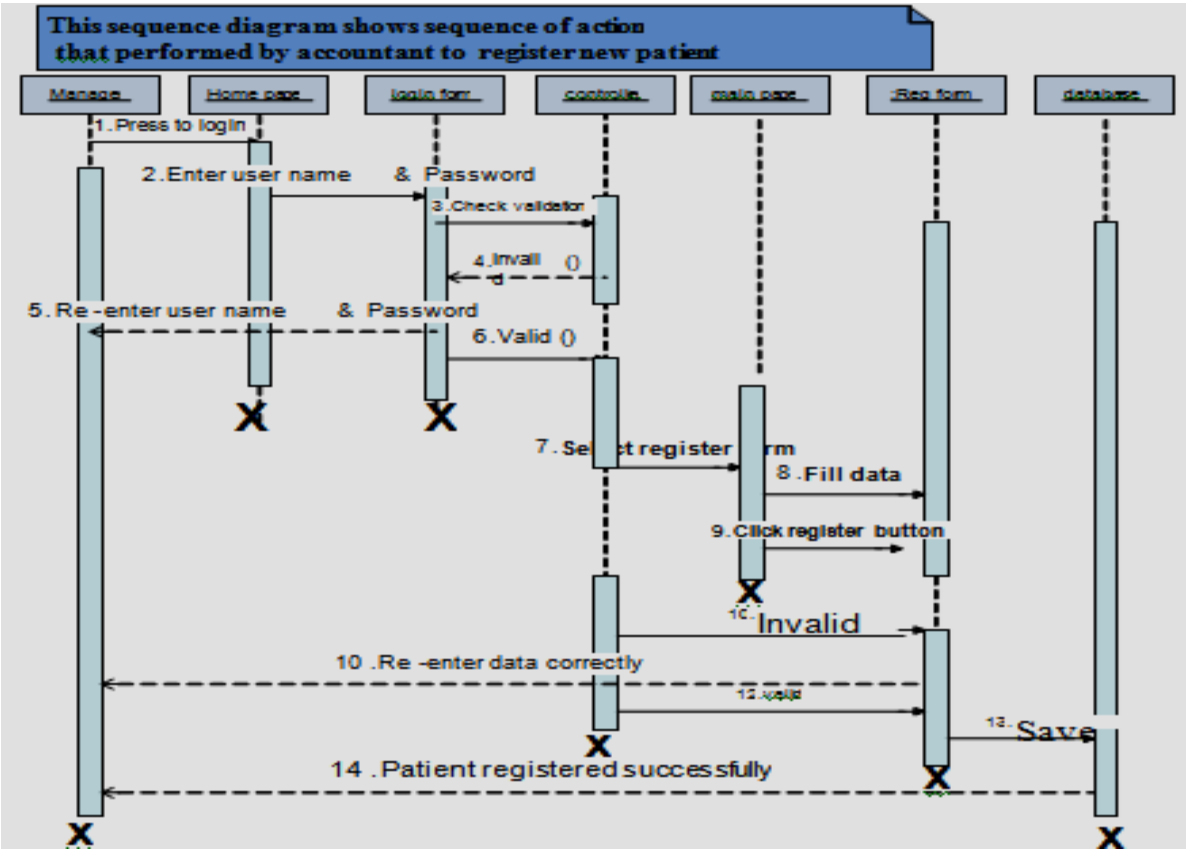


Figure 11 Sequence diagram for register new patient

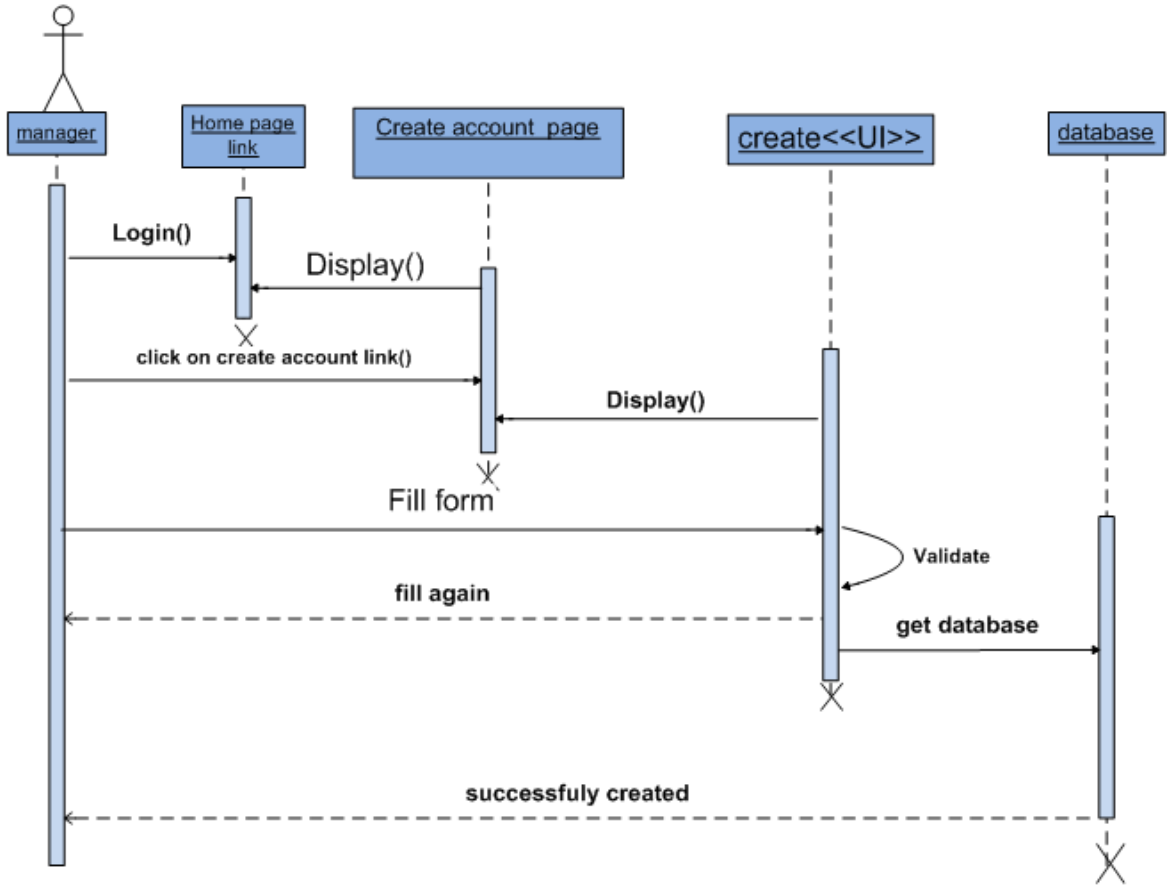


Figure 12 Sequence diagram for create account

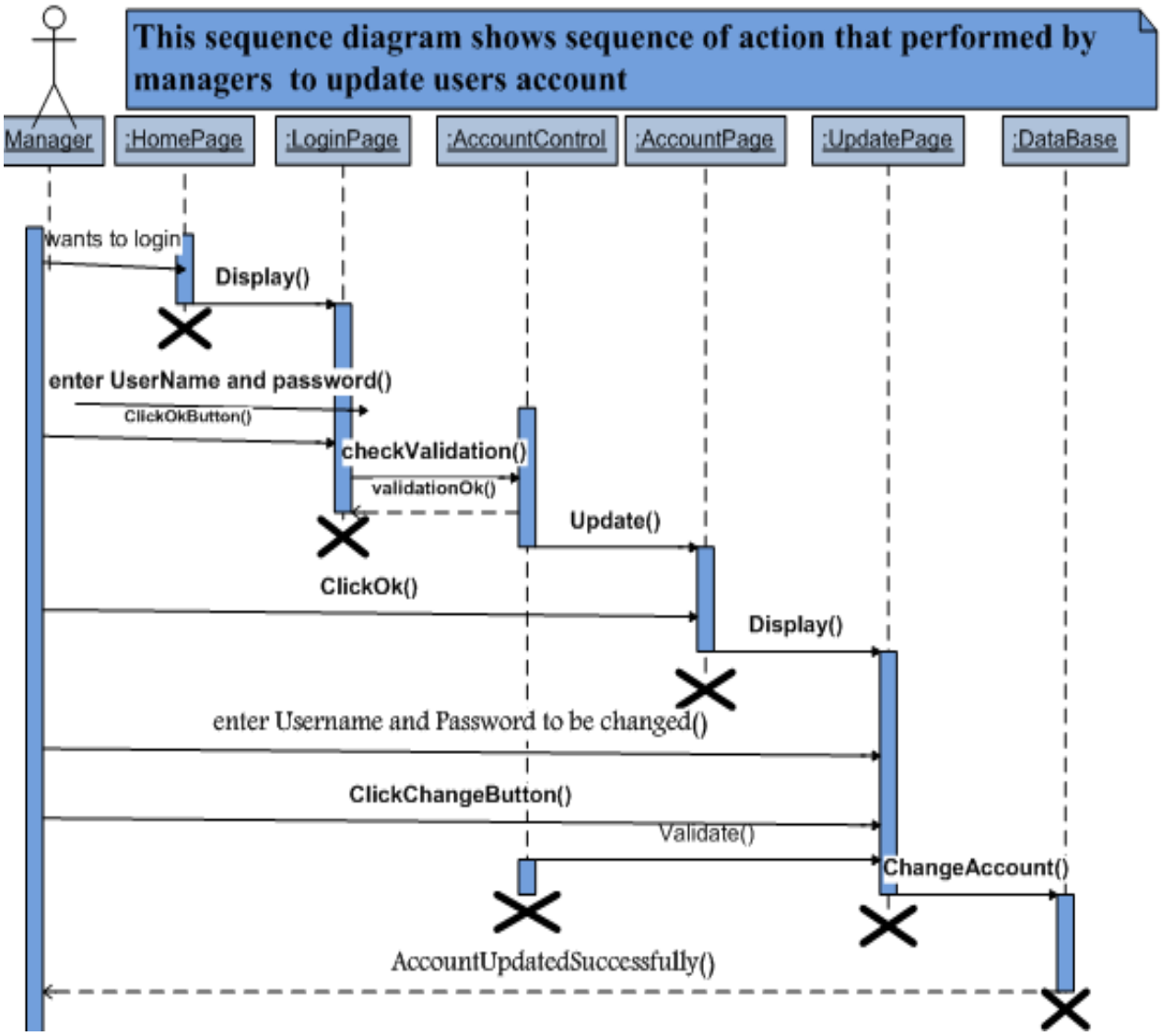


Figure 13 Sequence diagram for update account

3.3 Class diagram

It represents the properties of entities, their operations and relationships. Also it drives use case diagrams from use case. The class diagram is the main building block in our project modeling. It is used both for general conceptual modeling of the systematic of the application and for detailed modeling translating the models into the code. The classes in a class diagram represent both the main objects and or interactions in the application and the

objects to be programmed Generally the project is including the following class in the class diagram.

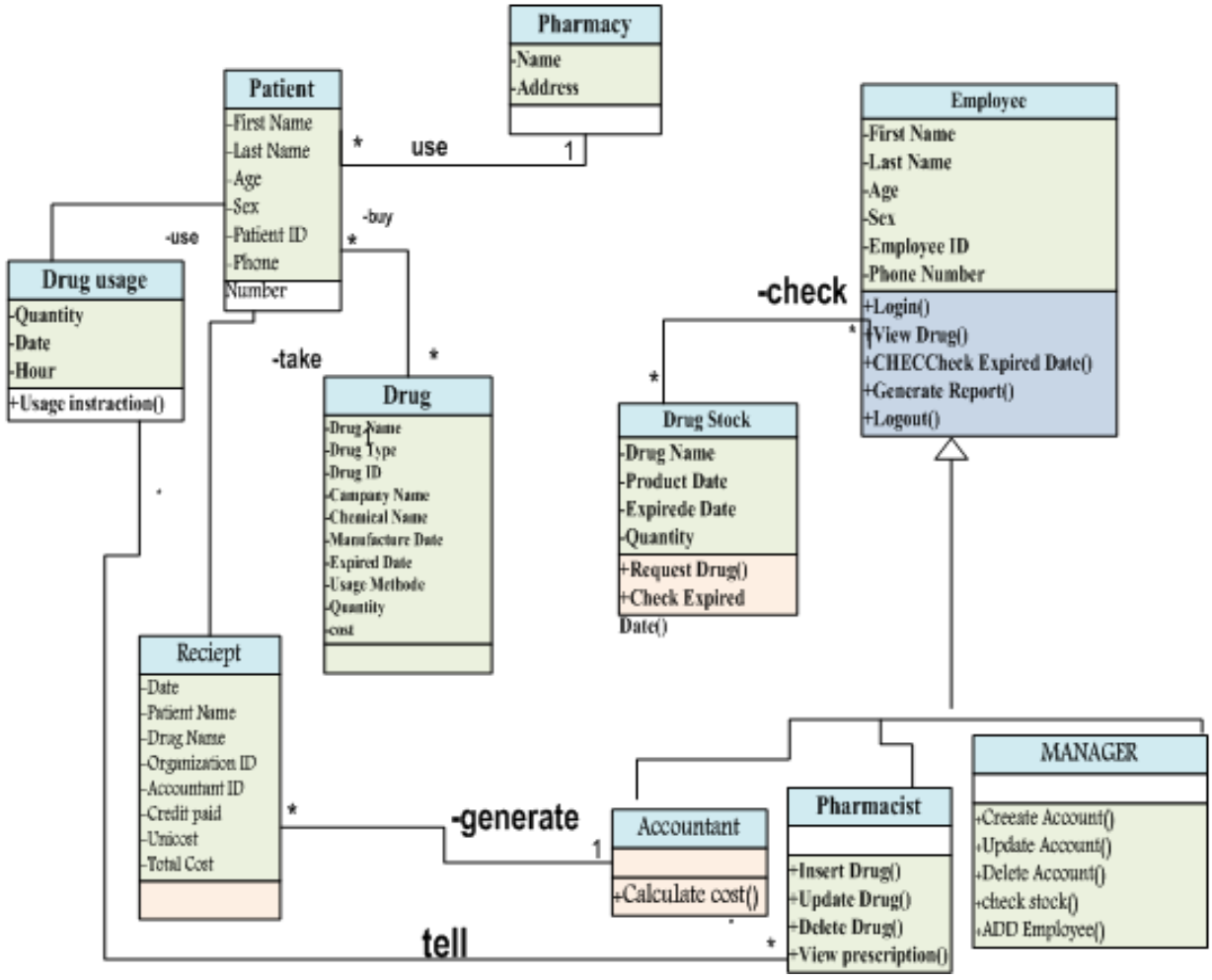


Figure 14 class diagram

Chapter Four

System Design

4.1 Design Goals

Main principle of creating Adigrat PMS sytem is develop it according to user's requirements. It is a web based system , rather than desktop application. Design of PMS system will be very simple because of two reasons:

1. PMS's interface has to be simple and easy, it is not more complicated for users, it is near that of logic with that of ordinary systems.
2. Implementation term is quite advanced and simple.

The overall system design objective is to provide an efficient, modular design that will reduce the system's complexity, facilitate change, and result in an easy implementation. This will be accomplished by designing a strongly cohesion system with minimal coupling or combination. In addition, this document will provide interface design models that are consistent, user friendly, and will provide straightforward transitions through the various system functions. This stage of system design of our project will result or expected to achieve the following goals:

Performance

The system performs the action given by the operator and produces a result in a few seconds. The system is expected to search Medicine which is given by the user to be searched and display the result in less than few seconds.

Maintainability

The system shall be maintained by using important maintenance tools in case the system got some failure. Our system is described by its modular design to minimize the effort required to locate and fix an errors.

Reliability

Specifies system capability and provides valid or authentic information for users. The system will continue operating actions in the expected way over time.

Security

The system must provide user authentication for pharmacist and manager to protect illegal access of unauthorized users and intruders from getting access to administrative features of the system by setting username and password. The password must be combination of uppercase and lower case letters and numbers and the system must prohibit the user password from entering weak passwords. The system must encrypt the authorized user password to hash codes which can be viewed in database.

Availability

A system availability or uptime is the amount of time that it is operational and available for use. This is specified because some systems are designed with expected downtime for acitvitties like database upgrades and backups. Our system will be 24/7 available.

Usability

The system shall allow usability as it is important to users. The users should be able to navigate the System at a minimal level without any training. This characteristic can be measured by user satisfaction with user ability to navigate and use the system, and can be tested by the effectiveness of the limited training, and whether there is a need for more.

Portability

This system is not platform dependent. It is possible to run this system in any operating system and in any browser.

4.2 System Decomposition

The main aim of sub-system decomposition is to divide the system in to smaller sub-systems with strong coherence and weak coupling. To increase the system coherence and loosing coupling we divided into five sub systems.

- UI management
- Medicine (Drug) management
- User management
- Report management

- Data storage management

1. **UI Management**

   This sub-system is responsible for the user and system interaction. It provides better and flexible user interface for the user. It performs different operations. Some of these operations are:

   - ✓ DisplayDetail()
   - ✓ Update()
   - ✓ ViewList()
   - ✓ DisplayForms()

2. **Medicine (Drug) Management**

   This sub-system is responsible for processing medicine information like Add Medicine, Update Medicine, and Delete Medicine. This component mainly involves the pharmacist, it performs different operations. Some of these operations are:

   - ✓ SaveMedicine()
   - ✓ DeleteMedicine()
   - ✓ UpdateMedicine()
   - ✓ SearchMedicine()
   - ✓ DisplaySearchResult()

3. **User Management**

   This component is concerned with managing users of our system specially authorized users (pharmacist and managers). This component mainly helps the manager to manage pharmacists account. So that this component has different operations some of these are:

   - ✓ AddPharmacist()
   - ✓ DeletePharmacist()
   - ✓ Add accountant()
   - ✓ Delete accountant()

4. **Report Management**

   This component is concerned with report processing. The main purpose of this component is to enable the pharmacist send report to manager and enabling the

manager to get reports. Some of the operations that will be performed by this component are:

- ✓ SendReport()
- ✓ GetReportList()
- ✓ GetReportDetail()

5. **Data Storage management**

This component is responsible for processing client query and storing data. Some of the operations that will be performed in this component are:

- ✓ Save()
- ✓ Retrieve()

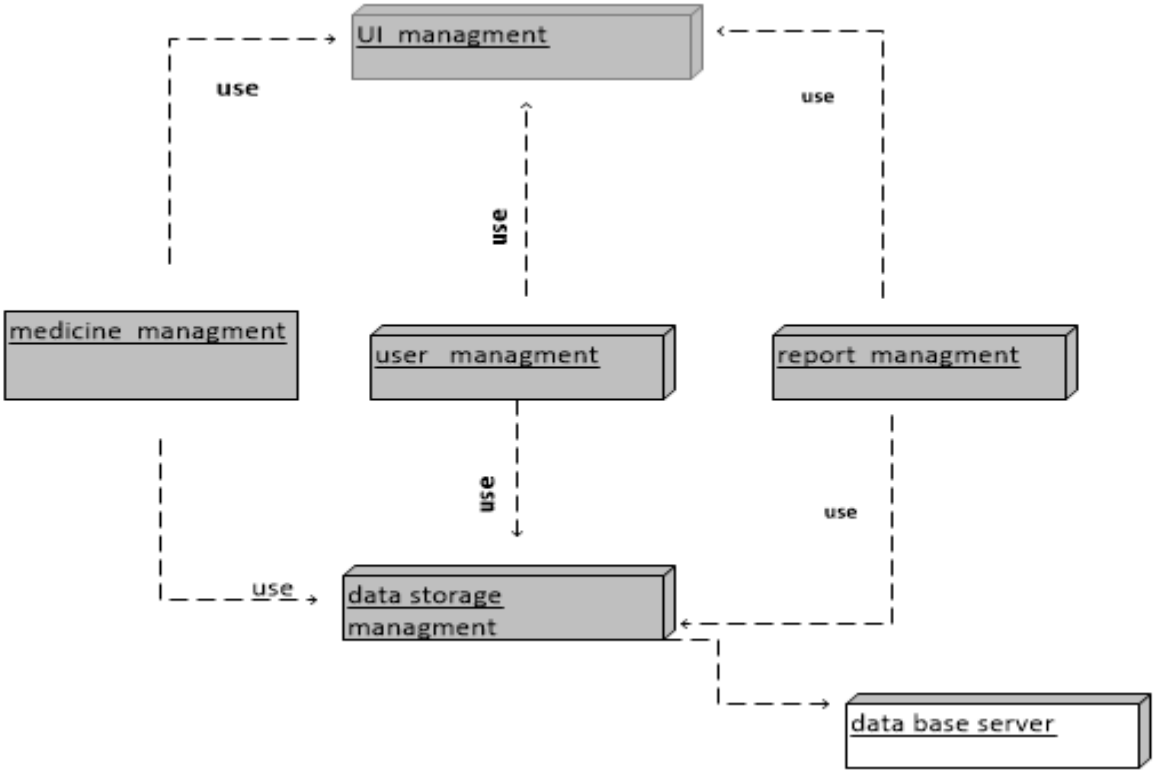


Figure 15: Sub-system decomposition diagram for Adigrat Red Cross Pharmacy

4.3 Software Architecture

In this project the team uses a three tier architecture which has three layers. These three layers are the process layer, the domain layer and the data access layer. **Process layer** is the form which provides the user interface to either programmer or end user. The **business**

layer is the class which the team uses to write the function which works as a mediator to transfer data from process layer to data layer. The third tire is the **data access layer** which is also a class to get or set data to the database queries back and forth. This layer only interacts with the database. The database queries or stored procedures will be written here to access the data from the database or to perform any operation to the database the following diagram shows the class type architecture of web based management system.

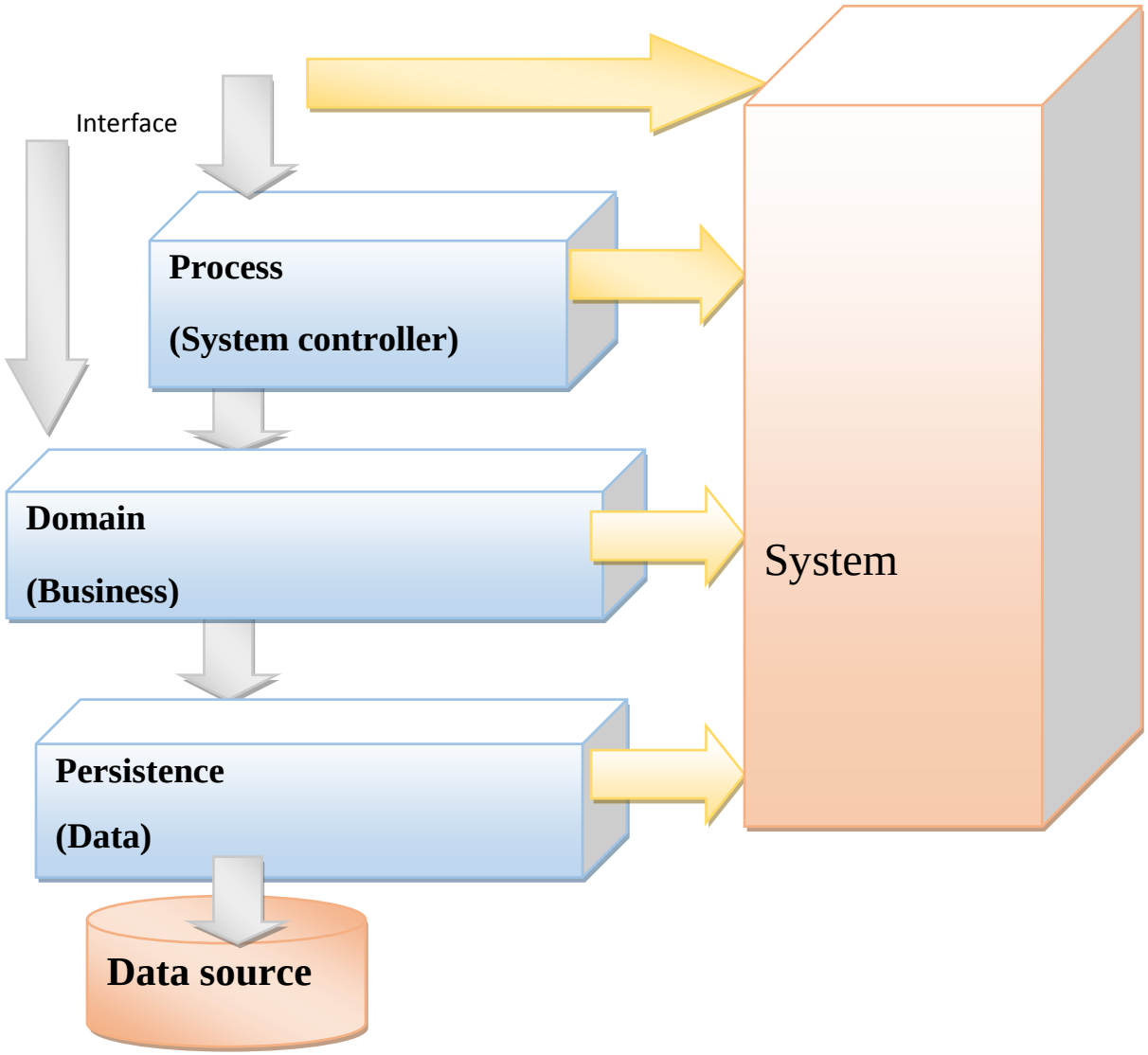


Figure 16: Software Architecture of the system

4.4 Deployment diagram

This deployment diagram shows how the software components, processes, and objects are deployed into the physical architecture of our system and configuration of the hardware units. A Deployment diagram depicts a static view of the run-time configuration of processing nodes and components that run on those nodes of our system. And it shows: -

- The hard ware for the system
- The software that is installed on the hardware
- Depict the hardware/network infrastructure of an organization.

The deployment diagram is shown as follows

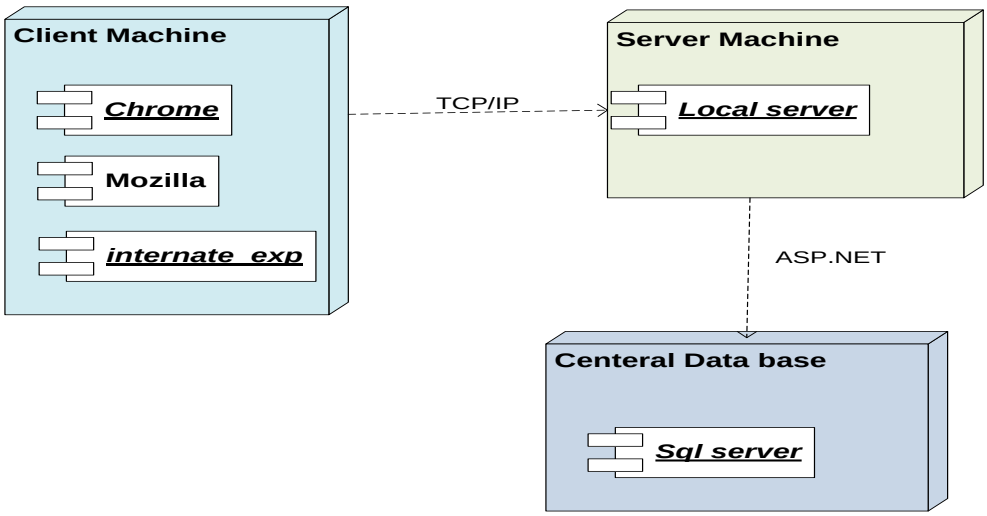


Figure 17: Deployment diagram of system

Description of the architecture of the system is described below.

Clients are responsible for: -Providing user interface to the user enabling to get services

- ✓ Receiving inputs from user.
- ✓ Initiating database transactions once all necessary data are collected.

Server responsible for:-Transaction performance

- ✓ Guaranteeing the integrity of data.
- ✓ Putting backup of the database

4.5 Persistent data management

In the proposed system we decided to store medicine information like medicineName, medicineDetail, expiryDate, manacturedDate, with the disease type that they can cure and other information on a database.

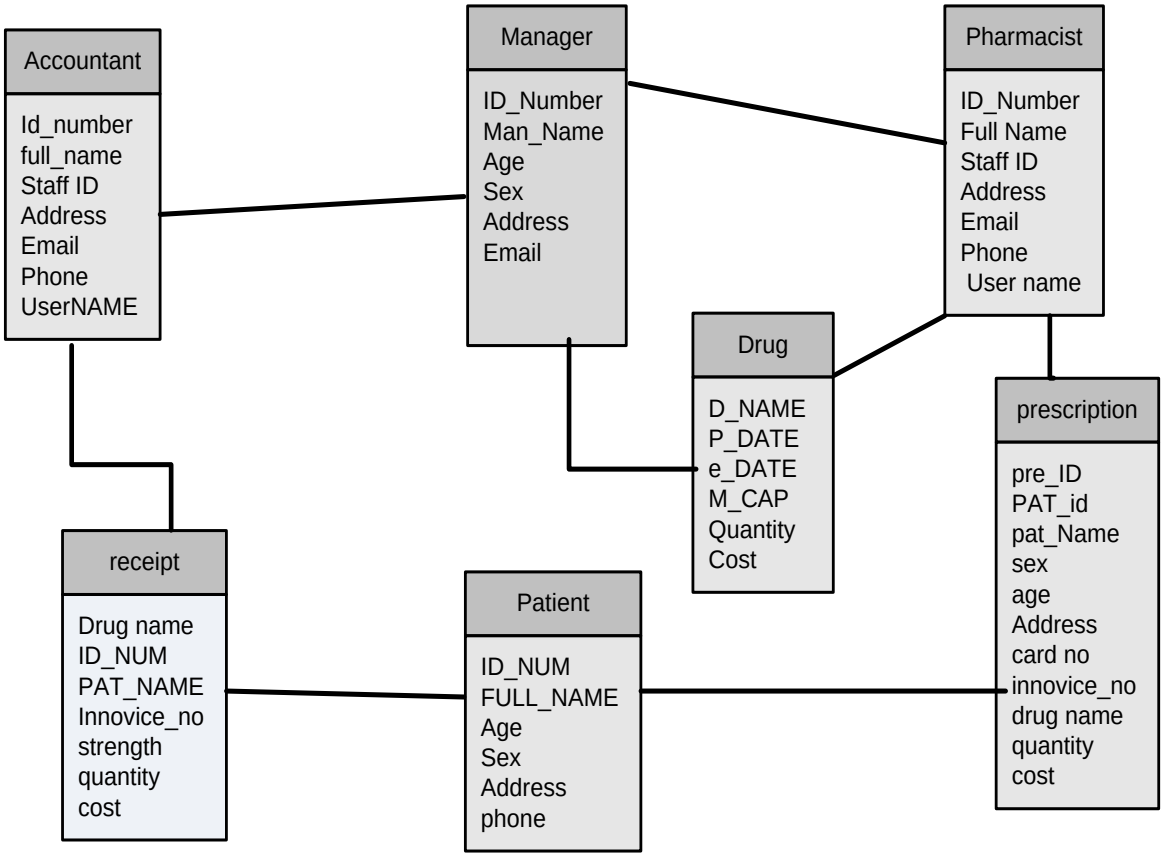


Figure 18: Persistence diagram

4.6 Access control and security

The new system is so secured than that of the current ordinary system and it is more reliable. The system is not accessed by any of unauthorized users rather than searching medicine and viewing information about the system. Each users access the database table fields when they are authorized. This mechanism is implemented through username and password.

4.7 User Interface design

The system GUI is consistent with all other programs. The interface should be clear to understand. The interface has help files that describe the usage and about office that contains the general information about the office access publically of each user interface. The homepage contain the entire pages and it is master page. The entire patient, accountant, pharmacist manager are need to login to the system & can access it.

In this system users of this system will communicate with it through the following user interfaces:

I. **Home Page:** This form contains some links which lead it to the concerned page, and if the user has an account he/she will click on the login Button and directly go to concerned page by entering their valid and correct username and password.

Figure 19: home page user interface

II. **Log In form:** This form found immediately following the home page if the users want data from the database or the users those have an account. Home page appears as the site on which the system is deployed is opened. Only manager, pharmacist, accountant and patient owners of Adigrat Red Cross Pharmacy those will have their

own user name & password. Those forms appeared using password and user name will not be accessible by other persons except for those who have privilege.

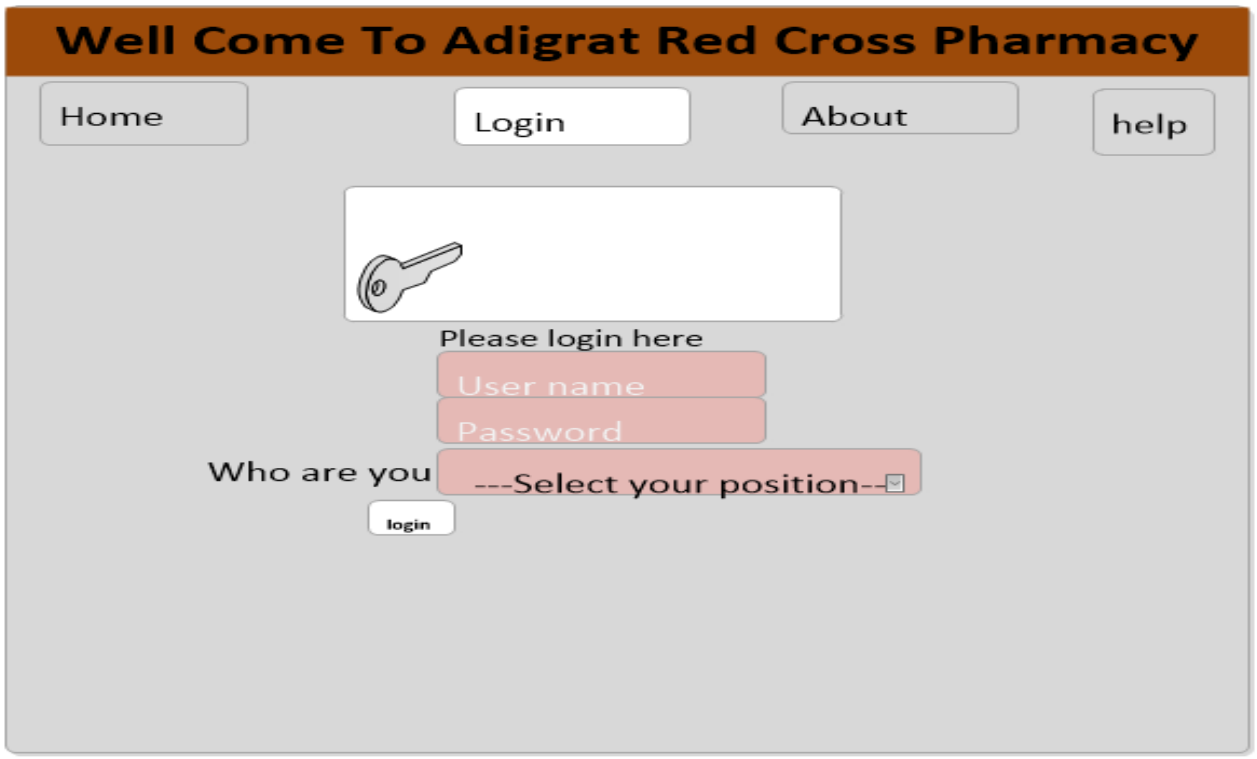


Figure 20: login page user interface

III. **About:** In this form there will be explanations about the pharmacy and its historical background such as location where the office found the time which starts service, and its aims with its mission and vision.

IV. **Help:** In this link there will be guidelines for the users how to use the system for their operations in the system. Generally it look like the following in diagram

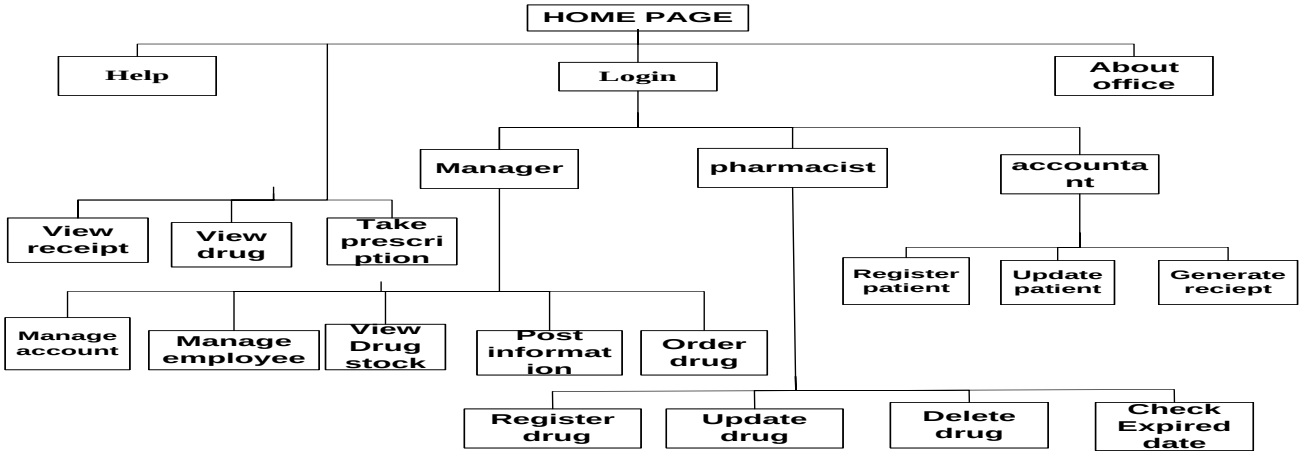


Figure 21: general User interface layout

CHAPTER FIVE

5. Implementation

System Description

Once the system is hosted, it has two parts: One which needs password and username that is for manager, pharmacist and accountant. To access those parts one has to have password and user name so that he/she can enter into it and use it. This accessibility has also two parts, one which is restricted for manager and the other for surveyor and the other part is those which do not need password and username so they can be viewed by anybody.

System Development

Development Editor

- Visual studio

Markup and Scripting Languages

- Css
- Ajax controller toolkit

System Implementation

During Design phase, the project team developed user interface see it in chapter three to give a sneak preview to the interface that will be involved in the logical part of the system

Implementing basic Pages

By basic pages, we mean pages like Home page or main menu and login pages of the system. We included these pages as part of the system in order to increase its dynamicity of the system but it does not any interconnection with the functionality of the system.

For implementing these pages, we used C Sharp(c#) code to make the system more interactive.

Implementing Displays

By displays, we mean menus and pages used to present available services to user of the system in order to make the register and process some tasks. These pages are essential for providing information to the users for whom using the system. The displays are designed by the visual basic forms.

Implementing forms

Forms are simply pages used to receive inputs from users that will be used to the register and placement or about the system. Here we used the c sharp forms.

Database implementation

It is the implementation of the database of the functional system. The design of the persistence or data model is done on the previous chapters designing systems and objects.

From Design to Persistence code

The design of the model is on the previous chapter but now we used structural query Language (SQL 2008R2) for our implementation of the database or persistence model of the system.

Creating (Adding), Retrieving, Updating, and Deleting data

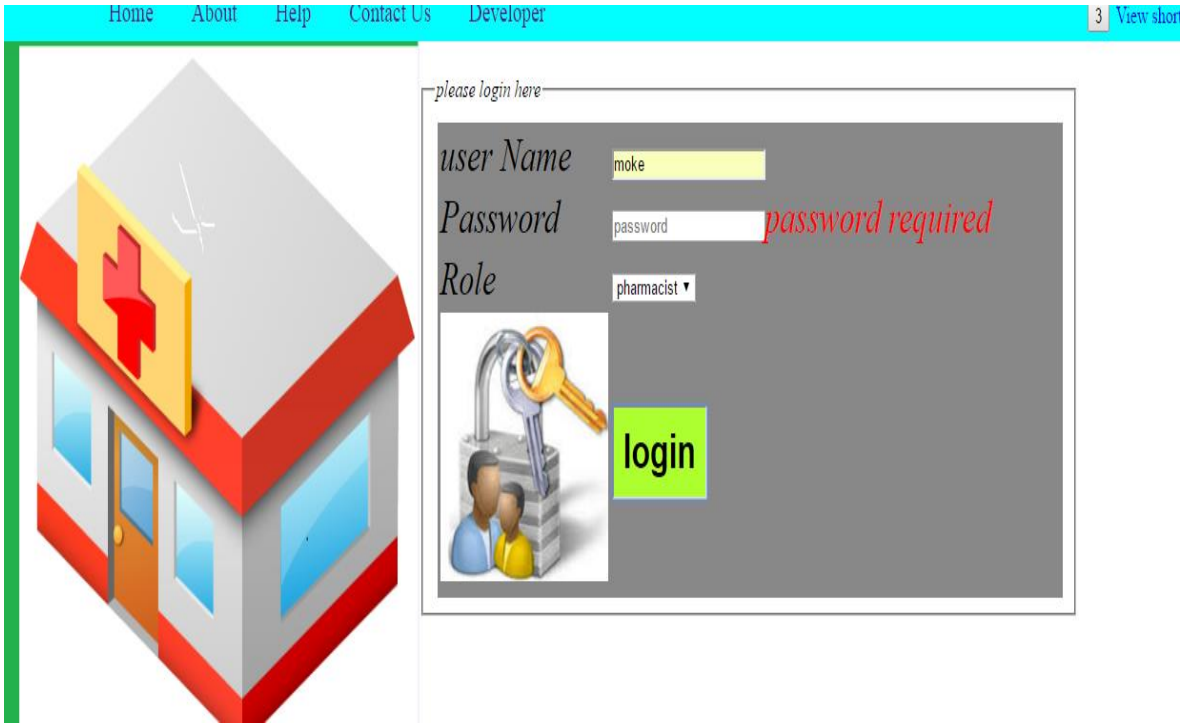
These operations are fundamental operations in any database management system, which are also used in our system database.

A database is a permanent repository of data from user inputs and data already stored in the database for viewing by users.

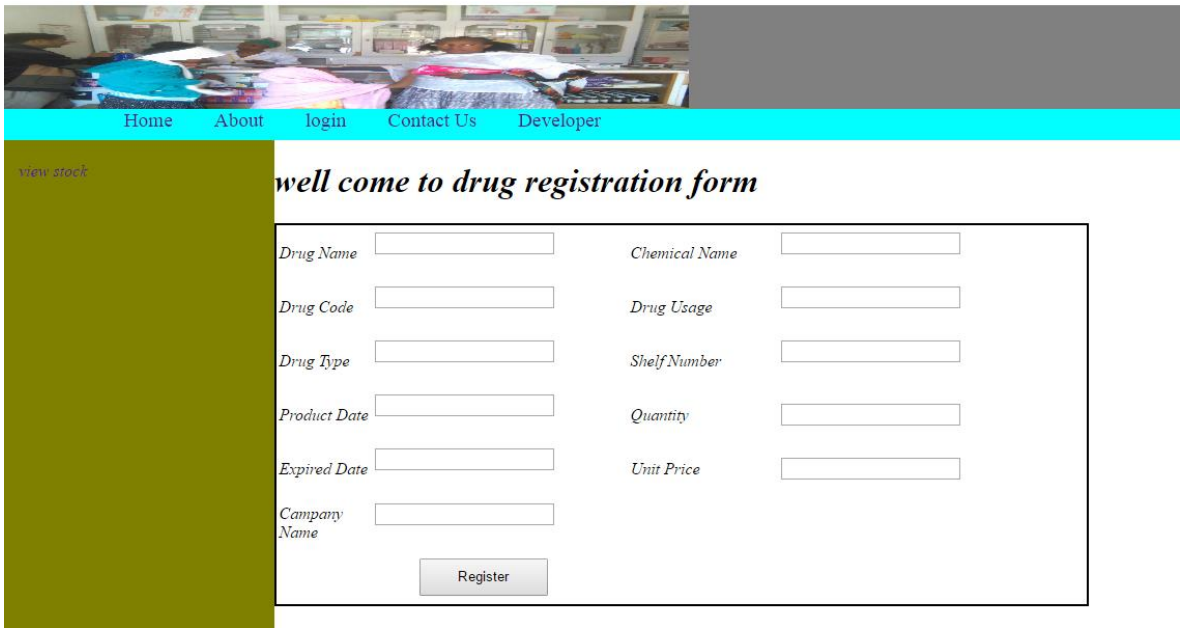
Our project team used SQL 2008R2 for database implementation because its flexibility in handling large number of data.

Prototype of our system

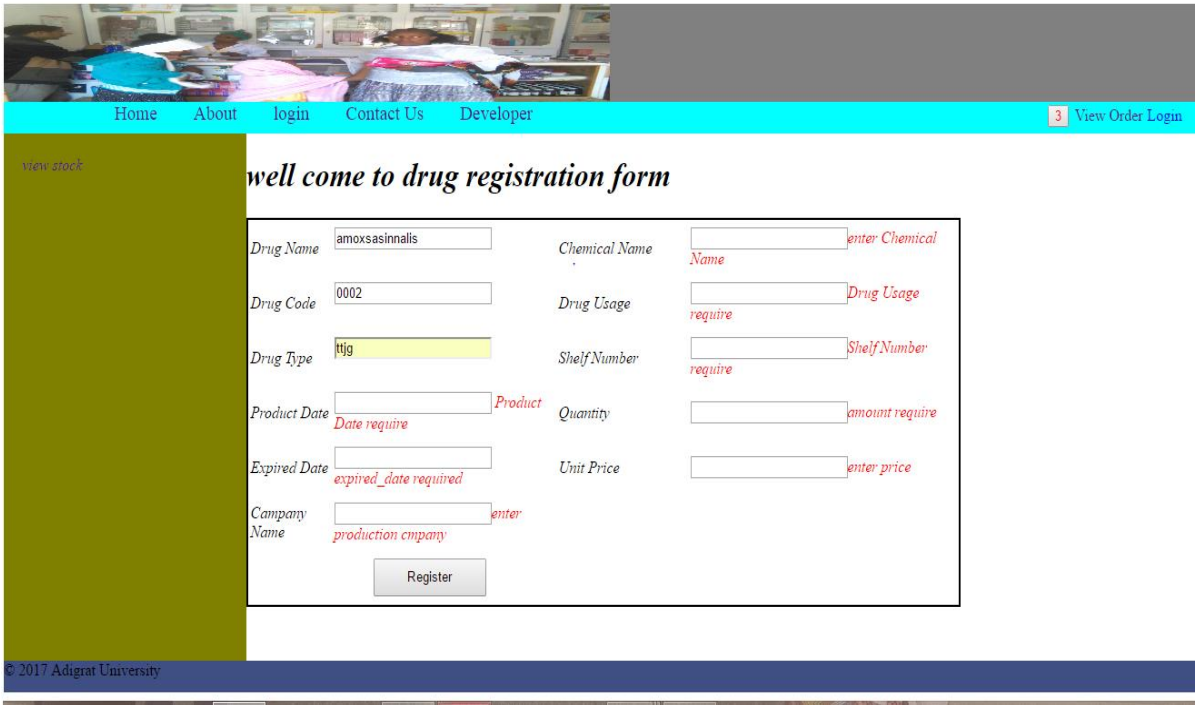
The order of events at our system is as follows



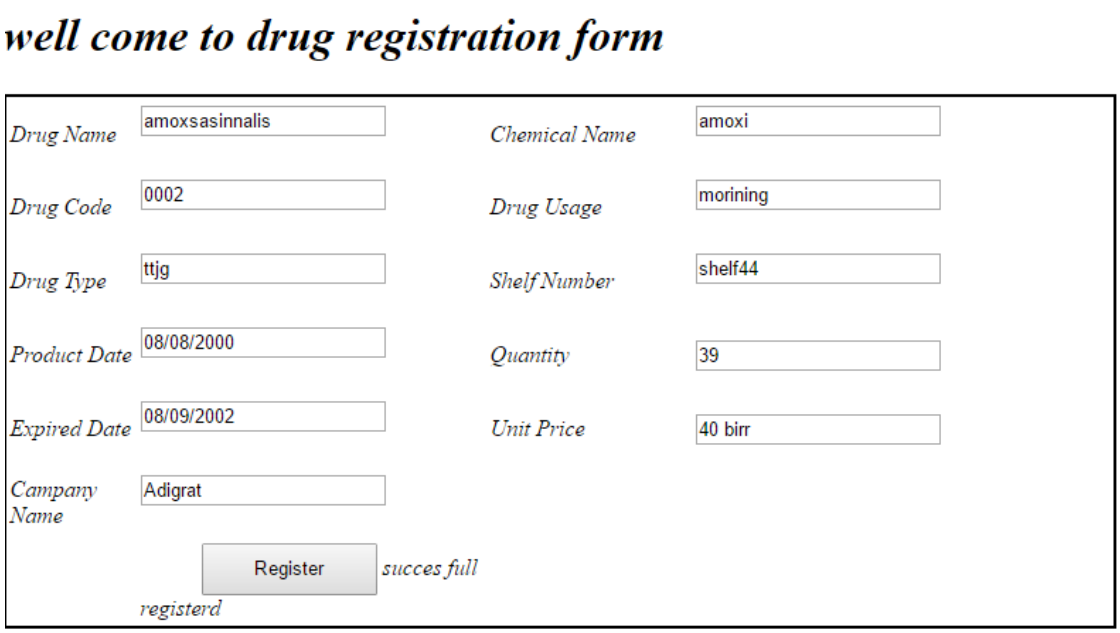
Then the pharmacist login he or she can access the page of him that enables to register and perform other tasks.



Then after the page displays the user begin register new drugs as follows



If we insert the correct data the page will display success message feedbacks as follows



Some of markup and Scripting Languages

- Css

- Ajax control toolkit
- Java script

5.1. Code review and testing

Libraries that we used for developing the system

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;
using System.Data.SqlClient;
using System.Configuration;
using pharmacyManagmentSystem;
using pharmacyManagmentSystem.allbusinesslogic;
using pharmacyManagmentSystem.alldataaccess;
using System.Data;
```

5.1.1 Unit Testing

Every module of the System is separately tested. I.e. we test every module by applying some selection mechanism. Through this mechanism every modules gets tested. If an error occurs correction will be taken without affecting another module.

Login to the System Testing:

When user of the system does not enter the correct Username and password it displays value required message of the following.

The following section shows part of the code from Authentication class for the login

```
protected void eee_Click(object sender, EventArgs e)
{
    {
        con.Open();
        SqlCommand cmd = con.CreateCommand();
        cmd.CommandType = CommandType.Text;
        cmd.CommandText = "select * from login where username='" + us.Text + "'and password='" + ps.Text + "'";
        cmd.ExecuteNonQuery();
        DataTable dt = new DataTable();
        SqlDataAdapter ad = new SqlDataAdapter(cmd);
        ad.Fill(dt);
        foreach (DataRow dr in dt.Rows)
            //{
            //    Session["userName"] = dr["userName"].ToString();
            //    Response.Redirect("student.aspx");

            //}
            if (dt.Rows.Count > 0)
            {
                string type = (dt.Rows[0]["role"]).ToString().Trim();
                if (type == "Admin")
                {
                    // Session["userName"] = us.Text;
                    Response.Redirect("~/all interface/ViewExpDrug.aspx");
                }
                if (type == "user")
```

Test Case1			
Test Case Name: Login			
Purpose: To identify the user			
Input	**Expected Result**	**Output**	Pass/Fail
Valid user name and Password combination	The system successfully accept the user and display the profile page	The system successfully accept the user and display the profile page	Success
Valid user name and invalid password	The system display “invalid user name/password”	The system display “incorrect user name/password”	Success
Incorrect user name and correct password	The system display “invalid user name/password”	The system display “incorrect user name/password”	Success
Incorrect user name and Incorrect password	The system display “invalid user name/password”	The system display “incorrect user name/password”	Success
Null user name and password	The system displays “pleas fill user name”	The system displays “pleas fill user name”	Success
user name and null password	The system display “pleas fill password”	The system display “pleas fill password”	Success

5.1.2 Integration Testing

In this testing part, all the modules combined together and tested for fitness with each other and with the systems functionality. If error occurs in combining them, the module with problem will be identified and re combined.

System testing: - In this testing, we the team performs over all functional testing by checking whether it meets the required target.

Chapter six

6. Conclusions

It is known that developing a system for an organization is not easy. But the team has tried its best and developed interesting web based drug management system for Adigrat Red Cross pharmacy. 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 general the manual system in to web based drug management system of the Organization and makes it more reliable and efficient than the previous manual system.

6.1 Recommendations

While doing this system we team has faced different challenges. But by the cooperation of all the group members and an advisor the team is now able to reach to the final result. I.e. all the group members strongly fought these challenge and take the turn to the front.

So now we all the group members strongly recommend the department that for the coming students, it has to provide them with better service than the present in better hard ware, guaranteed software's, giving orientations how to proceed, offering guest to provide them with more experienced work, support morally, manually, forming good relation with students, giving students description of each phases and so on. So that it will get what it expects from its students and satisfy with them.

References

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