SUDAN UNIVERSITY OF SCIENCE & TECHNOLOGY
FACULTY OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

IMPLEMENTED BLOOD BANK SYSTEM (STACK INSTITUTE CASE STUDY)

2017

THESIS SUMITTED AS A PARTIAL REQUIREMENTS 0F B.Sc. (HONOR)
DEGREE IN INFORMATION SYSTEM AND SYSTEM OF NETWORK

بسم الله الرحمن الرحيم

SUDAN UNIVERSITY OF SCIENCE & TECHNOLOGY
FACULTY OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

IMPLEMENTED BLOOD BANK SYSTEM (STACK INSTITUTE CASE STUDY)

PREPARED BY:
AHMED MOHAMMED NAJEB
MOHAMMED AL-KHAIR ALTAYEB
HIBA AHMED HASSAN
OLA AHMED FOUAD

THESIS SUMITTED AS A PARTIAL REQUIREMENTS 0F B.Sc. (HONOR) DEGREE IN INFORMATION SYSTEM AND SYSTEM OF NETWORK

SUPERVISOR: ALSHAREF HAJO ALMOGADAM

SUPERVISOR SIGNATURE: …….

DATE: 22 OCTOBER 2017

الآيــه

بسم الله الرحمن الرحيم
قال تعالى:
{قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَاۖ إِنَّكَ أَنتَ الْعَلِيمُ الْحَكِيمُ}

صدق الله العظيم
(سورة البقرة الآيه 32)

الحمد لله

الحمدلله الذي هدانا لهذا وما كنا لنهتدي لولا أن هدانا الله.

الحمد لله الّذي بعزّته وجلاله تتمّ الصالحات ، اللهم لك الحمد والشكر كما ينبغي لجلال وجهك وعظيم سلطانك وعلو مكانك.

الحمد لله اقصى مبلغ الحمد والشكر لله من قبل ومن بعد.

الحمد لله الذي لا يبلغ مدحه قائل ولا يحصى نعمائه العادون ولا يؤدي حقه المجتهدون والصلاة والسلام على سيدنا محمد صلى الله عليه و سلم.

الحمدلله الذي لا يخيب من دعاه ، ولا يقطع رجاء من رجاه .

الإهداء

إلي رعاة قلبي و إيماني و يقيني
إلي روحين تطوفان حولي أينما أكون
أبي و أمي

إلي منبع قوتي و ثباتي
حين تترصدني أشواك الدروب
أخوتي و أخواتي

إلي سحب تمطر علي
سلاما و تصالحا
كلما أشتد بي هجير نفسي
أصدقائي

الى شموع العلم التي اضاءت لنا الدروب
اساتذة كلية علوم الحاسوب و تقانة المعلومات

هذا قليل من كثير أنوي تقديمه لكم طالما حييت

شكر وعرفان

بعد رحلة بحث و جهد و اجتهاد تكللت بإنجاز هذا البحث ، نحمد الله عز وجل على نعمه التي من بها علينا فهو العلي القدير.

كما لا يسعنا إلا أن نخص بأسمى عبارات الشكر و التقدير للأستاذ الشريف مقدم هجو لما قدمه لنا من جهد و نصح و معرفة طيلة انجاز هذا البحث.

كما نتقدم بالشكر الجزيل لكل من أسهم في تقديم يد العون لإنجاز هذا البحث، و نخص بالذكر المهندس الأرقم أحمد إبراهيم الذي لم يبخل بتقديم المشورة الراجحة.

ولا يفوتنا ان نقدم جزيل الشكر لكافة موظفين بنك الدم المركزي (معهد ستاك) و كل من ساهم منهم في امدادنا بمعلومة كانت لنا عونا في انجاز هذه الدراسة.

Abstract

Blood transfusion is a crucial process. Time is a key factor in its success. The Stack Institute's central blood bank, which has many difficulties, is not connected to all hospitals' blood banks within a unified system and is fully dependent on phone communication, to blood in time.

The aim of this study is to link the Stack Institute with all hospitals within a unified system through the ODOO and to enable the patient who is present within any hospital to establish the blood request he needs and the integration that is supposed to be among all the blood banks within one system.
This system provides all donor data in a timely manner and provides the required blood quantity required in the specified time. It monitors the blood banks in all hospitals and covers the deficit of the factions by setting up automatic requests for Stack Institute.

The study found several results, including: saving time and effort in manual data entry, integrating all hospitals within a single system with the Stack Institute, enabling the Stack Institute to see all the blood banks of all the hospitals in the system.

المستخلص

عملية نقل الدم هي عملية حرجه ويمثل الزمن عامل رئيسي في نجاحها، بنك الدم المركزي لمعهد ستاك يواجهه العديد من الصعوبات تتمثل في عدم ربطه بكافه بنوك الدم الخاصة بالمستشفيات داخل نظام موحد و الاعتمادية الكامله علي التواصل عن طريق الهاتف،و عدم معرفة حوجه المرضى للدم في الوقت المناسب.

الهدف من هذه الدراسة هو ربط معهد ستاك مع كافة المستشفيات داخل نظام موحد عن طريق ال ODOO و تمكين المريض الذي يتواجد داخل أي مستشفى بانشاء طلب بالدم الذي يحتاجه و تحقيق التكامل الذي من المفترض أن يكون بين كافة بنوك الدم داخل نظام واحد.

يقوم هذا النظام بربط كافة المستشفيات الحكومية و الخاصة مع بنك الدم المركزي مباشرة كما يقوم أيضا بتوفير كافة بيانات المتبرعين في الوقت المناسب و توفير الدم المطلوب بالكمية المطلوبة في الزمن المحدد عن طريق إنشاء طلبات الدم التي تعرض داخل النظام و ربطها مع كافة المتبرعين المحتملين. ويتيح للمستخدم معرفة كل الفصائل المتوفرة داخل أي بنك دم و تغطية العجز في الفصائل بانشاء طلبات بالدم بصورة تلقائية لمعهد ستاك.

توصلت الدراسة الى عدة نتائج اهمها: توفير الوقت و الجهد المبذول في عمليات التدوين اليدوي للبيانات، دمج كافة المستشفيات داخل نظام واحد مع معهد ستاك، تمكين معهد ستاك من رؤية كافة بنوك الدم الخاصة بجميع المستشفيات المتواجدة داخل النظام.

TABLE OF TERMS

#	Term	Description
1	ASP	Active Server Page
2	ERP	Enterprise Resource Planning
3	HTML	Hypertext Markup Language
4	ODOO	Open ERP On Demand Open Object
5	XML	Extensible Markup Language
6	UML	Unified Modeling Language
7	SQL	Structured Query Language

TABLE OF TABLES

TABLE OF FIGURES

Table of Contents

CHAPTER ONE
INTRODUCTION

1.1 Introduction

The operation of transforming blood is a very important vital process. Many of lives could depend on it, but there's a lot of hindrances face this operation includes: the difficulty of transforming blood, none linking the geographical areas that contain hospitals & blood banks under the coverage of an integrated information system, there's also the lack of knowledge about the procedures that both patient & contributor should do. The ease of the operation of transforming blood between patient & contributor could save lives.

The contribution of blood summarized in the main derivatives and it includes: Plasma, Platelets, and Red blood cells.

According to the importance of transforming blood we developed a complete system that makes the operations easier and faster using ODOO and XML techniques.

1.2 Research problem

- The research discusses how to encourage the contributors and making the procedures easy by using the application and the website.
- Linking all the geographical areas to make the operations of transforming blood between states easier.

There are some hospitals that selling blood bags to make use of the need of the patient, the research will settle this phenomenon and that's by grouping all the blood banks under the coverage of the system.

1.3 Importance of research

Central blood bank system is a non-profit organization; it faces problems represents at:

The difficulty at covering all the needs of hospitals of blood with all its sectors, according to the general manager of the central blood bank "the bank daily need's is 650 bottles, but there's only 250 available".

The importance of research in the province on the life of the patient.

1.4 Research objectives

The objectives of research is to:

- accelerates the transfer and blood donation process
- fill patients' needs as soon as possible
- link all blood banks with Stack institute
- cover the needs of hospitals of blood
- encourage the contributors and making the procedures easy

1.5 Scope

This system integrates central blood bank (STACK) with all hospitals whether private sector or public sector to manage blood transfusion and donation between STACK and hospitals through ODOO module and linking the patient with all possible donors within the Android application.

1.6 Research questions

1- Is the blood bank aware of all the hospital’s needs?

2- How to accelerate the process of contributing blood?

CHAPTER TWO
BACKGROUND AND PREVIOUS STUDIES

2.1 BACKGROUND

On this section we give a background for blood banking, blood transfusions, blood types and blood donation process.

2.1.1 Introduction to blood bank system

The following are introduction for blood banking and donation history.

2.1.1.1 Blood Banking and Donation

Blood banking refers to the process of collecting, separating, and storing blood. The first U.S. blood bank was established in 1936. Today, blood banks collect blood and separate it into its various components so they can be used most effectively according to the needs of the patient. Red blood cells carry oxygen, platelets help the blood clot, and plasma has specific proteins that allow proper regulation of coagulation and healing. Although research has yielded drugs that help people's bone marrow produce new blood cells more rapidly, the body's response time can still take weeks, thus donated blood remains an important and more immediate life-saving resource.

Blood is the vital connection to having a healthy body, and according to the American Red Cross, nearly 5 million people receive blood transfusions each year. [1]

2.1.1.2 History of blood banking transfusions

1492: First Historical Transfusion Attempt

The blood of three 10-year-old boys was infused by mouth into Pope Innocent VIII as he sank into a coma. The Pope and the boys died.

1667: First Recorded Human Transfusion

The first fully documented human blood transfusion was administered in France. King

Louis XIV's doctor transfused the blood of a sheep into a 15-year-old boy, who survived.

1818: First Recorded Human-to-Human Transfusion

British obstetrician and physiologist James Blundell performs the first recorded human-to-human blood transfusion. He injected a patient suffering from internal bleeding with 12 to 14 ounces of blood from several donors. The patient died after initially showing improvement.

1901: Three Main Blood Groups Discovered

Discovery of the three main human blood groups, A, B, and C, which is later changed to O. Research charts the regular pattern of reaction that occurs after mingling the serum and red cells of an initial set of six blood specimens.

1902: Fourth Blood Group Discovered

Fourth blood group, AB, is identified.

1907: First Use of Cross Matching

Cross matching checks the blood of donors and recipients for signs of incompatibility.

1914: First Non-Direct Transfusion

The first transfusions had to be made directly from donor to receiver before coagulation. Researchers discover that adding sodium citrate to blood will prevent it from clotting. Adding anticoagulant and refrigerating the blood made it possible to store it for days, opening the way for blood banking.

1917: First Blood Depot

Army doctor collects and stores type O blood, with citrate-glucose solution in advance of the battle of -Cambria in world war.[1]

2.1.1.3 Blood Types

ABO Types:

The ABO blood groups are defined by the presence or absence of two inherited molecules, or antigens, A and B, that are present on the surface of red

blood cells. You inherit either A or B antigens (group A or B), both A and B antigens (group AB), or neither antigen (group O).

The Rh system:

Discovered 40 years after the identification of ABO blood groups, the Rh factor is the second most significant blood-group system in human-blood transfusion. The presence or absence of the D antigen on a red cell determines whether you are Rh+ or Rh ([1]

ABO and Rh distribution in the USA:

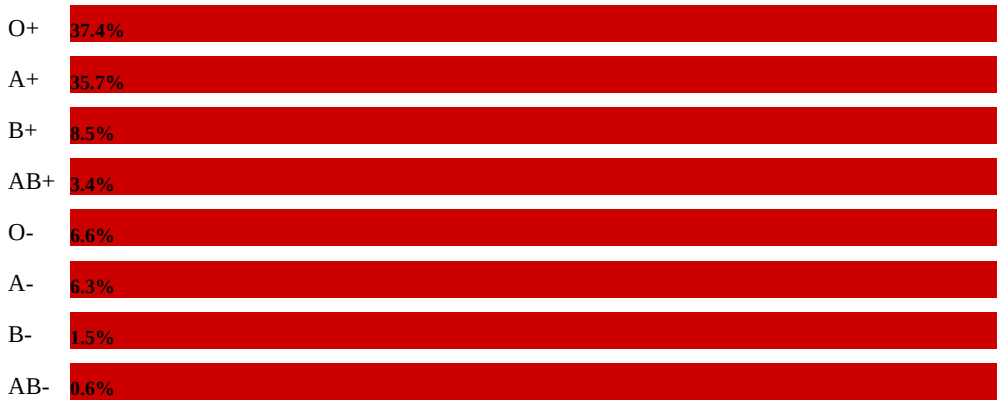


Figure 2.1 ABO and Rh distribution in the USA

2.1.2 Donation Procedures

Since the institution of blood banking, safety for both donors and blood recipients has been continually and significantly improved. Because a safe, reliable source of blood is critical to providing effective blood products to recipients, blood banks are dependent on the altruistic voluntary donations of citizens. As a result, blood banks place great emphasis on making the donation process pleasant, convenient, and as safe as possible for donors.

The donation process begins with a screening procedure to determine if the donor is healthy and has no conditions that would make his or her donation hazardous. Donors are asked about their general health, as well as their travel history and possible past exposure of blood-transmitted diseases, such as HIV,

malaria, and hepatitis. A simple physical, including blood pressure, pulse rate, and temperature, is used to rule out other risks. This physical will also look for signs of any of the blood-transmitted diseases that might increase recipient risk. A simple laboratory measurement is used to make sure that the blood donation will not make the donor anemic.

If the donor is found suitable for donating blood, approximately one pint of blood is collected from an arm vein into a plastic bag. This is normally well tolerated by the donor, since the average donor's blood volume is about 11 pints. The donor will produce replacement fluid for the blood donation within 24 hours and red blood cells in four to six weeks. At least eight weeks between donations are therefore required for whole blood donations.

Complications of blood donations are uncommon and usually minor. Fainting is typically the most significant complication encountered. This can be minimized by requiring the donor to wait a short period of time after donation before standing, and to eat and drink fluids before leaving the donor area. Minor bruising at the needle site may also occur. [2]

2.1.3 Recipient Safety

Risks for a person receiving blood can be divided into several categories, which include reactions due to incompatible blood types, allergic reactions, and infections in the donated blood. By strictly adhering to standardized procedures, these risks have been reduced to a minimum. [2]

2.1.4 Blood Type Matching

On their surface, red cells have inherited chemical structures called antigens that can cause a person's immune system to make antibodies against them. Humans have 35 major groups or families of these antigens, as well as other minor groups, but consideration of two, the ABO group and the RhD group, is very important to

ensure that a transfusion recipient receives compatible blood. The presence of antigens within these groups is what determines a person's blood type. Blood types are referred to as Type A, Type B, Type AB (which has both A and B antigens), or Type O (which has neither A or B antigens) followed by positive or negative, which indicates the presence of the RhD antigen. Persons who are RhD negative have no RhD antigen.[2]

Recipient Blood Type	Matching Donor Blood Type
A+	A+, A-, O+, O-
A-	A-, O-
B+	B+, B-, O+, O-
B-	B-, O-
AB+	Compatible with all blood types
E	AB-, A-, B-, O-
O+	O+, O-
O-	O-

Table 2.1 Blood Type Matching.

We used odoo because it had several advantages and it as follows:

Formatted: Left

2.1.7 Introduction to (ODOO)

Odoo is a powerful open source platform for business applications. On top of it a suite of closely integrated applications was built, covering all business areas from CRM and sales to accounting and stocks. Odoo has a dynamic and growing community around it, constantly adding features, connecters, and additional business apps. [3]

2.1.7.1 THE BENEFITS OF ERP

There are many benefits of an ERP system, but these are the chief ones

1. **SCALABILITY:** An ERP system is easily scalable. That means change is easy. This could mean easy management of new processes, departments, and more.

2. **IMPROVED REPORTING:** Much of the inefficiency in operational work stems from improper reporting. With an ERP system, this possibility is eliminated as reporting follows an automated template system, allowing various departments to access information seamlessly.

3. **DATA QUALITY:** As compared with manual record-keeping or other traditional approaches, an ERP system improves data quality by improving the underlying processes. As a result, better business decisions can be reached.

4. **LOWER COST OF OPERATIONS**: An ERP system introduces fundamental innovations in managing resources, which eliminates delays and thus reduces cost of operations. For instance, use of mobility allows real-time collection of data, which is indispensable to lowering costs.

5. **BETTER CRM:** A direct benefit of using a good ERP system is improved customer relations as a result of better business processes.

6. **BUSINESS ANALYTICS:** Having high-quality data allows businesses to use the power of intelligent analytics tools to arrive at 24 better business decisions. In fact, many good ERP systems have built-in analytics functionality to allow easier data analysis.

7. **IMPROVED DATA ACCESS:** Controlling data access properly is always a challenge in organizations. With an ERP system, this challenge is overcome with the use of advanced user management and access control.

8. **BETTER SUPPLY CHAIN**: Having the right ERP system in place means improved procurement, inventory, demand forecasting,
etc. essentially improving the entire supply chain and making it more responsive.

9. **REGULATORY COMPLIANCE:** Having the system in control means organizations can better comply with regulations. Further, the most important and recurring regulatory requirements can be built right into the system.

10. **REDUCED COMPLEXITY:** Perhaps the most elegant argument in the favor of ERP systems is that they reduce the complexity of a business and introduce a neatly designed system of workflows. This makes the entire human resource chain more efficient. [4]

2.2 PREVIOUS STUDIES

2.2.1 Designing an Information System Model for National Blood Bank of Sri Lanka

The national blood bank of sri lanka is the only authorized institute that maintains the donation of blood. The existing system faces the challenge of dealing with management of donating blood as it is manual. This study is based on designing an information system model for the national blood bank of srilanka to utilize the donation of blood to minimize the existing barriers such as limiting early reservations for donations, the records of donors must be at one place “centralized database”, low security.

By using software requirements namely ASP.NET and Microsoft SQL Server Database an extended version of scientific method has been used as the research methodology and it has been accomplished. Using the queries that have been written the operation of donating blood can be done effectively, as for the need, and on time.

Result:

Using in-depth analysis of data which have been gathered the proposed solution have been developed in ASP.net as server end with Microsoft SQL Server 2008 R2 and PHP as client end with MySQL database.

This work consists of modules (donor registration, patient registration, blood stock management, stock movement, donor motivation, campaign management).[5]

2.2.2 CBBR Centralized Blood Bank Repository Implementation with Java/JSP and Integrated with mobile app using phone gap (Case Study on Developing countries)

There are numbers of online web based blood bank management system existing for storage of data for blood centers and hospitals to maintain information of donors, blood available, as well as transaction information.

Centralized Blood Bank Repository (CBBR) with this system, donors and other recipients such as patients and hospitals can register into the system. Donors will be able to access information about the various blood banks registered to the system as well as blood donation campaigns organized by blood banks. The blood banks are added into the system by the administrator.

Recipients (Patients, hospitals, clinics, etc.) will also have access to important information like type of blood available and at which blood center. Also, continuous track of all transactions in the blood banks will be done by the system to keep efficient log of data and enhance proper report and decision making.

RESULT

Prior to this paper, facts were gathered in which helped to uncover the misfits that the system was facing. After proper analysation of these problems, a solution was then developed in order to meet up the needs of a more advanced system. This system is known as the centralized blood bank repository which helped in eliminating all the problems that the previous systems were facing. With the system, Blood banks

Centers, Hospitals, Patients and Blood donors will be brought together, thereby making blood donation and reception easier.[6]

2.2.3 BLOOD DONATION SYSTEM FOR ONLINE USERS

The system provides how to get blood at time. Matcher system is implemented with Decision Tree and Decision Table by rules. This matcher applies the rules based on Blood Donation in Blood Bank in Myanmar. Information about donors and patients has been reserved in the system so that it is ready to donate blood instantly.

Result

The system provides a connection between the Blood Donors and Patients. Web-based matcher matches up acceptable Blood Donors information for Patient by using Knowledge-based Rules. Moreover, the Web-based system provides more suitable application for health care and life saving processes. The system can be extended to other welfare societies and health organizations.[7]

2.3 SUMMARY OF PREVIOUS STUDIES

According to the previous studies above, they either focused on linking the patient with the donor or automating the blood bank processes; not both They did not link donors to blood banks, we made integration between stack institute and all hospitals and donors.

They used web application to automating the blood banks, we used odoo and android. This study focuses on automating stack institute processes and linking the patient with probably donors, it linked Stack Institute to all hospitals within a single system, and

Stack Institute can browse all the blood banks within the system and know where the required blood type is located at the right time.

Hospitals can also request blood from Stack Institute when they need it and the data of all donors are recorded within the system, in addition to the communication numbers and all personal data.

Hospital’s admin sets a critical limit for the hospital's blood bank. Upon reaching this limit, the system automatically creates a request for Stack Institute showing the blood bank's deficit in the quantity required.

Upon completion of the donation process, the system will send a statement that the operation has been completed successfully to the hospital where the patient is located and provide him with the required quantity.

CHAPTER THREE
TOOLS AND TECHNIQUES

3.1 INTRODUCTION

This chapter divided into two sections; the first section describes the system techniques and tools.
The second section describes the system analysis using UML techniques.

3.2 TOOLS AND TECHNIQUES

3.2.1 PYTHON

Python is a simple yet powerful programming language with excellent functionality for processing linguistic data, we chose Python because it has a shallow learning curve, its syntax and semantics are transparent, and it has good string-handling functionality. As an interpreted language, Python facilitates interactive exploration. as an object-oriented language, Python permits data and methods to be encapsulated and re-used easily. As a dynamic language, Python permits attributes to be added to objects on the fly, and permits variables to be typed dynamically, facilitating rapid development. Python comes with an extensive standard library, including components for graphical programming, numerical processing, and web connectivity. [8]

3.2.2 XML

Extensible Markup Language (XML) is used to describe data. The XML standard is a flexible way to create information formats and electronically share structured data via the public Internet, as well as via corporate networks.
XML code, a formal recommendation from the World Wide Web Consortium (W3C), is similar to Hypertext Markup Language (HTML). Both XML and HTML contain markup symbols to describe page or file contents. HTML code describes Web page content (mainly text and graphic images) only in terms of how it is to be displayed and interacted with.[9]

3.2.4 ODOO technique

Odoo is an open source ERP system which contains variety of applications, such as: Accounting, inventory management, customer relationship management and many other Applications.

These applications work consistently with each other's to manage companies f all sizes. The application in Odoo is made up of one or several Odoo modules.

Odoo is built to work tightly with PostgreSQL1 as Object-Relation Database Management System (ORDBMS), with time and increasing amount of data stored in PostgreSQL database the performance of the system will be reduced, which leads to Bad customer experience.

Odoo is an open source ERP system known previously as OpenERP.
Odoo is considered the highest installed business application worldwide with more than 2,000,000 users. Odoo offers both On-Premise and Cloud ERP system. It consists of 30 main applications such as (sales, e-commerce, invoicing, and accounting and user website management). In addition, more modules and applications have been published by developers from all over the world.
In the Figure, we present the main ERP modules that the user can select when Subscribes to in cloud version of Odoo.

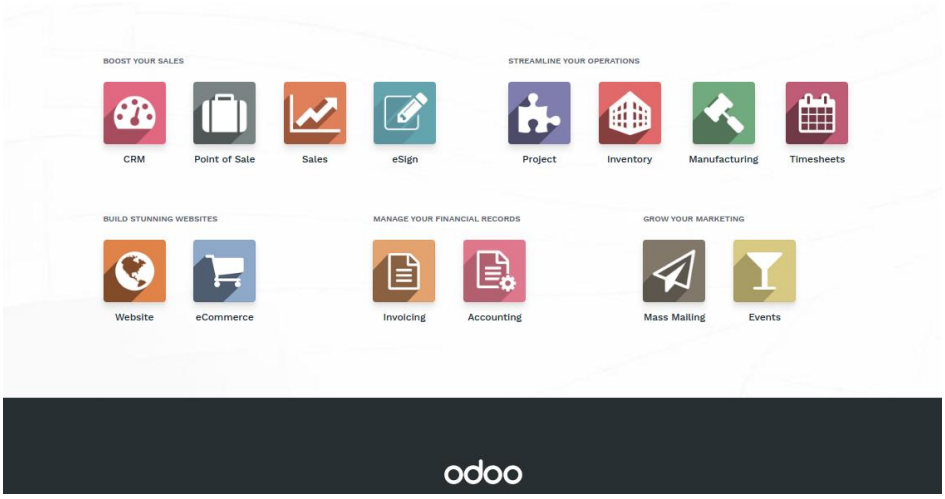


Figure 3.1 Odoo on Cloud Modules

Odoo is developed using Python. Odoo provides a standardized way for developers to develop new Odoo modules or customize and modify already existed modules. Odoo modules consist of several models which interact with each other's and with other modules to achieve the goal of the developed module. Model inheritance and View inheritance are the main features in Odoo which allow the developer to add new features to a model or view and modify an existing model or view. [10]

3.2.5 ANDROID

Android is a software package and Linux based operating system for mobile devices such as tablet computers and smartphones. It is developed by Google and later the OHA (Open Handset Alliance). Java language is mainly used to write the android code even though other languages can be used. The goal of android project is to create a successful real-world product that improves the mobile experience for end users. There are many code names of android such as Lollipop, Kit Kat, Jelly Bean, Ice cream Sandwich, Froyo, Ecliar, Donut etc. [11]

3.2.6 ANDROID STUDIO

Android studio is a popular IDE developed by google for developing applications that are targeted at the android platform. [12]

3.2.7 POSTGRESQL

PostgreSQL is a general purpose and object-relational database management system, the most advanced open source database system. PostgreSQL was developed based on POSTGRES 4.2 at Berkeley Computer Science department, University of California.

PostgreSQL was designed to run on UNIX-like platforms. However, PostgreSQL was then also designed to be portable so that it could run on various platforms such as Mac OS X, Solaris, and Windows.

PostgreSQL is free and open source software. Its source code is available under PostgreSQL license, a liberal open source license. You are free to use, modify and distribute PostgreSQL in any form. [13]

3.3.8 QWEB REPORTS:

QWeb is the primary templating engine used by Odoo. It is an XML templating engine and used mostly to generate HTML fragments and pages. It's implemented fully in JavaScript and rendered in the browser. Each template file (XML files) contains multiple templates, where template engine usually have a 1:1 mapping between template files and templates.

The rationale behind using QWeb instead of a more popular template syntax is that its extension mechanism is very similar to the openerp view inheritance mechanism. Like openerp views a QWeb template is an xml tree and therefore xpath or Dom manipulations are easy to perform on it. [14]

3.3.9 SUBLIME TEXT

Sublime Text is a versatile and fun text editor for code and prose that automates repetitive tasks so you can focus the important stuff. It works on OS X, Windows and Linux. [15]

3.3 SYSTEM ANALYSIS

3.3.1 USE CASE DIAGRAM

DIAGRAM FOR ADMIN INTERACTING WITH THE SYSTEM:

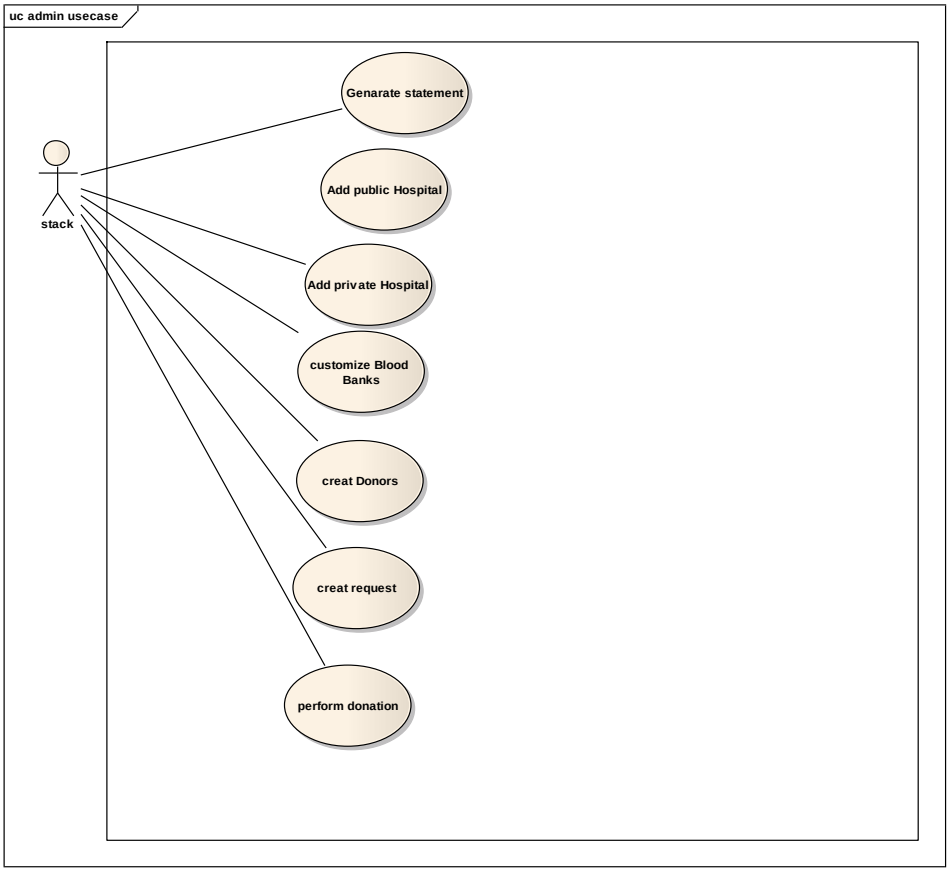


Figure 2.2 Use case Diagram for Stack.

3.3.1.1 DIAGRAM FOR USER INTERACTING WITH THE SYSTEM

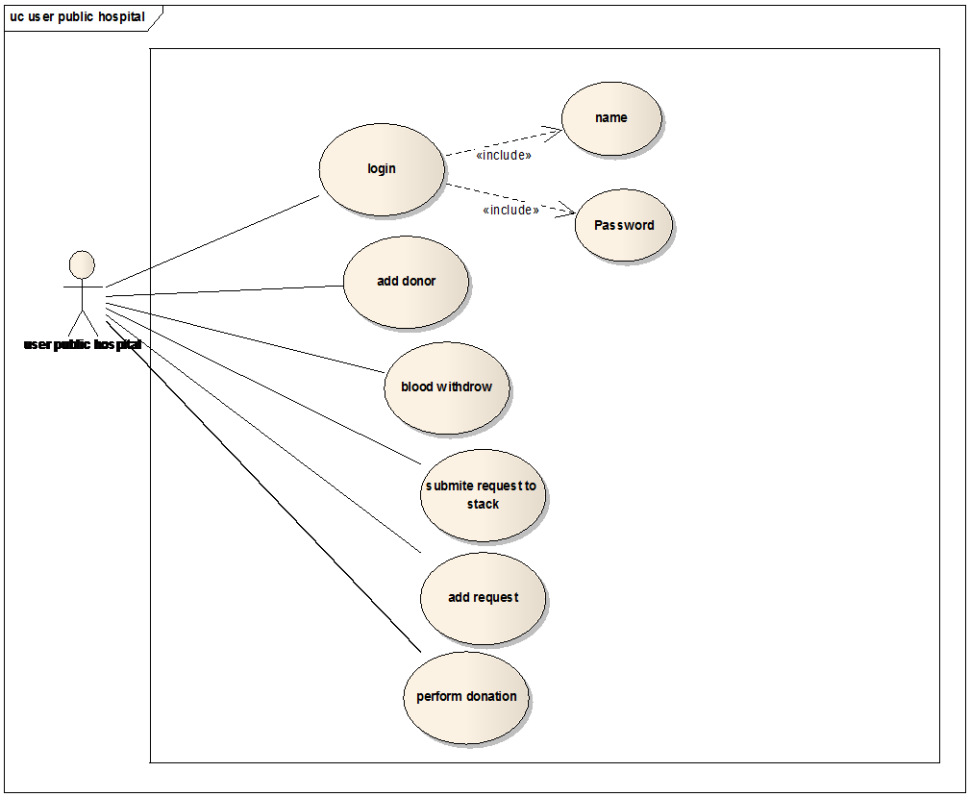


Figure 3.3 Use case Diagram **for public hospital.**

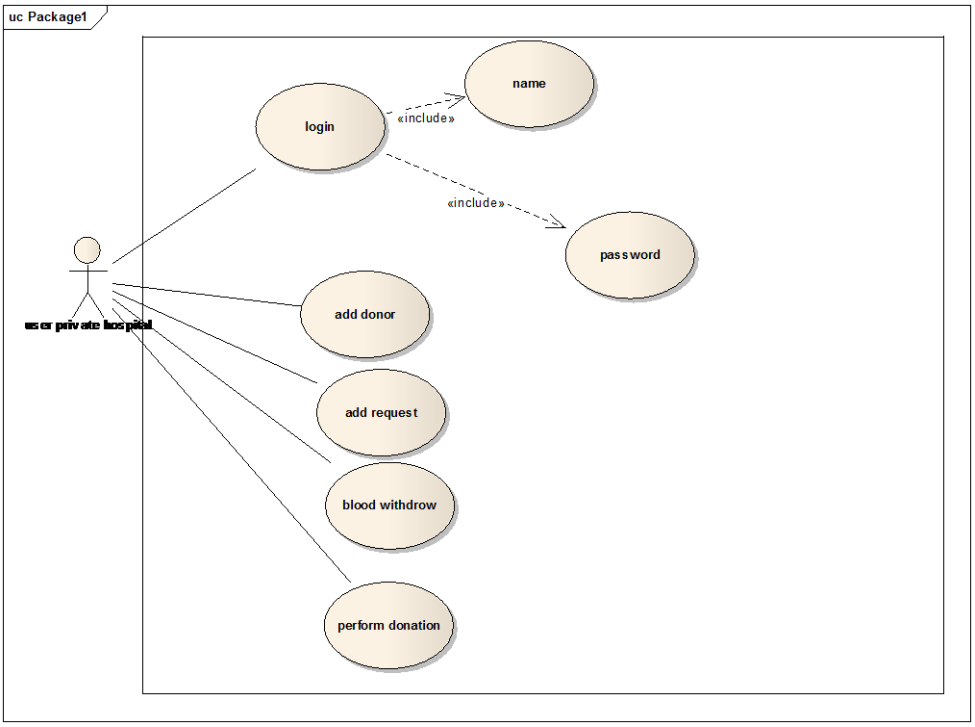


Figure 3.4 Use case Diagram for private hospital.

3.3.2 SEQUENCE DIAGRAM

3.3.2.1 LOGIN DIAGRAM

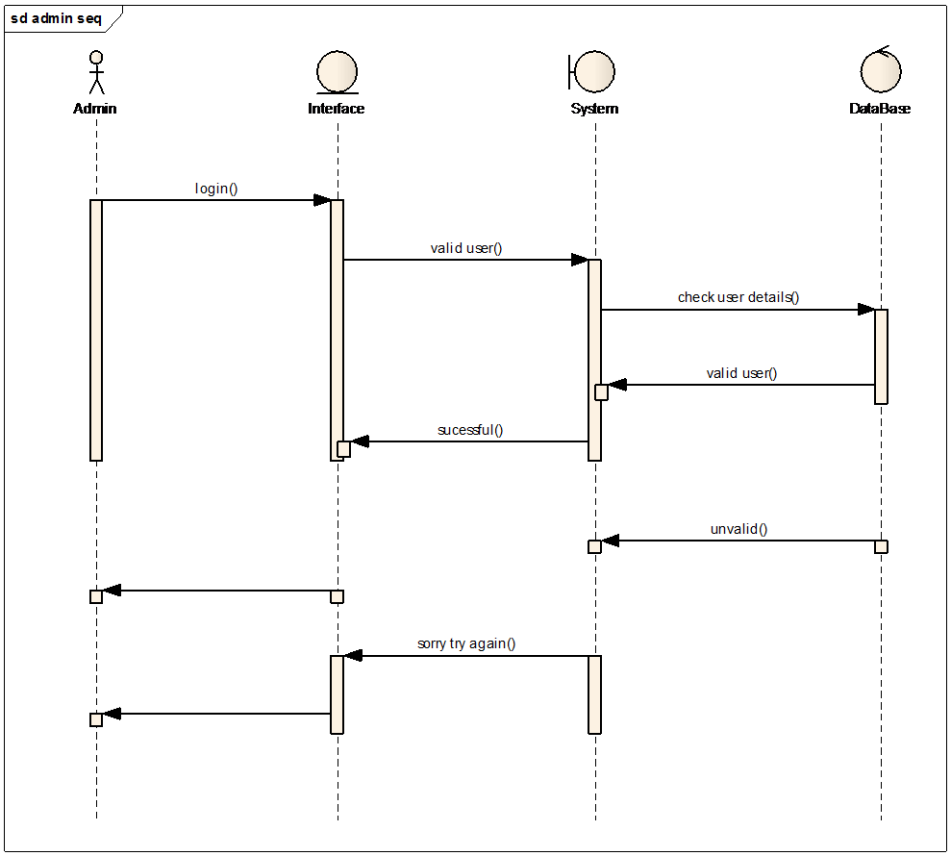


Figure 3.5 Sequence Diagram for Login System.

3.3.2.2 ADD HOSPITAL DIAGRAM

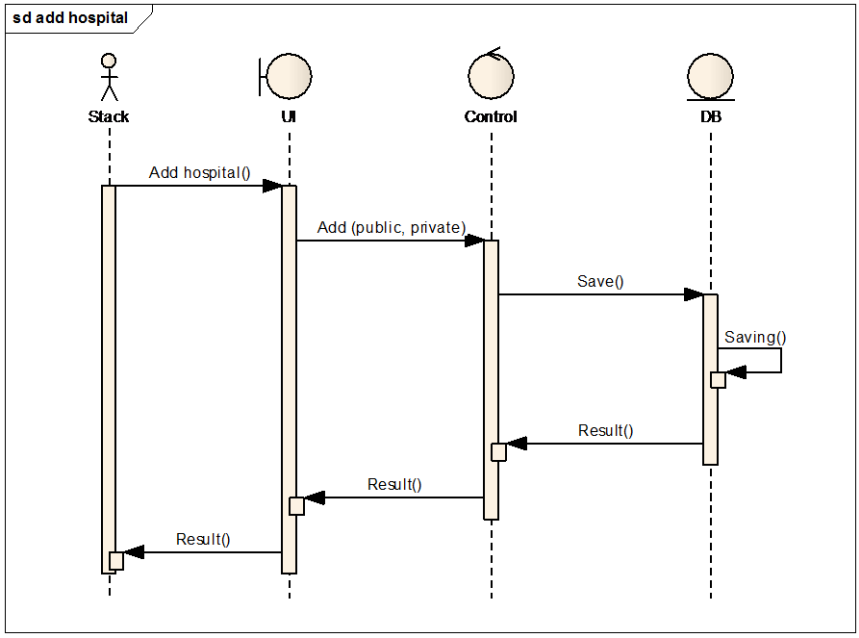


Figure 3.6 Sequence Diagram for add hospital.

3.3.2.3 BLOOD REQUEST

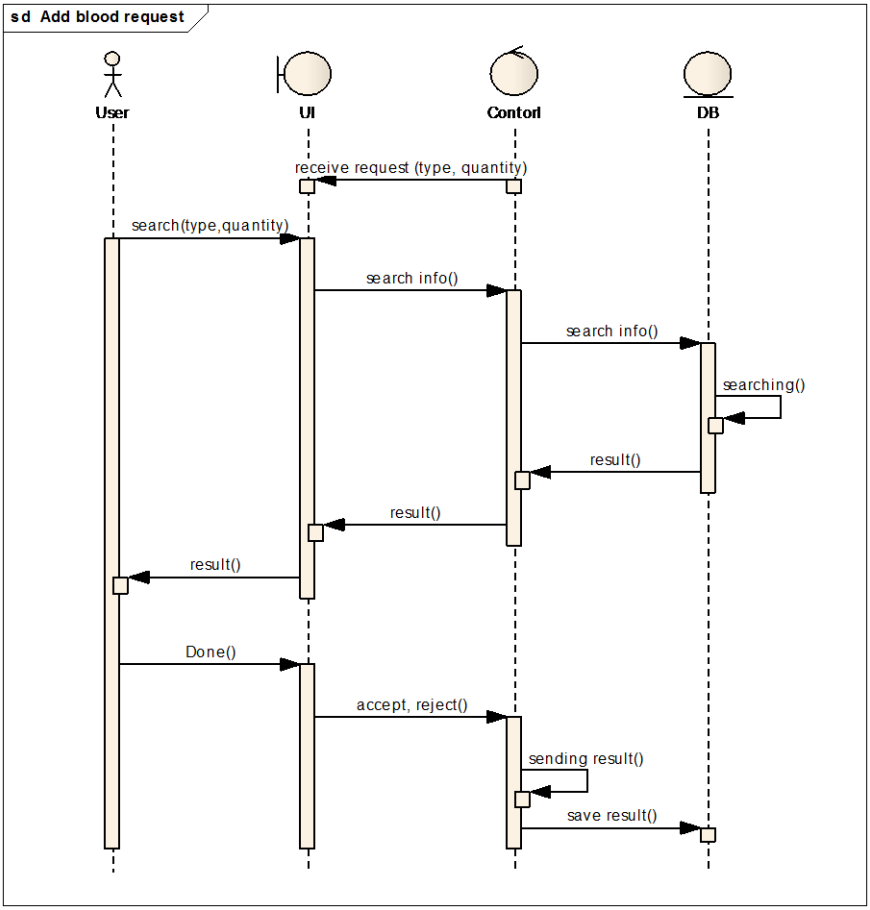


Figure 3.7 Sequence Diagram for blood request.

3.3.2.4 BLOOD TYPE DIAGRAM

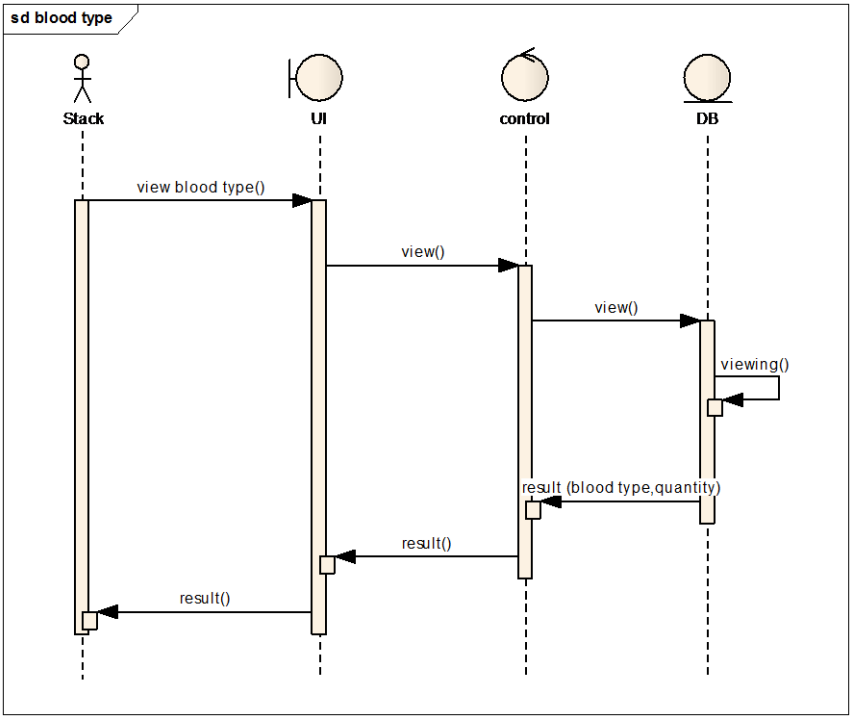


Figure 3.8 Sequence Diagram for blood type.

3.3.2.5 BLOOD WITHDRAW DIAGRAM

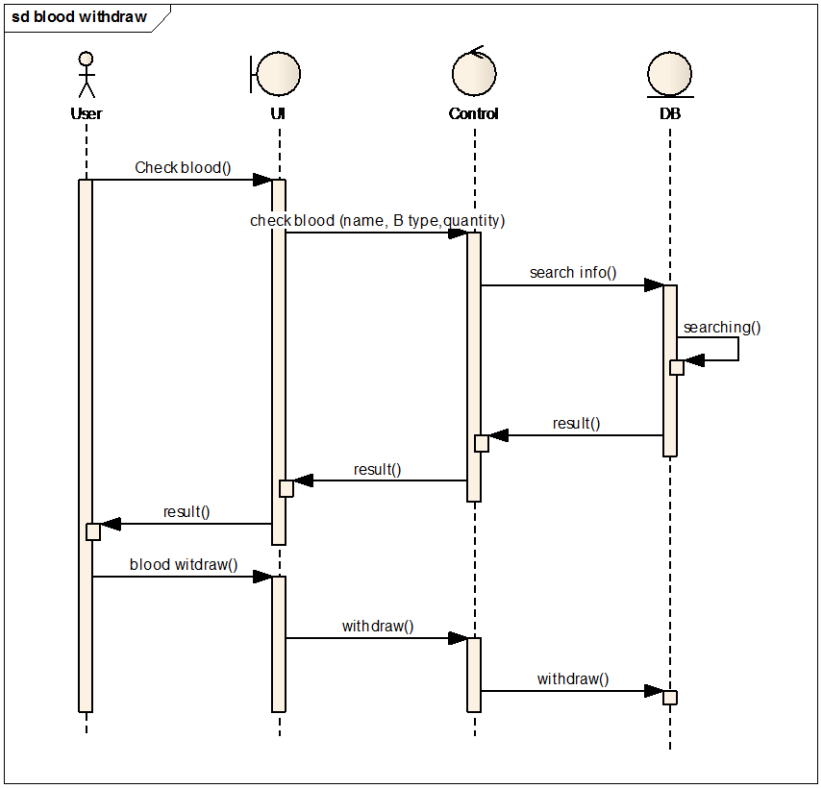


Figure 3.9 Sequence Diagram for blood withdraw.

3.3.2.6 DONORS DIAGRAM

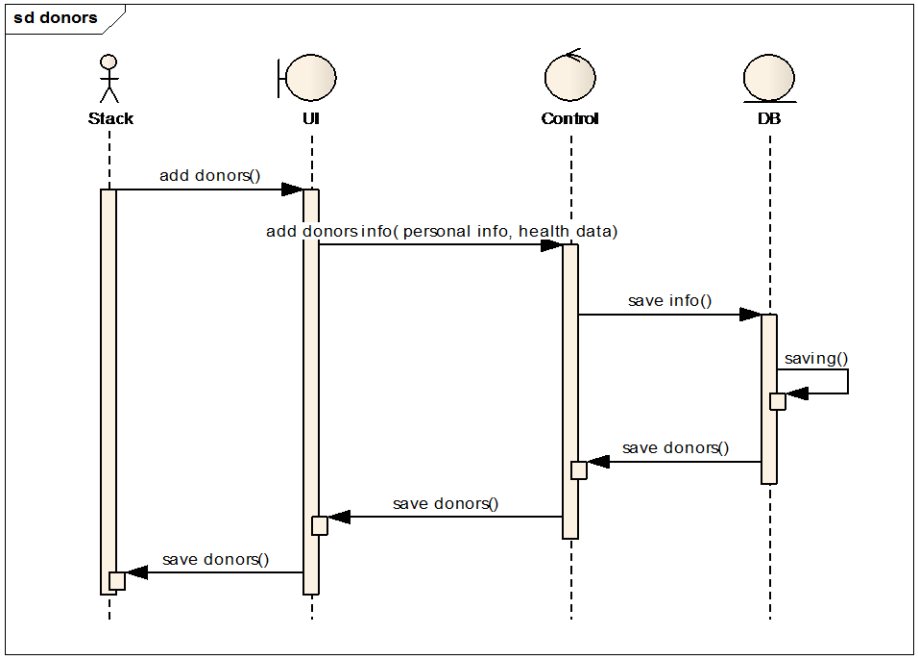


Figure 3.10 Sequence Diagram for donor.

3.3.2.7 DONATION DIAGRAM

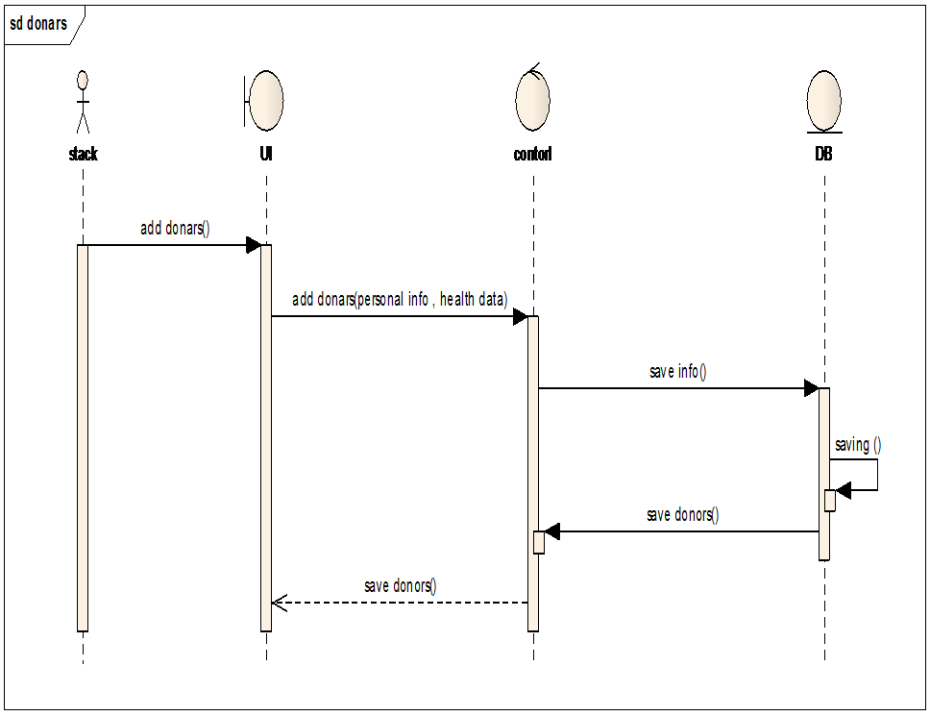


Figure 3.11 Sequence Diagram for donation.

3.3.2.8 GENARATE REPORT DIAGRAM

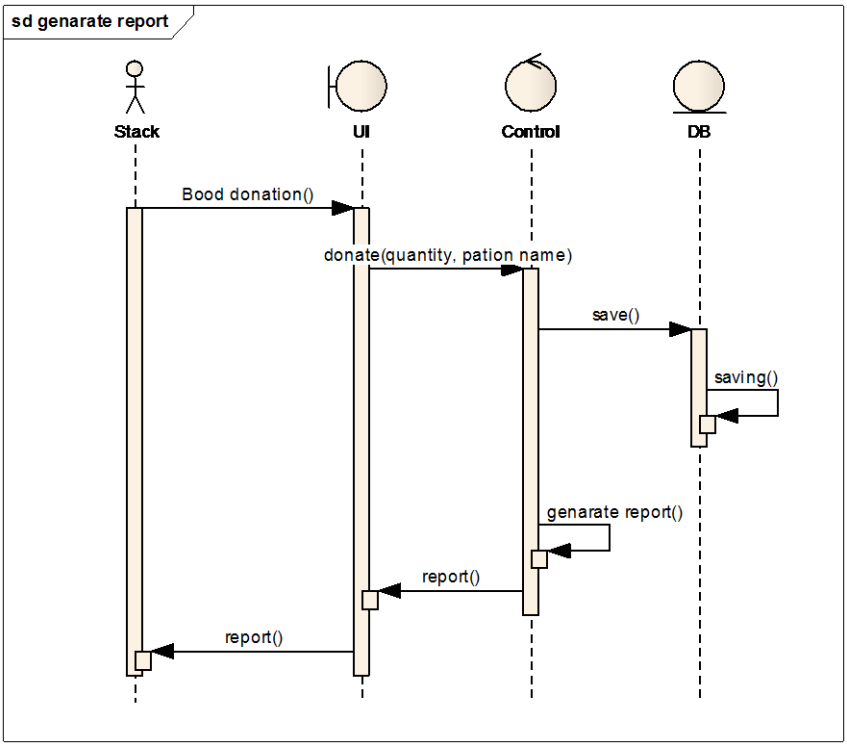


Figure 3.12 Sequence Diagram generate report.

3.3.2.9 RECEIVE REQUEST

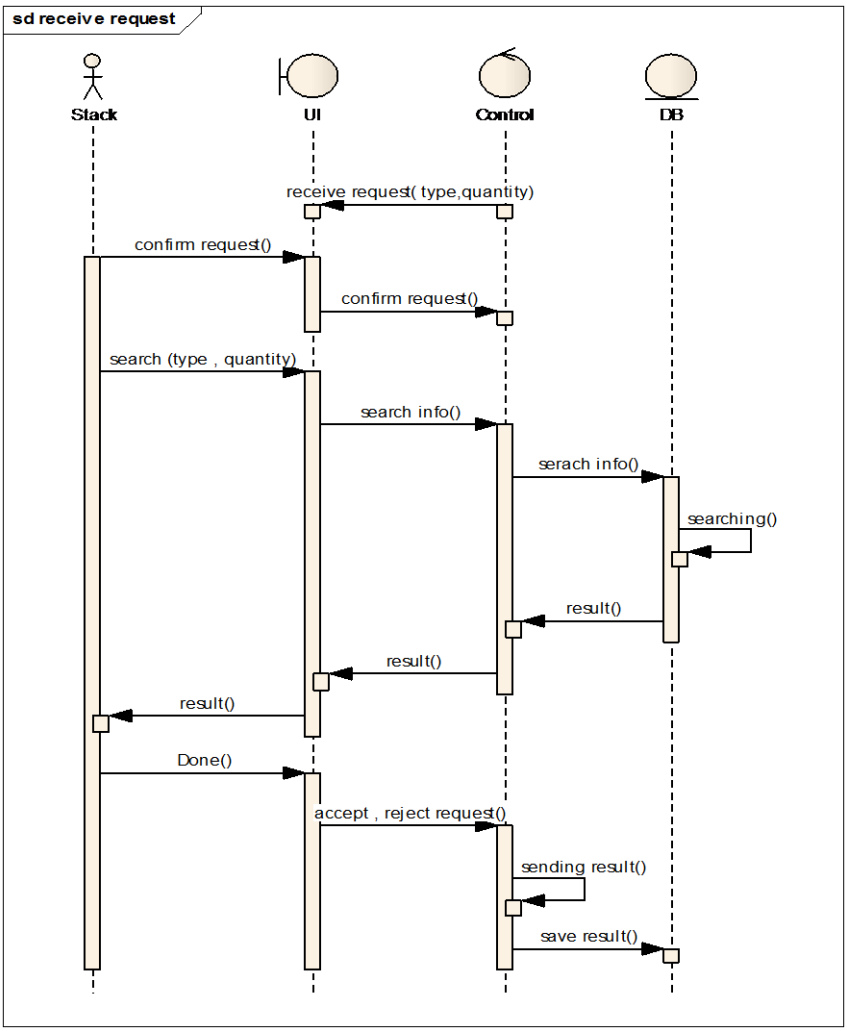


Figure 3.133 Sequence Diagram for receive request.

3.3.2.10 REORDERING RULES

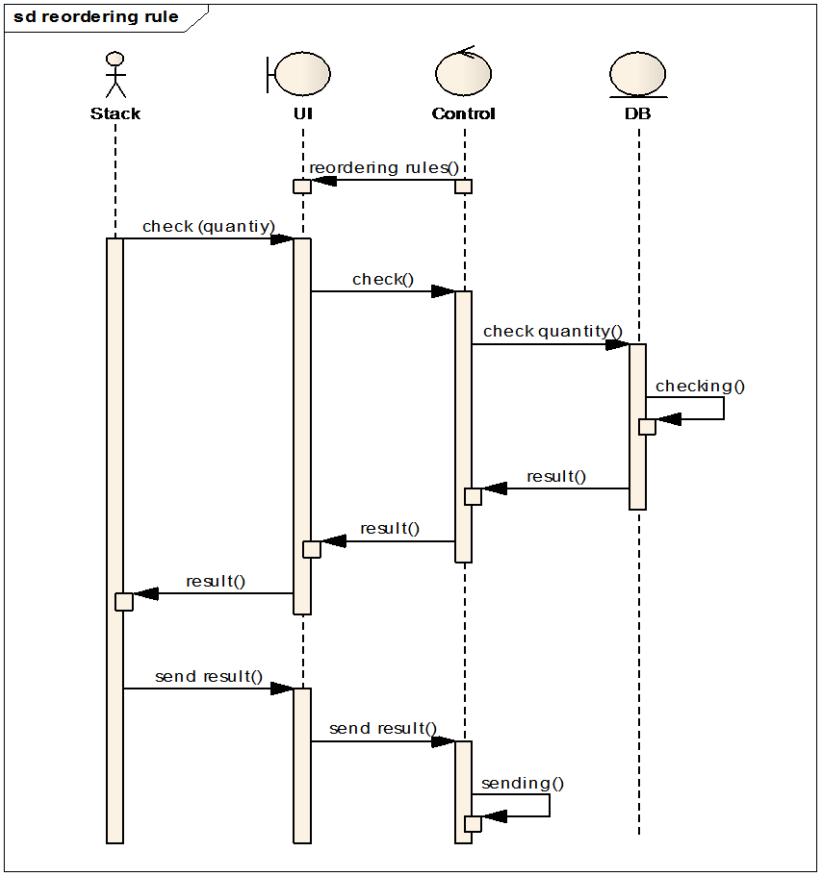


Figure 3.14 Sequence Diagram for reordering rules.

3.3.2.11 REQUEST DIAGRAM

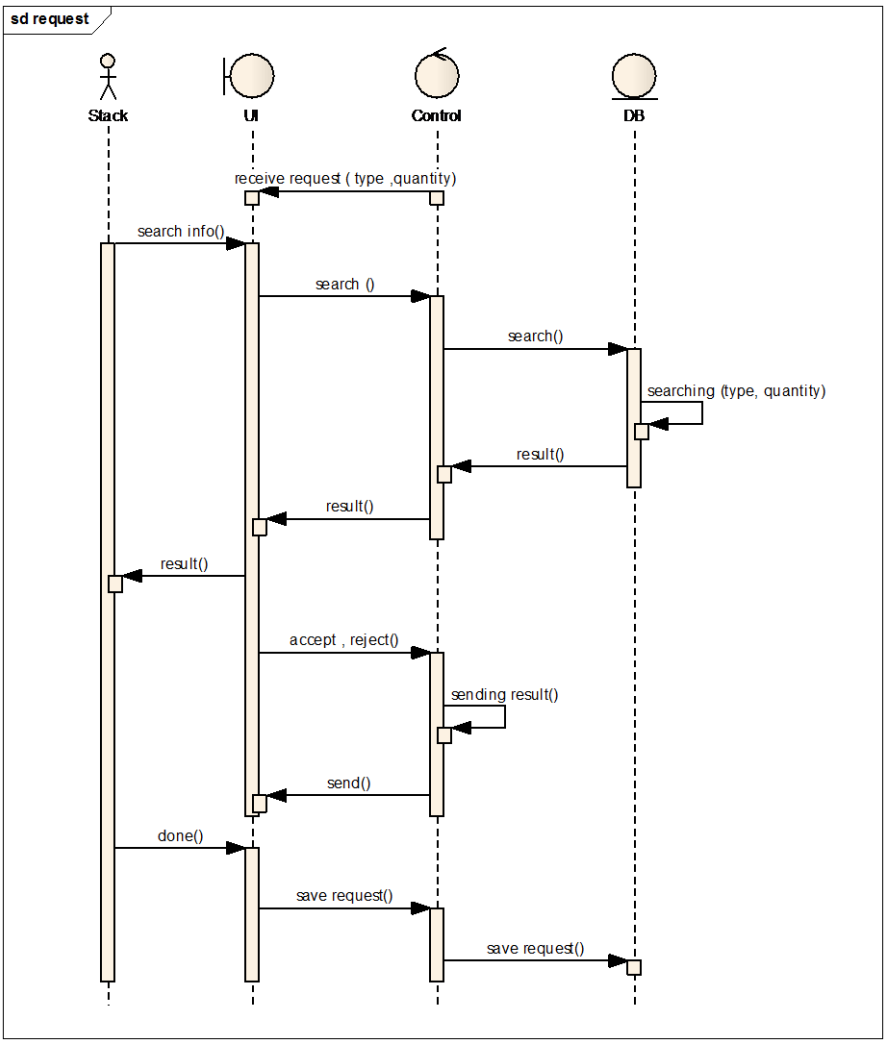


Figure 3.15 Sequence Diagram for request.

3.3.3 ACTIVITY DIGRAM

3.3.3.1 STACK USER

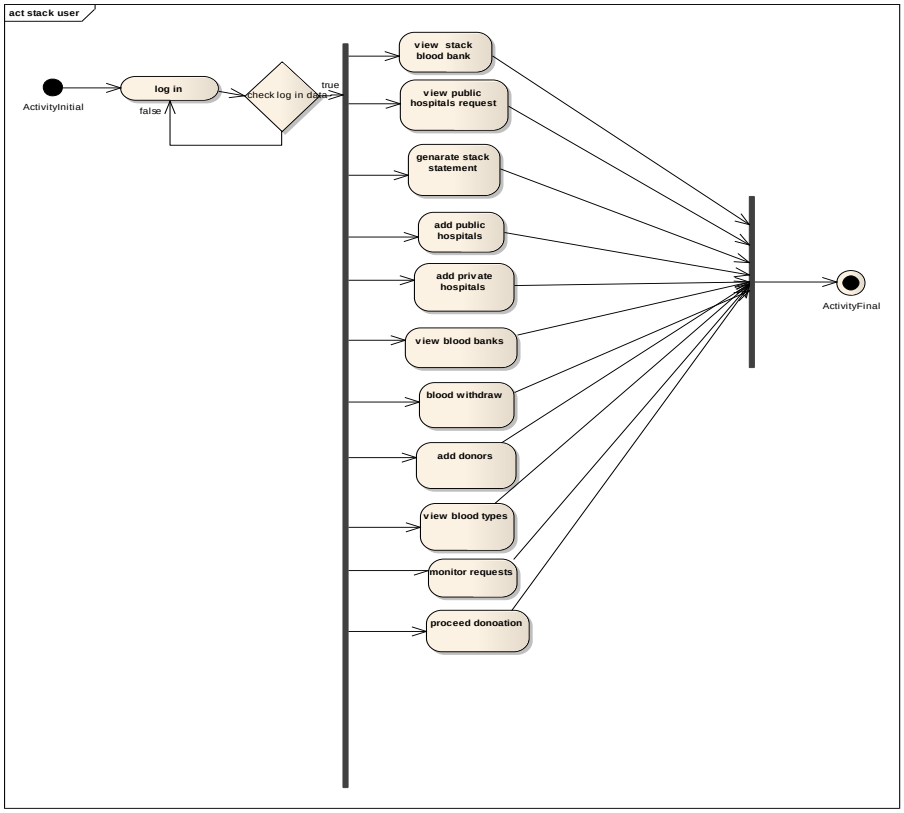


Figure 3.16 Activity diagram for stack user.

3.3.3.2 PUBLIC HOSPITAL USER

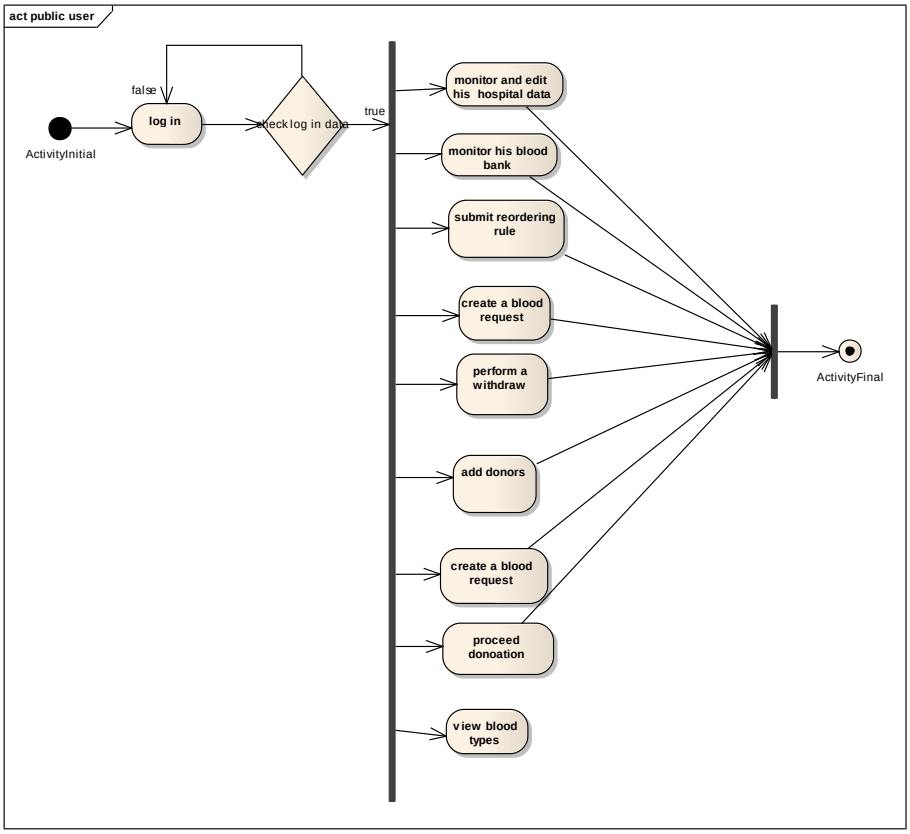


Figure 3.17 Activity diagram for public hospital user.

3.3.3.3 PRIVATE HOSPITAL USER

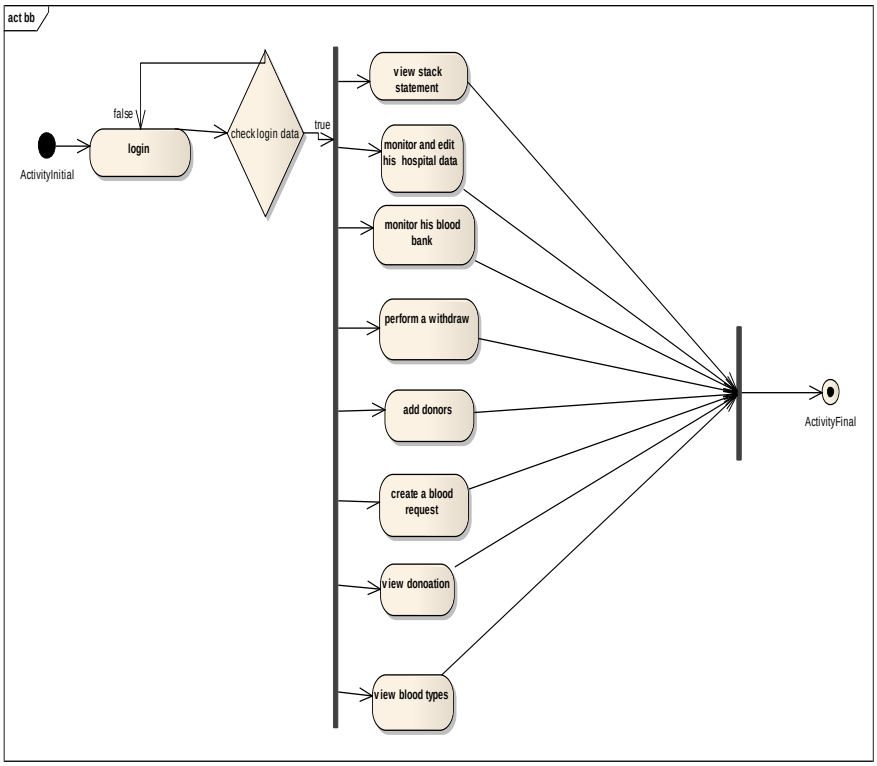


Figure 3.18 Activity diagram for private hospital user.

3.3.3.4 MOBILE USER

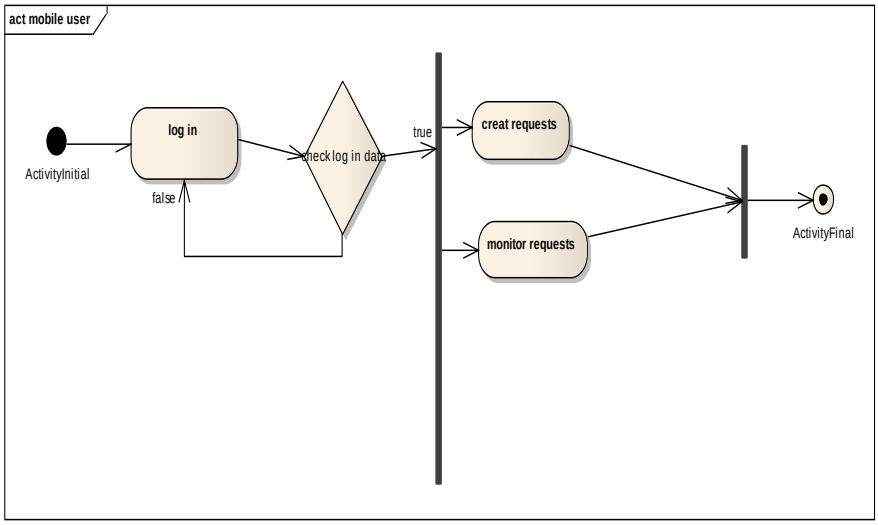


Figure 3.19 Activity diagram for mobile user.

CHAPTER FOUR
IMPLEMENTATION

4.2 SYSTEM INTERFACES

4.2.1 STACK USER INTERFACES

Here all the interfaces of the stack user.

4.2.1.1 STACK INSTITUTE BLOOD BANK

This screen shows Stack data, and allows stack administrator to modify these data at any time, also monitoring blood types in Stack and the available quantities of each blood type.

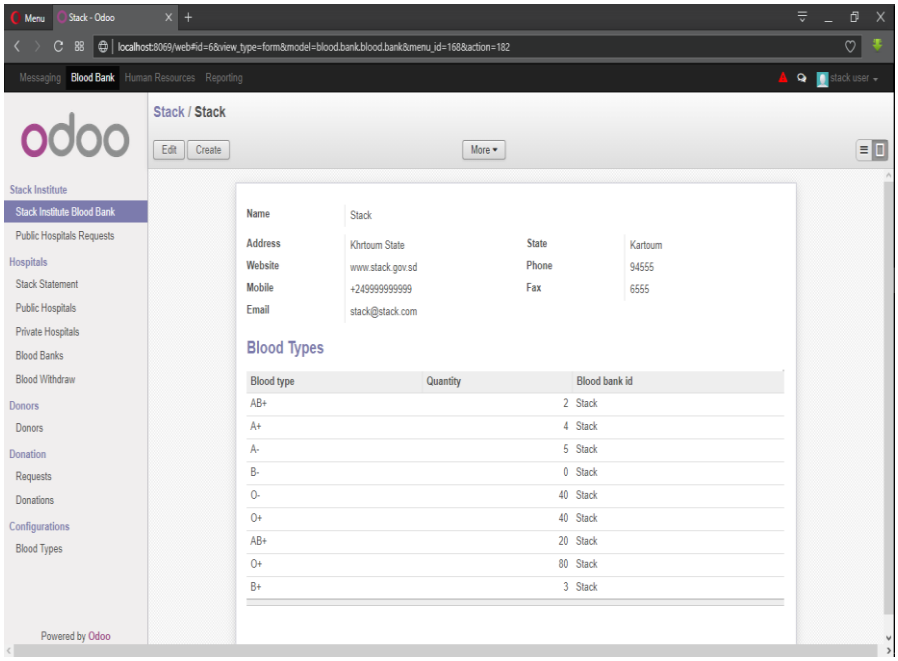


Figure 4.1 Stack institute blood bank.

4.2.1.2 PUBLIC HOSPITAL REQUEST

This screen shows the stack's administrator all the blood requests coming from public hospitals.

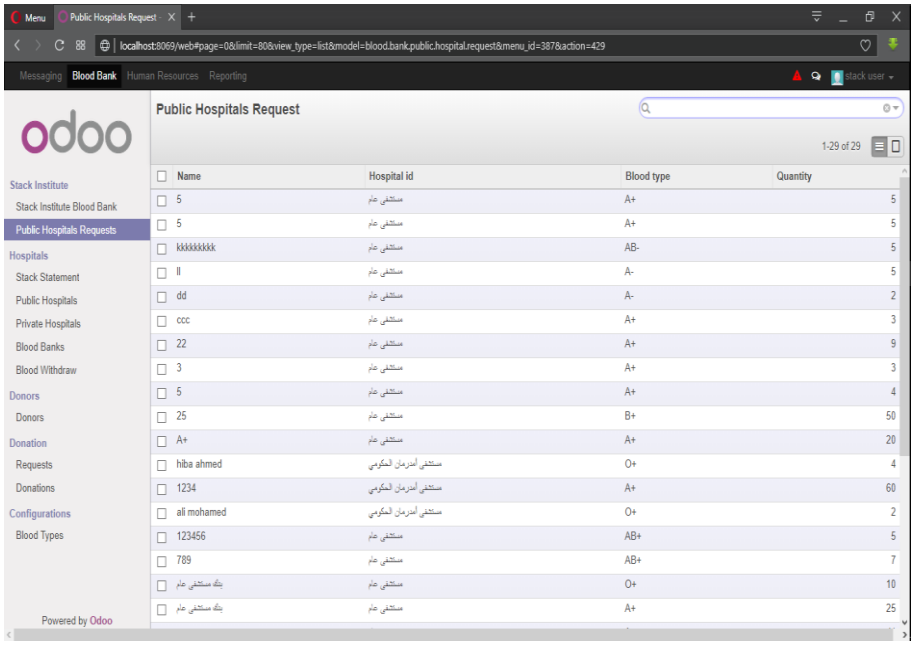


Figure 4.2 Public hospital request.

4.2.1.3 STACK STATEMENT

This receipt is taken out automatically from stack institute user's account when the blood donation process is successfully completed to the private hospital user's account informing them that the patient has been denoted with blood.

Only stack user can modify and generate this paper, otherwise it will be only read for the private hospitals users.

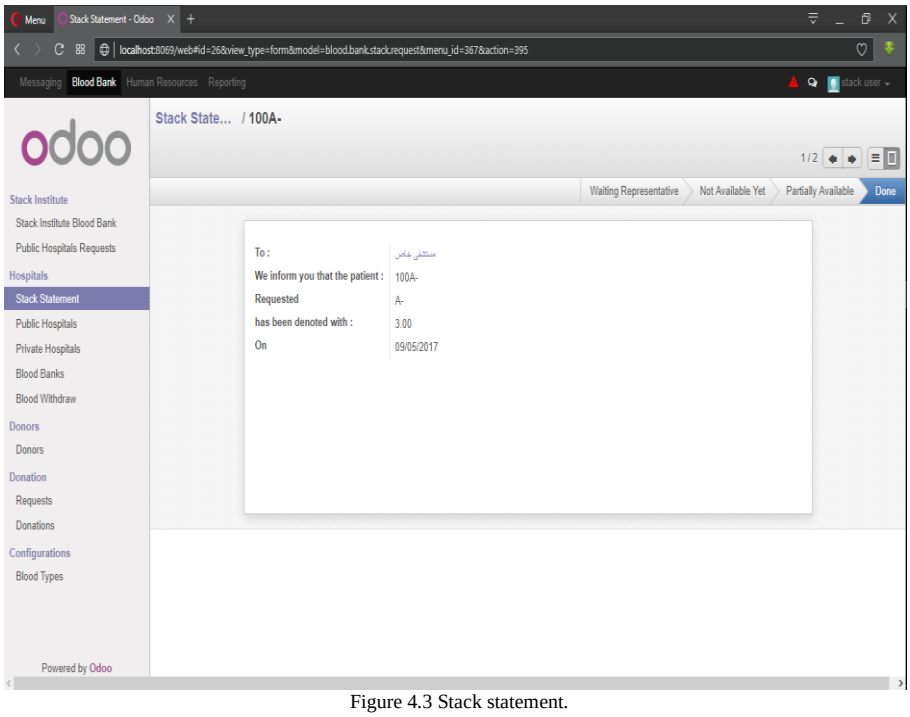


Figure 4.3 Stack statement.

4.2.1.4 PUBLIC HOSPITALS

On this screen stack user can add a new public hospital with all its data.

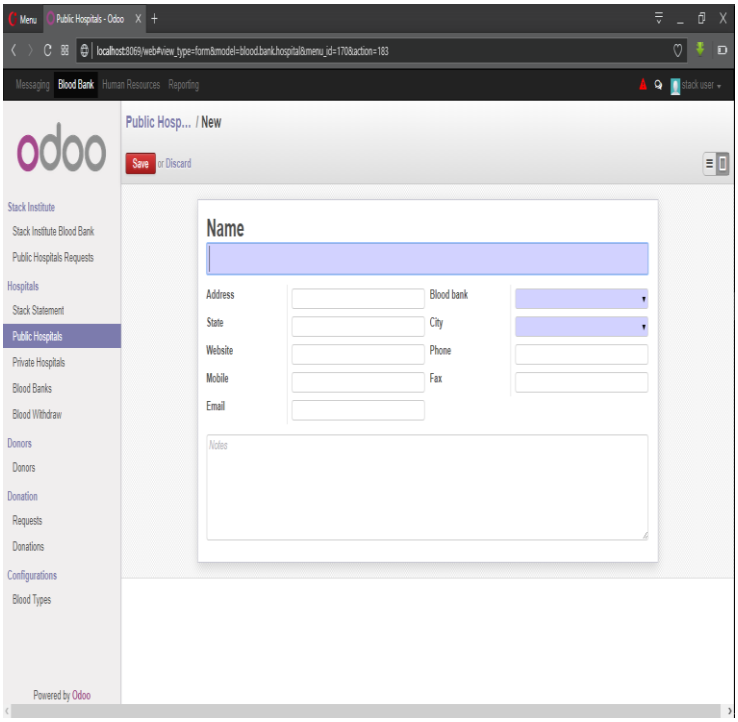


Figure 4.4 Public hospital.

4.2.1.5 PRIVATE HOSPITALS

On this screen stack user can add a new private hospital with all its data.

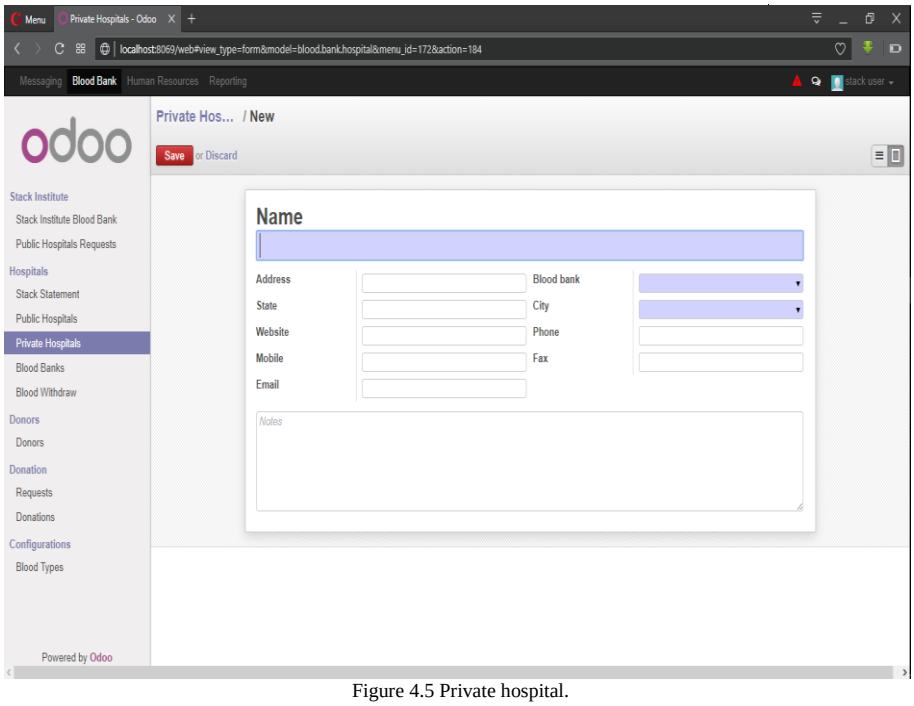


Figure 4.5 Private hospital.

4.2.1.6 BLOOD BANK CREATION

This screen allows stack user to create a blood bank for specific hospital.

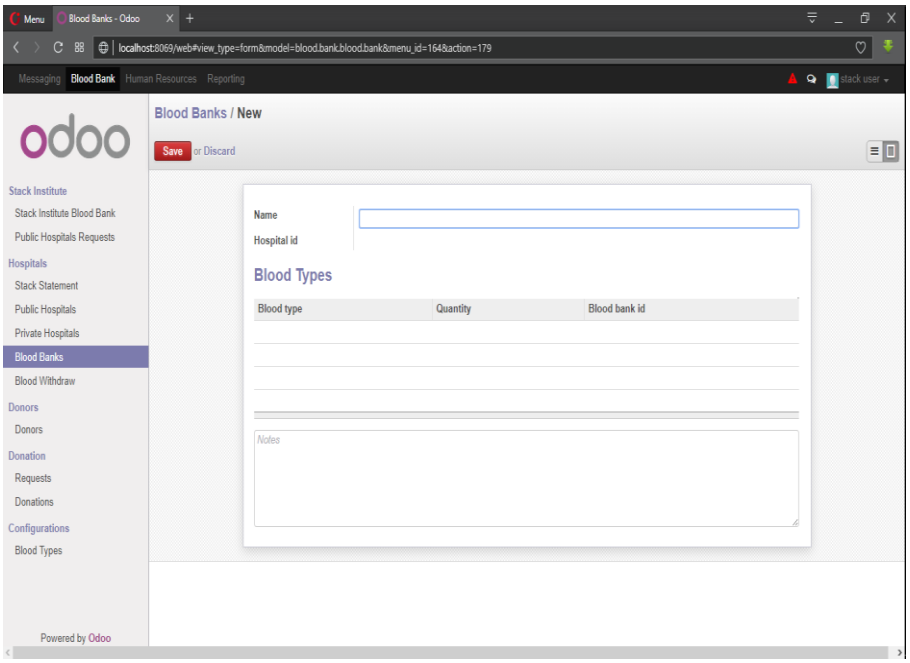


Figure 4.6 Blood bank creation.

4.2.2 PUBLIC USER INTERFACES

Here is all the interfaces of the public hospital user.

4.2.2.1 PUBLIC HOSPITALS

On this screen the public hospital user is able to monitor and modify his own hospital data.

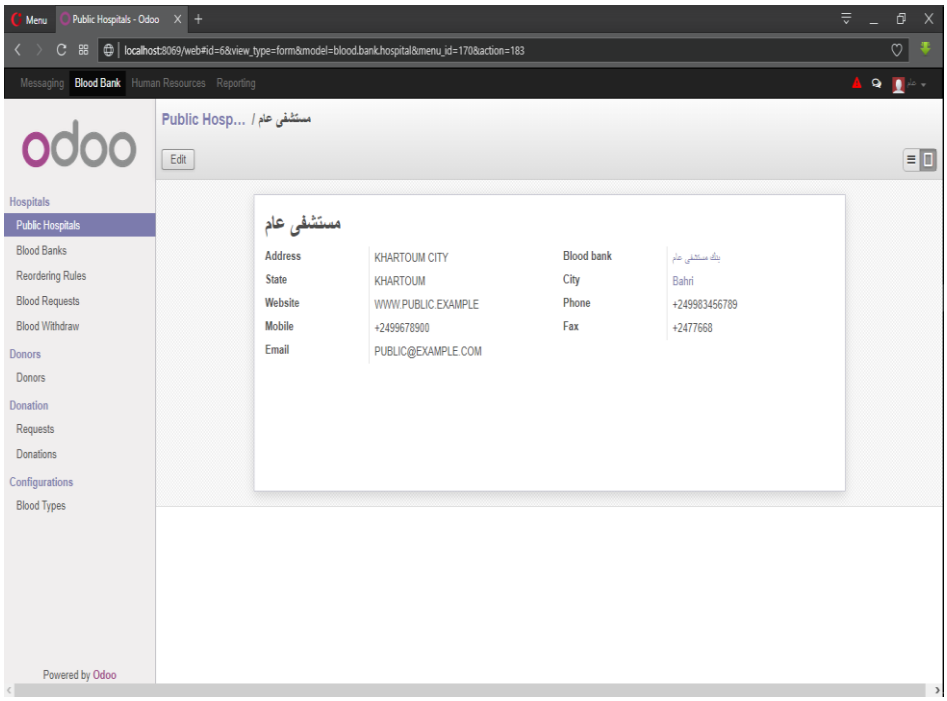


Figure 4.7 Public hospital.

4.2.2.2 BLOOD BANKS

This screen allows the public hospital user to monitor his own blood bank.

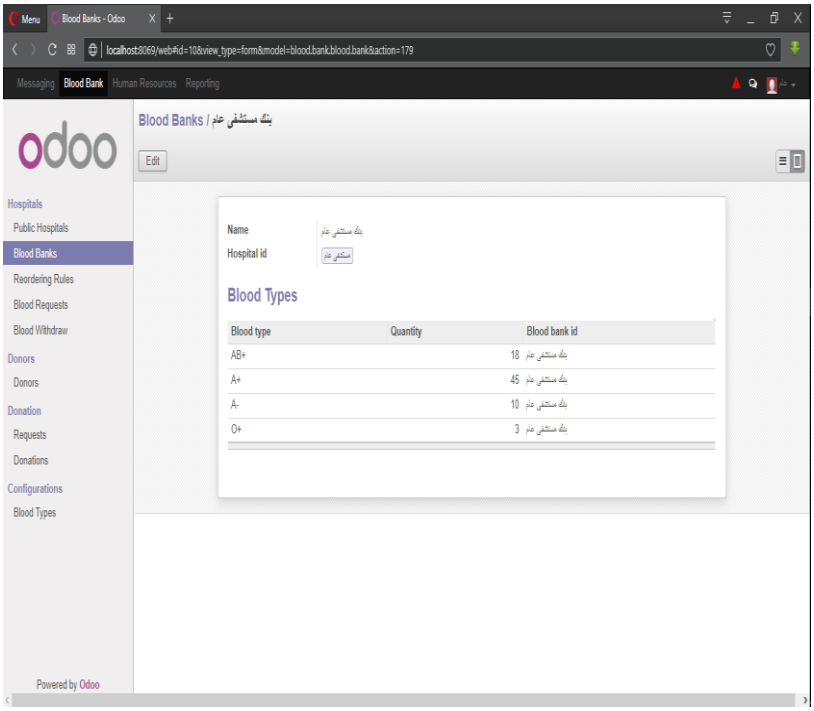


Figure 4.8 Blood banks.

4.2.2.3 REORDERING RULES

This screen allows the public hospital user to determine a critical quantity of specific blood type on his own blood bank, by specifying a minimum, maximum quantity for the exact blood type, when the quantity of the specified blood type reaches the minimum quantity, the system will automatically send a request to stack institute with the blood type, missing quantity in order to make the minimum quantity arrives the maximum quantity.

A reordering rule process has been made per withdraw process.

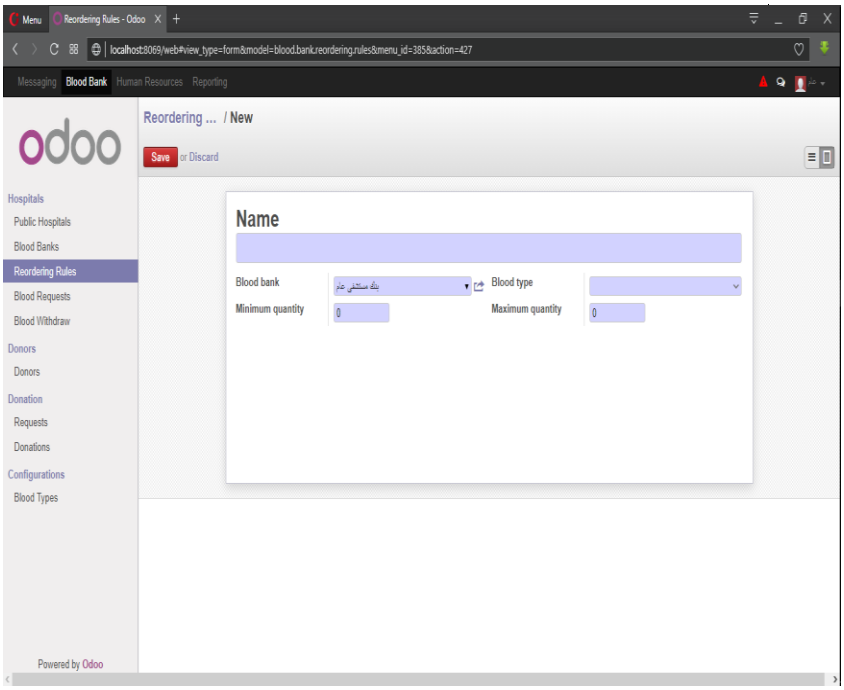


Figure 4.9 Reordering rules.

4.2.2.3 BLOOD REQUESTS

On this screen the public hospital user can request for emergency blood support for a specific blood type with specific quantity from stack institute.

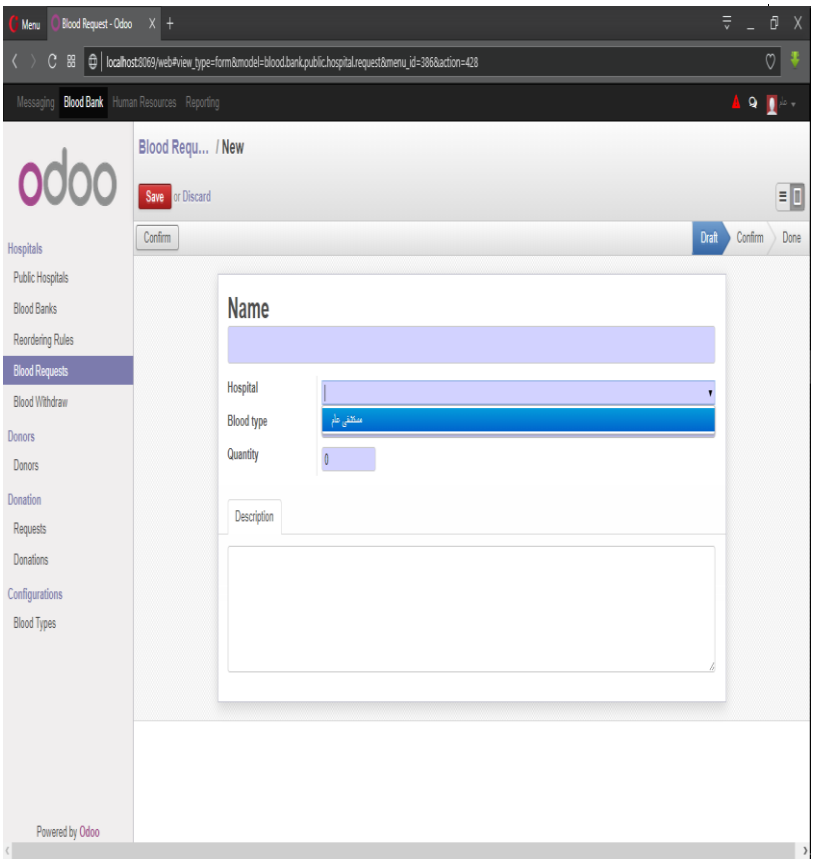


Figure 4.10 Blood requests.

4.2.2.4 BLOOD WITHDRAW

On this screen the public hospital user can perform a blood withdraw from his blood bank.

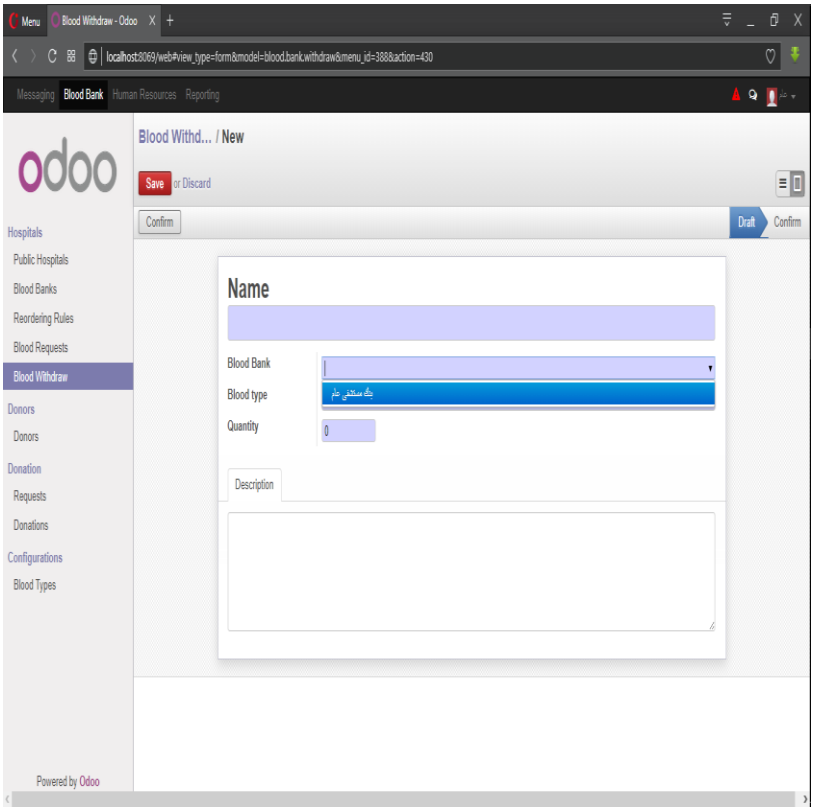


Figure 4.11 Blood withdraw.

4.2.3 PRIVATE USER INTERFACES

Here is all the interfaces of the private hospital user.

4.2.3.1 STACK STATEMENT

On this screen the private hospital receives a blood donation statement from stack institute informing the private hospital that the patient has been denoted with blood.

Private hospital user can only view this statement.

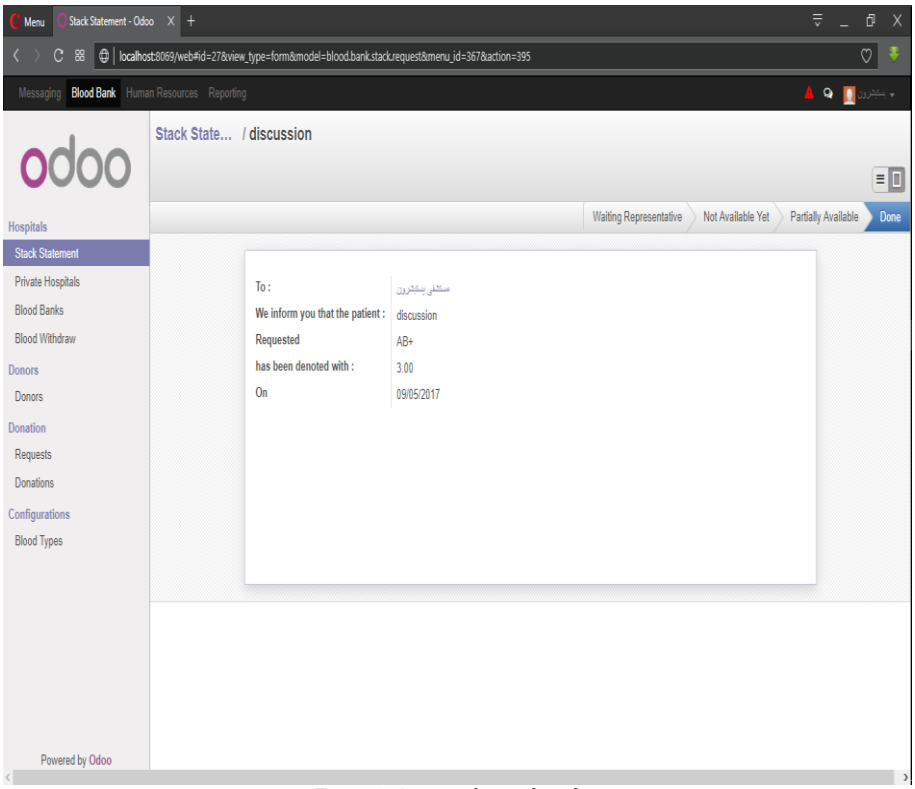


Figure 4.12 private hospital stack statement.

4.2.3.2 PRIVATE HOSPITALS

On this screen the private hospital user is able to monitor and modify his own hospital data.

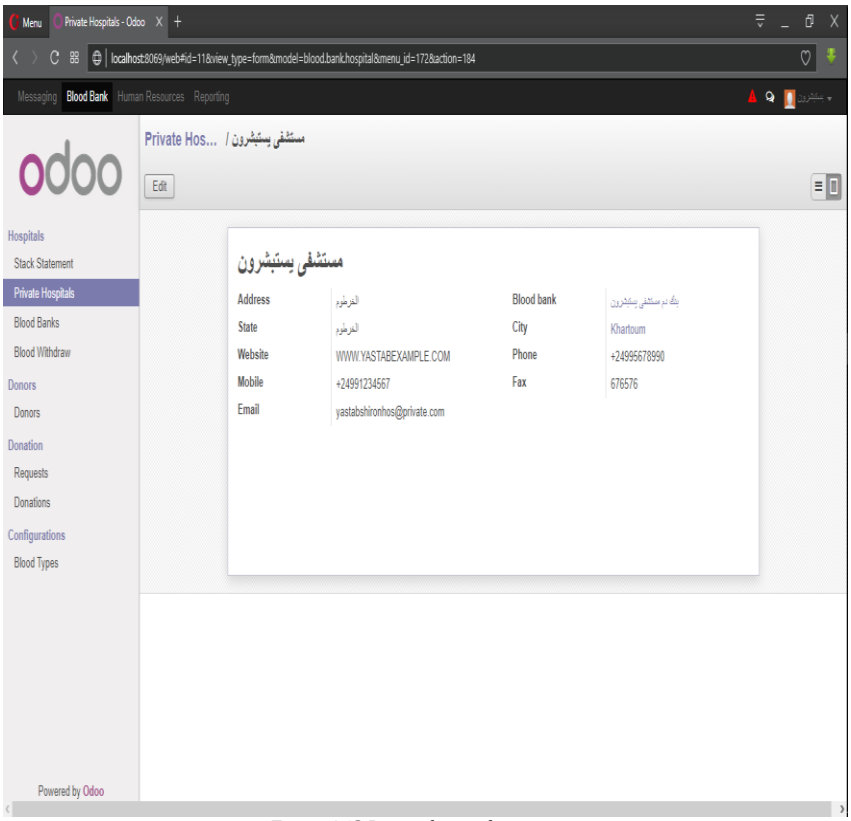


Figure 4.13 Private hospital.

4.2.3.3 BLOOD BANKS

This screen allows the private hospital user to monitor his own blood bank.

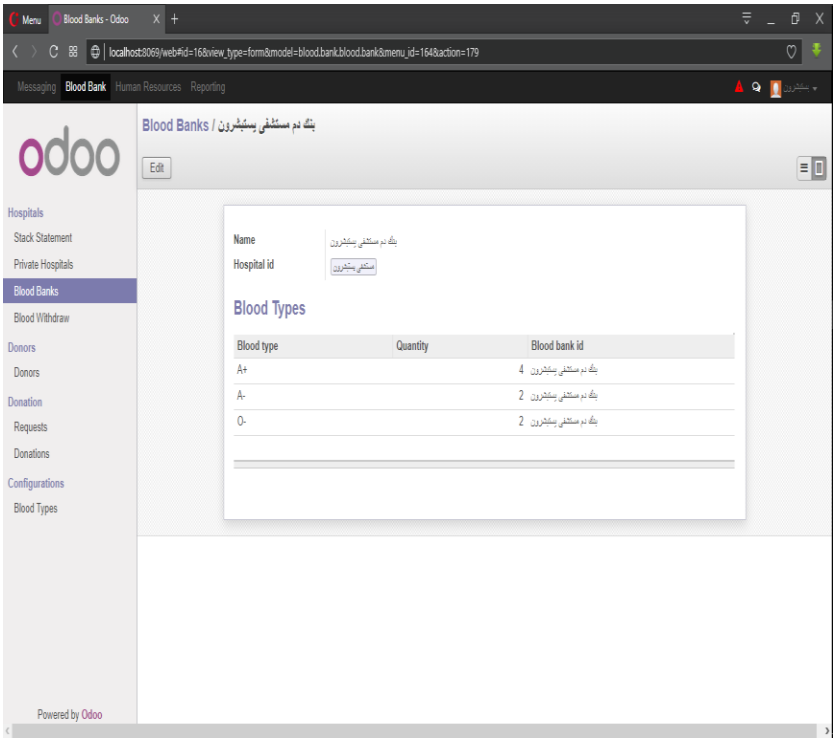


Figure 4.14 Blood banks.

4.2.3.4 BLOOD WITHDRAW

On this screen the private hospital user can perform a blood withdraw from his blood bank.

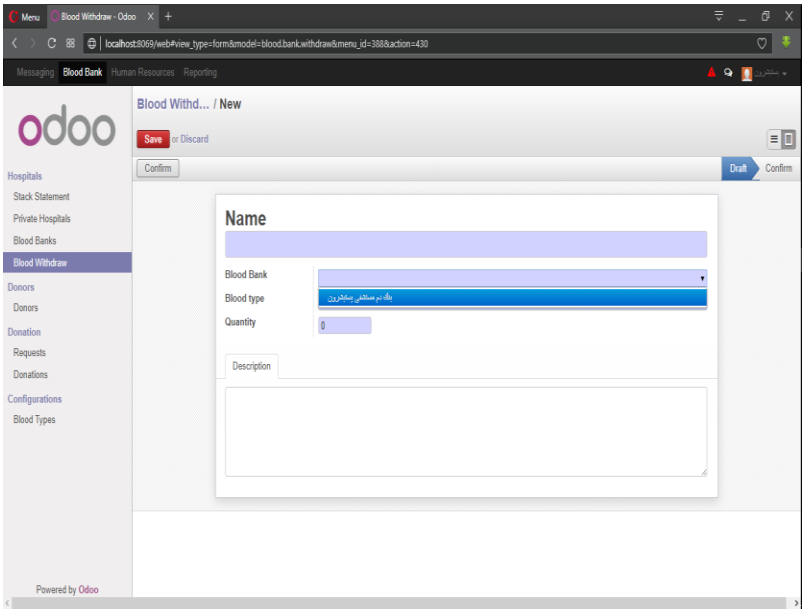


Figure 4.15 Blood withdraw.

4.2.4 MOBILE USER INTERFACES

4.2.4.1 VIEW ALL BLOOD REQUESTS

On this screen on the server site the mobile user can monitor all the blood requests through the website.

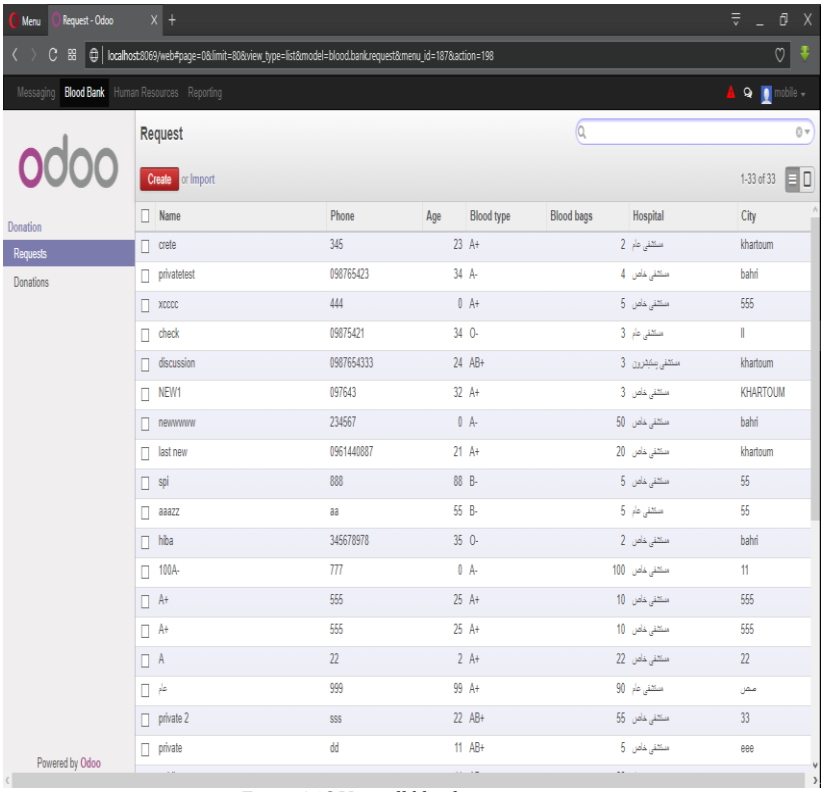


Figure 4.16 View all blood requests.

4.2.4.1.1 CREATE REQUEST

On this screen on the server site the mobile user can create a blood request with all its data through the website.

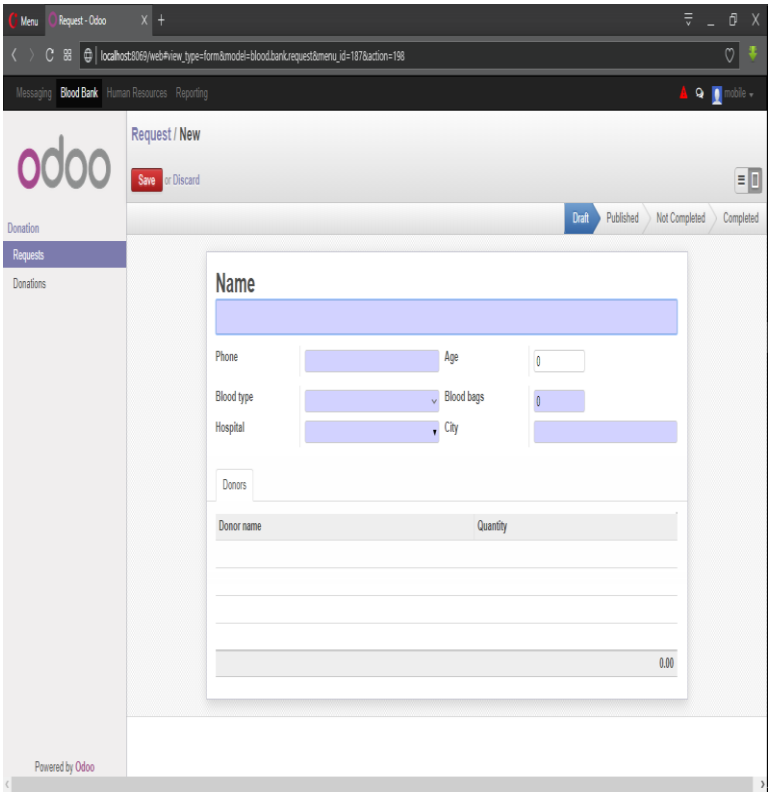


Figure 4.17 Create request.

4.2.4.2 ANDROID APPLICATION REGISTRATION INTERFACE

On this interface the android application user do the registrations process.

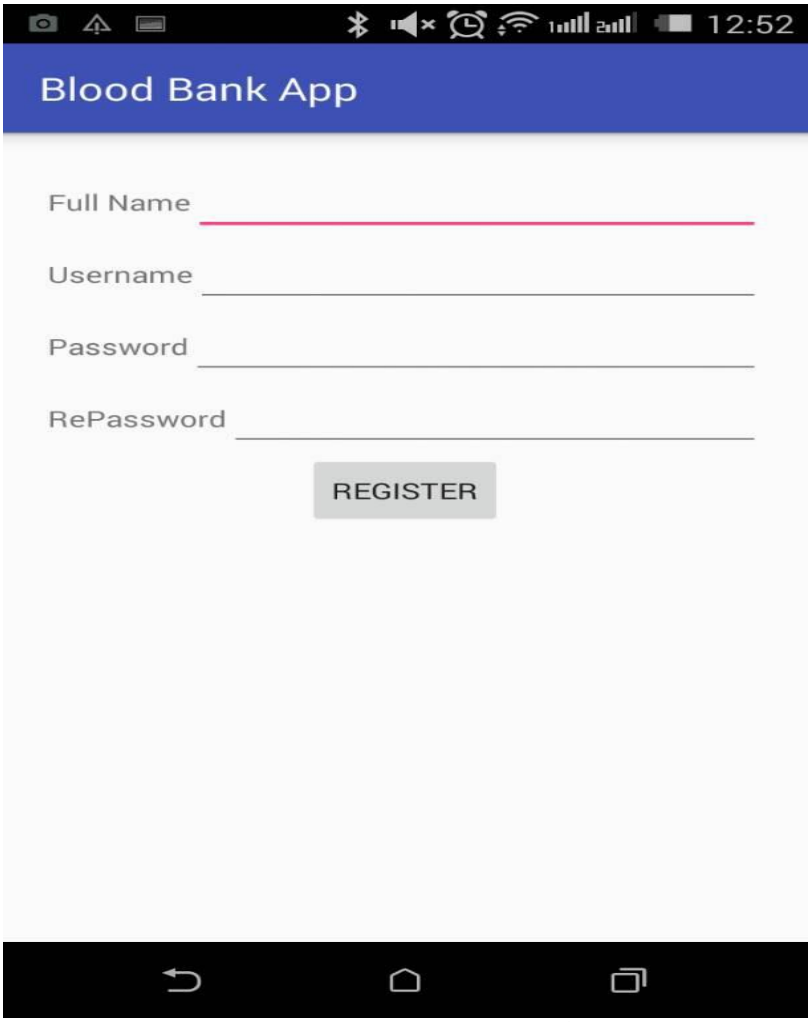


Figure 4.18 Android application registration interface.

4.2.4.3 ANDROID APPLICATION LOG IN INTERFACE

Here's the android user login interface.

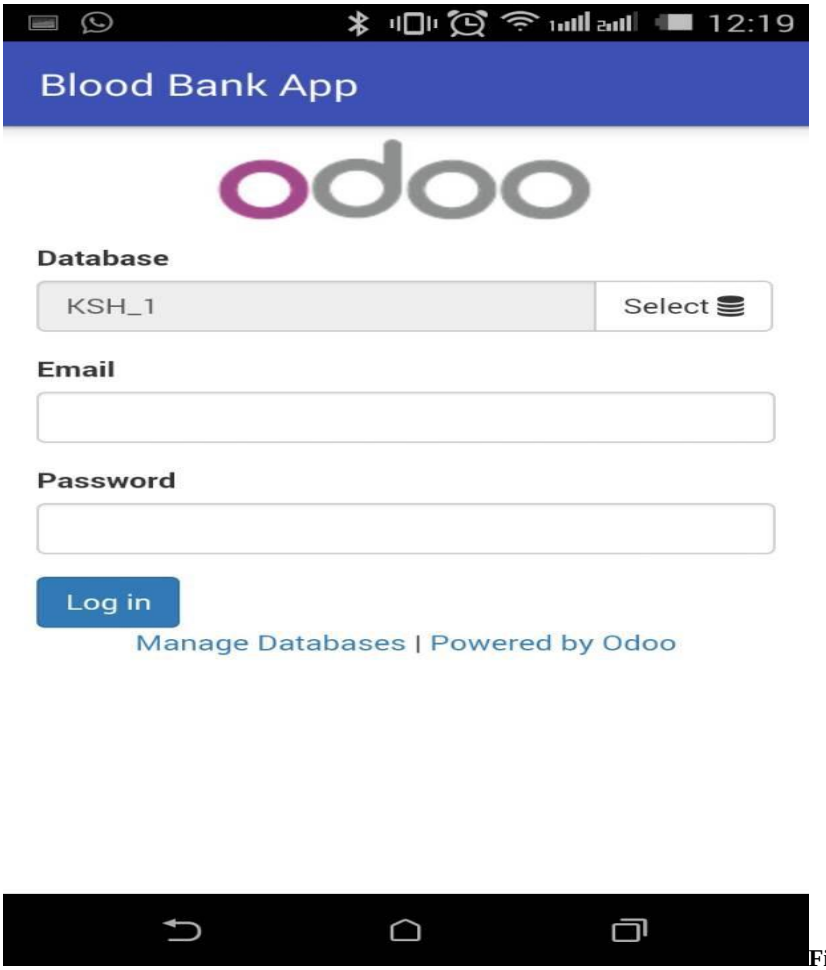


Figure 4.19 Android Application log in interface.

4.2.4.3 ANDROID APPLICATION REQUEST CREATION

On this screen the android user is able to create a request by entering (name, phone, age, blood type, blood bags, hospital, and city).

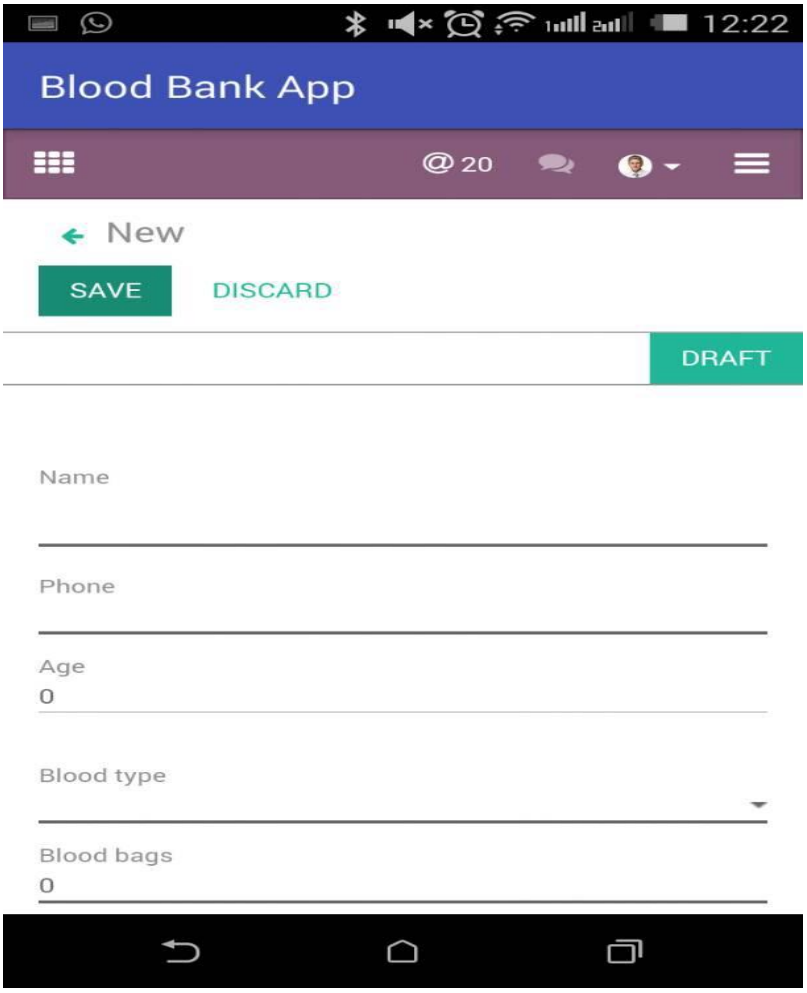


Figure 4.20 Android application request creation.

4.2.4.3 ANDROID APPLICATION REQUEST VIEW

On this screen the android application user can monitor all blood requests with all its data.

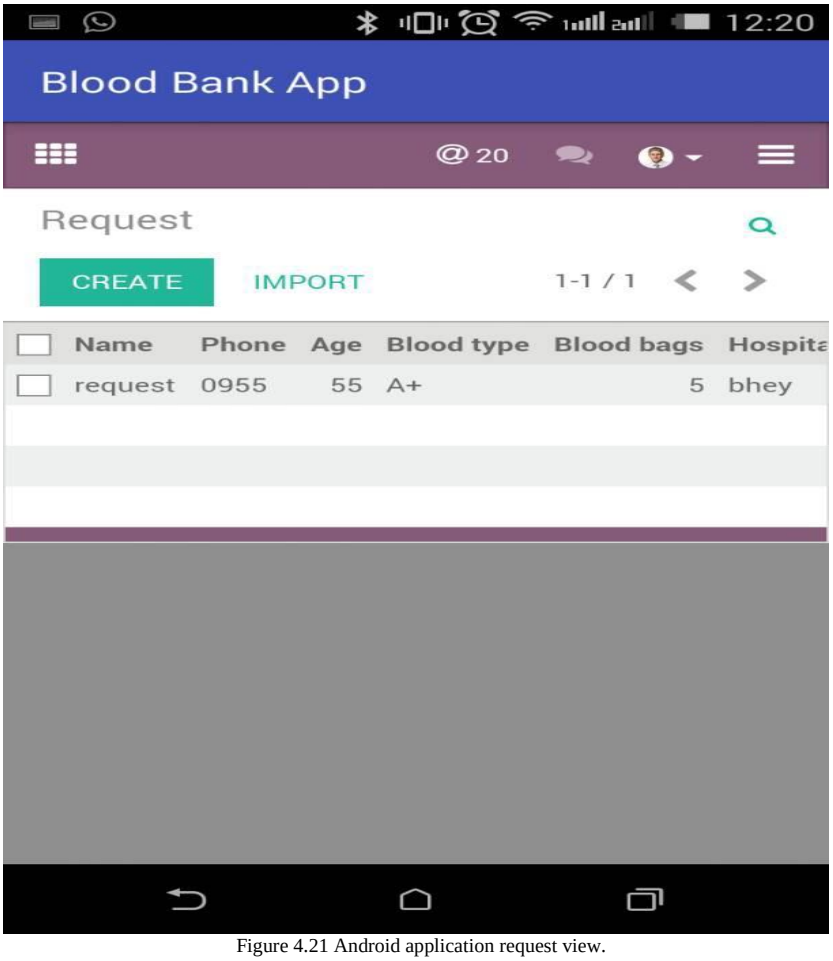


Figure 4.21 Android application request view.

4.2.5 MUTUAL INTERFACES

4.2.5.1 DONORS

Stack user, public hospital user, and private hospital user can monitor all system's donors on this screen.

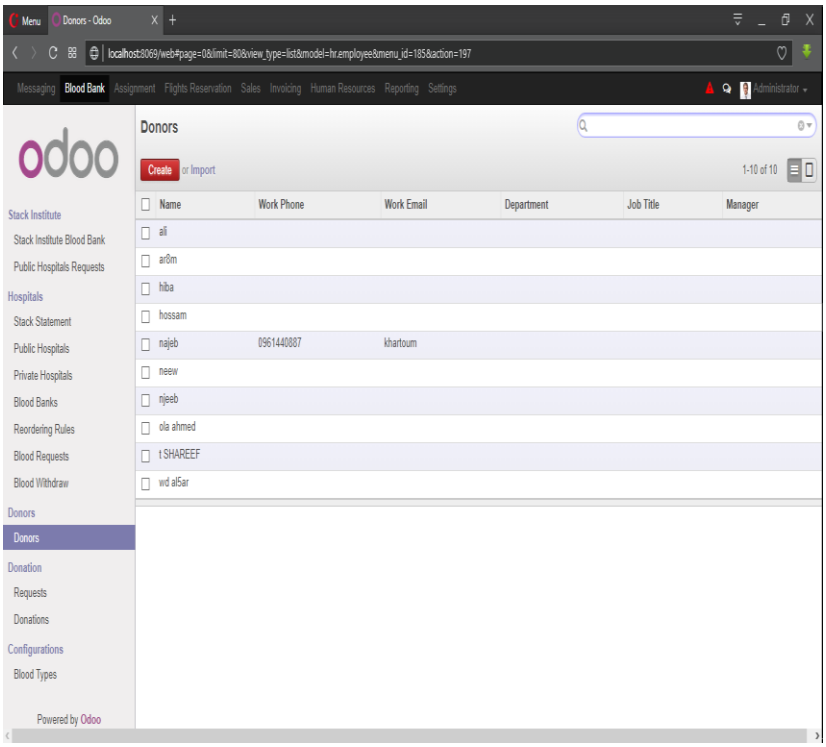


Figure 4.22 Donors.

4.2.5.1.1 CREATE A DONOR

Stack user, public hospital user, and private hospital user are able to add a new donor to the system with all his information on this screen.

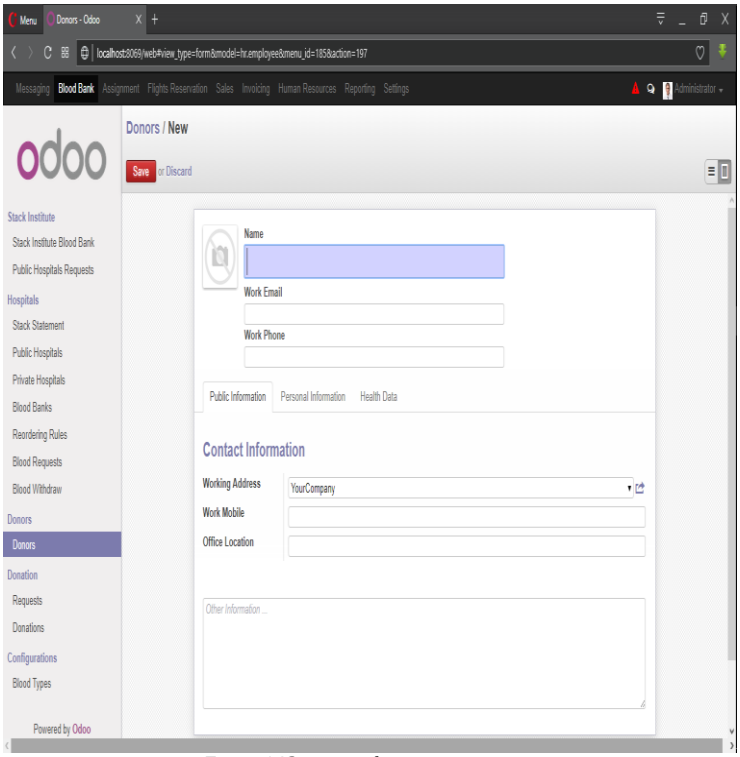


Figure 4.23 create a donor.

4.2.5.2 REQUESTS

All system users are able to monitor all system requests on this screen.

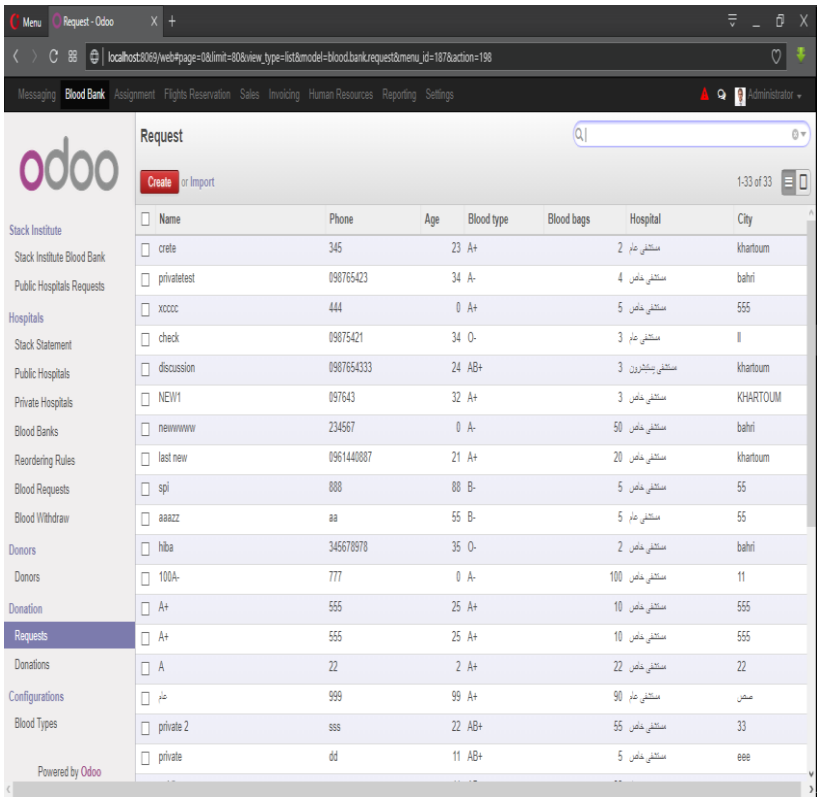


Figure 4.24 Requests.

4.2.5.2.1 CREATE A REQUEST

On this screen all system users are able to create a request.

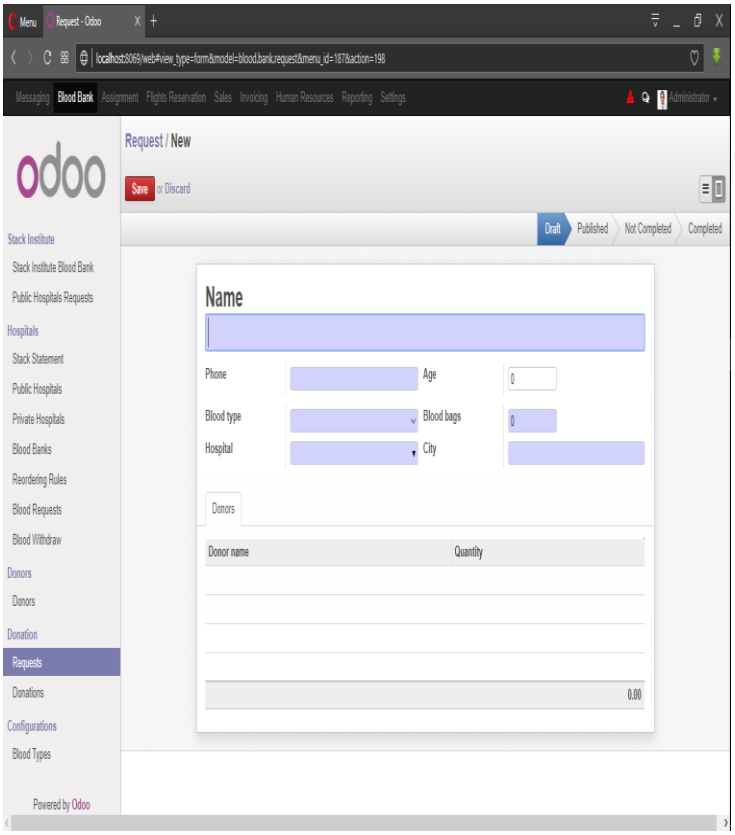


Figure 4.25 create a request.

4.2.5.3 DONATIONS

Stack user and public hospital user are able to monitor and create a donation.

Private user only able to monitor donations.

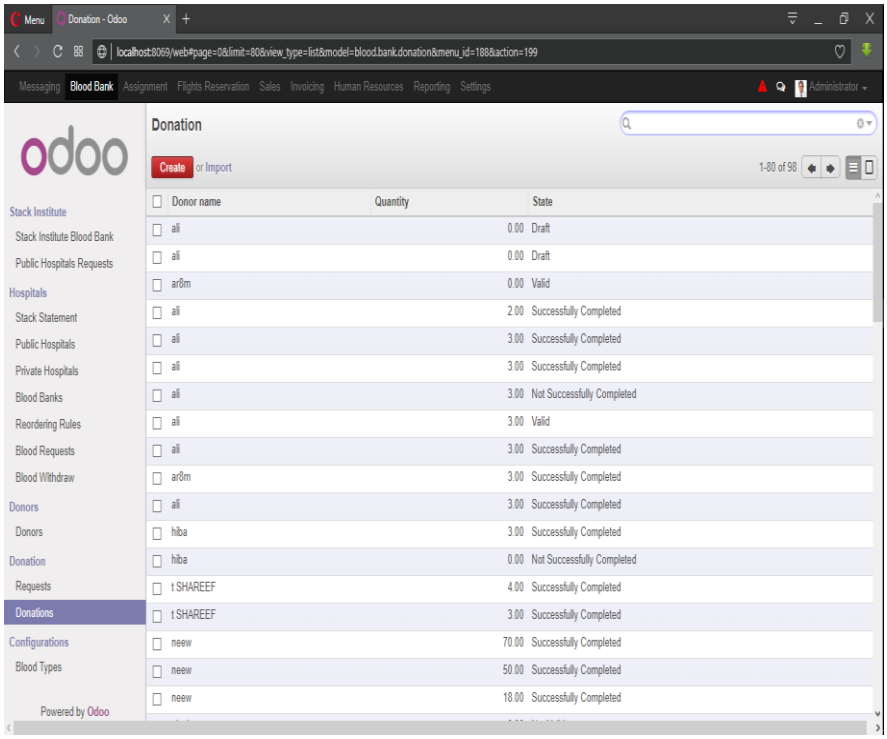


Figure 4.26 Donations.

4.2.5.3.1 CREATE DONATION

Stack user, public hospital user are able to perform a blood donation.

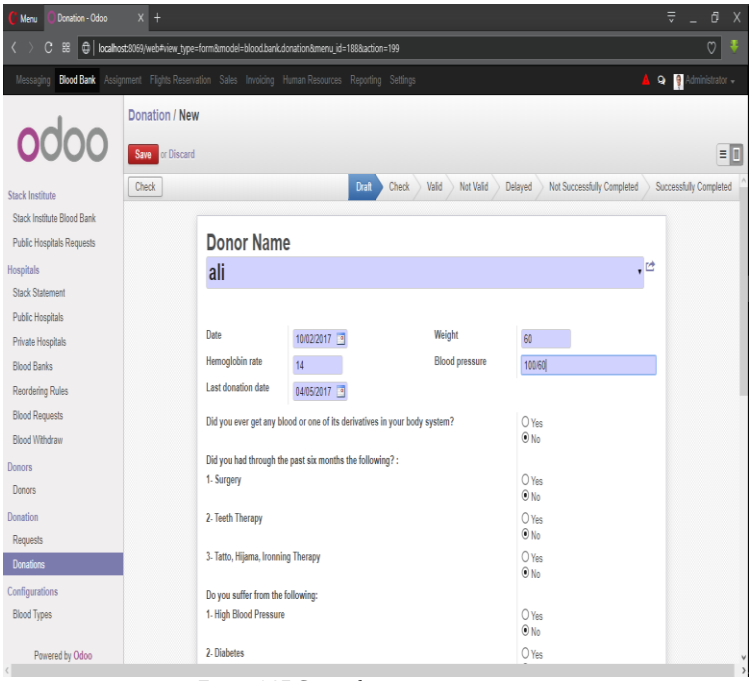


Figure 4.27 Create donation.

4.2.5.3.2 CHECKING DONOR

On this screen the administrator enters the donor's medical checking results and determining whether the donor is valid for donation process or not.

If the donor is not valid for donation the administrator must place a note with the medical reasons that prevented the donor from donation.

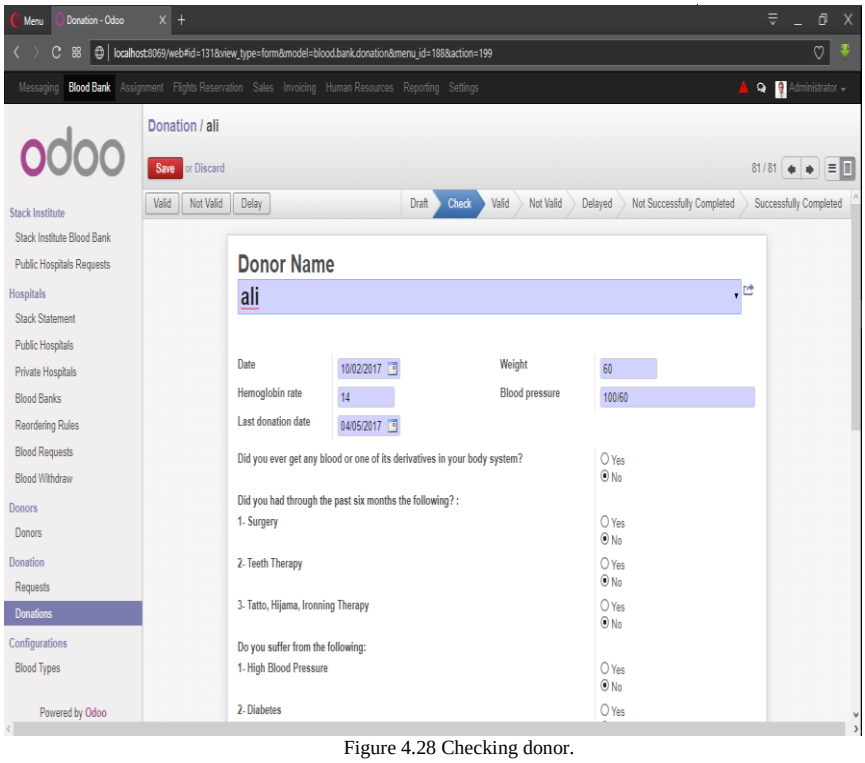


Figure 4.28 Checking donor.

4.2.5.3.3 COMPLETING DONATION

After determining that the donor is medically valid for donation, we determine the donation up on volunteer or a specific request.

If volunteer the blood donation process must be implemented at stack blood bank.

If the donation up on a specific request the administrator pick the request from the requests list that the patient hopefully want to donate for

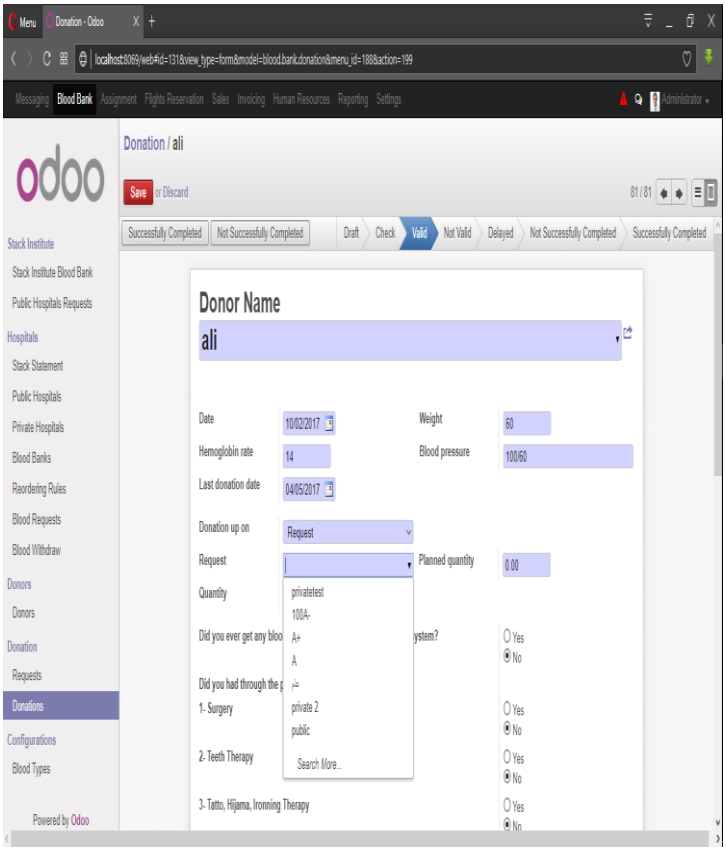


Figure 4.29 Completing donation.

4.2.5.3.4 DONATION VIEW WHEN COMPLETED

Here is a view for a completed donation.

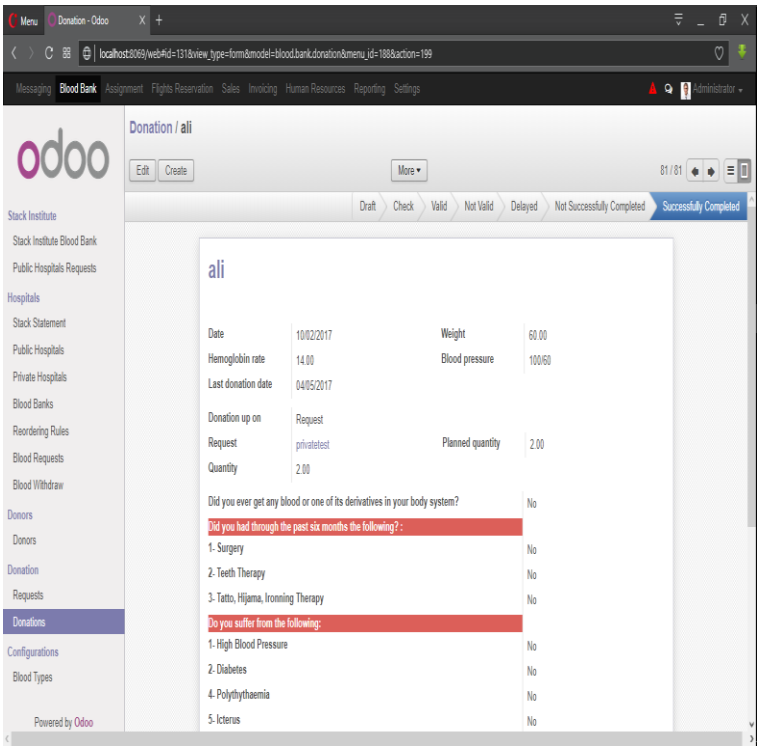


Figure 4.30 Donation view when completed.

4.2.5.4 BLOOD TYPES

Stack user, public hospital user, private hospital user are able to monitor all the blood types with its exact quantity in every hospital that registered on the system.

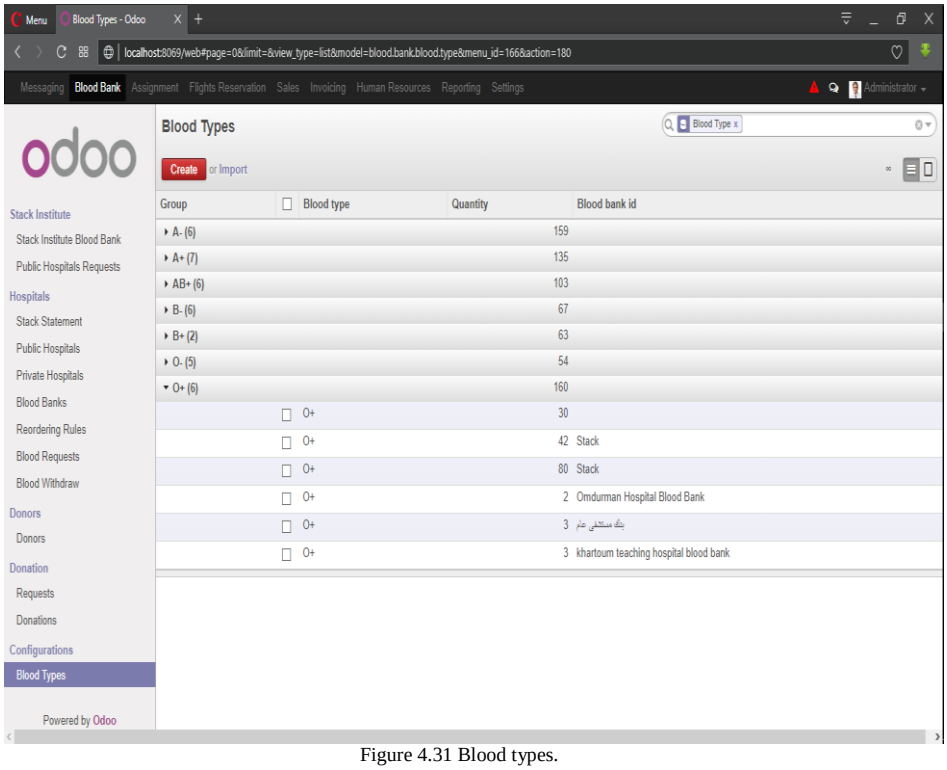


Figure 4.31 Blood types.

CHAPTER FIVE
RESULT

5.1 INTRODUCTION:

This chapter includes the result that we reached, after this system is been implemented into stack institute they will come out with the following results:

5.2 RESULTS

After applying our research idea we reach the following results:

- We designed a system that integrates all blood banks with stack blood bank institute.
- We categorized hospitals into private hospitals and public hospitals and applied the current stack's procedures on them.
- Our working system increased effectiveness by the automation of generating reports process for the private hospitals.
- Stack institute has been able to monitor all the blood types and it's quantity in every blood bank that registered on the system.
- Every hospital in the system is able to monitor all blood types at any time.
- All the donors are registered on the system with their personal data and every blood donation they made and every user is able to add a new donor whenever there is.
- The blood bank admin can determine a critical minimum quantity of specific blood type, when the quantity is down to that amount the system will generate a request with the missing quantity automatically to stack institute in order to raise the total quantity to the maximum quantity.
- Saves time and effort in the automation management of information.
- We made an android application to ease the communication process between donors, patients, and hospitals.

CHAPTER SIX
CONCLUSION AND RECOMMENDATIONS

6.1 INTRODUCTION

This chapter includes conclusion that we came out with, and recommendation for some features that are not included in our scope for the next developers.

6.2 CONCLUSION

Perfect software does not exist, but we did our best to develop a system that introduces best practices for stack institute blood bank.

The system has been developed to manage all blood banks and blood transfusions by using on demand open object, the main concept of this research is to integrate all blood banks in one system so we achieve better performance and monitor all blood types at a time.

We made an android application to link the patient with all possible donors at the exact time.

6.3 RECOMMENDATIONS

We developed a completed functions as the paper working functions at stack institute blood bank and we added additional features to the working system. Developers who want to start from where we ended, here are some recommendations:

- Complementing other standard modules for stack institute blood bank and link it with our work in order to make a full ERP for stack institute blood bank.
- Improve android application efficiency by linking the location automatically in order to determine the nearest blood bank that contains your blood type.
- Adding medicine determination system that determine where exactly is your medicine available at, in order to make a complete health and medical system.
- Adding blood derivatives donation on the system and it includes: Plasma, Platelets, and Red blood cells.

References

[1] GivingbloodAvailable: http://givingblood.org/about-blood/history-of-blood-banking.aspx.13septemper2017

[2] HematologyAvailable:http://www.hematology.org/Patients/Basics/5583.aspx.13septemper2017

[3] Daniel ReisOdoo Development Essentials2015

[4] MHD Fawaz EnayaAn Experimental Performance Comparison of NoSQL and RDBMS Data Storage Systems in the ERP System Odoo2016

[5] SRCN Senanayake and ADAI Gunesekeva Designing an Information System Model for National Blood Bank of Sri LankaSri Lanka2015

[6] Ibrahim Fawze Akar , Tukur Anas Mohammad , Mohamed Ismail ZCBBR Centralized Blood Bank Repository Implementation with Java/JSP and Integrated with mobile app using phonegap (Case Study on Developing countries) Malaysia 2015

[7] BLOOD DONATION SYSTEM FOR ONLINE USERSMyanmar2015

[8] Steven Bird , Ewan Klein , Edward Loper Natural Language Processing with python.United State America2009

[9] Searchmicroservices,Available:http://searchmicroservices.techtarget.com/definition/XML-Extensible-Markup-Language27july2017

[10] RamcoAvailable:http://www.ramco.com/benefits-of-erp-software 4Septemper2017

[11] What is AndroidAvailable:https://www.javatpoint.com/android-what-wshere-and-why.26july2017

[12] Android Studio Tutorial : An IntroductionAvailable:http://www.developer.com/ws/android/android-studio-tutorial-an-introduction.html14may2017

[13] postgresqltutorialAvailable:http://www.postgresqltutorial.com/what-is-postgresql/27july2017

[14] zbeanztechAvailable:http://www.zbeanztech.com/blog/qweb-report.10Septemper2017

[15] docs.sublimetextAvailable:http://docs.sublimetext.info/en/latest/intro.html.18Septemper2017

APPENDICES

APPENDIX A

1. EXPLAIN FORMS UML

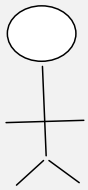
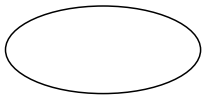
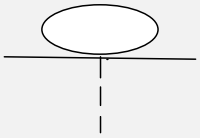
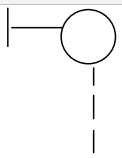
Explain Figure	Name Figure	Figure
An actor is anything outside the system that interacts with the system to complete a task.	Actor	
Each **use case** on the diagram represents a single task that the system needs to carry out.	Uses Case	
A system components	Object	
It is usual to display use cases as being inside the system and actors as being outside the system.	Boundary	

Figure A.1 Explain forms UML.

2. UML RELATIONSHIPS

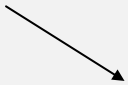
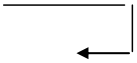
Explain Figure	Name Figure	Figure
The **association** is the link that is drawn **between actor and a use case.** It indicates which actors interact with the system to complete the various tasks.	Associate	
Use the **includes** link to show that one use case includes the task described by another use case.	Include	
Use the Extends link to show that one use case extends the functionality of another use case at specific Extension Points.	Extend	
A self -message can represent a recursive call of an operation or one method calling another method belong to the same object .	Self-message	
The sender sends the message**.**	Message	
Results of procedure calls	Return-massage	

Figure A.2 UML relationship.