



**INSTITUTE FOR ADVANCED COMPUTING  
AND SOFTWARE DEVELOPMENT (IACSD),  
AKURDI, PUNE**

Documentation On

**RaktKosh Online Blood  
Bank Portal**

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## **ABSTRACT**

RaktKosh.com deals with the maintenance of the blood bank and blood donor's details. It gives benefit to donor for registration and getting appointment for blood donation. The blood banks will be provided with the username & password to see the donor's details.

The main goal is to provide blood donation service to the peoples. On Internet there are less or none systems are available for blood donation. Blood banks uses physical files to store the records which are destructible. RaktKosh.com is a website that is designed to store, process, retrieve and analyse information concerned with the administrative and inventory management within a blood donation.

This project aims at maintaining all the information pertaining to blood donors, different blood groups available in each blood bank and help them manage in a better way. Project Aim is to provide transparency in this field, make the process of obtaining blood from a blood donation hassle-free and corruption-free and make the system of blood donation management effective.

## **ACKNOWLEDGEMENT**

I take this occasion to thank God, almighty for blessing us with his grace and taking our endeavor to a successful culmination. I extend my sincere and heartfelt thanks to our esteemed guide, **Mrs. Geeta Darunte** for providing me with the right guidance and advice at the crucial juncture and for showing me the right way. I extend my sincere thanks to our respected **Centre Co-Ordinator Mr. Rohit Puranik**, for allowing us to use the facilities available. I would like to thank the other faculty members also, at this occasion. Last but not the least, I would like to thank my friends and family for the support and encouragement they have given me during the course of our work.

**Dhiraj Shinde (233087)**

**Shrinivas Shirke (233090)**

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## **1.INTRODUCTION.**

Blood donation is required during an organ transplant, accidents, cancer treatment etc. For blood donation, one needs to check for a donation camp or needs to visit blood bank. The Manual Blood donation system has many disadvantages which includes, it is too time consuming, often leads to error prone results, consumes lot of manpower, lacks donor information, retrieval of data takes a lot of time, percentage of accuracy is less.

In the time of emergency, it becomes difficult to approach the right donor. Rare blood groups are not available all the time at all blood banks and recipients find difficulties to track the right blood donor.

To overcome this problem, we proposed RaktKosh.com system. There are many blood donation management systems, but these systems only maintain the information of blood banks and donors. This online blood bank portal maintains the list of blood donors

The online blood bank portal is a  $24 \times 7$  system provides services to blood banks and other users. The system is easy to maintain all the information about the blood donor. Proposed work provides services to persons who pursue donors who are willing to donate blood.

### **Problem Statement:**

- With the growing population and the advancement in medical science, the demand for blood has also increased.
- Due to the lack of communication between the blood donors and the blood recipients, most of the patients in need of blood do not get blood on time and hence they may lose their lives.
- Older adults, who account for a large percentage of donations, are aging and younger donors are not replacing them quickly enough.
- So many people die due to scarcity of blood every year.

### **Aims and Objective:**

The goal of the project is to develop a website for blood bank and donors to manage information about their donors and blood stock. The main objectives of this website development can be defined as follows:

1. To develop a system that provides functions to support donors to view and manage their information conveniently.
2. To maintain records of blood donors, blood donation information and blood stocks in a centralized database system.
3. To inform donors of their blood result after their donation.
4. To support searching, matching and requesting for blood convenient for administrators.
5. To manage the details of Blood, Donor, Blood Group, Blood Bank, Stock.

## **2.OVERALL DESCRIPTION.**

### **Proposed Methodology:**

The objective of RaktKosh.com is to provide an online web portal for blood availability, donate blood, check nearby blood bank and stock of blood. The incremental models that are chosen in developing this project. This model has been selected because project can be developed through cycle of phase. The development of the project is that it must follow the phase that is a phase at a time. If there is any correction, it can be done in the middle of the process. Incremental model included five phases which are requirement analysis, design, implementation and unit testing, integration and system testing and operation.

### **Operating Environment:**

#### **Server Side:**

**Processor:** Intel® Xeon® processor 3500 series

**HDD:** Minimum 500GB Disk Space

**RAM:** Minimum 4GB

**OS:** Windows 10, Linux 6

**IDE:** Open jdk 11.0.12 2021-07-20

OpenJDK Runtime Environment Microsoft-25199 (build 11.0.12+7)

OpenJDK 64-Bit Server VM Microsoft-25199 (build 11.0.12+7, mixed mode)

**Database:** MySQL-8.0.30

#### **Client Side (minimum requirement):**

**Processor:** Intel Dual Core

**HDD:** Minimum 80GB Disk Space

**RAM:** Minimum 2GB

**OS:** Windows 7, Linux

**Design and Implementation Constraints:**

- The application will use JavaScript, jQuery and CSS as main web technologies.
- HTTP and FTP protocols are used as communication protocols. FTP is used to upload the web application in live domain and the client can access it via HTTP protocol.
- Several types of validations make this web application a secured one and SQL Injections can also be prevented.
- Since RaktKosh.com-Online blood bank web Portal is a web-based application, internet connection must be established.
- The RaktKosh.com-Online blood bank web Portal will be used on PCs and will function via internet or intranet in any web browser.



### **3. Requirements Specification.**

#### **External Interface Requirements:**

##### User Interfaces:

- All the users will see the same page when they enter in this website. This page asks the Donor, Admin and Blood Bank a email and a password.
- After being authenticated by correct email and password, donor, admin and blood bank will be redirect to their corresponding profile where they can do various activities.
- The user interface will be simple and consistence, using terminology commonly understood by intended users of the system. The system will have simple interface, consistence with standard interface, to eliminate need for user training of infrequent users.

##### Hardware Interfaces:

- No extra hardware interfaces are needed.
- The system will use the standard hardware and data communication resources.

This includes, but not limited to, general network connection at the server/hosting site, network server and network management tools.

##### Application Interfaces:

##### **Web Browser:**

The system is a web-based application; clients need a modern web browser such as Mozilla Firebox, Internet Explorer, Opera, and Chrome. The computer must have an Internet connection in order to be able to access the system.

##### Communications Interfaces:

- This system uses communication resources which includes but not limited to, HTTP protocol for communication with the web browser and web server and TCP/IP network protocol with HTTP protocol.
- This application will communicate with the database that holds all the booking information. Users can contact with server side through HTTP protocol by means of a function that is called HTTP Service. This function allows the application to use the data retrieved by server to fulfil the request fired by the user.

## **4. System Requirement Specification**

### **Objective (Purpose):**

- The focus of this system is to provide an online easy access to blood stock and manage blood stock data available, so that using this blood bank management system people can search blood group available they need.
- It will replace the paperwork.
- It keeps the records of Donor, User, Blood bank, Blood stock available.

### **Functional Requirements:**

#### **1. Admin:**

- Manage User, Donor, and Organization Registrations:
  - Admin should have the ability to register new users, donors, and organizations in the system.
- View Information:
  - Admin should be able to view the information of registered users, donors, and blood banks.

#### **2. User:**

- Check Blood Availability:
  - Users should be able to check the availability of blood.
- Register:
  - Users should have the option to register for an account in the system.
- Login:
  - Registered users should be able to log in to their accounts.

#### **3. Donor:**

- Register:
  - Donors should have the ability to register for an account in the system.
- Login:
  - Registered donors should be able to log in to their accounts.
- Book an Appointment to Donate Blood:
  - Donors should be able to schedule an appointment to donate blood.

#### **4. Blood Bank:**

- Registration:
  - Organizations should be able to register for an account in the system.
- Login:
  - Registered organizations should be able to log in to their accounts.
- Schedule Blood Donation Campaign:
  - Organizations should have the ability to schedule a blood donation campaign, specifying details such as date, time, location, and requirements

**Non-Functional Requirements:****Security:**

- Users and Donors information should be kept confidential under security system.
- The system automatically logs out after the period of inactivity.

**Reliability:**

- System will be reliable enough to provide intact information about to user and donor.
- Once the blood is donated donor will receive the notification on the same.

**Availability:**

- Users and Donors can access this management system from anywhere from this web application.
- System should be available 24\*7 hrs.

**Performance:**

- Basic system configuration is enough to access the web application.
- Users and Donors can access the web application from mobile phones with minimal performance of the same.
- Performance of the system remains same regardless of platform either it is laptop or mobile phone.

**Portability:**

- PDA: Portable Device Application.
- System will provide portable User Interface (HTML, CSS, JS) through users will be able to access online portal.
- System can be deployed to single server, multi-server, to any OS, Cloud (Azure or AWS or GCP).

**Accessibility:**

- Only registered person will be able to see available blood stock after authentication.
- Admin will be able to view all available blood stock and registered blood bank and users' information.

**Modularity:**

- System will design and developed using reusable, independent or dependent scenarios in the form of modules
- These modules will be loosely coupled and highly cohesive.

**Maintainability:**

- System should be easy to maintain and upgrade. Commercial database software will be used to maintain system data persistence. Separate environment will be maintained for production, testing and development.

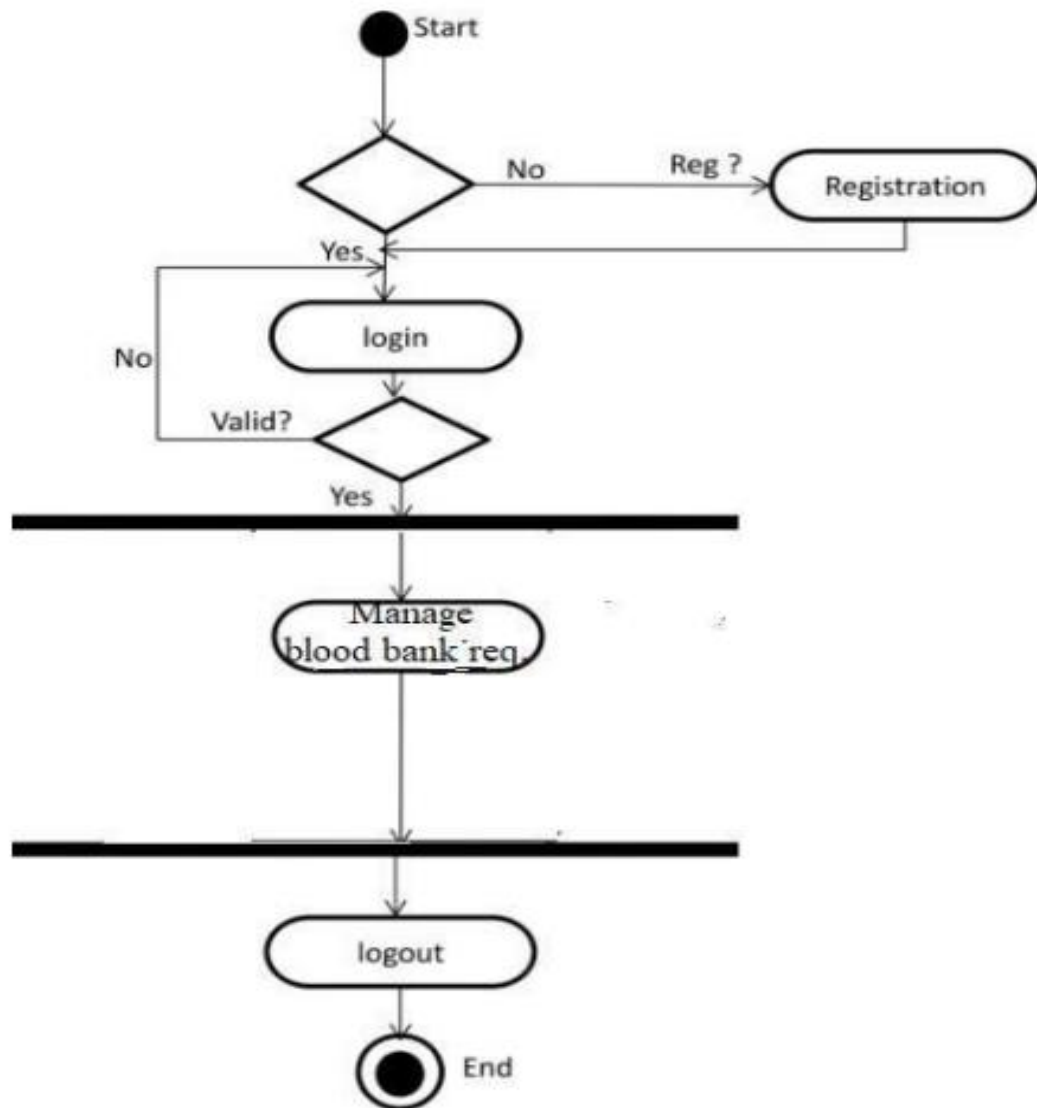
**Scalability:**

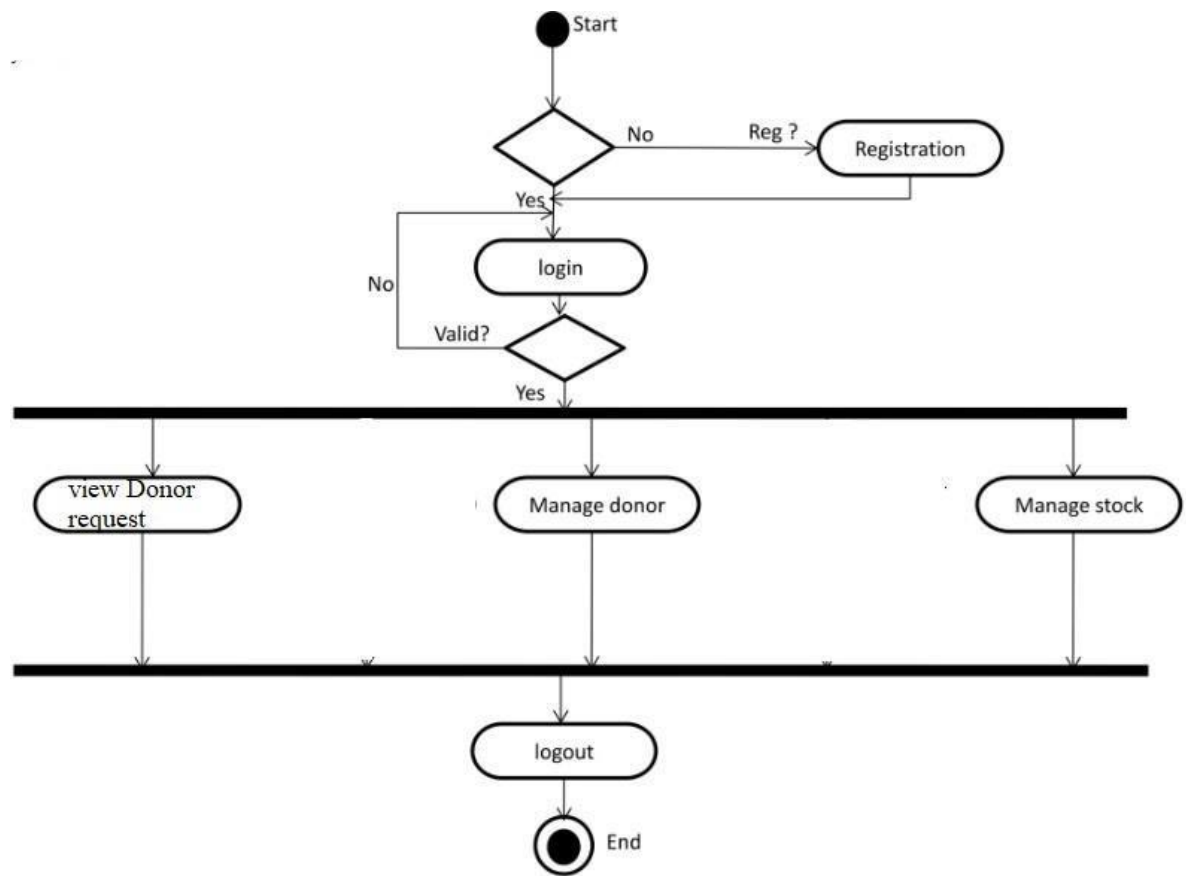
- System should be scalable as donor base, user base and blood bank increases system should provide consistent user experience.

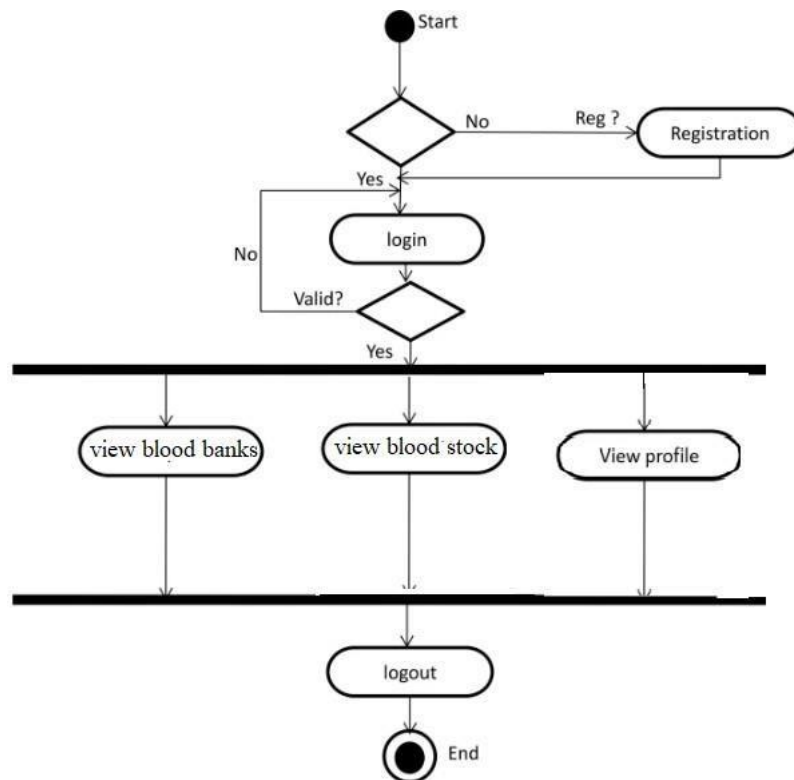
## 5. System Diagrams.

- **Activity Diagram:**

Admin Activity

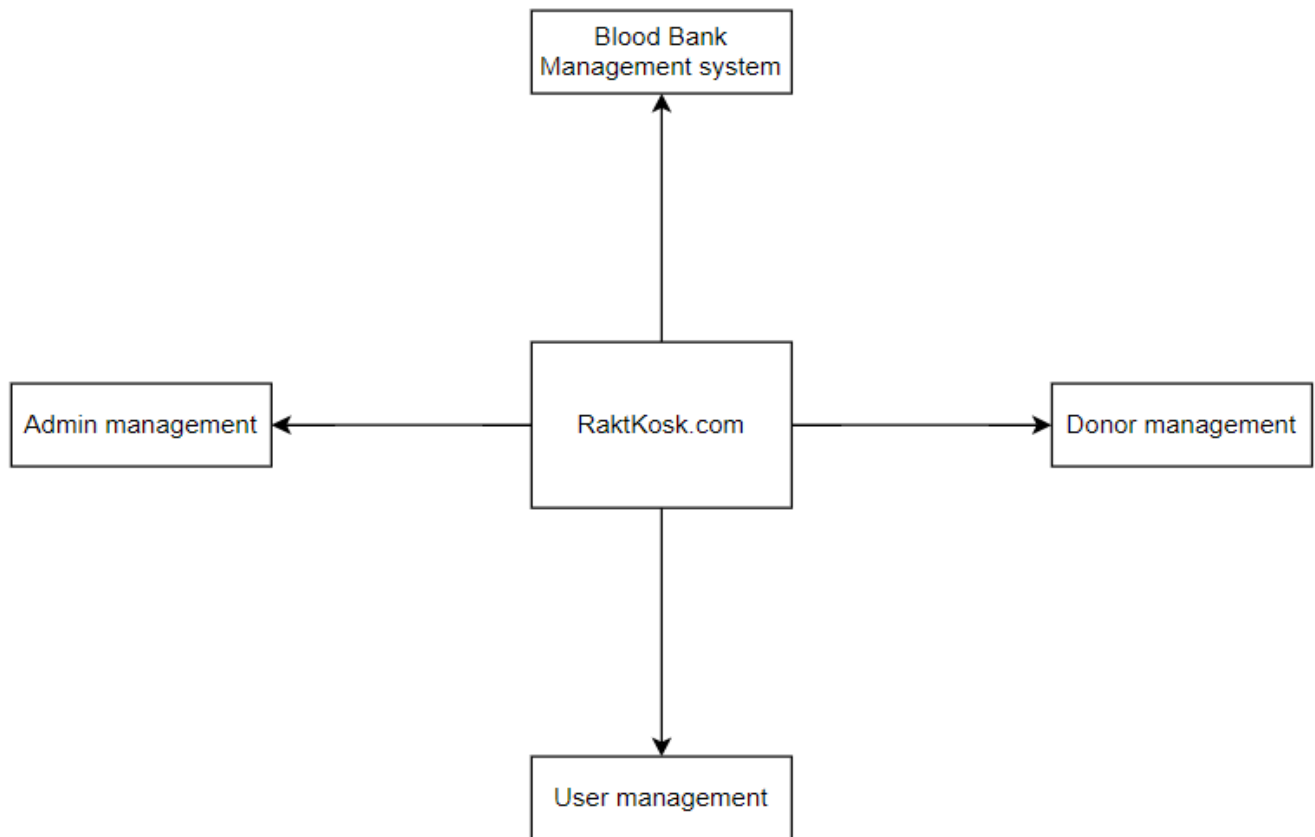


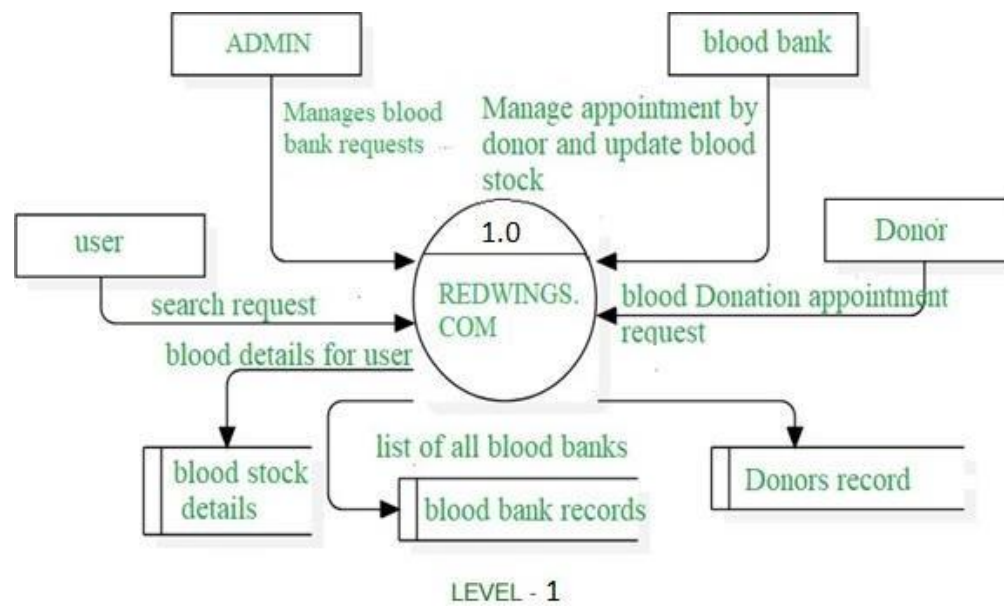
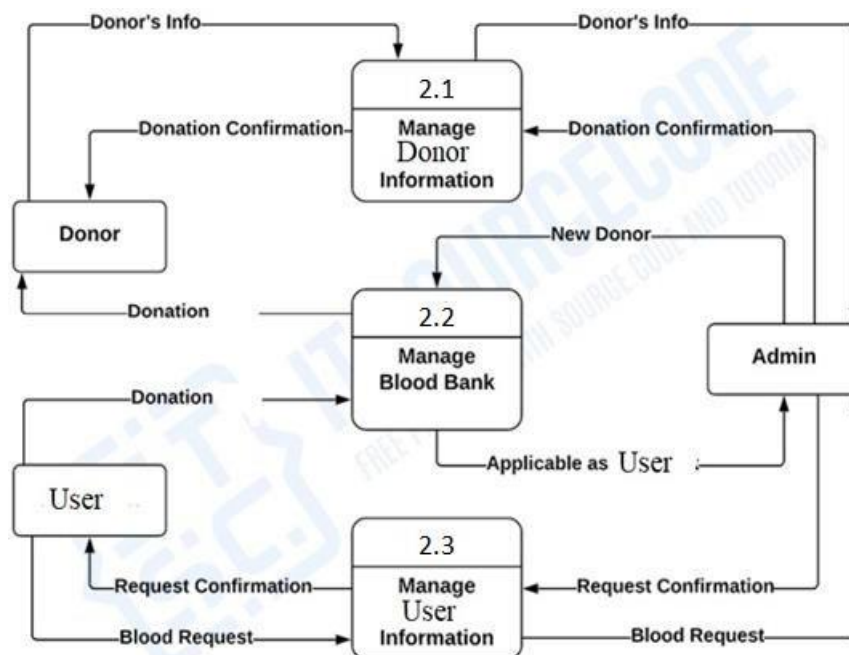
Blood Bank Activity:

User Activity:

- **Data Flow diagram:**

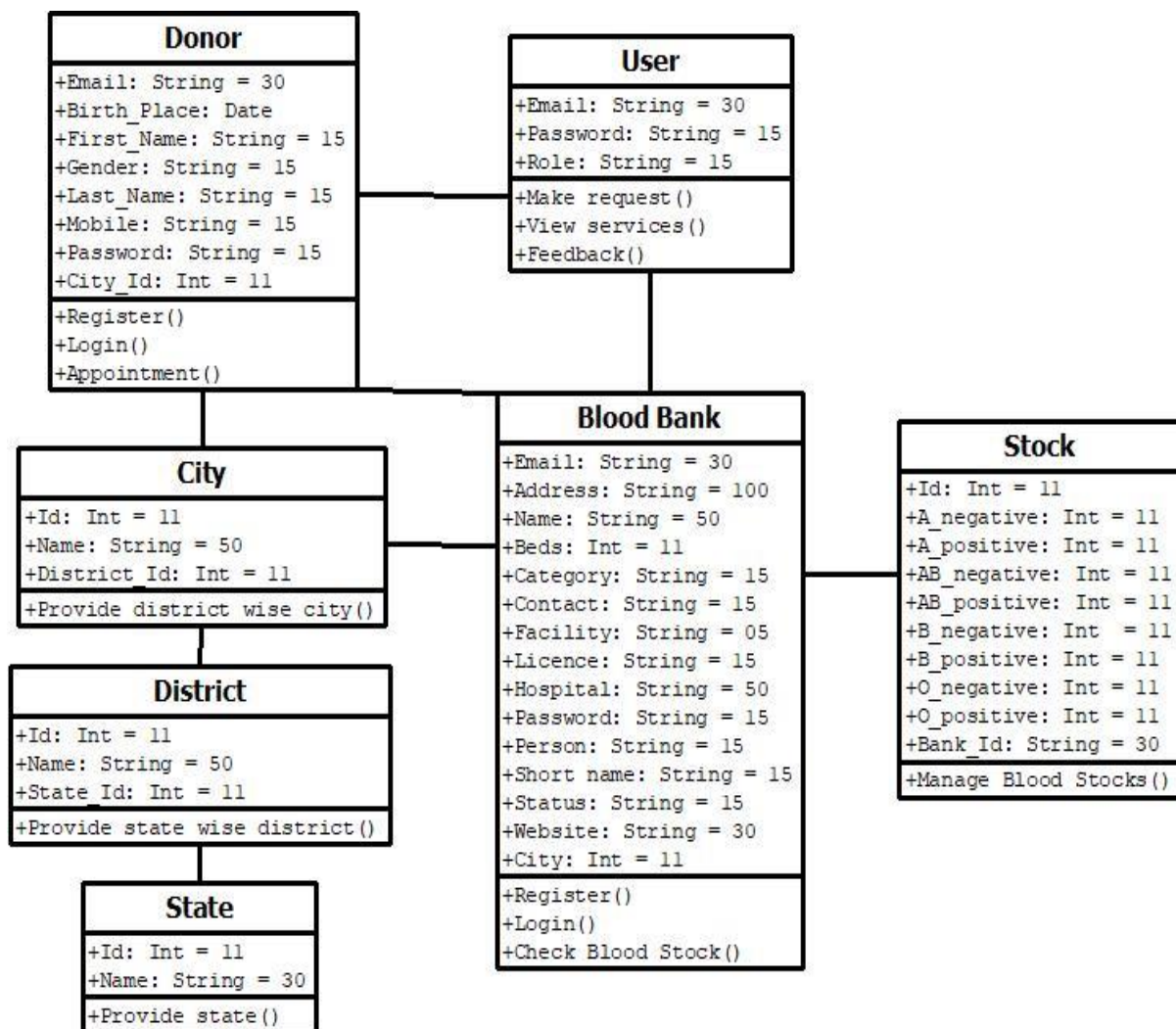
Zeroth level DFD:



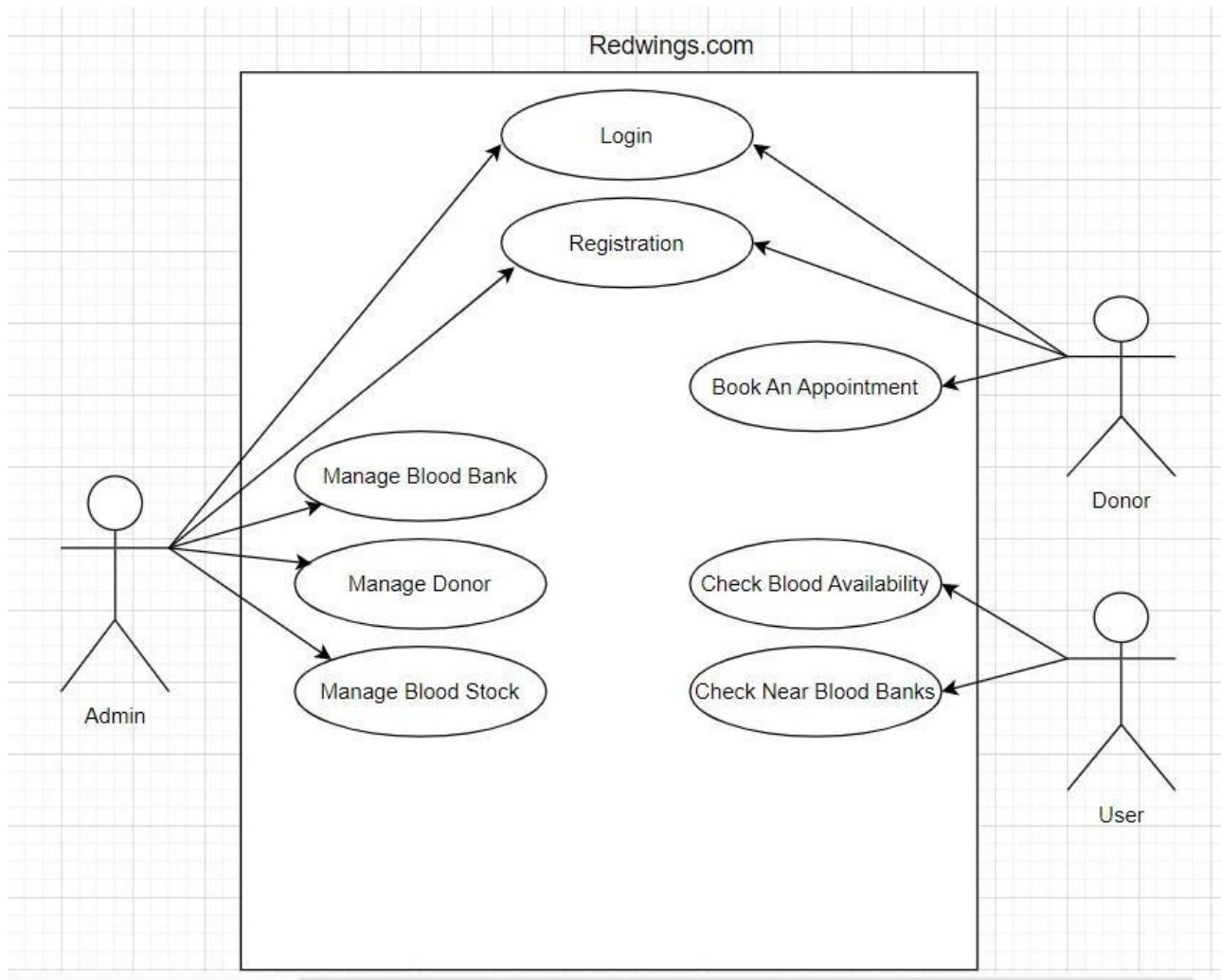
First Level DFD:Second Level DFD:



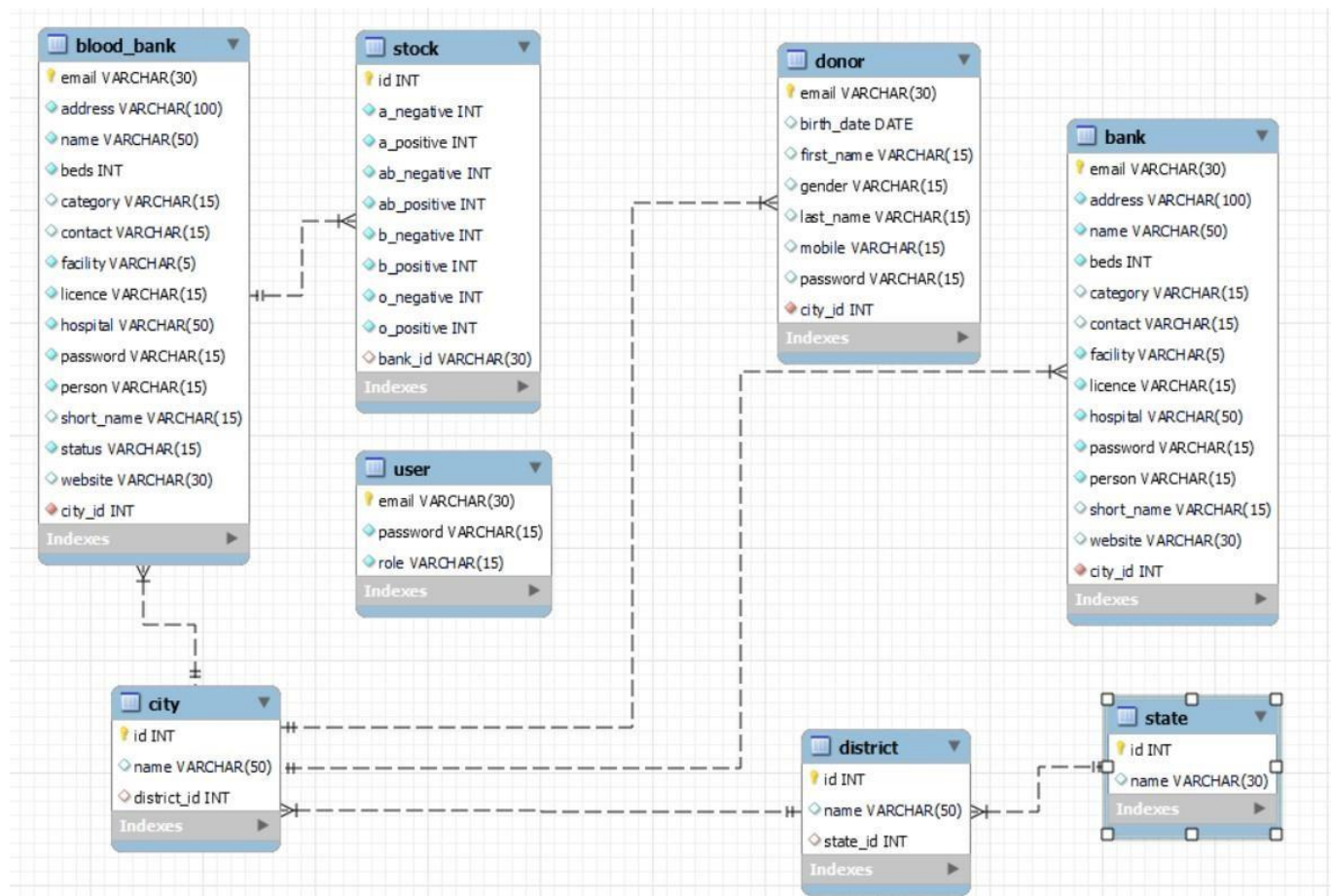
- Class Diagram:**

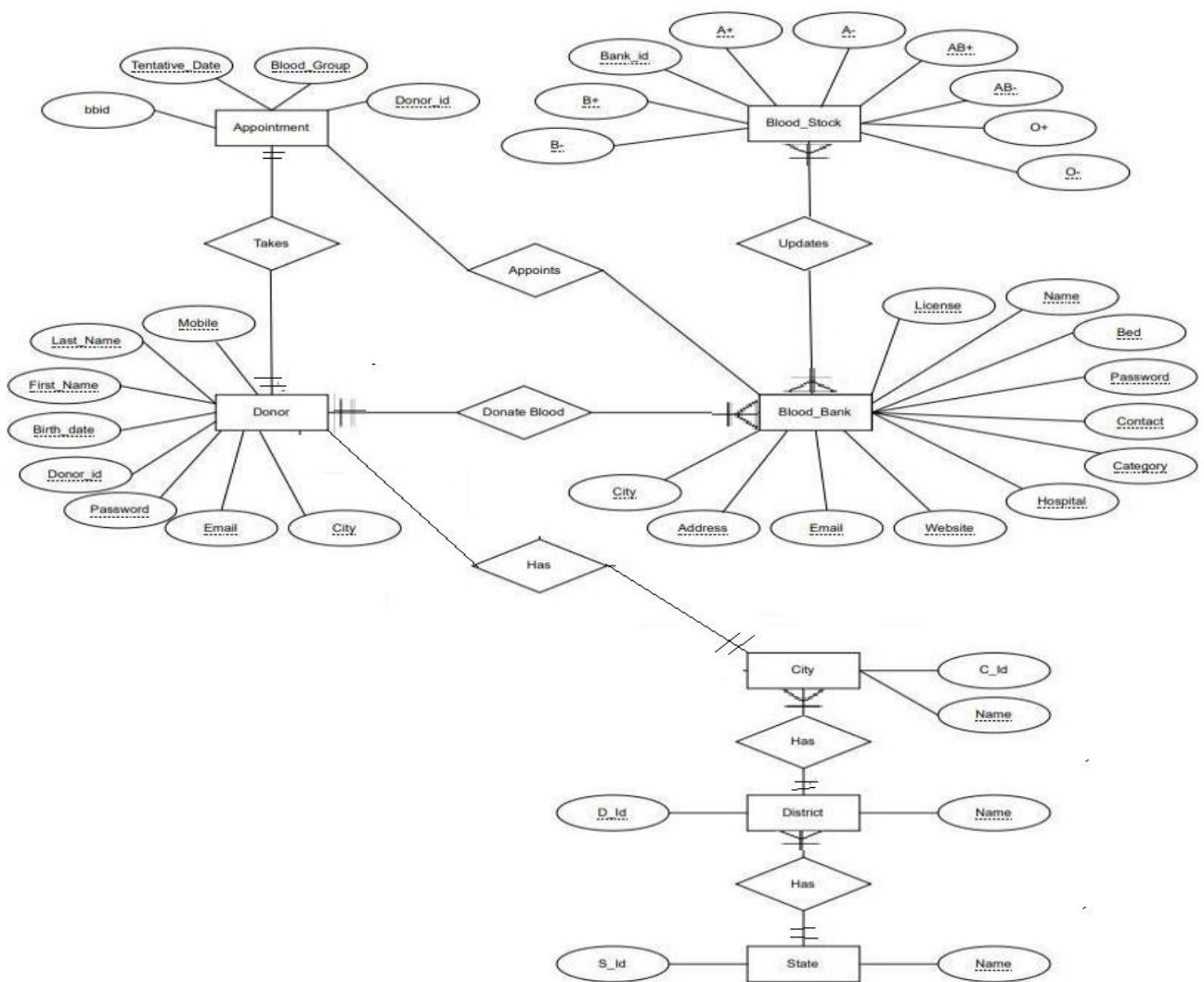


- **Use Case Diagram:**



• **ER Diagram:**





## 6. Table Structure.

There are seven tables created in my project which are attached below

### 1. Blood\_bank:

```
mysql> desc blood_bank;
+-----+-----+-----+-----+-----+-----+
| Field      | Type          | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| email      | varchar(30)   | NO   | PRI | NULL    |       |
| address    | varchar(100)  | NO   |     | NULL    |       |
| name       | varchar(50)   | NO   |     | NULL    |       |
| beds       | int           | NO   |     | NULL    |       |
| category   | varchar(15)   | YES  |     | NULL    |       |
| contact    | varchar(15)   | YES  | UNI | NULL    |       |
| facility   | varchar(5)    | NO   |     | NULL    |       |
| licence    | varchar(15)   | NO   | UNI | NULL    |       |
| hospital   | varchar(50)   | NO   |     | NULL    |       |
| password   | varchar(15)   | NO   |     | NULL    |       |
| person     | varchar(15)   | NO   |     | NULL    |       |
| short_name | varchar(15)   | YES  |     | NULL    |       |
| status     | varchar(15)   | NO   |     | NULL    |       |
| website    | varchar(30)   | YES  |     | NULL    |       |
| city_id    | int           | NO   | MUL | NULL    |       |
+-----+-----+-----+-----+-----+-----+
15 rows in set (0.03 sec)
```

### 2. City:

```
mysql> desc city;
+-----+-----+-----+-----+-----+-----+
| Field      | Type          | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| id         | int           | NO   | PRI | NULL    | auto_increment |
| name       | varchar(50)   | YES  |     | NULL    |       |
| district_id | int           | YES  | MUL | NULL    |       |
+-----+-----+-----+-----+-----+-----+
3 rows in set (0.00 sec)
```

## 3.District:

```
mysql> desc district;
```

Field	Type	Null	Key	Default	Extra
id	int	NO	PRI	NULL	auto_increment
name	varchar(50)	YES		NULL	
state_id	int	YES	MUL	NULL	

3 rows in set (0.01 sec)

## 4.Donor:

```
mysql> desc donor;
```

Field	Type	Null	Key	Default	Extra
email	varchar(30)	NO	PRI	NULL	
birth_date	date	YES		NULL	
first_name	varchar(15)	YES		NULL	
gender	varchar(15)	YES		NULL	
last_name	varchar(15)	YES		NULL	
mobile	varchar(15)	YES		NULL	
password	varchar(15)	YES		NULL	
city_id	int	NO	MUL	NULL	

8 rows in set (0.01 sec)

## 5.State :

```
mysql> desc state;
```

Field	Type	Null	Key	Default	Extra
id	int	NO	PRI	NULL	auto_increment
name	varchar(30)	YES		NULL	

2 rows in set (0.01 sec)

## 6.Stock:

```
mysql> desc stock;
```

Field	Type	Null	Key	Default	Extra
id	int	NO	PRI	NULL	auto_increment
a_negative	int	NO		NULL	
a_positive	int	NO		NULL	
ab_negative	int	NO		NULL	
ab_positive	int	NO		NULL	
b_negative	int	NO		NULL	
b_positive	int	NO		NULL	
o_negative	int	NO		NULL	
o_positive	int	NO		NULL	
bank_id	varchar(30)	YES	MUL	NULL	

10 rows in set (0.00 sec)

## 7.User:

```
mysql> desc user;
```

Field	Type	Null	Key	Default	Extra
email	varchar(30)	NO	PRI	NULL	
password	varchar(15)	NO		NULL	
role	varchar(15)	NO		NULL	

3 rows in set (0.01 sec)

## PROJECT SCREENSHOTS.

### 1. Home Page

**Compatible Blood Type Donors**

Blood Type	Donate Blood To	Receive Blood From
A+	A+ AB+	A+ A- O+ O-
O+	O+ A+ B+ AB+	O+ O-
B+	B+ AB+	B+ B- O+ O-
AB+	AB+	Everyone
A-	A+ A- AB+ AB-	A- O-
O-	Everyone	O-
B-	B+ B- AB+ AB-	B- O-
AB-	AB+ AB-	AB- A- B- O-

### TYPES OF DONATION

The human body contains five liters of blood, which is made of several useful components i.e. Whole blood, Platelet, and Plasma. Each type of component has several medical uses and can be used for different medical treatments. your blood donation determines the best donation for you to make.



## 2. Donor Registration Page

React App x +

localhost:3000/donor/register

RaktKosh Home Looking for Blood Want to Donate About us Register/Login

### Donor Registration

First Name Last Name

Shri Shirke

Looks good! Looks good!

Enter Birth Date Gender E-Mail

06-05-2000 Male shri@gmail.com

Looks good! Looks good! Looks good!

State District City

Maharashtra Ahamadnagar Shrigonda

Looks good! Looks good! Looks good!

Mobile Password Confirm Password

8444323423 \*\*\*\*\* \*\*\*\*\*

Looks good! Looks good! Looks good!

Register Already Registered ?

Hinjewadi Dang... Closed road

Search

ENG IN 14:42 30-08-2023

## 3. Donor Login Page

React App x +

localhost:3000/donor/login

RaktKosh Home Looking for Blood Want to Donate About us Register/Login

### Donor Login

E-Mail

shri@gmail.com

Looks good!

Password

\*\*\*\*\*

Looks good!

Login Not Registered ?

30°C Sunny

Search

ENG IN 14:43 30-08-2023

## 4. Donor Appointment Page

The screenshot shows a web browser window with the URL `localhost:3000/donor/donorAppointment`. The page title is "Donor Appointment". The form contains the following fields and values:

First Name	Last Name	Mobile
Dhiraj	Shinde	7972187018

Enter Birth Date	Gender	E-Mail
19-06-2000	Male	dhiraj@gmail.com

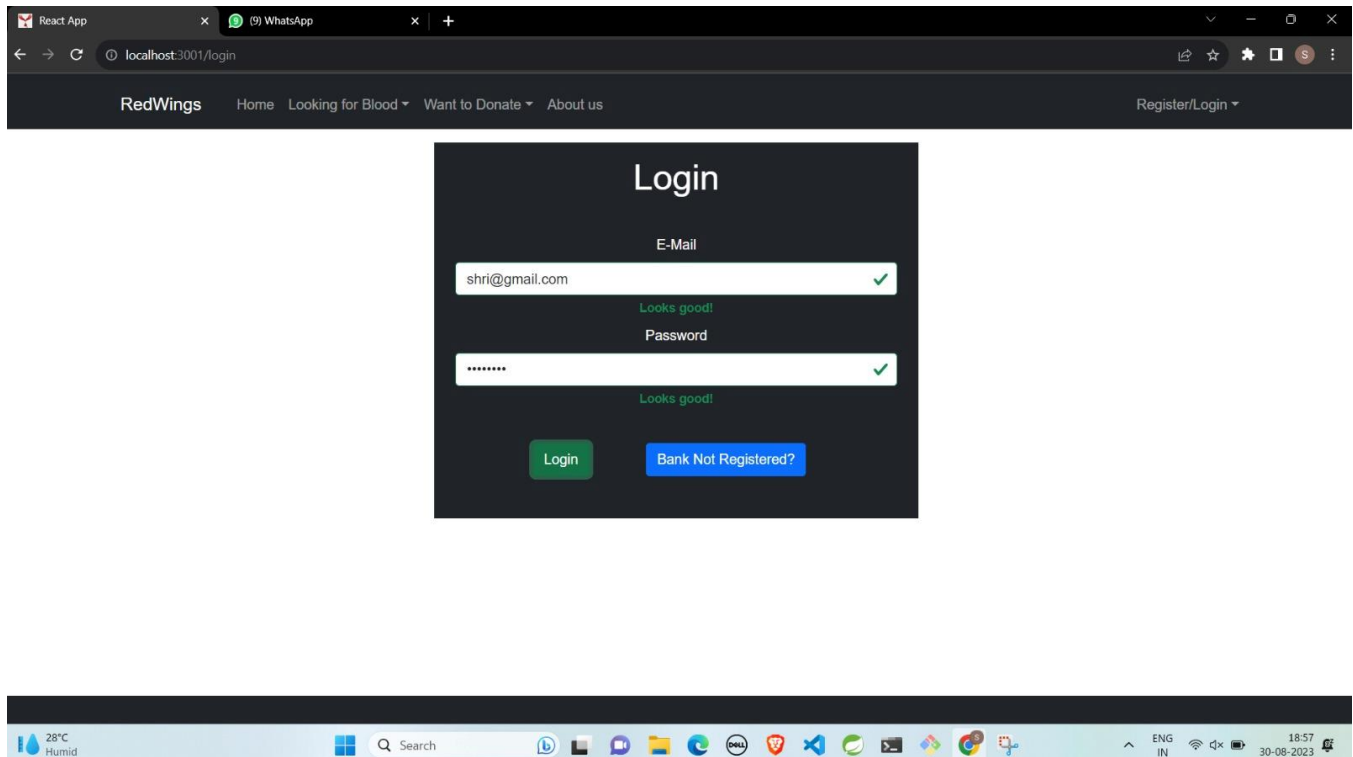
State	District	City
Maharashtra	Pune	Baramati

Enter Tentative Date	Blood Group	Blood Bank
26-08-2023	O +ve	Saramati

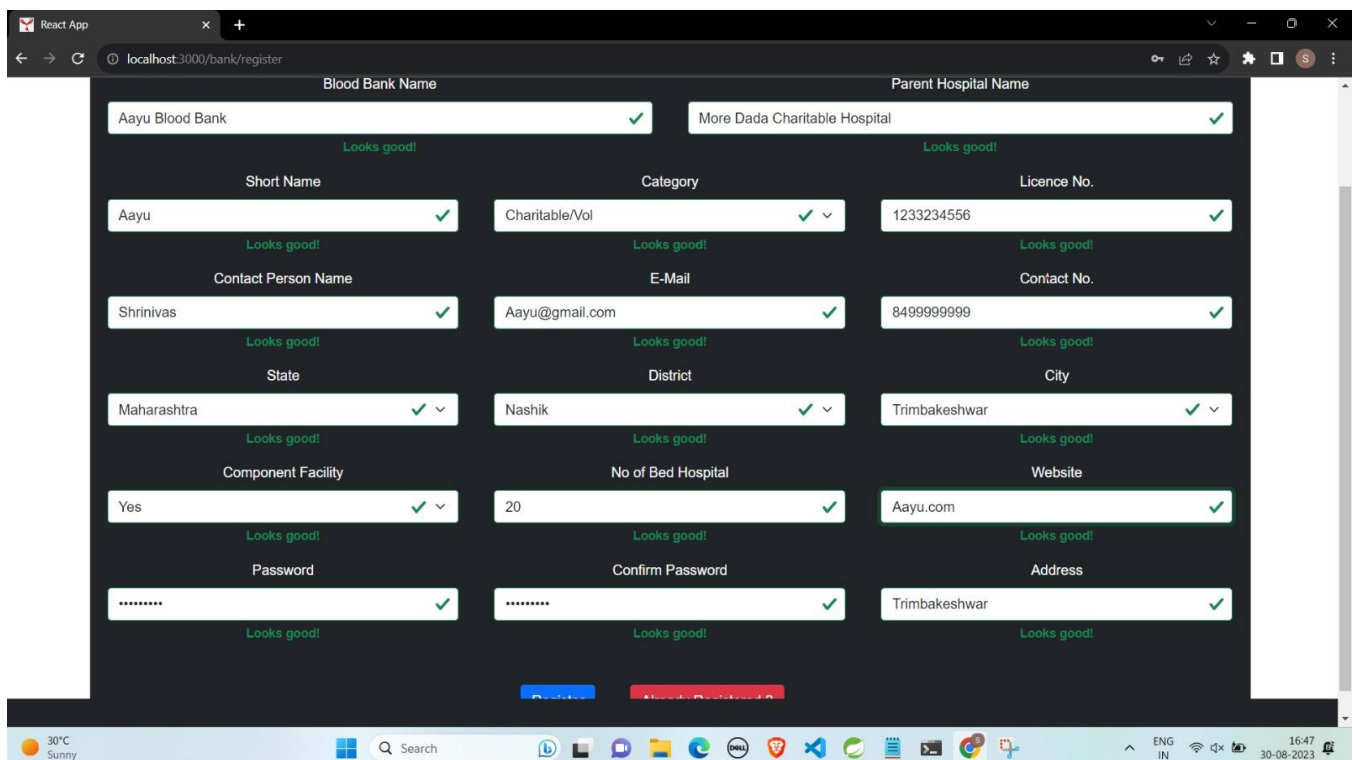
At the bottom of the form are two buttons: "Submit" (blue) and "Logout" (red).

## 5. Admin/BloodBank Login Page



The screenshot shows a web browser window with the URL `localhost:3001/login`. The page has a dark theme. At the top, there is a navigation bar with the text "RedWings" and links for "Home", "Looking for Blood", "Want to Donate", and "About us". On the right side of the navigation bar, there is a link "Register/Login". The main content area is a dark box with the title "Login". It contains two input fields: "E-Mail" with the value "shri@gmail.com" and "Password" with masked characters "\*\*\*\*\*". Both fields have a green checkmark and the text "Looks good!" below them. At the bottom of the login box, there are two buttons: a green "Login" button and a blue "Bank Not Registered?" button. The browser's taskbar at the bottom shows the system tray with a temperature of 28°C, humidity, and the date 30-08-2023.

## 6. Blood bank Registration Page

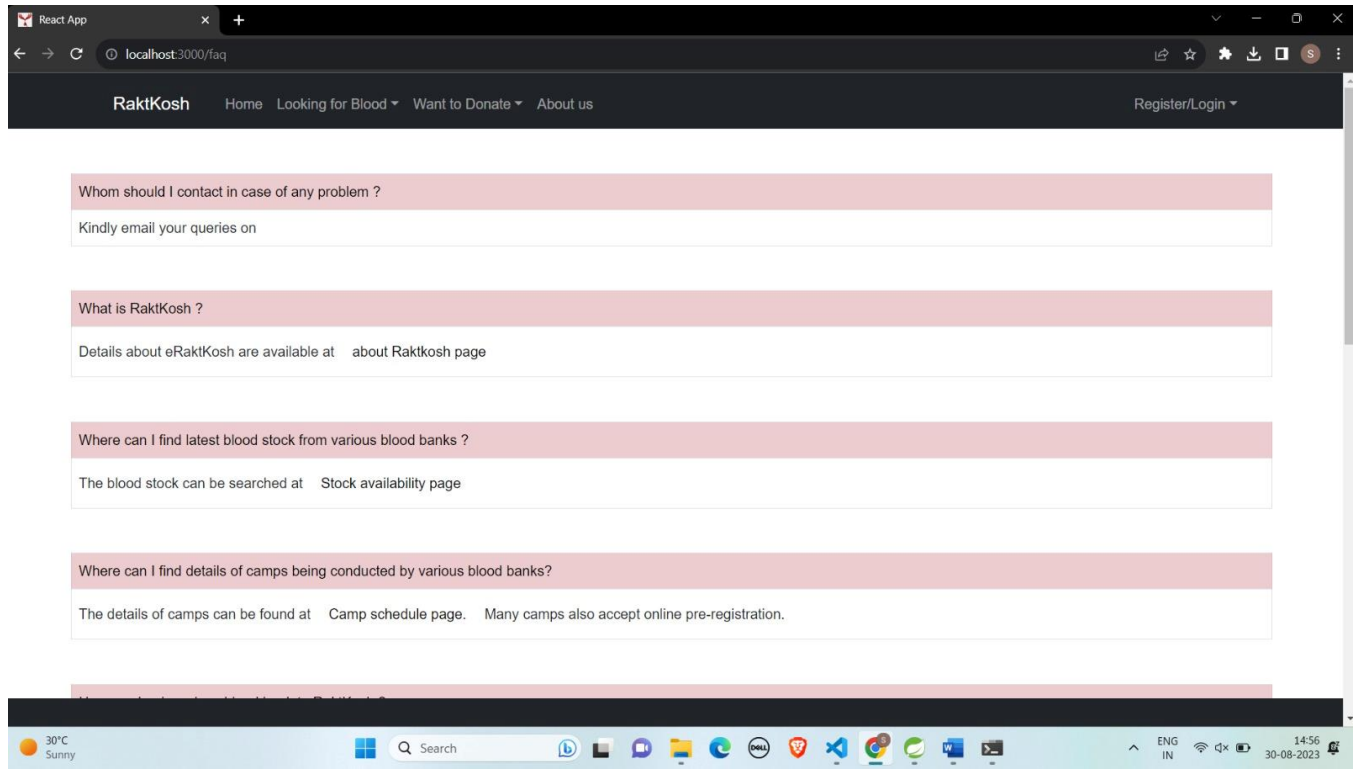


The screenshot shows a web browser window with the URL `localhost:3000/bank/register`. The page has a dark theme. It contains a registration form with the following fields and values:

- Blood Bank Name:** Aayu Blood Bank (Looks good!)
- Parent Hospital Name:** More Dada Charitable Hospital (Looks good!)
- Short Name:** Aayu (Looks good!)
- Category:** Charitable/Vol (Looks good!)
- Licence No.:** 1233234556 (Looks good!)
- Contact Person Name:** Shrinivas (Looks good!)
- E-Mail:** Aayu@gmail.com (Looks good!)
- Contact No.:** 8499999999 (Looks good!)
- State:** Maharashtra (Looks good!)
- District:** Nashik (Looks good!)
- City:** Trimbakeshwar (Looks good!)
- Component Facility:** Yes (Looks good!)
- No of Bed Hospital:** 20 (Looks good!)
- Website:** Aayu.com (Looks good!)
- Password:** \*\*\*\*\* (Looks good!)
- Confirm Password:** \*\*\*\*\* (Looks good!)
- Address:** Trimbakeshwar (Looks good!)

At the bottom of the form, there are two buttons: a blue "Register" button and a red "Cancel" button. The browser's taskbar at the bottom shows the system tray with a temperature of 30°C, sunny weather, and the date 30-08-2023.

## 7. Frequently Asked Questions



## 8. Search for blood Availability

The screenshot displays a web browser window with two tabs labeled 'React App'. The address bar shows 'localhost:3000/bloodAvailability'. The browser's bookmark bar includes 'Telegram Web', 'JavaDocs', 'Mock-Test-Test Con...', 'ChatGPT', 'Java(TM) EE 8 Docs', and '.NET documentatio...'. The page header for 'RaktKosh' includes links for 'Home', 'Looking for Blood', 'Want to Donate', and 'About us', along with a 'Register/Login' link.

The main content area is titled 'Blood Stock Availability'. It features four dropdown menus for 'State', 'District', 'City', and 'Blood Group', all currently set to 'All'. Each dropdown has a green checkmark and the text 'Looks good!'. A blue 'Search' button is positioned below these filters. To the left of the table is a search input field with the placeholder text 'Search..'. Below the filters, there is a table with the following data:

Blood Bank Name	A+	A-	B+	B-	AB+	AB-	O-	O+
hapseBloodBank	15	10	30	25	25	20	70	60
hapseBloodBank	10	0	0	0	0	0	0	0

At the bottom of the table, there is a pagination bar with the following controls: '<< Previous', 'Page 1 of 1', 'Go to page: 1', 'Next >>', and 'Show 5'.

The Windows taskbar at the bottom shows the system clock as 16:47 on 30-08-2023, with the language set to 'ENG IN'. The taskbar also displays various application icons including the Start menu, Search, and several open programs.

## 9. Search for Nearby Blood Bank

React App x React App x +

localhost:3000/bloodBankAvailability

Telegram Web JavaDocs Mock-Test-Test Con... ChatGPT Java(TM) EE 8 Docs .NET documentatio...

RaktKosh Home Looking for Blood Want to Donate About us Register/Login

### Blood Bank Availability

State All ✓ District All ✓ City All ✓

Looks good! Looks good! Looks good!

Search

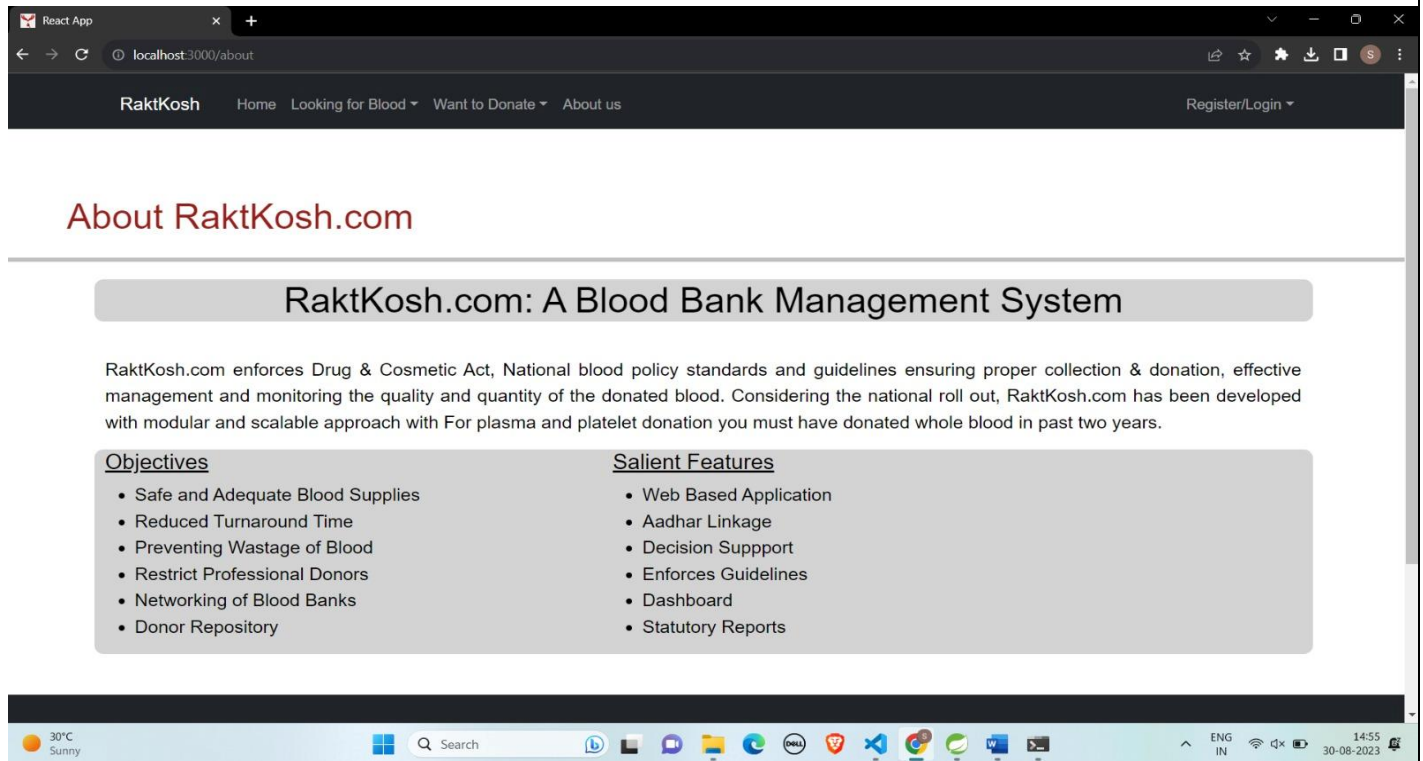
Search..

Email	Blood Bank Name	Parent Hospital	Short Name	Category	Licence	Person Name	Contact	City	Component Facility
hapse@gmail.com	hapseBloodBank	global hospital	hapse	PRIVATE	1234567788	guru	7972187055	Dholka	YES

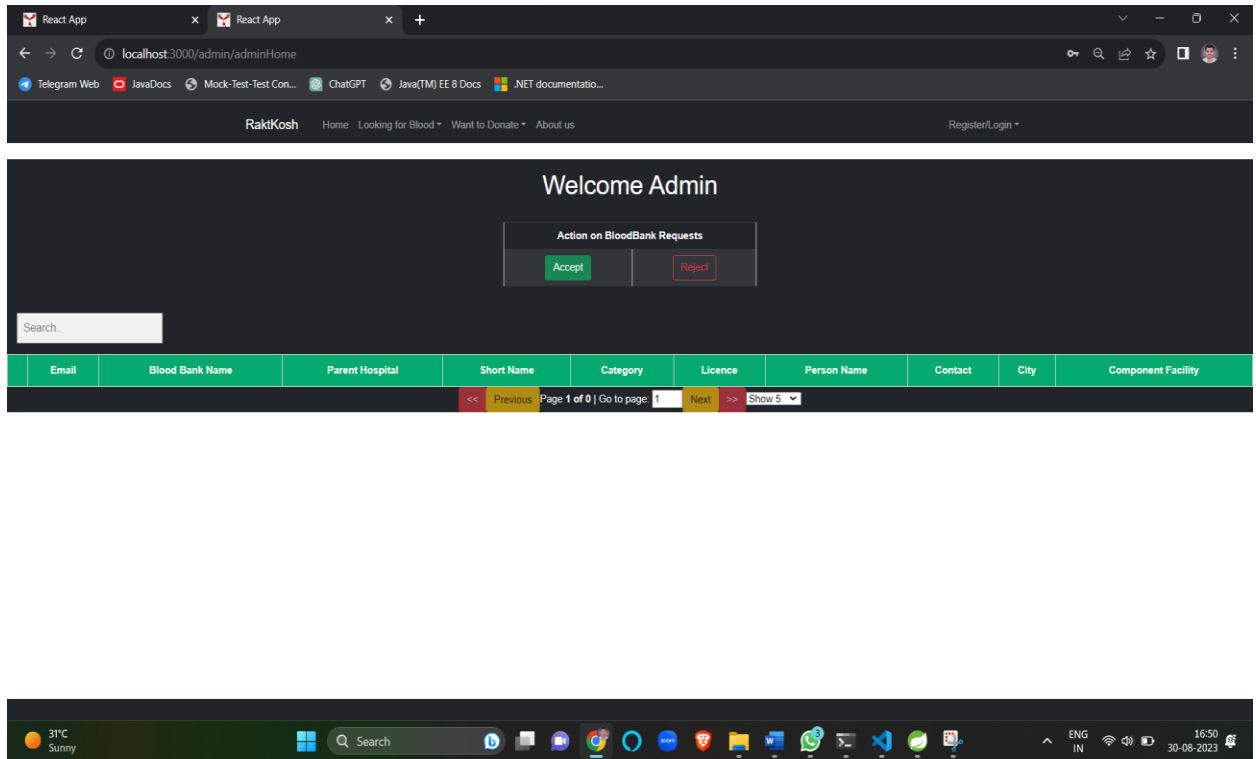
<< Previous Page 1 of 1 | Go to page: 1 Next >> Show 5

31°C Sunny Search ENG IN 16:48 30-08-2023

## 10. About Us Page

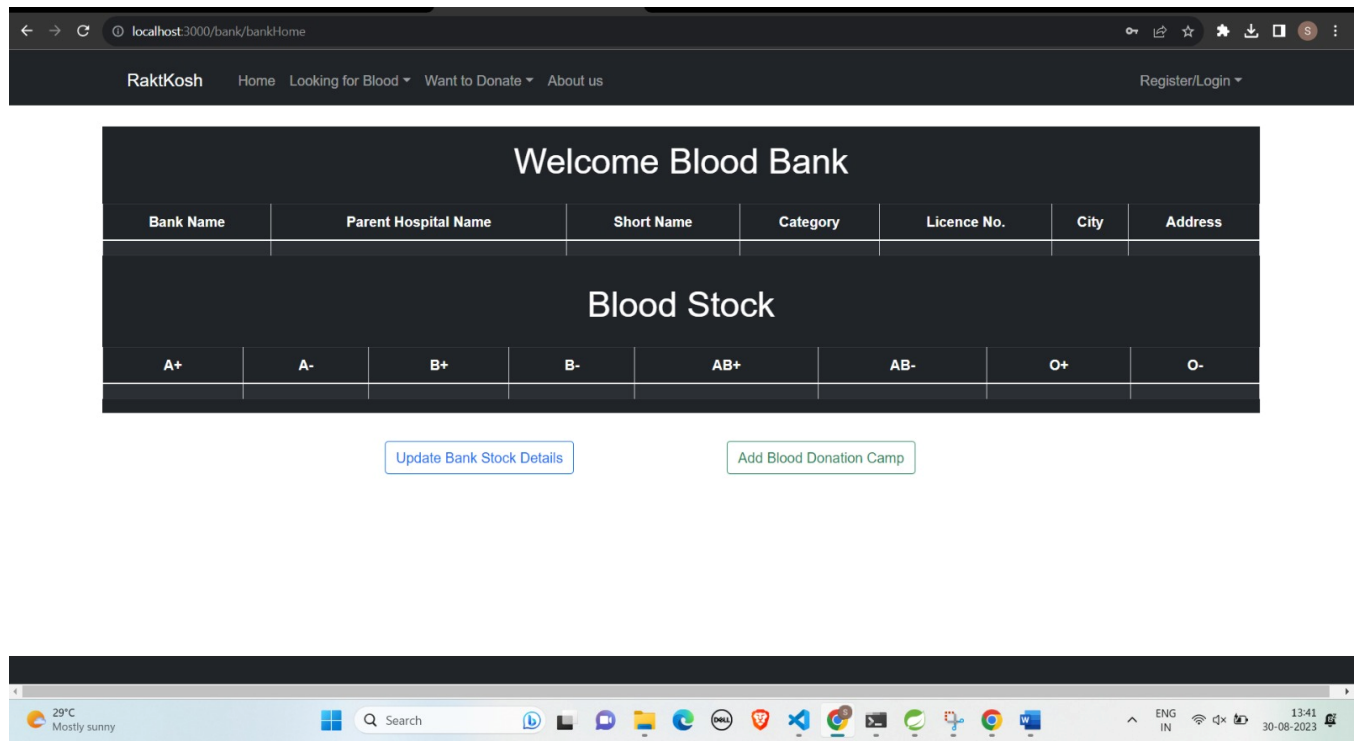


## 11. Admin Home Page





## 12. Blood Bank Home Page



## 13. Blood Donation Camp Registration

The screenshot displays a web browser window with the URL `localhost:3000/bank/campRegister`. The page title is "Blood Donation Camp Registration". The form contains the following fields and values:

Camp Name	Organized By	Mobile
aayu bloodcamp	city hospital	7972187018

Date	Start Time	End Time	E-Mail
31-08-2023	10:30	17:30	city@gmail.com

State	District	City
Maharashtra	Dhule	Dhule

The Address field contains: "lane number 5,Dhule-424002".

At the bottom of the form are two buttons: "Submit" (blue) and "Logout" (red).

## **7.Conclusion**

- **Conclusion:**

- The web site provides a way of communication and synchronization between the blood donors and the blood banks. It also helps needy peoples to find blood in nearby blood banks in emergency.
- Here, the individual can find the data of all blood groups and data of all blood banks.
- It saves a lot of time and last but not the least, it can save many lives.
- This project has given us great satisfaction in having designed an application which can be implemented to blood banks.
- This project helped us in gaining valuable information and practical knowledge on several topics like designing web pages using React.js, usage of responsive templates, designing of android applications, and management of database using MySQL. The entire system is secured. Also, the project helped us understanding about the development phases of a project and software development life cycle. We learned how to test different features of a project.
- We are confident that the numerous features and visually appealing look of application will certainly give a big boost to the donors.

- **Future Scope:**

- This system proposes a Blood Donation Management System which we believe will bring remarkable change. Support of various regional languages for better reach. The size of the database may increase exponentially, so our (RAKTKOSH.COM) will be made such that it is scalable and can be deployed on cloud storage systems like Amazon Elastic Compute Cloud (EC2) or Google's Kubernetes Engine (GKE) after containerizing the application.
- In case the user forgets the password, a 'reset password' functionality can be added.
- There is a scope for further development in our project to a great extent. A number of features can be added to this system in future like combining hospitals with this project. Also making dashboard more user's friendly. Also generate blood donation certificate. These features could have implemented unless the time did not limit us

## 7. **REFERENCES.**

- **References:**

- [1] JavaScript Enlightenment, Cody Lindley-First Edition, based on JavaScript 1.5.
- [2] Mc Graw Hill's, Java: The complete reference 7th Edition, Herbert Schildt
- [3] Complete CSS Guide, Maxine Sherrin and John Allsopp-O'Reilly Media; September 2012
- [4] Mrs. Kishori Khadilkar for Database.
- [5] Mrs. Kishori Khadilkar for REACT JS.
- [6] Mrs. Madhura Anturkar for Springboot, java.
- [7] <https://www.slideshare.net>
- [8] <https://www.projectideas.co.in> A special thanks to IACSD Management who arranged extra lab time for us.

- **ONLINE REFERENCE**

- [1] [www.Google.com](http://www.Google.com)
  - [2] [www.w3school.com](http://www.w3school.com)
  - [3] [www.javatpoint.com](http://www.javatpoint.com)
- 
- [9] React JS framework available at <https://reactjs.org/>.
  - [10]     Redux State management tool available at <https://redux.js.org/>.  
          Node (Express.js) for back-end available at <https://nodejs.org>