

Project Report on

‘BloodMate’

(An Android Application for User-to-User Blood Donation)

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Preface

In today's rapidly advancing digital age, access to timely healthcare resources is critical—especially in life-threatening situations that require immediate blood transfusions. However, even with modern technology, there remains a significant gap between blood donors and recipients, often due to the lack of a centralized and accessible platform. Recognizing this challenge, this application aims to bridge that gap by providing a direct, user-centric blood donation management system.

This project presents a simplified yet impactful solution to connect individuals in need of blood with voluntary donors without the involvement of intermediaries like hospitals or blood banks. By allowing users to register, request, and donate blood through a single platform, the system fosters a sense of community responsibility and empowers users to save lives in urgent situations.

The primary objective of this application is to facilitate transparent and efficient communication between donors and recipients. With features like city-based filtering, blood group and urgency-level matching, real-time updates, and donor eligibility checks, this platform ensures that critical blood requests are fulfilled quickly and accurately.

This preface sets the tone for a solution that not only embraces technological innovation but also promotes social good by making blood donation more accessible, reliable, and humane.

Declaration

I hereby declare that the project entitled “**BloodMate**” submitted in partial fulfilment of the requirements for the award of the degree (BCA) is my original work and has not been submitted earlier, either partly or fully, for the award of any other degree or diploma to any other university or institution.

This project is the result of my own efforts and research, guided by the principles of academic integrity. All information and data provided in this report are true to the best of my knowledge. Any work or content used from external sources has been properly referenced.

I have developed this project with the objective of providing a real-time solution to bridge the gap between blood donors and recipients, using modern technologies and a user-oriented approach.

Project Title: BloodMate
Submitted by: Abhishek Dhawan
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Department: Professional Studies
Institution: Post Graduate Government College Sector 11 Chandigarh

Acknowledgement

I express my deepest gratitude to everyone who contributed to the successful completion of this project, “BloodMate”

First and foremost, I sincerely thank **Dr. Puneet Modgil**, my project supervisor, for their invaluable guidance, encouragement, and constructive feedback throughout this project. Their expertise and insights played a crucial role in shaping this work.

I would also like to extend my appreciation to **Post Graduate Government College Sector 11** and the **Department of Professional Studies** for providing the necessary resources and a conducive learning environment to carry out this project.

A special thanks to my friends and classmates who offered their support and helpful suggestions during the development phase. Their motivation and discussions helped refine my ideas and improve the application.

Finally, I am deeply grateful to my family for their constant support, patience, and encouragement throughout this journey. Their belief in my abilities kept me motivated to complete this project successfully.

This project is a step toward leveraging technology for social good, and I hope it contributes to making a real impact in emergency blood donation scenarios.

Abhishek Dhawan

(4204/22)

Brief Introduction – PGGC 11 Chandigarh

Post Graduate Government College, Sector 11, Chandigarh (commonly known as PGGC-11), is a prestigious co-educational institution affiliated with Panjab University, Chandigarh. Established in 1953, the college has evolved into a center of academic excellence, offering a wide array of undergraduate and postgraduate courses across Arts, Science, Commerce, Computer Applications, and Physical Education.

PGGC-11 is spread over 48.3 acres, providing modern infrastructure such as smart classrooms, science and computer laboratories, a fully equipped library, hostels, a botanical garden, swimming pool, and various sports facilities. The institution is known for promoting holistic development through academics, sports, and co-curricular activities.

Brief Introduction – PGGC 11 Department Of Professional Studies

The Department of Professional Studies at Post Graduate Government College, Sector 11, Chandigarh, is committed to delivering industry-oriented education through its specialized undergraduate programs.

The department integrates practical knowledge, project-based learning, and modern pedagogy to equip students with essential skills for today's competitive world. With a focus on employability and entrepreneurial thinking, the department frequently organizes guest lectures, industrial visits, seminars, and workshops led by academic and industry experts.

The BCA and BBA programs, affiliated with Panjab University, blend theoretical foundation with real-world application in areas such as software development, database management, business operations, marketing, and financial management.

The department plays a pivotal role in bridging the gap between academics and industry expectations, nurturing students into competent professionals who are ready to take on managerial and technological challenges in the real world.

Title of Project

BloodMate

Why BloodMate?

The project is titled “**BloodMate**”, which symbolizes a lifesaving connection between blood donors and recipients. The name is derived from two meaningful words:

- **"Blood"** – Representing the essential resource that sustains life and the core focus of the application.
- **"Mate"** – Signifying friendship, support, and a community-driven approach to voluntary blood donation.

Description

The **BloodMate** is a platform designed to connect blood donors and recipients directly, without intermediaries like hospitals or blood banks. The application allows **users in need of blood** to request donations by specifying their **blood group, urgency level, and location**. At the same time, **eligible blood donors** can view these requests and volunteer to donate.

Key features of the application include:

- **User Registration & Authentication** (Donors & Requesters)
- **Blood Request Posting & Management**
- **Filtering & Searching** (by city, blood group, urgency level, and unassigned requests)
- **Donor Assignment & Unassignment**
- **User Health Profile Management** (to check donor eligibility)
- **Blood Donation Camps Management**

The system ensures an **efficient, transparent, and lifesaving** way to facilitate blood donation, making the process **quicker and more accessible** for those in urgent need.

Scope of the Project

- **User Registration and Profiles:** Both donors and recipients can register, update personal and medical information, and manage availability status.
- **Blood Requests:** Users can create and submit blood requests specifying blood group, location, urgency, and contact details.
- **Donor Matching:** The app matches requests with available donors based on location proximity and blood type compatibility.
- **Security and Verification:** Mobile number/email verification ensures authenticity of users.
- **History Tracking:** Maintains a history of donations and requests for transparency and record-keeping.

Future Scope

- **Chat or Call Feature:** In-app communication between donors and recipients for faster coordination.
- **Health Certificate Upload:** Donors can upload recent health reports to ensure safe donations.
- **NGO and Hospital Integration:** Partnering with local hospitals and NGOs for wider reach and trust-building.
- **Blood Camp Announcements:** Allowing blood banks and NGOs to promote upcoming donation camps through the app.
- **AI-Based Matching:** Using AI to suggest the best possible donors based on availability, distance, and past donation patterns.

Objective

The primary objective of BloodMate is to develop a user-friendly, efficient, and community-driven blood donation platform that facilitates direct communication between blood donors and recipients without intermediaries such as hospitals or blood banks.

Key Objectives:

1. Seamless Blood Donation Process

- Enable users to request and donate blood directly without relying on third-party organizations.

2. Quick and Efficient Blood Request Matching

- Provide real-time filtering of blood requests based on location, blood group, urgency level, and unassigned requests to ensure faster donor-recipient connections.

3. Encouraging Voluntary Blood Donation

- Foster a community-driven approach where people willingly donate blood to those in urgent need.

4. Transparency and Accessibility

- Ensure that blood donation information is easily accessible to all users, promoting trust and reliability in the system.

5. Health and Eligibility Tracking

- Maintain a health profile for donors, tracking factors like recent surgeries, medical conditions, and last donation date to ensure safe and eligible blood donations.

6. Blood Donation Camp Management

- Facilitate the organization and management of blood donation camps, allowing users to find and participate in donation drives.

7. Emergency Assistance and Notifications

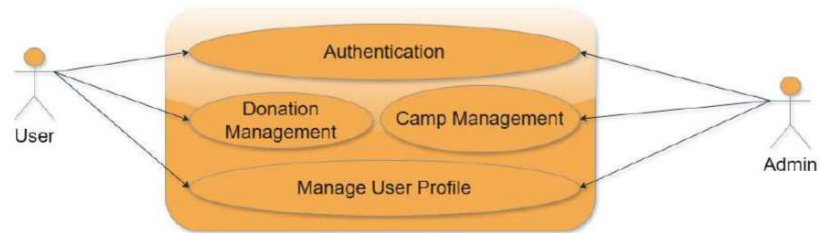
- Implement an alert system to notify users about urgent blood requirements in their area.

Use Case Diagram

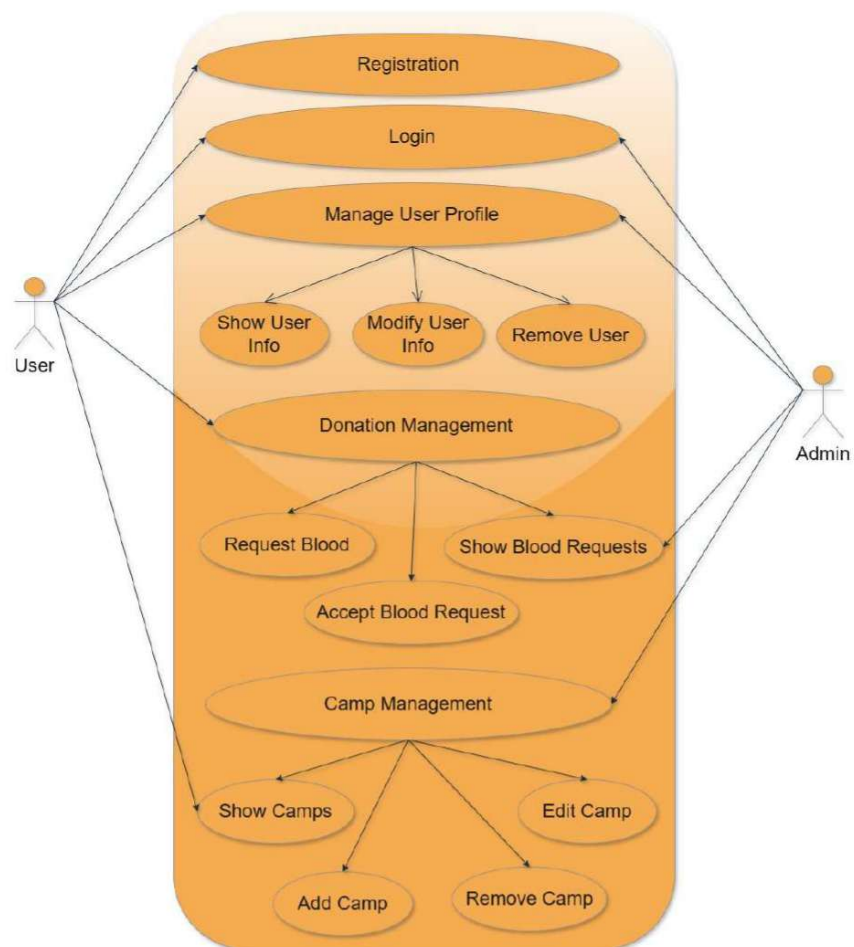
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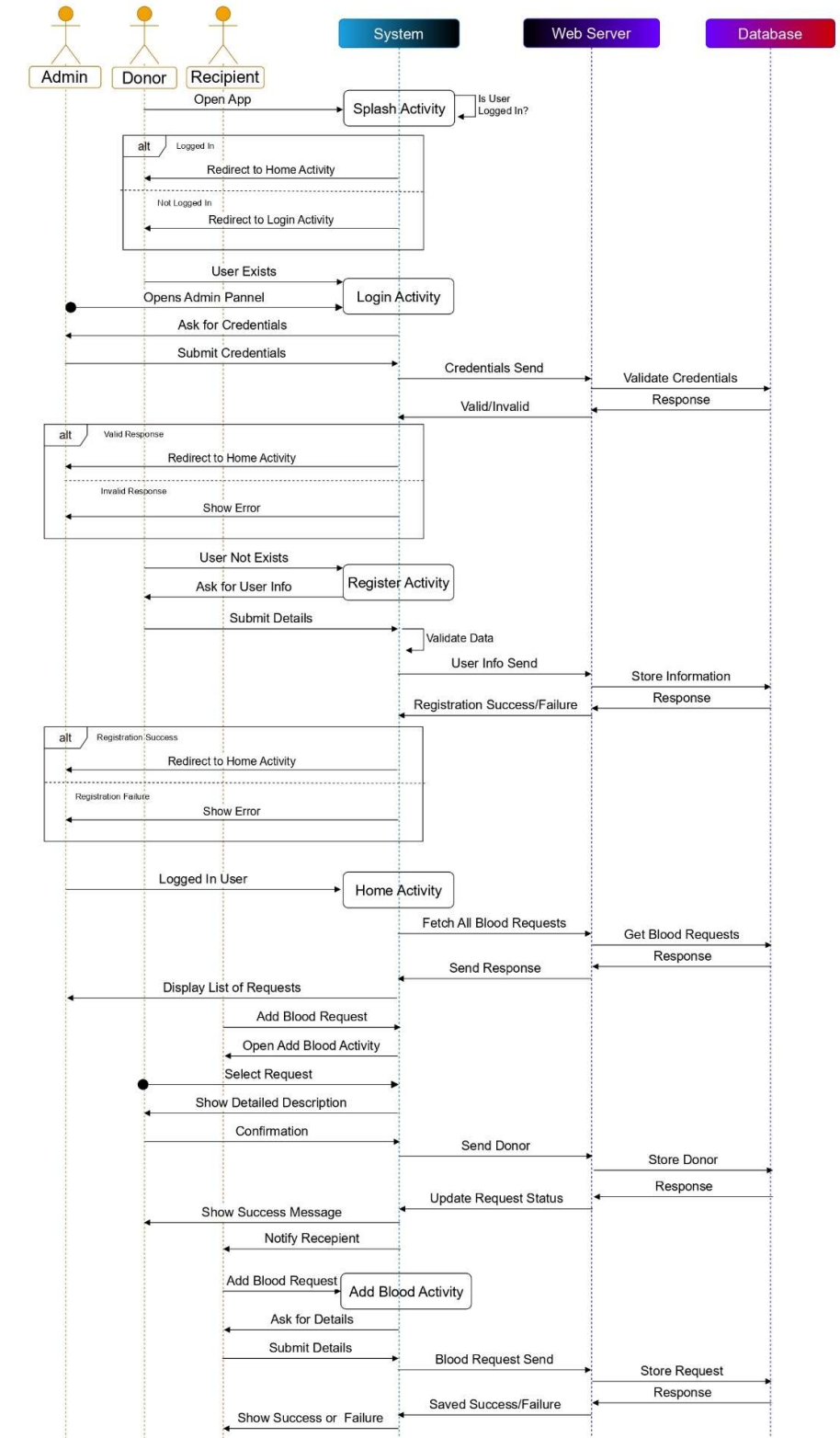
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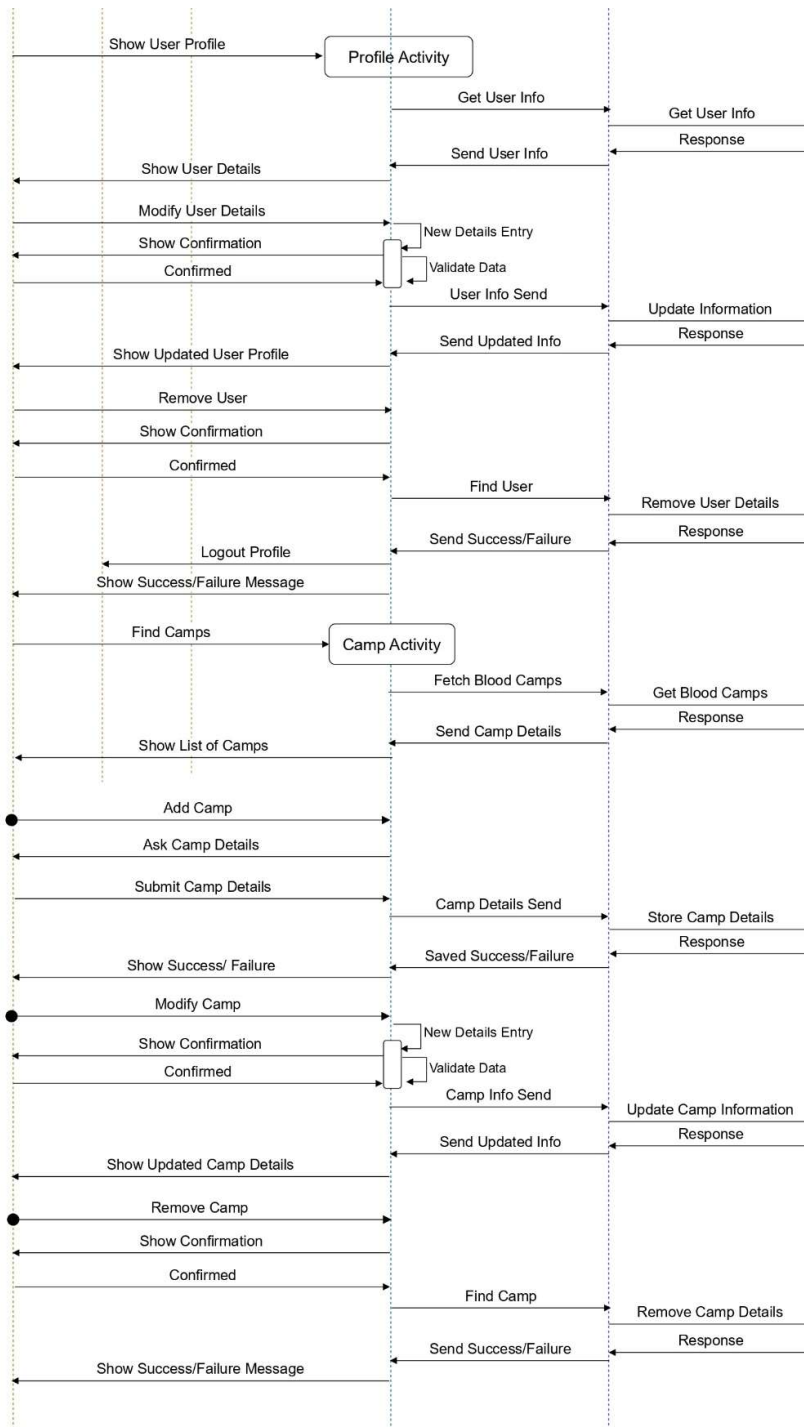


Level 2



Sequence Diagram





Frontend Technologies Used and Justification

Using **XML and Java** for my BloodMate application is a practical choice for me due to their efficiency, structure, and widespread support. **XML** is primarily used for designing user interfaces because it provides a clear, declarative, and lightweight way to structure UI elements while keeping them separate from business logic. This separation makes the code more maintainable and modular. XML is also optimized for Android, ensuring fast rendering and compatibility across various devices.

On the other hand, **Java** has been the traditional language for Android development, offering strong object-oriented programming (OOP) support, platform independence, and vast libraries. It runs efficiently on Android's **ART (Android Runtime)**, optimizing performance while managing memory through garbage collection. Additionally, Java ensures backward compatibility, allowing applications to work on older Android versions. With a large developer community and extensive documentation, Java remains a reliable choice for Android development.

While modern development is shifting towards **Kotlin** and **Jetpack Compose**, Java are still valuable, especially for maintaining legacy applications or working in enterprise environments. All the user developed libraries of android is not totally shifted towards Kotlin. My priorities are stability, compatibility, and a structured development that's why Java and XML remain excellent choices for me.

Development Platform

Using **Android Studio** for developing my **Blood Mate** application in native Android is the best choice due to its performance, reliability, and seamless integration with Android-specific features. **Android Studio** offers an advanced debugging environment, drag and drop components, a built-in emulator, and a Gradle-based build system that simplifies app testing and deployment. Being the official IDE from Google, it ensures compatibility with the latest Android versions and security updates, making it a future-proof choice. Compared to cross-platform frameworks, native development with Android Studio provides better performance, smoother animations, and deeper access to hardware features like Fields Validations and push notifications, which are essential for my **Blood Mate** app to function effectively.

Backend Technologies Used and Justification

Using **Spring Boot** for the backend of my **Blood Mate** application is an ideal choice due to its scalability, security, and ease of integration with a native Android app. **Spring Boot** simplifies backend development by providing a robust framework for handling user authentication, data management, and real-time updates. Since my **Blood Mate** app involves critical operations like **donor registration, blood request matching, location tracking, and notifications**, Spring Boot's built-in support for **REST APIs** allows seamless communication between the Android app and the backend server.

Additionally, **Spring Boot** integrates well with databases such as **MySQL, PostgreSQL, or MongoDB**, ensuring efficient data storage and retrieval. Its support for **Spring Security** helps protect sensitive user data, while tools like **Spring WebSockets** enable real-time updates for emergency blood requests. Compared to other backend frameworks, **Spring Boot** provides a more structured, enterprise-grade solution, making it the best choice for my **Blood Mate** app that requires reliability, speed, and security.

Development Platform

Using **VS Code** for developing the **Spring Boot** backend of my **Blood Mate** application is a great choice for me due to its **lightweight, flexibility, and extensive plugin support**. Unlike heavier IDEs like IntelliJ IDEA or Eclipse, **VS Code** is faster and consumes fewer system resources, making it ideal for smooth backend development. It supports **Spring Boot** development through extensions like the **Spring Boot Extension Pack**, which provides features such as **intelligent code completion, live debugging, and Spring Boot dashboard integration**.

Additionally, its **integrated terminal** allows developers to run and test **Spring Boot APIs** directly within the editor, making the development workflow more efficient. **Integrated terminal** allows developers to run and test **Spring Boot APIs** directly within the editor, making the development workflow more efficient. **VS Code** is an excellent choice for me due because it is **lightweight, highly customizable, and fast** development environment for **Spring Boot**.

Database Used

Using **MySQL** as the database for my **Blood Mate** application with **Spring Boot** is an excellent choice due to its **scalability, reliability, and strong support for relational data**. Since a **Blood Mate** app requires efficient management of structured data, including **user profiles, donor records and request logs**, MySQL's **relational database model** ensures **data integrity and consistency**. It supports powerful **ACID (Atomicity, Consistency, Isolation, Durability) transactions**, making it ideal for handling sensitive data like medical records securely.

Additionally, MySQL integrates seamlessly with **Spring Boot's Spring Data JPA**, allowing developers to write efficient queries with minimal boilerplate code. Its **performance optimization features, indexing, and replication support** make it suitable for applications that need **fast read and write operations**, especially when handling a large number of donor requests.

Database Schema

Table: users

Column Name	Data Type	Key	Description
id	BIGINT	PK	Unique identifier for each user
name	VARCHAR		User's full name
emailid	VARCHAR		Email address
phone	VARCHAR		Phone number
password	VARCHAR		Password
bloodgroup	VARCHAR		Blood group (e.g. A+, B-)
gender	CHAR		Gender (M/F)
dob	BIGINT		Date of birth (timestamp)
lastdonation	BIGINT		Last blood donation date

Table: **userhealth**

Column Name	Data Type	Key	Description
id	BIGINT	PK	Unique health entry ID
user_id	BIGINT	FK → users(id)	Linked user ID
hasDiabetes	BOOLEAN		Has diabetes
hasHypertension	BOOLEAN		Has hypertension
hasAsthma	BOOLEAN		Has asthma
hasThyroid	BOOLEAN		Has thyroid
hasHeartDisease	BOOLEAN		Has heart disease
weight	INTEGER		Weight in kilograms
anyRecentSurgery	BOOLEAN		Had recent surgery
willDonate	BOOLEAN		Willing to donate blood

Table: **camp**

Column Name	Data Type	Key	Description
id	BIGINT	PK	Unique ID for each camp
title	VARCHAR		Camp name/title
location	VARCHAR		Location of the camp
city	VARCHAR		City where camp is held
date	BIGINT		Date of the camp (timestamp)
organizerBy	VARCHAR		Who is organizing the camp

Table: **banners**

Column Name	Data Type	Key	Description
id	BIGINT	PK	Unique ID for each banner
url	VARCHAR		URL of the banner image

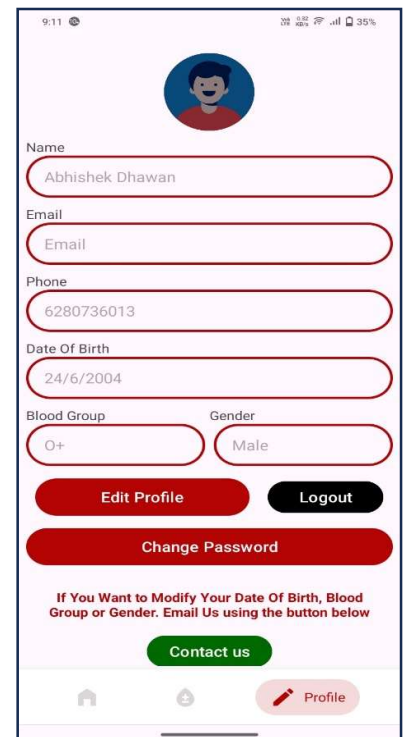
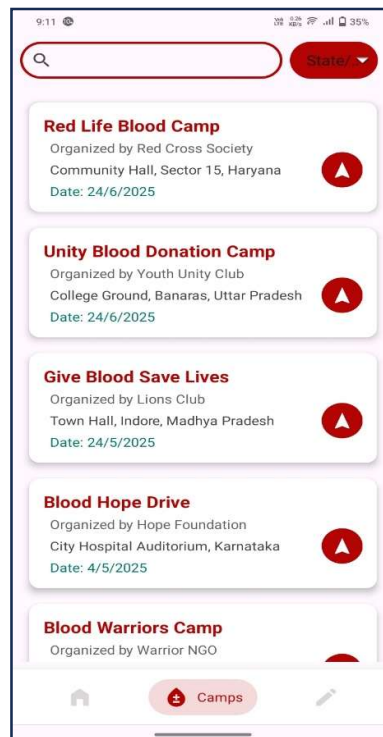
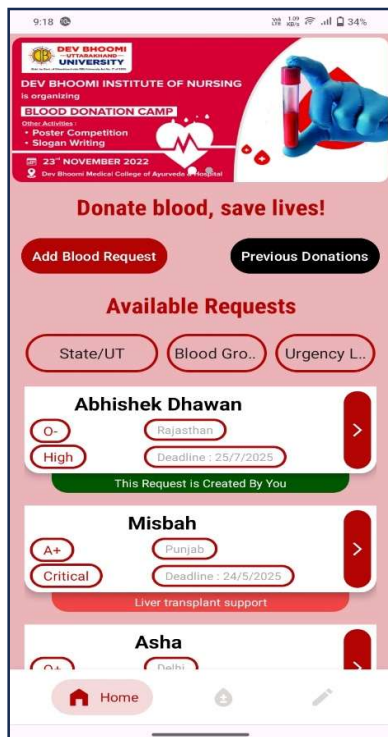
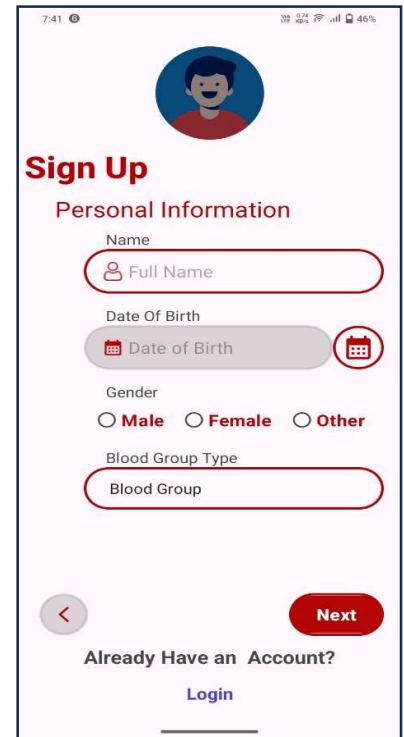
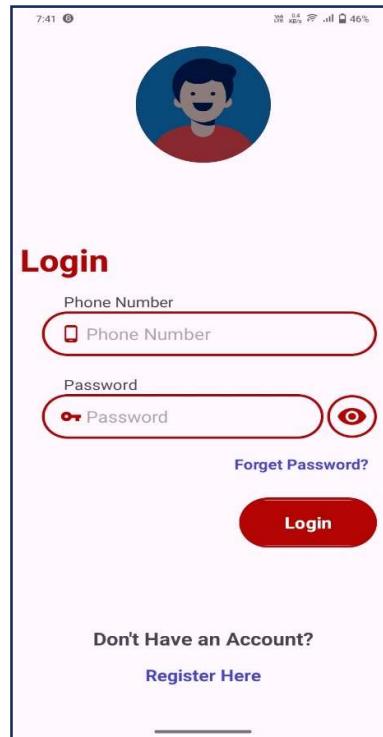
Table: **bloodrequests**

Column Name	Data Type	Key	Description
id	BIGINT	PK	Unique blood request ID
patientName	VARCHAR		Name of the patient
hospitalName	VARCHAR		Hospital where donation is needed
location	VARCHAR		Specific location
city	VARCHAR		City name
bloodGroup	VARCHAR		Blood group needed
urgencyLevel	VARCHAR		Urgency level (Critical /High/Medium/Low)
description	TEXT		Additional details
isDonationCompleted	BOOLEAN		Donation status
note	TEXT		Optional notes
deadline	BIGINT		Request deadline (timestamp)
requestDate	BIGINT		Date of request
requester_id	BIGINT	FK → users(id)	Requester (user ID)
donor_id	BIGINT	FK → users(id)	Donor (user ID) (nullable)

Key Relationships Table - BloodMate App

From Table	Foreign Key	To Table	Referenced Column	Type	Description
userhealth	user_id	users	id	One-to-One	Each user has exactly one health record
bloodrequests	requester_id	users	id	Many-to-One	A user can create multiple blood requests
bloodrequests	donor_id	users	id	Many-to-One (nullable)	A user can donate to multiple requests or none

Frontend Interface



References

Oracle Documentation – Java SE: <https://docs.oracle.com/javase/>

Spring Boot Reference Guide: <https://docs.spring.io/spring-boot/docs/current/reference/htmlsingle/>

Android Developers Guide – XML Layouts and Components:
<https://developer.android.com/guide/topics/ui/>

MySQL Documentation: <https://dev.mysql.com/doc/>

GitHub Repositories for Open-Source UI Components and Networking