BLOOD BANK MANAGEMENT SYSTEM

SUBMITTED BY

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CHAPTER 1: INTRODUCTION

Blood transfusion safety remains an important public health concern. The availability of blood products of all blood types and the provision of its safety ensure public trust of its excellent healthcare system. However, lack of availability of these blood products and provision of unsafe blood products still impact morbidity and mortality in the Sultanate. Through the use of online blood bank management system, blood transfusion safety is expected to be enhanced or improved. Risks on improper blood donors' documentation, and misplaced records can be minimized or totally avoided. Also, processes involving blood bag collection, storage, and inventory will be systematized and organized, hence, improving the healthcare management.

1.1 Background of the Study

For hospitals, a blood bank known as blood collection centre, also is an area in which collected blood bags are stored and preserved for future use in blood transfusion services. Blood transfusion is a medical operation where a patient requires blood or blood products as a life saving measure. Most blood banks are still running manual systems in its processes. As such, there is a lack of efficiency because it is still paper-based in collecting information about donors, inventories of blood bags, and blood transfusion services. The lack of proper documentation may endanger patients' health due to the possibility of having contaminated blood bags. Contamination happened when there is an incomplete donors' medical history record and the blood bags' shelf life is not monitored properly. Hence, a web-based blood bank management system might be needed to address these issues and problems encountered to ensure blood transfusion safety.

1.2 Problem Statement

Despite advances in technology, nowadays, most blood bank systems are running in manual system. As such, there is a prevalent problem in the availability of needed blood types. For instance, when a person needs a certain type of blood and this type is not available in the hospital, family members send messages through social media to those who can donate to them and this process takes longer than the life of the patient to the most dangerous. In addition, it

seems that there is lack of proper documentation about blood donors and its medical history.

This may lead to blood bag contamination and may affect the blood transfusion safety.

Generally, this project aims to describe the working of a very basic online blood bank management system.

1.3 Objective(s), Scope, and Limitations

1.3.1 Objective:

This applied project aims to design, develop, and implement an online blood bank management system. This web-based application provides:

- To ensure hospitals have a good supply or inventories of blood bags.
- To check the availability of blood bags anytime.
- To manage the information of its blood donor.
- Function to check if the person donated blood for the last 3 months.
- To allow good documentation about the hospitals and their blood donation activities.
- Support fast searching to find match blood bags for the right person.

1.3.2 Scope:

This project covers the three (3) basic operations of blood banks, namely: donor registration, monitoring of blood bags or products' inventories, and monitoring of blood bags or products' issuance. Also, due to time-constraint, respondents will be from hospitals only.

In addition, the project considers three (3) possible users of the system, namely: hospital administrator, doctors, and blood receptionists.

1.3.3 Limitation:

This project does not cover the actual blood collection activity, and actual blood transfusion operation. Blood donors and patients or recipients of blood donation are not system users, their registration, or information will be encoded by the blood bank receptionists.

1.4. Assumptions and Hypothesis:

Assumptions made:

1. Internet connectivity is needed for the online blood management system. Internet speed may affect the perception of the systems users with regards to the system effectiveness and efficiency.

2. Blood transfusion should be performed by medical or professional doctors only. The over-all safety depends on the success of the medical operation.

Hypotheses put forward:

1. There is a significant difference in the level of blood transfusion safety between manual-based and online blood bank systems.
2. There is an increased level of blood transfusion safety in using online blood bank management systems while there is an increased risk when using manual-based one.

1.5 Significance of the problem

The system will benefit blood banks in managing blood donation donors, activities, and blood bags. This will allow the hospital to take decision if a particular type of blood is needed and currently unavailable in the hospital, however, available in another nearby hospitals. Furthermore, managing the blood bags in the blood bank will be much easier because each blood bag has information about the donor, donation activity details. Also, doctors can use this system to serve blood bags to their patient and monitor the details of the donor.The main advantages of the system are:

- Blood bank staff can find and manage the donor details on the system easily.
- Hospitals can be alerted about issued blood bags and its availability.
- The system is systematized, and organized in managing blood donor records and blood donation activities.

1.6 Definition of terms

- Blood bags are designed for the collection, processing and storage of whole blood and blood components They help in providing aseptic conditions for the separation of blood components. It acts as a closed system reducing the chances of contamination.
- Blood bank is a place where blood bag that is collected from blood donation events is stored in one place. Which refers to a division of a hospital laboratory where the storage of blood product occurs and where proper testing is performed to reduce the risk of transfusion related events.
- Donor is someone who gives a part of their body or some of their blood to be used by doctors to help a person who is ill.
- Transfusion is done as a lifesaving manoeuvre to replace blood cells or blood products lost through severe bleeding. Transfusion of one's own blood (autologous transfusion) is the safest method, but it requires advanced planning, and not all patients are eligible.

CHAPTER 2: SOFTWARE REQUIREMENT SPECIFICATION

2.1 Product Perspective

This Blood Bank Management System is a self-contained system that manages activities of the blood bank.

Due to improperly managed details blood bank centres faces quite a lot of difficulties in accessing past data as well as managing present data. The fully functional automated blood bank management system which will be developed through this project will eliminate the disadvantages caused by the manual system by improving the reliability, efficiency and performance. The usage of a database to store donor, acceptor, blood quantity details etc. will accommodate easy access, retrieval, and search and manipulation of data. The access limitations provided through access privilege levels will enhance the security of the system. The system will facilitate concurrent access and convenient management of activities of the blood bank centre.

2.1.1 System Interfaces

❖ User Interfaces

▪ This section provides a detailed description of all inputs into and outputs from the system. It also gives a description of the hardware, software and communication interfaces and provides basic prototypes of the user interface.

▪ The protocol used shall be HTTP.

❖ Hardware Interfaces

▪ Laptop/Desktop PC-Purpose of this is to enter details about the donor and acceptor, blood type, quantity of blood donated etc. Hence an efficient system is needed to process such large quantities of data.

▪ Laser Printer (B/W) - This device is for printing donor's info etc.

▪ Wi-Fi router - Wi-Fi router is used for internetwork operations inside of a blood bank centre and simply data transmission from pcs to server.

❖ Software Interfaces

▪ OS Windows 7/8/8.1- Very user friendly and common OS

▪ JavaScript- *JavaScript* (JS) is a lightweight, interpreted, or just-in-time compiled programming language with first-class functions.

2.1.2 System Specifications

2.1.2.1 H/W Requirement

- Core i3 processor
- 2 GB Ram.
- 20 GB of hard disk space in terminal machines
- 1 TB hard disk space in Server Machine

2.1.2.2 S/W Requirement

- Windows 7 or above operating system
- JavaScript
- HTML
- CSS
- Node JS
- XAMPP

Hyper Text Markup Language: The Hyper Text Markup Language or HTML is the standard markup language for documents designed to be displayed in a web browser. It can be assisted by technologies such as Cascading Style Sheets and scripting languages such as JavaScript.

Cascading Style Sheets: Cascading Style Sheets is a style sheet language used for describing the presentation of a document written in a markup language such as HTML or XML. CSS is a cornerstone technology of the World Wide Web, alongside HTML and JavaScript.

Node.js: Node.js is a cross-platform, open-source server environment that can run on Windows, Linux, Unix, macOS, and more. Node.js is a back-end JavaScript runtime environment, runs on the V8 JavaScript Engine, and executes JavaScript code outside a web browser.

XAMPP: XAMPP is a free and open-source cross-platform web server solution stack package developed by Apache Friends, consisting mainly of the Apache HTTP Server, MariaDB database, and interpreters for scripts written in the PHP and Perl programming languages.

2.1.3 Communication Interfaces

- NIC (Network Interface Card) – It is a computer hardware component that allows a computer to connect to a network. NICs may be used for both wired and wireless connections.
- CAT 5 network cable - for high signal integrity
- TCP/IP protocol - Internet service provider to access and share information
- over the Internet
- Ethernet Communications Interface - Ethernet is a frame-based computer network technology for local area networks (LANs) ubiquitous, easy to set up and easy to use. Low cost and high data transmission rate.

2.2 Product Functions

- Provide access to registered users only
- Registration of new donors
- Registration of new recipients
- Registration of new hospitals
- Transfer of blood across individual patients
- Transfer of blood across hospitals
- Admin access to donor and recipient details
- Admin can verify blood transfer details
- Admin can view monthly/yearly records

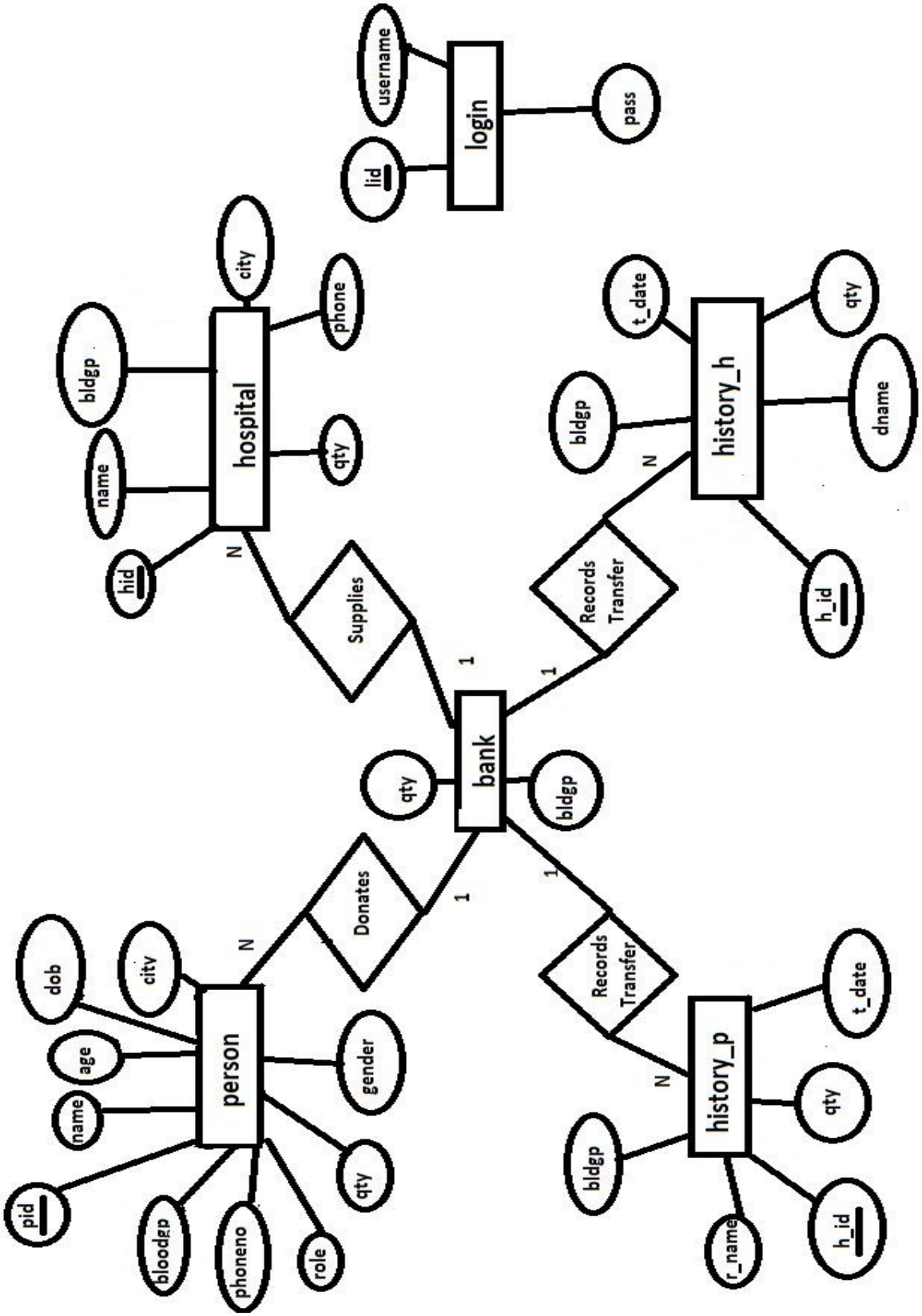
CHAPTER 3: FUNCTIONAL REQUIREMENTS

The functional requirements for a blood bank management system would typically include:

1. **Donor Management:** The system should be able to manage donor information, including personal details, blood type and other relevant information.
2. **Blood Collection and Testing:** The system should be able to track and manage the collection of blood from donors, as well as manage the testing and screening process.
3. **Inventory Management:** The system should be able to track and manage the storage and distribution of blood products, including the type and quantity of blood products available.
4. **Patient Management:** The system should be able to manage information about patients who require blood transfusions, including their blood type, and other relevant information.
5. **Order Management:** The system should be able to manage the process of receiving and fulfilling blood product requests from hospitals and other medical facilities.
6. **Reporting**: The system should provide various reports, such as blood product usage, donor and patient information, and inventory levels.
7. **Security:** The system should have proper security measures in place to ensure that confidential information is protected and that only authorized users have access to the system.
8. **Integration:** The system should be able to integrate with other medical systems, such as hospital information systems, to ensure seamless and efficient communication and data transfer.
9. **User-friendly interface:** The system should have an intuitive and user-friendly interface, allowing users to easily manage and access the information they need.

CHAPTER 4: DESIGN

4.1 ER DIAGRAM



4.2 DATA DESIGN

Table 4.2.1: person

S NO.	COLUMN NAME	DATA TYPE	CONSTRAINTS	DESCRIPTION
1	pid	integer	Primary key, Auto Increment	Contains the id of the person
2	name	varchar(255)	--	Contains the name
3	age	integer	--	Contains age
4	dob	date	--	Contains the date of birth
5	gender	varchar(255)	--	Contains the gender
6	bldgrp	varchar(255)	--	Contains the blood group
7	city	varchar(255)	--	Contains the city
8	phone	varchar(255)	--	Contains phone number
9	qty	integer	--	Contains quantity
10	role	varchar(255)	--	Contains the role of person

Table 4.2.2 Hospital

S NO.	COLUMN NAME	DATA YTPE	CONSTRAINTS	DESCRIPTION
1	hid	integer	Primary key, Auto Increment	Contains id of hospitals
2	name	varchar(255)	--	Contains the name of hospital
3	bldgrp	varchar(255)	--	Contains the blood group
4	qty	integer	--	Contains the blood group
5	city	varchar(255)	--	Contains the city
6	phone	varchar(255)	--	Contains phone number

Table 4.2.3: bank

S NO.	COLUMN NAME	DATA TYPE	CONSTRAINTS	DESCRIPTION
1	bldgrp	varchar(255)	--	Contains blood group
2	qty	integer	--	Contains the quantity

Table 4.2.4: history_h

S NO.	COLUMN NAME	DATA TYPE	CONSTRAINTS	DESCRIPTION
1	hid	integer	Primary key, Auto Increment	Contains id of hospitals
2	bldgrp	varchar(255)	--	Contains the blood group
3	name	varchar(255)	--	Contains name of hospital
4	dname	varchar(255)	--	Contains name of donor
5	qty	integer	--	Contains quantity
6	tdate	date	--	Contains date of transfusion

Table 4.2.5: history_p

S NO.	COLUMN NAME	DATA TYPE	CONSTRAINTS	DESCRIPTION
1	hid	integer	Primary key, Auto Increment	Contains the id of hospital
2	bldgrp	varchar(255)	--	Contains the blood group
3	dname	varchar(255)	--	Contains donor name
4	rname	varchar(255)	--	Contains recipient name
5	qty	integer	--	Contains the quantity
6	tdate	date	--	Contains the date of transfusion

Table 4.2.6: donors

S NO.	COLUMN NAME	DATA TYPE	CONSTRAINTS	DESCRIPTION
1	pid	integer	--	Contains id of the person
2	name	varchar(255)	--	Contains the name of person
3	age	integer	--	Contains the age of the person
4	dob	date	--	Contains the date of birth of the person
5	gender	varchar(255)	--	Contains the gender of the person
6	bldgrp	varchar(255)	--	Contains the blood group of the person
7	city	varchar(255)	--	Contains the city person is living in
8	phone	varchar(255)	--	Contains the phone number of the person
9	qty	integer	--	Contains the quantity of blood donated /received
10	role	varchar(255)	--	Contains the role of the person(donor/receiver)

Table 4.2.7: recipients

S NO.	COLUMN NAME	DATA TYPE	CONSTRAINTS	DESCRIPTION
1	pid	integer	--	Contains id of the person
2	name	varchar(255)	--	Contains the name of person
3	age	integer	--	Contains the age of the person
4	dob	date	--	Contains the date of birth of the person
5	gender	varchar(255)	--	Contains the gender of the person
6	bldgrp	varchar(255)	--	Contains the blood group of the person
7	city	varchar(255)	--	Contains the city person is living in
8	phone	varchar(255)	--	Contains the phone number of the person
9	qty	integer	--	Contains the quantity of blood donated /received
10	role	varchar(255)	--	Contains the role of the person(donor/receiver)

Table 4.2.8: login

S NO	COLUMN NAME	DATA TYPE	CONSTRAINTS	DESCRIPTION
1	lid	integer	auto_increment	Contains the id of the admin
2	username	varchar(255)	--	Contains the username of the admin
3	pass	varchar(255)	--	Contains the password of the admin

CHAPTER 5: CODE

DATABASE

- Database: `blood-db`
- Table structure for table `person`

```
CREATE TABLE person (
  pid int PRIMARY KEY AUTO_INCREMENT,
  name varchar(255),
  age int,
  dob date,
  gender varchar(255),
  bldgrp varchar(255),
  city varchar(255),
  phone varchar(255),
  qty int,
  role varchar(255)
);
```

- Trigger when a person with role 'need' is deleted. It decreases the blood qty in the bank of that blood grp by qty inserted and -- deletes the record

```
DELIMITER $$
CREATE TRIGGER dec_qty BEFORE DELETE ON person FOR EACH ROW BEGIN
  IF OLD.role = 'need' THEN
    UPDATE bank
    SET qty = qty - OLD.qty
    WHERE bldgrp = OLD.bldgrp;
  END IF;
END
```

```
$$
DELIMITER ;
```

- Trigger when a person with role 'donate' is added. It increases the blood qty in the bank of that blood grp by qty inserted

```
DELIMITER $$
CREATE TRIGGER inc_qty AFTER INSERT ON person FOR EACH ROW BEGIN
  IF NEW.role = 'donate' THEN
    UPDATE bank
    SET qty = qty + NEW.qty
    WHERE bldgrp = NEW.bldgrp;
  END IF;
END
$$
DELIMITER ;
```

- Table structure for table `hospital`

```
CREATE TABLE hospital (
  hid int PRIMARY KEY AUTO_INCREMENT,
  name varchar(255),
  bldgrp varchar(255),
  qty int,
  city varchar(255),
  phone varchar(255)
);
```

- Triggers `hospital` when a record is deleted it decrements the blood qty of that blood grp in 'bank' table

```
DELIMITER $$
CREATE TRIGGER h_dec_qty BEFORE DELETE ON hospital FOR EACH ROW BEGIN
   UPDATE bank
   SET qty = qty - OLD.qty
   WHERE bldgrp = OLD.bldgrp;
END
$$
DELIMITER ;
```

- Table structure for table `bank`

```
CREATE TABLE bank (
 bldgrp varchar(255),
 qty int
);
```

- Table structure for table `history_h`

```
CREATE TABLE history_h (
 h_id int PRIMARY KEY AUTO_INCREMENT,
 bldgrp varchar(255)'
 name varchar(255),
 d_name varchar(255),
 qty int,
 t_date date
);
```

- Table structure for table `history_p`

```
CREATE TABLE history_p (
  h_id int PRIMARY KEY AUTO_INCREMENT,
  bldgrp varchar(255),
  d_name varchar(255),
  r_name varchar(255),
  qty int,
  t_date date
);
```

- View created from 'person' table

```
CREATE VIEW donors AS SELECT * FROM person WHERE role = 'donate';
//Stand-in structure for view `donors`
//(See below for the actual view)
CREATE TABLE donors (
  pid int
  name varchar(255),
  age int,
  dob date,
  gender varchar(255),
  bldgrp varchar(255),
  city varchar(255),
  phone varchar(255),
  role varchar(255)
  );
```

- View created from 'person' table

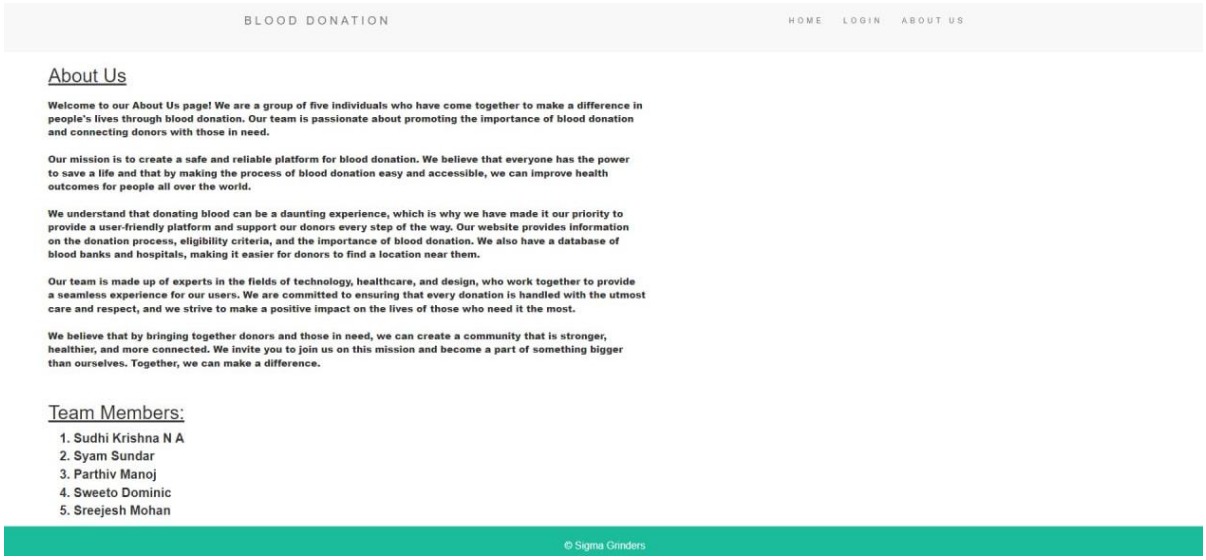
```
CREATE VIEW recipients AS SELECT * FROM person WHERE role = 'need';


//Stand-in structure for view `recipients`
//(See below for the actual view)
 CREATE TABLE recipients (
 pid int,
 name varchar(255),
 age int,
 dob date,
 gender varchar(255),
 bldgrp varchar(255),
 city varchar(255),
 phone varchar(255),
 qty int,
role varchar(255)
 );
```

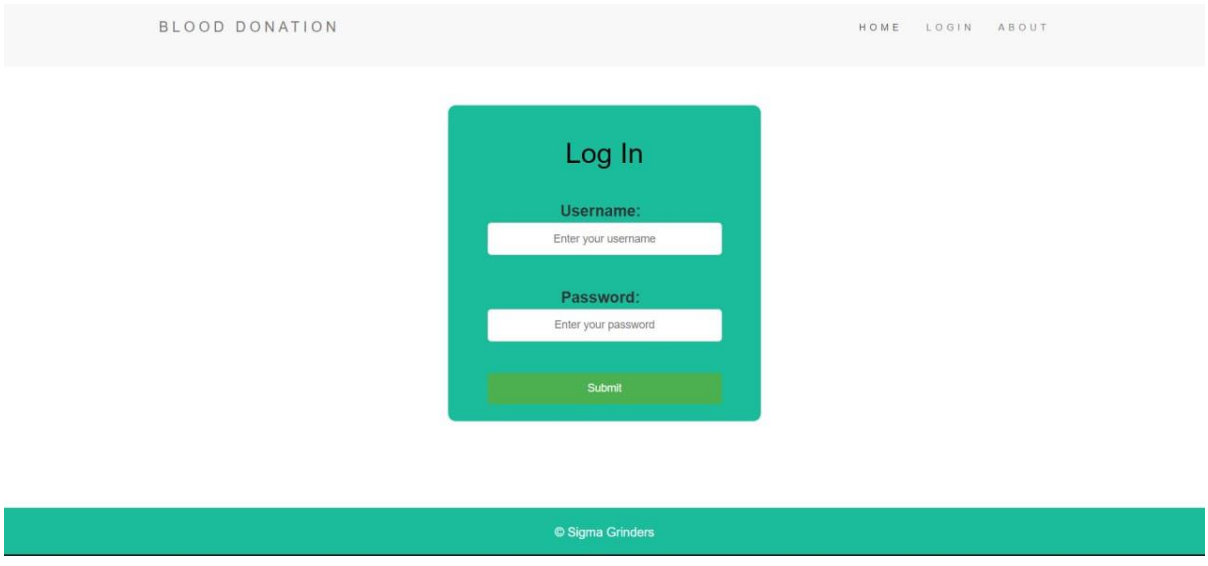
- Connecting the website to the database

```
const express = require("express");
const bodyParser = require("body-parser");
const ejs = require("ejs");
const mysql = require("mysql2");

const app = express();

app.set('view engine', 'ejs');
app.use(bodyParser.urlencoded({ extended: true }));
app.use(express.static("public"));

const con = mysql.createConnection({
host: 'localhost',
```

```
user: 'root',
port: 3306,
password: "123456",
database: "blood-db"
});

con.connect((err) => {
if (err) {
throw err;
}
else {
console.log("Connected to database");
}
        });
```

CHAPTER 6: SAMPLE SCREENSHOTS





BLOOD DONATION HOME REGISTER DONORS RECIPIENTS TRANSFER BANK HOSPITAL

REGISTER AS ..

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BLOOD DONATION HOME REGISTER DONORS RECIPIENTS TRANSFER BANK HOSPITAL

REGISTER YOUR DETAILS

Name
Sudhi Krishna N A

Age
20

D.O.B
27-08-2002

Choose your gender:
Male Female Other

Blood Group
A+

City
Kochi

Phone no:
55656465

Blood Quantity(in ml):
490

Choose your purpose:
Donate Need

Submit

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BLOOD DONATION HOME REGISTER DONORS RECIPIENTS TRANSFER BANK HOSPITAL

DONOR PAGE

ID	NAME	AGE	DOB	GENDER	BLOOD GROUP	CITY	PHONE	QTY(IN ML)	ROLE
1	Sudhi Krishna N A	20	2002-08-26	male	A+	Kochi	55656465	490	donate
2	Parthiv Manoj	21	2001-04-15	male	O+	New York	4565535	470	donate
3	Syam Sundar	19	2003-02-27	male	AB+	Paris	987894546	480	donate
4	Sweeto Dominic	69	1954-09-05	male	B+	Delhi	45546519	460	donate
5	Pavithra	22	2000-03-04	female	A-	Nagpur	76346876	475	donate
6	Rupali	35	1988-02-18	female	B-	Jaipur	8765477	485	donate
7	Sunaina	45	1978-04-10	female	O-	Dholakpur	587438977	465	donate
8	Kiran	26	1997-11-19	other	AB-	Kolkata	898747654	495	donate

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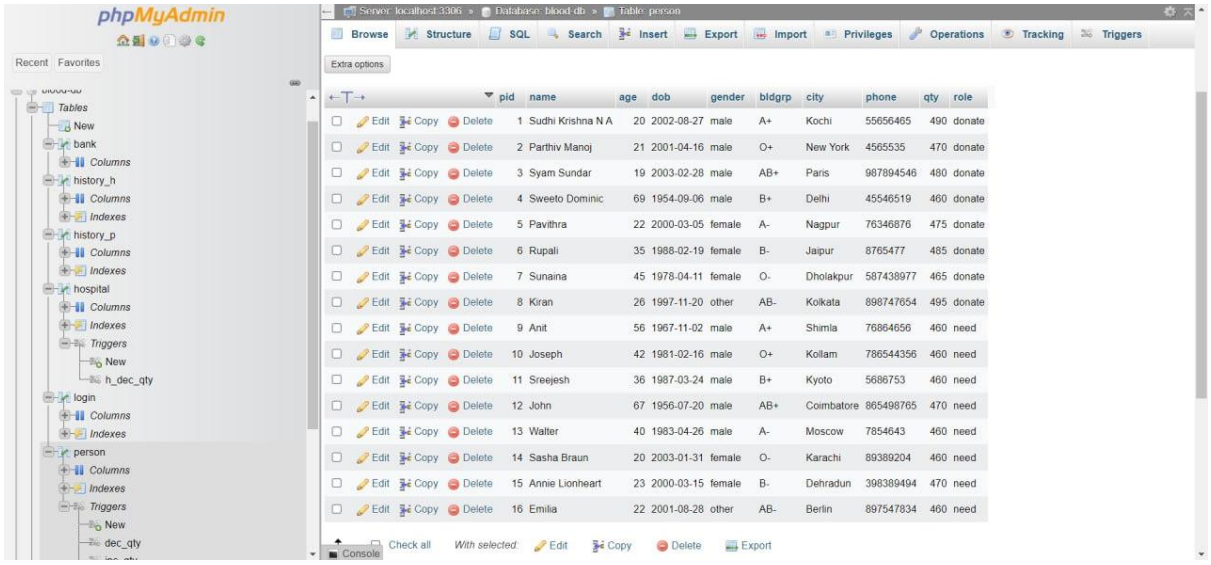
BLOOD DONATION HOME REGISTER DONORS RECIPIENTS TRANSFER BANK HOSPITAL

RECIPIENTS PAGE

ID	NAME	AGE	DOB	GENDER	BLOOD GROUP	CITY	PHONE	QTY(IN ML)	ROLE
9	Anit	56	1967-11-01	male	A+	Shimla	76864656	460	need
10	Joseph	42	1981-02-15	male	O+	Kollam	786544356	460	need
11	Sreejesh	36	1987-03-23	male	B+	Kyoto	5686753	460	need
12	John	67	1956-07-19	male	AB+	Coimbatore	865498765	470	need
13	Walter	40	1983-04-25	male	A-	Moscow	7854643	460	need
14	Sasha Braun	20	2003-01-30	female	O-	Karachi	89389204	460	need
15	Annie Lionheart	23	2000-03-14	female	B-	Dehradun	398389494	470	need
16	Emilia	22	2001-08-27	other	AB-	Berlin	897547834	460	need



BLOOD DONATION HOME REGISTER DONORS RECIPIENTS TRANSFER BANK HOSPITAL

BLOOD BANK PAGE

BLOOD GROUP	QTY(IN ML)
A+	490
O+	470
B+	460
AB+	480
A-	475
O-	465
B-	485
AB-	495

BLOOD DONATION HOME REGISTER DONORS RECIPIENTS TRANSFER BANK HOSPITAL

TRANSFER OPTION

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BLOOD DONATION HOME REGISTER DONORS RECIPIENTS TRANSFER BANK HOSPITAL

INDIVIDUAL TRANSFER PAGE

Transfer date dd-mm-yyyy → Enter the blood type → Enter the donor's id → Enter the recipient's id Transfer

TRANSFER HISTORY RECORDS

ID	DATE	BLOOD GROUP	DONOR'S NAME	RECIPIENT'S NAME	QTY
1	2023-01-31	A+	Sudhi Krishna N A	Anit	460
2	2023-02-01	AB+	Syam Sundar	John	470
3	2023-02-02	AB-	Kiran	Emilia	460

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BLOOD DONATION HOME REGISTER DONORS RECIPIENTS TRANSFER BANK HOSPITAL

HOSPITAL TRANSFER PAGE

Transfer date dd-mm-yyyy → Enter the blood type → Enter the donor id → Enter the hospital's id Transfer

TRANSFER HISTORY RECORDS

ID	DATE	BLOOD GROUP	DONOR NAME	HOSPITAL NAME	QTY
1	2023-01-03	O+	Parthiv Manoj	Fortis Hospital	460
2	2023-02-04	B-	Rupali	Medanta Hospital	460

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BLOOD DONATION HOME REGISTER DONORS RECIPIENTS TRANSFER BANK HOSPITAL

BLOOD BANK PAGE

BLOOD GROUP	QTY(IN ML)
A+	30
O+	10
B+	460
AB+	10
A-	475
O-	465
B-	25
AB-	35

CHAPTER 7: SUMMARY & CONCLUSIONS

Summary

This project aims to design and implement a very basic layout of an online blood bank management system. Due to the very limited knowledge in the medical field, this project has its own fair share of limitations, thus needing improvements in several sections to be deployed for industrial use.

Conclusion

The Blood Bank Management System project aims to automate the processes of a blood bank and make it more efficient and accessible. The system helps to keep track of blood donations, manage blood inventory, and streamline the process of finding and distributing blood to those in need.

The implementation of this system has resulted in several benefits, including increased accuracy and efficiency in blood tracking and distribution, reduced manual labour, and improved accessibility to blood for those in need. Additionally, the system provides better data analysis and reporting, which can aid in decision making and improve the overall operations of the blood bank.

In conclusion, the Blood Bank Management System has been successful in meeting its objectives and providing valuable assistance to the blood bank in managing its operations. The implementation of this system has improved the overall efficiency and accessibility of the blood bank, and has the potential to have a significant positive impact on the lives of those in need of blood transfusions.