DBMS Mini Project Report

"COVID-19 Plasma Bank Donation System"

Submitted by

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Contents

Abstract : It is clear that the Coronavirus pandemic will remain on the world agenda for a few more months. Even after it's one of the most disastrous pandemics the world has ever seen, there are some therapies which the experts have suggested, Plasma Therapies being one of them.

The system proposed in this chapter would be an attempt to counter the Plasma need and requirement chain. The system would smoothly fulfill the flow of plasma from donations to the required patients through a sequentially designed Plasma Donation System. The proposed system will be constantly monitored, there by taking care from the accessibility and user-first prospect.

This system follows a top-down approach and uses Relational Database Concepts for managing various databases required. The aim of the system is to simplify the Plasma process as much as possible and counter the pandemic situation with integrity and voluntariness.

List of Figures

List of Tables (All tables are in 3NF form)

1) Introduction:

The coronavirus pandemic has brought the world to a standstill. Each and every group of people have been affected because of it. In this scenario, Plasma Therapy is seen as an effective way of treating the Covid patients. It involves transferring of the antibodies produced by the recovered patients to the infected patients. This may increase the chances of the infected patients developing immunity against the virus. This process of voluntarily donating the plasma, if streamlined through a proper system, and carried out as per plans, could help us to eradicate it. This system is one such attempt to streamline the Plasma donation process.

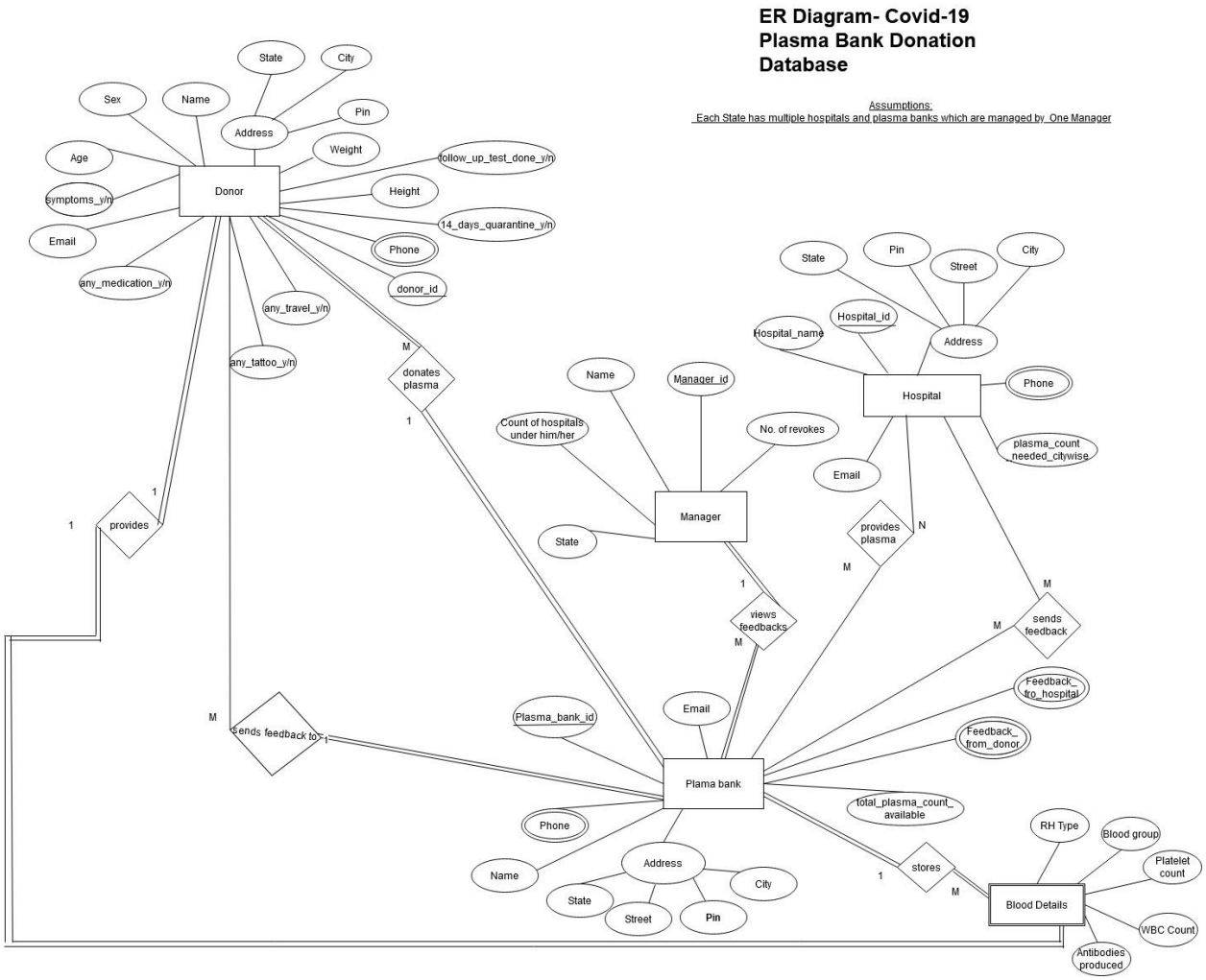
2) Problem Statement:

In the proposed system the recovered Covid patients can donate blood to the plasma bank in their city. The plasma bank will store the details of donors. It will separately store the blood details of each donor.
The hospitals can request for plasma samples from the plasma bank present in their city.
The hospitals will have a unique Hospital ID and will have it's personal details stored.
The Plasma banks will have a unique Plasma Bank ID too.
The donors can provide feedback to the plasma banks on the basis of services he/she has received. Provision is also given to hospital to provide feedback for services provided by the Plasma Bank. We have assumed that there will be multiple plasma banks in every state.
The manager will monitor the entire system by viewing the feedback received by the donors and hospitals. He/she has the authority to revoke underperforming Plasma banks from the system based on unsatisfactory feedback by donors and hospitals. We have considered that there will be one manager per state.

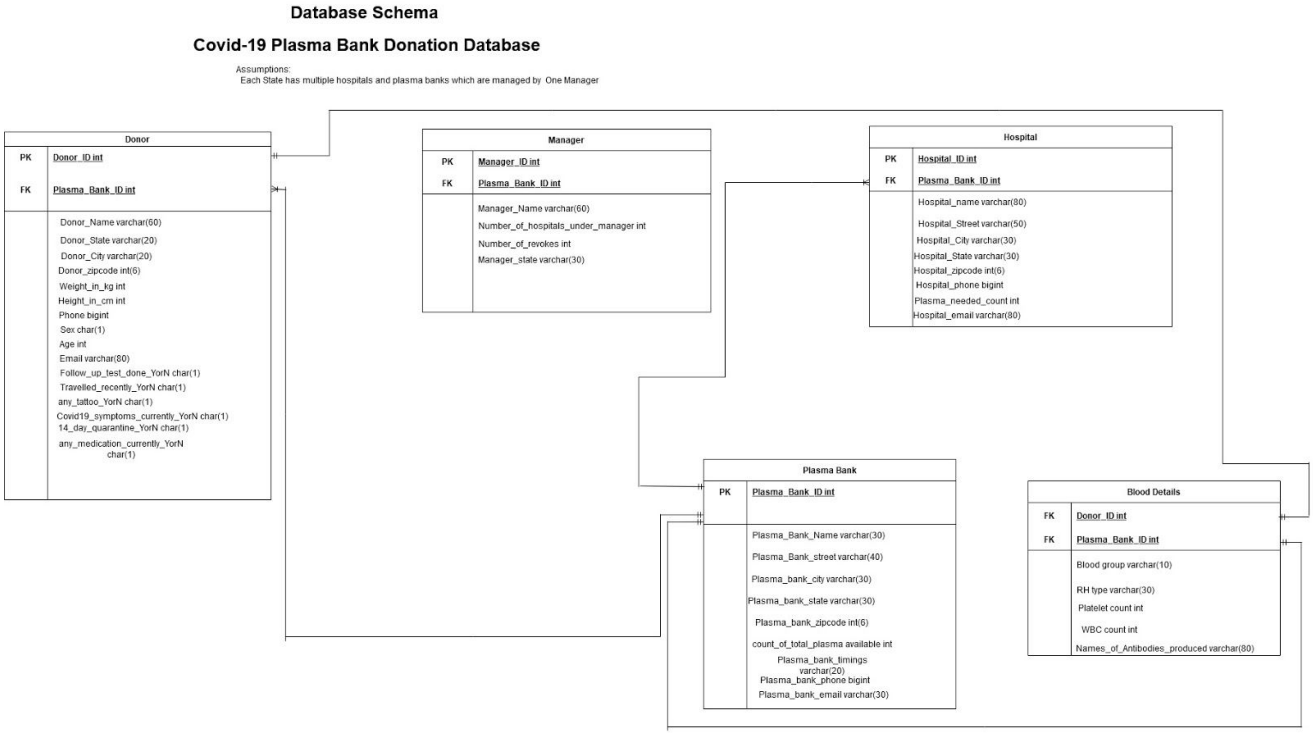
3) Tools and Technologies used:

1) Python (Django Framework)
2) MySQL Database
3) HTML
4) CSS and Bootstrap
5) JS

Database Design (ERD Diagram) :



Relational Database Design using Schema diagram:



Functional Requirements

R1. Search
1. Input: Search for any city.
2. Output: List of hospitals in that city along with numbers of Covid-19 patients that need plasma are displayed with 'donate' button alongside.

R2. Registration form
1. Input: Click on donate button.
2. Output: Registration form which accepts the necessary data (eg: personal details, eligibility criteria, etc).
3. Forms are forwarded to the respective hospitals.

R3.Offline slot booking
1. Input: Users fill the registration form which is accessed by the respective hospitals.
2. Hospitals verify the eligibility criteria and provide slot timings for donation through offline means.
3. Output: Users are notified with the slot timings for donation by hospital.

R4. Feedback
1. Input: After donation, users can fill the feedback form to share their experience regarding how they were treated at the hospital.
2. Output: Their feedback gets stored that can be reviewed by the respective hospital and the association of hospitals.

Non-Functional Requirements

R1. User requirements:
1. The system shall allow the user to access the system from phone, desktop, laptop using the web application as an interface.
2. The system is user friendly which makes it easy to use.

R2. Availability Requirement:
1. System is available hundred percent for the user and is used 24 hours a day and 365 days a year.
2. The system shall be operational during the entire pandemic to serve the affected.

R3. Efficiency Requirement:
1. If the system fails it will be recovered by the backup in no time.
2. The details would be backed up on the cloud.

R4. Accuracy :
1. The system would accurately provide real-time information taking into consideration various concurrency issues.
2. It would always show real time data.

R5. Performance Requirements:
1. The information is refreshed depending upon whether some updates have occurred or not in the application.
2. The system shall respond to the number and no less than 2 seconds from the time of submitted.
3. Responses to the information shall take no longer than 5 seconds to appear on the screen.

R6. Reliability Requirement :
1. The system would be 100% reliable due to the importance of data and the damages that can be caused.

NORMALIZATION (UPTO 3NF)

1. PLASMA BANK TABLE

Plasma_bank_ID(PK)	Plasma_Bank_Name	Plasma_Bank_Street	Zipcode	count_of_total_plasma_available	Plasma_Bank_phone	Plasma_Bank_email
1	Om_Bank	M.G Road	400067	50	22222222	ombank@xyz.com
1	Om_Bank	M.G Road	400067	50	66666666	ombank@xyz.com
2	Shyam_bank	S.V Road	411038	30	77777777	shyambank@xyz.com

1NF:

Since Plasma Bank phone and email are multivalued, Plasma_Bank_id (PK), Zipcode (FK) should not be unique

2NF:

All non-key attributes are fully functionally dependent on primary key.

3NF:

There are no transitive functionalities.

2. DONOR TABLE

Plasma_bank_ID(FK)	Donor_ID (PK)	Donor_Name	Zip Code(FK)	Weight_in_kg	Height_in_cm	Phone	Sex	Age	Email	Follow_up_test_done_YorN	Travelled_recently_YorN	any_tatto_YorN	14_day_quarantine_YorN	Covid19_symptoms_currently_YorN
1	1	Neha Sharma	400067	70	162	2323232323	F	26	nehashar@xyz.com	Y	N	N	Y	N
1	1	Neha Sharma	400067	70	162	3434343434	F	26	nehashar@xyz.com	Y	N	N	Y	N
2	2	Nidhi Shah	411038	68	158	1212121212	F	24	nidhi@xyz.com	Y	N	N	Y	N

1NF:

Since Donor phone is multivalued, Plasma_Bank_id (PK), Zipcode (FK) should not be unique

2NF:

All non-key attributes are fully functionally dependent on primary key.

3NF:

There are no transitive functionalities.

3.SERVICE QUALITY MANAGER TABLE

Plasma_bank_ID(FK)	Manager_ID (PK)	Manager_Name	ZipCode	Number_of_hospitals_under_manager	Number_of_revokes
1	1	Sachin Nayak	Maharashtra	5	2
1	1	Sachin Nayak	Maharashtra	5	2
1	1	Sachin Nayak	Maharashtra	5	2

1NF:

Each manager is assigned one state and thus it has multiple plasma banks under it.
Hence Plasma_bank_id and Manager_id cannot be unique

2NF:

All non-key attributes are fully functionally dependent on primary key.

3NF:

There are no transitive
functionalities.

4. BLOOD DETAILS TABLE

Plasma_bank_ID(FK)	Donor_ID(FK)	Blood_group	RH_type	Platelet_count	WBC_count	Names_of_antibodies_produced
1	1	B+ve	positive	200000	6000	IgG
1	3	B+ve	positive	300000	7000	IgG

1NF: Blood details table

As multiple donors can provide blood details to same plasma bank, plasma_bank_id (fk) will not be unique

As one donor will have unique blood details, donor_id(fk) will be unique

2NF:

All non-key attributes are fully functionally dependent on primary key.

3NF:

There are no transitive functionalities.

5. HOSPITAL TABLE

Plasma_bank_ID (FK)	Hospital_ID (PK)	Hospital_name	Hosital_street	zipcode(FK)	Hospital_phone	Plasma_needed_count	Hospital_email
1	1	Cama Hospital	M.G. Road	400067	7373737373	10	camah@xyz.com
1	1	Cama Hospital	M.G. Road	400067	6767676767	10	camah@xyz.com
2	2	Tata Hospital	S.V.Road	411038	2332233222	15	tatahos@xyz.com

1NF: Hospital Table

Hospital phone are multivalued and so hospital_id(pk), plasma_bank_id(fk) are not unique

2NF:

All non-key attributes are fully functionally dependent on primary key.

3NF:

There are no transitive functionalities.

6. ADDRESS TABLE

Zipcode (PK)	City
400067	Mumbai
411038	Pune

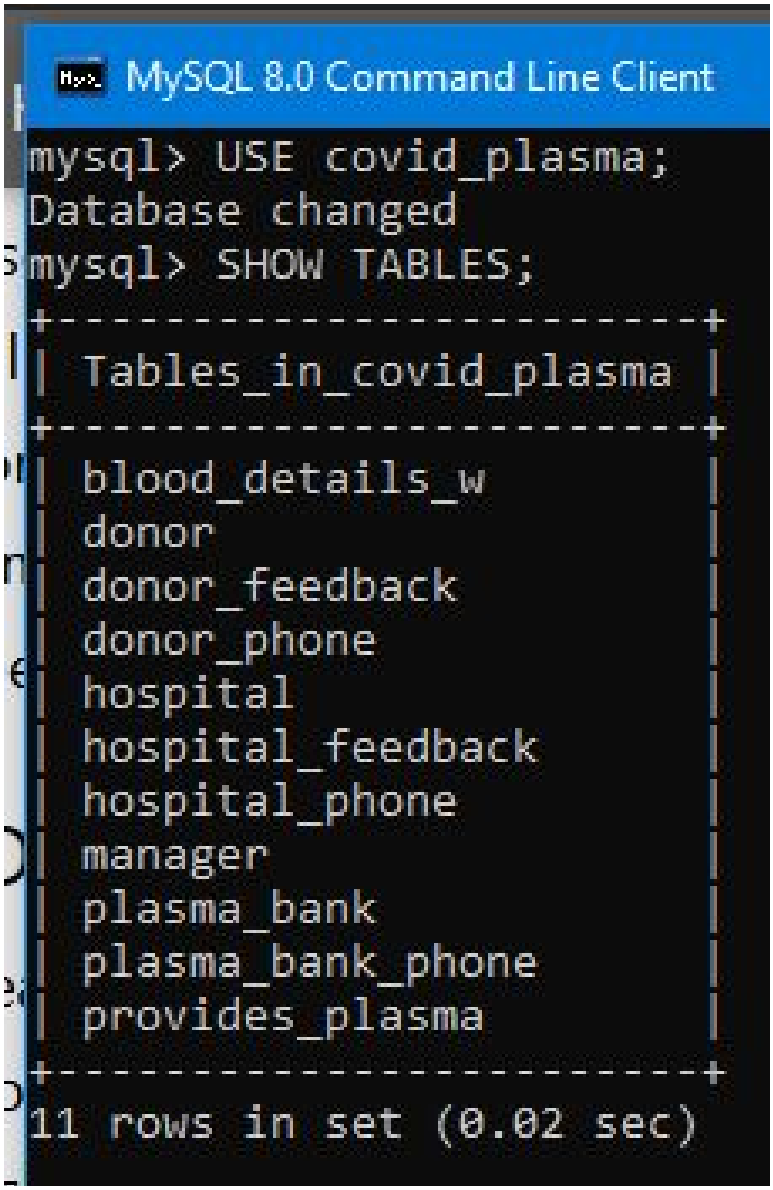
Address Table is created to transform table to 2NF.

7. STATE TABLE

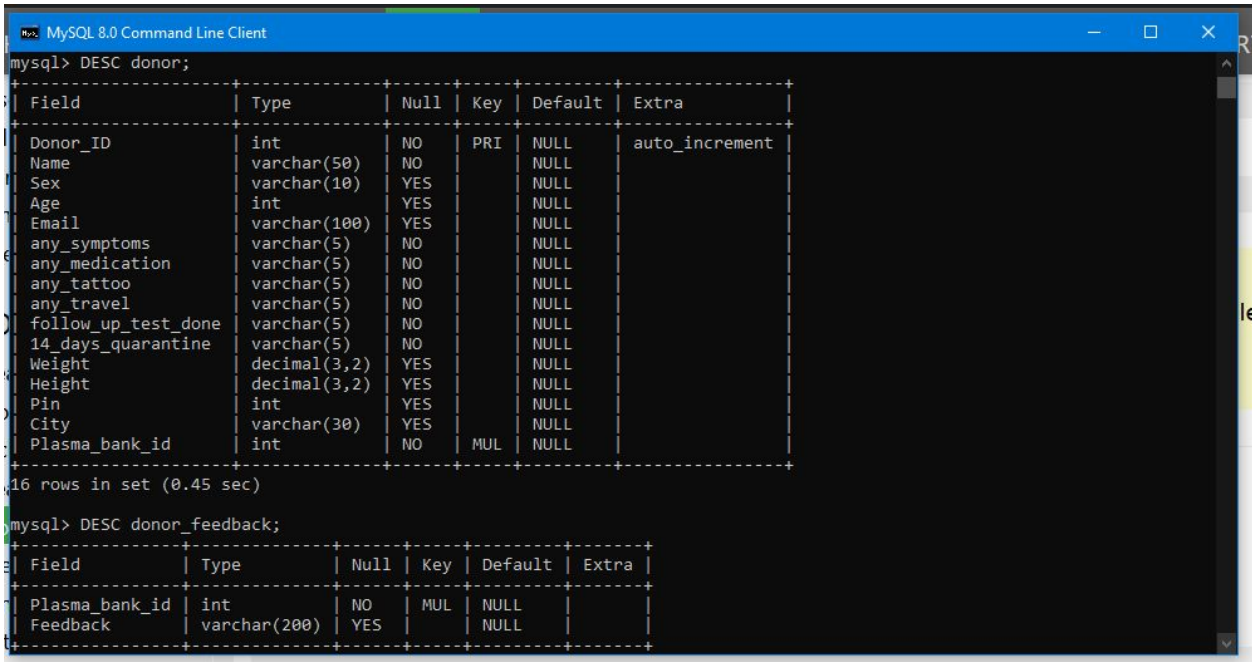
Zipcode (PK)	State
400067	Maharashtra
411038	Maharashtra

State Table is created to transform table to 3NF.

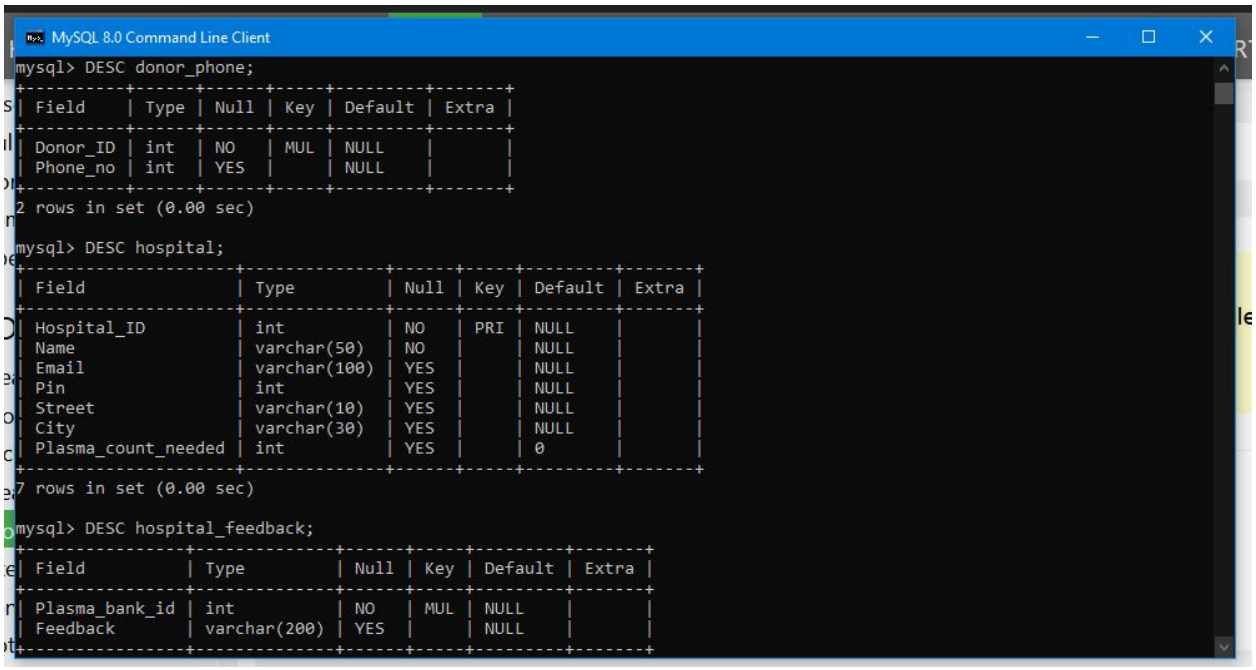
Plasma Donation System Database Tables



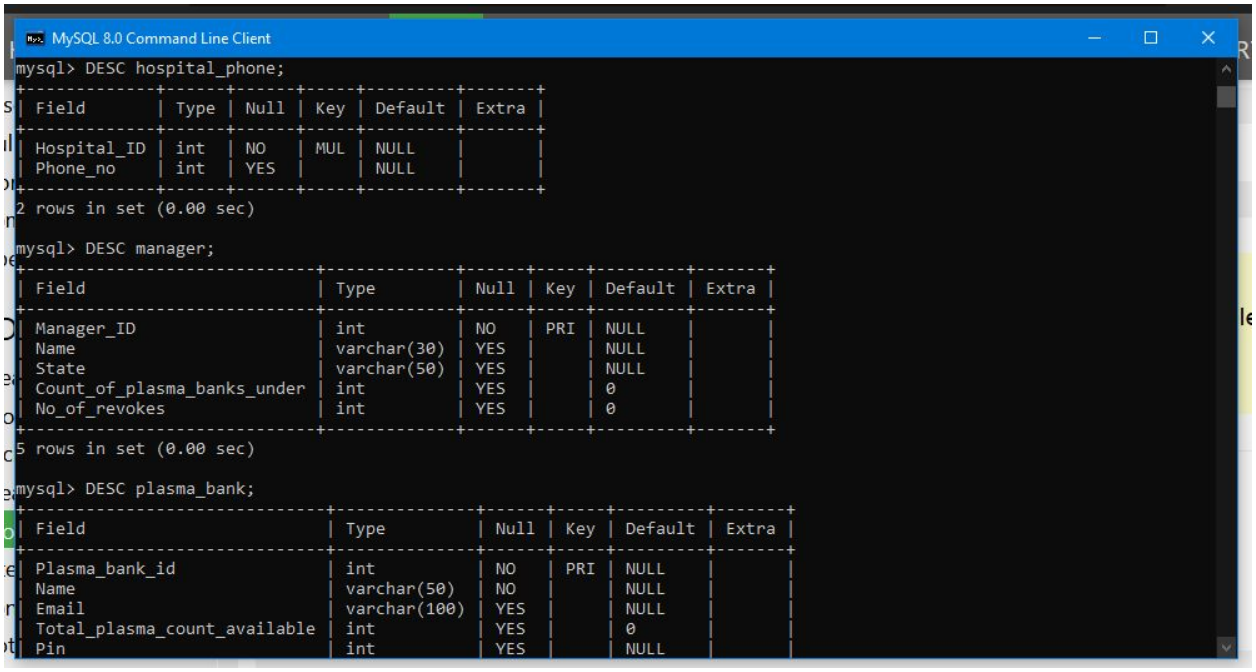
Donor's Tables: Donor Info and the feedback table consisting of the feedback given by donors to the Plasma_banks.



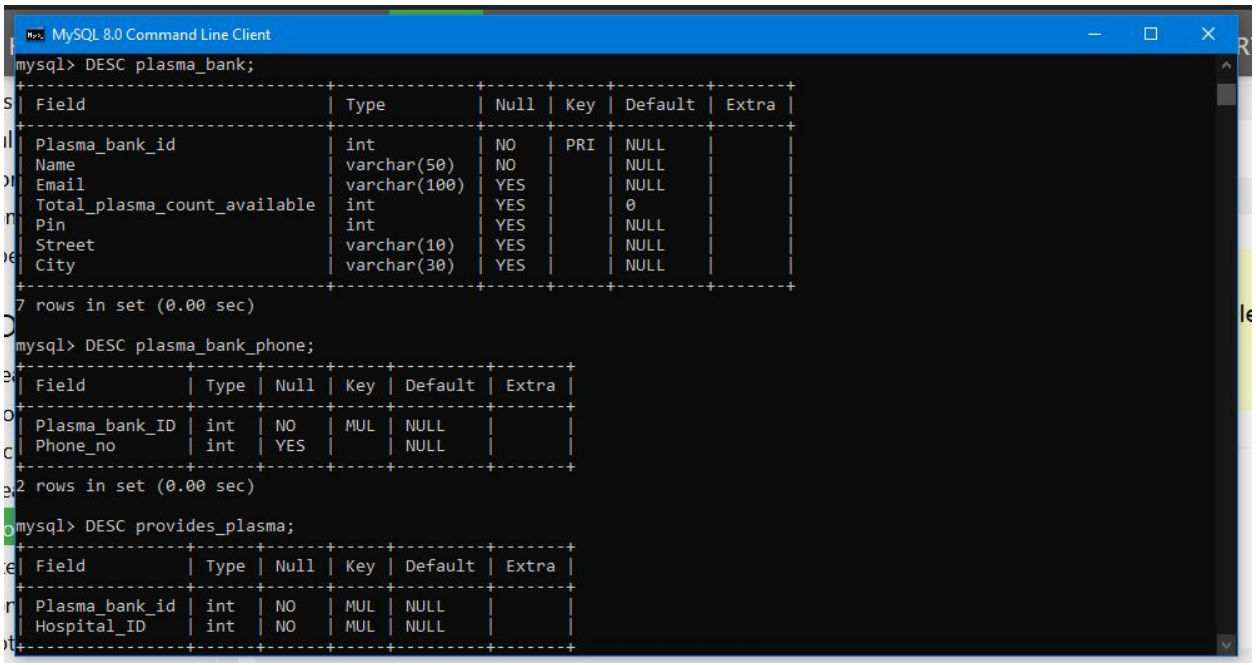
Hospitals Tables: Hospital Details and Feedback Table



Manager Table and Plasma Bank Table



Plasma bank Table and Provide Plasma table



Tables with Values

Donor Table:

MySQL 8.0 Command Line Client

```
mysql> SELECT Donor_ID,Name,Sex,Age,Email,Pin,City,Height,Weight,Plasma_bank_ID from Donor;
+----------+---------+------+------+------------------+-------+----------+--------+--------+----------------+
| Donor_ID | Name    | Sex  | Age  | Email            | Pin   | City     | Height | Weight | Plasma_bank_ID |
+----------+---------+------+------+------------------+-------+----------+--------+--------+----------------+
|      101 | Ankit   | M    |   21 | ankit@yahoo.in   | 44002 | Nagpur   | 157    | 58     |          20204 |
|      102 | Aradhya | F    |   21 | aru@yahoo.in     | 41108 | Pune     | 146    | 48     |          20203 |
|      103 | Ananya  | F    |   23 | ananya@yahoo.in  | 40198 | Mumbai   | 140    | 49     |          20201 |
|      104 | Dency   | F    |   37 | dency@yahoo.in   | 40037 | Mumbai   | 141    | 51     |          20202 |
|      105 | Shivang | M    |   29 | shiv@yahoo.in    | 20138 | Nagpur   | 155    | 61     |          20204 |
|      106 | Vyom    | M    |   25 | vyom@yahoo.in    | 21154 | Banglore | 171    | 69     |          20205 |
|      107 | Prem    | M    |   32 | prem@yahoo.in    | 50012 | Manglore | 136    | 78     |          20206 |
|      108 | Jagdish | M    |   35 | jag@yahoo.in     | 21055 | Delhi    | 155    | 65     |          20208 |
|      109 | Ashwin  | M    |   32 | ash@yahoo.in     | 55001 | Noida    | 146    | 78     |          20207 |
|      110 | Shivani | F    |   33 | shivani@yahoo.in | 22065 | Noida    | 169    | 58     |          20207 |
|      111 | Anushka | F    |   21 | anush@yahoo.in   | 33084 | Delhi    | 171    | 48     |          20209 |
|      112 | Haridas | M    |   35 | hari@yahoo.in    | 44024 | Pune     | 196    | 64     |          20203 |
|      113 | Om      | M    |   35 | hari@yahoo.in    | 44024 | Noida    | 151    | 64     |          20207 |
+----------+---------+------+------+------------------+-------+----------+--------+--------+----------------+
13 rows in set (0.00 sec)
```

```
ERROR 1054 (42S22): Unknown column '14_days' in 'field list'
mysql> SELECT Donor_ID,Name,any_symptoms,any_medication,any_tattoo,any_travel,follow_up_test_done,14_days_quarantine, Plasma_bank_id from Donor;
+----------+---------+-------------+----------------+-----------+-----------+---------------------+--------------------+---------------+
| Donor_ID | Name    | any_symptoms | any_medication | any_tattoo | any_travel | follow_up_test_done | 14_days_quarantine | Plasma_bank_id |
+----------+---------+-------------+----------------+-----------+-----------+---------------------+--------------------+---------------+
|      101 | Ankit   | No          | No             | No        | No        | Yes                 | Yes                |          20204 |
|      102 | Aradhya | No          | No             | No        | No        | Yes                 | Yes                |          20203 |
|      103 | Ananya  | No          | Yes            | Yes       | No        | Yes                 | No                 |          20201 |
|      104 | Dency   | No          | Yes            | No        | No        | Yes                 | Yes                |          20202 |
|      105 | Shivang | No          | No             | Yes       | No        | Yes                 | Yes                |          20204 |
|      106 | Vyom    | No          | No             | No        | No        | Yes                 | Yes                |          20205 |
|      107 | Prem    | No          | No             | No        | No        | No                  | No                 |          20206 |
|      108 | Jagdish | No          | No             | No        | No        | Yes                 | Yes                |          20208 |
|      109 | Ashwin  | No          | No             | No        | No        | Yes                 | Yes                |          20207 |
|      110 | Shivani | No          | No             | No        | No        | Yes                 | Yes                |          20207 |
|      111 | Anushka | No          | No             | No        | No        | Yes                 | Yes                |          20209 |
|      112 | Haridas | No          | No             | No        | No        | Yes                 | Yes                |          20203 |
|      113 | Om      | No          | No             | No        | No        | Yes                 | Yes                |          20207 |
+----------+---------+-------------+----------------+-----------+-----------+---------------------+--------------------+---------------+
13 rows in set (0.00 sec)
```

Donor Phone Table:

MySQL 8.0 Command Line Client

```
mysql> SELECT * FROM donor_phone;
+----------+-----------+
| Donor_ID | Phone_No  |
+----------+-----------+
|      101 | 789654562 |
|      103 | 975621556 |
|      104 | 745521520 |
|      105 | 874532145 |
|      106 | 451515558 |
|      107 | 741265258 |
|      108 | 741852965 |
|      109 | 741585665 |
|      110 | 412563255 |
|      111 | 741596525 |
|      112 | 741258966 |
|      113 | 654785224 |
+----------+-----------+
12 rows in set (0.11 sec)
```

Manager Table:

```
mysql> SELECT * FROM Manager;
+------------+-----------+--------------+-----------------------------+---------------+
| Manager_ID | Name      | State        | Count_of_plasma_banks_under | No_of_revokes |
+------------+-----------+--------------+-----------------------------+---------------+
|          1 | A Mohite  | Maharshtra   |                          13 |             0 |
|          2 | VC Shukla | Karnataka    |                           7 |             0 |
|          3 | AK Sinha  | Delhi        |                           6 |             0 |
|          4 | LG Singh  | Uttar Pradesh |                           9 |             0 |
+------------+-----------+--------------+-----------------------------+---------------+
4 rows in set (0.12 sec)
```

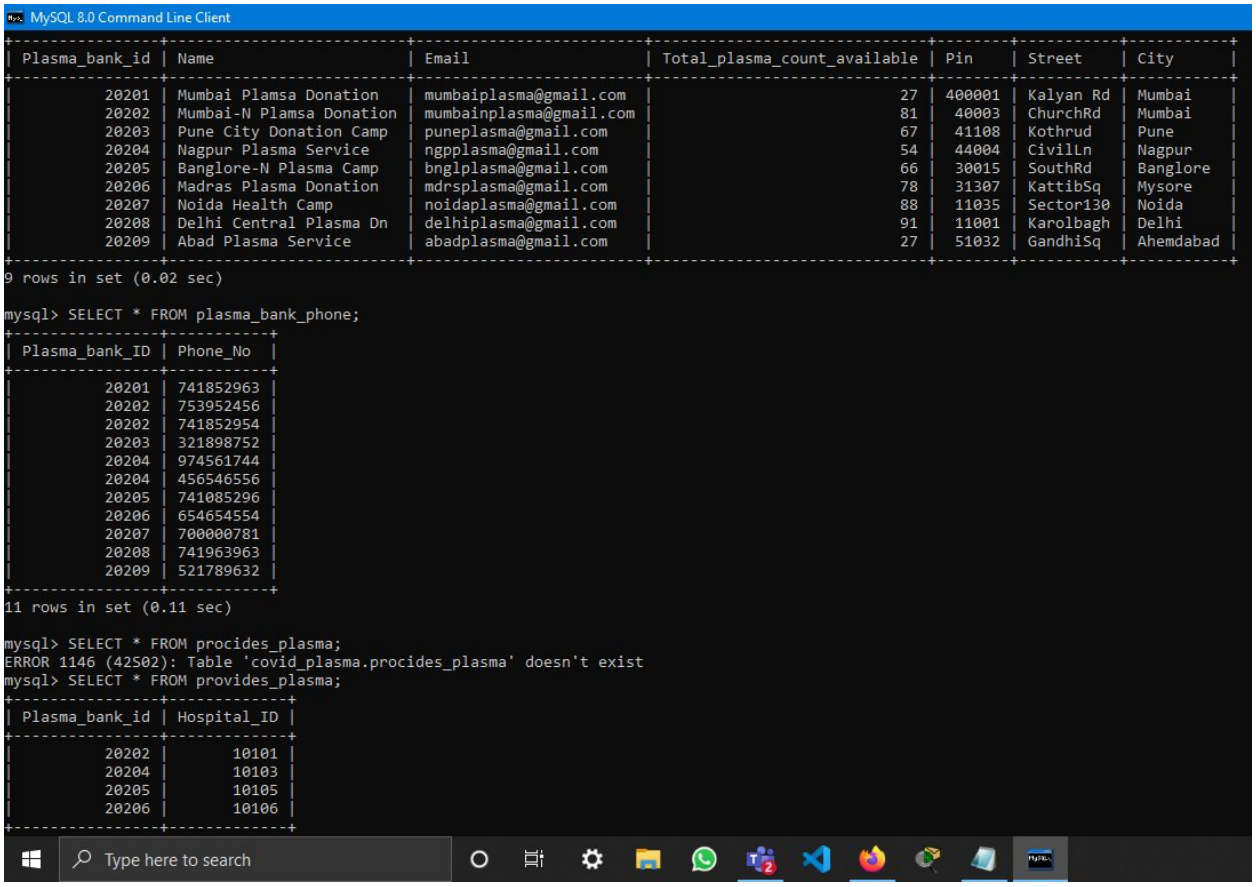
Donor Feedback Table:

```
mysql> SELECT * FROM Donor_feedback;
+----------------+-----------------------------------------------------+
| Plasma_bank_id | Feedback                                            |
+----------------+-----------------------------------------------------+
|          20202 | Great Service, Social Distancing was taken care of. |
|          20204 | Too many formalities                                |
|          20205 | Great system                                        |
|          20206 | Easy and better way for donation.                   |
+----------------+-----------------------------------------------------+
4 rows in set (0.06 sec)
```

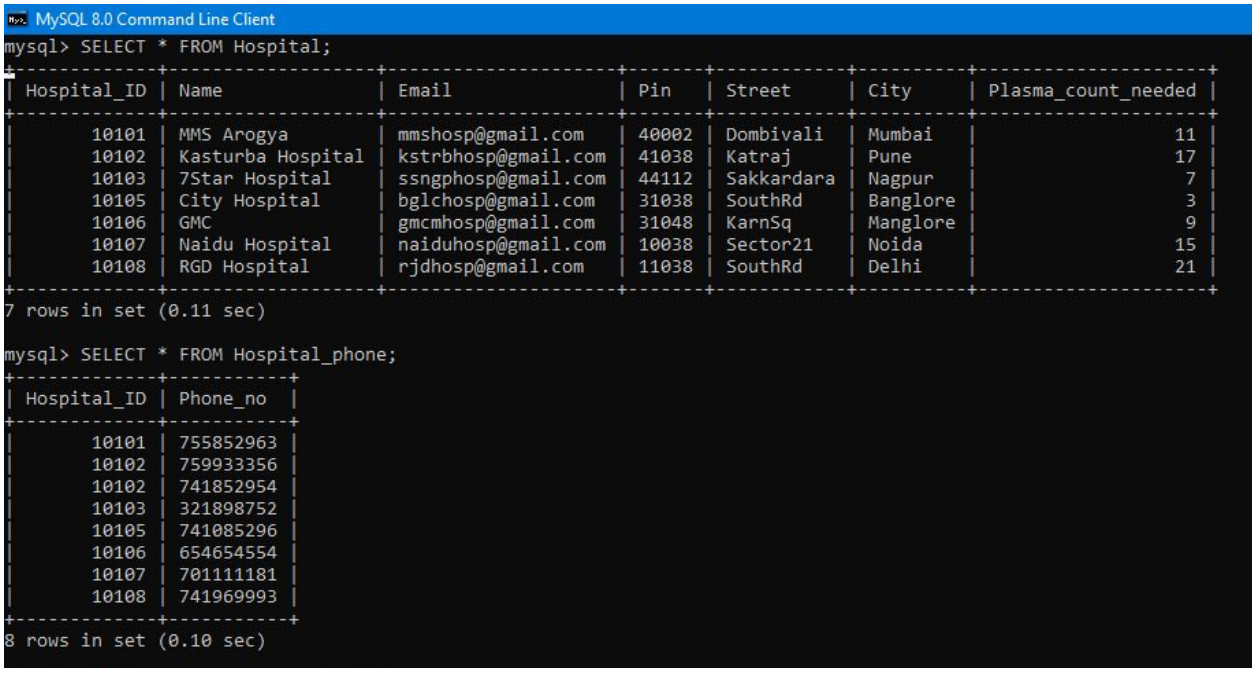
Hospital Feedback Table:

```
mysql> SELECT * FROM Hospital_feedback;
+----------------+--------------------+
| Plasma_bank_id | Feedback           |
+----------------+--------------------+
|          20202 | OK                 |
|          20204 | OK                 |
|          20205 | Impure/Bad Quality |
|          20206 | OK                 |
+----------------+--------------------+
4 rows in set (0.00 sec)

mysql>
```

Plasma Bank Table (Main Table, Phone Table and Provided to Hospital table) :



Hospitals Table:



Blood Details Table:

```
mysql> SELECT * FROM Blood_details_W;
+----------+-------------+----------+----------------+-----------+---------------------+----------------+
| Donor_ID | Blood_group | RH_Type  | Platelet_count | WBC_Count | Antibodies_produced | Plasma_bank_id |
+----------+-------------+----------+----------------+-----------+---------------------+----------------+
|      101 | AP          | Positive |          37000 |      8000 | Immunnoglobulin_M   |          20204 |
|      104 | AN          | Positive |          31000 |     10000 | None                |          20202 |
|      105 | ABP         | Positive |          27000 |      8000 | Immunnoglobulin_M   |          20204 |
|      106 | AN          | Negative |          26000 |      5000 | None                |          20205 |
|      107 | ABP         | Positive |          26000 |      8000 | None                |          20206 |
+----------+-------------+----------+----------------+-----------+---------------------+----------------+
5 rows in set (0.13 sec)

mysql>
```

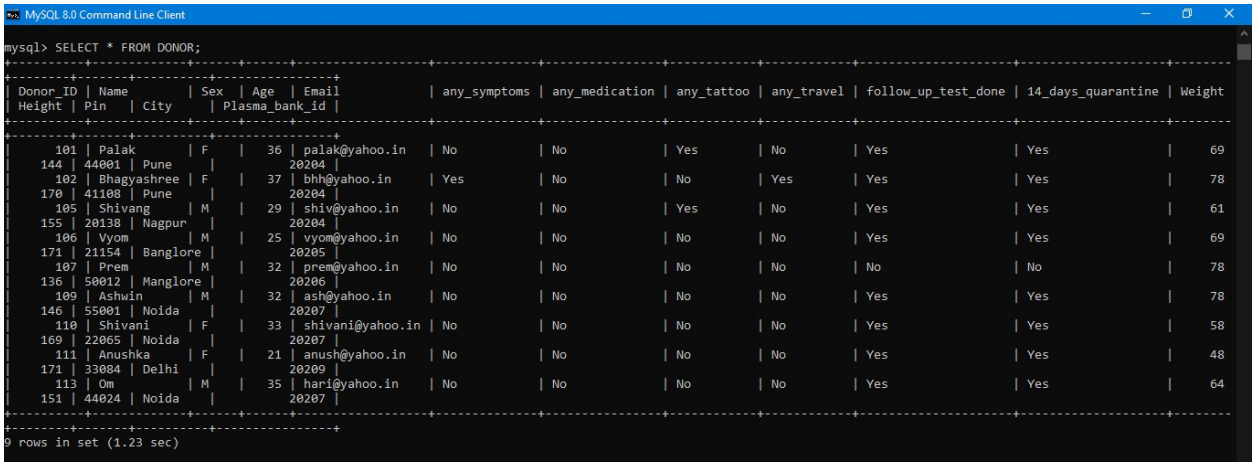
Triggers

1) To Create a backup of Donor's details in the other "Donor_backup" table when Donor's details are deleted from Donor table i.e. when the respective donor's plasma is utilized by a hospital.

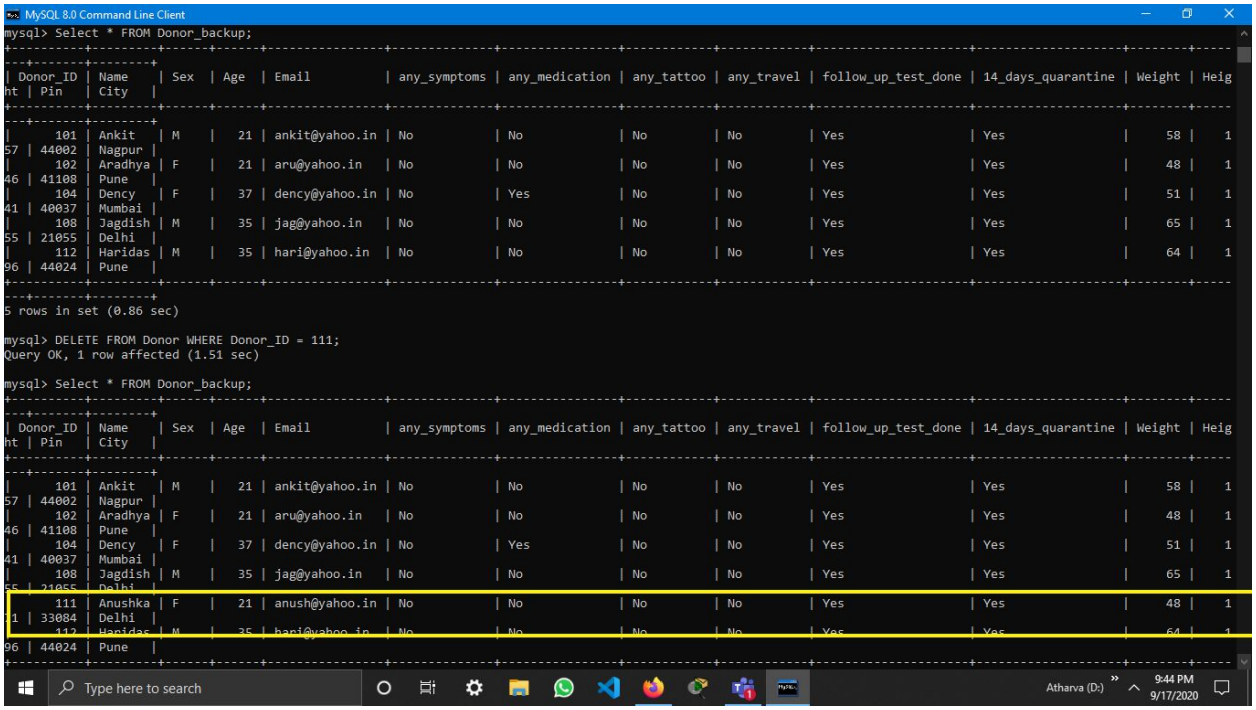
Code:

```
//Trigger to backup the Taken Donor
DELIMITER $$
CREATE TRIGGER donor_backup
BEFORE DELETE
On Donor
FOR EACH ROW
BEGIN
INSERT INTO Donor_backup(Donor_ID, Name, Sex, Age, Email, any_symptoms,
any_medication, any_tattoo, any_travel, follow_up_test_done,
14_days_quarantine, Weight, Height, Pin, City)
VALUES
(OLD.Donor_ID, OLD.Name, OLD.Sex, OLD.Age, OLD.Email, OLD.any_symptoms,
OLD.any_medication, OLD.any_tattoo, OLD.any_travel, OLD.follow_up_test_done,
OLD.14_days_quarantine, OLD.Weight, OLD.Height, OLD.Pin, OLD.City);
END $$
DELIMITER ;
```

Execution Screenshots:



The Donor with Donor_ID = 111 would now be deleted from Donor's table and be added in Donor_Backup Table.



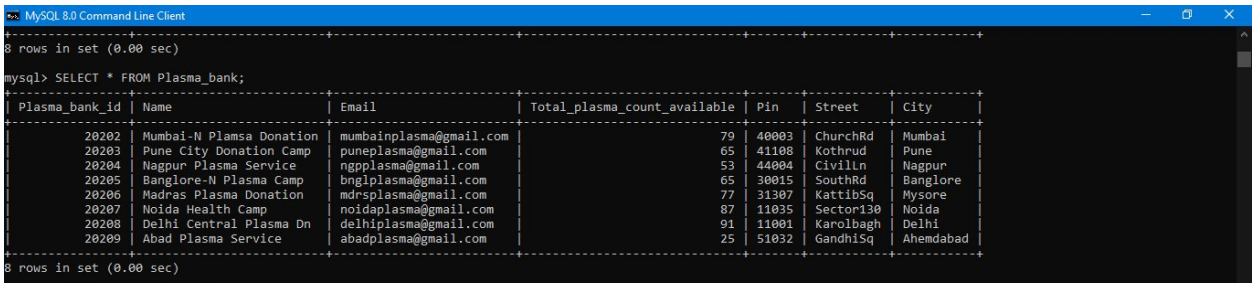
2) To update the total available plasma count in the Plasma bank table when a donor's plasma is utilized.

Code:

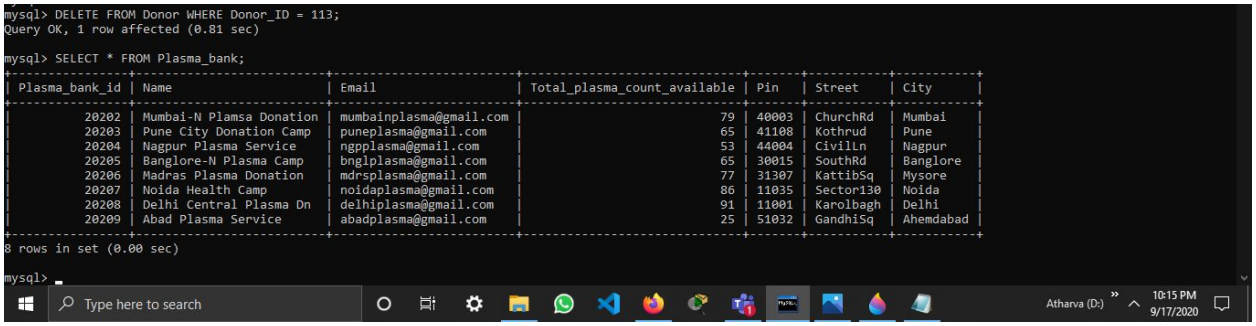
```
//Trigger to update the plasma count in the plasma bank
DELIMITER $$
CREATE TRIGGER update_p_count
BEFORE DELETE
ON donor
FOR EACH ROW
BEGIN
UPDATE Plasma_bank
SET Total_plasma_count_available = Total_plasma_count_available - 1
WHERE old.Plasma_bank_ID = Plasma_bank.Plasma_bank_ID;
END $$
DELIMITER ;
```

Execution Screenshots:

The Plasma bank with ID = 20207 Contains 87 Plasma presently.



Now, when we delete a Donor with Plasma_bank ID 20207, the plasma count in the table gets reduced to 86.



PL SQL Procedures

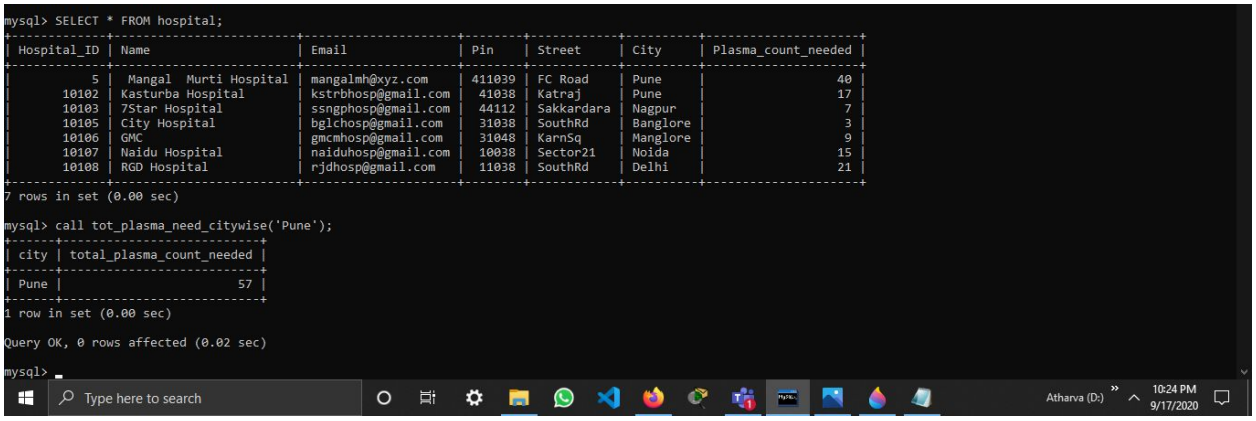
1) To display city wise count of the plasma needed.

Code:

```
DELIMITER //
CREATE PROCEDURE TOT_PLASMA_NEED_CITYWISE(IN CITYN VARCHAR(30))
BEGIN
DECLARE EXIT HANDLER FOR NOT FOUND
SELECT 'CITY DOES NOT EXIST.' AS "ERROR";
SELECT CITY, SUM(PLASMA_COUNT_NEEDED) AS TOTAL_PLASMA_COUNT_NEEDED FROM
HOSPITAL WHERE CITY=CITYN;
END;//
DELIMITER ;

CALL TOT_PLASMA_NEED_CITYWISE('PUNE');
```

Execution Screenshot:

The total plasma count needed in Pune city is 40 (in HospitalID = 5) + 17 (in HospitalID = 10102) = 57.



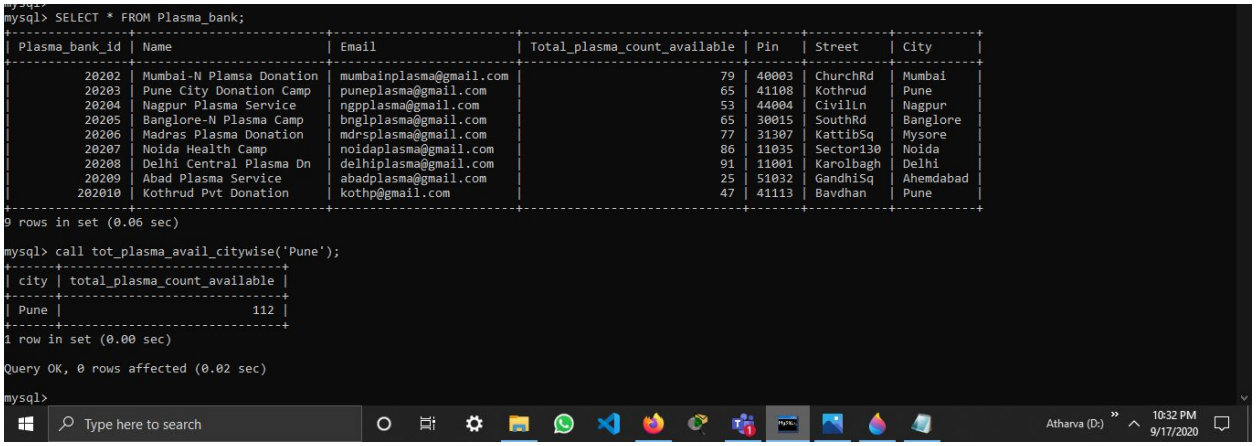
2) To display city wise available plasma data.

Code:

```
DELIMITER //
CREATE PROCEDURE TOT_PLASMA_AVAIL_CITYWISE(IN CITYN VARCHAR(30))
BEGIN
DECLARE EXIT HANDLER FOR NOT FOUND
SELECT 'CITY DOES NOT EXIST.' AS "ERROR";
SELECT CITY, SUM(TOTAL_PLASMA_COUNT_AVAILABLE) AS TOTAL_PLASMA_COUNT_AVAILABLE
FROM PLASMA_BANK WHERE CITY=CITYN;
END;//
DELIMITER ;
CALL TOT_PLASMA_AVAIL_CITYWISE('PUNE');
```

Execution Screenshot:

The total plasma count available in Pune city is 64 (in Plasma Bank ID = 20203) + 47 (in Plasma Bank ID = 202010) = 117.



Test Cases (Automation Testing)

Code:

assig.py > ...

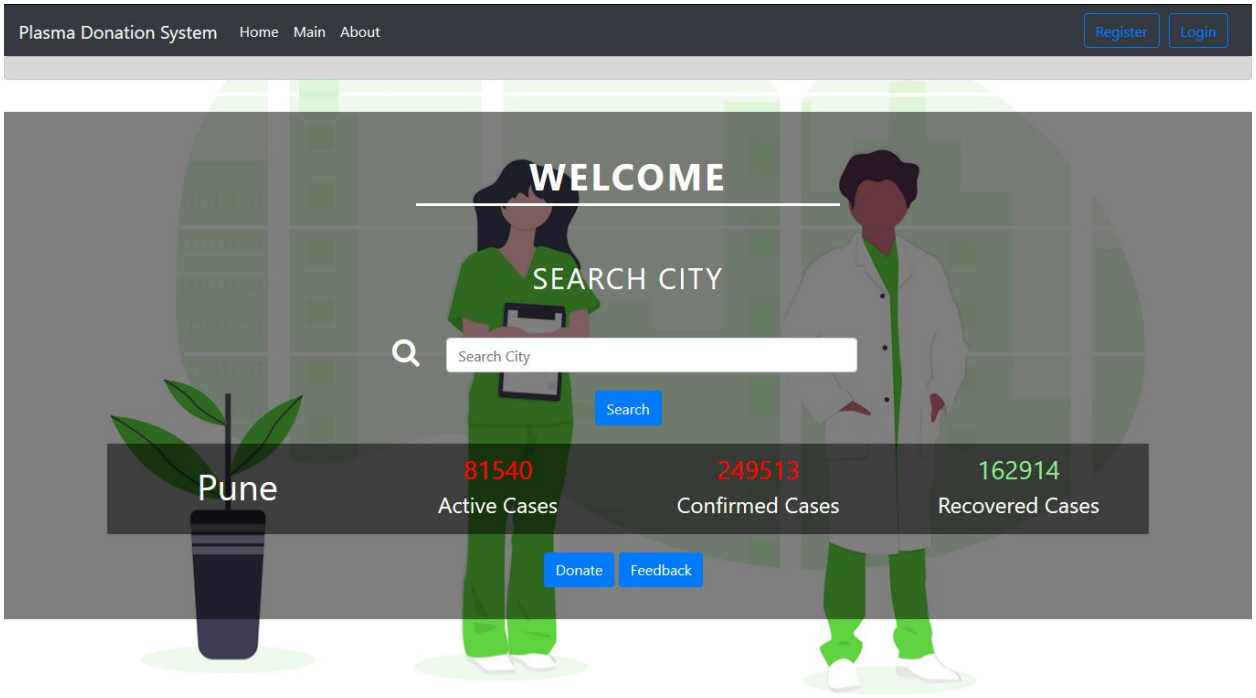
```python
from selenium import webdriver
from selenium.webdriver.common.by import By


driver = webdriver.Chrome(executable_path='C:\\Users\\Shradha\\Desktop\\Selenium\\chromedriver_win32\\chromedriver.exe')

driver.implicitly_wait(3)

driver.get("http://127.0.0.1:8000/")

driver.find_element_by_xpath("//*[@id='navbarSupportedContent']/button[2]").click()
driver.find_element(By.NAME,"loginreg").send_keys("7585")
driver.find_element(By.NAME, "loginpassword").send_keys("password")
driver.find_element_by_xpath("//*[@id='login']/div/div/div[2]/form/div[3]/button").click()

driver.implicitly_wait(10)
driver.quit()
```

Test Cases:

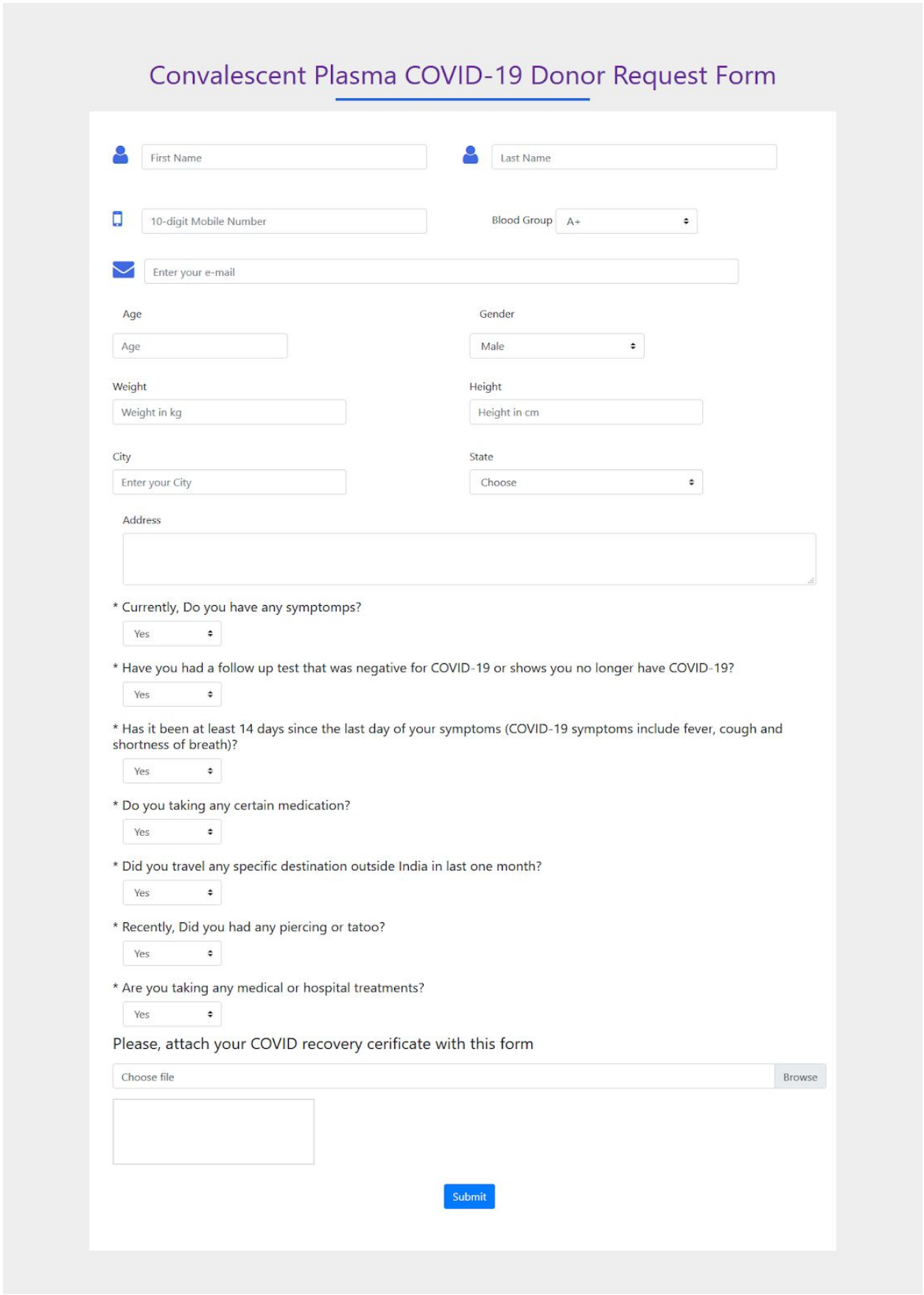
	A	B	C	D	E	F	G
1	Test Case	Test Case Scenario	Test Step	Test Data	Expected Result	Actual Result	Pass/Fail
2	T01	Plasma Bank Login	go to site->click login ->enter reg id and password->click submit	reg id - 7585 pass - password	plasma bank should ligin	as expected	Pass
3	T02	Hospital Login	go to site->click login ->enter reg id and password->click submit	reg id- 1234 pass- 1234	hospital should login	as expected	Pass
4	T03	Hospital Login	go to site->click login ->enter reg id and password->click submit	reg id- 1234 pass- pass	hospital shouldn't log in	as expected	Pass
5	T04	Plasma Bank Login	go to site->click login ->enter reg id and password->click submit	reg id- 7585 pass- 7585	plasma bank shouldn't log in	as expected	Pass
6	T05	Plasma Bank Login	go to site->click login ->enter reg id and password->click submit	reg id- 4567 pass-4567	plasma bank should log in	as expected	Pass
7	T06	Plasma Bank Login	go to site->click login ->enter reg id and password->click submit	reg id- 4567 pass-pass	plasma bank shouldn't log in	as expected	Pass
8	T07	Hospital Login	go to site->click login ->enter reg id and password->click submit	reg id-2323 pass-2323	hospital should log in	as expected	Pass
9	T08	Hospital Login	go to site->click login ->enter reg id and password->click submit	reg id- 2323 pass-pass	hospital shouldn't log in	as expected	Pass
10							

Frontend User Interface Screenshots

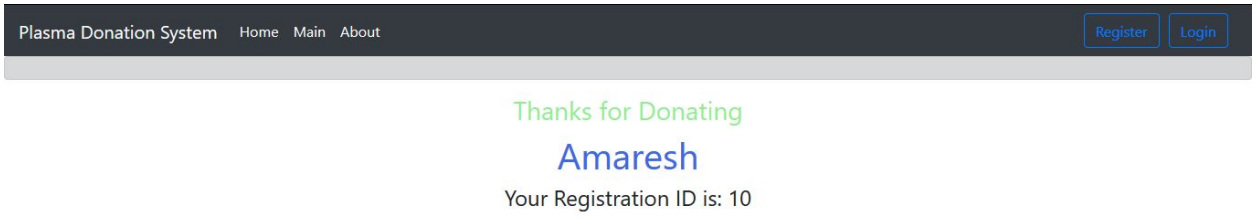
1) Landing Page : Users may search any city in the search box to see the details of COVID situation in it.



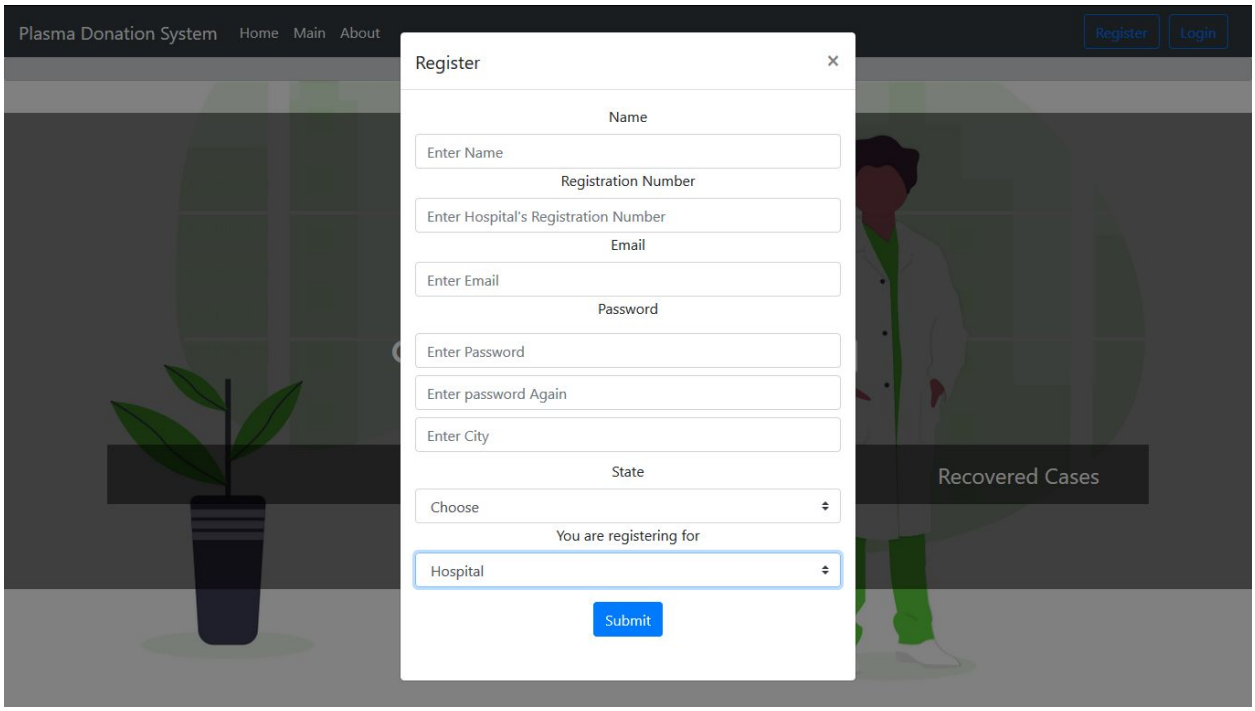
2) Donor Form: This is the form the donor needs to fill.


Convalescent Plasma COVID-19 Donor Request Form
First Name
Last Name
10-digit Mobile Number
Blood Group
A+
Enter your e-mail
Age
Gender
Age
Male
Weight
Height
Weight in kg
Height in cm
City
State
Enter your City
Choose
Address
* Currently, Do you have any symptomps?
Yes
* Have you had a follow up test that was negative for COVID-19 or shows you no longer have COVID-19?
Yes
* Has it been at least 14 days since the last day of your symptoms (COVID-19 symptoms include fever, cough and shortness of breath)?
Yes
* Do you taking any certain medication?
Yes
* Did you travel any specific destination outside India in last one month?
Yes
* Recently, Did you had any piercing or tatoo?
Yes
* Are you taking any medical or hospital treatments?
Yes
Please, attach your COVID recovery cerificate with this form
Choose file
Browse
Submit

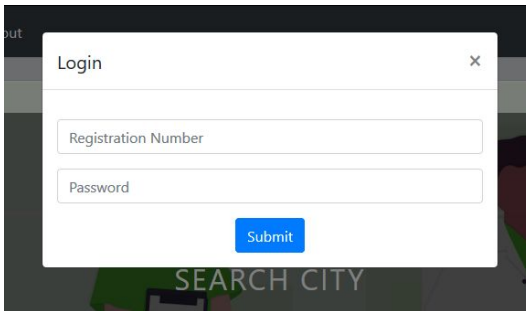
3) The Donor will be allotted a unique ID once he/she completes the registration process.



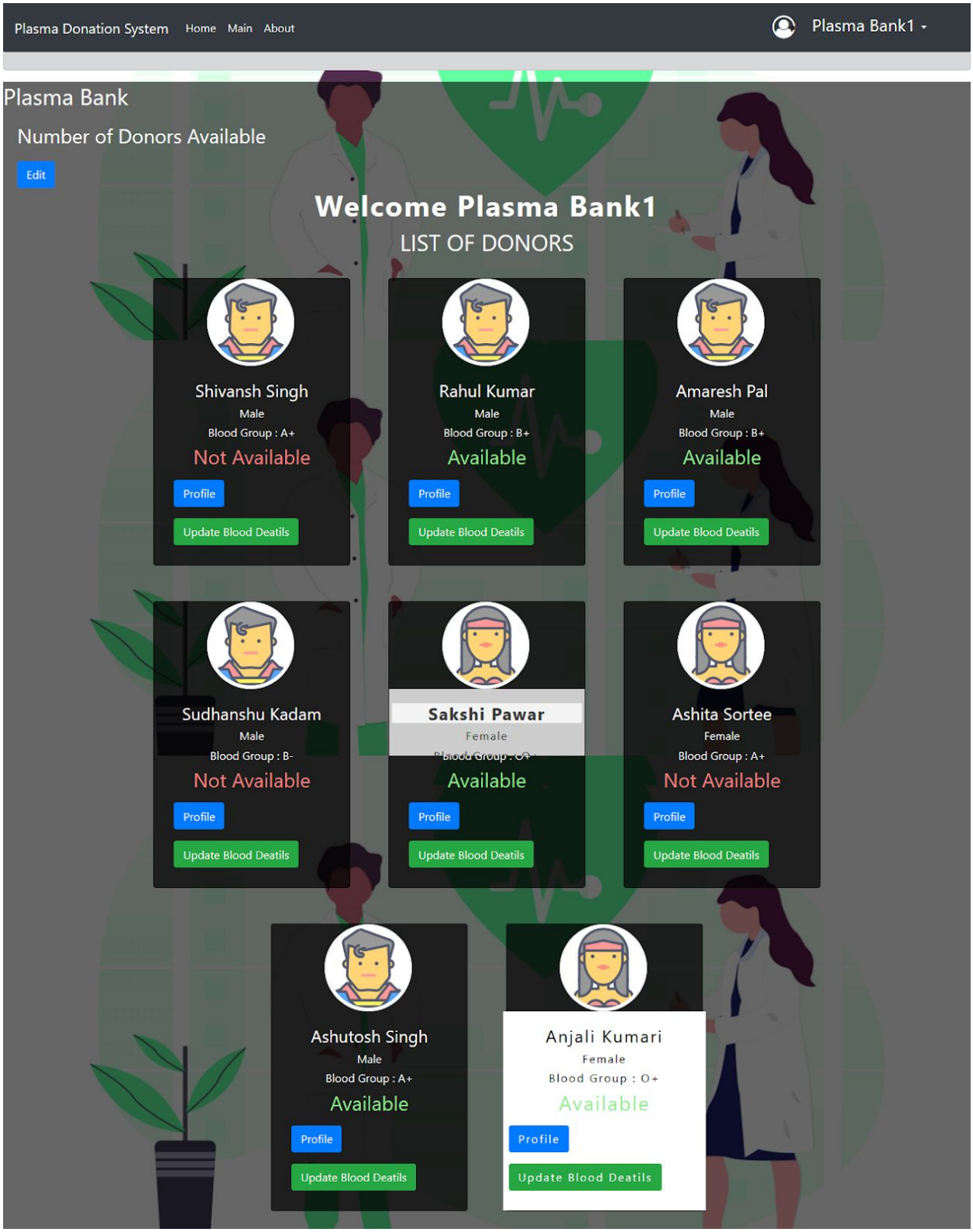
4) The Hospitals/Plasma Banks have been provided with a portal from where they can register themselves in this system.



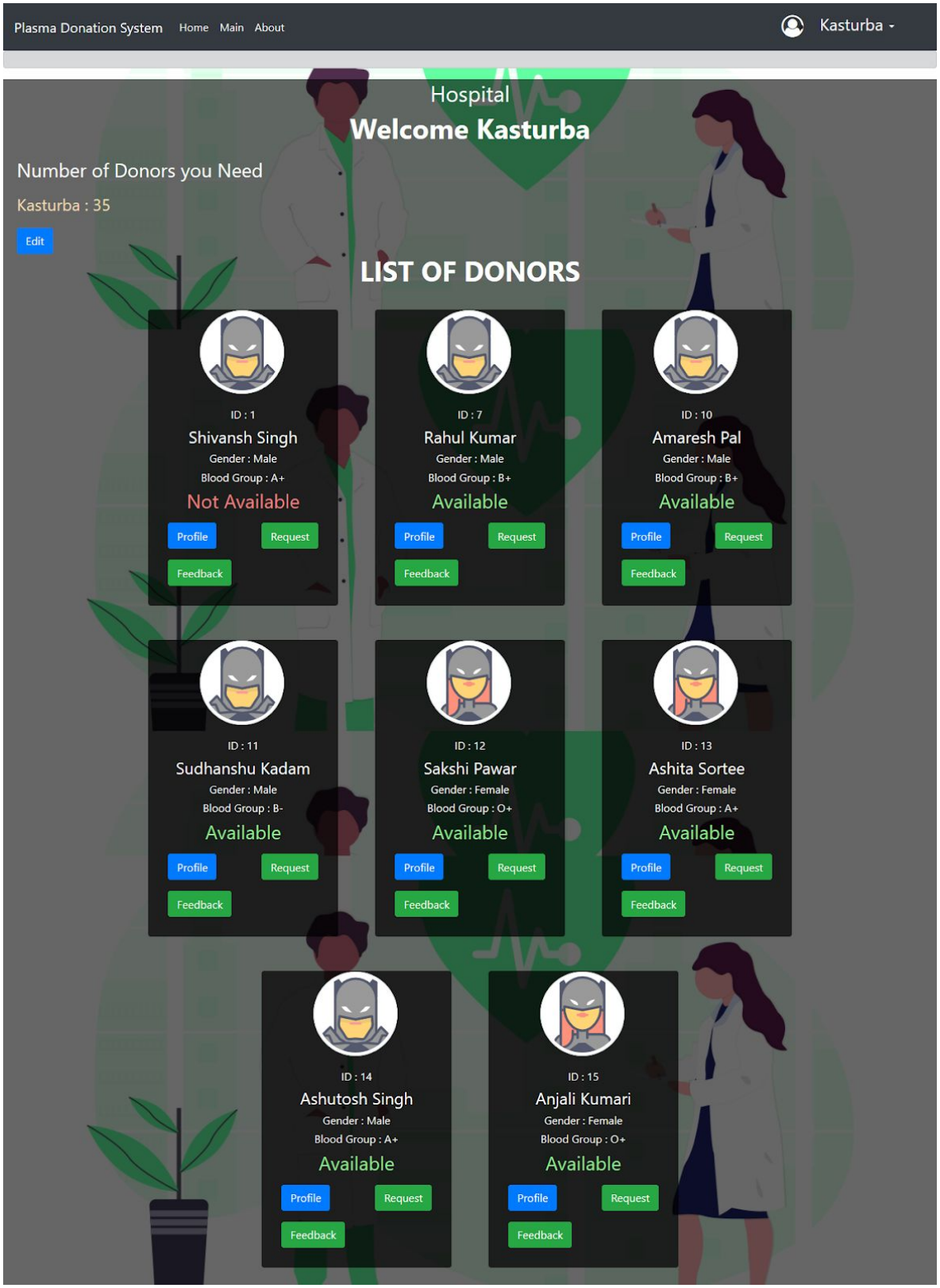
5) The Hospitals/Plasma Banks once approved, can login into the system to see the admin panel.



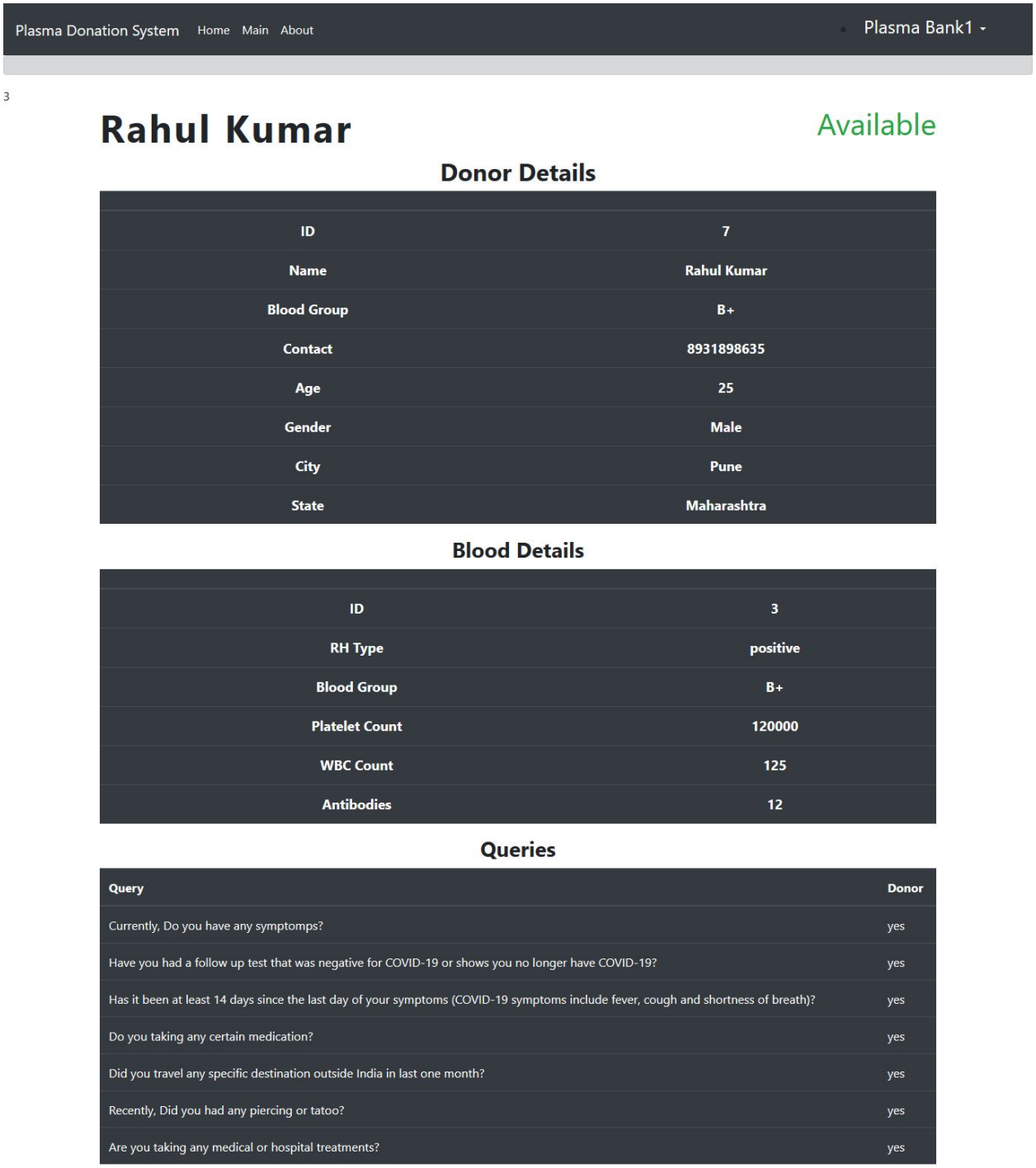
6) The Plasma Bank Admin can view the data of donors who have donated to them.



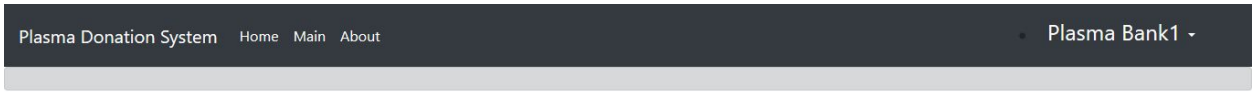
7) The Hospital Admin can view the list of Donor and can see if the Donor with matching blood is available.



8) If clicked on the Donor Card, all the details of the Donor can be seen, including the blood details.



9) The details of any Hospital/Plasma Bank can be seen by any donor.



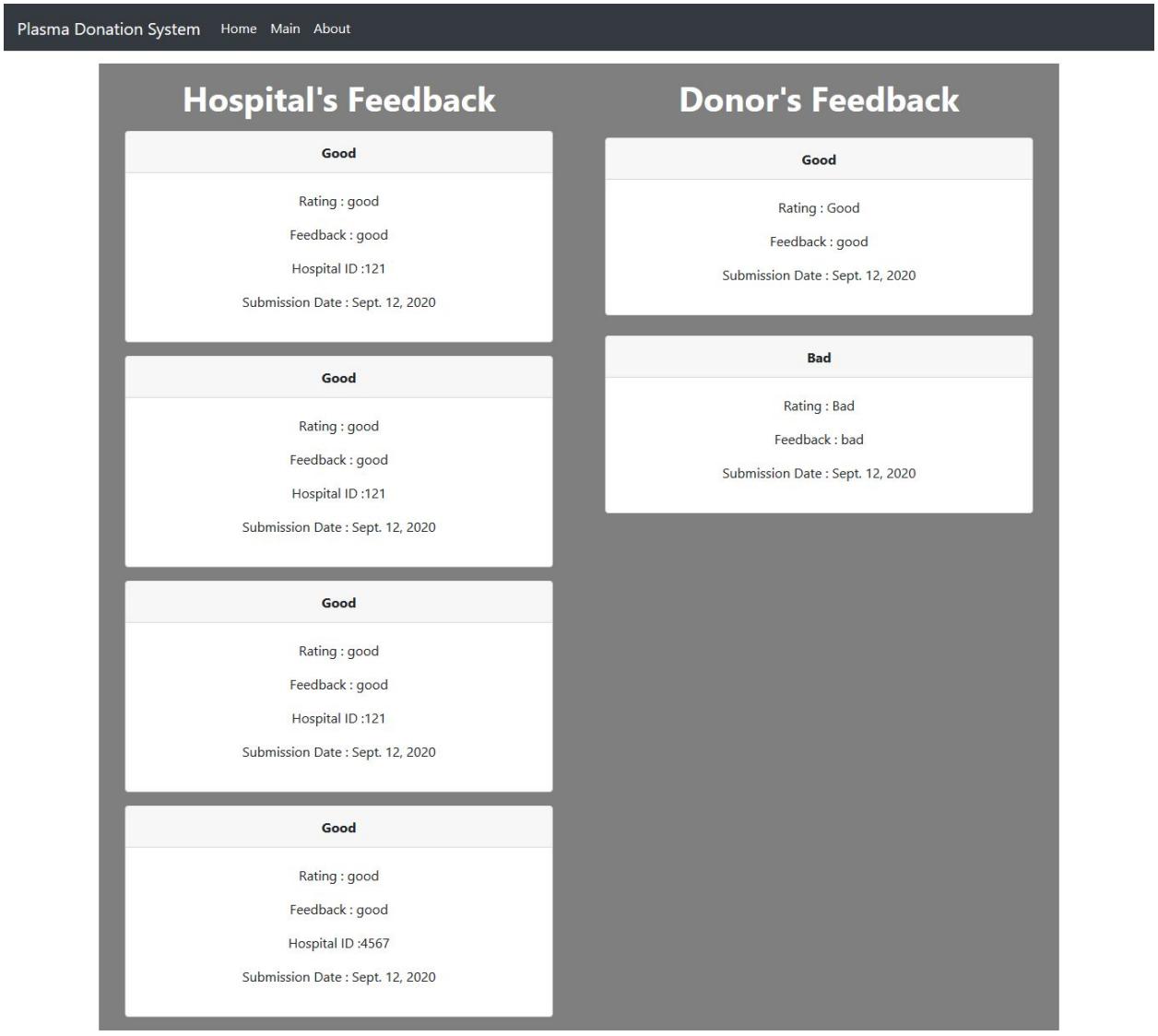
Plasma Bank1

Registration ID: 1211
E-Mail : plasma@gmail.com
City: Pune
State : Maharashtra

Kasturba Hospital

Registration ID: 121
E-Mail : kasturba@gmail.com
City: Pune
State : Maharashtra

10) The Manager admin of each state can see the feedbacks provided by Hospitals and Donors about the Plasma banks.



Conclusion

In conclusion, a database is a far more efficient mechanism to store and organize data than spreadsheets; it allows for a centralized facility that can easily be modified and quickly shared among multiple users. Having a web based front end removes the requirement of users having to understand and use a database directly, and allows users to connect from anywhere with an internet connection and a basic web browser. It also allows the possibility of queries to obtain information for various surveys. Use of various functionalities like Triggers, Procedures, etc helps a lot in creating dynamic systems and automating tasks.

The proposed database system uses these functionalities in a way to streamline the Plasma Donation process to the maximum extent possible. All the entities involved in the system have access to a user friendly interface to ease the data insertion and retrieval process. The future objective is to add more functionalities and create a state of art application for the Plasma Donation System with accessibility to each and every person in this COVID affected world.

References

[1] Plasma Essentials : https://en.wikipedia.org/wiki/Blood_plasma
[2] E-Rakt Kosh Blood Cell NHM : https://www.eraktkosh.in/BLDAHIMS/bloodbank/transactions/bbpublicindex.html
[3] Plasma : https://www.webmd.com/a-to-z-guides/what-is-plasma
[4] Medical News Today : https://www.medicalnewstoday.com/articles/319162