Namal Blood Bank Management System (NBBMS)
Database Design Document
V 3.0

By

Group Members	Roll Numbers
1 Muhammad Asim Khan	NUM-BSCS-2022-14
2 Umair Ahmad	NUM-BSCS-2022-36
3 Ayesha Tahir	NUM-BSCS-2022-17

Department of Computer Sciences

Namal University

Mianwali, Pakistan

Submission Date: 30th June, 2024

REVISION HISTORY

Date	Version	Description	Approved by
30/6/24	V.3.0	No changes.	Mam Asiya Batool
10/6/24	V.2.0	Removed extra attributes like Group Blood Type, Status, expiry date derived attribute.	Mam Asiya Batool
22/04/24	V 1.0	No changes	Mam Asiya Batool

TABLE OF CONTENTS

CHAPTER 1: PROJECT OVERVIEW

1.1. INTRODUCTION:

Our project aims to develop a comprehensive Namal Blood Bank Management System (NBBMS) utilizing MySQL for database management and Python/JavaScript for backend logic along with HTML & CSS for frontend development. The system addresses the critical need for efficient management of blood donation, storage, and distribution processes within blood banks.

In a world where efficient blood management is paramount, the NBBMS addresses the critical need for accurate record-keeping of donors, blood units, and recipients. By streamlining processes and minimizing manual data entry errors, the system aims to overcome challenges such as inefficient blood tracking and delays in matching donor blood types with recipient needs.

The ultimate goal of the NBBMS is to provide blood bank staff with a powerful toolset for managing donor registration, donation recording, blood unit storage, recipient registration, and transfusion management. By enhancing data accuracy, improving tracking capabilities, and enabling timely matching of donor blood types with recipient needs, the NBBMS ensures that blood banks can operate with maximum efficiency and effectiveness.

1.2. PROBLEM STATEMENT:

The NBBMS addresses the challenges faced by Blood Wing of NSSI Society of Namal University in maintaining accurate records of donors, blood units, networks (blood Banks) and recipients. These challenges include manual data entry errors, inefficient blood tracking, and difficulties in matching donor blood types with recipient needs in a timely manner. By implementing the NBBMS, we aim to mitigate these issues and improve the overall management of blood donation, storage, and distribution processes.

1.3.   PROJECT OBJECTIVES:

- Design and implement an efficient database schema for storing donor, donation, blood bag, recipient, and related data.

- Develop user-friendly interfaces for blood bank staff to input and access relevant information.

- Implement functionalities for managing blood units from donation to transfusion, including expiry management.

- Enable efficient search and matching of donor blood types with recipient needs.

- Ensure data security and integrity through appropriate access controls and validation mechanisms.

1.4.   DOCUMENT OBJECTIVES:

The objectives of this documentation are to provide a detailed overview of the database design and implementation progress achieved in the fourth milestone of the NBBMS project. It aims to define and describe entities, establish relationships, create an Entity Relationship Diagram (ERD), design a relational schema, and demonstrate the practical use of the database through real time data and SQL queries. The documentation also ensures proper citation of all sources consulted.

CHAPTER 2: DETAILED DATABASE DESIGN

2.1. ENTITY:

The entities are given below:

Sr. No	Entity Name	Description
01	STAFF	The STAFF entity represents the individuals working within the blood bank facility who are responsible for managing various aspects of blood donation, storage, and distribution processes.
02	DONOR	The DONOR entity represents individuals who voluntarily want to donate blood to the blood bank for use in transfusions.
03	RECIPIENT	The RECIPIENT entity represents individuals who require blood transfusions due to medical reasons.
04	BLOOD_BAGS	The BLOOD-BAGS entity is an **"associative entity"** which is intended to manage information related to blood bags used for storing donated blood.
05	NETWORKS	The NETWORKS entity represents connections or interactions between the blood bank and other healthcare facilities or organizations.

2.2. DATA DICTIONARY:

The entities and their attributes are given below:

2.2.1. STAFF:

Sr. No	Name	Data Type	Constraint	Description
01	S_ID	INT	NOT NULL, AUTO_INCREMENT, PRIMARY KEY	It uniquely identifies each staff member within the blood bank system.
02	Name	CHAR(50)	NOT NULL	It stores the name of the staff member.
03	Contact	CHAR(12)	NOT NULL	It holds the contact number of the staff member.
04	CNIC	CHAR(15)	NOT NULL	It stores the National Identity Card (CNIC) number of the staff member.
05	Address	CHAR(50)	No constraint	It represents the address of the staff member.

2.2.2. DONOR:

Sr. No	Name	Data Type	Constraint	Description
01	D_CNIC	CHAR(15)	NOT NULL, PRIMARY KEY	It uniquely identifies each donor within the blood bank system using their CNIC.
02	Name	CHAR(50)	NOT NULL	It stores the name of the donor.
03	Contact	CHAR(12)	NOT NULL	It holds the contact number of Donor.
04	Department	CHAR(15)	No constraint	It represents the department or field of work of the donor.
05	Category	CHAR(15)	No constraint	It categorizes the donor based on position (Student, Staff, or Faculty of Namal)
06	Blood_Group	CHAR(3)	NOT NULL	It stores the blood group of the donor.

2.2.3. RECIPIENT:

Sr. No	Name	Data Type	Constraint	Description
01	R_CNIC	CHAR (15)	NOT NULL, PRIMARY KEY	It uniquely identifies each recipient within the blood bank system using their CNIC.
02	Name	CHAR(50)	NOT NULL	It stores the name of the recipient.
03	Contact	CHAR(12)	NOT NULL	It holds the contact number of the recipient.
04	Address	VARCHAR(100)	No constraint	It represents the address of the recipient.
05	Institute	VARCHAR(100)	No constraint	It stores the institution or medical facility associated with the recipient.

2.2.4. BLOOD-BAGS:

Sr. No	Name	Data Type	Constraint	Description
01	Bag_ID	INT	NOT NULL, AUTO_INCREMENT, PRIMARY KEY	It uniquely identifies each staff member within the blood bank system. It uniquely identifies each blood bag within the blood bank system.
03	Donation_Date	Date	NOT NULL	It records the date when the blood was donated and the bag was created.

| 05 | Delivery_Date | Date | No constraint | It indicates the date when the blood bag was delivered for transfusion or other purposes. |

## 2.2.5. NETWORKS:

Sr. No	Name	Data Type	Constraint	Description
01	<u>N_ID</u>	INT	NOT NULL, AUTO_INCREMENT, PRIMARY KEY	It uniquely identifies each networking connection within the blood bank system.
02	Institute_Name	VARCHAR(100)	NOT NULL	It stores the name of the institution or organization for networking purposes.
03	Contact	CHAR(13)	NOT NULL	It holds the contact number of the networking connection.
04	Address	VARCHAR(100)	No constraint	It represents the address of the institution or organization for networking.

2.3. RELATIONSHIPS:

Sr. No	Participating Entities	Relation	Business Rule
01	DONOR, BLOOD_BAGS	Donor donates blood. One Mandatory to Many Optional.	One donor may donate many blood bag. One blood bag may donated by one donor.
02	RECIPIENT, BLOOD_BAGS	Recipient receives blood bags. Many Mandatory to One Mandatory.	One blood bag can be donated to one recipient. One recipient can receive many blood bags.
03	STAFF, BLOOD_BAGS	Staff manages blood bags and its Information. One Mandatory to Many One.	One staff may manage many blood bags. One blood bag is managed by one staff.
04	NETWORKS, BLOOD_BAGS	Networks provide. blood bags. One Mandatory to Many Optional.	One network may donate many blood bag. One blood bag may donated by one network.

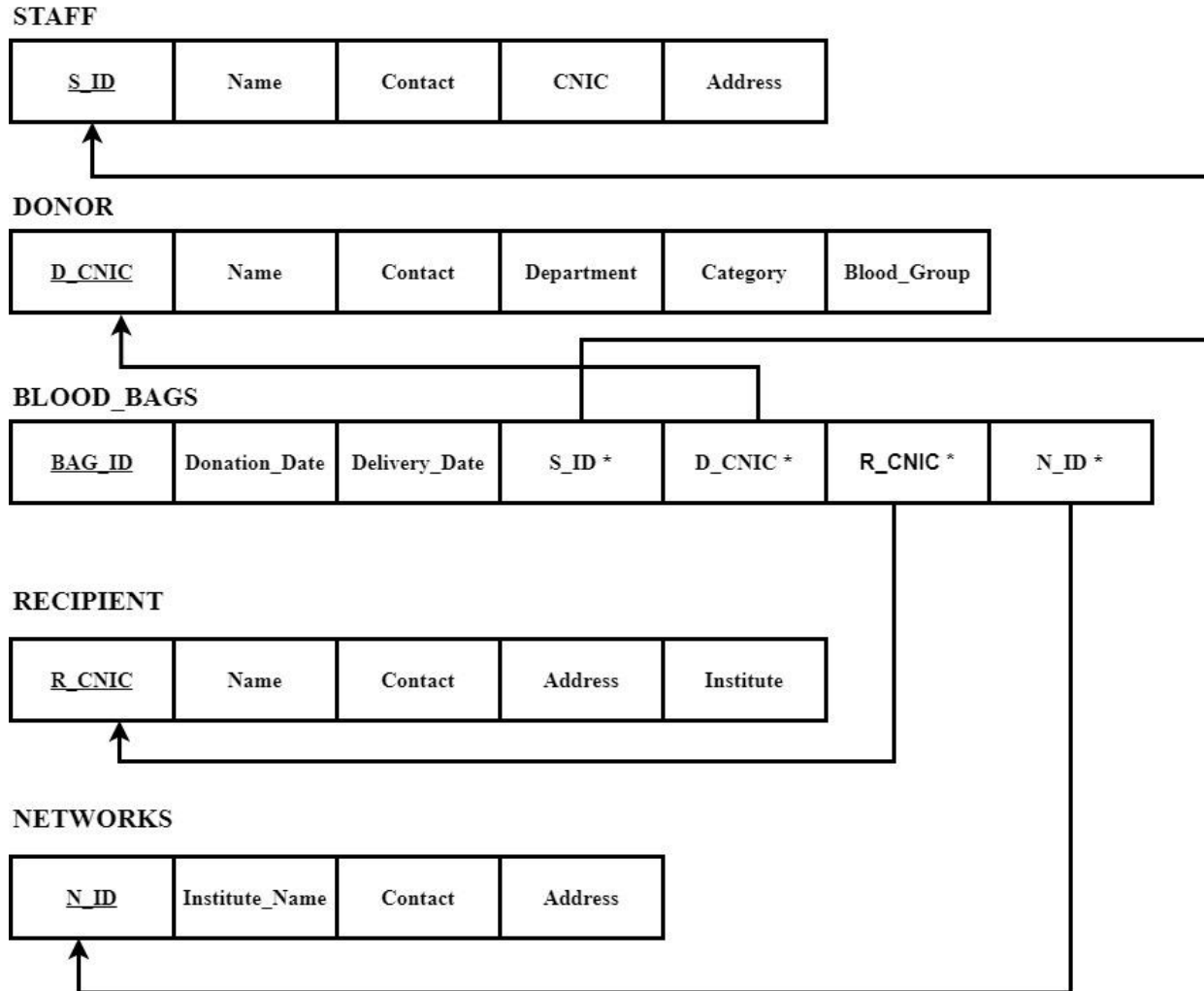## 2.4. ENTITY RELATIONSHIP DIAGRAM:
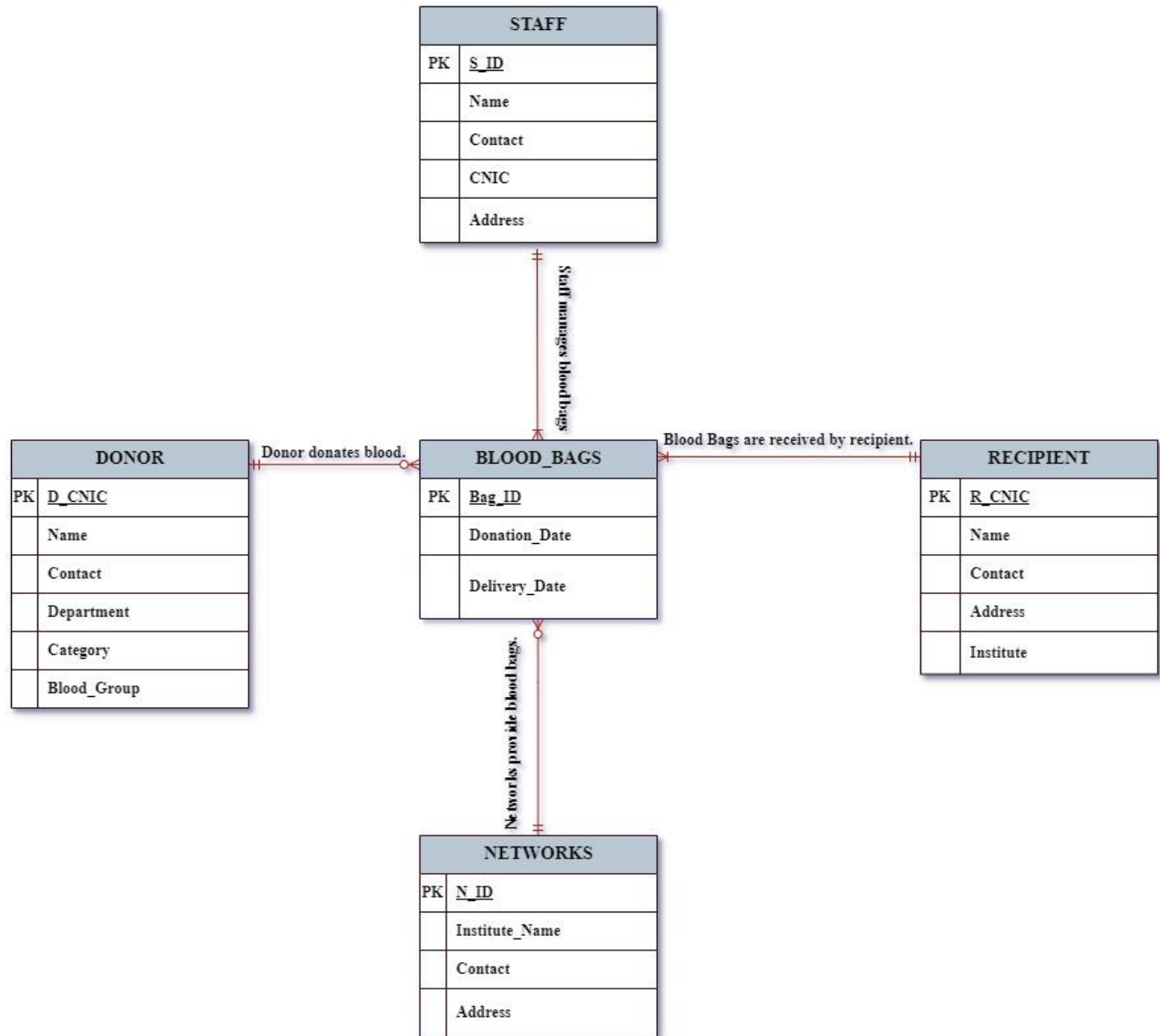
ERD of Namal Blood Bank Management System (NBBMS) [1]

CHAPTER 3 : LOGICAL DATABASE DESIGN

3.1. RELATIONAL SCHEMA:

Relational Schema of *"Namal* Blood Bank Management System (NBBMS)" is given below: [1]

STAFF

S_ID	Name	Contact	CNIC	Address

DONOR

D_CNIC	Name	Contact	Department	Category	Blood_Group

BLOOD_BAGS

BAG_ID	Donation_Date	Delivery_Date	S_ID *	D_CNIC *	R_CNIC *	N_ID *

RECIPIENT

R_CNIC	Name	Contact	Address	Institute

NETWORKS

N_ID	Institute_Name	Contact	Address

3.2. FUNCTIONAL DEPENDENCIES:

STAFF

- **S_ID → Name, Contact, CNIC, Address**

 Example:
If S_ID = 13, then Name = Umair Ahmad, Contact = 0326-1218644

, CNIC = 32101-7676321-4, Address = Namal University Mianwali

DONOR

- **D_CNIC → Name, Contact, Department, Category, Blood_Group**

Example:
- If D_CNIC = 30007-0000007-7, then Name = said Anwar, Contact = 0302-6065103, Department = CS, Category = 4th Year , Blood_Group = A+

RECIPIENT

- **R_CNIC → Name, Contact, Address, Institute**

Example:

If R_CNIC = 32919-3698521-1, then Name = Sadia, Contact = 0339-0123456, Address = Ban Hafiz Jee ,Mianwali, Institute = Tasneem hospital, bun

BLOOD-BAGS

- **Bag_ID → Donation_Date, Delivery_Date, D_CNIC (Donor), R_CNIC (Recipient), S_ID (Staff)**
- **Bag_ID → Donation_Date, Delivery_Date**

Example:

- If Bag_ID = 7, then Donation_Date = 2024-05-29, Delivery_Date = 2024-06-03, D_CNIC = 30336-0000336-3, R_CNIC = 32737-7654321-9, S_ID = 5

NETWORKS

- **N_ID → Institute_Name, Contact, Address**

Example:

- If N_ID = 5, then Institute_Name = Agha Khan Blood Bank Mianwali, Contact = (0459) 227589, Address = Near Agha Khan Diagnostic Center, Mianwali

3.3. NORMALIZATION:

3.3.1. First Normal Form (1NF)

- ➢ Ensure each table has a primary key.
- ➢ Ensure no repeating groups or arrays.

All provided tables are in 1NF as each table has a primary key and contains atomic values.

3.3.2. Second Normal Form (2NF)

- ➢ Achieve 1NF.
- ➢ Remove partial dependencies (i.e., no non-prime attribute should depend on a part of a candidate key).

Relations:

STAFF

- Already in 2NF because S_ID is the primary key and all attributes depend on it fully.

DONOR

- Already in 2NF because D_CNIC is the primary key and all attributes depend on it fully.

RECIPIENT

- Already in 2NF because R_CNIC is the primary key and all attributes depend on it fully.

BLOOD-BAGS

- Already in 2NF because Bag_ID is the primary key and all attributes depend on it fully.

NETWORKS

- Already in 2NF because N_ID is the primary key and all attributes depend on it fully.

3.3.3. Third Normal Form (3NF)

- ➢ Achieve 2NF.
- ➢ Remove transitive dependencies.

Relations:

STAFF

- Already in 3NF because there are no transitive dependencies.
- **S_ID → Name, Contact, CNIC, Address**

DONOR

- Already in 3NF because there are no transitive dependencies.
- **D_CNIC → Name, Contact, Department, Category, Blood_Group**

RECIPIENT

- Already in 3NF because there are no transitive dependencies.
- **R_CNIC → Name, Contact, Address, Institute**

BLOOD-BAGS

- Already in 3NF because there are no transitive dependencies.
- **Bag_ID → Donation_Date, Delivery_Date**

NETWORKS

- Already in 3NF because there are no transitive dependencies.

N_ID → Institute_Name, Contact, Address

CHAPTER 4 : PHYSICAL DATABASE DESIGN

4.1. STRUCTURE OF THE TABLES: [2]

STAFF:

```
mysql> DESCRIBE STAFF;
+---------+-------------+------+-----+---------+----------------+
| Field   | Type        | Null | Key | Default | Extra          |
+---------+-------------+------+-----+---------+----------------+
| S_ID    | int         | NO   | PRI | NULL    | auto_increment |
| NAME    | char(50)    | NO   |     | NULL    |                |
| CONTACT | char(12)    | NO   |     | NULL    |                |
| CNIC    | char(15)    | NO   |     | NULL    |                |
| ADDRESS | varchar(50) | YES  |     | NULL    |                |
+---------+-------------+------+-----+---------+----------------+
5 rows in set (0.00 sec)
```

DONOR:

```
mysql>  DESCRIBE donor;
+-------------+----------+------+-----+---------+-------+
| Field       | Type     | Null | Key | Default | Extra |
+-------------+----------+------+-----+---------+-------+
| D_CNIC      | char(15) | NO   | PRI | NULL    |       |
| Name        | char(50) | NO   |     | NULL    |       |
| Contact     | char(12) | NO   |     | NULL    |       |
| Department  | char(15) | YES  |     | NULL    |       |
| Category    | char(15) | YES  |     | NULL    |       |
| Blood_Group | char(3)  | NO   |     | NULL    |       |
+-------------+----------+------+-----+---------+-------+
6 rows in set (0.00 sec)
```

RECIPIENT:

```
mysql> DESCRIBE recipient;
+-----------+--------------+------+-----+---------+-------+
| Field     | Type         | Null | Key | Default | Extra |
+-----------+--------------+------+-----+---------+-------+
| R_CNIC    | char(15)     | NO   | PRI | NULL    |       |
| NAME      | char(50)     | NO   |     | NULL    |       |
| CONTACT   | char(12)     | NO   |     | NULL    |       |
| ADDRESS   | varchar(100) | YES  |     | NULL    |       |
| INSTITUTE | varchar(100) | YES  |     | NULL    |       |
+-----------+--------------+------+-----+---------+-------+
5 rows in set (0.00 sec)
```

NETWORKS:

```
mysql> DESCRIBE networks;
+----------------+--------------+------+-----+---------+----------------+
| Field          | Type         | Null | Key | Default | Extra          |
+----------------+--------------+------+-----+---------+----------------+
| N_ID           | int          | NO   | PRI | NULL    | auto_increment |
| Institute_Name | varchar(100) | NO   |     | NULL    |                |
| Contact        | char(13)     | NO   |     | NULL    |                |
| Address        | varchar(100) | YES  |     | NULL    |                |
+----------------+--------------+------+-----+---------+----------------+
4 rows in set (0.00 sec)
```

BLOOD_BAGS:

```
mysql> DESCRIBE blood_bags;
+---------------+----------+------+-----+---------+----------------+
| Field         | Type     | Null | Key | Default | Extra          |
+---------------+----------+------+-----+---------+----------------+
| Bag_ID        | int      | NO   | PRI | NULL    | auto_increment |
| Donation_Date | date     | YES  |     | NULL    |                |
| Delivery_Date | date     | YES  |     | NULL    |                |
| S_ID          | int      | YES  | MUL | NULL    |                |
| D_CNIC        | char(15) | YES  | MUL | NULL    |                |
| R_CNIC        | char(15) | YES  | MUL | NULL    |                |
| N_ID          | int      | YES  | MUL | NULL    |                |
+---------------+----------+------+-----+---------+----------------+
7 rows in set (0.00 sec)
```

4.2. DATA SAMPLES INSIDE TABLES: [3]

SELECT * FROM Staff;

```
+------+--------------+---------------+-----------------+---------------------------+
| S_ID | NAME         | CONTACT       | CNIC            | ADDRESS                   |
+------+--------------+---------------+-----------------+---------------------------+
|    1 | Shazam       | 0321-1234567  | 32101-7654321-2 | Namal University Mianwali |
|    2 | Abdul Raheem | 0321-1234568  | 32101-7654321-3 | Namal University Mianwali |
|    3 | Rehan        | 0321-1234569  | 32101-7654321-4 | Namal University Mianwali |
|    4 | Awais        | 0321-1234570  | 32101-7654321-5 | Namal University Mianwali |
|    5 | Ghazia       | 0321-1234571  | 32101-7654321-6 | Namal University Mianwali |
|    6 | Ali Taimoor  | 0321-1234572  | 32101-7654321-7 | Namal University Mianwali |
|    7 | Anila        | 0321-1234573  | 32101-7654321-8 | Namal University Mianwali |
|    8 | Nouman       | 0321-1234574  | 32101-7654321-9 | Namal University Mianwali |
|    9 | Shariq Khan  | 0321-1234575  | 32101-7654321-1 | Namal University Mianwali |
|   10 | Umar Shehzad | 0321-1234576  | 32101-7654321-1 | Namal University Mianwali |
|   11 | Zoya         | 0321-1234577  | 32101-7654321-6 | Namal University Mianwali |
|   12 | Shahid       | 0321-1234578  | 32101-7654321-1 | Namal University Mianwali |
|   13 | Umair Ahmed  | 0321-1234579  | 32101-7676321-4 | Namal University Mianwali |
|   14 | Kamran Malik | 0321-1234580  | 32101-7657321-5 | Namal University Mianwali |
|   15 | Asim Khan    | 0321-1234581  | 32101-7666321-8 | Namal University Mianwali |
|   16 | Noor Fatima  | 0321-1234582  | 32101-7654351-6 | Namal University Mianwali |
+------+--------------+---------------+-----------------+---------------------------+
16 rows in set (0.00 sec)
```

SELECT * FROM Donor;

```
+-----------------+-------------------+-----------------+------------+-----------+-------------+
| D_CNIC          | Name              | Contact         | Department | Category  | Blood_Group |
+-----------------+-------------------+-----------------+------------+-----------+-------------+
| 30005-0000005-5 | M Saleem          | 0301-2685998    | NULL       | Faculty   | A+          |
| 30014-0000014-1 | M Irfan           | 0335-6302675    | CS         | 3rd Year  | A+          |
| 30018-0000018-5 | Muhammad Usman    | 0345-6443752    | EE         | 2nd Year  | O+          |
| 30033-0000033-6 | muhammad Usman    | 0301-7720324    | EE         | 3rd Year  | A+          |
| 30047-0000047-2 | Aqsa              | 0311-7121603    | EE         | 1st Year  | A+          |
| 30049-0000049-4 | sana Malik        | 0324-5972465    | BBA        | 3rd Year  | A+          |
| 30069-0000069-6 | Ahad Khan         | 0309-6556446    | NULL       | 2nd Year  | A+          |
| 30076-0000076-2 | Khan Mehmood      | 0307-6566654    | NULL       | Faculty   | A+          |
| 30092-0000092-2 | Sana              | 0349-6084322    | EE         | 1st Year  | A+          |
| 30104-0000104-5 | Siuuira           | 0301-5840522    | CS         | 1st Year  | A+          |
| 30134-0000134-8 | riaz u din        | 0346-0520951    | EE         | 3rd Year  | AB+         |
| 30164-0000164-2 | Quratulain        | 0306-8454860    | MATHS      | 1st Year  | AB-         |
| 30167-0000167-5 | Nisar Ali         | 0345-4779109    | NULL       | Faculty   | B+          |
| 30214-0000214-6 | Naseem            | 0347-7611603    | Math       | 2nd Year  | O+          |
| 30220-0000220-4 | Bisma amir        | 0323-1897256    | Math       | 3rd Year  | B+          |

| 30524-0000524-2 | Sadia             | 0302-7178430    | BBA        | 2nd Year  | B+          |
| 30528-0000528-6 | Ibrahim           | 0347-7373032    | EE         | 1st Year  | B+          |
| 30529-0000529-7 | Shazia Nazir      | 0342-6871795    | CS         | 2nd Year  | O+          |
| 30534-0000534-0 | Nida Anwar        | 0308-7981364    | Math       | 2nd Year  | A+          |
| 30535-0000535-1 | Shahbaz           | 0343-7743305    | CS         | 3rd Year  | B+          |
| 30543-0000543-4 | Salma             | 0305-6291897    | CS         | 1st Year  | O+          |
| 30547-0000547-3 | Naeem             | 0342-9574186    | CS         | 3rd Year  | A+          |
| 30550-0000550-5 | Aziz Ul Haq       | 0321-9451601    | CS         | 1st Year  | O+          |
| 30553-0000553-9 | Bushra            | 0311-9982304    | CS         | 1st Year  | B+          |
| 30562-0000562-4 | Wazir M           | 0333-7363017    | EE         | 1st Year  | O+          |
| 30568-0000568-1 | basit             | 0327-0367753    | EE         | 1st Year  | O+          |
| 30569-0000569-2 | Aqsa              | 0327-3299072    | MATHS      | 1st Year  | O+          |
| 30573-0000573-6 | Rehana            | 0325-8174066    | MATHS      | 1st Year  | O+          |
+-----------------+-------------------+-----------------+------------+-----------+-------------+
52 rows in set (0.00 sec)
```

SELECT * FROM Recipient;

```
+-----------------+----------+--------------+-----------------------------+---------------------------------------+
| R_CNIC          | NAME     | CONTACT      | ADDRESS                     | INSTITUTE                             |
+-----------------+----------+--------------+-----------------------------+---------------------------------------+
| 30535-3698741-7 | Aiza     | 0355-4321098 | Agha khan center, Minawali  | Rehman Hospital, Mianwali             |
| 30545-7654321-7 | Zoya     | 0365-8901234 | HGJV+639, Mianwali          | Obaid Noor Hospital, Mianwali         |
| 31626-2468013-8 | Javed    | 0346-7890123 | Civil Hospital, Mianwali    | Blood Bank DHQ Hospital Mianwali      |
| 31636-1234567-8 | Saad     | 0356-9012345 | Gulberg Chock, Minawali     | Namal hospital                        |
| 31646-2468013-8 | Raza     | 0366-7890123 | Civil Hospital, Mianwali    | Rehman Hospital, Mianwali             |
| 31818-2468013-0 | Umar     | 0338-5432109 | Dhurnaka, Minawali          | Rehman Hospital, Mianwali             |
| 31909-7654321-1 | Saira    | 0329-5678901 | Gulberg Chock, Minawali     | Tabish Children Hospital, Mianwali    |
| 32010-2468013-2 | Arman    | 0330-1098765 | Gulberg Chock, Minawali     | Rehman Hospital, Mianwali             |
| 32101-7654321-2 | Adnan    | 0321-1234567 | Ballo khail RD, Minawali    | Rehman Hospital, Mianwali             |

| 37323-3698741-5 | Khadija  | 0343-2345678 | Gulberg Chock, Minawali     | Agha Khan Blozod Bank Mianwali        |
| 37515-3698741-7 | Maryam   | 0335-8901234 | Agha khan center, Minawali  | Sarmad Trust Blood Bank               |
| 37606-2468135-8 | Asad     | 0326-9876543 | Gulberg Chock, Minawali     | Kashaf Homoeopthic Clinic, Mianwali   |
| 38333-7890123-5 | Daniyal  | 0353-3210987 | Main Street, Minawali       | Tasneem hospital, bun                 |
| 38343-3698741-5 | Humna    | 0363-8765432 | Gulberg Chock, Minawali     | Sarmad Trust Blood Bank               |
| 38424-1234567-6 | Adil     | 0344-8765432 | Gulberg Chock, Minawali     | Obaid Noor Hospital, Mianwali         |
| 38616-1234567-8 | Waseem   | 0336-4321098 | Gulberg Chock, Minawali     | Agha Khan Blozod Bank Mianwali        |
| 38707-3698741-9 | Amina    | 0327-4567890 | Namal, Minawali             | Rehman Hospital, Mianwali             |
| 39434-2468135-6 | Aiman    | 0354-8901234 | Near Civil Hospital, Minawali | Kashaf Homoeopthic Clinic, Mianwali |
| 39444-1234567-6 | Aqsa     | 0364-3456789 | Gulberg Chock, Minawali     | Agha Khan Blozod Bank Mianwali        |
| 39525-7654321-7 | Rukhsana | 0345-3456789 | HGJV+639, Mianwali          | Obaid Noor Hospital, Mianwali         |
| 39717-7654321-9 | Ayesha   | 0337-9012345 | Gulberg Chowk, Minawali     | Obaid Noor Hospital, Mianwali         |
| 39808-1234567-0 | Faisal   | 0328-0987654 | Ballo khail RD, Minawali    | Namal hospital                        |
+-----------------+----------+--------------+-----------------------------+---------------------------------------+
49 rows in set (0.00 sec)
```

SELECT * FROM Networks;

```
+------+-------------------------------+----------------+------------------------------------------------+
| N_ID | Institute_Name                | Contact        | Address                                        |
+------+-------------------------------+----------------+------------------------------------------------+
|    1 | Blood Bank DHQ Hospital Mianwali | (0459) 235136 | HGJV+639, Mianwali, Punjab                     |
|    2 | Naml Wellness Blood Bank      | (0459) 229847  | Naml College Road, Mianwali                    |
|    3 | Red Crescent Blood Bank Mianwali | (0459) 228035 | Main Street, Mianwali                          |
|    4 | Sarmad Trust Blood Bank       | (0459) 226043  | Near Civil Hospital, Mianwali                  |
|    5 | Agha Khan Blood Bank Mianwali | (0459) 227589  | Near Agha Khan Diagnostic Center, Mianwali     |
+------+-------------------------------+----------------+------------------------------------------------+
5 rows in set (0.00 sec)
```

SELECT * FROM Blood_Bags;

```
+--------+---------------+---------------+------+-----------------+-----------------+------+
| Bag_ID | Donation_Date | Delivery_Date | S_ID | D_CNIC          | R_CNIC          | N_ID |
+--------+---------------+---------------+------+-----------------+-----------------+------+
|      1 | 2024-05-20    | 2024-05-30    |    1 | 30005-0000005-5 | 33848-1234567-0 | NULL |
|      2 | 2024-05-21    | 2024-05-22    |    2 | 30033-0000033-6 | 34929-7654321-1 | NULL |
|      3 | 2024-05-23    | NULL          |    3 | 30134-0000134-8 | NULL            | NULL |
|      4 | 2024-05-24    | 2024-06-03    |    4 | NULL            | 36222-2468135-4 |    3 |
|      5 | 2024-05-24    | 2024-06-01    |    5 | 30316-0000316-1 | 37515-3698741-7 | NULL |
|      6 | 2024-05-27    | NULL          |    6 | NULL            | NULL            |    5 |
|      7 | 2024-05-29    | 2024-06-03    |    5 | 30336-0000336-3 | 32737-7654321-9 | NULL |
|      8 | 2024-05-31    | NULL          |    3 | 30347-0000347-5 | NULL            | NULL |
|      9 | 2024-06-01    | NULL          |    2 | 30255-0000255-3 | NULL            | NULL |
|     10 | 2024-06-01    | 2024-06-22    |    9 | NULL            | 31818-2468013-0 |    1 |
|     11 | 2024-06-01    | 2024-06-20    |    7 | NULL            | 39808-1234567-0 |    1 |
|     12 | 2024-06-02    | 2024-06-05    |    2 | 30507-0000507-2 | 33838-2468013-0 | NULL |
|     13 | 2024-06-03    | 2024-06-08    |    8 | NULL            | 32101-7654321-2 |    4 |
|     14 | 2024-06-03    | 2024-06-12    |    6 | 30553-0000553-9 | 36505-7890123-7 | NULL |
|     15 | 2024-06-04    | 2024-06-10    |    4 | NULL            | 34212-1357902-4 |    2 |
+--------+---------------+---------------+------+-----------------+-----------------+------+
15 rows in set (0.00 sec)
```

4.3. QUERIES RESULTS:

Queries for Namal Blood Bank Database	
1	**Query for counting total no of unique blood groups.**
Query	SELECT Blood_Group, COUNT(*) AS NumberOfDonors FROM DONOR GROUP BY Blood_Group HAVING COUNT(*) > 1 ORDER BY NumberOfDonors DESC;
| Output | ```
+-------------+----------------+
| Blood_Group | NumberOfDonors |
+-------------+----------------+
| B+          |             20 |
| A+          |             16 |
| O+          |             12 |
| B-          |              2 |
+-------------+----------------+
4 rows in set (0.01 sec)
``` |
| 2 | **This query retrieves the names, contact information, blood groups, and donation counts of** |

	donors with the blood group 'A+' .In a blood_bags tables and shows the results by the donor's details, and sorts them by the number of donations in descending order.
Query	SELECT D.Name, D.Contact, D.Blood_Group, COUNT(BB.Bag_ID) AS NumberOfDonations FROM DONOR D JOIN blood_bags BB ON D.D_CNIC = BB.D_CNIC WHERE D.Blood_Group = 'A+' GROUP BY D.Name, D.Contact, D.Blood_Group ORDER BY NumberOfDonations DESC;
Output	+----------------+---------------+-------------+-------------------+ | Name | Contact | Blood_Group | NumberOfDonations | +----------------+---------------+-------------+-------------------+ | M Saleem | 0301-2685998 | A+ | 1 | | muhammad Usman | 0301-7720324 | A+ | 1 | | Huma Saleem | 0345-6788431 | A+ | 1 | +----------------+---------------+-------------+-------------------+ 3 rows in set (0.00 sec)
3	**Find all blood bags delivered on a specific date (e.g., '2024-06-05').**
Query	SELECT Bag_ID, Donation_Date, Delivery_Date FROM BLOOD_BAGS WHERE Delivery_Date = '2024-06-05';
Output	+--------+---------------+---------------+ | Bag_ID | Donation_Date | Delivery_Date | +--------+---------------+---------------+ | 12 | 2024-06-02 | 2024-06-05 | +--------+---------------+---------------+ 1 row in set (0.00 sec)
4	**Count the number of blood bags donated by each donor.**
Query	SELECT d.Name AS 'Donor Name', COUNT(bb.Bag_ID) AS Blood_Bag_Count FROM DONOR d JOIN BLOOD_BAGS bb ON d.D_CNIC = bb.D_CNIC GROUP BY d.Name;

| **Output** | ```
+----------------+------------------+
| Donor Name     | Blood_Bag_Count  |
+----------------+------------------+
| M Saleem       |               1  |
| muhammad Usman |               1  |
| riaz u din     |               1  |
| Huma Saleem    |               1  |
| Aqsa aziz      |               1  |
| Ghazia         |               1  |
| Samra Tariq    |               1  |
| Shahida        |               1  |
| Bushra         |               1  |
+----------------+------------------+
9 rows in set (0.00 sec)
``` |
| **5** | **Find the number of blood bags managed by each staff member.** |
| **Query** | SELECT s.S_ID AS 'Staff_ID', s.Name, COUNT(bb.Bag_ID) AS Blood_Bag_Manage

FROM STAFF s JOIN BLOOD_BAGS bb ON s.S_ID = bb.S_ID GROUP BY s.S_ID,

s.Name; |
| **Output** | ```
+----------+---------------+-------------------+
| Staff_ID | Name          | Blood_Bag_Manage  |
+----------+---------------+-------------------+
|        1 | Shazam        |                1  |
|        2 | Abdul Raheem  |                3  |
|        3 | Rehan         |                2  |
|        4 | Awais         |                2  |
|        5 | Ghazia        |                2  |
|        6 | Ali Taimoor   |                2  |
|        7 | Anila         |                1  |
|        8 | Nouman        |                1  |
|        9 | Shariq Khan   |                1  |
+----------+---------------+-------------------+
9 rows in set (0.00 sec)
``` |
| **6** | **Find all blood bags provided by a specific network (e.g., network ID 3).** |
| **Query** | SELECT COUNT(bb.Bag_ID) AS Total_Bags, n.N_ID AS Network_ID, n. Institute_Name,

bb.Donation_Date FROM BLOOD_BAGS bb

JOIN NETWORKS n ON bb.Bag_ID = n.N_ID WHERE n.N_ID = 3; |
| **Output** | ```
+------------+------------+-----------------------------+----------------+
| Total_Bags | Network_ID | Institute_Name              | Donation_Date  |
+------------+------------+-----------------------------+----------------+
|          1 |          3 | Red Crescent Blood Bank Mianwali | 2024-05-23 |
+------------+------------+-----------------------------+----------------+
1 row in set (0.01 sec)
``` |
| **7** | **List all blood bags ordered by their expiry date.** |

19

Query	SELECT bb.Bag_ID, bb.Donation_Date, DATE_ADD(bb.Donation_Date, INTERVAL 42 DAY) AS Expiry_Date FROM BLOOD_BAGS bb ORDER BY Expiry_Date;

Output	<pre>+--------+---------------+--------------+
	| Bag_ID | Donation_Date | Expiry_Date |
	+--------+---------------+--------------+
	| 1 | 2024-05-20 | 2024-07-01 |
	| 2 | 2024-05-21 | 2024-07-02 |
	| 3 | 2024-05-23 | 2024-07-04 |
	| 4 | 2024-05-24 | 2024-07-05 |
	| 5 | 2024-05-24 | 2024-07-05 |
	| 6 | 2024-05-27 | 2024-07-08 |
	| 7 | 2024-05-29 | 2024-07-10 |
	| 8 | 2024-05-31 | 2024-07-12 |
	| 9 | 2024-06-01 | 2024-07-13 |
	| 10 | 2024-06-01 | 2024-07-13 |
	| 11 | 2024-06-01 | 2024-07-13 |
	| 12 | 2024-06-02 | 2024-07-14 |
	| 13 | 2024-06-03 | 2024-07-15 |
	| 14 | 2024-06-03 | 2024-07-15 |
	| 15 | 2024-06-04 | 2024-07-16 |
	+--------+---------------+--------------+
	15 rows in set (0.00 sec)</pre>

8	**Query to Find Eligible Donors**
Query	SELECT d.D_CNIC AS Donor_identity, d.Name AS Donor_Name, Contact, d.Blood_Group, 'Eligible' AS Eligibility_Status FROM DONOR d WHERE NOT EXISTS (SELECT 1 FROM BLOOD_BAGS bb WHERE bb.D_CNIC = d.D_CNIC) OR (SELECT MAX(bb.Donation_Date) FROM BLOOD_BAGS bb WHERE bb.D_CNIC = d.D_CNIC) <= DATE_SUB(CURRENT_DATE, INTERVAL 90 DAY);

Output	<pre>+-----------------+----------------+------------+-------------+--------------------+
	| Donor_identity | Donor_Name | Contact | Blood_Group | Eligibility_Status |
	+-----------------+----------------+------------+-------------+--------------------+
	| 30014-0000014-1 | M Irfan | 0335-6302675 | A+ | Eligible |
	| 30018-0000018-5 | Muhammad Usman | 0345-6443752 | O+ | Eligible |
	| 30047-0000047-2 | Aqsa | 0311-7121603 | A+ | Eligible |
	| 30049-0000049-4 | sana Malik | 0324-5972465 | A+ | Eligible |
	| 30069-0000069-6 | Ahad Khan | 0309-6556446 | A+ | Eligible |
	| 30076-0000076-2 | Khan Mehmood | 0307-6566654 | A+ | Eligible |
	| 30092-0000092-2 | Sana | 0349-6084322 | A+ | Eligible |
	| 30104-0000104-5 | Siuuira | 0301-5840522 | A+ | Eligible |
	| 30164-0000164-2 | Quratulain | 0306-8454860 | AB- | Eligible |
	| 30167-0000167-5 | Nisar Ali | 0345-4779109 | B+ | Eligible |
	| 30214-0000214-6 | Naseem | 0347-7611603 | O+ | Eligible |
	| 30220-0000220-4 | Bisma amir | 0323-1897256 | B+ | Eligible |
	| 30225-0000225-9 | bilal hassan | 0349-9669755 | B+ | Eligible |
	| 30244-0000244-5 | Muhammad Ismail| 0324-6457297 | B+ | Eligible |
	| 30258-0000258-6 | Naila | 0345-2017983 | B+ | Eligible |</pre>

```
| 30534-0000534-0 | Nida Anwar    | 0308-7981364 | A+ | Eligible |
| 30535-0000535-1 | Shahbaz       | 0343-7743305 | B+ | Eligible |
| 30543-0000543-4 | Salma         | 0305-6291897 | O+ | Eligible |
| 30547-0000547-3 | Naeem         | 0342-9574186 | A+ | Eligible |
| 30550-0000550-5 | Aziz Ul Haq   | 0321-9451601 | O+ | Eligible |
| 30562-0000562-4 | Wazir M       | 0333-7363017 | O+ | Eligible |
| 30568-0000568-1 | basit         | 0327-0367753 | O+ | Eligible |
| 30569-0000569-2 | Aqsa          | 0327-3299072 | O+ | Eligible |
| 30573-0000573-6 | Rehana        | 0325-8174066 | O+ | Eligible |
+-----------------+---------------+--------------+----+----------+
43 rows in set (0.00 sec)
```

9	Find the total number of blood bags donated each month.
Query	SELECT DATE_FORMAT(bb.Donation_Date, '%Y-%m') AS Month, COUNT(bb.Bag_ID) AS Blood_Bag_Count FROM BLOOD_BAGS bb GROUP BY DATE_FORMAT(bb.Donation_Date, '%Y-%m');
| **Output** | ```
+---------+-----------------+
| Month   | Blood_Bag_Count |
+---------+-----------------+
| 2024-05 |               8 |
| 2024-06 |               7 |
+---------+-----------------+
2 rows in set (0.01 sec)
``` |
| 10 | This query retrieves blood bag information along with the donor's name and blood group, calculates the expiry date as 30 days after the delivery date, and counts the number of bags for each unique bag ID, then orders the results by the expiry date. |
| **Query** | SELECT BB.Bag_ID, BB.Delivery_Date, ADDDATE(BB.Delivery_Date, 30) AS Expiry_date, D.Name AS Donor_Name, D.Blood_Group, COUNT(BB.Bag_ID) AS NumberOfBags FROM blood_bags BB JOIN DONOR D ON BB.D_CNIC = D.D_CNIC GROUP BY BB.Bag_ID, BB.Delivery_Date, D.Name, D.Blood_Group ORDER BY Expiry_date; |

| **Output** | ```
+--------+---------------+-------------+---------------+-------------+-------------+
| Bag_ID | Delivery_Date | Expiry_date | Donor_Name    | Blood_Group | NumberOfBags |
+--------+---------------+-------------+---------------+-------------+-------------+
|      3 | NULL          | NULL        | riaz u din    | AB+         |           1 |
|      8 | NULL          | NULL        | Samra Tariq   | B-          |           1 |
|      9 | NULL          | NULL        | Huma Saleem   | A+          |           1 |
|      2 | 2024-05-22    | 2024-06-21  | muhammad Usman| A+          |           1 |
|      1 | 2024-05-30    | 2024-06-29  | M Saleem      | A+          |           1 |
|      5 | 2024-06-01    | 2024-07-01  | Aqsa aziz     | B+          |           1 |
|      7 | 2024-06-03    | 2024-07-03  | Ghazia        | B+          |           1 |
|     12 | 2024-06-05    | 2024-07-05  | Shahida       | B+          |           1 |
|     14 | 2024-06-12    | 2024-07-12  | Bushra        | B+          |           1 |
+--------+---------------+-------------+---------------+-------------+-------------+
9 rows in set (0.00 sec)
``` |
| **11** | **Query to return detail of those staff member who have collected blood from networks.** |
| **Query** | SELECT S.S_ID, S.NAME, S.CONTACT FROM STAFF S WHERE S.S_ID IN(SELECT B.S_ID FROM BLOOD_BAGS B WHERE B.N_ID IS NOT NULL); |
| **Output** | ```
+------+-------------+--------------+
| S_Id | name        | contact      |
+------+-------------+--------------+
|    9 | Shariq Khan | 0321-1234575 |
|    7 | Anila       | 0321-1234573 |
|    4 | Awais       | 0321-1234570 |
|    8 | Nouman      | 0321-1234574 |
|    6 | Ali Taimoor | 0321-1234572 |
+------+-------------+--------------+
5 rows in set (0.01 sec)
``` |
| **12** | **Give detail of donor and recipient having delivery date not null.** |
| **Query** | SELECT D.D_CNIC, D.BLOOD_GROUP, R.R_CNIC,R.NAME, R.INSTITUTE FROM DONOR D, RECIPIENT R WHERE (D.D_CNIC, R.R_CNIC) IN (SELECT D_CNIC, R_CNIC FROM BLOOD_BAGS WHERE DELIVERY_DATE IS NOT NULL); |
| **Output** | ```
+----------------+-------------+----------------+--------+------------------------------------+
| D_CNIC         | blood_group | R_CNIC         | name   | institute                          |
+----------------+-------------+----------------+--------+------------------------------------+
| 30005-0000005-5| A+          | 33848-1234567-0| Madiha | Tasneem hospital, bun              |
| 30033-0000033-6| A+          | 34929-7654321-1| Sami   | Tabish Children Hospital, Mianwali |
| 30316-0000316-1| B+          | 37515-3698741-7| Maryam | Sarmad Trust Blood Bank            |
| 30336-0000336-3| B+          | 32737-7654321-9| Lubna  | Tabish Children Hospital, Mianwali |
| 30507-0000507-2| B+          | 33838-2468013-0| Eman   | Rehman Hospital, Mianwali          |
| 30553-0000553-9| B+          | 36505-7890123-7| Zainab | Tasneem hospital, bun              |
+----------------+-------------+----------------+--------+------------------------------------+
6 rows in set (0.00 sec)
``` |
| **13** | **Query to select details of those recipient who have received blood group 'A+'.** |
| **Query** | SELECT * FROM RECIPIENT WHERE R_CNIC IN (SELECT R_CNIC FROM |

	BLOOD_BAGS WHERE D_CNIC IN (SELECT D_CNIC FROM DONOR WHERE BLOOD_GROUP='A+'));
Output	
14	**This query is using INNER JOIN to find those blood bag IDs that are donated by institutes with institude details.**
Query	SELECT N.N_ID, N.INSTITUTE_NAME, N.CONTACT, B.BAG_ID FROM NETWORKS N INNER JOIN BLOOD_BAGS B ON N.N_ID=B.N_ID;
Output	

CHAPTER 5 : INTERFACE DESIGN

5.1. LANGUAGE/FRAMEWORK:

For the development of our GUI client, we chose the Python programming language with the Tkinter library for the graphical user interface. Python was selected due to its simplicity, readability, and vast ecosystem of libraries, which accelerates development and enhances productivity. Tkinter, being the standard GUI toolkit for Python, offers a straightforward and efficient way to create graphical interfaces.

Suitability and Advantages:

- **Ease of Use**: Python's syntax is clear and concise, making it easier for developers to write and maintain the code.
- **Extensive Libraries**: Python offers a wide range of libraries for database connectivity, GUI development, and other functionalities.
- **Cross-Platform Compatibility**: Both Python and Tkinter are cross-platform, ensuring that the application can run on various operating systems without significant changes.
- **Community Support**: Python has a large community, providing plenty of resources, tutorials, and third-party modules.

Key Features:

- **Event-Driven Programming**: Tkinter supports event-driven programming, allowing the application to respond to user actions seamlessly.
- **Widgets**: Tkinter offers a variety of widgets (e.g., buttons, labels, text boxes) that are essential for building a user-friendly interface.
- **Customization**: Tkinter allows for the customization of widgets and layouts, providing the flexibility to design an intuitive and attractive GUI.

These features contribute significantly to the development and functionality of the GUI client by enabling us to create an interactive and responsive interface for both admin and user sides of the application.

5.2. DATABASE CONNECTIVITY:

The GUI client connects to the MySQL database using the mysql-connector-python library. This library provides a robust interface for connecting to MySQL databases from Python, handling various database operations, and ensuring secure and efficient data transactions.

Code Snippet for Database Connection:

import mysql.connector

from mysql.connector import Error

```python
def create_connection():

  connection = None

  try:

    connection = mysql.connector.connect(

      host="localhost",

      user="root",

      password="Namal.123",

      database="namal_blood_bank"

    )

    if connection.is_connected():

      print("Connection to MySQL DB successful")

  except Error as e:

    print(f"The error '{e}' occurred")

  return connection


# Example usage

conn = create_connection()
```

Error Handling:

The above code snippet includes basic error handling by catching any `Error` exceptions that occur during the connection attempt. This ensures that any issues with the database connection are identified and reported, allowing for troubleshooting.

5.3.   STORED PROCEDURES AND FUNCTIONS:

5.3.1. Stored Procedure: GetEligibleDonors

Purpose:

This procedure retrieves donors who are eligible based on specific criteria (either no donations recorded or last donation date more than 90 days ago).

Script:
DELIMITER //

```
CREATE PROCEDURE GetEligibleDonors()
BEGIN
  SELECT
    d.D_CNIC AS Donor_identity,
    d.Name AS Donor_Name,
    d.Contact,
    d.Blood_Group,
    'Eligible' AS Eligibility_Status
  FROM
    DONOR d
  WHERE
    NOT EXISTS (
      SELECT 1
      FROM BLOOD_BAGS bb
      WHERE bb.D_CNIC = d.D_CNIC
    )
    OR (
      SELECT MAX(bb.Donation_Date)
      FROM BLOOD_BAGS bb
      WHERE bb.D_CNIC = d.D_CNIC
    ) <= DATE_SUB(CURRENT_DATE, INTERVAL 90 DAY);
END //
```

DELIMITER ;

Implementation:

- **Objective**: This procedure identifies donors who can potentially donate blood based on their donation history.
- **How it Enhances Functionality**: It allows the GUI client to easily fetch and display eligible donors, ensuring efficient management of blood availability.

5.3.2. Stored Procedure: GetBloodBagCountsByMonth

Purpose:

This procedure aggregates and counts blood bags donated each month.

Script:
DELIMITER //

```
CREATE PROCEDURE GetBloodBagCountsByMonth()
BEGIN
  SELECT
```

```
      DATE_FORMAT(bb.Donation_Date, '%Y-%m') AS Month,
      COUNT(bb.Bag_ID) AS Blood_Bag_Count
   FROM
      BLOOD_BAGS bb
   GROUP BY
      DATE_FORMAT(bb.Donation_Date, '%Y-%m');
END //

DELIMITER ;
```

Implementation:

- **Objective**: To provide a monthly summary of blood bag donations.
- **How it Enhances Functionality**: It enables the GUI client to visualize and track blood donation trends over time, aiding in inventory management and planning.

5.3.3. Stored Procedure: GetBloodBagDetails

Purpose:

This procedure retrieves detailed information about blood bags, including donor information.

Script:

```
DELIMITER //

CREATE PROCEDURE GetBloodBagDetails()
BEGIN
   SELECT
      BB.Bag_ID,
      BB.Delivery_Date,
      ADDDATE(BB.Delivery_Date, 30) AS Expiry_date,
      D.Name AS Donor_Name,
      D.Blood_Group,
      COUNT(BB.Bag_ID) AS NumberOfBags
   FROM
      BLOOD_BAGS BB
   JOIN
      DONOR D ON BB.D_CNIC = D.D_CNIC
   GROUP BY
      BB.Bag_ID, BB.Delivery_Date, D.Name, D.Blood_Group
   ORDER BY
      Expiry_date;
END //

DELIMITER ;
```

Implementation:

- **Objective**: To retrieve comprehensive details of blood bags, including donor names, blood groups, delivery dates, and expiry dates.
- **How it Enhances Functionality**: It provides the GUI client with essential information for managing blood stock efficiently, facilitating quick access to critical data.

5.3.4. Function: CalculateExpiryDate

Purpose:

This function calculates the expiry date of a blood bag based on its delivery date.

Script:
CREATE FUNCTION CalculateExpiryDate(delivery_date DATE)
RETURNS DATE
BEGIN
   DECLARE expiry_date DATE;
   SET expiry_date = ADDDATE(delivery_date, 30);
   RETURN expiry_date;
END;

Implementation:

- **Objective**: To compute the expiry date of a blood bag, typically 30 days from its delivery date.
- **How it Enhances Functionality**: It can be used within SQL queries or other procedures/functions to dynamically calculate and manage blood bag expiry dates, ensuring accuracy in blood stock management.

Explanation:

- **Stored Procedures**: These encapsulate complex queries or operations that are frequently used in the application, promoting code reusability and reducing network overhead by executing the logic directly on the database server.
- **Functions**: Provide reusable calculations or transformations that can be incorporated into SQL queries or procedures, enhancing flexibility and maintainability of the database logic.

The database utilizes stored procedures and functions to enhance the application's functionality by deriving expiry blood bags and identifying eligible donors.

<u>Objective and Implementation In GUI:</u>

- **GetExpiredBags Method**: This procedure retrieves all blood bags that have an expiry date earlier than the current date, helping the admin to identify and remove expired blood bags from the inventory.

- **EligibleDonors Method**: This function returns a list of donors who are eligible to donate blood based on their last donation date, ensuring that only suitable donors are contacted.

These scripts are implemented in the MySQL database and are called from the Python application as needed to enhance the GUI client's functionality.

5.4. INTERFACES: [4]

Below are screenshots and descriptions of the main interfaces of our GUI client.

Main Interface:

1) Admin Interface

2) User Interface
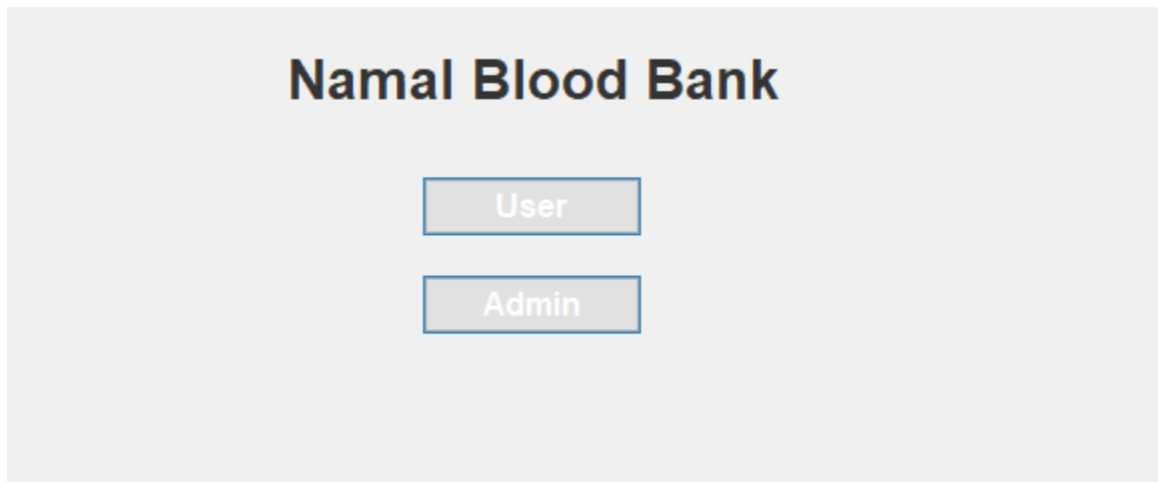
5.4.1. Admin Interface

1. Forms for Data Entry

- **Description**: This screenshot shows the forms used for entering new data into the database. Each form includes fields for relevant attributes such as donor information, blood bag details, recipient data, etc. Data validation checks ensure accurate input.

2. Display Existing Data

- **Description**: Here, existing data from the database is displayed in a table format. This view allows administrators to see all records currently stored, such as blood bag records, donor information, staff details, etc.

Donor Table

D_CNIC	Name	Contact	Department	Category	Blood_Group
30001-0000001-1	Adnan iqbal	09877234567			
30002-0000002-2	Muhammad Saleem	0301-2685998		Staff	A+
30003-0000003-3	Muhammad Saleem	0301-2685998		Staff	A+
30004-0000004-4	Yaar Muhammad Khan	0301-7698303		Staff	A+
30005-0000005-5	M Saleem	0301-2685998		Faculty	A+
30006-0000006-6	Naveed Ahmad	0345-9665509		Staff	A+
30007-0000007-7	said Anwar	0302-6065103	CS	4th Year	A+
30008-0000008-8	Muhmmad Awais	0307-9062748	Math	4th Year	A+
30009-0000009-9	Hanif Noor	0332-0830144	CS	4th Year	A+
30010-0000010-1	Muhmmad Dawood sewood	0310-6760423	CS	4th Year	A+
30011-0000011-2	Mishkatullah	0345-9529168	Maths	4th Year	A+
30012-0000012-3	naila saif	0312-5535565	maths	4th Year	A+
30013-0000013-4	muhammad zain	0308-5363655	math	4th Year	A+
30014-0000014-5	javeria amir	0324-2435363	math	4th Year	A+
30015-0000015-6	amjad iqbal	0303-0574811	math	4th Year	A+
30016-0000016-7	muhammad shafqat	0316-1613442	EE	4th Year	A+
30017-0000017-8	wasat ullah	0340-2692916	BBA	4th Year	A+
30018-0000018-9	hareem naz	0312-4646435	BBA	4th Year	A+
30020-0000020-2	Bakhat Maarij	0344-4346353	Maths	3rd Year	A+
30021-0000021-3	Nargis Shehzadi	0324-2281565	Maths	3rd Year	A+
30022-0000022-4	M. Bilal khan	0308-2684617	Maths	3rd Year	A+
30023-0000023-5	Mohsin Zareef Khan	0341-6756671	Maths	3rd Year	A+
30024-0000024-6	Bushra Khadim	0304-4971200	Maths	3rd Year	A+
30025-0000025-7	Mehwish Iqbal	0321-6696360	Maths	3rd Year	A+
30026-0000026-8	M. Tufail Khan	0312-4345310	Maths	3rd Year	A+

Networks Table

N_ID	Institute_Name	Contact	Address
1	Blood Bank DHQ Hospital Mianwali	(0459) 235136	HGJV+639, Mianwali, Punjab
2	Naml Wellness Blood Bank	(0459) 229847	Naml College Road, Mianwali
3	Red Crescent Blood Bank Mianwali	(0459) 228035	Main Street, Mianwali
5	AS1	3232	SADA

Blood Bags Table

Bag_ID	Donation_Date	Delivery_Date	S_ID	D_CNIC	R_CNIC	N_ID
2	2024-05-21	2024-05-22	2	30346-0000346-4	36131-3698741-3	None
3	2024-05-23	None	3	30049-0000049-4	None	None
4	2024-05-24	2024-06-03	4	30069-0000069-6	38424-1234567-6	None
6	2024-05-27	None	6	None	None	5
7	2024-05-29	2024-06-03	5	30134-0000134-8	34020-1357902-2	None
8	2024-05-31	None	3	30295-0000295-7	None	None
9	2024-06-01	None	2	30033-0000033-6	None	None
10	2024-06-01	2024-06-22	9	None	35080-1234567-2	1
11	2024-06-01	2024-06-20	7	30220-0000220-4	35080-1234567-2	1
12	2024-06-02	2024-06-05	2	30092-0000092-2	35080-1234567-2	1
13	2024-06-03	2024-06-08	8	30568-0000568-1	35080-1234567-2	1
14	2024-06-03	2024-06-12	6	30347-0000347-5	35080-1234567-2	1
15	2024-06-04	2024-06-10	4	30121-0000121-4	35080-1234567-2	1
16	2024-06-06	None	3	30068-0000068-5	None	None
17	2024-06-07	2024-06-15	5	30422-0000422-8	35080-1234567-2	1
18	2024-06-08	None	1	30330-0000330-6	None	None
19	2024-06-09	2024-06-20	9	30379-0000379-1	35080-1234567-2	1
20	2024-06-09	2024-06-25	7	30227-0000227-2	35080-1234567-2	1
21	2024-06-10	2024-06-18	2	30203-0000203-5	35080-1234567-2	1

Staff Table

S_ID	NAME	CONTACT	CNIC	ADDRESS
2	AS1	3232	38302	ADSAD
3	Rehan	0321-1234684	32101-7654321-4	Namal University Mianwali
4	Asad	0321-99304321-0		
5	Ghazia	0321-1234571	32101-7654321-6	Namal University Mianwali
6	Ali Taimoor	0321-1234572	32101-7654321-7	Namal University Mianwali
7	Anila	0321-1234673	32101-7654334-8	Namal University Mianwali
8	Nouman	0321-1234574	32101-7654321-9	Namal University Mianwali
9	Shariq Khan	0321-1234575	32101-7654321-1	Namal University Mianwali
10	Umar Shehzad	0321-1234576	32101-7654321-1	Namal University Mianwali
11	Zoya	0321-1234577	32101-7654321-6	Namal University Mianwali
12	Shahid	0321-1234578	32101-7654321-1	Namal University Mianwali
13	Umair Ahmed	0321-1234579	32101-7676321-4	Namal University Mianwali
14	Kamran Malik	0321-1234580	32101-7657321-5	Namal University Mianwali
15	Asim Khan	0321-1234581	32101-7666321-8	Namal University Mianwali
16	Noor Fatima	0321-1234582	32101-7654351-6	Namal University Mianwali
18	Asim Khan	03478818644		Namal
12	Shahid	0321-1234578	32101-7654321-1	Namal University Mianwali

R_CNIC	NAME	CONTACT	ADDRESS	INSTITUTE
12345	umair	34577	bhakkar	
30535-3698521-7	Noor	0355-8901234	Dhurnaka, Minawali	Kashaf Homoeopthic Clinic, Mianwali.
30545-7890123-7	Hira	0365-3456789	Agha khan center, Minawali	Agha Khan Blozod Bank Mianwali
30555-3698741-7	Laila	0375-8901234	HGJV+639, Mianwali	Blood Bank DHQ Hospital Mianwali
30565-7654321-7	Nadia	0385-3456789	Dhurnaka, Minawali	Kashaf Homoeopthic Clinic, Mianwali
30575-3698521-7	Laila	0395-8901234	Agha khan center, Minawali	Agha Khan Blozod Bank Mianwali
30585-7890123-7	Hira	0405-3456789	HGJV+639, Mianwali	Blood Bank DHQ Hospital Mianwali
30595-3698741-7	Nadia	0415-8901234	Dhurnaka, Minawali	Kashaf Homoeopthic Clinic, Mianwali
31626-2468013-8	Javed	0346-9876543	HGJV+639, Mianwali	Blood Bank DHQ Hospital Mianwali
31636-1357902-8	Yasir	0356-4321098	Gulberg Chock, Minawali	Rehman Hospital, Mianwali
31646-2468135-8	Khalid	0366-9876543	Gulberg Chock, Minawali	Obaid Noor Hospital, Mianwali
31656-1234567-8	Amir	0376-4321098	HGJV+639, Mianwali	Blood Bank DHQ Hospital Mianwali
31666-2468013-8	Salman	0386-9876543	Gulberg Chock, Minawali	Rehman Hospital, Mianwali
31676-1357902-8	Waqar	0396-4321098	Gulberg Chock, Minawali	Obaid Noor Hospital, Mianwali
31686-2468135-8	Umar	0406-9876543	HGJV+639, Mianwali	Blood Bank DHQ Hospital Mianwali
31696-1234567-8	Salman	0416-4321098	Gulberg Chock, Minawali	Rehman Hospital, Mianwali
31818-2468013-0	Umar	0338-5432109	Dhurnaka, Minawali	Kashaf Homoeopthic Clinic, Mianwali
31909-7654321-1	Saira	0329-5678901	Gulberg Chock, Minawali	Rehman Hospital, Mianwali
32010-2468013-2	Arman	0330-1098765	Gulberg Chock, Minawali	Obaid Noor Hospital, Mianwali
32101-7654321-2	Adnan	0321-1234567	Ballo khail RD,Minawali	Tabish Children Hospital, Mianwali
32727-3698521-9	Alina	0347-4567890	Ballo khail RD,Minawali	Tabish Children Hospital, Mianwali
32737-7890123-9	Farhana	0357-9012345	Namal, Minawali	Namal hospital
32747-3698741-9	Saba	0367-4567890	Gulberg Chock, Minawali	Rehman Hospital, Mianwali
32757-7654321-9	Saira	0377-9012345	Ballo khail RD,Minawali	Tabish Children Hospital, Mianwali
32767-3698521-9	Saba	0387-4567890	Namal, Minawali	Namal hospital
32777-7890123-9	Sadia	0397-9012345	Gulberg Chock, Minawali	Rehman Hospital, Mianwali

3. Search Data

- **Description**: The search feature enables administrators to search for specific records based on various criteria. It enhances usability by quickly locating relevant information without manually scanning through large datasets.

Network Records

Enter N_ID: [ ] Search

N_ID	Institute_Name	Contact	Address

Blood Bag Records

Enter Bag_ID: [ ] Search

Bag_ID	Donation_Date	Delivery_Date	S_ID	D_CNIC	R_CNIC	N_ID

Enter D_CNIC:

[ ]

Search

4. Modify Data

- **Description**: This screenshot illustrates the functionality to modify existing records. Admins can select a record from the displayed data, edit its details directly within the form fields, and save the changes back to the database.

UPDATE STAFF INFORMATION

Staff ID

Name

Contact

CNIC

Address

Update Staff

Update Staff

UPDATE RECIPIENT INFORMATION

CNIC

Name

Contact

Address

Institute

Update Recipient

Update Recipient

NETWORK DETAILS

Network ID

Institute Name

Contact

Address

Update Network

Update Network

UPDATE BLOOD BAG

Bag ID

Donation Date (YYYY-MM-DD)

Delivery Date (YYYY-MM-DD)

Staff ID

Donor CNIC

Recipient CNIC

Network ID

Update Blood Bag

Update Blood Bag

UPDATE DONOR INFORMATION

Donor CNIC

Name

Contact

Department

Category

Blood Group

Update Donor

Update Donor

5. Delete Data

- **Description**: Admins can delete records from the database using this feature. By selecting a record and confirming deletion, the system removes the entry from the database, ensuring data integrity and management.

Namal Blood Bank

Delete Donor

Delete Network

Delete Staff

DELETE STAFF

Staff ID

Delete Staff

Delete Staff

REMOVE DONOR

Donor CNIC

Delete Donor

Delete Donor

I Bank - Delete Network
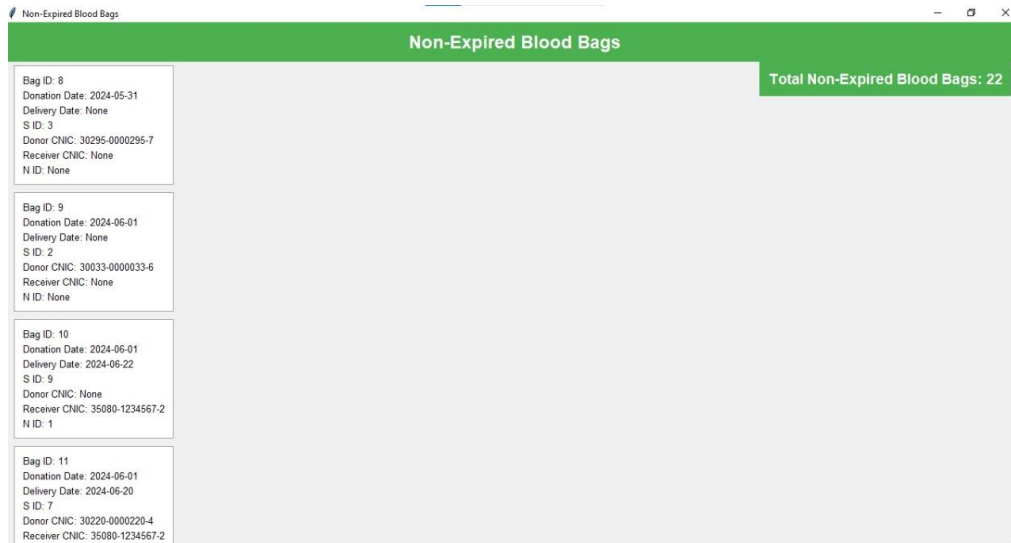
REMOVE NETWORK

Network ID

Delete Network

Delete Network

5.4.2. User Interface

1. View Available Blood Bags

- **Description**: The user interface allows users to view available blood bags. It displays essential details such as blood type, and expiration date, enabling users to find and select suitable blood bags for recipients.

2. Search for Donors via Blood Bags

- **Description**: Users can search for donors through blood bags. This functionality helps users find donors based on specific blood types or other criteria associated with blood bags in the system.
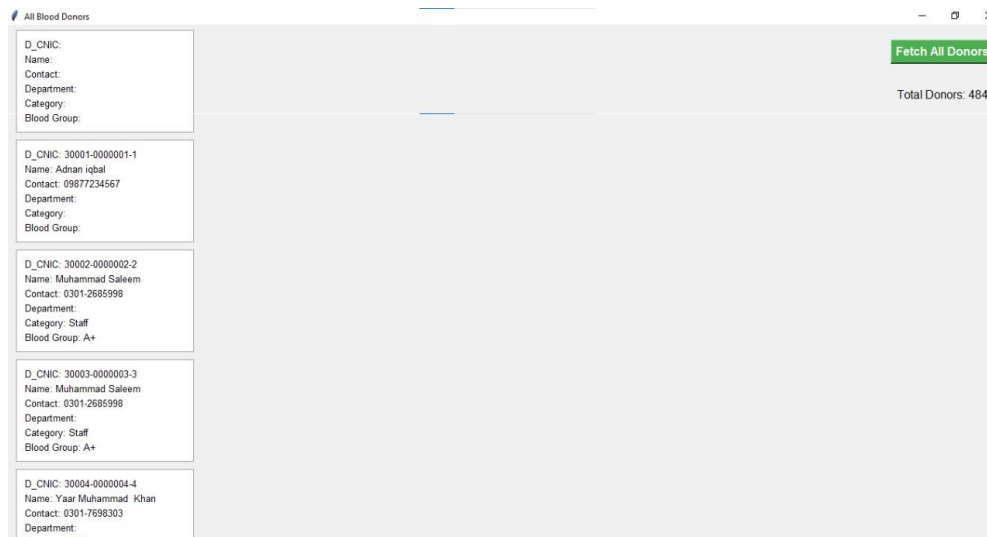
CHAPTER 6 : CONCLUSION

6.1. LESSONS LEARNED:

Throughout the development of the Namal Blood Bank Management System (NBBMS), several key lessons were gleaned that encompass technical insights, project management skills, teamwork experiences, and overall project execution.

Firstly, from a technical perspective, the project reinforced the importance of robust database design and efficient query management. Understanding how to optimize database operations significantly enhanced the system's performance and responsiveness.

In terms of project management, effective communication and regular progress tracking emerged as crucial factors in ensuring team cohesion and project success. Clear delegation of tasks among team members, facilitated by regular meetings and updates, helped in maintaining project timelines and addressing issues promptly.

Teamwork experiences underscored the significance of collaboration and leveraging individual strengths. Assigning roles based on expertise allowed each team member to contribute effectively, fostering a productive work environment.

Lastly, the project highlighted the value of adaptability and problem-solving skills. Adapting to unexpected challenges during implementation and testing phases required innovative solutions and the ability to pivot when necessary.

6.2. CHALLENGES AND SOLUTIONS:

Throughout the project lifecycle, several challenges tested the team's resolve and ingenuity.

During the design phase, defining the database schema and ensuring compatibility with all required functionalities posed initial challenges. Through meticulous planning and consultation with the database designer, these challenges were overcome by iteratively refining the schema to accommodate evolving project requirements.

Implementation challenges included integrating diverse subsystems and ensuring seamless interaction between the frontend and backend components. Issues such as data consistency and user interface responsiveness were resolved through rigorous testing and debugging sessions. Collaborative troubleshooting and peer reviews played a pivotal role in identifying and rectifying implementation errors promptly.

Testing presented its own set of challenges, particularly in simulating real-world scenarios and edge cases. Rigorous testing protocols and the adoption of automated testing frameworks helped in identifying and addressing bugs early in the development cycle. Additionally, user feedback sessions provided valuable insights for refining user interface elements and enhancing user experience.

6.3. FUTURE WORK AND IMPROVEMENTS:

There are several avenues for enhancing the NBBMS to better serve its users and stakeholders.

One area of improvement involves enhancing data analytics capabilities within the system. Implementing data visualization tools and predictive analytics algorithms could provide deeper insights into blood donation patterns and inventory management, thereby optimizing resource allocation.

Furthermore, integrating mobile-friendly interfaces and developing a dedicated mobile application could enhance accessibility and user engagement, catering to a broader audience.

6.4. FINAL THOUGHTS:

In conclusion, the development of the Namal Blood Bank Management System has been a rewarding journey marked by collaborative effort, technical innovation, and valuable learning experiences.

Personally, this project has underscored the importance of perseverance and teamwork in overcoming challenges and achieving project goals. The system holds promise not only in streamlining blood bank operations but also in contributing to the broader healthcare ecosystem.

Acknowledgments are due to our project team, mentors, and supporters whose guidance and encouragement were instrumental throughout this endeavor.

As a team we look forward, the insights gained and the relationships forged during this project will undoubtedly shape our future endeavors in technology and healthcare.

REFERENCES

[1] "DRAW.IO," [Online]. Available: https://app.diagrams.net/.

[2] "MYSQL," [Online]. Available: https://www.mysql.com/.

[3] "MYSQL WORKBENCH," [Online]. Available: https://www.mysql.com/products/workbench/.

[4] "VISUAL CODE STUDIO," [Online]. Available: https://code.visualstudio.com/.