E-Seba Management System

This database project provides a platform for users to access medical services and products online. It includes online doctor appointments, medical accessory sales, and emergency services such as ambulances, and available blood in hospitals or ICU's. Users can easily schedule appointments, purchase medical accessories, and access emergency services through a user-friendly interface. The project aims to simplify the process of accessing medical services and products by storing all necessary data securely and efficiently. This ER model is designed to represent a database for an online healthcare platform that includes entities such as User, Doctor, Appointment, Medical Accessory, Hospital, Ambulance, and Roles with their respective attributes. The relationships between these entities are also represented using one-to-many and many-to-many relationship tables. This can be used by developers to implement the database and understand the data model of the healthcare platform.

Entities:

1. **Hospital:** This entity holds all the information of a hospital.

2. **Ambulance:** This shows all the information and availability of an ambulance.

3. **Users:** This holds information all about users of this database.

4. **Role:** This entity indicates which roles is assigned to which user and their details.

5. **Doctor:** This entity stores information about doctors in the system.

6. **Appointment:** This entity shows appointment details of our users.

7. **Medical Accessories:** This holds medical accessories information.

## Entities and their *Relationships* (Cardinality)

- A Hospital can hold multiple Users and a User can be admitted to multiple hospitals.
    - **Hospital-User(M:N)** is *Admit*
- A User can get multiple appointments but an appointment can be assigned to one User
    - **User-Appointment(1:N)** in *Search*

- A Doctor can be assigned to multiple Appointments but an appointment can be assigned to one doctor.
  - **Doctor-Appointment(1:N)** is *Grant*
- A Role can hold multiple Users and a User can be admitted to multiple roles.
  - **Roles-User(M:N)** is *Access*
- A Medical item can be bought by multiple Users and a User can get multiple Medical Accessories.
  - **Medical Accessories-User(M:N)** is *Buys*
- A User can call many Ambulances and an Ambulance is able get to multiple users.
  - **Ambulance-User(M:N)** is *Takes*
- A Hospital can hold multiple Ambulances and an Ambulance can get to multiple Hospitals.
 - **Hospital-Ambulance(M:N)** is *Goes*

Attributes(<u>key</u>):

- **User:** (<u>u_id</u>, u_name, u_age, u_email, u_address, u_gender, u_mobile)
- **Ambulence:** (<u>a_id</u>, a_type, a_cost, a_location, a_status, a_number,

  driver_id references to [User] u_id)

- **Roles**: (<u>r_id</u>, r_name, r_description, r_permission)
- **Hospital**: (<u>h_id</u>, h_name, h_location, h_phone, h_icuStatus, h_bloodGroup1, h_bloodGroup2, h_bloodGroup3, h_cost)
- **Medical Accessories**: (<u>acc_id</u>, acc_name, acc_type, acc_cost, acc_count, seller_id)
- **Doctor**: (<u>d_id</u>, d_speciality, d_status, d_location, d_cost, d_days, d_startTime, d_endTime, d_rating)
- **Appointment**: (<u>app_id</u>, app_type, app_time, indv_rating,

  u_id references to [User] u_id ,

  d_id references to [Doctor] d_id)

ER Diagram:
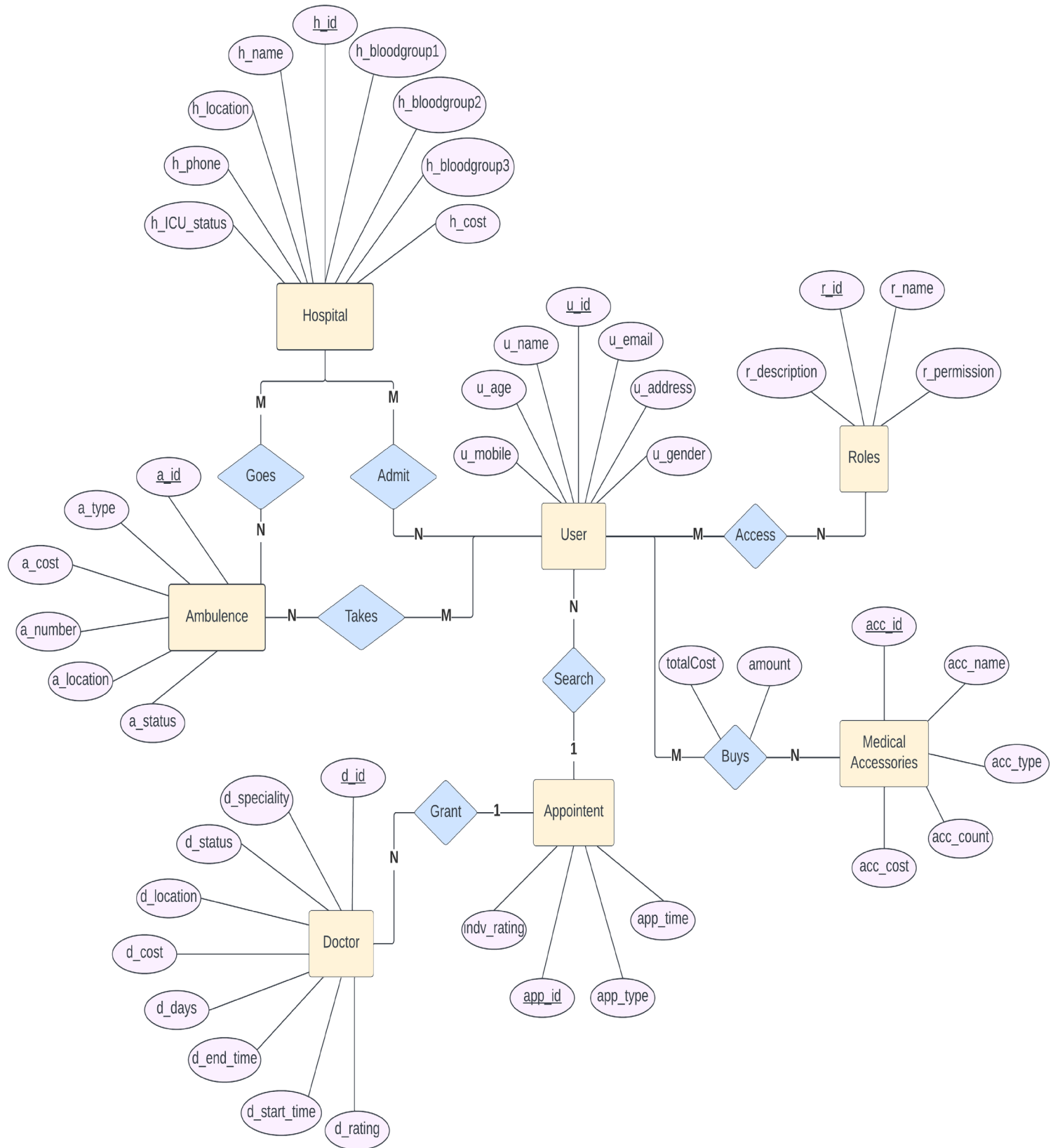
Schema Diagram:
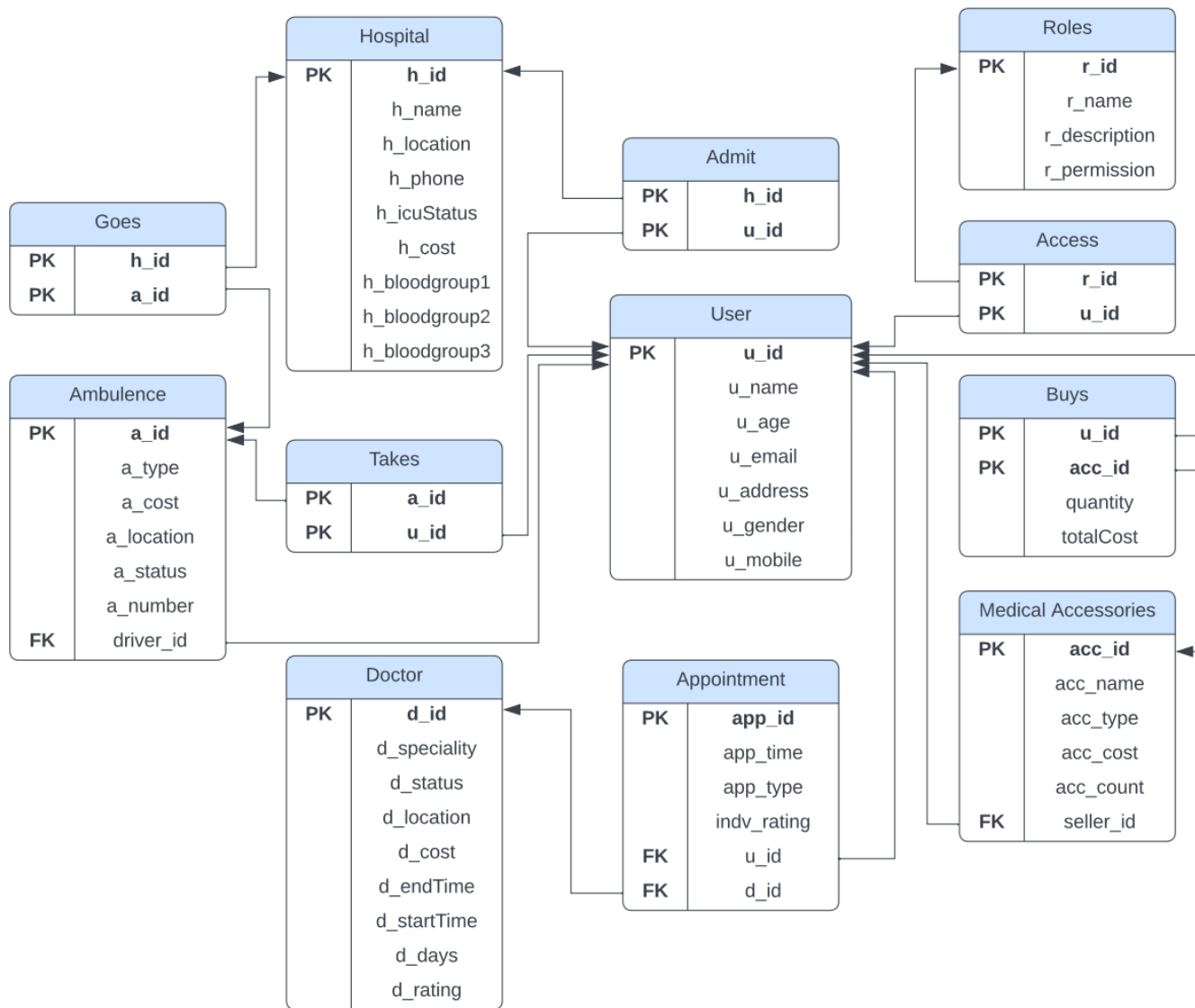
Some queries:

1. What is the total number of users and categorize them by roles?

```sql
SELECT r_name AS Role, r_description AS Description,
(SELECT COUNT(*)
 FROM Access
 WHERE Access.r_id = Roles.r_id) AS Total
    FROM Roles
```

	Role	Description	Total
1	General User	Has no special permissions	50
2	Seller	Can sell company products	5
3	Driver	Can drive company vehicles	10
4	Doctor	Can provide medical treatment	10

2. Find users whose age is greater than or equal to 40 and lives in New York?

```sql
SELECT *
FROM [User]
WHERE [u_age] >= 40 AND [u_address] LIKE '%NY%';
```

	u_id	u_name	u_age	u_email	u_address	u_gender	u_mobile
1	13	Steven Chen	41	schen@gmail.com	456 Pine St, NY	Male	555-555-3210
2	37	William Turner	44	wturner@hotmail.com	234 Cedar Ave, NY	Male	555-999-0000

3. Select the name and email of the user with a specific mobile number 555-987-6543?

```sql
SELECT [u_name], [u_email]
FROM [User] WHERE [u_mobile] = '555-987-6543';
```

	u_name	u_email
1	Emily Davis	edavis@yahoo.com

4. Select all doctors who have a rating greater than or equal to 4.5 and is available also sort them according to their rating.

```sql
SELECT *
FROM Doctor
WHERE d_rating >= 4.5 and d_status = 'Available'
order by d_rating desc;
```

	d_id	d_speciality	d_status	d_location	d_cost	d_days	d_startTime	d_endTime	d_rating
1	46	Family medicine	Available	Phoenix	400	Mon-Thu	08:00:00	16:00:00	4.90
2	43	Dermatologist	Available	Chicago	150	Mon-Sun	10:00:00	18:00:00	4.70
3	48	Pediatrician	Available	San Diego	280	Tue-Sun	10:00:00	18:00:00	4.60
4	41	Cardiologist	Available	New York	250	Mon-Sat	09:00:00	17:00:00	4.50

5. Select the name and specialties of doctors who work on Monday to Thursday and have a cost less than or equal to 500.

```sql
SELECT u_name as Name ,d_speciality as Speciality
from [User], [Doctor]
where [Doctor].d_id = [User].u_id
and [Doctor].d_days LIKE '%Mon-Thu%' AND [Doctor].d_cost <= 500;
```

	Name	Speciality
1	Madison Lee	Family medicine
2	William Taylor	Pediatrician

6. Select the doctor ID, name, and cost for doctors whose cost is less than the average cost of all doctors.

```
SELECT d_id, u_name, d_cost
FROM Doctor ,[User]
WHERE [Doctor].d_id = [User].u_id
and d_cost < (SELECT AVG(d_cost) FROM Doctor);
```

	d_id	u_name	d_cost
1	41	Mark Williams	250
2	42	Sarah Davis	200
3	43	Christopher Brown	150
4	47	Jason Kim	220
5	48	Julia Rodriguez	280

7. Select the number of doctors who are ' Dermatologist'.

```
SELECT COUNT(*) AS num_doctors
FROM Doctor
WHERE d_speciality = 'Dermatologist';
```

	num_doctors
1	2

8. What is the average rating of all appointments made by male patients?

```
SELECT AVG(indv_rating) as Average_rating
FROM Appointment
WHERE u_id IN (
   SELECT u_id FROM [User]
   WHERE u_gender = 'Male'
      );
```

	Average_rating
1	4.353333

9. How many times online appointment happened?

```
select count(app_type) as Total
from Appointment
where app_type ='Online'
```

	Total
1	16

10. Show all the doctor names and their appointment count and sort them in descending order?

```
select u_name as DocName, count(d_id) as AppointmentCount
from Appointment, [User]
where [Appointment].d_id = [User].u_id
group by d_id,u_name
order by AppointmentCount desc
```

	DocName	AppointmentCount
1	Mark Williams	5
2	Ethan Johnson	5
3	Sarah Davis	4
4	Jason Kim	4
5	Olivia Hernandez	4
6	Christopher Brown	3
7	Madison Lee	3
8	Julia Rodriguez	2

11. Find hospital details if they have ICU available and sort them by cost?

```
Select * from Hospital
where h_icuStatus = 'Available'
order by h_cost
```

	h_id	h_name	h_location	h_phone	h_icuStatus	h_bloodGroup1	h_bloodGroup2	h_bloodGroup3	h_cost
1	101	St. Mary Hospital	New York City	555-123-4567	Available	A+	B-	O+	500
2	110	Mercy Hospital	Chicago	555-012-3456	Available	O+	A-	B-	600
3	112	University of Colorado Hospital	Aurora	555-234-5078	Available	O+	B+	O-	800
4	104	Massachusetts General Hospital	Boston	555-456-7890	Available	AB+	B+	O+	800
5	103	Johns Hopkins Hospital	Baltimore	555-345-6789	Available	A+	A-	AB-	1000
6	113	Duke University Hospital	Durham	555-345-6089	Available	B-	O+	AB+	1000
7	115	UCSF Medical Center	San Francisco	555-567-8001	Available	A+	AB+	O-	1100
8	107	Stanford Hospital	Stanford	555-789-0123	Available	AB-	O+	A-	1100
9	106	Mayo Clinic	Rochester	555-678-9012	Available	A+	B+	O-	1200

12. Find hospital details where O+ blood is available?

```
select * from Hospital
where h_bloodGroup1 ='O+' or h_bloodGroup2 = 'O+' or h_bloodGroup3 = 'O+'
```

	h_id	h_name	h_location	h_phone	h_icuStatus	h_bloodGroup1	h_bloodGroup2	h_bloodGroup3	h_cost
1	101	St. Mary Hospital	New York City	555-123-4567	Available	A+	B-	O+	500
2	104	Massachusetts General Hospital	Boston	555-456-7890	Available	AB+	B+	O+	800
3	105	Cleveland Clinic	Cleveland	555-567-8901	Not Available	O+	O-	B-	900
4	107	Stanford Hospital	Stanford	555-789-0123	Available	AB-	O+	A-	1100
5	109	Texas Medical Center	Houston	555-901-2345	Not Available	O+	AB+	O-	950
6	110	Mercy Hospital	Chicago	555-012-3456	Available	O+	A-	B-	600
7	112	University of Colorado Hospital	Aurora	555-234-5078	Available	O+	B+	O-	800
8	113	Duke University Hospital	Durham	555-345-6089	Available	B-	O+	AB+	1000

13. Which hospital holds how many users/patients?

```
select h_name as HospitalName, count(Admit.h_id) as UserCount
from Admit, Hospital
```

```
where Admit.h_id = Hospital.h_id
group by h_name, Admit.h_id
```

Results | Messages

	HospitalName	UserCount
1	St. Mary Hospital	3
2	Mount Sinai Hospital	3
3	Johns Hopkins Hospital	3
4	Massachusetts General Hospital	3
5	Cleveland Clinic	3
6	Mayo Clinic	3
7	Stanford Hospital	3
8	UCLA Medical Center	3
9	Texas Medical Center	3
10	Mercy Hospital	3

14. Find all the ambulances in San Francisco?

```
Select * from Ambulence
where a_location like '%SF%';
```

Results | Messages

	a_id	a_type	a_cost	a_location	a_status	a_number	driver_id
1	1	Type A	50	123 Main St, SF	Available	SF-111	31
2	10	Type C	100	777 Valencia St, SF	Available	SF-444	40
3	4	Type A	50	111 Market St, SF	Available	SF-222	34
4	8	Type B	75	555 Montgomery St, SF	Available	SF-333	38

15. Find out the names of the sellers and count of the products they sell?

```
select u_name, count(acc_id) as ProductCount
from [Medical Accessories], [User]
where seller_id = [User].u_id
group by u_name, seller_id
```

Results | Messages

	u_name	ProductCount
1	Christina Brown	4
2	Brandon Davis	4
3	Hannah Chen	4
4	Andrew Kim	4
5	Lauren Wilson	4

16. What distinct type of products are available to purchase?

```
select distinct(acc_type)
from [Medical Accessories]
```

Results | Messages

	acc_type
1	Emergency
2	Equipment
3	Medicine
4	Mobility aid
5	Protection

17. What products does 'Christina Brown' sell?

```sql
select acc_name
from [Medical Accessories]
where seller_id in
        (select u_id from [User]
        where u_name = 'Christina Brown')
```

	acc_name
1	Surgical gloves
2	Crutches
3	Paracetamol
4	Thermometer

18. Show the total cost of all purchases made?

```sql
SELECT SUM(totalCost) AS total_cost
FROM Buys;
```

	total_cost
1	39730

19. Show the name of the user and total number of medical accessories purchased by them?

```sql
SELECT u_name, SUM(quantity) AS total_quantity
FROM Buys, [User]
where [User].u_id = Buys.u_id
GROUP BY u_name;
```

	u_name	total_quantity
1	Amanda Johnson	2
2	Ashley Davis	3
3	Daniel Kim	1
4	David Brown	1
5	Emily Davis	2
6	Eric Rodriguez	2
7	Jennifer Kim	3
8	Jessica Chen	5
9	John Smith	2
10	Julie Lee	2
11	Karen Johnson	3
12	Kevin Chen	4
13	Linda Wilson	4
14	Megan Davis	1
15	Michael Lee	4
16	Paul Brown	5
17	Robert Rodriguez	4
18	Sarah Johnson	1
19	Steven Chen	2
20	William Kim	3

CEP Mapping

- How **Knowledge Profile (K's)** are addressed through our project and mapping among K's, CO's, PO's:

K's	Attribute	How K's are addressed through our project	CO	PO
K3	Engineering fundamentals	Our project need understanding on Database fundamental to formulate a suitable model.	CO2, CO3, CO4	PO1
K4	Specialist knowledge	Blood group related knowledge.		PO1
K5	Engineering design	We used ER diagram and Schema diagram to design our project.	CO3, CO4	PO3, PO5
K6	Engineering practice	Implemented our project in SQL Server Management Studio with the help of SQL language.	CO1, CO2, CO5	PO5
K7	Comprehension	Our project gives positive feedback on society as it will help people to get healthcare services easily and effectively.	CO6, CO7	PO6, PO7, PO8

- How **Complex Engineering Problems (P's)** are addressed through our project and mapping among P's, CO's, PO's:

P's	Attribute	How P's are addressed through our project	CO	PO
P1	Depth of knowledge required	Cannot be resolved without in-depth engineering knowledge at the level of one or more of Database fundamental(**K3**), Blood group related knowledge(**K4**), ER and Schema diagram(**K5**), Implementation with SQL on SQL server(**K6**), Impact on society(**K7**)	CO 1-5	PO1, PO3, PO 5-8
P3	Depth of analysis required	This work requires more study on **Integrity Constraints**. As we applied many-to-many relations where one-to-many relations can be applied. This further analysis will help us to design more suitable and efficient model that users can use to interact with doctors, find emergency services like view available hospitals with ICU and what blood groups are available in them.	CO3, CO4, CO5	PO 6-8, PO12
P6	Extent of stakeholder	Many stakeholders need doctor appointment system as they want to get an appointment to the highest rated doctor, many want accessories management system as the need to buy some emergency equipment. Our project fulfils their needs	CO6, CO7	
P7	Interdependence	According to our stakeholder's requirement we made our database's table into smaller tables hold their data.	CO8	P10, P11

		This helped us grasp the whole idea of our stakeholders and implement the idea using smaller sub-problems. Doctor's appointment schedule can be found on Appointment table, who got admitted into which hospital can be found on Admit table, all user's data can be found on user table and so on.		

- How **Complex Engineering Activities (A's)** are addressed through our project and mapping among A's, CO's, PO's:

A's	Attribute	How A's are addressed through our project	CO	PO
A1	Range of resources	We needed many diverse resources like **Information's:** Data of Users, Role, Doctor, Hospital, Appointment, Medical Accessories, Ambulance. **Technologies**: Computer, SQL, SQL Server. **People:** Users, Developers. **Money**	CO8	P11
A4	Consequences for society and the environment	People can now find easily where blood is available, doctor is busy or not, can buy easily, get their selves admitted in a hospital all in our project.	CO6	P6, P7
A5	Familiarity	The project deals with online health care management system based on Database for all types of users.	CO9	