PART – 1

DDL Commands to create tables

1. **Patient**
   Schema: Patient (PatientID: integer, BloodTypeID: integer, Name: string, Age: integer, Gender: string)

   CREATE TABLE Patient (
   PatientID SERIAL PRIMARY KEY,
   BloodTypeID INTEGER REFERENCES BloodGroup(BloodTypeID),
   Name VARCHAR(50),
   Age INTEGER,
   Gender VARCHAR(10)
   );

```
project=# CREATE TABLE Patient (
project(#       PatientID SERIAL PRIMARY KEY,
project(#       BloodTypeID INTEGER REFERENCES BloodGroup(BloodTypeID),
project(#       Name VARCHAR(50),
project(#       Age INTEGER,
project(#       Gender VARCHAR(10)
project(# );
CREATE TABLE
```

2. **BloodGroup**
   Schema: BloodGroup (BloodTypeID: integer, BloodType: string)

   CREATE TABLE BloodGroup (
   BloodTypeID SERIAL PRIMARY KEY,
   BloodType VARCHAR(5) UNIQUE
   );

```
project=# CREATE TABLE BloodGroup (
project(#       BloodTypeID SERIAL PRIMARY KEY,
project(#       BloodType VARCHAR(5) UNIQUE
project(# );
CREATE TABLE
```

3. **InsuranceProvider**
   Schema: InsuranceProvider (InsuranceProviderID: integer, PatientID: integer, InsuranceProviderName: string)

   CREATE TABLE InsuranceProvider (
   InsuranceProviderID SERIAL PRIMARY KEY,
   PatientID INTEGER REFERENCES Patient(PatientID),

InsuranceProviderName VARCHAR(50)
);

```
project=# CREATE TABLE InsuranceProvider (
project(#       InsuranceProviderID SERIAL PRIMARY KEY,
project(#       PatientID INTEGER REFERENCES Patient(PatientID),
project(#       InsuranceProviderName VARCHAR(50)
project(# );
CREATE TABLE
```

4. **Admission**

Schema: Admission (AdmissionID: integer, PatientID: integer, DoctorID: integer, HospitalID: integer, MedicationID: integer, AdmissionDate: date, DischargeDate: date)

CREATE TABLE Admission (
AdmissionID SERIAL PRIMARY KEY,
PatientID INTEGER REFERENCES Patient(PatientID),
DoctorID INTEGER REFERENCES Doctor(DoctorID),
HospitalID INTEGER REFERENCES Hospital(HospitalID),
MedicationID INTEGER REFERENCES Medication(MedicationID),
AdmissionDate DATE,
DischargeDate DATE
);

```
project=# CREATE TABLE Admission (
project(#       AdmissionID SERIAL PRIMARY KEY,
project(#       PatientID INTEGER REFERENCES Patient(PatientID),
project(#       DoctorID INTEGER REFERENCES Doctor(DoctorID),
project(#       HospitalID INTEGER REFERENCES Hospital(HospitalID),
project(#       MedicationID INTEGER REFERENCES Medication(MedicationID),
project(#       AdmissionDate DATE,
project(#       DischargeDate DATE
project(# );
CREATE TABLE
```

5. **AdmissionType**

Schema: AdmissionType (AdmissionTypeID: integer, AdmissionID: integer, AdmissionType: string)

CREATE TABLE AdmissionType (
AdmissionTypeID SERIAL PRIMARY KEY,
AdmissionID INTEGER REFERENCES Admission(AdmissionID),
AdmissionType VARCHAR(20)
);

```
project=# CREATE TABLE AdmissionType (
project(#       AdmissionTypeID SERIAL PRIMARY KEY,
project(#       AdmissionID INTEGER REFERENCES Admission(AdmissionID),
project(#       AdmissionType VARCHAR(20)
project(# );
CREATE TABLE
```

6. **Billing**

   Schema: Billing (BillingID: integer, AdmissionID: integer, BillingAmount: real)

   CREATE TABLE Billing (
   BillingID SERIAL PRIMARY KEY,
   AdmissionID INTEGER REFERENCES Admission(AdmissionID),
   BillingAmount DECIMAL(10,2)
   );

```
project=# CREATE TABLE Billing (
project(#       BillingID SERIAL PRIMARY KEY,
project(#       AdmissionID INTEGER REFERENCES Admission(AdmissionID),
project(#       BillingAmount DECIMAL(10,2)
project(# );
CREATE TABLE
```

7. **TestResult**

   Schema: TestResult (AdmissionID: integer, TestResults: string)

   CREATE TABLE TestResult (
   AdmissionID INTEGER REFERENCES Admission(AdmissionID),
   TestResults TEXT,
   PRIMARY KEY (AdmissionID)
   );

```
project=# CREATE TABLE TestResult (
project(#       AdmissionID INTEGER REFERENCES Admission(AdmissionID),
project(#       TestResults TEXT,
project(#       PRIMARY KEY (AdmissionID)
project(# );
CREATE TABLE
```

8. **Hospital**

   Schema: Hospital (HospitalID: integer, HospitalName: string)

   CREATE TABLE Hospital (
   HospitalID SERIAL PRIMARY KEY,
   HospitalName VARCHAR(50) NOT NULL
   );

```
project=# CREATE TABLE Hospital (
project(#       HospitalID SERIAL PRIMARY KEY,
project(#       HospitalName VARCHAR(50) NOT NULL
project(# );
CREATE TABLE
```

9. **Room**

   Schema: Room (RoomID: integer, HospitalID: integer, RoomNumber: integer)

   CREATE TABLE Room (
   RoomID SERIAL PRIMARY KEY,
   HospitalID INTEGER REFERENCES Hospital(HospitalID),
   RoomNumber INTEGER
   );

```
project=# CREATE TABLE Room (
project(#       RoomID SERIAL PRIMARY KEY,
project(#       HospitalID INTEGER REFERENCES Hospital(HospitalID),
project(#       RoomNumber INTEGER
project(# );
CREATE TABLE
```

10. **Doctor**

    Schema: Doctor (DoctorID: integer, HospitalID: integer, DoctorName: string)

    CREATE TABLE Doctor (
    DoctorID SERIAL PRIMARY KEY,
    HospitalID INTEGER REFERENCES Hospital(HospitalID),
    DoctorName VARCHAR(50) NOT NULL
    );

```
project=# CREATE TABLE Doctor (
project(#       DoctorID SERIAL PRIMARY KEY,
project(#       HospitalID INTEGER REFERENCES Hospital(HospitalID),
project(#       DoctorName VARCHAR(50) NOT NULL
project(# );
CREATE TABLE
```

11. **Medication**

    Schema: Medication (MedicationID: integer, DiagnosisID: integer, MedicineName: string)
    CREATE TABLE Medication (
    MedicationID SERIAL PRIMARY KEY,
    DiagnosisID INTEGER REFERENCES Diagnosis(DiagnosisID),
    MedicineName VARCHAR(50) NOT NULL
    );

```
project=# CREATE TABLE Medication (
project(#       MedicationID SERIAL PRIMARY KEY,
project(#       DiagnosisID INTEGER REFERENCES Diagnosis(DiagnosisID),
project(#       MedicineName VARCHAR(50) NOT NULL
project(# );
CREATE TABLE
```

12. Diagnosis

Schema: Diagnosis (DiagnosisID: integer, MedicalCondition: string)

```
CREATE TABLE Diagnosis (
    DiagnosisID SERIAL PRIMARY KEY,
    MedicalCondition VARCHAR(100) NOT NULL
);
```

```
project=# CREATE TABLE Diagnosis (
project(#       DiagnosisID SERIAL PRIMARY KEY,
project(#       MedicalCondition VARCHAR(100) NOT NULL
project(# );
CREATE TABLE
```

13. DiagAdm (Associate Entity)

Schema: DiagAdm (AdmissionID: integer, AdmissionID: integer)

```
CREATE TABLE DiagAdm (
    AdmissionID INTEGER REFERENCES Admission(AdmissionID),
    AdmissionID INTEGER REFERENCES Diagnosis(DiagnosisID),
    PRIMARY KEY (AdmissionID, DiagnosisID)
);
```

```
project=# CREATE TABLE DiagAdm (
project(#       AdmissionID INTEGER REFERENCES Admission(AdmissionID),
project(#       DiagnosisID INTEGER REFERENCES Diagnosis(DiagnosisID),
project(#       PRIMARY KEY (AdmissionID, DiagnosisID)
project(# );
CREATE TABLE
```

DML Commands to display all the rows inserted into the tables

```
project=# SELECT COUNT(*) FROM Patient;
 count
-------
 10000
(1 row)
```

```
project=# SELECT * FROM Patient;
 patientid |          name           | age | gender | bloodtypeid
-----------+-------------------------+-----+--------+-------------
         4 | Tiffany Ramirez         |  81 | Female |           1
         5 | Ruben Burns             |  35 | Male   |           2
         6 | Chad Byrd               |  61 | Male   |           3
         7 | Antonio Frederick       |  49 | Male   |           3
         8 | Mrs. Brandy Flowers     |  51 | Male   |           1
         9 | Patrick Parker          |  41 | Male   |           4
        10 | Charles Horton          |  82 | Male   |           4
        11 | Patty Norman            |  55 | Female |           1
        12 | Ryan Hayes              |  33 | Male   |           5
        13 | Sharon Perez            |  39 | Female |           1
        14 | Amy Roberts             |  45 | Male   |           3
        15 | Mrs. Caroline Farrell   |  23 | Female |           1
        16 | Christina Williams      |  85 | Female |           5
        17 | William Page            |  72 | Female |           5
        18 | Michael Bradshaw        |  65 | Female |           4
        19 | Brian Dorsey            |  32 | Female |           2
        20 | Olivia Gonzalez         |  64 | Male   |           6
        21 | Teresa Caldwell         |  23 | Male   |           5
        22 | Desiree Williams MD     |  66 | Male   |           2
        23 | Sally Shaw              |  80 | Male   |           1
        24 | William Johnson         |  55 | Female |           4
        25 | Steven Bennett          |  79 | Male   |           1
        26 | Haley Li                |  51 | Male   |           3
        27 | Angela Brown            |  33 | Female |           3
        28 | Beverly Miller          |  54 | Male   |           7
        29 | Daniel Dickson          |  26 | Female |           3
        30 | Kimberly Mason          |  70 | Female |           3
-- More  --
```

```
project=# SELECT * FROM Admission;
 admissionid | patientid | doctorid | hospitalid | medicationid | admissiondate | dischargedate
-------------+-----------+----------+------------+--------------+---------------+---------------
           3 |         4 |        4 |          4 |            4 | 2022-11-17    | 2022-12-01
           4 |         5 |        5 |          5 |            5 | 2023-06-01    | 2023-06-15
           5 |         6 |        6 |          6 |            6 | 2019-01-09    | 2019-02-08
           6 |         7 |        7 |          7 |            7 | 2020-05-02    | 2020-05-03
           7 |         8 |        8 |          8 |            8 | 2021-07-09    | 2021-08-02
           8 |         9 |        9 |          9 |            9 | 2020-08-20    | 2020-08-23
           9 |        10 |       10 |         10 |           10 | 2021-03-22    | 2021-04-15
          10 |        11 |       11 |         11 |           11 | 2019-05-16    | 2019-06-02
          11 |        12 |       12 |         12 |           12 | 2020-12-17    | 2020-12-22
          12 |        13 |       13 |         13 |           13 | 2022-12-15    | 2022-12-16
          13 |        14 |       14 |         14 |           14 | 2021-04-13    | 2021-05-11
          14 |        15 |       15 |         15 |           15 | 2019-06-09    | 2019-06-26
          15 |        16 |       16 |         16 |           16 | 2021-11-29    | 2021-12-14
          16 |        17 |       17 |         17 |           17 | 2021-07-29    | 2021-08-14
          17 |        18 |       18 |         18 |           18 | 2021-06-05    | 2021-06-25
          18 |        19 |       19 |         19 |           19 | 2021-08-07    | 2021-08-14
          19 |        20 |       20 |         20 |           20 | 2019-11-15    | 2019-12-04
          20 |        21 |       21 |         21 |           21 | 2022-03-08    | 2022-03-16
          21 |        22 |       22 |         22 |           22 | 2022-06-19    | 2022-06-29
          22 |        23 |       23 |         23 |           23 | 2019-07-10    | 2019-08-07
          23 |        24 |       24 |         24 |           24 | 2023-02-25    | 2023-03-27
          24 |        25 |       25 |         25 |           25 | 2022-12-12    | 2022-12-26
          25 |        26 |       26 |         26 |           26 | 2022-10-09    | 2022-11-01
          26 |        27 |       27 |         27 |           27 | 2019-01-10    | 2019-01-31
          27 |        28 |       28 |         28 |           28 | 2022-08-05    | 2022-09-03
          28 |        29 |       29 |         29 |           29 | 2021-05-27    | 2021-06-23
          29 |        30 |       30 |         30 |           30 | 2021-07-12    | 2021-07-29
-- More  --
```

```
project=# SELECT * FROM Billing ORDER BY BillingID DESC;
 billingid | admissionid | billingamount
-----------+-------------+---------------
     10003 |       10003 |       1300.00
     10002 |       10002 |      37223.97
     10001 |       10001 |      25236.34
     10000 |       10000 |      49559.20
      9999 |        9999 |       5995.72
      9998 |        9998 |      39606.84
      9997 |        9997 |      16793.60
      9996 |        9996 |      12379.13
      9995 |        9995 |       8296.30
      9994 |        9994 |      14426.40
      9993 |        9993 |      48753.13
      9992 |        9992 |      36044.47
      9991 |        9991 |       6532.31
      9990 |        9990 |      27920.31
      9989 |        9989 |      15872.81
      9988 |        9988 |      27476.72
      9987 |        9987 |      37181.84
      9986 |        9986 |       1675.09
      9985 |        9985 |      35961.41
      9984 |        9984 |      46629.77
      9983 |        9983 |      47369.55
      9982 |        9982 |      14416.63
      9981 |        9981 |       4997.58
      9980 |        9980 |      22434.60
      9979 |        9979 |      37726.18
      9978 |        9978 |      20793.03
      9977 |        9977 |      10021.90
      9976 |        9976 |      18614.47
      9975 |        9975 |      27648.10
      9974 |        9974 |      38831.71
      9973 |        9973 |       9641.00
      9972 |        9972 |       7716.36
      9971 |        9971 |      31861.54
```

```
project=# \dt
              List of relations
 Schema |       Name         | Type  |  Owner
--------+--------------------+-------+----------
 public | admission          | table | postgres
 public | admissiontype      | table | postgres
 public | billing            | table | postgres
 public | bloodgroup         | table | postgres
 public | diagadm            | table | postgres
 public | diagnosis          | table | postgres
 public | doctor             | table | postgres
 public | hospital           | table | postgres
 public | insuranceprovider  | table | postgres
 public | medication         | table | postgres
 public | patient            | table | postgres
 public | room               | table | postgres
 public | testresult         | table | postgres
(13 rows)
```

PART – 2

The tables are already in the BCNF form.
Justification:

1. Patient:
    a. The primary key (PatientID) uniquely identifies each patient.
    b. All attributes (Name, Age, Gender) depend on the entire primary key, not just a part of it.
2. BloodGroup:
    a. The primary key (BloodTypeID) uniquely identifies each blood group.
    b. BloodType depends on the entire primary key.
3. InsuranceProvider:
    a. The primary key (InsuranceProviderID) uniquely identifies each provider for each patient.
    b. PatientID (foreign key) depends on the whole primary key (ensures a provider is associated with a specific patient).
    c. InsuranceProviderName depends on the whole primary key (indirectly through PatientID).
4. Admission:
    a. AdmissionID uniquely identifies each admission record.
    b. All foreign keys (PatientID, DoctorID, HospitalID, MedicationID) depend on the entire AdmissionID, not just PatientID.
5. AdmissionType:
    a. AdmissionType depends on the Admission (via AdmissionID as foreign key). The dependency chain goes through the entire AdmissionID for AdmissionType to be valid.
6. Billing:
    a. The primary key (BillingID) uniquely identifies each billing record.
    b. AdmissionID (foreign key) depends on the whole primary key (ensures a billing is associated with a specific admission).
7. TestResult:
    a. The foreign key (AdmissionID) depends on the whole primary key of Admission (assuming Admission is in BCNF).
8. Hospital:
    a. The primary key (HospitalID) uniquely identifies each hospital.
    b. HospitalName depends on the whole primary key.
9. Room:
    a. The primary key (RoomID) uniquely identifies each room.
    b. HospitalID (foreign key) depends on the whole primary key (ensures a room belongs to a specific hospital).
10. Doctor:
    a. DoctorID uniquely identifies each doctor.

    b. Since a doctor can only work in one hospital (assumption according to the dataset), HospitalID directly depends on the entire DoctorID (no partial dependency on PatientID from Admission).
11. Medication:
    a. MedicationID uniquely identifies each medication.
    b. DiagnosisID (foreign key) as a foreign key referencing the Diagnosis table. Since a medication is specific to a diagnosis (assumption according to the dataset), DiagnosisID directly depends on the entire MedicationID (no partial dependency on PatientID from Admission).
12. Diagnosis:
    a. The primary key (DiagnosisID) uniquely identifies each diagnosis.
    b. MedicalCondition depends on the whole primary key.
13. DiagAdm (Associative Entity):
    a. By definition, an associative entity has a composite primary key that uniquely identifies each relationship between the participating entities (Admission and Diagnosis in this case).

Here are all the relations (in BCNF) form:

1. Patient:
    a. PatientID (Primary Key)
    b. BloodTypeID (Foreign Key references BloodGroup)
    c. Name
    d. Age
    e. Gender
2. BloodGroup:
    a. BloodTypeID (Primary Key)
    b. BloodType
3. InsuranceProvider:
    a. InsuranceProviderID (Primary Key)
    b. PatientID (Foreign Key references Patient)
    c. InsuranceProviderName
4. Admission:
    a. AdmissionID (Primary Key)
    b. PatientID (Foreign Key references Patient)
    c. DoctorID (Foreign Key references Doctor)
    d. HospitalID (Foreign Key references Hospital)
    e. MedicationID (Foreign Key references Medication)
    f. AdmissionDate
    g. DischargeDate
5. AdmissionType:
    a. AdmissionTypeID (Primary Key)
    b. AdmissionID (Foreign Key references Admission)

    c. AdmissionType (Emergency, Elective, Urgent)
6. Billing:
    a. BillingID (Primary Key)
    b. AdmissionID (Foreign Key references Admission)
    c. BillingAmount
7. TestResult:
    a. AdmissionID (Foreign Key references Admission)
    b. TestResults
8. Hospital:
    a. HospitalID (Primary Key)
    b. HospitalName
9. Room:
    a. RoomID (Primary Key)
    b. HospitalID (Foreign Key references Hospital)
    c. RoomNumber
10. Doctor:
    a. DoctorID (Primary Key)
    b. HospitalID (Foreign Key references Hospital)
    c. DoctorName
11. Medication:
    a. MedicationID (Primary Key)
    b. DiagnosisID (Foreign Key references Diagnosis)
    c. MedicineName
12. Diagnosis:
    a. DiagnosisID (Primary Key)
    b. MedicalCondition
13. DiagAdm (Associative Entity):
    a. AdmissionID (Foreign Key references Admission) – Primary Key part 1
    b. DiagnosisID (Foreign Key references Diagnosis) – Primary Key part 2

PART – 3

Functionalities and their corresponding screenshots are as follows:

1. **Insert a new patient:**
   INSERT INTO BloodGroup (BloodType) VALUES ({blood_type}) RETURNING BloodTypeID;
   INSERT INTO Patient (Name, Age, Gender, BloodTypeID) VALUES ({name}, {age}, {gender}, {bloodtype_id}) RETURNING PatientID;
   INSERT INTO InsuranceProvider (PatientID, InsuranceProviderName) VALUES ({patient_id}, {insurance_provider});
   INSERT INTO Hospital (HospitalName) VALUES ({hospital}) RETURNING HospitalID;
   INSERT INTO Room (HospitalID, RoomNumber) VALUES ({hospital_id}, {room_number});
   INSERT INTO Doctor (HospitalID, DoctorName) VALUES ({hospital_id}, {doctor}) RETURNING DoctorID;
   INSERT INTO Diagnosis (MedicalCondition) VALUES ({medical_condition}) RETURNING DiagnosisID;
   INSERT INTO Medication (DiagnosisID, MedicineName) VALUES ({diagnosis_id}, {medication}) RETURNING MedicationID;
   INSERT INTO Admission (PatientID, DoctorID, HospitalID, MedicationID, AdmissionDate, DischargeDate) VALUES ({patient_id}, {doctor_id}, {hospital_id}, {medication_id}, {admission_date}, {discharge_date}) RETURNING AdmissionID;
   INSERT INTO AdmissionType (AdmissionID, AdmissionType) VALUES ({admission_id}, {admission_type});
   INSERT INTO Billing (AdmissionID, BillingAmount) VALUES ({admission_id}, {billing_amount});
   INSERT INTO TestResult (AdmissionID, TestResults) VALUES ({admission_id}, {test_results});
   INSERT INTO DiagAdm (AdmissionID, DiagnosisID) VALUES ({admission_id}, {diagnosis_id});

   Screenshot below:

```
Welcome to the Hospital Management System!
1. Insert a new patient
2. Delete the expired insurance on file for a patient
3. Update the billing amount for a patient
4. Search for patients by the doctor assigned to them
5. Aggregate Functions on Patient table
6. Sorts patients by age in descending order
7. Joins Patients and Admission tables for emergency admissions with O- blood type
8. Groups patients based on user-specified columns
9. Finds patients who have been admitted more than once using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 1
Enter Name: Harshit Jain
Enter Age: 20
Enter Gender: Male
Enter Blood Type: A+
Enter Medical Condition (optional): Lower Back Pain
Enter Date of Admission (MM/DD/YYYY): 03/20/2024
Enter Admission Type: Elective
Enter Doctor Name (optional): Jake Cole
Enter Hospital Name: Hospital ABC Inc.
Enter Insurance Provider (optional): UnitedHealthCareSR
Enter Room Number (optional): 202
Enter Discharge Date (MM/DD/YYYY) (optional): 04/01/2024
Enter Medication (optional): Yoga
Enter Test Results (optional): Normal
Enter Billing Amount (optional): 1200
New patient added successfully!
```

```
project=# SELECT * FROM Patient WHERE name = 'Harshit Jain';
 patientid |     name     | age | gender | bloodtypeid
-----------+--------------+-----+--------+-------------
     10004 | Harshit Jain |  20 | Male   |           5
(1 row)
```

2. **Delete the expired insurance on file for a patient**

   DELETE FROM InsuranceProvider WHERE PatientID = {patient_id};

```
project=# SELECT * FROM InsuranceProvider WHERE PatientID = 10004;
 insuranceproviderid | patientid | insuranceprovidername
---------------------+-----------+-----------------------
               10002 |     10004 | UnitedHealthCareSR
(1 row)
```

```
Welcome to the Hospital Management System!
1. Insert a new patient
2. Delete the expired insurance on file for a patient
3. Update the billing amount for a patient
4. Search for patients by the doctor assigned to them
5. Aggregate Functions on Patient table
6. Sorts patients by age in descending order
7. Joins Patients and Admission tables for emergency admissions with O- blood type
8. Groups patients based on user-specified columns
9. Finds patients who have been admitted more than once using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 2
Enter the Patient ID: 10004
Insurance provider for Patient ID 10004 deleted successfully!
```

```
project=# SELECT * FROM InsuranceProvider WHERE PatientID = 10004;
 insuranceproviderid | patientid | insuranceprovidername
---------------------+-----------+-----------------------
(0 rows)
```

3. **Update the billing amount for a patient**
   UPDATE Billing SET BillingAmount = {new_billing_amount}
   WHERE AdmissionID = {admission_id}

```
Welcome to the Hospital Management System!
1. Insert a new patient
2. Delete the expired insurance on file for a patient
3. Update the billing amount for a patient
4. Search for patients by the doctor assigned to them
5. Aggregate Functions on Patient table
6. Sorts patients by age in descending order
7. Joins Patients and Admission tables for emergency admissions with O- blood type
8. Groups patients based on user-specified columns
9. Finds patients who have been admitted more than once using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 3
Enter the Admission ID: 10003
Enter the new Billing Amount: 1300
Billing amount for Admission ID 10003 updated successfully!
```

```
project=# SELECT * FROM Billing WHERE AdmissionID = 10003;
 billingid | admissionid | billingamount
-----------+-------------+---------------
     10003 |       10003 |       1300.00
(1 row)
```

4. **Search for patients by the doctor assigned to them**

SELECT Admission.PatientID, Name, AdmissionID, Admission.DoctorID, DoctorName, AdmissionDate, DischargeDate
FROM Admission
JOIN Patient ON Admission.PatientID = Patient.PatientID
JOIN Doctor ON Admission.DoctorID = Doctor.DoctorID
WHERE Doctor.DoctorName LIKE '%{doctor_name}%'

```
Welcome to the Hospital Management System!
1. Insert a new patient
2. Delete the expired insurance on file for a patient
3. Update the billing amount for a patient
4. Search for patients by the doctor assigned to them
5. Aggregate Functions on Patient table
6. Sorts patients by age in descending order
7. Joins Patients and Admission tables for emergency admissions with O- blood type
8. Groups patients based on user-specified columns
9. Finds patients who have been admitted more than once using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 4
Enter the doctor's full name: Jake Cole

Search results for patients:
 patientid        name  admissionid  doctorid doctorname admissiondate dischargedate
     10004 Harshit Jain        10003     10004  Jake Cole    2024-03-20    2024-04-01
```

5. **Aggregate Functions on Patient table**

SELECT COUNT(*) FROM Patient;

```
Welcome to the Hospital Management System!
1. Insert a new patient
2. Delete the expired insurance on file for a patient
3. Update the billing amount for a patient
4. Search for patients by the doctor assigned to them
5. Aggregate Functions on Patient table
6. Sorts patients by age in descending order
7. Joins Patients and Admission tables for emergency admissions with O- blood type
8. Groups patients based on user-specified columns
9. Finds patients who have been admitted more than once using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 5
1. Count Total Patients
2. Find Average Age of Patients
Enter your choice (1-2): 1
Total Patients: 10001
```

SELECT AVG(Age) FROM Patient;

```
Welcome to the Hospital Management System!
1. Insert a new patient
2. Delete the expired insurance on file for a patient
3. Update the billing amount for a patient
4. Search for patients by the doctor assigned to them
5. Aggregate Functions on Patient table
6. Sorts patients by age in descending order
7. Joins Patients and Admission tables for emergency admissions with O- blood type
8. Groups patients based on user-specified columns
9. Finds patients who have been admitted more than once using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 5
1. Count Total Patients
2. Find Average Age of Patients
Enter your choice (1-2): 2
Average Patient Age: 51.4490550944905509
```

6. **Sorts patients by age in descending order**

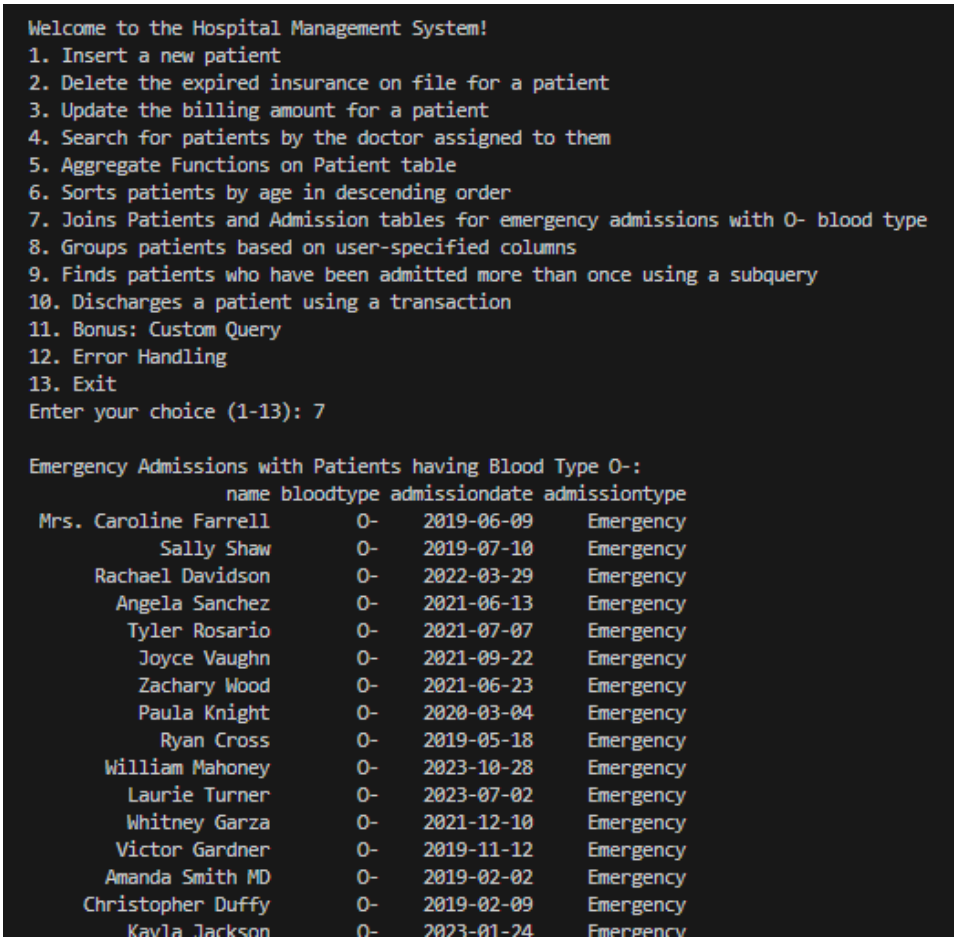
SELECT * FROM Patient ORDER BY Age DESC;

```
Welcome to the Hospital Management System!
1. Insert a new patient
2. Delete the expired insurance on file for a patient
3. Update the billing amount for a patient
4. Search for patients by the doctor assigned to them
5. Aggregate Functions on Patient table
6. Sorts patients by age in descending order
7. Joins Patients and Admission tables for emergency admissions with O- blood type
8. Groups patients based on user-specified columns
9. Finds patients who have been admitted more than once using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 6

Patients Sorted by Age (Descending):
 patientid                  name  age gender  bloodtypeid
      3933          Scott Underwood   85 Female           6
       997          Joshua Phillips   85   Male           3
      4399            George Steele   85 Female           1
      5265             Robert Bates   85   Male           2
       107            Amber Solomon   85   Male           5
      6812             Craig Bryant   85 Female           2
      7383            Thomas Bishop   85 Female           3
      9671            Yesenia Marks   85 Female           5
      9665             George Smith   85 Female           6
      1964             Craig Jensen   85   Male           4
      1316          Gregory Russell   85 Female           4
      6540           Joseph Stevens   85 Female           8
      6835             Tabitha Gray   85 Female           7
      5737               Todd Cross   85 Female           2
      5188          Michael Harding   85   Male           1
      2802            Lisa Ferguson   85 Female           5
      6935            James Richard   85   Male           1
```

7. **Joins Patients and Admission tables for emergency admissions with O- blood type**

```
SELECT P.Name, BG.BloodType, A.AdmissionDate, AT.AdmissionType
FROM Patient P
INNER JOIN Admission A ON P.PatientID = A.PatientID
INNER JOIN AdmissionType AT ON A.AdmissionID = AT.AdmissionID
INNER JOIN BloodGroup BG ON P.BloodTypeID = BG.BloodTypeID
WHERE AT.AdmissionType = 'Emergency' AND BG.BloodType = 'O-';
```



```
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1. Insert a new patient
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4. Search for patients by the doctor assigned to them
5. Aggregate Functions on Patient table
6. Sorts patients by age in descending order
7. Joins Patients and Admission tables for emergency admissions with O- blood type
8. Groups patients based on user-specified columns
9. Finds patients who have been admitted more than once using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 7

Emergency Admissions with Patients having Blood Type O-:
                name bloodtype admissiondate admissiontype
 Mrs. Caroline Farrell        O-    2019-06-09     Emergency
           Sally Shaw         O-    2019-07-10     Emergency
      Rachael Davidson        O-    2022-03-29     Emergency
        Angela Sanchez        O-    2021-06-13     Emergency
         Tyler Rosario        O-    2021-07-07     Emergency
          Joyce Vaughn        O-    2021-09-22     Emergency
          Zachary Wood        O-    2021-06-23     Emergency
          Paula Knight        O-    2020-03-04     Emergency
            Ryan Cross        O-    2019-05-18     Emergency
       William Mahoney        O-    2023-10-28     Emergency
         Laurie Turner        O-    2023-07-02     Emergency
         Whitney Garza        O-    2021-12-10     Emergency
         Victor Gardner       O-    2019-11-12     Emergency
       Amanda Smith MD        O-    2019-02-02     Emergency
     Christopher Duffy        O-    2019-02-09     Emergency
          Kayla Jackson       O-    2023-01-24     Emergency
```

8. **Groups patients based on user-specified columns**

```
SELECT AVG(P.Age), P.{column} FROM Patient P GROUP BY {column};
```

```
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9. Finds patients who have been admitted more than once using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 8
Enter the column to group by: BloodTypeID

Grouping results:
                avg  bloodtypeid
52.2290996784565916            8
50.7552504038772213            7
51.1382636655948553            1
52.1143317230273752            5
51.3529411764705882            4
51.3990384615384615            2
51.7623529411764706            6
50.8362619808306709            3
```

```
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11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 8
Enter the column to group by: Gender

Grouping results:
               avg gender
51.6084729064039409 Female
51.2848152659358506   Male
```

9. **Finds patients with a length of stay exceeding a threshold using a subquery**
   subquery = SELECT PatientID, AdmissionDate, DischargeDate, (DischargeDate - AdmissionDate) AS LengthOfStay FROM Admission;
   query = SELECT P.PatientID, P.Name, Stay.AdmissionDate, Stay.DischargeDate, Stay.LengthOfStay
   FROM Patient P
   INNER JOIN ({subquery}) AS Stay ON P.PatientID = Stay.PatientID
   WHERE Stay.LengthOfStay > {threshold_days};

```
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11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 9
Enter the minimum threshold for length of stay (in days): 28

Patients with average length of stay exceeding 28 days:
 patientid                    name admissiondate dischargedate  lengthofstay
         6               Chad Byrd    2019-01-09    2019-02-08            30
        24         William Johnson    2023-02-25    2023-03-27            30
        28          Beverly Miller    2022-08-05    2022-09-03            29
        54          Dylan Mcknight    2019-06-14    2019-07-13            29
        85        Douglas Crawford    2023-08-16    2023-09-15            30
        87         Kimberly Vargas    2018-12-28    2019-01-27            30
        88           Travis Walker    2019-01-12    2019-02-11            30
        95             Ariel Davis    2021-10-23    2021-11-21            29
        96            Joyce Vaughn    2021-09-22    2021-10-22            30
       100            Steven Boyer    2020-12-10    2021-01-09            30
       104              Paul Greer    2020-10-05    2020-11-03            29
       106             Scott Adams    2022-10-31    2022-11-29            29
       108            Jacob Howell    2019-08-25    2019-09-23            29
       110              Kurt Sloan    2022-06-14    2022-07-13            29
       118             Susan Mills    2020-03-08    2020-04-06            29
       119           Kelly Manning    2019-06-21    2019-07-20            29
```

10. Discharges a patient using a transaction

BEGIN TRANSACTION;
SELECT * FROM Admission WHERE PatientID = {patient_id} AND DischargeDate IS NULL;
UPDATE Admission SET DischargeDate = {discharge_date} WHERE AdmissionID = {active_admission[0]};
COMMIT/ROLLBACK;

a. DischargeDate is NULL. That means, it's an active admission.

```
project=# SELECT * FROM Admission WHERE PatientID = 10004;
 admissionid | patientid | doctorid | hospitalid | medicationid | admissiondate | dischargedate
-------------+-----------+----------+------------+--------------+---------------+---------------
       10003 |     10004 |    10004 |       8643 |        10004 | 2024-03-20    |
(1 row)
```

b. Patient is discharged and DischargeDate has been updated to the current date.

```
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9. Finds patients with a length of stay exceeding a threshold using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 10
Enter Patient ID: 10004
Patient ID 10004 discharged successfully!
```

c. DischargeDate updated (COMMIT) in the database.

```
project=# SELECT * FROM Admission WHERE PatientID = 10004;
 admissionid | patientid | doctorid | hospitalid | medicationid | admissiondate | dischargedate
-------------+-----------+----------+------------+--------------+---------------+---------------
       10003 |     10004 |    10004 |       8643 |        10004 | 2024-03-20    | 2024-04-19
(1 row)
```

d. Since the patient is successfully discharged and that patient is no longer having an active admission, the transaction will ROLLBACK if ran again.

```
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7. Joins Patients and Admission tables for emergency admissions with O- blood type
8. Groups patients based on user-specified columns
9. Finds patients with a length of stay exceeding a threshold using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 10
Enter Patient ID: 10004
An error occurred: Patient not found or has no active admission.
Transaction rolled back.
```

11. **Bonus: Custom Query**

Here, the user can enter any additional query they would like.

```
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8. Groups patients based on user-specified columns
9. Finds patients with a length of stay exceeding a threshold using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13): 11
Enter your desired SQL query:
> SELECT * FROM BloodGroup;

Query Results:
 bloodtypeid bloodtype
           1        O-
           2        O+
           3        B-
           4       AB+
           5        A+
           6       AB-
           7        A-
           8        B+
```

PART – 4

CLI Interface

```
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8. Groups patients based on user-specified columns
9. Finds patients with a length of stay exceeding a threshold using a subquery
10. Discharges a patient using a transaction
11. Bonus: Custom Query
12. Error Handling
13. Exit
Enter your choice (1-13):
```