Blood bank management system

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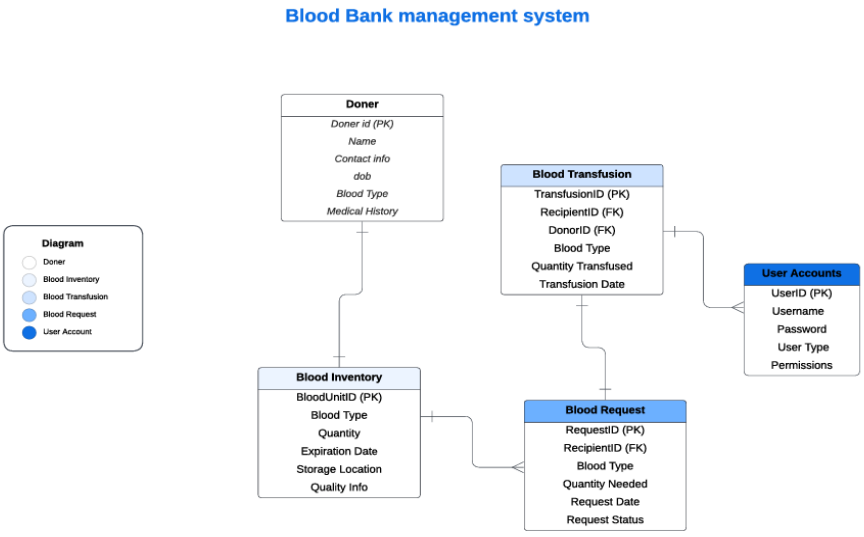
Blood Management System

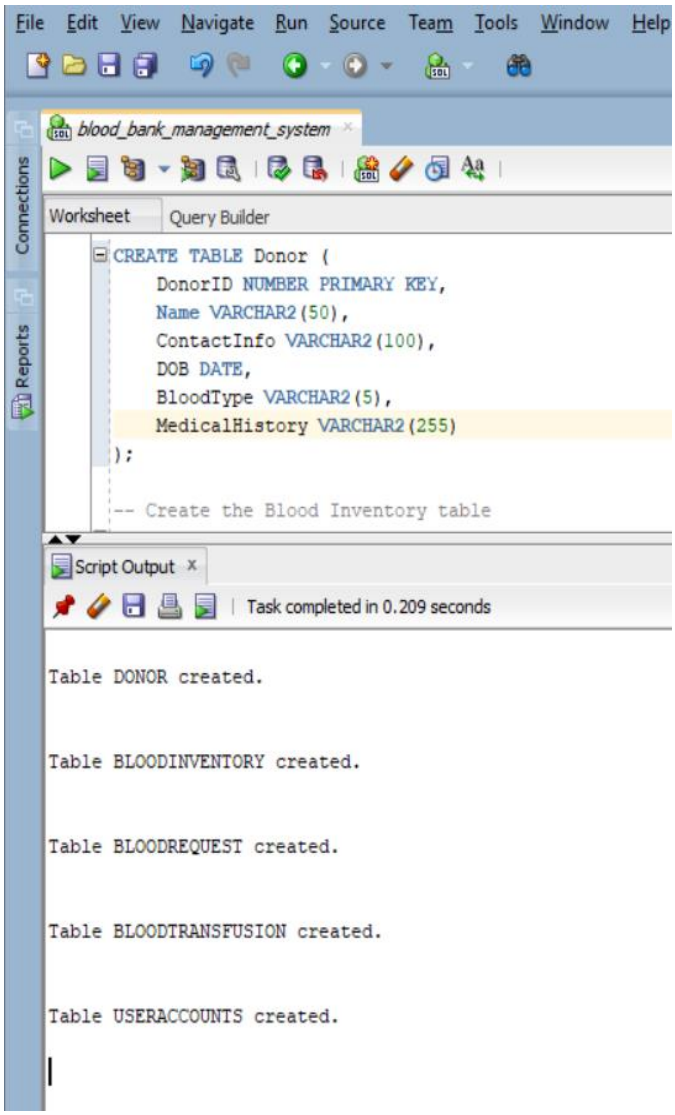
1. **Donor Table**: This is crucial because it contains information about blood donors, which is the primary source of blood donations. It includes essential details like donor ID, blood type, and medical history.
2. **Blood Inventory Table**: This table is central to managing blood supply. It tracks the availability and status of blood units, including blood type, quantity, and expiration date. Ensuring an accurate and up-to-date inventory is vital for effective blood management.
3. **Blood Request Table**: This table is essential for tracking and fulfilling requests for blood units. It contains information about recipients, the blood type needed, and the quantity required.
4. **Blood Transfusion Table**: This table records information about each blood transfusion, including recipient details, blood type, and quantity. Tracking transfusions is critical for monitoring patient care and ensuring the correct blood is used.
5. **User Accounts Table**: User accounts are vital for authentication, access control, and accountability in the system. This table manages information about system users, including administrators, staff, and recipients.

ER diagram:



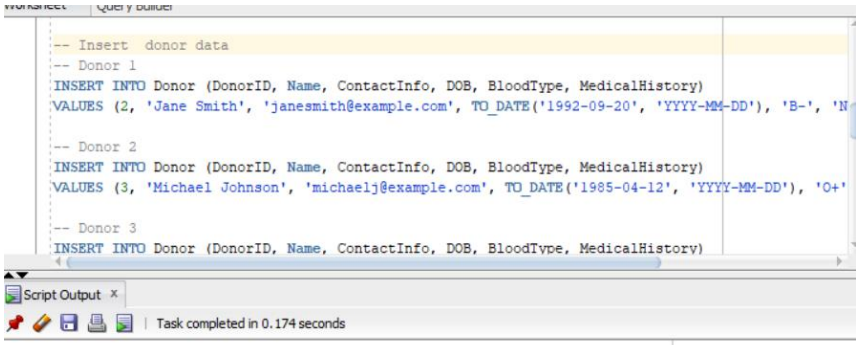
ORACLE_SQLDEVELOPER

```
CREATE TABLE Donor (
    DonorID NUMBER PRIMARY KEY,
    Name VARCHAR2(50),
    ContactInfo VARCHAR2(100),
    DOB DATE,
    BloodType VARCHAR2(5),
    MedicalHistory VARCHAR2(255)
);
CREATE TABLE BloodInventory (
    BloodUnitID NUMBER PRIMARY KEY,
    BloodType VARCHAR2(5),
    Quantity NUMBER,
    ExpirationDate DATE,
    StorageLocation VARCHAR2(100),
    QualityInfo VARCHAR2(255)
);
CREATE TABLE BloodRequest (
    RequestID NUMBER PRIMARY KEY,
    RecipientID NUMBER, -- Foreign key to Recipient table
    BloodType VARCHAR2(5),
    QuantityNeeded NUMBER,
    RequestDate DATE,
    RequestStatus VARCHAR2(20)
);
CREATE TABLE BloodTransfusion (
    TransfusionID NUMBER PRIMARY KEY,
    RecipientID NUMBER, -- Foreign key to Recipient table
    DonorID NUMBER,     -- Foreign key to Donor table
    BloodType VARCHAR2(5),
    QuantityTransfused NUMBER,
    TransfusionDate DATE
);
CREATE TABLE UserAccounts (
    UserID NUMBER PRIMARY KEY,
    Username VARCHAR2(50),
    Password VARCHAR2(255), -- Securely hashed and salted
    UserType VARCHAR2(20),
    Permissions VARCHAR2(100)                 ):
```



-- Insert donor data

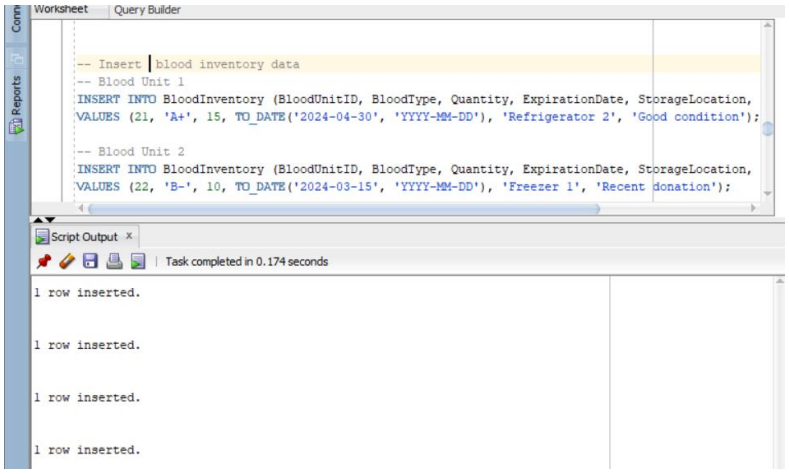
```
INSERT INTO Donor (DonorID, Name, ContactInfo, DOB, BloodType, MedicalHistory)
VALUES (2, 'Jane Smith', 'janesmith@example.com', TO_DATE('1992-09-20', 'YYYY-MM-DD'), 'B-', 'No known issues');
INSERT INTO Donor (DonorID, Name, ContactInfo, DOB, BloodType, MedicalHistory)
VALUES (3, 'Michael Johnson', 'michaelj@example.com', TO_DATE('1985-04-12', 'YYYY-MM-DD'), 'O+', 'Regular blood dono
INSERT INTO Donor (DonorID, Name, ContactInfo, DOB, BloodType, MedicalHistory)
VALUES (4, 'Sara Davis', 'saradavis@example.com', TO_DATE('1990-08-05', 'YYYY-MM-DD'), 'A-', 'Allergic to penicillin');
INSERT INTO Donor (DonorID, Name, ContactInfo, DOB, BloodType, MedicalHistory)
VALUES (5, 'Robert Wilson', 'robertwilson@example.com', TO_DATE('1993-02-28', 'YYYY-MM-DD'), 'AB+', 'No known issues');
INSERT INTO Donor (DonorID, Name, ContactInfo, DOB, BloodType, MedicalHistory)
VALUES (6, 'Emily Clark', 'emilyc@example.com', TO_DATE('1988-11-15', 'YYYY-MM-DD'), 'B+', 'Previous blood transfusion');
INSERT INTO Donor (DonorID, Name, ContactInfo, DOB, BloodType, MedicalHistory)
VALUES (7, 'David Lee', 'davidlee@example.com', TO_DATE('1979-07-03', 'YYYY-MM-DD'), 'O-', 'Diabetic, controlled');
INSERT INTO Donor (DonorID, Name, ContactInfo, DOB, BloodType, MedicalHistory)
VALUES (8, 'Olivia Brown', 'oliviab@example.com', TO_DATE('1995-03-22', 'YYYY-MM-DD'), 'A+', 'No known issues');
INSERT INTO Donor (DonorID, Name, ContactInfo, DOB, BloodType, MedicalHistory)
VALUES (9, 'William White', 'williamwhite@example.com', TO_DATE('1982-06-10', 'YYYY-MM-DD'), 'B-', 'High blood pressure');
INSERT INTO Donor (DonorID, Name, ContactInfo, DOB, BloodType, MedicalHistory)
VALUES (10, 'Sophia Hall', 'sophiah@example.com', TO_DATE('1989-12-01', 'YYYY-MM-DD'), 'AB-', 'Asthma, mild');
INSERT INTO Donor (DonorID, Name, ContactInfo, DOB, BloodType, MedicalHistory)
VALUES (11, 'James Adams', 'jamesadams@example.com', TO_DATE('1975-01-19', 'YYYY-MM-DD'), 'O+', 'Regular blood donor');
```




```
1 row inserted.

1 row inserted.

1 row inserted.

1 row inserted.

1 row inserted.

1 row inserted.
```

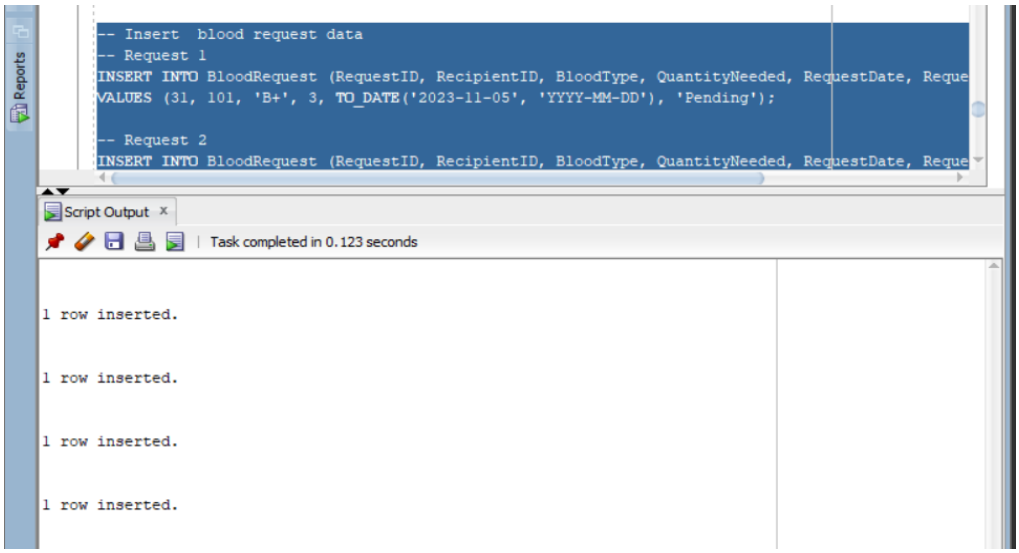
-- Insert blood inventory data

```
INSERT INTO BloodInventory (BloodUnitID, BloodType, Quantity, ExpirationDate, StorageLocation, QualityInfo)
VALUES (21, 'A+', 15, TO_DATE('2024-04-30', 'YYYY-MM-DD'), 'Refrigerator 2', 'Good condition');
INSERT INTO BloodInventory (BloodUnitID, BloodType, Quantity, ExpirationDate, StorageLocation, QualityInfo)
VALUES (22, 'B-', 10, TO_DATE('2024-03-15', 'YYYY-MM-DD'), 'Freezer 1', 'Recent donation');
INSERT INTO BloodInventory (BloodUnitID, BloodType, Quantity, ExpirationDate, StorageLocation, QualityInfo)
VALUES (23, 'O+', 20, TO_DATE('2024-04-20', 'YYYY-MM-DD'), 'Refrigerator 3', 'Good condition');
INSERT INTO BloodInventory (BloodUnitID, BloodType, Quantity, ExpirationDate, StorageLocation, QualityInfo)
VALUES (24, 'AB+', 8, TO_DATE('2024-03-10', 'YYYY-MM-DD'), 'Freezer 2', 'No known issues');
INSERT INTO BloodInventory (BloodUnitID, BloodType, Quantity, ExpirationDate, StorageLocation, QualityInfo)
VALUES (25, 'A-', 12, TO_DATE('2024-05-05', 'YYYY-MM-DD'), 'Refrigerator 1', 'Recent donation');
INSERT INTO BloodInventory (BloodUnitID, BloodType, Quantity, ExpirationDate, StorageLocation, QualityInfo)
VALUES (26, 'B+', 18, TO_DATE('2024-04-25', 'YYYY-MM-DD'), 'Freezer 3', 'No known issues');
INSERT INTO BloodInventory (BloodUnitID, BloodType, Quantity, ExpirationDate, StorageLocation, QualityInfo)
VALUES (27, 'O-', 25, TO_DATE('2024-05-10', 'YYYY-MM-DD'), 'Refrigerator 2', 'Good condition');
INSERT INTO BloodInventory (BloodUnitID, BloodType, Quantity, ExpirationDate, StorageLocation, QualityInfo)
VALUES (28, 'AB-', 6, TO_DATE('2024-04-15', 'YYYY-MM-DD'), 'Freezer 1', 'Previous transfusion');
INSERT INTO BloodInventory (BloodUnitID, BloodType, Quantity, ExpirationDate, StorageLocation, QualityInfo)
VALUES (29, 'A+', 14, TO_DATE('2024-05-02', 'YYYY-MM-DD'), 'Refrigerator 3', 'No known issues');
INSERT INTO BloodInventory (BloodUnitID, BloodType, Quantity, ExpirationDate, StorageLocation, QualityInfo)
VALUES (30, 'O+', 22, TO_DATE('2024-05-12', 'YYYY-MM-DD'), 'Refrigerator 1', 'Recent donation');
```



-- Insert blood request data

```
INSERT INTO BloodRequest (RequestID, RecipientID, BloodType, QuantityNeeded, RequestDate, RequestStatus)
VALUES (31, 101, 'B+', 3, TO_DATE('2023-11-05', 'YYYY-MM-DD'), 'Pending');
INSERT INTO BloodRequest (RequestID, RecipientID, BloodType, QuantityNeeded, RequestDate, RequestStatus)
VALUES (32, 102, 'O-', 2, TO_DATE('2023-10-18', 'YYYY-MM-DD'), 'Fulfilled');
INSERT INTO BloodRequest (RequestID, RecipientID, BloodType, QuantityNeeded, RequestDate, RequestStatus)
VALUES (33, 103, 'A+', 5, TO_DATE('2023-11-02', 'YYYY-MM-DD'), 'Pending');
INSERT INTO BloodRequest (RequestID, RecipientID, BloodType, QuantityNeeded, RequestDate, RequestStatus)
VALUES (34, 104, 'AB-', 1, TO_DATE('2023-10-20', 'YYYY-MM-DD'), 'Fulfilled');
INSERT INTO BloodRequest (RequestID, RecipientID, BloodType, QuantityNeeded, RequestDate, RequestStatus)
VALUES (35, 105, 'O+', 4, TO_DATE('2023-10-25', 'YYYY-MM-DD'), 'Fulfilled');
INSERT INTO BloodRequest (RequestID, RecipientID, BloodType, QuantityNeeded, RequestDate, RequestStatus)
VALUES (36, 106, 'B-', 2, TO_DATE('2023-10-22', 'YYYY-MM-DD'), 'Pending');
INSERT INTO BloodRequest (RequestID, RecipientID, BloodType, QuantityNeeded, RequestDate, RequestStatus)
VALUES (37, 107, 'A-', 3, TO_DATE('2023-10-29', 'YYYY-MM-DD'), 'Fulfilled');
INSERT INTO BloodRequest (RequestID, RecipientID, BloodType, QuantityNeeded, RequestDate, RequestStatus)
VALUES (38, 108, 'AB+', 2, TO_DATE('2023-11-01', 'YYYY-MM-DD'), 'Pending');
INSERT INTO BloodRequest (RequestID, RecipientID, BloodType, QuantityNeeded, RequestDate, RequestStatus)
VALUES (39, 109, 'O-', 4, TO_DATE('2023-10-23', 'YYYY-MM-DD'), 'Fulfilled');
INSERT INTO BloodRequest (RequestID, RecipientID, BloodType, QuantityNeeded, RequestDate, RequestStatus)
VALUES (40, 110, 'A+', 6, TO_DATE('2023-11-03', 'YYYY-MM-DD'), 'Pending');
```



-- Insert blood transfusion data

INSERT INTO BloodTransfusion (TransfusionID, RecipientID, DonorID, BloodType, QuantityTransfused, TransfusionDate)

VALUES (41, 101, 1, 'B+', 2, TO_DATE('2023-10-15', 'YYYY-MM-DD'));

INSERT INTO BloodTransfusion (TransfusionID, RecipientID, DonorID, BloodType, QuantityTransfused, TransfusionDate)

VALUES (42, 102, 3, 'O-', 1, TO_DATE('2023-10-18', 'YYYY-MM-DD'));

INSERT INTO BloodTransfusion (TransfusionID, RecipientID, DonorID, BloodType, QuantityTransfused, TransfusionDate)

VALUES (43, 103, 2, 'A+', 3, TO_DATE('2023-10-20', 'YYYY-MM-DD'));

INSERT INTO BloodTransfusion (TransfusionID, RecipientID, DonorID, BloodType, QuantityTransfused, TransfusionDate)

VALUES (44, 104, 5, 'AB-', 1, TO_DATE('2023-10-22', 'YYYY-MM-DD'));

INSERT INTO BloodTransfusion (TransfusionID, RecipientID, DonorID, BloodType, QuantityTransfused, TransfusionDate)

VALUES (45, 105, 4, 'O+', 2, TO_DATE('2023-10-25', 'YYYY-MM-DD'));

INSERT INTO BloodTransfusion (TransfusionID, RecipientID, DonorID, BloodType, QuantityTransfused, TransfusionDate)

VALUES (46, 106, 7, 'B-', 1, TO_DATE('2023-10-28', 'YYYY-MM-DD'));

INSERT INTO BloodTransfusion (TransfusionID, RecipientID, DonorID, BloodType, QuantityTransfused, TransfusionDate)

VALUES (47, 107, 9, 'A-', 2, TO_DATE('2023-10-30', 'YYYY-MM-DD'));

INSERT INTO BloodTransfusion (TransfusionID, RecipientID, DonorID, BloodType, QuantityTransfused, TransfusionDate)

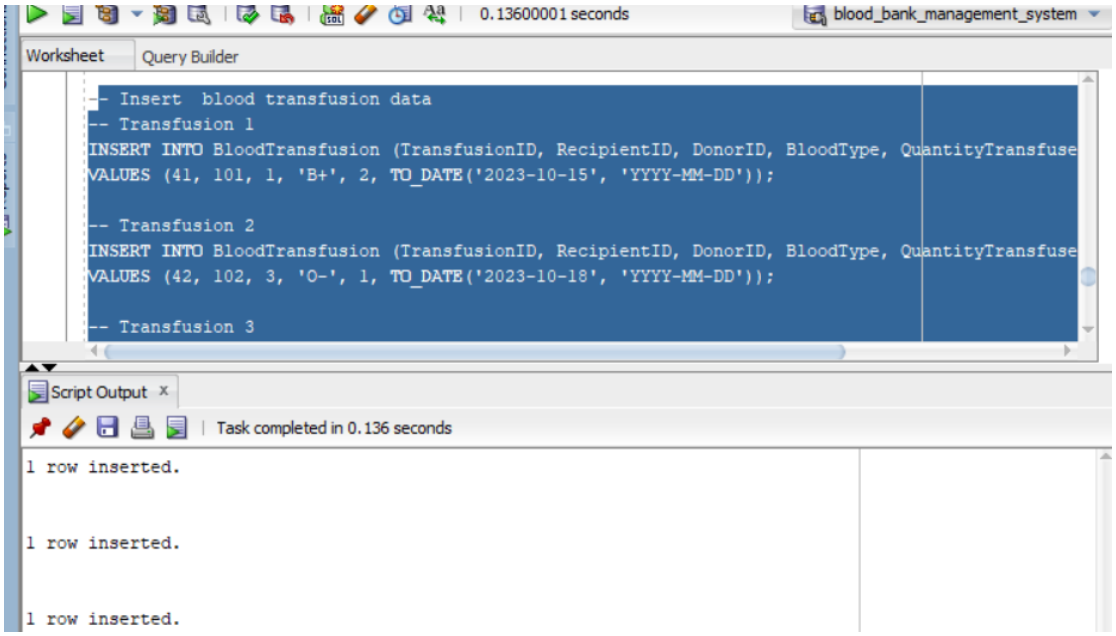
VALUES (48, 108, 6, 'AB+', 1, TO_DATE('2023-11-01', 'YYYY-MM-DD'));

INSERT INTO BloodTransfusion (TransfusionID, RecipientID, DonorID, BloodType, QuantityTransfused, TransfusionDate)

VALUES (49, 109, 8, 'O-', 3, TO_DATE('2023-11-03', 'YYYY-MM-DD'));

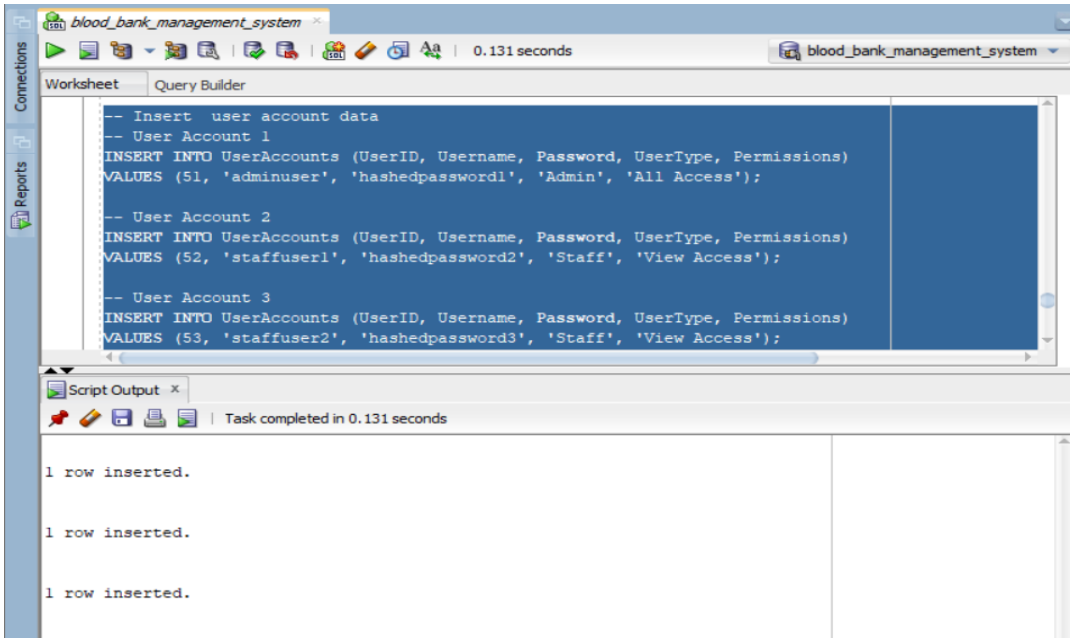
INSERT INTO BloodTransfusion (TransfusionID, RecipientID, DonorID, BloodType, QuantityTransfused, TransfusionDate)

VALUES (50, 110, 10, 'A+', 4, TO_DATE('2023-11-05', 'YYYY-MM-DD'));



-- Insert user account data

```
INSERT INTO UserAccounts (UserID, Username, Password, UserType, Permissions)
VALUES (51, 'adminuser', 'hashedpassword1', 'Admin', 'All Access');
INSERT INTO UserAccounts (UserID, Username, Password, UserType, Permissions)
VALUES (52, 'staffuser1', 'hashedpassword2', 'Staff', 'View Access');
INSERT INTO UserAccounts (UserID, Username, Password, UserType, Permissions)
VALUES (53, 'staffuser2', 'hashedpassword3', 'Staff', 'View Access');
INSERT INTO UserAccounts (UserID, Username, Password, UserType, Permissions)
VALUES (54, 'recipient1', 'hashedpassword4', 'Recipient', 'View Access');
INSERT INTO UserAccounts (UserID, Username, Password, UserType, Permissions)
VALUES (55, 'recipient2', 'hashedpassword5', 'Recipient', 'View Access');
INSERT INTO UserAccounts (UserID, Username, Password, UserType, Permissions)
VALUES (56, 'admin2', 'hashedpassword6', 'Admin', 'All Access');
INSERT INTO UserAccounts (UserID, Username, Password, UserType, Permissions)
VALUES (57, 'staff3', 'hashedpassword7', 'Staff', 'View Access');
INSERT INTO UserAccounts (UserID, Username, Password, UserType, Permissions)
VALUES (58, 'admin3', 'hashedpassword8', 'Admin', 'All Access');
INSERT INTO UserAccounts (UserID, Username, Password, UserType, Permissions)
VALUES (59, 'staff4', 'hashedpassword9', 'Staff', 'View Access');
INSERT INTO UserAccounts (UserID, Username, Password, UserType, Permissions)
VALUES (60, 'recipient3', 'hashedpassword10', 'Recipient', 'View Access');
```



List Donors with the Most Donations:

```
--List Donors with the Most Donations:

SELECT D.Name, COUNT(DT.DonorID) AS DonationCount
FROM Donor D
LEFT JOIN BloodTransfusion DT ON D.DonorID = DT.DonorID
GROUP BY D.Name
ORDER BY DonationCount DESC
FETCH FIRST 5 ROWS ONLY;
```

Script Output | Query Result

SQL | All Rows Fetched: 5 in 0.055 seconds

	NAME	DONATIONCOUNT
1	Michael Johnson	1
2	Jane Smith	1
3	David Lee	1
4	Sara Davis	1
5	Robert Wilson	1

Find Blood Units Close to Expiration

```
SELECT BloodUnitID, BloodType, ExpirationDate
FROM BloodInventory
WHERE ExpirationDate <= SYSDATE + 30
ORDER BY ExpirationDate;
```

Script Output | Query Result | Query Result 1

SQL | All Rows Fetched: 4 in 0.003 seconds

	BLOODUNITID	BLOODTYPE	EXPIRATIONDATE
1	27	O-	11-09-23
2	30	O+	11-09-23
3	29	A+	11-09-23
4	28	AB-	11-09-23

Calculate Average Quantity Transfused Per Blood Type:

```
--Calculate Average Quantity Transfused Per Blood Type:
SELECT BloodType, AVG(QuantityTransfused) AS AvgQuantityTransfused
FROM BloodTransfusion
GROUP BY BloodType;
```

Script Output | Query Result | Query Result 1

SQL | All Rows Fetched: 8 in 0.012 seconds

	BLOODTYPE	AVGQUANTITYTRANSFUSED
1	B+	2
2	O-	2
3	A+	3.5
4	AB-	1
5	O+	2
6	B-	1
7	A-	2
8	AB+	1

Retrieve the Ten Most Recent Blood Transfusions:

```
SELECT TransfusionID, RecipientID, DonorID, BloodType, QuantityTransfused, TransfusionDate
FROM BloodTransfusion
ORDER BY TransfusionDate DESC
FETCH FIRST 10 ROWS ONLY;
```

Script Output | Query Result | Query Result 1 | Query Result 2

SQL | All Rows Fetched: 10 in 0.01 seconds

	TRANSFUSIONID	RECIPIENTID	DONORID	BLOODTYPE	QUANTITYTRANSFUSED	TRANSFUSIONDATE
1	50	110	10	A+	4	05-11-23
2	49	109	8	O-	3	03-11-23
3	48	108	6	AB+	1	01-11-23
4	47	107	9	A-	2	30-10-23
5	46	106	7	B-	1	28-10-23
6	45	105	4	O+	2	25-10-23
7	44	104	5	AB-	1	22-10-23
8	43	103	2	A+	3	20-10-23
9	42	102	3	O-	1	18-10-23
10	41	101	1	B+	2	15-10-23

Find the Blood Type Most in Demand:

```
--Find the Blood Type Most in Demand:
SELECT BloodType, COUNT(*) AS RequestCount
FROM BloodRequest
GROUP BY BloodType
ORDER BY RequestCount DESC
FETCH FIRST 1 ROWS ONLY;
```

Script Output | Query Result | Query Result 1 | Query Result 2

SQL | All Rows Fetched: 1 in 0.01 seconds

	BLOODTYPE	REQUESTCOUNT
1	O-	2

Calculate the Recipient Satisfaction Rate:

Worksheet | Query Builder

```
--Calculate the Recipient Satisfaction Rate:

SELECT (COUNT(CASE WHEN BR.RequestStatus = 'Fulfilled' THEN 1 END) / COUNT(*)) * 100
AS SatisfactionRate
FROM BloodRequest BR;
```

Script Output | Query Result | Query Result 1 | Query Result 2 | Query Result 3

SQL | All Rows Fetched: 1 in 0.006 seconds

	SATISFACTIONRATE
1	50

MONGODB

1. **Donor Collection**:

db.createCollection("Donor");

2. **Blood Inventory Collection**:

db.createCollection("BloodInventory");

3. **Blood Request Collection**:

db.createCollection("BloodRequest");

4. **Blood Transfusion Collection**

db.createCollection("BloodTransfusion");

5. **User Accounts Collection**:

db.createCollection("UserAccounts");

```
test> use bloodrop
switched to db bloodrop
bloodrop> db.createCollection("Donor");
{ ok: 1 }
bloodrop> db.createCollection("BloodInventory");
{ ok: 1 }
bloodrop> db.createCollection("BloodRequest");
{ ok: 1 }
bloodrop> db.createCollection("BloodTransfusion");
{ ok: 1 }
bloodrop> db.createCollection("UserAccounts");
{ ok: 1 }
bloodrop>
```

INSERT VALUES

Donor

```
.. }
.. ,{
..   DonorID: 105,
..   Name: "Grace Turner",
..   ContactInfo: "grace@example.com",
..   DOB: ISODate("1993-11-30"),
..   BloodType: "O-",
..   MedicalHistory: "Previous blood transfusion"
.. }]);

 acknowledged: true,
 insertedIds: {
   '0': ObjectId("6526c5b5abc094866dddb374"),
   '1': ObjectId("6526c5b5abc094866dddb375"),
   '2': ObjectId("6526c5b5abc094866dddb376"),
   '3': ObjectId("6526c5b5abc094866dddb377")
 }
```

Blood inventory

```
...    QualityInfo: "No known issues"
... },{
...    BloodUnitID: 205,
...    BloodType: "A-",
...    Quantity: 12,
...    ExpirationDate: ISODate("2024-05-05"),
...    StorageLocation: "Refrigerator 2",
...    QualityInfo: "Recent donation"
... }]);
{
  acknowledged: true,
  insertedIds: {
    '0': ObjectId("6526c68cabc094866dddb378"),
    '1': ObjectId("6526c68cabc094866dddb379"),
    '2': ObjectId("6526c68cabc094866dddb37a"),
    '3': ObjectId("6526c68cabc094866dddb37b"),
    '4': ObjectId("6526c68cabc094866dddb37c")
  }
}
```

Blood Request

```
... },{
...    RequestID: 305,
...    RecipientID: 205,
...    BloodType: "O+",
...    QuantityNeeded: 4,
...    RequestDate: ISODate("2023-10-25"),
...    RequestStatus: "Fulfilled"
... }]);
{
  acknowledged: true,
  insertedIds: {
    '0': ObjectId("6526c765abc094866dddb37d"),
    '1': ObjectId("6526c765abc094866dddb37e"),
    '2': ObjectId("6526c765abc094866dddb37f"),
    '3': ObjectId("6526c765abc094866dddb380"),
    '4': ObjectId("6526c765abc094866dddb381")
  }
}
bloodrop>
```

Blood Transfusion

```
... ,{
...    TransfusionID: 405,
...    RecipientID: 305,
...    DonorID: 104,
...    BloodType: "O+",
...    QuantityTransfused: 2,
...    TransfusionDate: ISODate("2023-10-25")
... }]);
{
  acknowledged: true,
  insertedIds: {
    '0': ObjectId("6526c826abc094866dddb382"),
    '1': ObjectId("6526c826abc094866dddb383"),
    '2': ObjectId("6526c826abc094866dddb384"),
    '3': ObjectId("6526c826abc094866dddb385"),
    '4': ObjectId("6526c826abc094866dddb386")
  }
}
```

User Accounts

```
...    UserID: 505,
...    Username: "recipient2",
...    Password: "hashedpassword5",
...    UserType: "Recipient",
...    Permissions: "View Access"
... }])
{
  acknowledged: true,
  insertedIds: {
    '0': ObjectId("6526c994abc094866dddb387"),
    '1': ObjectId("6526c994abc094866dddb388"),
    '2': ObjectId("6526c994abc094866dddb389"),
    '3': ObjectId("6526c994abc094866dddb38a"),
    '4': ObjectId("6526c994abc094866dddb38b")
  }
}
```

List Donors and Their Recent Donations Sorted by Date

```
bloodrop> db.Donor.aggregate([ { $lookup: { from: "BloodTransfusion", localField: "
DonorID", foreignField: "DonorID", as: "donations" } }, { $unwind: "$donations" },
{ $sort: { "donations.TransfusionDate": -1 } }, { $group: { _id: "$DonorID", Name:
{ $first: "$Name" }, LastDonationDate: { $first: "$donations.TransfusionDate" } } }
]);
[
  {
    _id: 103,
    Name: 'Eva Martinez',
    LastDonationDate: ISODate("2023-10-18T00:00:00.000Z")
  },
  {
    _id: 105,
    Name: 'Grace Turner',
    LastDonationDate: ISODate("2023-10-22T00:00:00.000Z")
  },
  {
    _id: 102,
    Name: 'Bob Smith',
    LastDonationDate: ISODate("2023-10-20T00:00:00.000Z")
  },
  {
    _id: 104,
    Name: 'David Lee',
    LastDonationDate: ISODate("2023-10-25T00:00:00.000Z")
  },
  {
    _id: 101,
    Name: 'Alice Johnson',
    LastDonationDate: ISODate("2023-10-15T00:00:00.000Z")
  }
]
bloodrop>
```

Find Available Blood Units of a Specific Type and in Good Condition:

```
bloodrop> db.BloodInventory.find({
...   BloodType: "A+",
...   QualityInfo: "Good condition"
... });
[
  {
    _id: ObjectId("6526c68cabc094866dddb378"),
    BloodUnitID: 201,
    BloodType: 'A+',
    Quantity: 15,
    ExpirationDate: ISODate("2024-04-30T00:00:00.000Z"),
    StorageLocation: 'Refrigerator 1',
    QualityInfo: 'Good condition'
  }
]
bloodrop>
```

Calculate the Average Quantity Transfused Per Blood Type:

```
bloodrop> db.BloodTransfusion.aggregate([
..   {
..     $group: {
..       _id: "$BloodType",
..       AvgQuantityTransfused: { $avg: "$QuantityTransfused" }
..     }
..   }
.. ]);
[
  { _id: 'A+', AvgQuantityTransfused: 3 },
  { _id: 'O-', AvgQuantityTransfused: 1 },
  { _id: 'AB-', AvgQuantityTransfused: 1 },
  { _id: 'B+', AvgQuantityTransfused: 2 },
  { _id: 'O+', AvgQuantityTransfused: 2 }
]
```

Neo4j

Create Donor Nodes:

```
CREATE (:Donor {
  DonorID: 3,
  Name: "Bob Smith",
  ContactInfo: "bob@example.com",
  DOB: date('1992-03-10'),
  BloodType: 'B+',
  MedicalHistory: 'No allergies'
});
```

Table

Added 1 label, created 1 node, set 6 properties, completed after 26 ms.

```
CREATE (:BloodInventory {
  BloodUnitID: 3,
  BloodType: 'B+',
  Quantity: 8,
  ExpirationDate: date('2023-12-15'),
  StorageLocation: 'Refrigerator 2',
  QualityInfo: 'No known issues'
});
```

Table

Added 1 label, created 1 node, set 6 properties, completed after 6 ms.

```
CREATE (:BloodRequest {
  RequestID: 2,
  RecipientID: 102,
  BloodType: 'A+',
  QuantityNeeded: 3,
  RequestDate: date('2023-10-12'),
  RequestStatus: 'Fulfilled'
});
```

Table

Added 1 label, created 1 node, set 6 properties, completed after 23 ms.

```
CREATE (:BloodTransfusion {
  TransfusionID: 3,
  RecipientID: 103,
  DonorID: 3,
  BloodType: 'O+',
  QuantityTransfused: 3,
  TransfusionDate: date('2023-10-20')
});
```

Table

Added 1 label, created 1 node, set 6 properties, completed after 19 ms.

```
CREATE (:Recipient {
  RecipientID: 103,
  Name: "Emily Clark",
  ContactInfo: "emily@example.com"
});
```

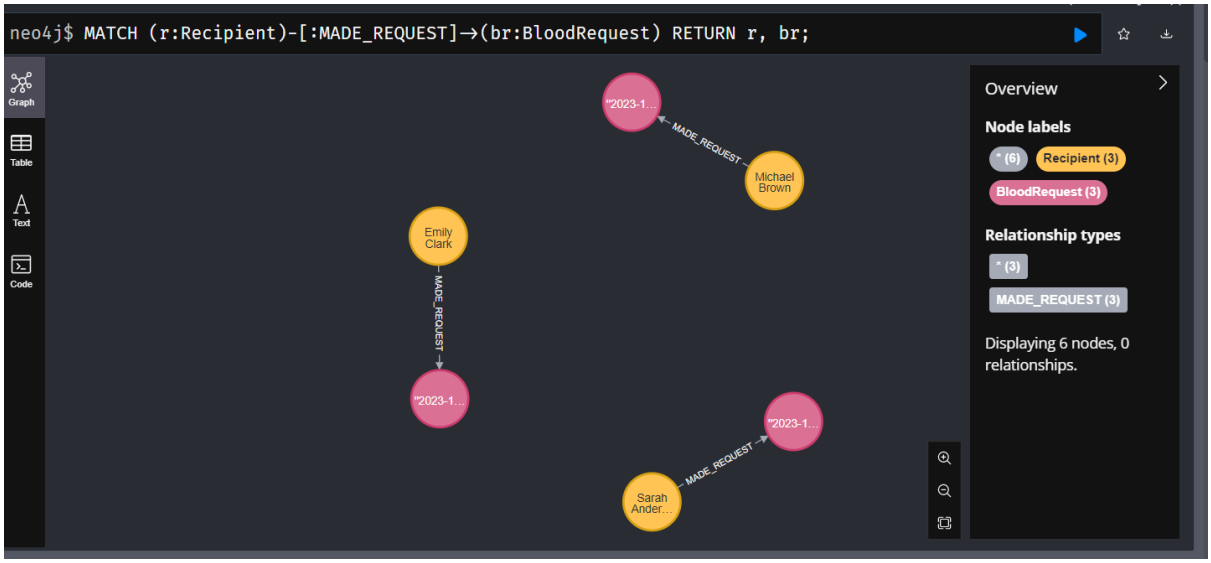
Table

Added 1 label, created 1 node, set 3 properties, completed after 16 ms.

```
MATCH (r1:Recipient {RecipientID: 101})
MATCH (br1:BloodRequest {RequestID: 1})
CREATE (r1)-[:MADE_REQUEST]→(br1);

MATCH (r2:Recipient {RecipientID: 102})
MATCH (br2:BloodRequest {RequestID: 2})
CREATE (r2)-[:MADE_REQUEST]→(br2);

MATCH (r3:Recipient {RecipientID: 103})
MATCH (br3:BloodRequest {RequestID: 3})
CREATE (r3)-[:MADE_REQUEST]→(br3);
```

```
neo4j$ MATCH (r1:Recipient {RecipientID: 101}) MATCH (br1:BloodReq…
neo4j$ MATCH (r2:Recipient {RecipientID: 102}) MATCH (br2:BloodReq…
neo4j$ MATCH (r3:Recipient {RecipientID: 103}) MATCH (br3:BloodReq…
```

NODE AND THEIR RELATIONSHIP



Identify Blood Units Expiring Soon:

MATCH (bi:BloodInventory)

WHERE bi.ExpirationDate <= date({year: 2023, month: 12, day: 31})

RETURN bi.BloodUnitID, bi.BloodType, bi.ExpirationDate

ORDER BY bi.ExpirationDate;4;

```
MATCH (bi:BloodInventory)
WHERE bi.ExpirationDate ⩽ date({year: 2023, month: 12, day: 31})
RETURN bi.BloodUnitID, bi.BloodType, bi.ExpirationDate
ORDER BY bi.ExpirationDate;
```

	bi.BloodUnitID	bi.BloodType	bi.ExpirationDate
1	2	"O-"	"2023-11-30"
2	3	"B+"	"2023-12-15"
3	3	"B+"	"2023-12-15"

Started streaming 3 records after 29 ms and completed after 52 ms.