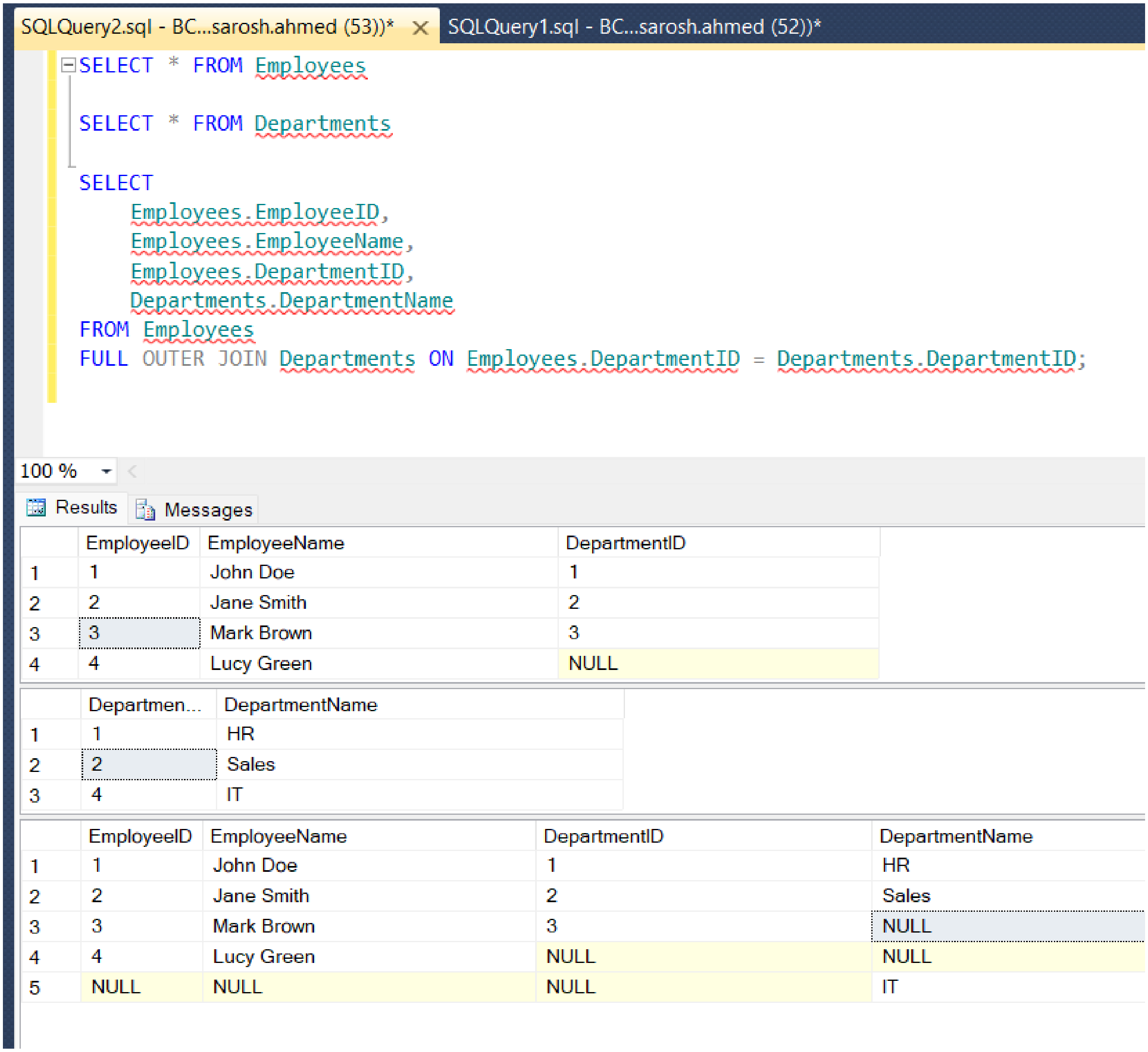
# FULL Outer Join

```
-- Create Employees Table
CREATE TABLE Employees (
    EmployeeID INT PRIMARY KEY,
    EmployeeName VARCHAR(100),
    DepartmentID INT
);

-- Insert Data into Employees Table
INSERT INTO Employees (EmployeeID, EmployeeName, DepartmentID) VALUES (1, 'John Doe', 1);
INSERT INTO Employees (EmployeeID, EmployeeName, DepartmentID) VALUES (2, 'Jane Smith',
2);
INSERT INTO Employees (EmployeeID, EmployeeName, DepartmentID) VALUES (3, 'Mark Brown',
3);
INSERT INTO Employees (EmployeeID, EmployeeName, DepartmentID) VALUES (4, 'Lucy Green',
NULL);

-- Create Departments Table
CREATE TABLE Departments (
    DepartmentID INT PRIMARY KEY,
    DepartmentName VARCHAR(100)
);

-- Insert Data into Departments Table
INSERT INTO Departments (DepartmentID, DepartmentName) VALUES (1, 'HR');
INSERT INTO Departments (DepartmentID, DepartmentName) VALUES (2, 'Sales');
INSERT INTO Departments (DepartmentID, DepartmentName) VALUES (4, 'IT');



SELECT * FROM Employees

SELECT * FROM Departments

SELECT
    Employees.EmployeeID,
    Employees.EmployeeName,
    Employees.DepartmentID,
    Departments.DepartmentName
FROM Employees
FULL OUTER JOIN Departments ON Employees.DepartmentID = Departments.DepartmentID;
```


SQLQuery2.sql - BC...sarosh.ahmed (53))*
SQLQuery1.sql - BC...sarosh.ahmed (52))*
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Results
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```sql
SELECT * FROM Employees

SELECT * FROM Departments

SELECT
    Employees.EmployeeID,
    Employees.EmployeeName,
    Employees.DepartmentID,
    Departments.DepartmentName
FROM Employees
FULL OUTER JOIN Departments ON Employees.DepartmentID = Departments.DepartmentID;
```

| | EmployeeID | EmployeeName | DepartmentID |
|---|---|---|---|
| 1 | 1 | John Doe | 1 |
| 2 | 2 | Jane Smith | 2 |
| 3 | 3 | Mark Brown | 3 |
| 4 | 4 | Lucy Green | NULL |

| | Departmen... | DepartmentName |
|---|---|---|
| 1 | 1 | HR |
| 2 | 2 | Sales |
| 3 | 4 | IT |

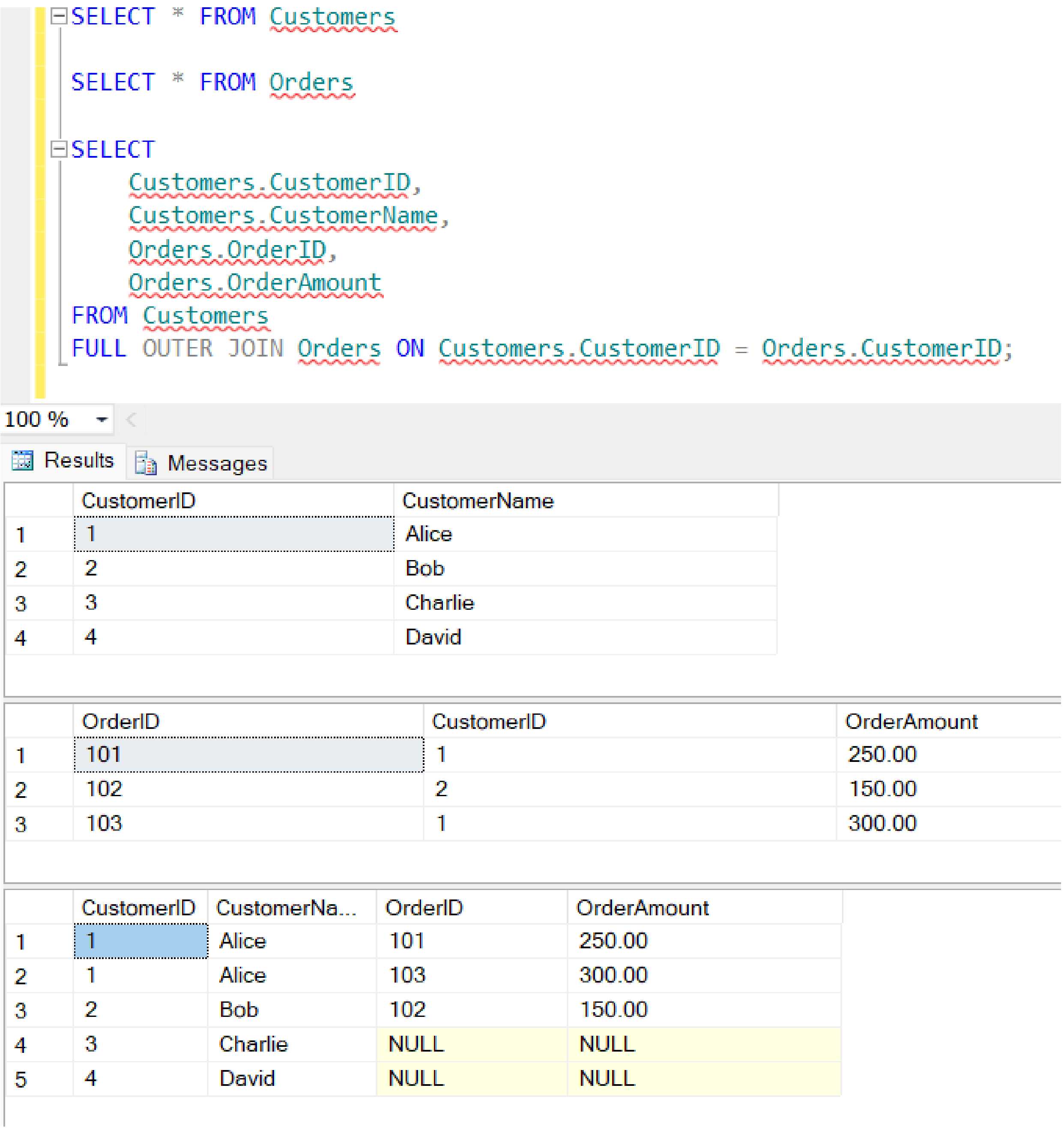
| | EmployeeID | EmployeeName | DepartmentID | DepartmentName |
|---|---|---|---|---|
| 1 | 1 | John Doe | 1 | HR |
| 2 | 2 | Jane Smith | 2 | Sales |
| 3 | 3 | Mark Brown | 3 | NULL |
| 4 | 4 | Lucy Green | NULL | NULL |
| 5 | NULL | NULL | NULL | IT |

```sql
-- Create Customers Table
CREATE TABLE Customers (
    CustomerID INT PRIMARY KEY,
    CustomerName VARCHAR(100)
);

-- Insert Data into Customers Table
INSERT INTO Customers (CustomerID, CustomerName) VALUES (1, 'Alice');
INSERT INTO Customers (CustomerID, CustomerName) VALUES (2, 'Bob');
INSERT INTO Customers (CustomerID, CustomerName) VALUES (3, 'Charlie');
INSERT INTO Customers (CustomerID, CustomerName) VALUES (4, 'David');
```

```
-- Create Orders Table
CREATE TABLE Orders (
    OrderID INT PRIMARY KEY,
    CustomerID INT,
    OrderAmount DECIMAL(10, 2),
    FOREIGN KEY (CustomerID) REFERENCES Customers(CustomerID)
);

-- Insert Data into Orders Table
INSERT INTO Orders (OrderID, CustomerID, OrderAmount) VALUES (101, 1, 250.00);
INSERT INTO Orders (OrderID, CustomerID, OrderAmount) VALUES (102, 2, 150.00);
INSERT INTO Orders (OrderID, CustomerID, OrderAmount) VALUES (103, 1, 300.00);
-- Removed the problematic insert statement with CustomerID 5
```



```sql
SELECT * FROM Customers

SELECT * FROM Orders

SELECT
    Customers.CustomerID,
    Customers.CustomerName,
    Orders.OrderID,
    Orders.OrderAmount
FROM Customers
FULL OUTER JOIN Orders ON Customers.CustomerID = Orders.CustomerID;
```

| | CustomerID | CustomerName |
|---|---|---|
| 1 | 1 | Alice |
| 2 | 2 | Bob |
| 3 | 3 | Charlie |
| 4 | 4 | David |

| | OrderID | CustomerID | OrderAmount |
|---|---|---|---|
| 1 | 101 | 1 | 250.00 |
| 2 | 102 | 2 | 150.00 |
| 3 | 103 | 1 | 300.00 |

| | CustomerID | CustomerNa... | OrderID | OrderAmount |
|---|---|---|---|---|
| 1 | 1 | Alice | 101 | 250.00 |
| 2 | 1 | Alice | 103 | 300.00 |
| 3 | 2 | Bob | 102 | 150.00 |
| 4 | 3 | Charlie | NULL | NULL |
| 5 | 4 | David | NULL | NULL |

## SELF JOIN

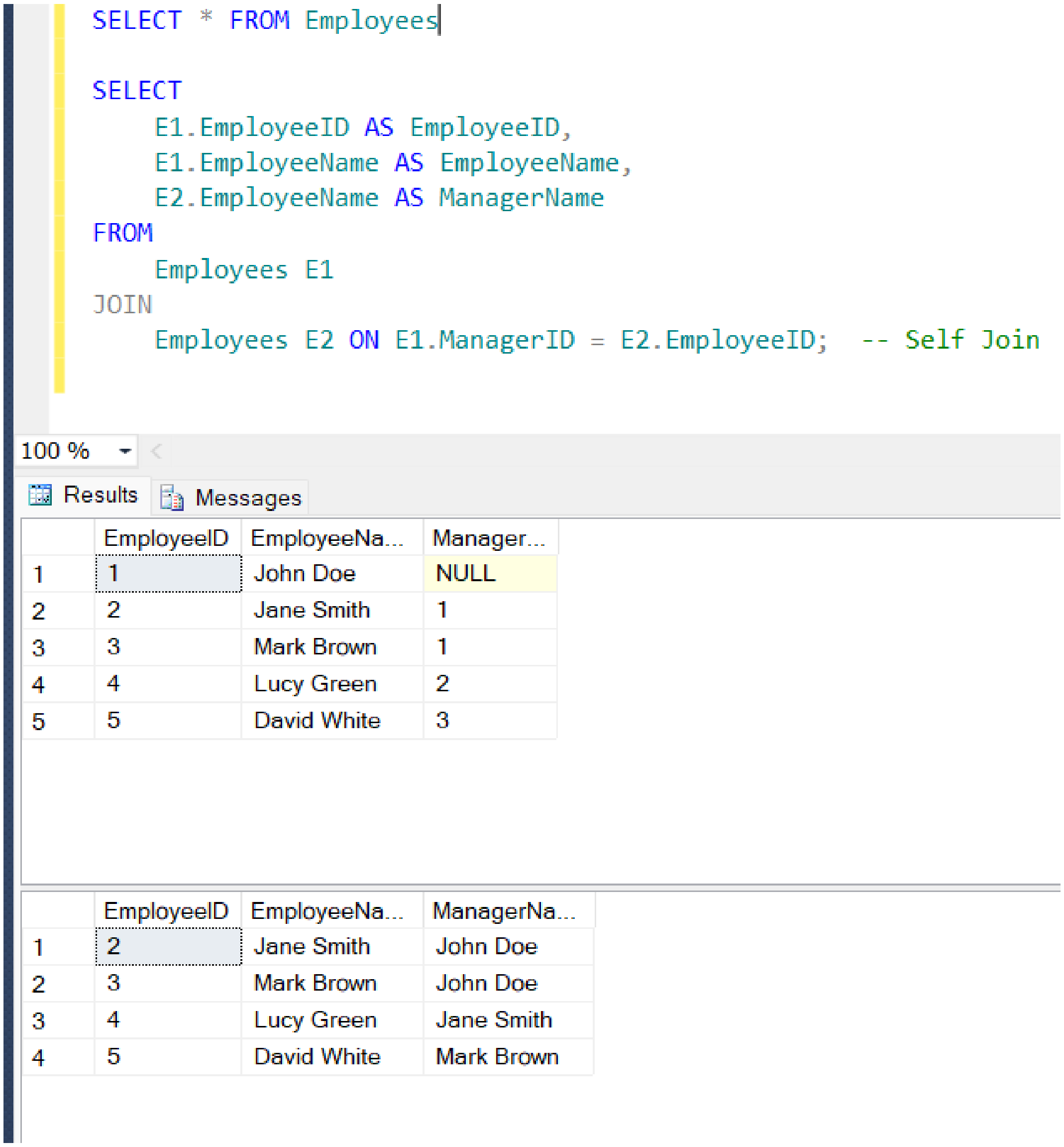
```sql
-- Create Employees Table
CREATE TABLE Employees (
    EmployeeID INT PRIMARY KEY,
    EmployeeName VARCHAR(100),
    ManagerID INT
);


-- Insert Data into Employees Table
INSERT INTO Employees (EmployeeID, EmployeeName, ManagerID) VALUES (1, 'John Doe', NULL);
INSERT INTO Employees (EmployeeID, EmployeeName, ManagerID) VALUES (2, 'Jane Smith', 1);
INSERT INTO Employees (EmployeeID, EmployeeName, ManagerID) VALUES (3, 'Mark Brown', 1);
INSERT INTO Employees (EmployeeID, EmployeeName, ManagerID) VALUES (4, 'Lucy Green', 2);
INSERT INTO Employees (EmployeeID, EmployeeName, ManagerID) VALUES (5, 'David White', 3);



SELECT * FROM Employees

SELECT
    E1.EmployeeID AS EmployeeID,
    E1.EmployeeName AS EmployeeName,
    E2.EmployeeName AS ManagerName
FROM
    Employees E1
JOIN
    Employees E2 ON E1.ManagerID = E2.EmployeeID;  -- Self Join
```



```sql
SELECT * FROM Employees

SELECT
    E1.EmployeeID AS EmployeeID,
    E1.EmployeeName AS EmployeeName,
    E2.EmployeeName AS ManagerName
FROM
    Employees E1
JOIN
    Employees E2 ON E1.ManagerID = E2.EmployeeID;  -- Self Join
```

| | EmployeeID | EmployeeNa... | Manager... |
|---|---|---|---|
| 1 | 1 | John Doe | NULL |
| 2 | 2 | Jane Smith | 1 |
| 3 | 3 | Mark Brown | 1 |
| 4 | 4 | Lucy Green | 2 |
| 5 | 5 | David White | 3 |

| | EmployeeID | EmployeeNa... | ManagerNa... |
|---|---|---|---|
| 1 | 2 | Jane Smith | John Doe |
| 2 | 3 | Mark Brown | John Doe |
| 3 | 4 | Lucy Green | Jane Smith |
| 4 | 5 | David White | Mark Brown |

**Self joins** can be applied in a variety of real-world scenarios where you need to compare rows within the same table or establish relationships within the same dataset. Here are some practical examples:

## 1. Employee Hierarchy (Manager-Employee Relationships)

This is a common use case where you need to display hierarchical relationships between employees and their managers.

**Scenario:**

You have an `Employees` table where each employee has a `ManagerID` that references another employee's `EmployeeID`. A self join can help list all employees along with their manager's name.

**Example Query:**

```
sql
Copy code
SELECT
    E1.EmployeeID AS EmployeeID,
    E1.EmployeeName AS EmployeeName,
    E2.EmployeeName AS ManagerName
FROM
    Employees E1
JOIN
    Employees E2 ON E1.ManagerID = E2.EmployeeID;
```

## 2. Finding Duplicate Records

Self joins can be used to find duplicate records in a table based on one or more column values.

**Scenario:**

You have a `Customers` table, and you want to identify all customers who have the same `Email` or `PhoneNumber`.

**Example Table: `Customers`**

| CustomerID | CustomerName | Email | PhoneNumber |
|---|---|---|---|
| 1 | Alice | alice@example.com | 1234567890 |
| 2 | Bob | bob@example.com | 1234567890 |
| 3 | Charlie | alice@example.com | 9876543210 |
| 4 | David | david@example.com | 1111111111 |

**Example Query:**

```
sql
Copy code
SELECT
    C1.CustomerID,
    C1.CustomerName,
    C1.Email,
    C1.PhoneNumber
FROM
    Customers C1
JOIN
    Customers C2 ON C1.Email = C2.Email OR C1.PhoneNumber = C2.PhoneNumber
WHERE
```

```
    C1.CustomerID < C2.CustomerID;  -- Prevent duplicate pairs in the result
```

## 3. Matching Products Based on Attributes

You can use a self join to match products based on similar attributes, like matching products with the same category or price range.

**Scenario:**

You have a `Products` table where each product belongs to a category. You want to find pairs of products within the same category but with different prices.

**Example Table: `Products`**

| ProductID | ProductName | Category | Price |
|---|---|---|---|
| 1 | Product A | Electronics | 100 |
| 2 | Product B | Electronics | 150 |
| 3 | Product C | Furniture | 200 |
| 4 | Product D | Electronics | 200 |

**Example Query:**

```
sql
Copy code
SELECT
    P1.ProductName AS Product1,
    P2.ProductName AS Product2,
    P1.Category,
    P1.Price AS Price1,
    P2.Price AS Price2
FROM
    Products P1
JOIN
    Products P2 ON P1.Category = P2.Category AND P1.ProductID < P2.ProductID;
-- Prevent duplicate pairs
```

## 4. Parent-Child Relationships in Organizational Charts

When you need to display parent-child relationships, such as organizational charts, you can use a self join to retrieve managers and their direct reports.

**Scenario:**

You have an `Organization` table where each entry has a `ParentDepartmentID` that references another department's `DepartmentID`.

**Example Table: `Organization`**

| DepartmentID | DepartmentName | ParentDepartmentID |
|---|---|---|
| 1 | HR | NULL |
| 2 | Recruitment | 1 |
| 3 | Training | 1 |
| 4 | IT | NULL |
| 5 | Support | 4 |

**Example Query:**

```
sql
Copy code
SELECT
    O1.DepartmentName AS Department,
    O2.DepartmentName AS ParentDepartment
FROM
    Organization O1
LEFT JOIN
    Organization O2 ON O1.ParentDepartmentID = O2.DepartmentID;
```

## 5. Finding Pairs of Students for a Project

In education or team-building contexts, you might want to pair students who have not previously been paired for a project.

**Scenario:**

You have a `Students` table, and you want to find all possible unique pairs of students.

**Example Table: `Students`**

| StudentID | StudentName |
|---|---|
| 1 | Alice |
| 2 | Bob |
| 3 | Charlie |
| 4 | David |

**Example Query:**

```
sql
Copy code
SELECT
    S1.StudentName AS Student1,
    S2.StudentName AS Student2
FROM
    Students S1
JOIN
```

```
    Students S2 ON S1.StudentID < S2.StudentID;  -- Avoid self-pairing and
duplicate pairs
```

## 6. Finding Products with Similar Pricing

You might want to find products in the same or similar price range, e.g., within $10 of each other.

### Example Query:

```
sql
Copy code
SELECT
    P1.ProductName AS Product1,
    P2.ProductName AS Product2,
    P1.Price,
    P2.Price
FROM
    Products P1
JOIN
    Products P2 ON ABS(P1.Price - P2.Price) <= 10 AND P1.ProductID <
P2.ProductID;  -- Price range condition
```

## Summary

These real-world scenarios demonstrate how **self joins** can be used to find relationships, compare records, detect duplicates, and identify matches within the same dataset. The versatility of self joins makes them a powerful tool in SQL queries, especially in cases of hierarchical or relational data.

If you have any more questions or need additional examples, feel free to ask!

4o

#### You said:

give table of code of all six examples and print table also

##### ChatGPT said:

ChatGPT

Below is the SQL code for creating and inserting data into tables for all six examples. After creating and populating each table, we also include queries to display the tables and verify the data.

## 1. Employee Hierarchy (Manager-Employee Relationships)

### Table Creation and Data Insertion:

```
sql
Copy code
-- Drop the Employees table if it already exists
DROP TABLE IF EXISTS Employees;

-- Create Employees Table
CREATE TABLE Employees (
    EmployeeID INT PRIMARY KEY,
    EmployeeName VARCHAR(100),
    ManagerID INT
);

-- Insert Data into Employees Table
INSERT INTO Employees (EmployeeID, EmployeeName, ManagerID) VALUES (1, 'John Doe', NULL);
INSERT INTO Employees (EmployeeID, EmployeeName, ManagerID) VALUES (2, 'Jane Smith', 1);
INSERT INTO Employees (EmployeeID, EmployeeName, ManagerID) VALUES (3, 'Mark Brown', 1);
INSERT INTO Employees (EmployeeID, EmployeeName, ManagerID) VALUES (4, 'Lucy Green', 2);
INSERT INTO Employees (EmployeeID, EmployeeName, ManagerID) VALUES (5, 'David White', 3);

-- Display the Employees Table
SELECT * FROM Employees;
```

## 2. Finding Duplicate Records

### Table Creation and Data Insertion:

```
sql
Copy code
-- Drop the Customers table if it already exists
DROP TABLE IF EXISTS Customers;

-- Create Customers Table
CREATE TABLE Customers (
    CustomerID INT PRIMARY KEY,
    CustomerName VARCHAR(100),
    Email VARCHAR(100),
    PhoneNumber VARCHAR(15)
);

-- Insert Data into Customers Table
INSERT INTO Customers (CustomerID, CustomerName, Email, PhoneNumber) VALUES (1, 'Alice', 'alice@example.com', '1234567890');
INSERT INTO Customers (CustomerID, CustomerName, Email, PhoneNumber) VALUES (2, 'Bob', 'bob@example.com', '1234567890');
INSERT INTO Customers (CustomerID, CustomerName, Email, PhoneNumber) VALUES (3, 'Charlie', 'alice@example.com', '9876543210');
INSERT INTO Customers (CustomerID, CustomerName, Email, PhoneNumber) VALUES (4, 'David', 'david@example.com', '1111111111');

-- Display the Customers Table
```

```
SELECT * FROM Customers;
```

## 3. Matching Products Based on Attributes

### Table Creation and Data Insertion:

```
sql
Copy code
-- Drop the Products table if it already exists
DROP TABLE IF EXISTS Products;

-- Create Products Table
CREATE TABLE Products (
    ProductID INT PRIMARY KEY,
    ProductName VARCHAR(100),
    Category VARCHAR(50),
    Price DECIMAL(10, 2)
);

-- Insert Data into Products Table
INSERT INTO Products (ProductID, ProductName, Category, Price) VALUES (1,
'Product A', 'Electronics', 100);
INSERT INTO Products (ProductID, ProductName, Category, Price) VALUES (2,
'Product B', 'Electronics', 150);
INSERT INTO Products (ProductID, ProductName, Category, Price) VALUES (3,
'Product C', 'Furniture', 200);
INSERT INTO Products (ProductID, ProductName, Category, Price) VALUES (4,
'Product D', 'Electronics', 200);

-- Display the Products Table
SELECT * FROM Products;
```

## 4. Parent-Child Relationships in Organizational Charts

### Table Creation and Data Insertion:

```
sql
Copy code
-- Drop the Organization table if it already exists
DROP TABLE IF EXISTS Organization;

-- Create Organization Table
CREATE TABLE Organization (
    DepartmentID INT PRIMARY KEY,
    DepartmentName VARCHAR(100),
    ParentDepartmentID INT
);

-- Insert Data into Organization Table
INSERT INTO Organization (DepartmentID, DepartmentName, ParentDepartmentID)
VALUES (1, 'HR', NULL);
INSERT INTO Organization (DepartmentID, DepartmentName, ParentDepartmentID)
VALUES (2, 'Recruitment', 1);
```

```
INSERT INTO Organization (DepartmentID, DepartmentName, ParentDepartmentID)
VALUES (3, 'Training', 1);
INSERT INTO Organization (DepartmentID, DepartmentName, ParentDepartmentID)
VALUES (4, 'IT', NULL);
INSERT INTO Organization (DepartmentID, DepartmentName, ParentDepartmentID)
VALUES (5, 'Support', 4);

-- Display the Organization Table
SELECT * FROM Organization;
```

## 5. Finding Pairs of Students for a Project

### Table Creation and Data Insertion:

```
sql
Copy code
-- Drop the Students table if it already exists
DROP TABLE IF EXISTS Students;

-- Create Students Table
CREATE TABLE Students (
    StudentID INT PRIMARY KEY,
    StudentName VARCHAR(100)
);

-- Insert Data into Students Table
INSERT INTO Students (StudentID, StudentName) VALUES (1, 'Alice');
INSERT INTO Students (StudentID, StudentName) VALUES (2, 'Bob');
INSERT INTO Students (StudentID, StudentName) VALUES (3, 'Charlie');
INSERT INTO Students (StudentID, StudentName) VALUES (4, 'David');

-- Display the Students Table
SELECT * FROM Students;
```

## 6. Finding Products with Similar Pricing

The `Products` table from example 3 can be reused here since it matches the requirements for this example. There is no need to create a new table.

```
sql
Copy code
-- Reuse Products Table from Example 3
-- Display the Products Table again
SELECT * FROM Products;
```

## Summary

The SQL code provided creates the tables and populates them with sample data for all six examples of self join scenarios. You can run each block of code in your SQL Server environment to set up the data and practice the self join queries. If you need further examples or explanations, let me know!