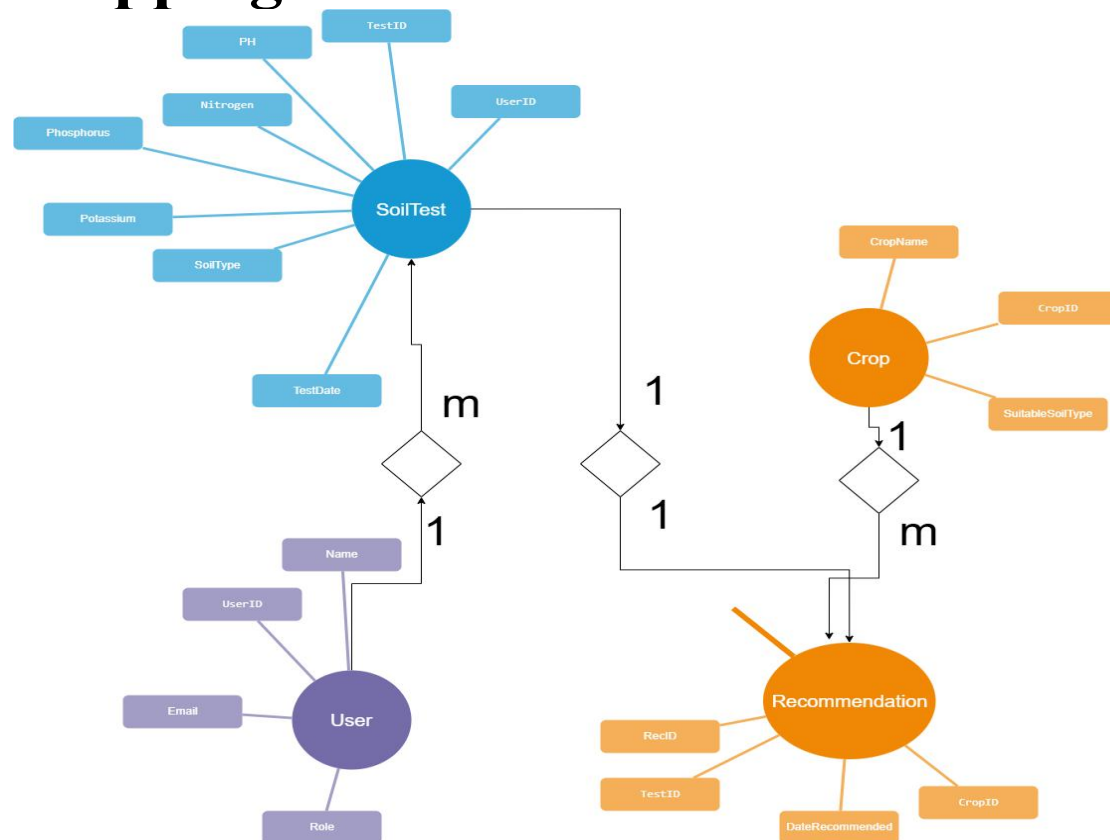


Mapping:



ERD

User			
<u>UserID</u>	Name	Email	Role

SoilTest							
<u>TestID</u>	PH	Nitrogen	Phosphorus	Potassium	SoilType	TestDate	<u>UserID</u>

Crop		
<u>CropID</u>	CropName	SuitableSoilType

Recommendation			
<u>RecID</u>	<u>TestID</u>	<u>CropID</u>	DateRecommended

SQL Queries

```

mysql> CREATE DATABASE SoilCropDB;
Query OK, 1 row affected (0.145 sec)

mysql> USE SoilCropDB;
Database changed
mysql>
mysql> CREATE TABLE User (
    -> UserID INT PRIMARY KEY AUTO_INCREMENT,
    -> Name VARCHAR(100),
    -> Email VARCHAR(100),
    -> Role ENUM('Admin', 'Engineer')
    -> );
Query OK, 0 rows affected (0.299 sec)

mysql> CREATE TABLE SoilTest (
    -> TestID INT PRIMARY KEY AUTO_INCREMENT,
    -> PH FLOAT,
    -> Nitrogen FLOAT,
    -> Phosphorus FLOAT,
    -> Potassium FLOAT,
    -> SoilType VARCHAR(50),
    -> TestDate DATE,
    -> UserID INT,
    -> FOREIGN KEY (UserID) REFERENCES User(UserID)
    -> );
Query OK, 0 rows affected (0.550 sec)

mysql> CREATE TABLE Crop (
    -> CropID INT PRIMARY KEY AUTO_INCREMENT,
    -> CropName VARCHAR(100),
    -> SuitableSoilType VARCHAR(50)
    -> );
Query OK, 0 rows affected (0.184 sec)

mysql> CREATE TABLE Recommendation (
    -> RecID INT PRIMARY KEY AUTO_INCREMENT,
    -> TestID INT,
    -> CropID INT,
    -> DateRecommended DATE,
    -> FOREIGN KEY (TestID) REFERENCES SoilTest(TestID),
    -> FOREIGN KEY (TestID) REFERENCES SoilTest(TestID),
    -> FOREIGN KEY (CropID) REFERENCES Crop(CropID)
    -> );
Query OK, 0 rows affected (0.459 sec)

mysql> CREATE USER 'admin'@'localhost' IDENTIFIED BY 'adminpass';
Query OK, 0 rows affected (0.357 sec)

mysql> CREATE USER 'engineer'@'localhost' IDENTIFIED BY 'engpass';
Query OK, 0 rows affected (0.049 sec)

mysql> GRANT ALL PRIVILEGES ON SoilCropDB.* TO 'admin'@'localhost';
Query OK, 0 rows affected (0.074 sec)

mysql> GRANT SELECT, INSERT ON SoilCropDB.SoilTest TO 'engineer'@'localhost';
Query OK, 0 rows affected (0.076 sec)

mysql> GRANT SELECT ON SoilCropDB.Recommendation TO 'engineer'@'localhost';
Query OK, 0 rows affected (0.063 sec)

mysql> INSERT INTO User (Name, Email, Role) VALUES
    -> ('Ahmed Ali', 'ahmed@example.com', 'Admin'),
    -> ('Fatma Hassan', 'fatma@example.com', 'Engineer'),
    -> ('Mohamed Salah', 'mohamed@example.com', 'Engineer'),
    -> ('Sara Youssef', 'sara@example.com', 'Admin'),
    -> ('Khaled Nabil', 'khaled@example.com', 'Engineer'),
    -> ('Laila Samir', 'laila@example.com', 'Engineer'),
    -> ('Youssef Ibrahim', 'youssef@example.com', 'Engineer'),
    -> ('Hana Omar', 'hana@example.com', 'Admin'),
    -> ('Ali Gamal', 'ali@example.com', 'Engineer'),
    -> ('Mona Tarek', 'mona@example.com', 'Engineer');
Query OK, 10 rows affected (0.203 sec)
Records: 10 Duplicates: 0 Warnings: 0

mysql> INSERT INTO Crop (CropName, SuitableSoilType) VALUES
    -> ('Wheat', 'Clay'),
    -> ('Corn', 'Loamy'),
    -> ('Rice', 'Silty'),
    -> ('Potato', 'Sandy'),
    -> ('Beans', 'Loamy'),
    -> ('Cotton', 'Clay'),

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-> ('Cotton', 'Clay'),
-> ('Beet', 'Silty'),
-> ('Onion', 'Loamy'),
-> ('Tomato', 'Sandy'),
-> ('Pepper', 'Sandy');
Query OK, 10 rows affected (0.078 sec)
Records: 10 Duplicates: 0 Warnings: 0

mysql> INSERT INTO SoilTest (PH, Nitrogen, Phosphorus, Potassium, SoilType, TestDate, UserID) VALUES
-> (6.5, 20, 10, 30, 'Clay', '2024-03-01', 2),
-> (6.8, 22, 12, 28, 'Loamy', '2024-03-02', 3),
-> (7.0, 18, 15, 25, 'Silty', '2024-03-03', 4),
-> (6.4, 19, 11, 26, 'Sandy', '2024-03-04', 5),
-> (6.7, 21, 13, 29, 'Clay', '2024-03-05', 6),
-> (6.3, 17, 9, 27, 'Loamy', '2024-03-06', 7),
-> (6.6, 23, 14, 31, 'Silty', '2024-03-07', 8),
-> (6.9, 24, 16, 32, 'Sandy', '2024-03-08', 9),
-> (6.2, 15, 8, 24, 'Loamy', '2024-03-09', 10),
-> (6.0, 16, 7, 23, 'Clay', '2024-03-10', 1);
Query OK, 10 rows affected (0.096 sec)
Records: 10 Duplicates: 0 Warnings: 0

mysql>
mysql> INSERT INTO Recommendation (TestID, CropID, DateRecommended) VALUES
-> (1, 1, '2024-03-11'),
-> (2, 2, '2024-03-12'),
-> (3, 3, '2024-03-13'),
-> (4, 4, '2024-03-14'),
-> (5, 5, '2024-03-15'),
-> (6, 6, '2024-03-16'),
-> (7, 7, '2024-03-17'),
-> (8, 8, '2024-03-18'),
-> (9, 9, '2024-03-19'),
-> (10, 10, '2024-03-20');
Query OK, 10 rows affected (0.056 sec)
Records: 10 Duplicates: 0 Warnings: 0

mysql> SELECT * FROM Crop WHERE CropName LIKE '%Tomato%';
+-----+-----+-----+
| CropID | CropName | SuitableSoilType |
+-----+-----+-----+

mysql> SELECT * FROM Crop WHERE CropName LIKE '%Tomato%';
+-----+-----+-----+
| CropID | CropName | SuitableSoilType |
+-----+-----+-----+
|      9 | Tomato  | Sandy            |
+-----+-----+-----+
1 row in set (0.093 sec)

mysql> SELECT AVG(PH) AS AveragePH FROM SoilTest;
+-----+
| AveragePH |
+-----+
| 6.54000009536743 |
+-----+
1 row in set (0.085 sec)

mysql> SELECT * FROM SoilTest ORDER BY TestDate ASC;
+-----+-----+-----+-----+-----+-----+-----+-----+
| TestID | PH   | Nitrogen | Phosphorus | Potassium | SoilType | TestDate | UserID |
+-----+-----+-----+-----+-----+-----+-----+-----+
|      1 | 6.5  |      20  |          10 |          30 | Clay     | 2024-03-01 |      2 |
|      2 | 6.8  |      22  |          12 |          28 | Loamy    | 2024-03-02 |      3 |
|      3 | 7.0  |      18  |          15 |          25 | Silty    | 2024-03-03 |      4 |
|      4 | 6.4  |      19  |          11 |          26 | Sandy    | 2024-03-04 |      5 |
|      5 | 6.7  |      21  |          13 |          29 | Clay     | 2024-03-05 |      6 |
|      6 | 6.3  |      17  |           9 |          27 | Loamy    | 2024-03-06 |      7 |
|      7 | 6.6  |      23  |          14 |          31 | Silty    | 2024-03-07 |      8 |
|      8 | 6.9  |      24  |          16 |          32 | Sandy    | 2024-03-08 |      9 |
|      9 | 6.2  |      15  |           8 |          24 | Loamy    | 2024-03-09 |     10 |
|     10 | 6.0  |      16  |           7 |          23 | Clay     | 2024-03-10 |      1 |
+-----+-----+-----+-----+-----+-----+-----+-----+
10 rows in set (0.044 sec)

mysql> SELECT * FROM Crop ORDER BY CropName DESC;
+-----+-----+-----+
| CropID | CropName | SuitableSoilType |
+-----+-----+-----+
|      1 | Wheat   | Clay             |
|      9 | Tomato  | Sandy            |
|      3 | Rice    | Silty            |
+-----+-----+-----+

```

```

10 | Pepper | Sandy
8 | Onion | Loamy
6 | Cotton | Clay
2 | Corn | Loamy
7 | Beet | Silty
5 | Beans | Loamy
+-----+
10 rows in set (0.019 sec)

mysql> SELECT SoilType, COUNT(*) AS TestCount FROM SoilTest GROUP BY SoilType;
+-----+
| SoilType | TestCount |
+-----+
| Clay | 3 |
| Loamy | 3 |
| Silty | 2 |
| Sandy | 2 |
+-----+
4 rows in set (0.055 sec)

mysql> SELECT User.Name AS UserName, Crop.CropName, Recommendation.DateRecommended
-> FROM Recommendation
-> INNER JOIN SoilTest ON Recommendation.TestID = SoilTest.TestID
-> INNER JOIN User ON SoilTest.UserID = User.UserID
-> INNER JOIN Crop ON Recommendation.CropID = Crop.CropID;
+-----+
| UserName | CropName | DateRecommended |
+-----+
| Fatma Hassan | Wheat | 2024-03-11 |
| Mohamed Salah | Corn | 2024-03-12 |
| Sara Youssef | Rice | 2024-03-13 |
| Khaled Nabil | Potato | 2024-03-14 |
| Laila Samir | Beans | 2024-03-15 |
| Youssef Ibrahim | Cotton | 2024-03-16 |
| Hana Omar | Beet | 2024-03-17 |
| Ali Gamal | Onion | 2024-03-18 |
| Mona Tarek | Tomato | 2024-03-19 |
| Ahmed Ali | Pepper | 2024-03-20 |
+-----+
10 rows in set (0.014 sec)

mysql> SELECT * FROM SoilTest WHERE PH BETWEEN 6.5 AND 7.0;
+-----+
| TestID | PH | Nitrogen | Phosphorus | Potassium | SoilType | TestDate | UserID |
+-----+
| 1 | 6.5 | 20 | 10 | 30 | Clay | 2024-03-01 | 2 |
| 2 | 6.8 | 22 | 12 | 28 | Loamy | 2024-03-02 | 3 |
| 3 | 7 | 18 | 15 | 25 | Silty | 2024-03-03 | 4 |
| 5 | 6.7 | 21 | 13 | 29 | Clay | 2024-03-05 | 6 |
| 7 | 6.6 | 23 | 14 | 31 | Silty | 2024-03-07 | 8 |
| 8 | 6.9 | 24 | 16 | 32 | Sandy | 2024-03-08 | 9 |
+-----+
6 rows in set (0.009 sec)

mysql> SELECT * FROM Crop WHERE SuitableSoilType IN ('Loamy', 'Sandy');
+-----+
| CropID | CropName | SuitableSoilType |
+-----+
| 2 | Corn | Loamy |
| 4 | Potato | Sandy |
| 5 | Beans | Loamy |
| 8 | Onion | Loamy |
| 9 | Tomato | Sandy |
| 10 | Pepper | Sandy |
+-----+
6 rows in set (0.009 sec)

mysql> UPDATE SoilTest SET SoilType = 'Loamy' WHERE TestID = 1;
Query OK, 1 row affected (0.055 sec)
Rows matched: 1 Changed: 1 Warnings: 0

mysql> DELETE FROM Recommendation WHERE RecID = 1;
Query OK, 1 row affected (0.055 sec)

```