Database Systems Mini Project

A report submitted to the

Department of Electrical and Information Engineering
Faculty of Engineering
University of Ruhuna Sri Lanka

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In completing an assignment for the module

EE4350 Data Base systems

By:

Group 47

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REQUIREMENT ANALYSIS

Functional Requirements

The database system for “Farm Management” includes a wide range of features designed specifically to optimize farm management operations. Each feature is carefully integrated to ensure optimal performance and seamless data processing. These are some key components.

- Data Retrieval
- Ability to Alter Database Content
- Completing Data Gaps or Missing Data
- Capability to Edit Existing Data
- Ability to Add Comments to Incomplete or Ambiguous
- Capacity to Provide Data with Enhanced Performance

The Schema comprehensively addresses farm management needs, encompassing employee, Farmer authentication, activities tracking such as Harvesting, Suppliers and Salary management. It enables efficient allocation of tasks for Employees and Farmers, production tracking, ensures secure access, and facilitates inventory and financial management for effective planning.

With its comprehensive functionalities and meticulous design, this database system serves as an invaluable tool for optimizing efficiency and decision-making in farm management.

Data Requirements

The attributes of each entity are shown below

1. Crop

- Crop_ID
- Crop_name
- Variety
- Planting_Date
- Harvest_Date
- Crop_age
- Pests

2. Employee

- Employee_ID
- Employee_name
- Supervisor
- Contact_info
- Email

3. Equipment

- Equipment_ID
- Modal
- Equipment_type
- Purchase_date

4. Field

- Field_ID
- Field_name
- Size

5. Harvest

- Harvest_month
- Quantity

6. Head_farmer

- Farmer_ID
- Farmer_name
- Email_address
- Street
- City
- Province
- Zip_code
- Contact_info

7. Salary

- Salary_month
- Working_hours
- Payment_per_hour
- Monthly_salary

8. Supplier

- Supplier_ID
- Supplier_name
- Product_supplied
- Contact_info

Relations in the ER Diagram

The ER diagram comprises significant entities and relationships, incorporating weak entities and a recursive relationship:

- **One to Many Relationships:**

  HEAD_FARMER and EQUIPMENT relationship (Owner)

  CROP and HARVEST relationship (Harvesting)

  HEAD_FARMER and FIELD relationship (Owner)

  FIELD and EMPLOYEE relationship (Working)

  EMPLOYEE and SALARY relationship (Receives)

  Recursive relationship (Supervise)

- **Many to Many relationships:**

  SUPPLIER and HEAD_FARMER relationship (Ordering)

  FIELD and EQUIPMENT relationship (Utilizing)

  FIELD and CROP relationship (Cultivating)

- **Strong Entities:**

  HEAD_FARMER

  SUPPLIER

  FIELD

  EQUIPMENT

  EMOLOYEE

  CROP

- **Weak Entities**:
  - Two weak entities are present, denoted by double-line rectangles.
  - "SALARY" is reliant on the "EMPLOYEE" entity and lacks its unique key, categorizing it as weak.
  - "HARVEST" also lacks a key and is entirely dependent on the "CROP" entity, thus considered weak.

- **Recursive Relationship**:
    - The database features a recursive relationship, specifically involving supervisor and employees.
    - This relationship demonstrates that a supervisor can oversee a limited number of employees, potentially including one who may also function as an employee, creating a recursive pattern.
- **Composite Attributes**

    Address (Head Farmer Attribute)
- **Multi-valued Attributes**

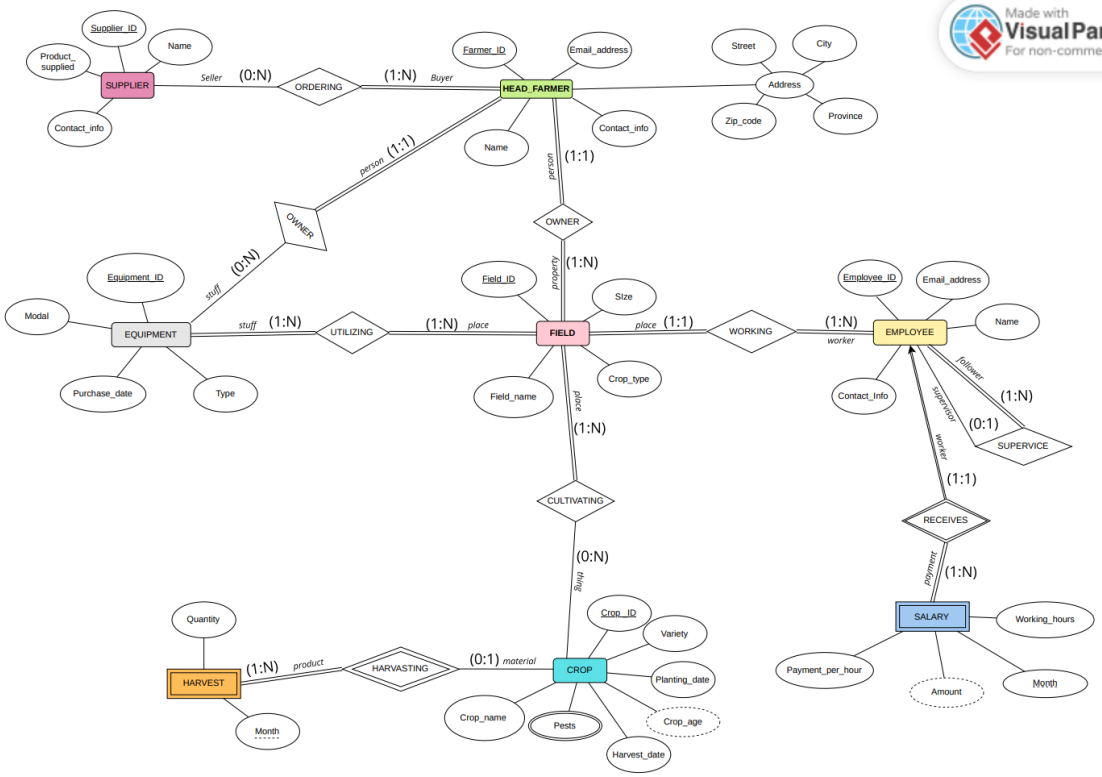
    Pests (Crop Attribute)
- **Derived Attributes**

    Crop_age (Crop Attribute)

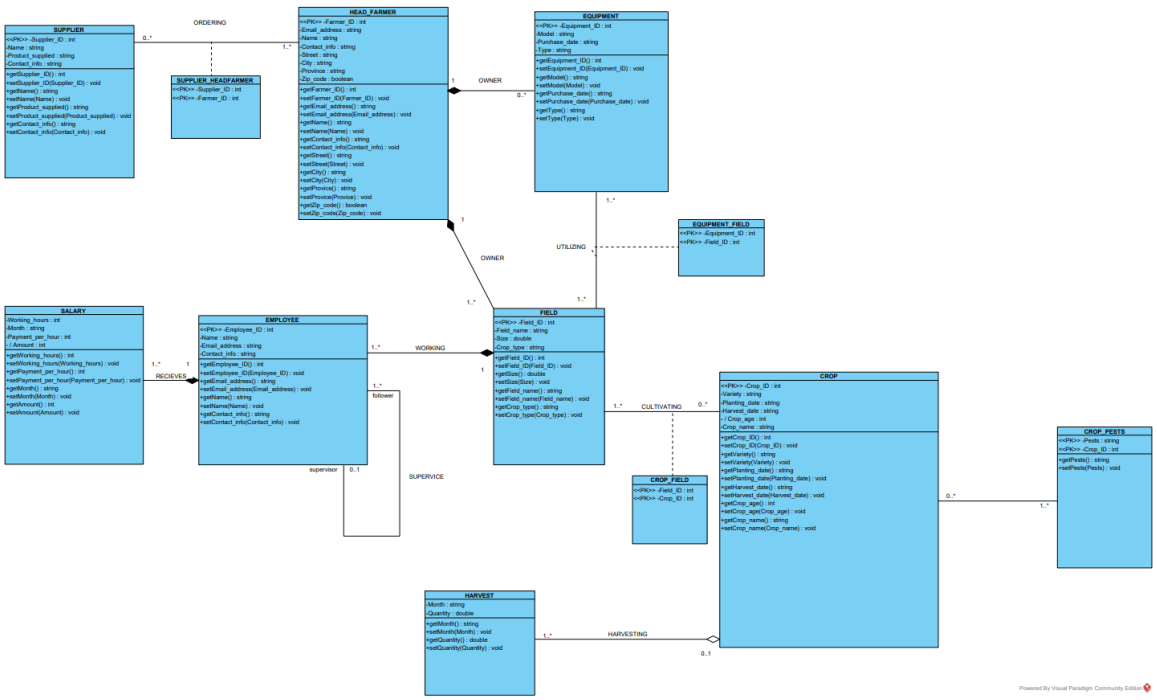
    Amount (Salary Attribute)

CONCEPTUAL DESIGN

ER Diagram



UML Class Diagram

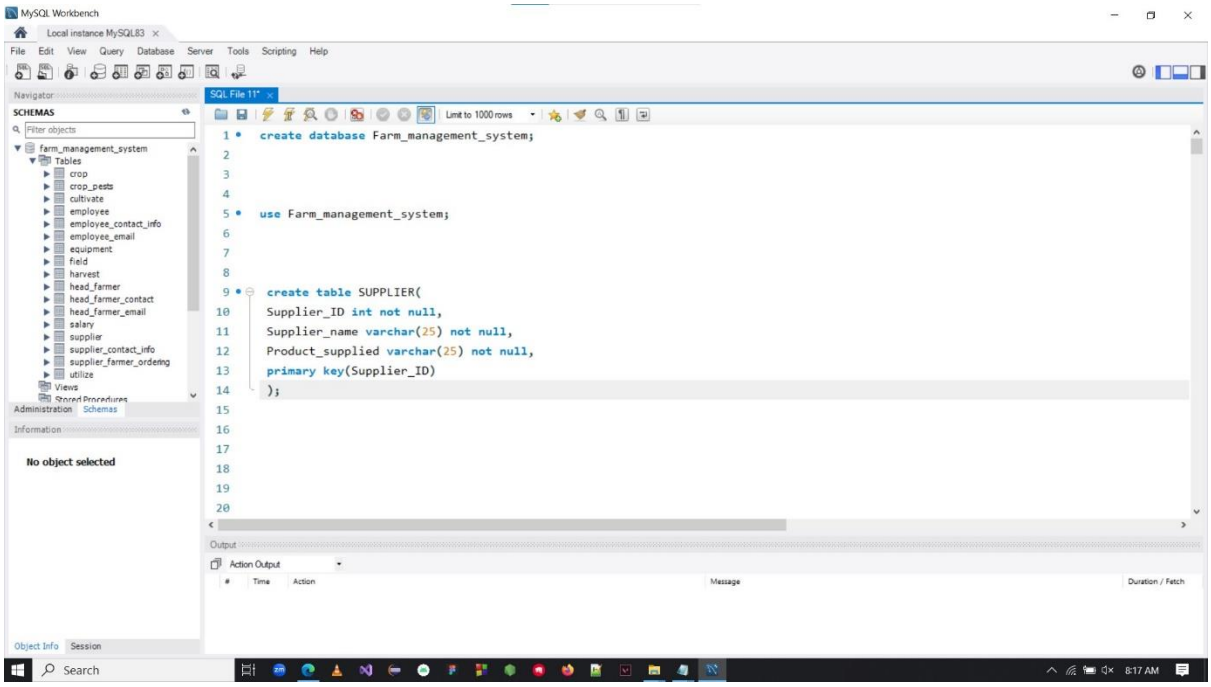


IMPLEMENTATION

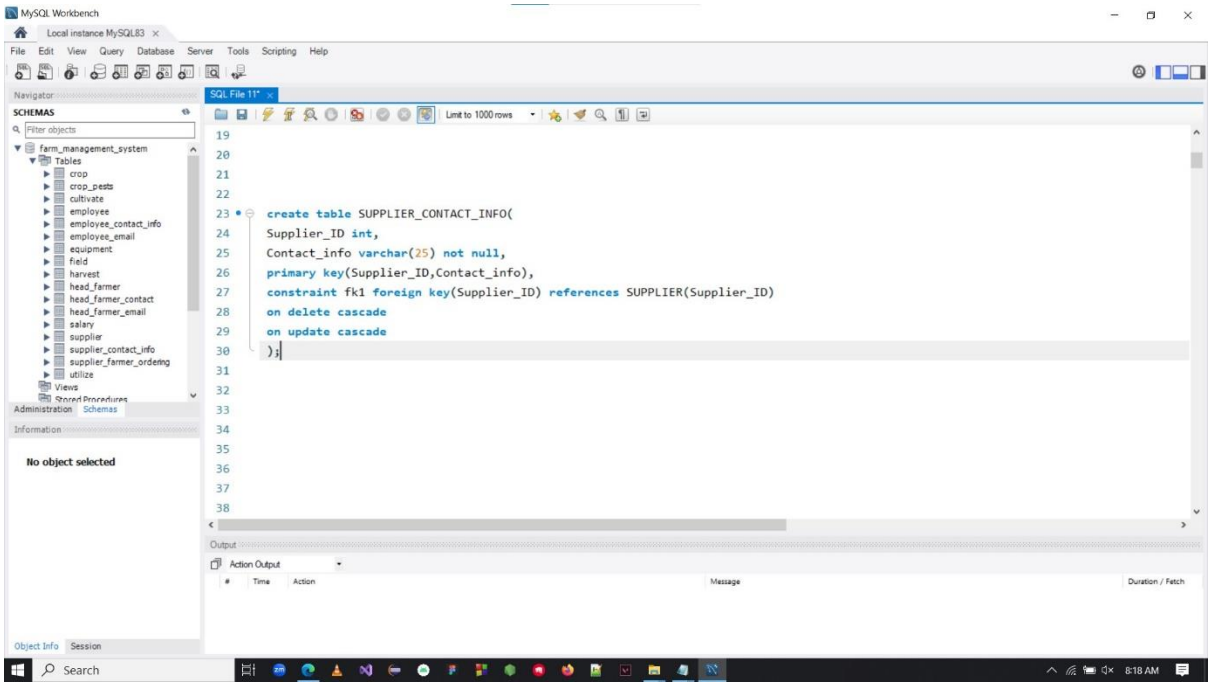
All of the implemented database model screenshots are included in this chapter.

Table Implementation

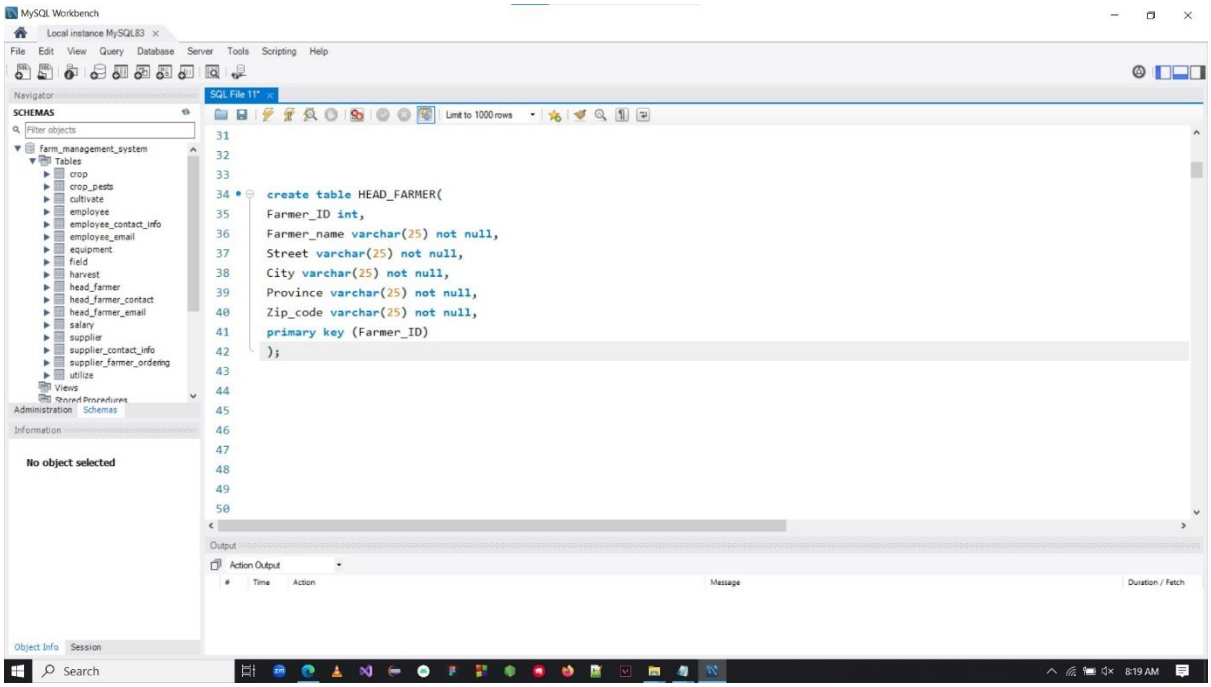
1. Supplier table



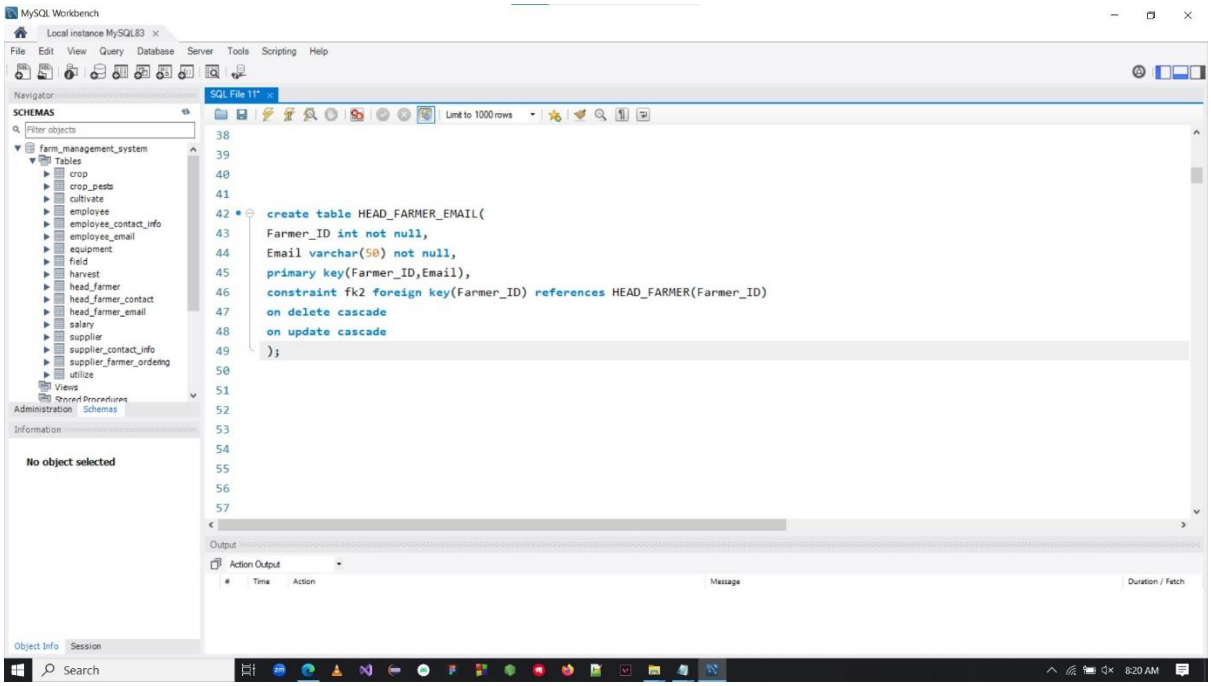
2. Supplier_contact_info table



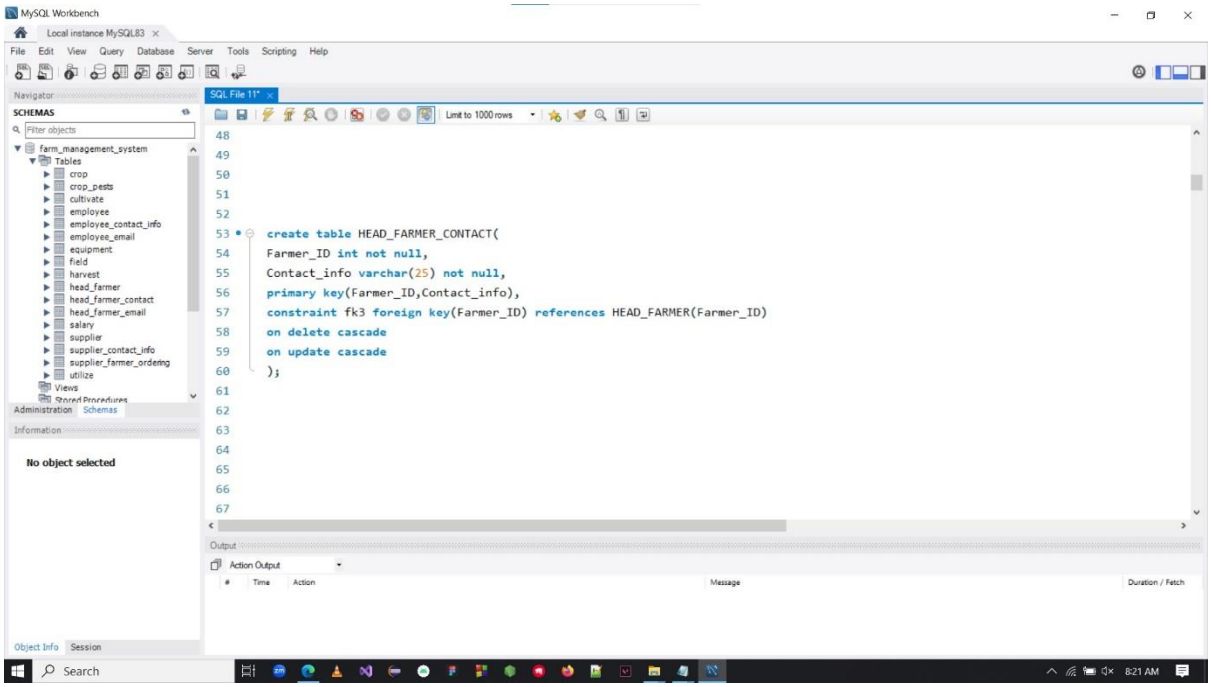
3. Head_farmer table



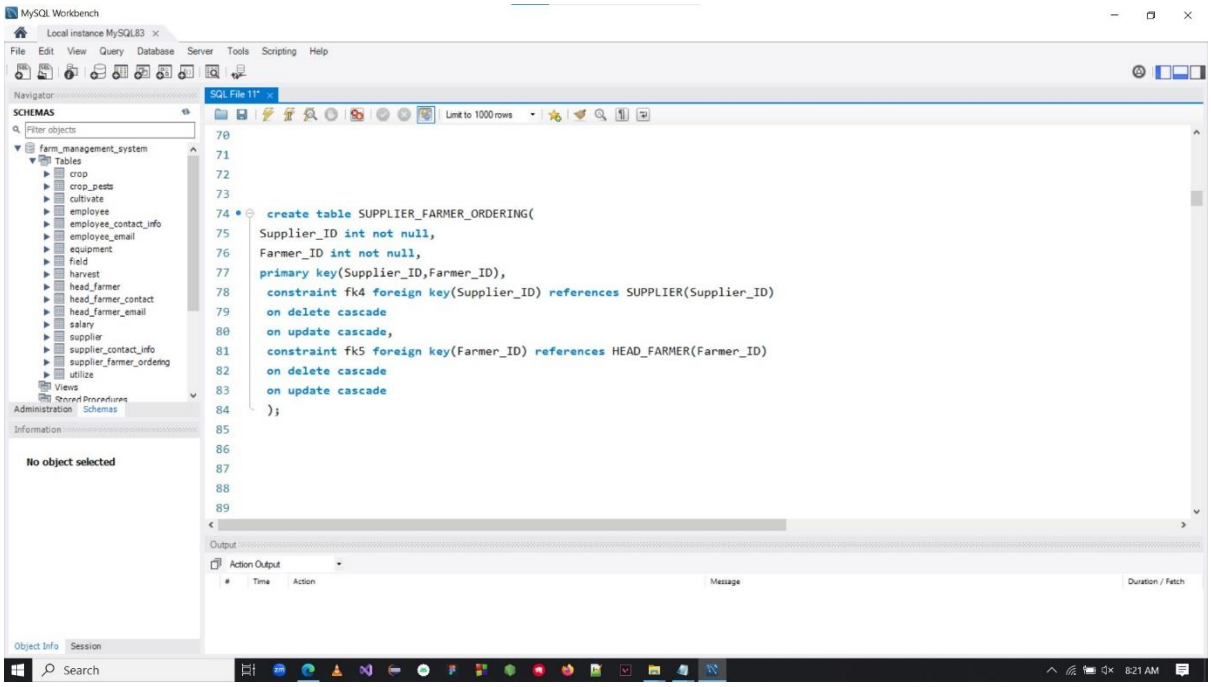
4. Head_farmer_email table



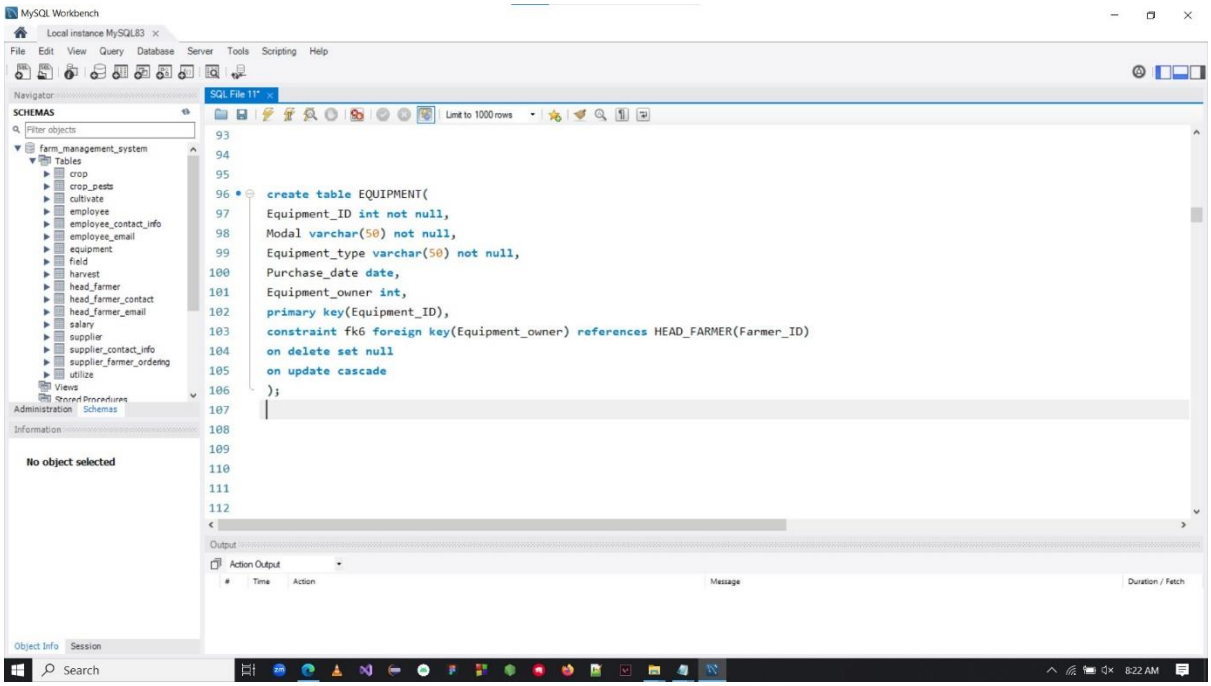
5. Head_farmer_contact table



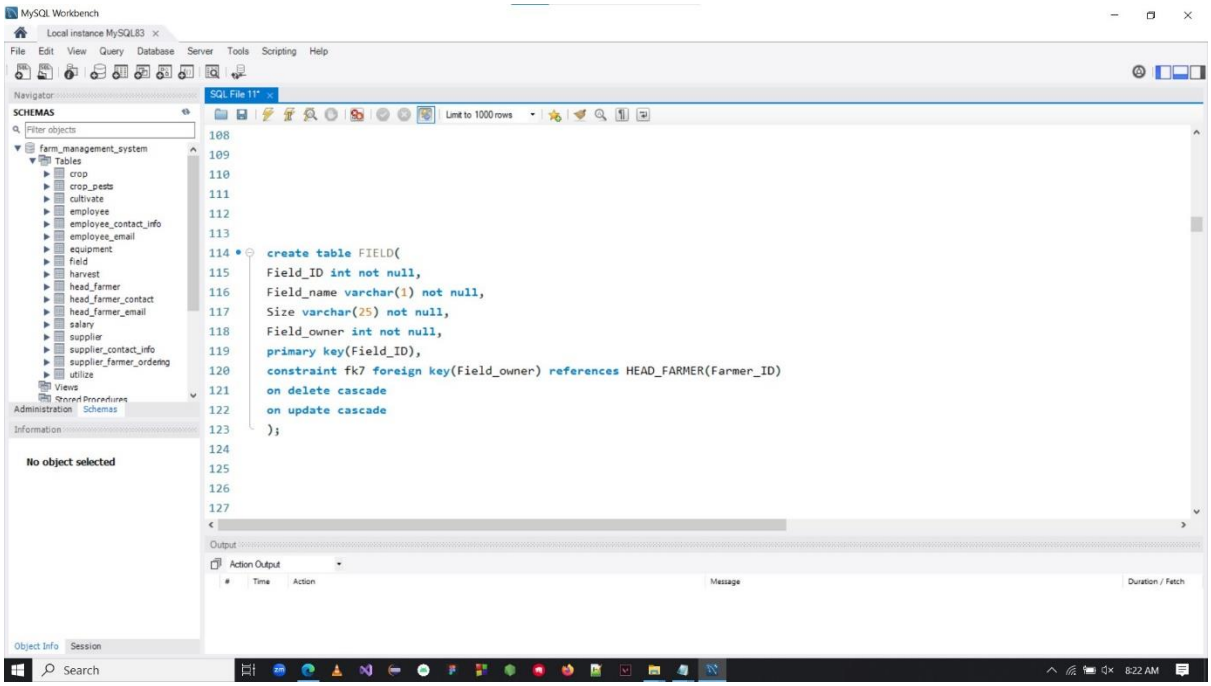
6. Supplier_farmer_ordering table



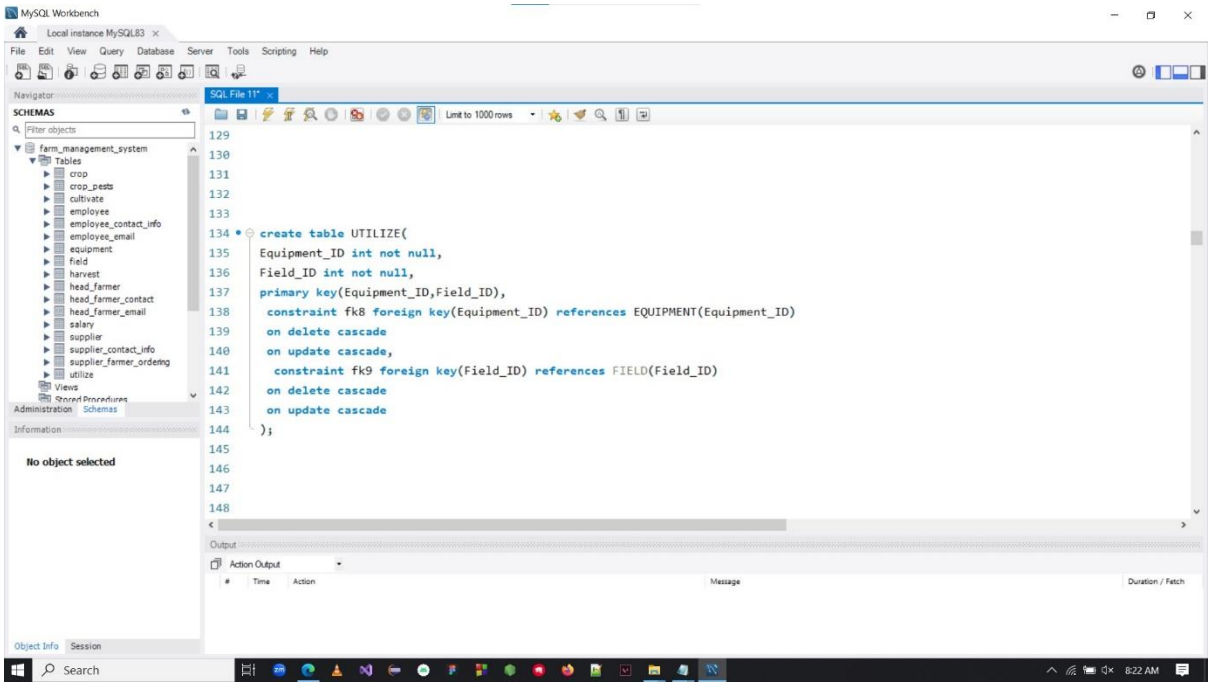
7. Equipment table



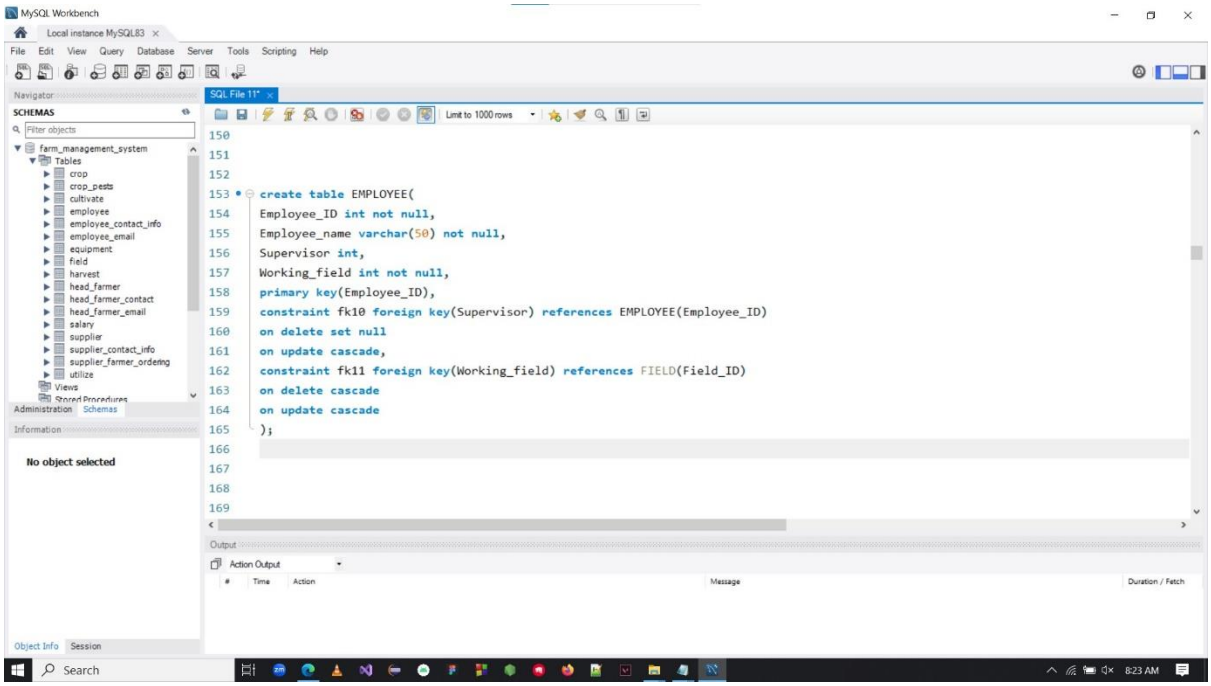
8. Field table



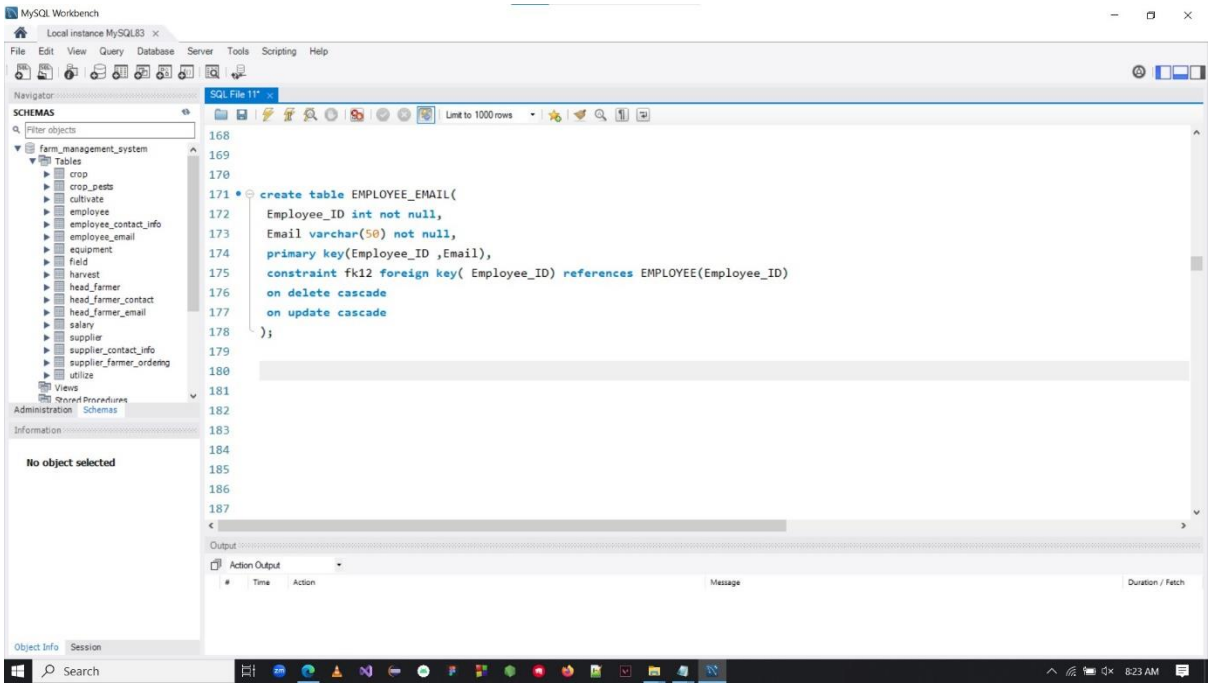
9. Utilize table



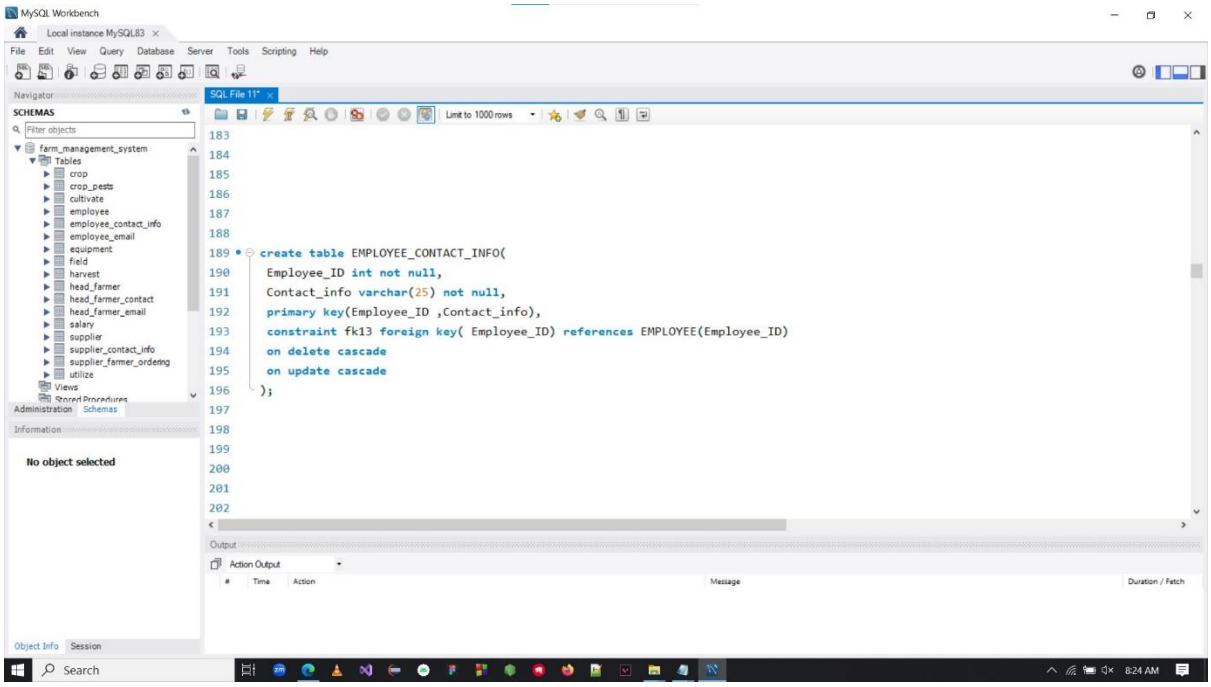
10.Employee table



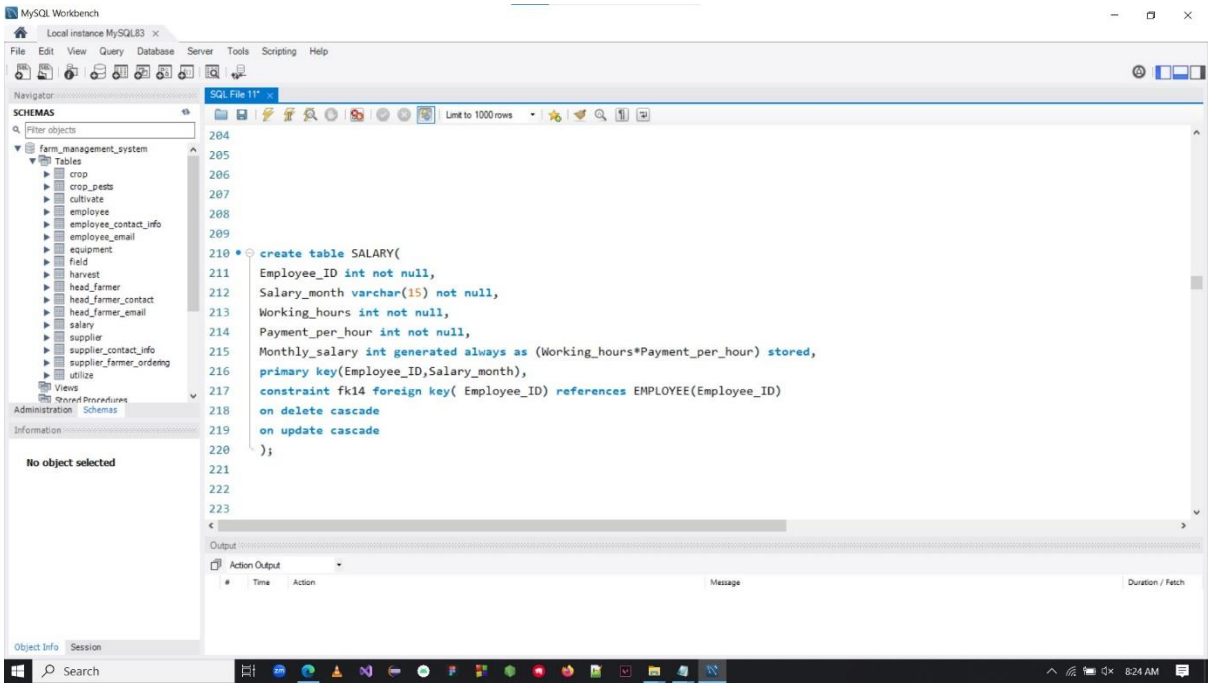
11.Employee_email table



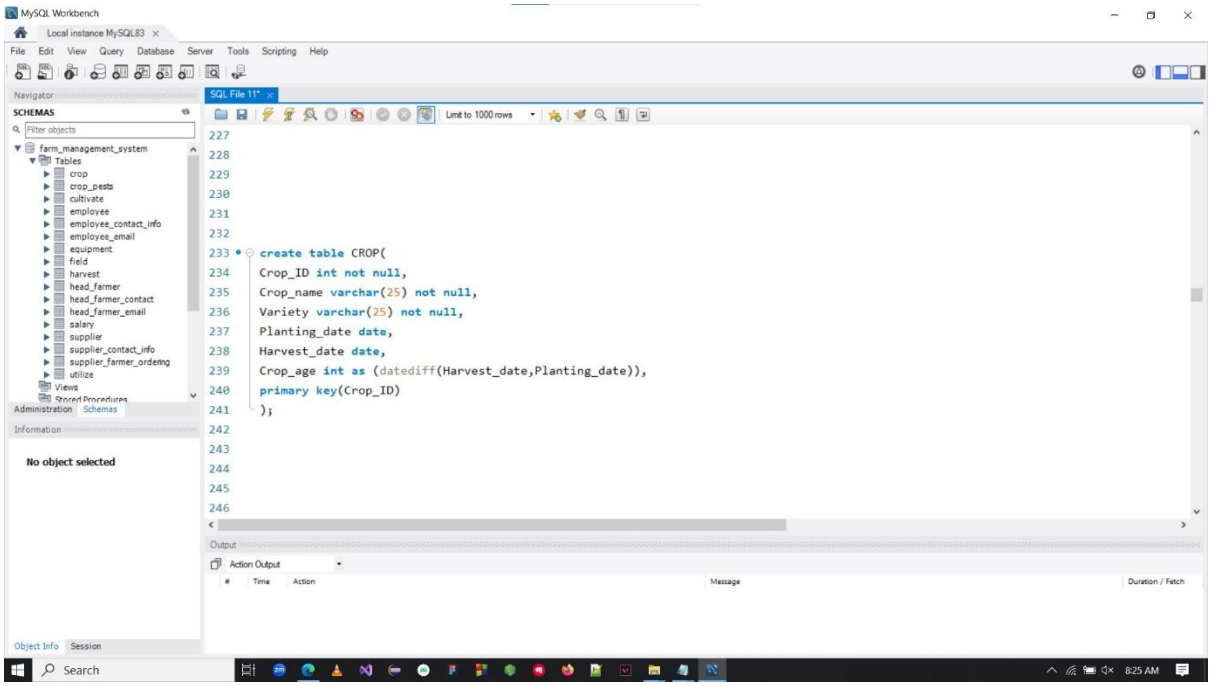
12.Employee_contact_info table



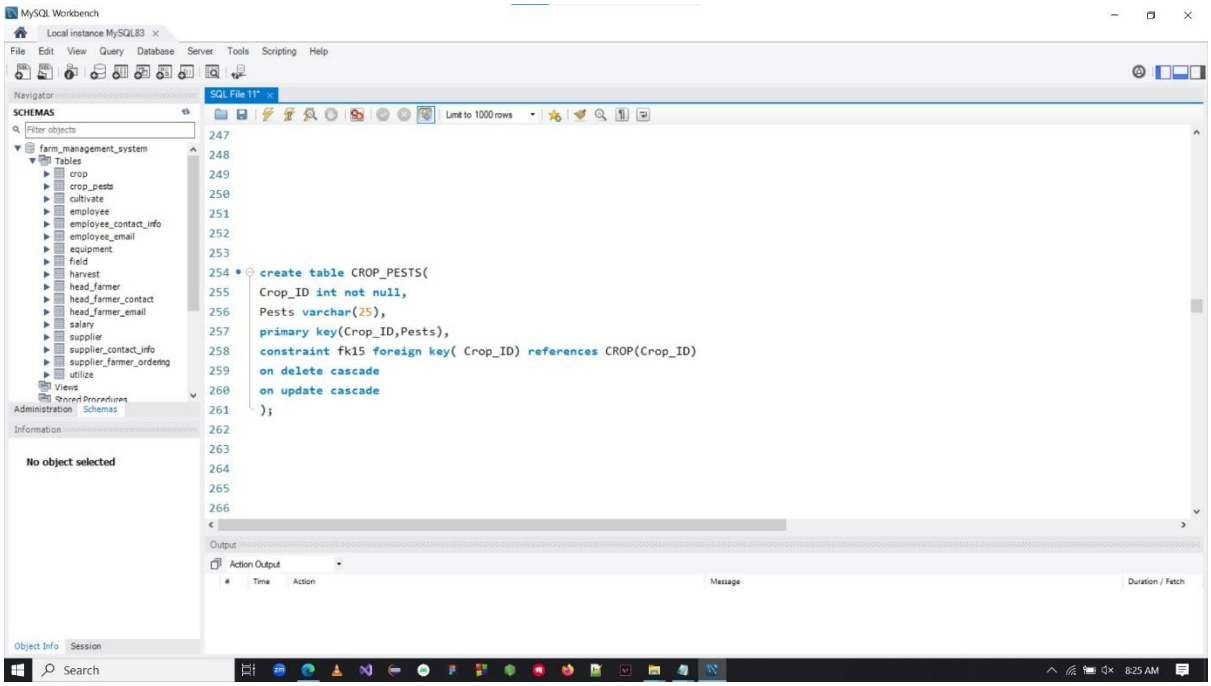
13.Salary table



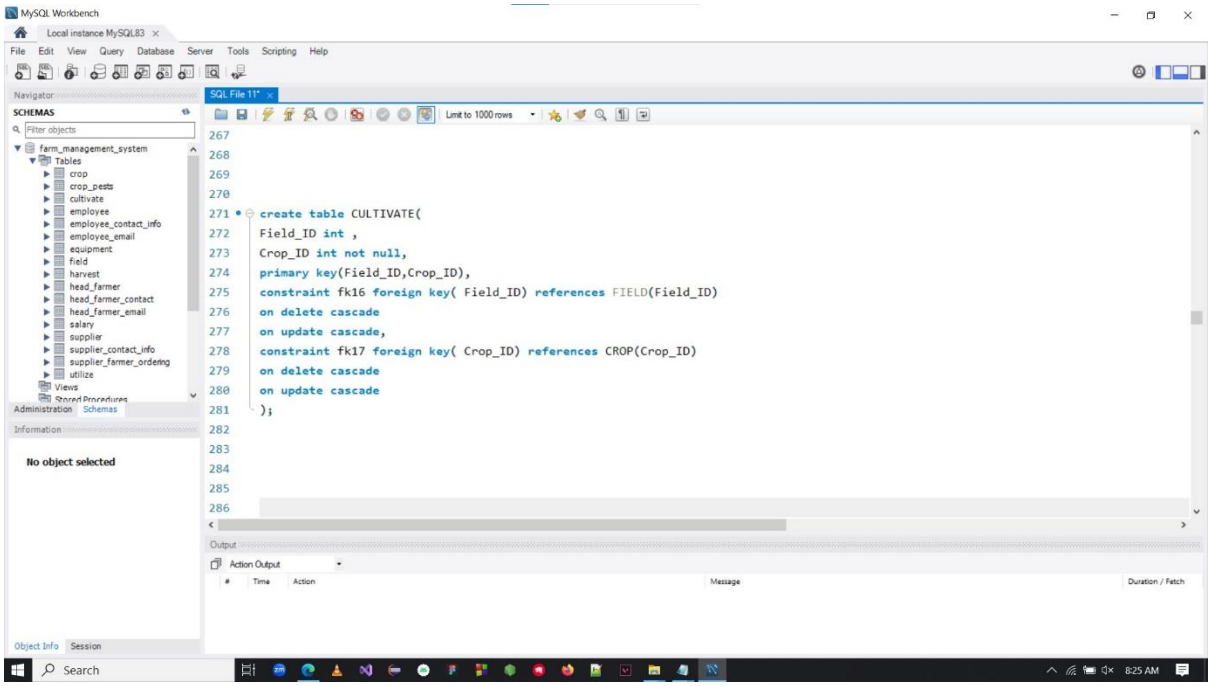
14.Crop table



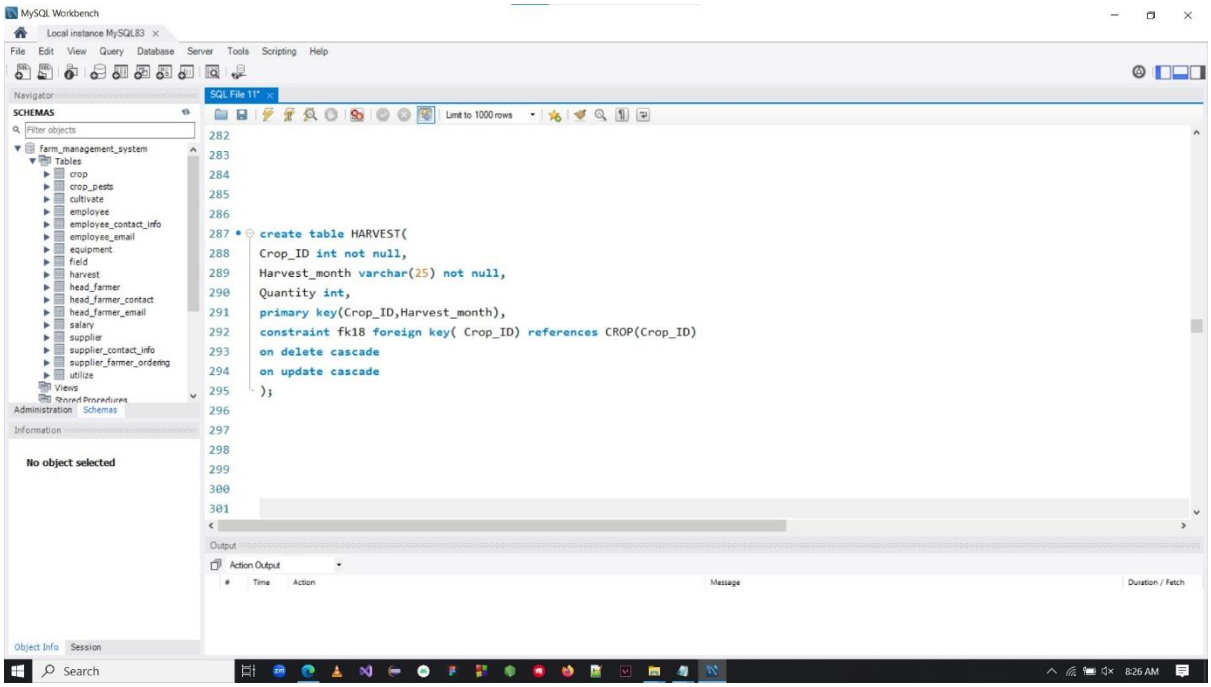
15.Crop_pests table



16.Cultivate table

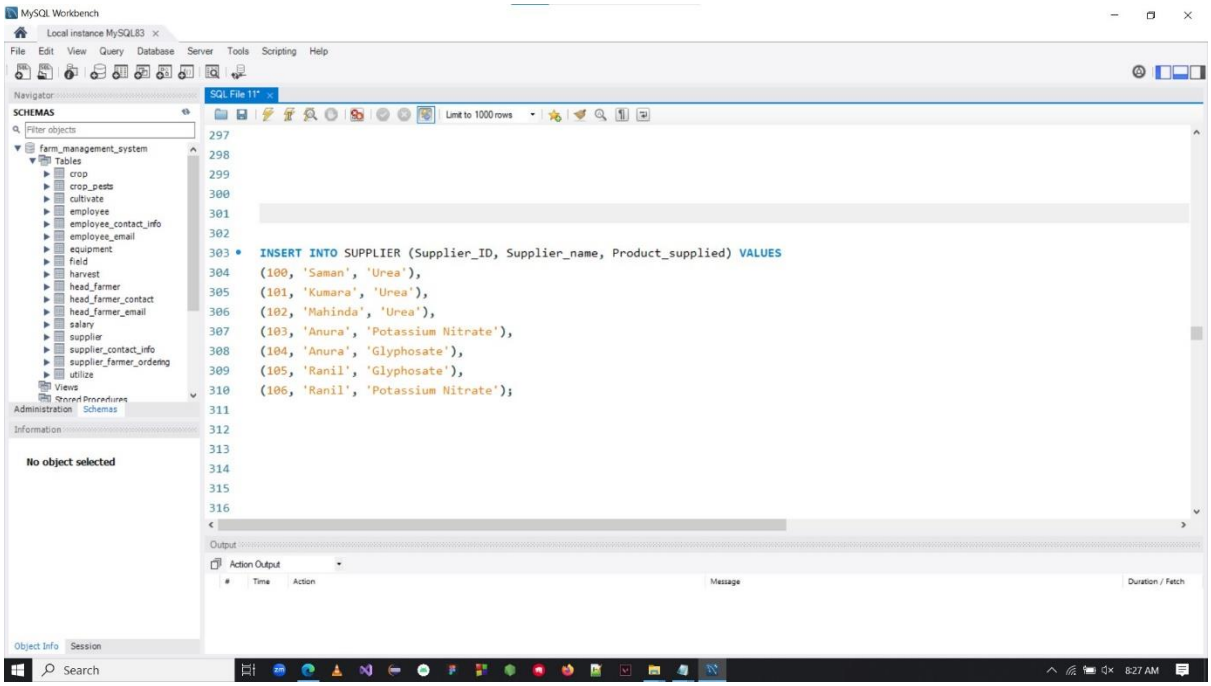


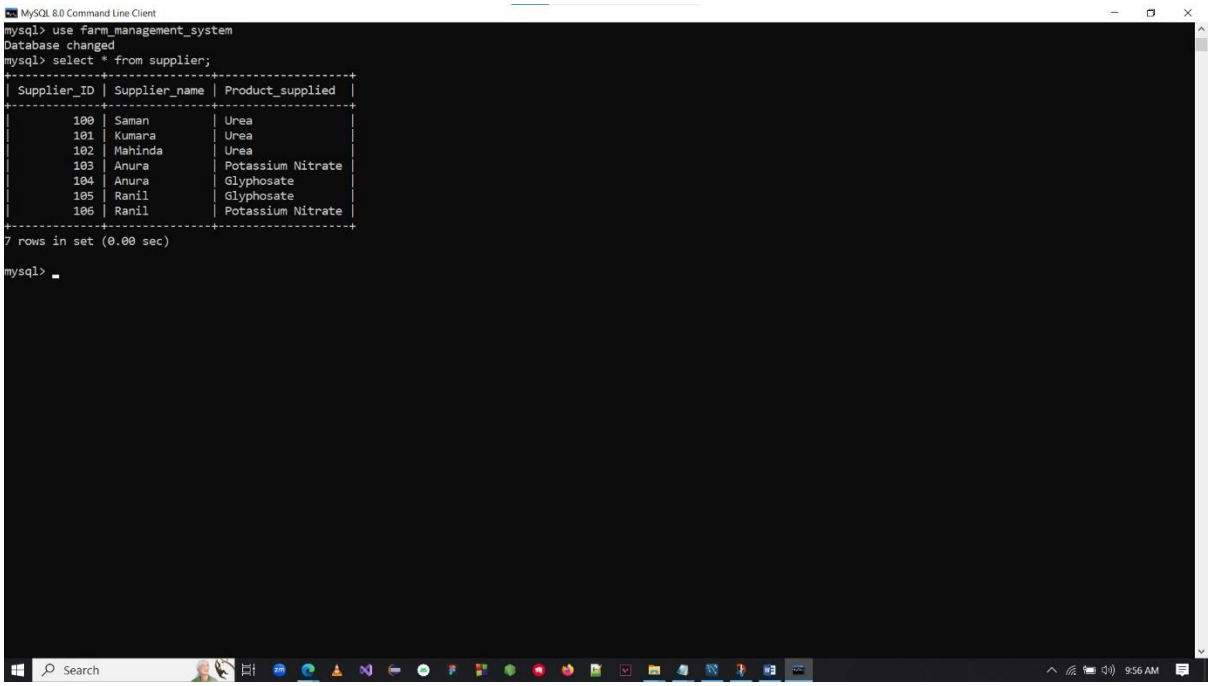
17.Harvest table



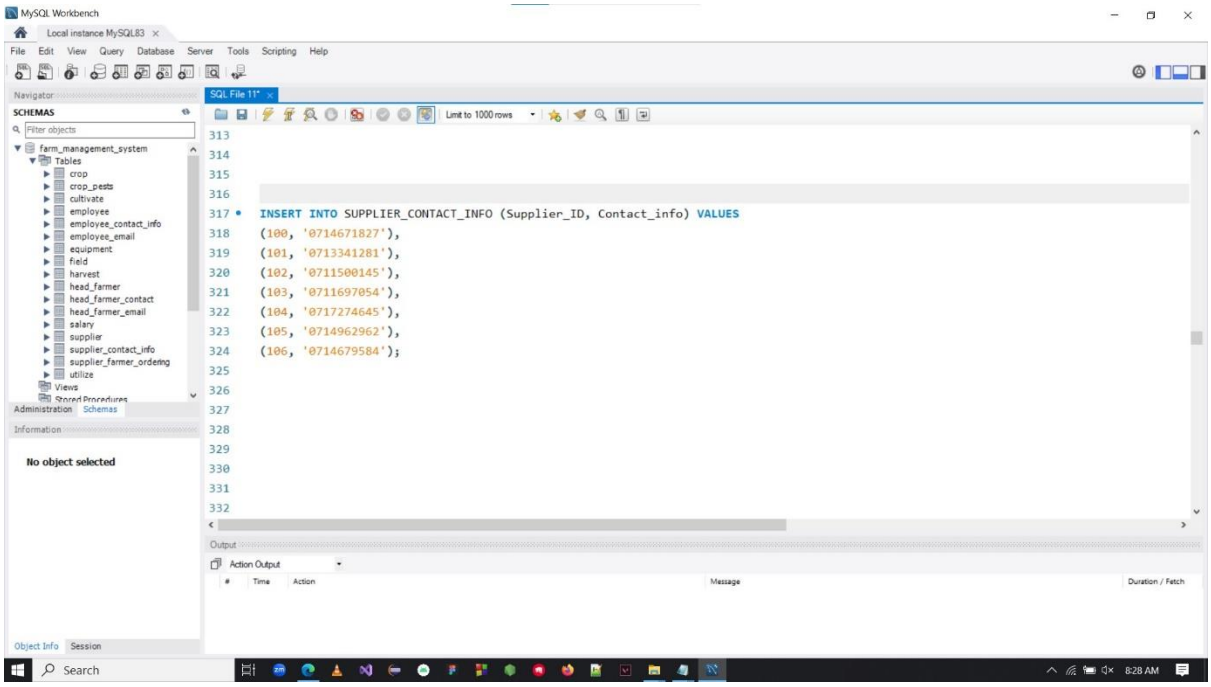
Inserting Data for Tables

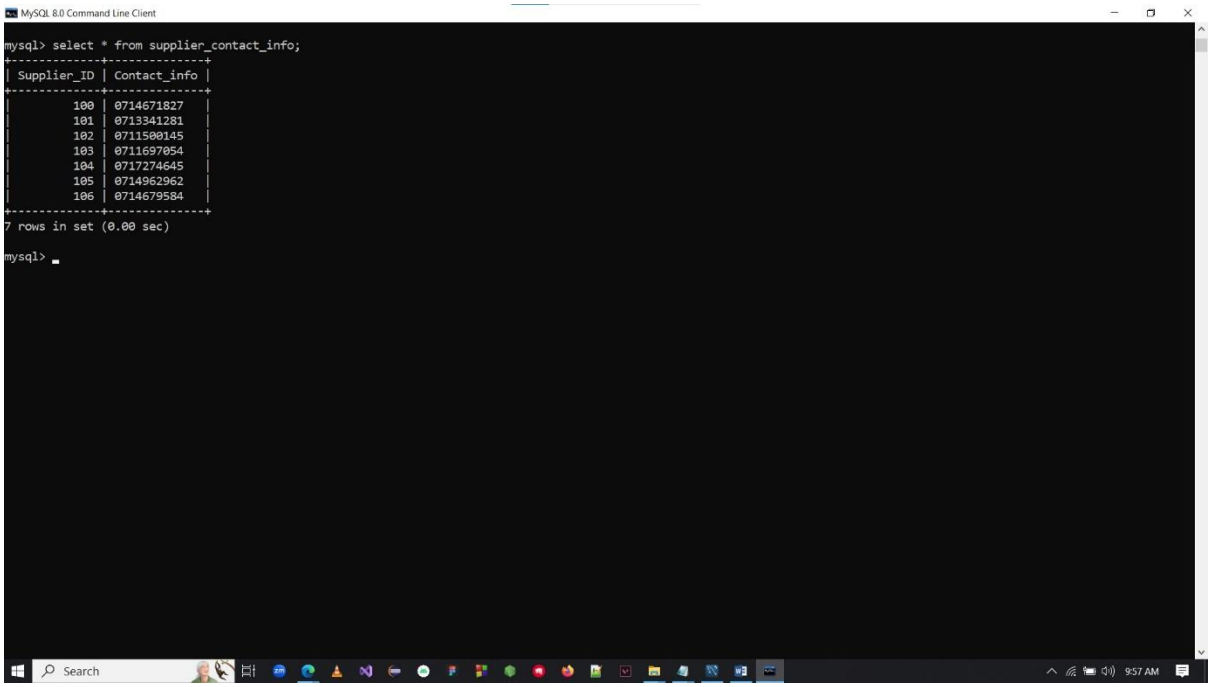
1. Insert into Supplier table



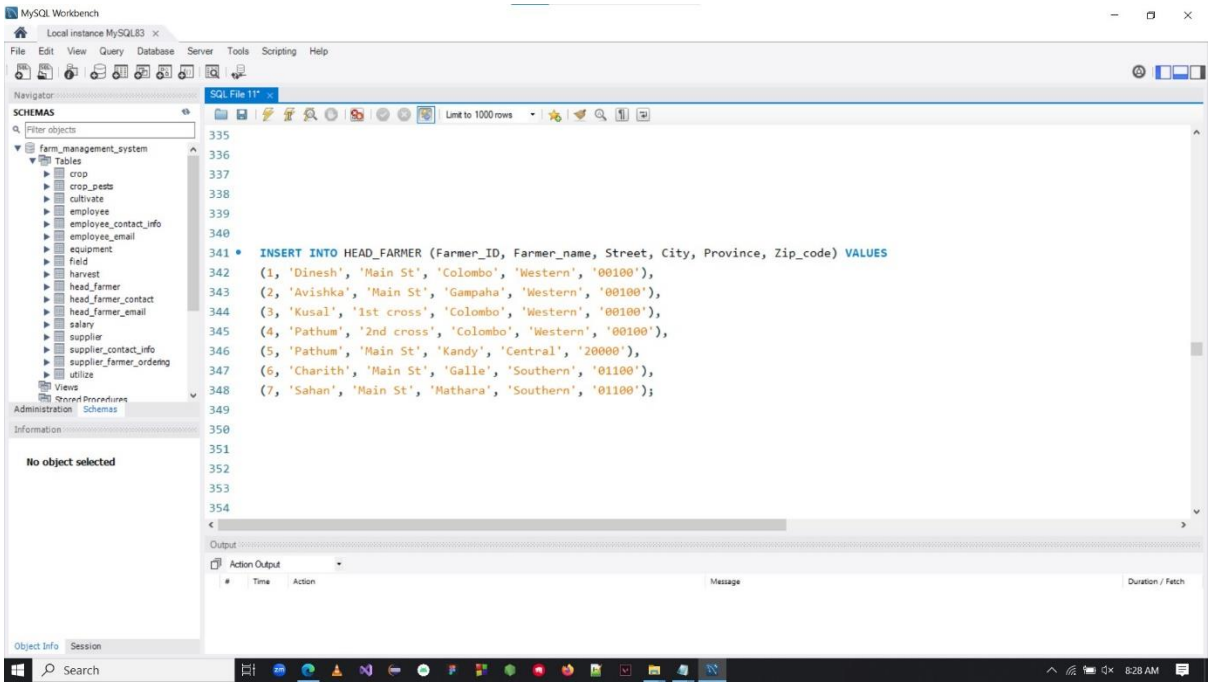


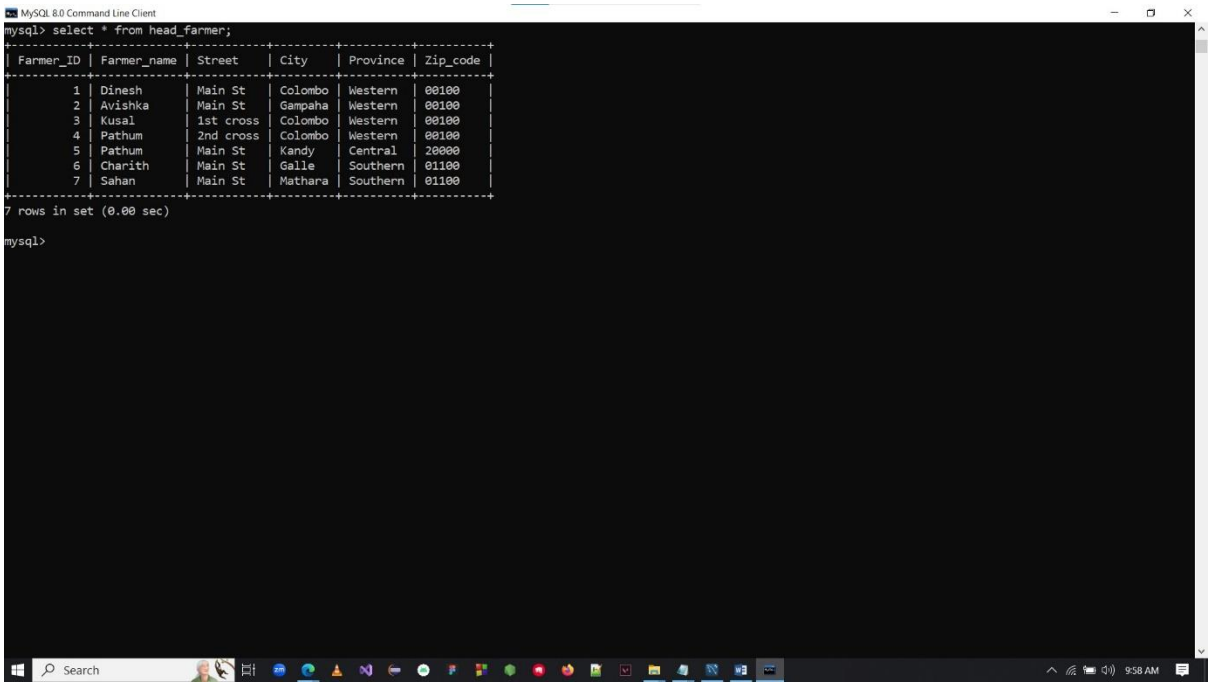
2. Insert into Supplier_contact_info table



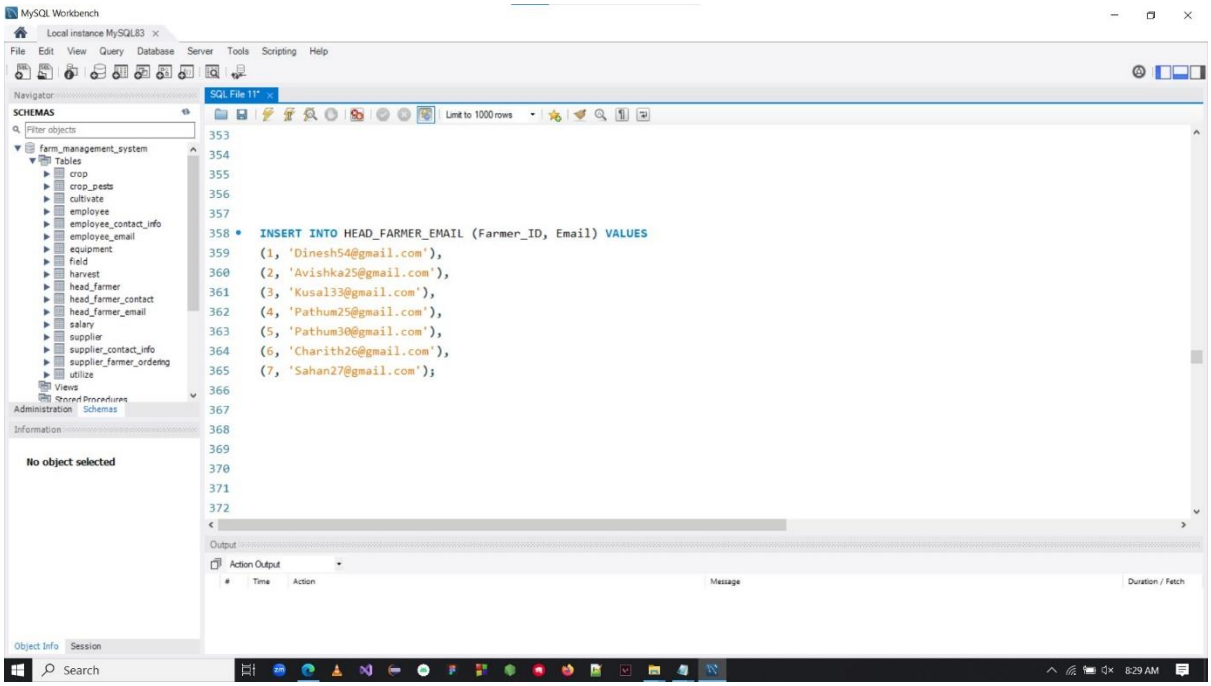


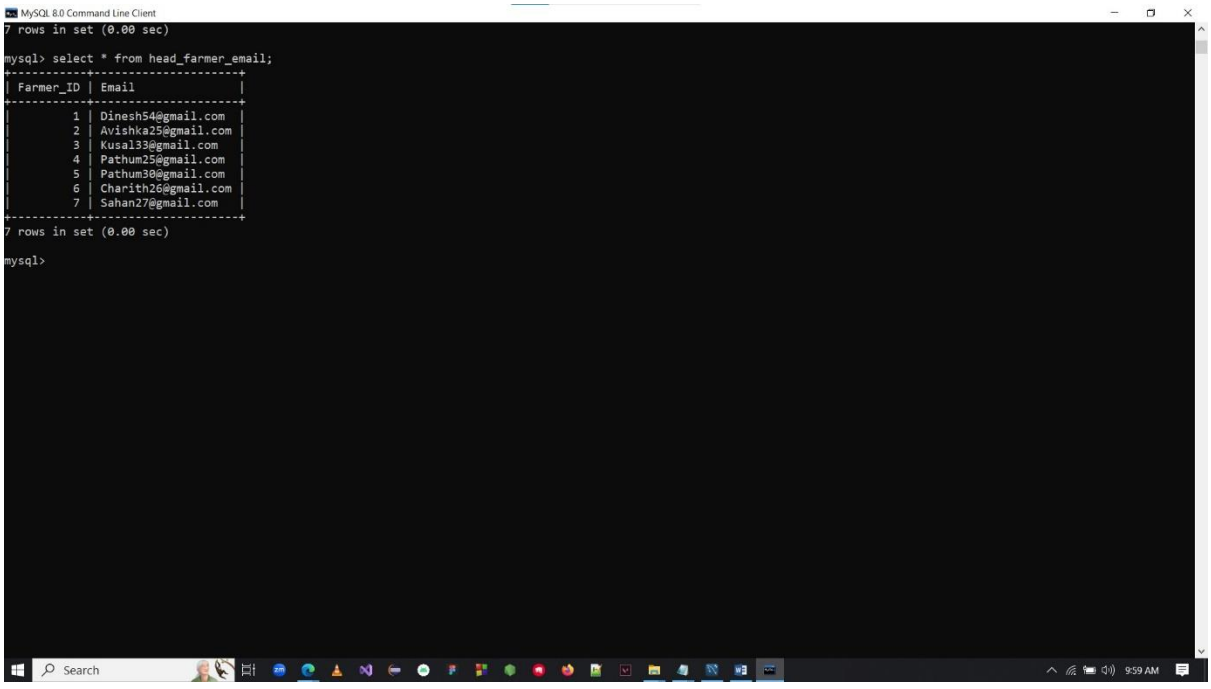
3. Insert into Head_famer table



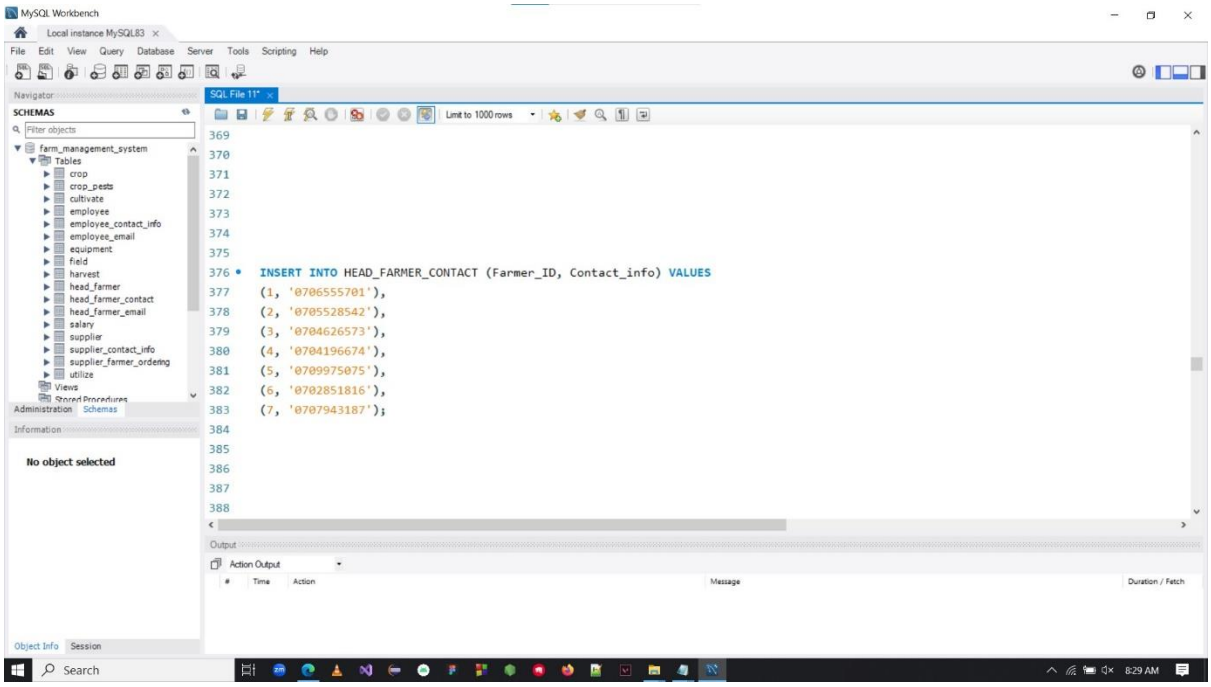


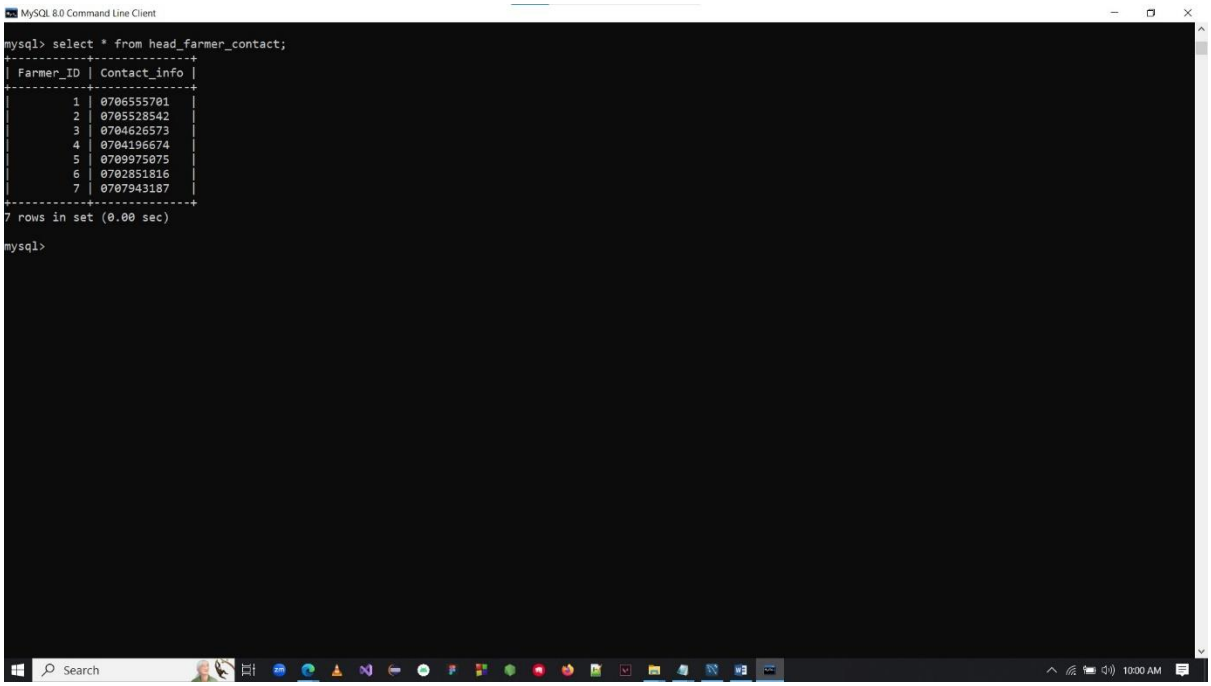
4. Insert into Head_farmer_email table



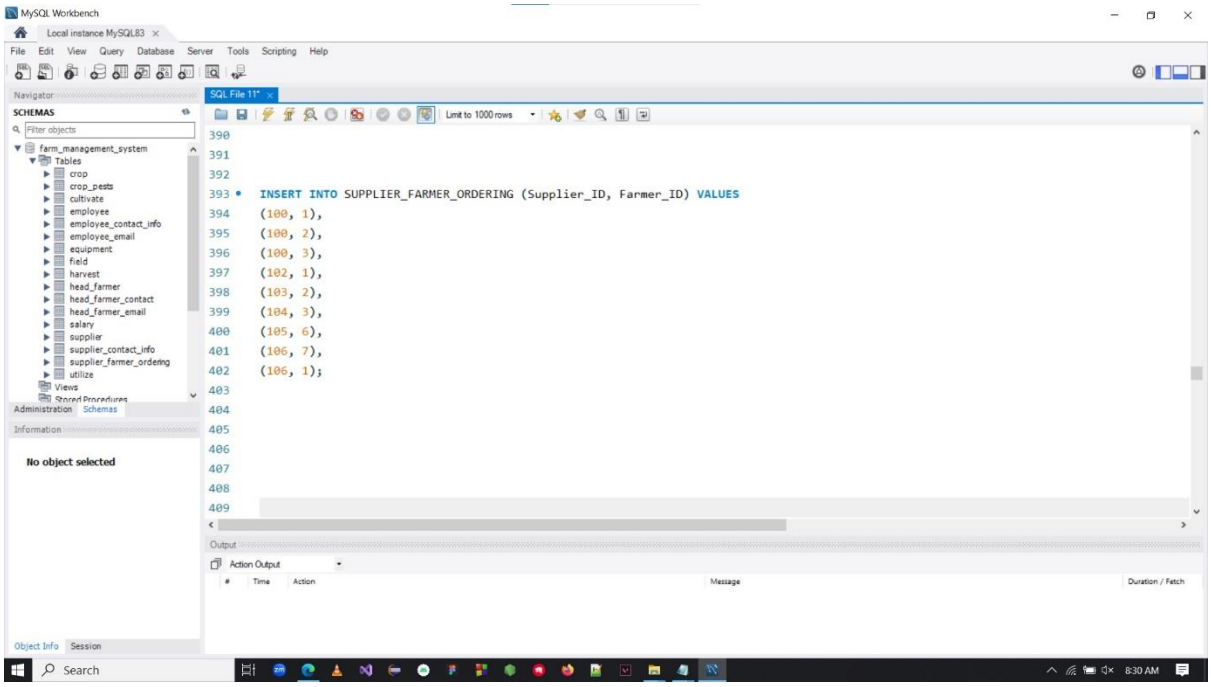


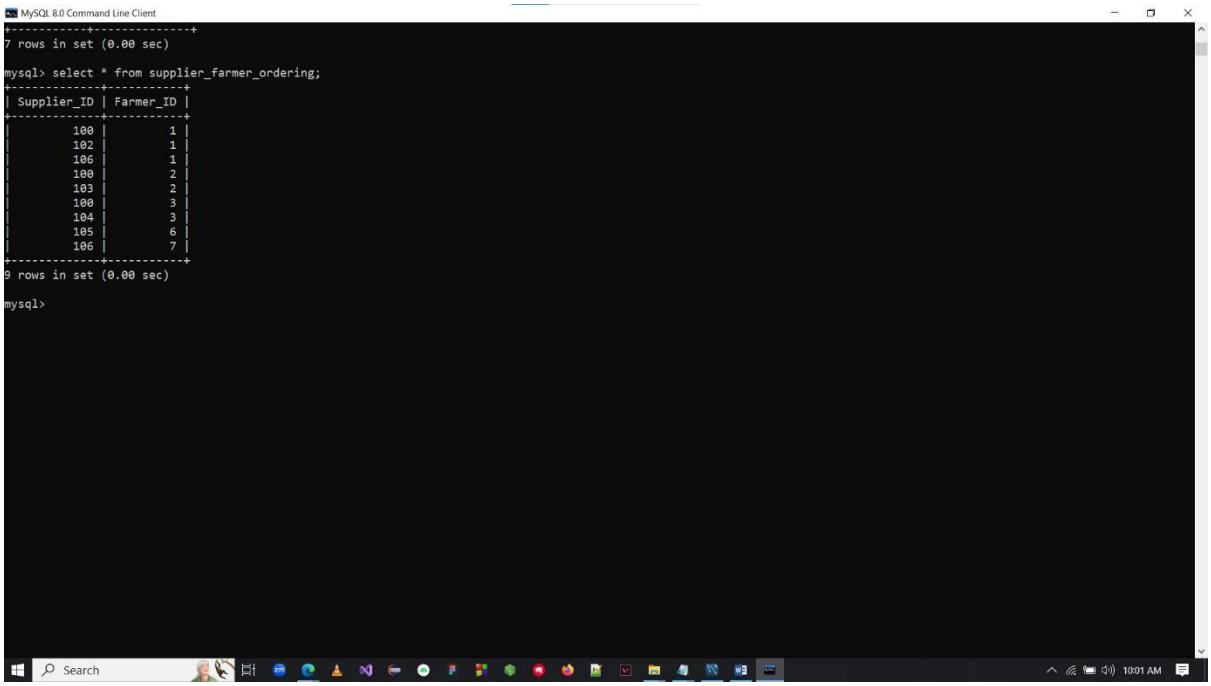
5. Insert into Head_farmer_contact table



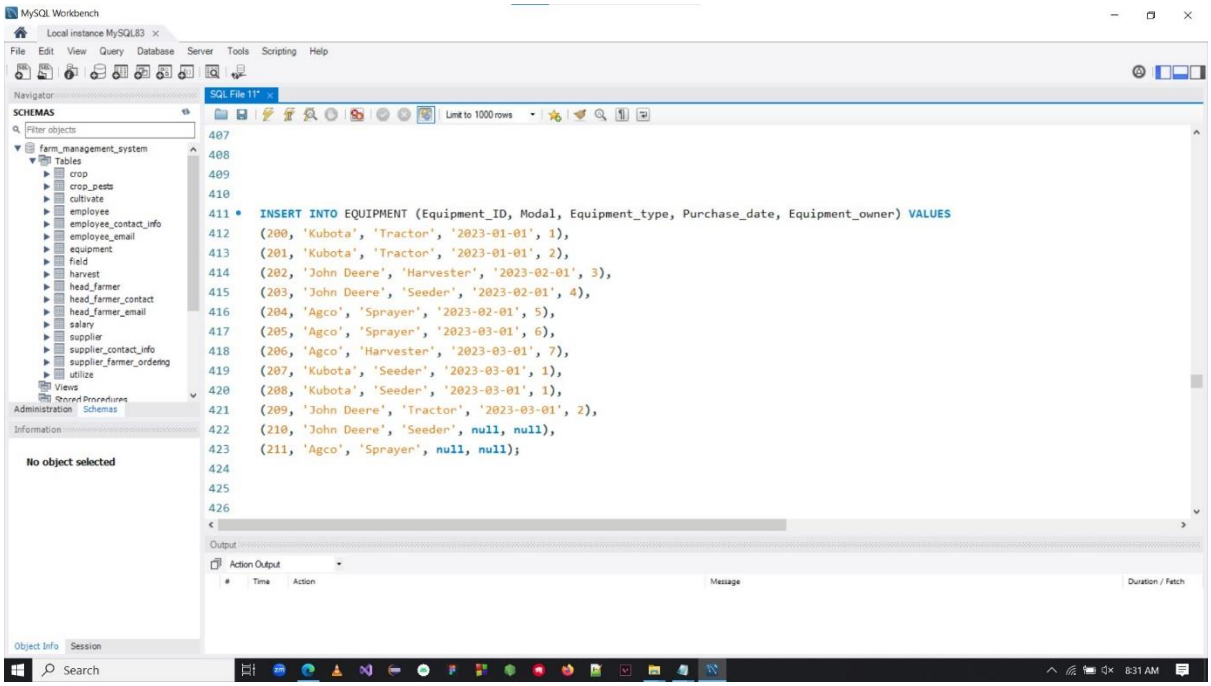


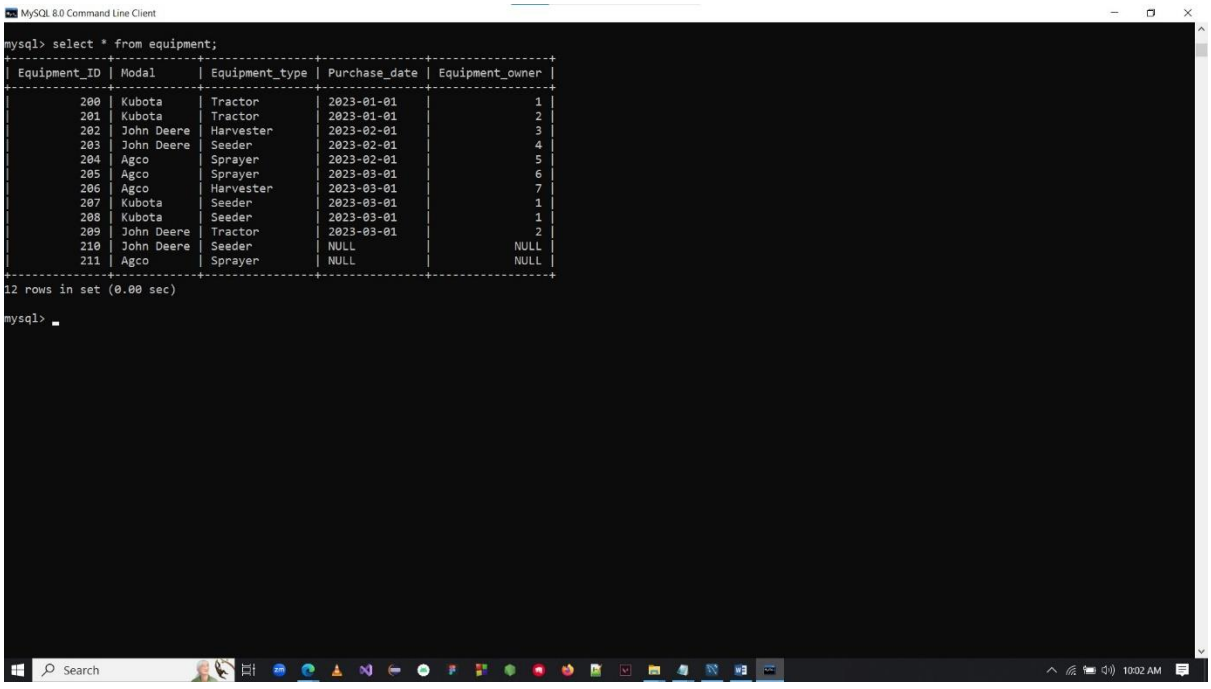
6. Insert into Supplier_farmer_ordering table



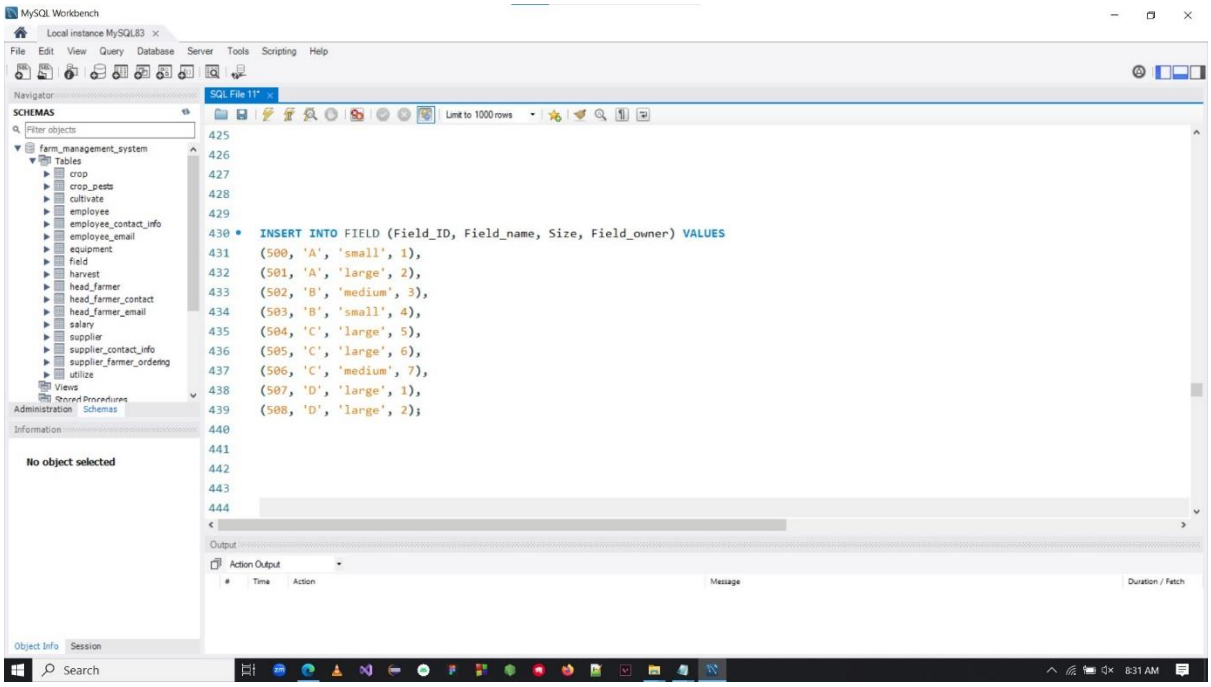


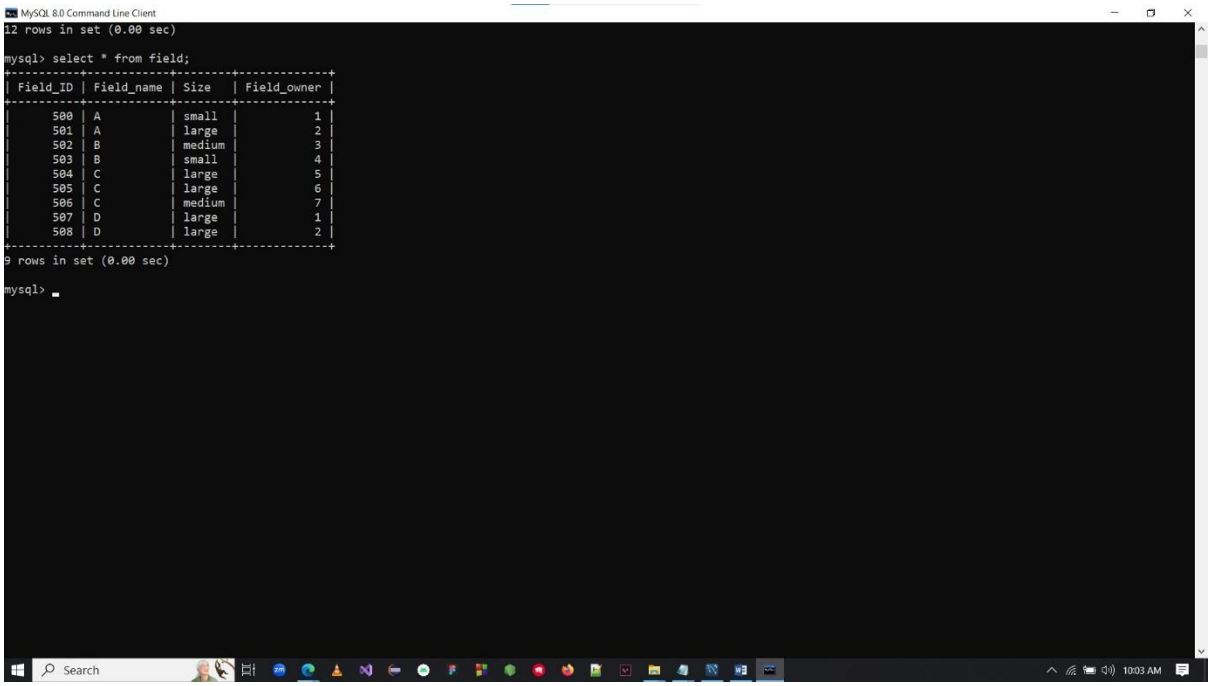
7. Insert into Equipment table



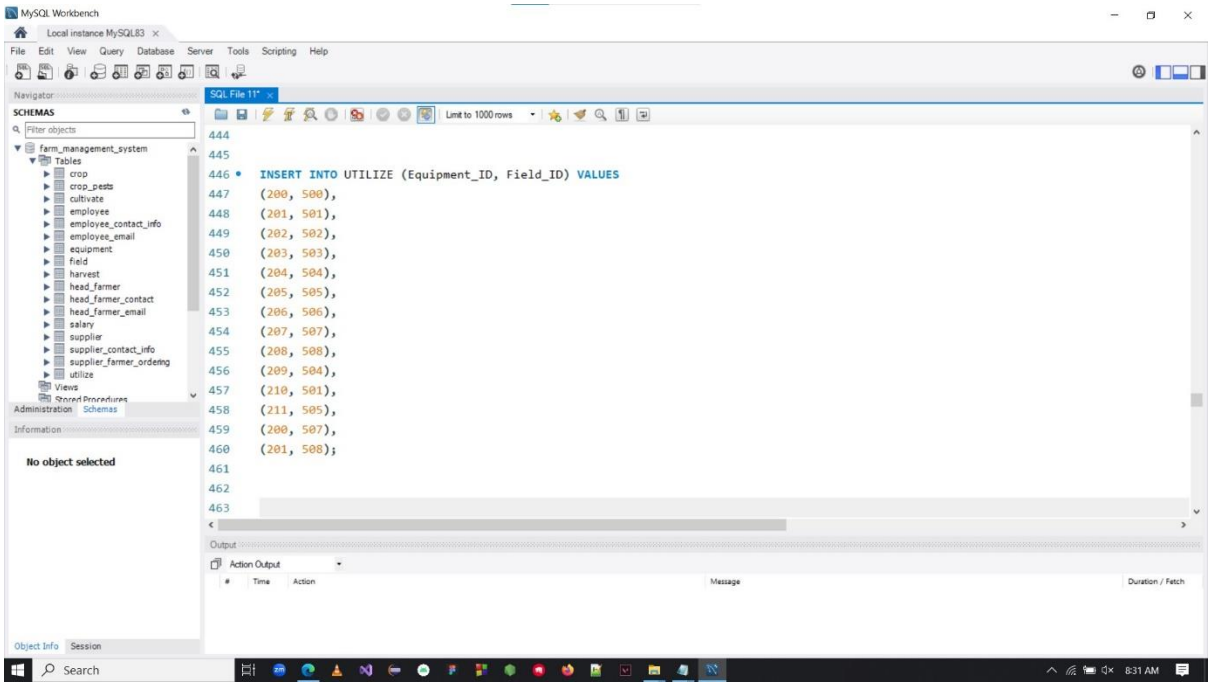


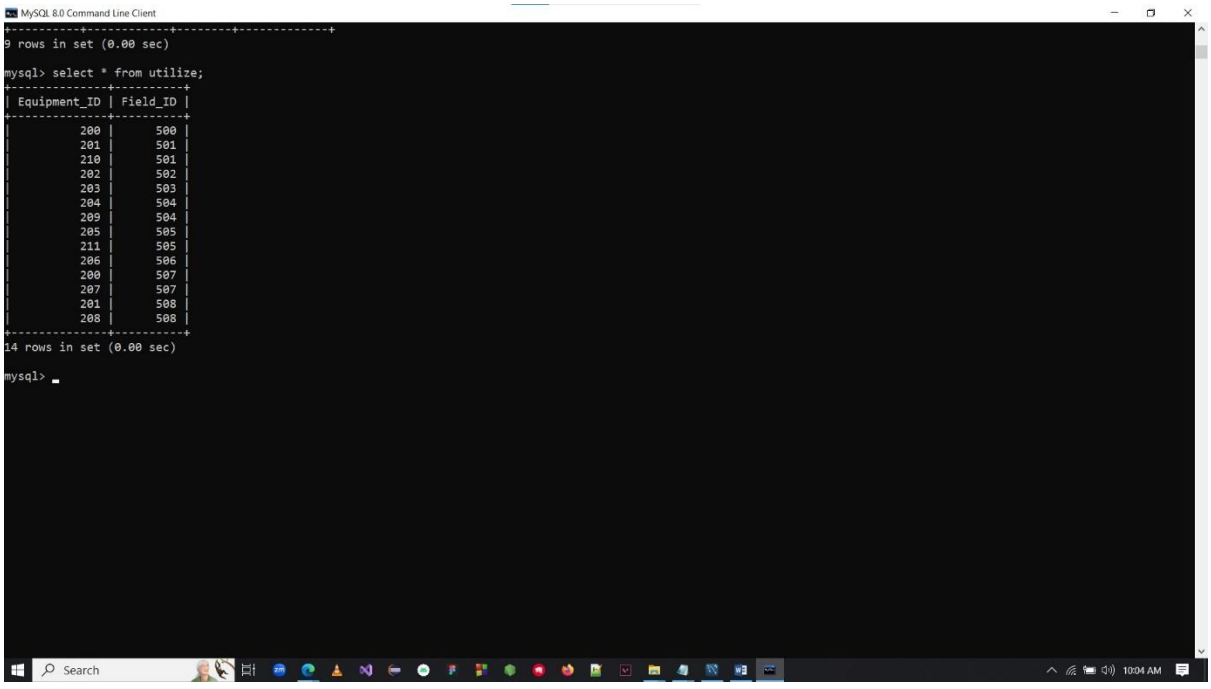
8. Insert into Field table



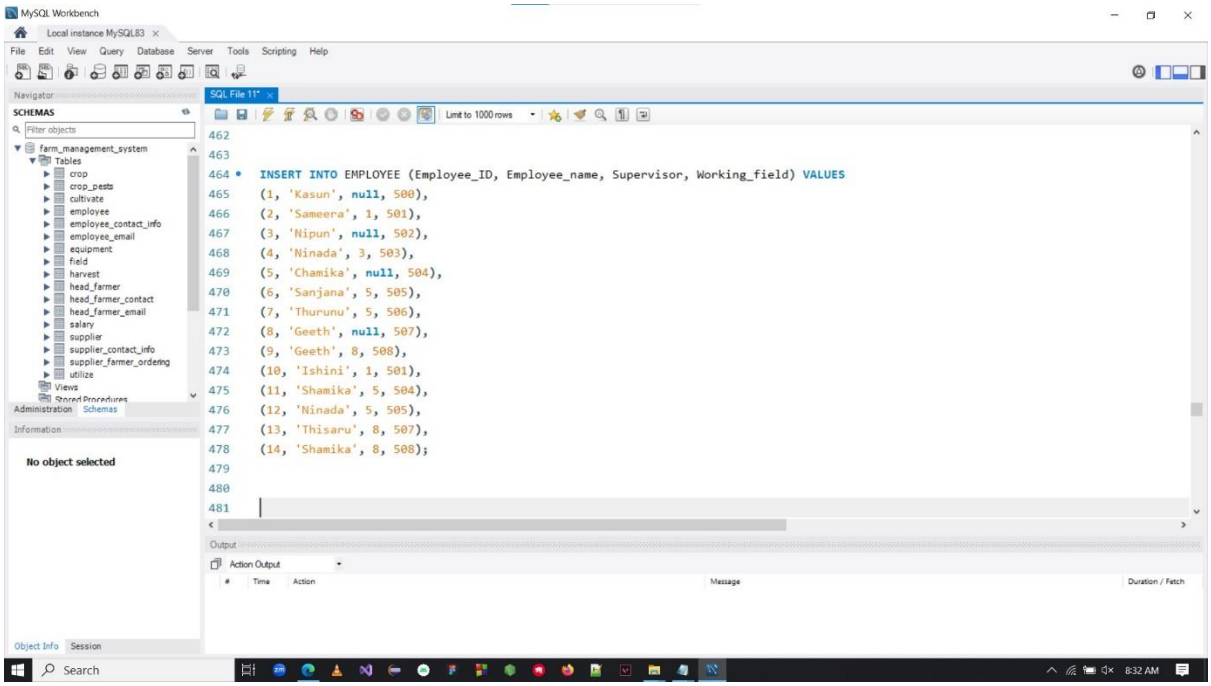


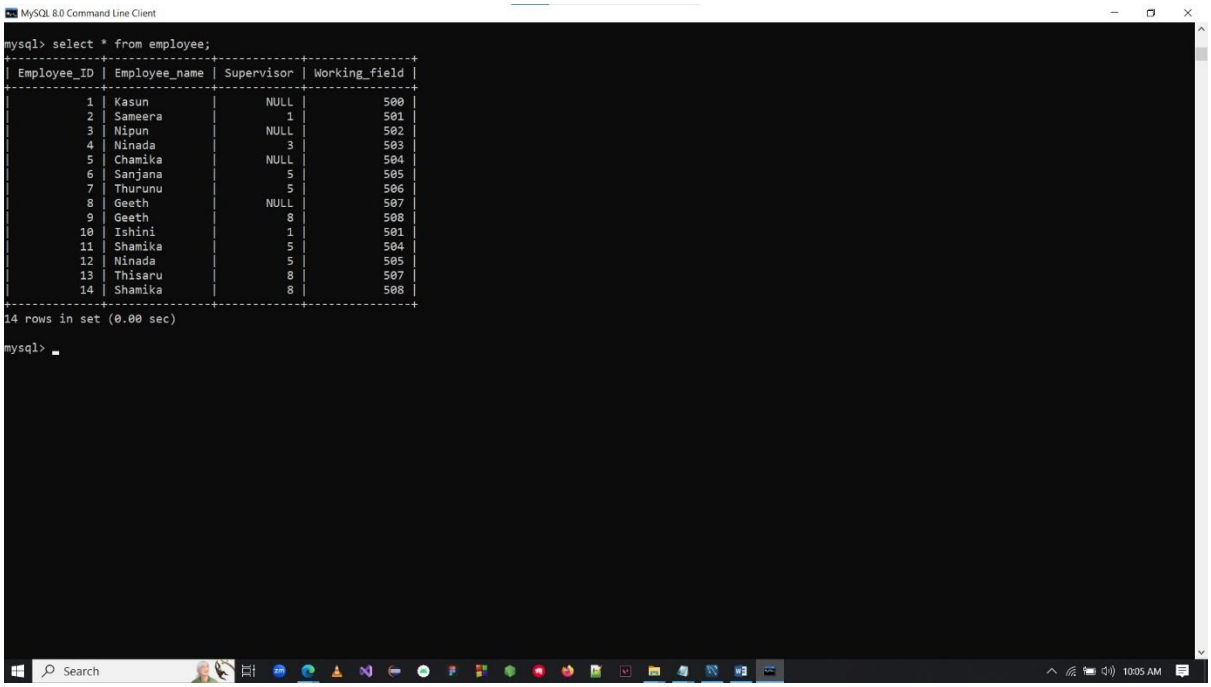
9. Insert into Utilize table



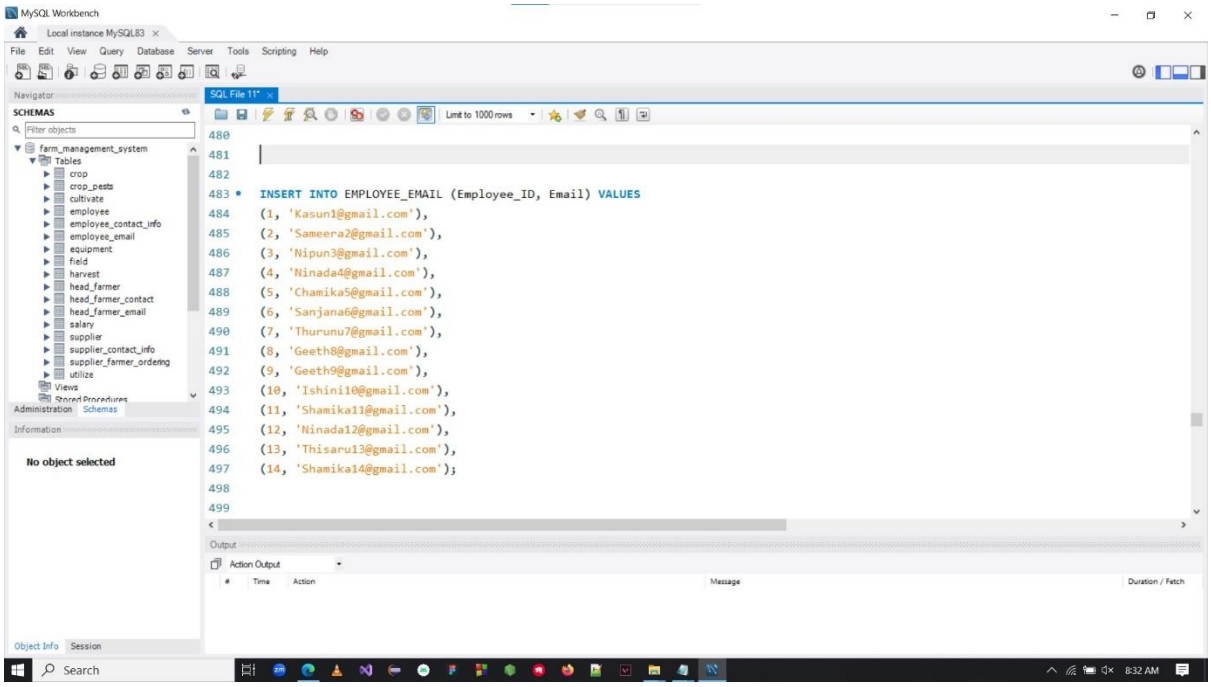


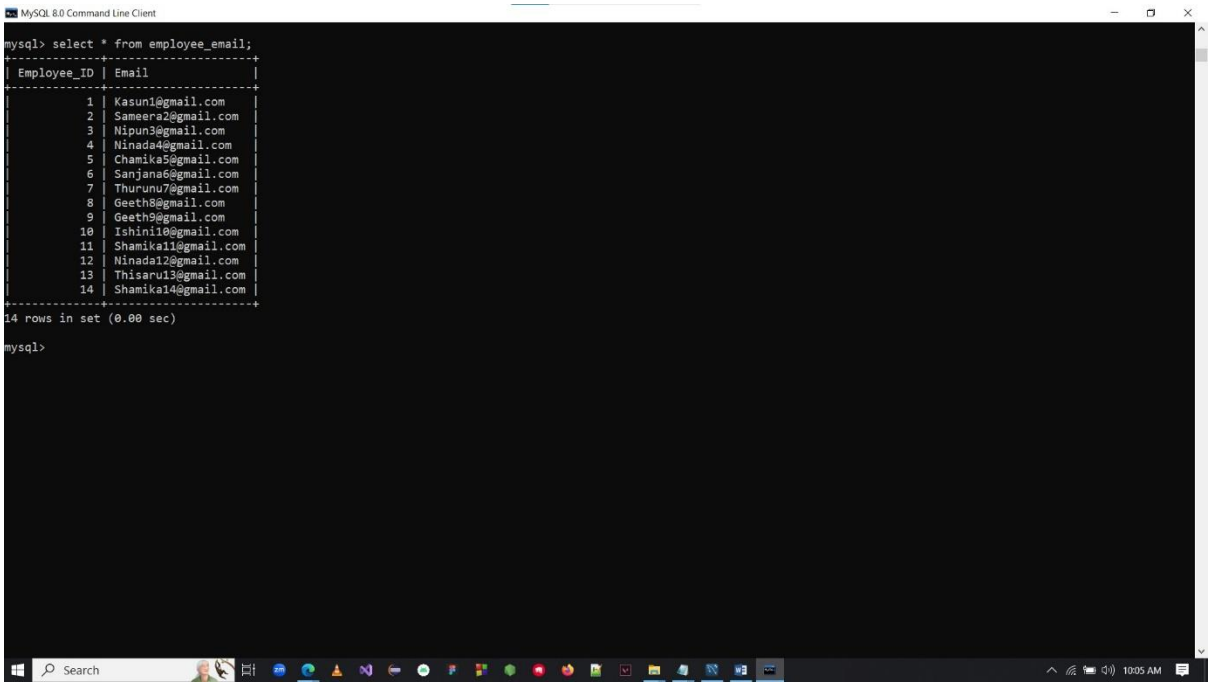
10.Insert into Employee table



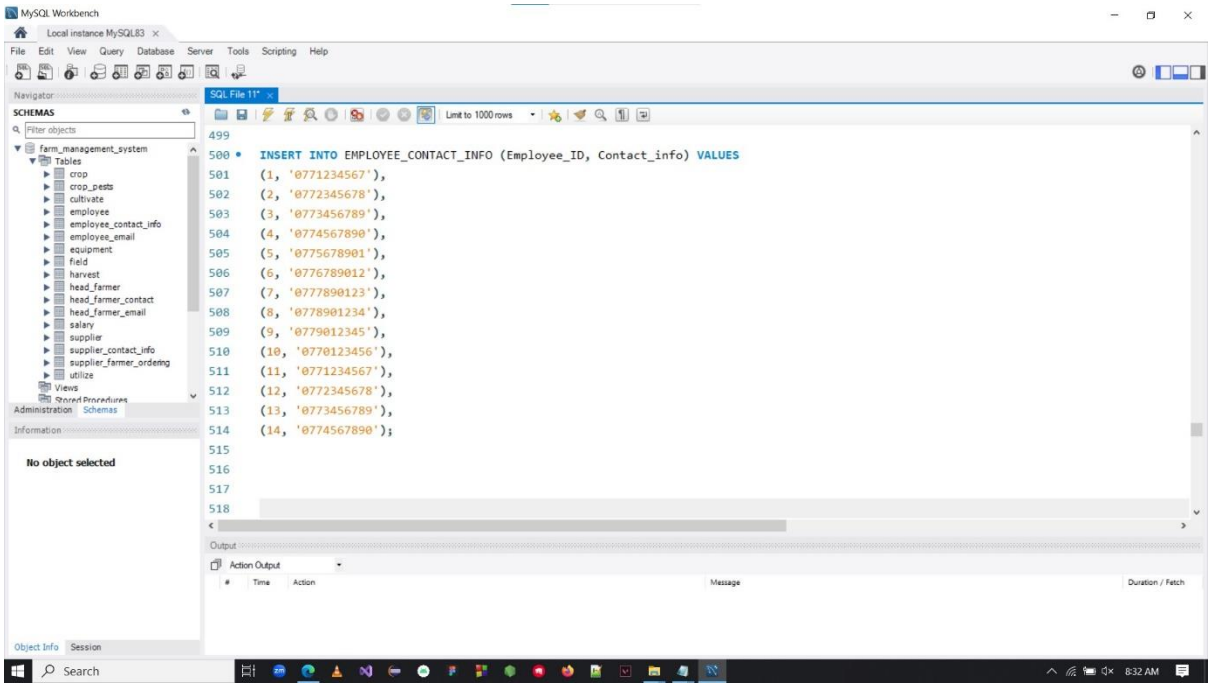


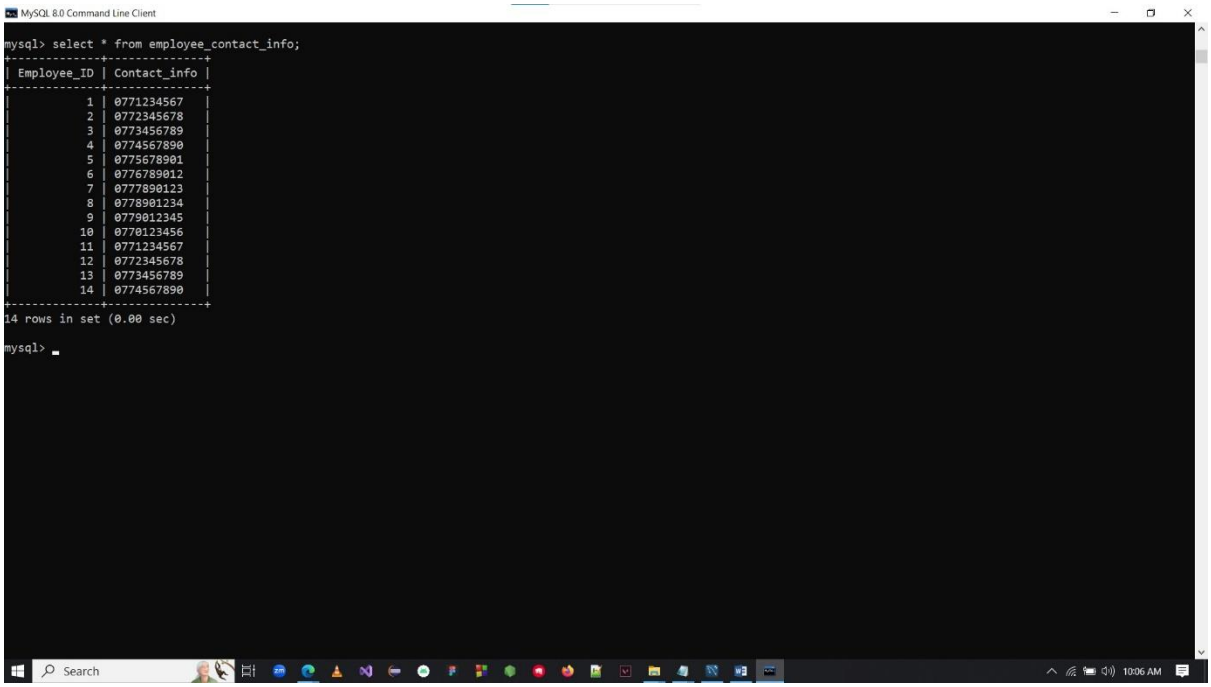
11.Insert into Employee_email table



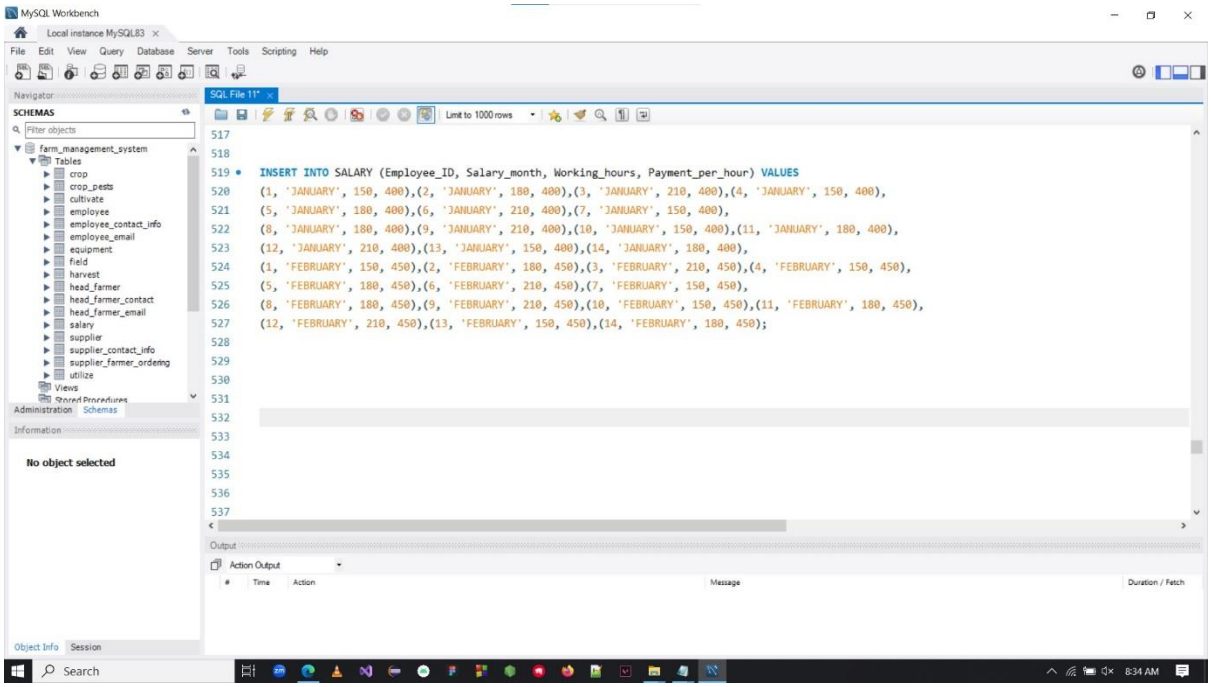


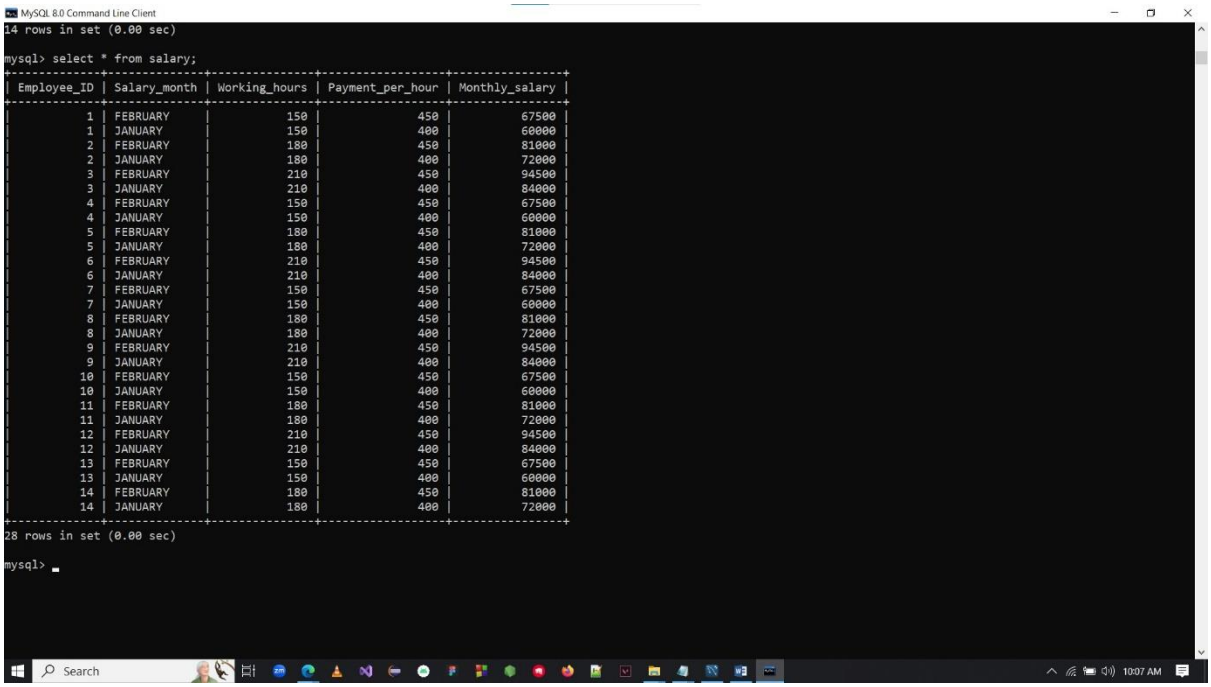
12.Insert into Employee_contact_info table



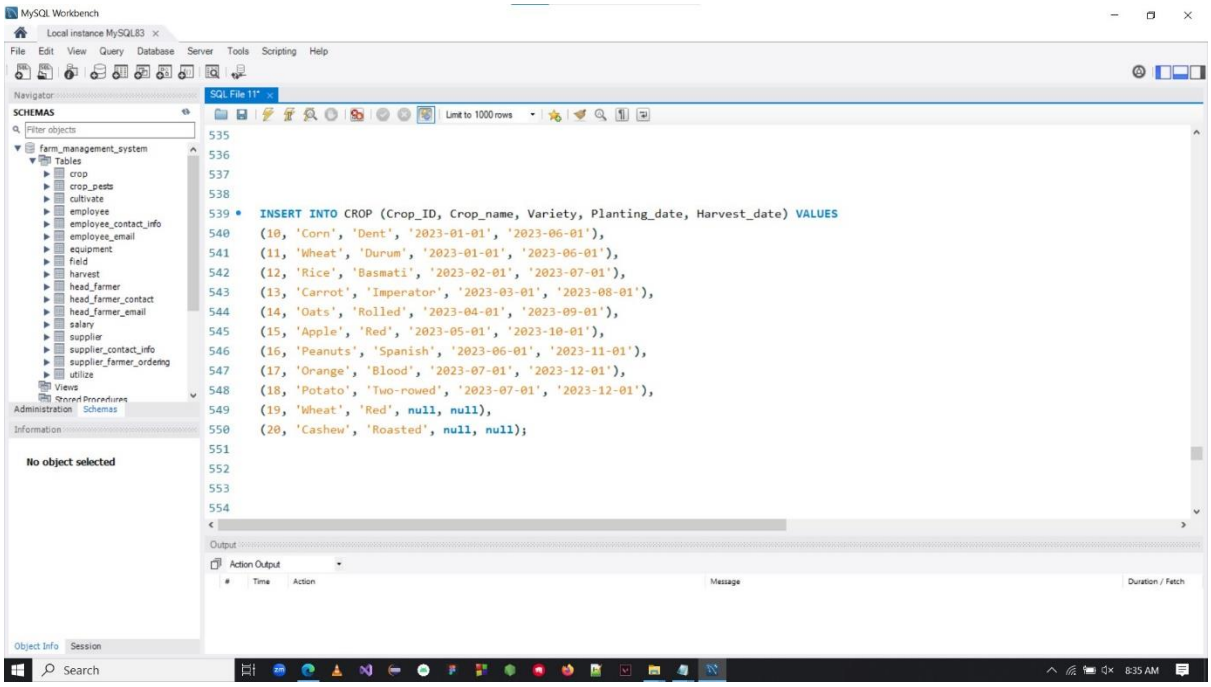


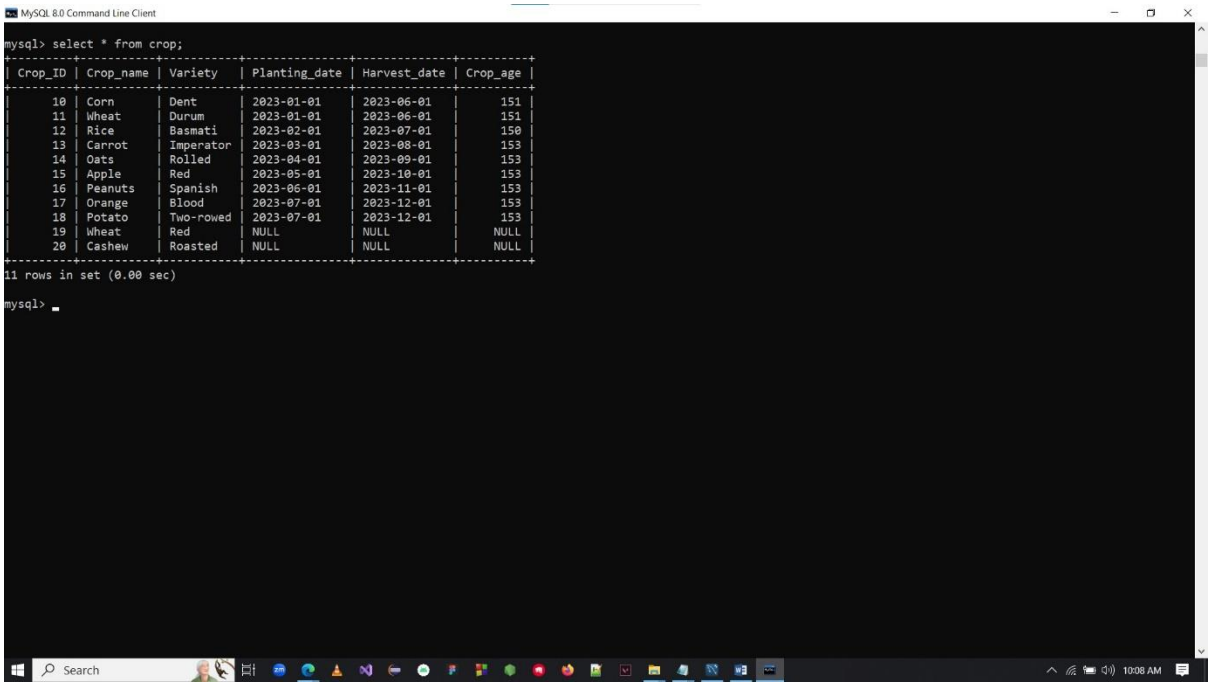
13.Insert into Salary table



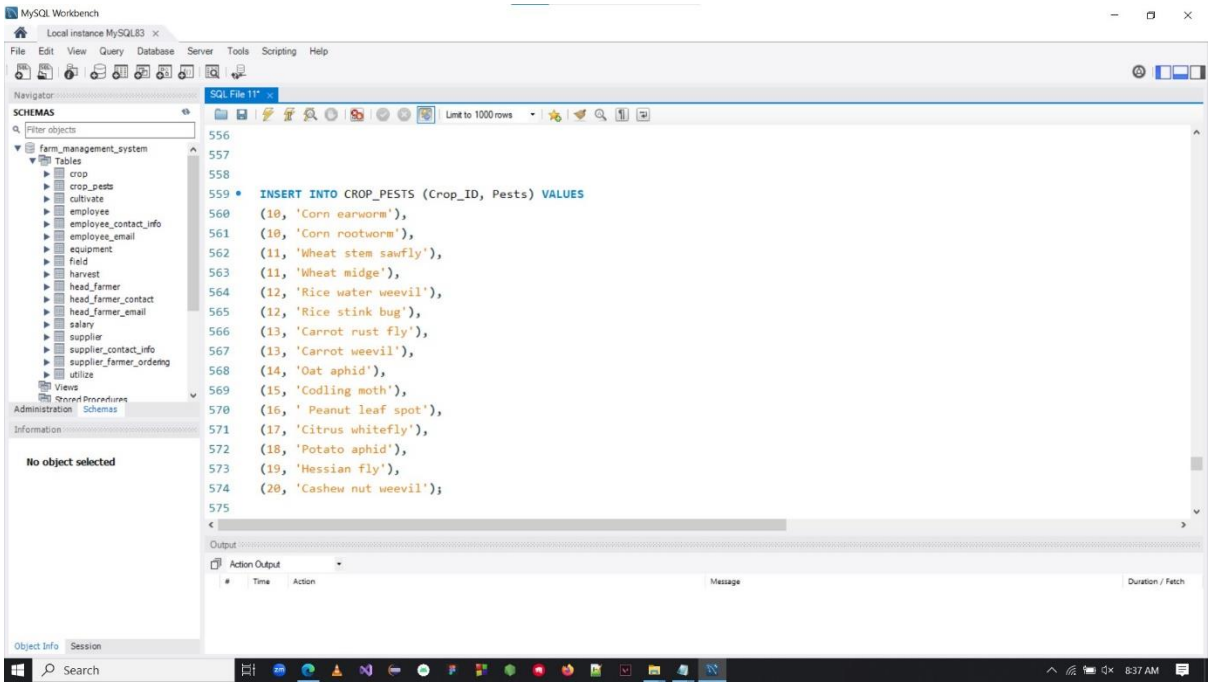


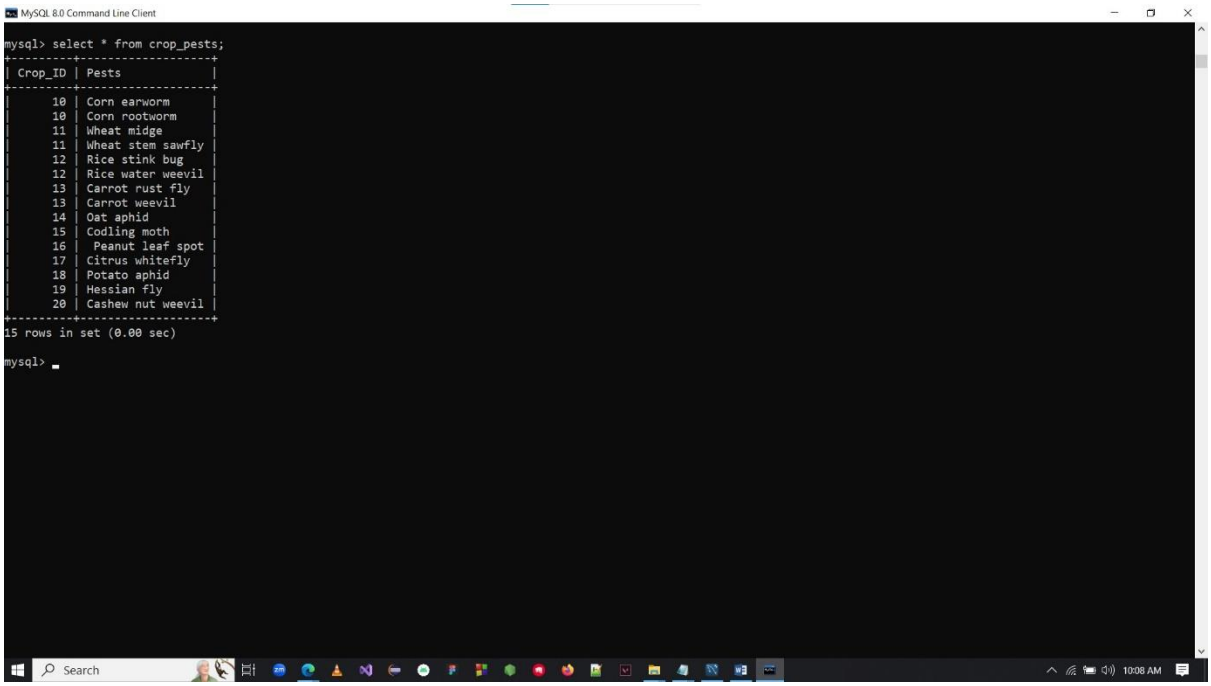
14.Insert into Crop table



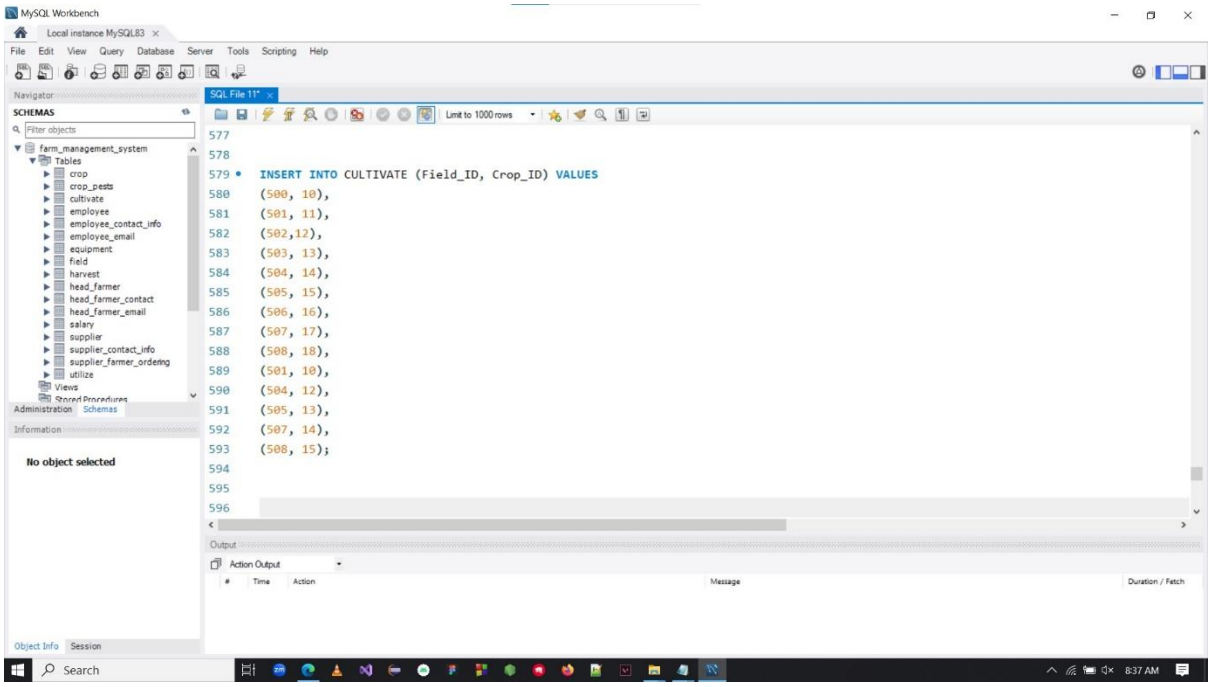


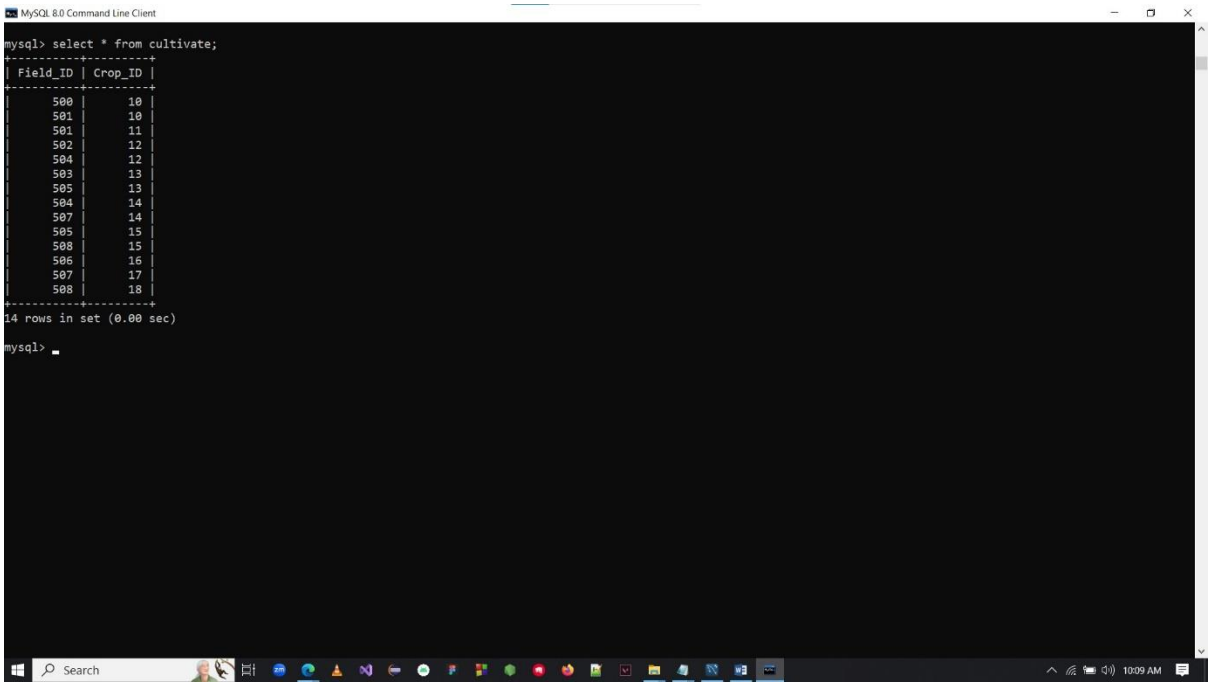
15.Insert into Crop_pests table



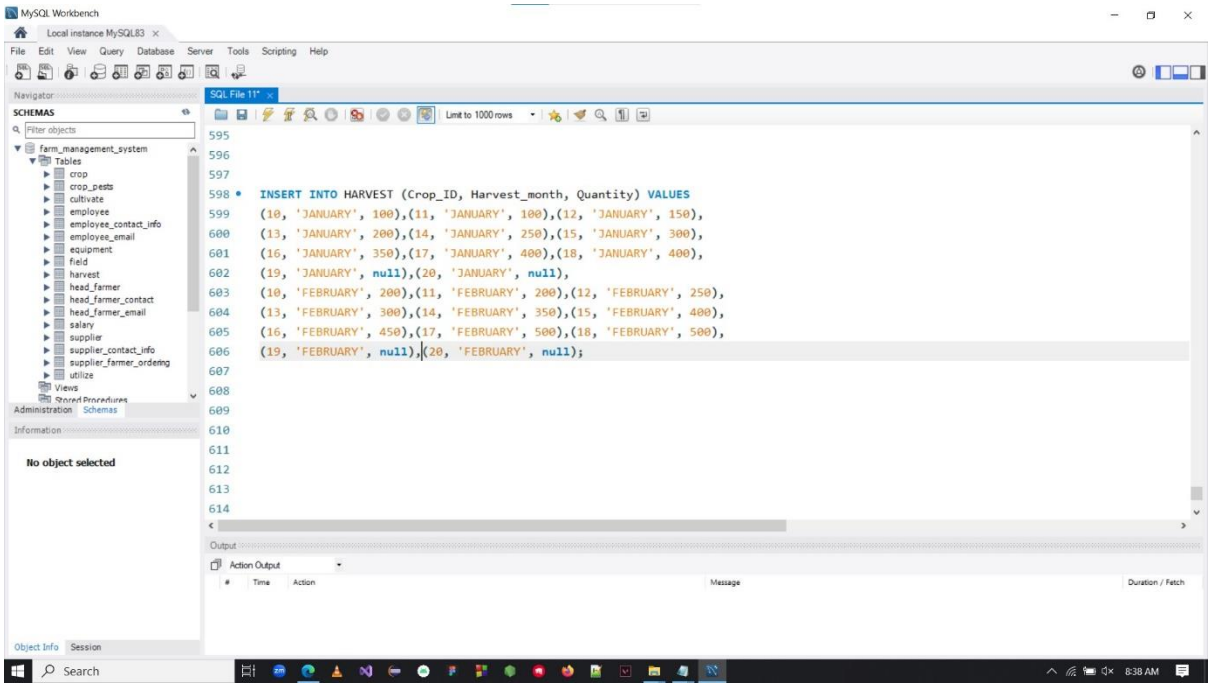


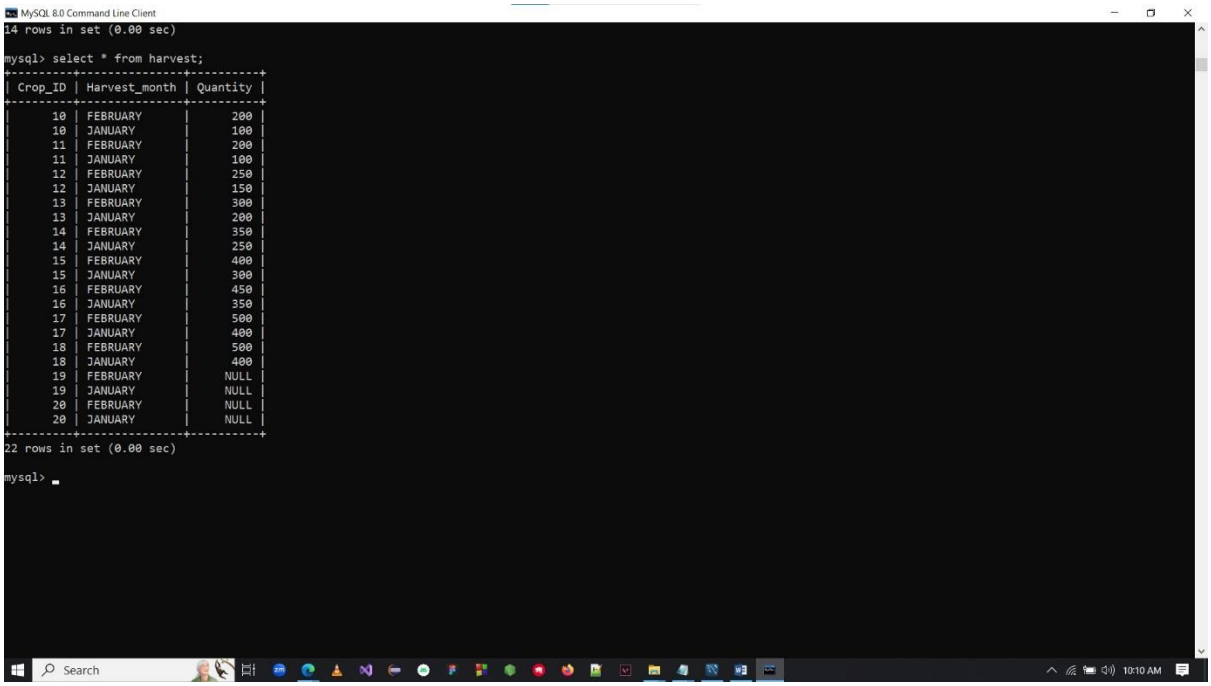
16.Insert into Cultivate table





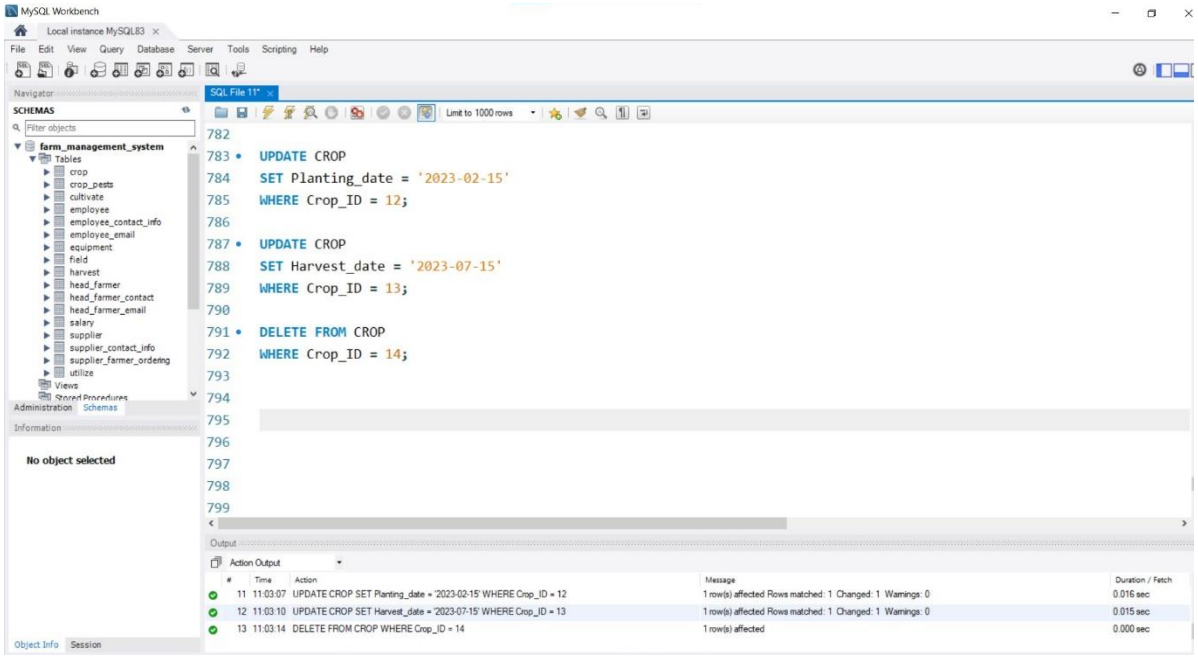
17.Insert into Harvest table

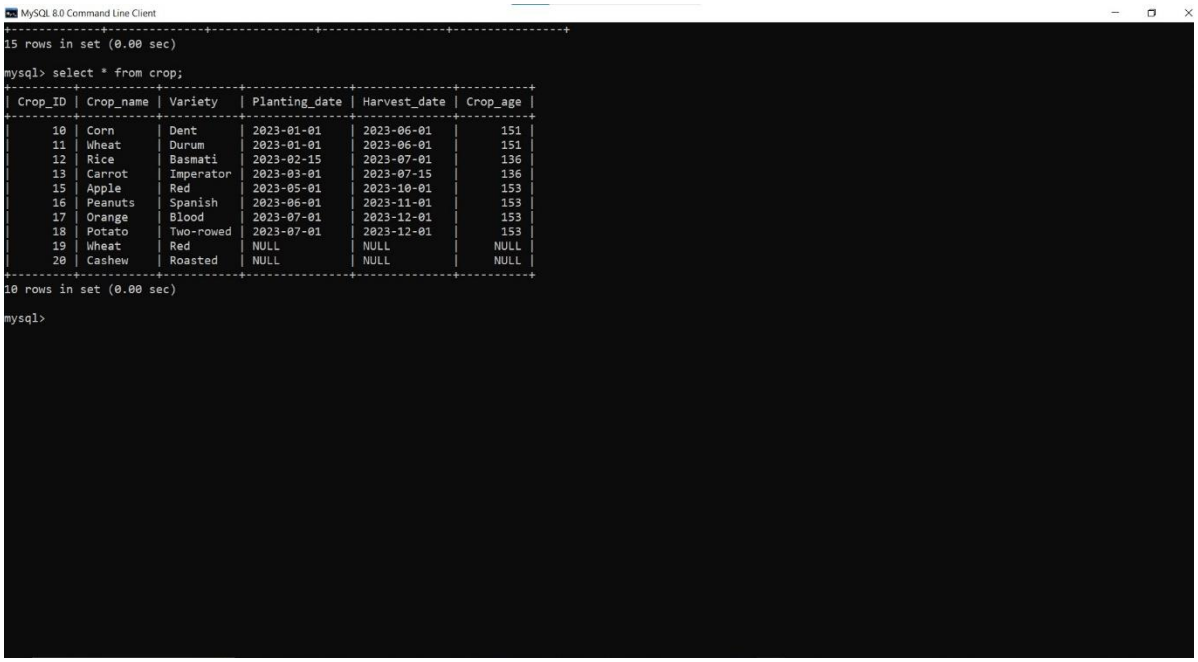




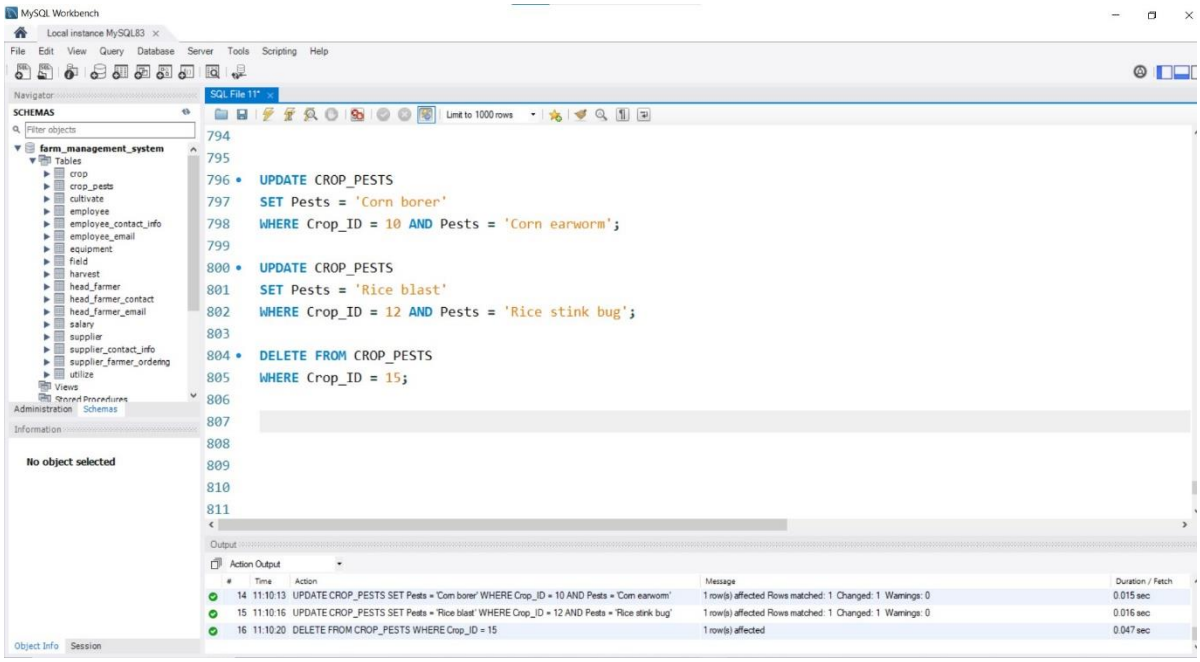
Update and Delete

1. Crop



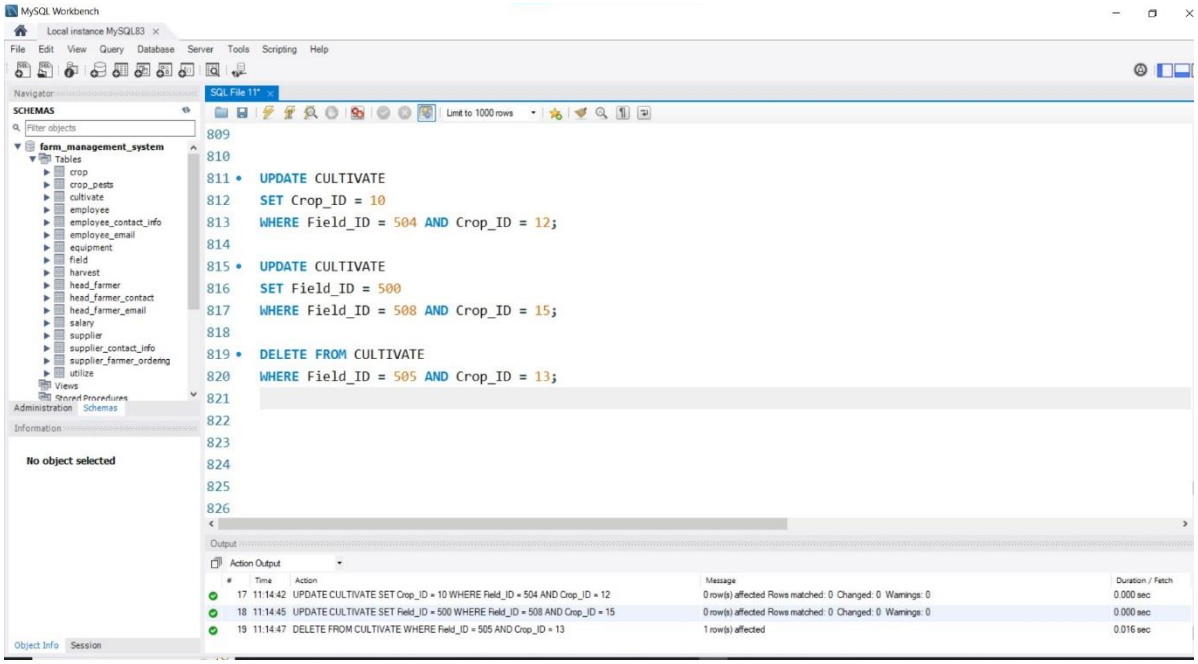


2. Crop_pests


MySQL Workbench
Local instance MySQL83
File Edit View Query Database Server Tools Scripting Help
SCHEMAS
farm_management_system
Tables
crop
crop_pests
cultivate
employee
employee_contact_info
employee_email
equipment
field
harvest
head_farmer
head_farmer_contact
head_farmer_email
salary
supplier
supplier_contact_info
supplier_farmer_ordering
utilize
Views
Stored Procedures
Administration Schemas
Information
No object selected
Object Info Session
SQL File 11*
Limit to 1000 rows
794
795
796 • UPDATE CROP_PESTS
797 SET Pests = 'Corn borer'
798 WHERE Crop_ID = 10 AND Pests = 'Corn earworm';
799
800 • UPDATE CROP_PESTS
801 SET Pests = 'Rice blast'
802 WHERE Crop_ID = 12 AND Pests = 'Rice stink bug';
803
804 • DELETE FROM CROP_PESTS
805 WHERE Crop_ID = 15;
806
807
808
809
810
811
Output
Action Output
Time Action Message Duration / Fetch
14 11:10:13 UPDATE CROP_PESTS SET Pests = 'Corn borer' WHERE Crop_ID = 10 AND Pests = 'Corn earworm' 1 row(s) affected Rows matched: 1 Changed: 1 Warnings: 0 0.015 sec
15 11:10:16 UPDATE CROP_PESTS SET Pests = 'Rice blast' WHERE Crop_ID = 12 AND Pests = 'Rice stink bug' 1 row(s) affected Rows matched: 1 Changed: 1 Warnings: 0 0.016 sec
16 11:10:20 DELETE FROM CROP_PESTS WHERE Crop_ID = 15 1 row(s) affected 0.047 sec

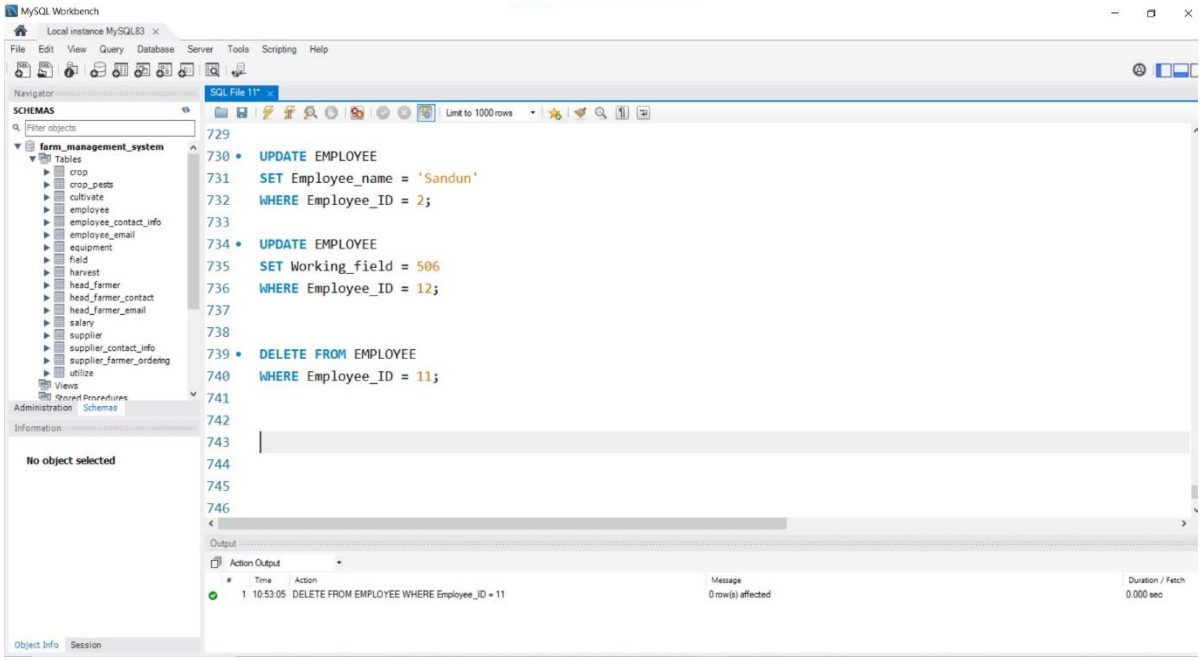

MySQL 8.0 Command Line Client
10 rows in set (0.00 sec)
mysql> select * from crop_pests;
+---------+------------------+
| Crop_ID | Pests |
+---------+------------------+
10	Corn borer
10	Corn rootworm
11	Wheat midge
11	Wheat stem sawfly
12	Rice blast
12	Rice water weevil
13	Carrot rust fly
13	Carrot weevil
16	Peanut leaf spot
17	Citrus whitefly
18	Potato aphid
19	Hessian fly
20	Cashew nut weevil
+---------+------------------+
13 rows in set (0.00 sec)
mysql>

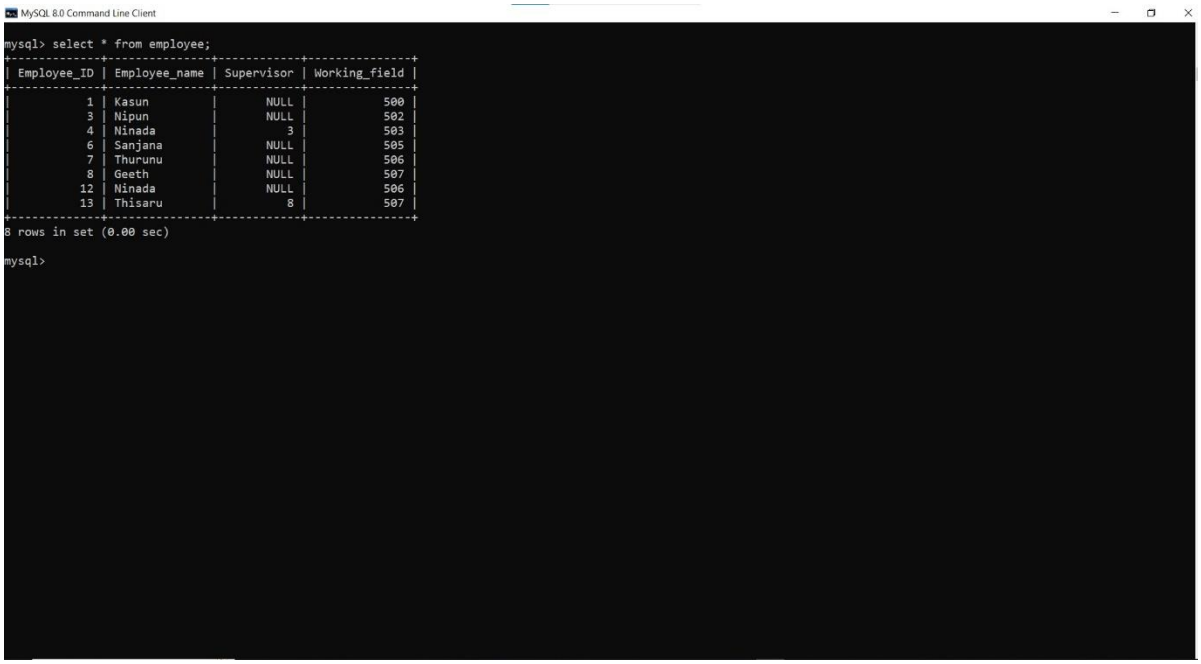
3. Cultivate


MySQL Workbench
Local instance MySQL83
File Edit View Query Database Server Tools Scripting Help
SCHEMAS
farm_management_system
Tables
crop
crop_pests
cultivate
employee
employee_contact_info
employee_email
equipment
field
harvest
head_farmer
head_farmer_contact
head_farmer_email
salary
supplier
supplier_contact_info
supplier_farmer_ordering
utilize
Views
Stored Procedures
Administration Schemas
Information
No object selected
Object Info Session
SQL File 11*
Limit to 1000 rows
809
810
811 • UPDATE CULTIVATE
812 SET Crop_ID = 10
813 WHERE Field_ID = 504 AND Crop_ID = 12;
814
815 • UPDATE CULTIVATE
816 SET Field_ID = 500
817 WHERE Field_ID = 508 AND Crop_ID = 15;
818
819 • DELETE FROM CULTIVATE
820 WHERE Field_ID = 505 AND Crop_ID = 13;
821
822
823
824
825
826
Output
Action Output
Time Action Message Duration / Fetch
17 11:14:42 UPDATE CULTIVATE SET Crop_ID = 10 WHERE Field_ID = 504 AND Crop_ID = 12 0 row(s) affected Rows matched: 0 Changed: 0 Warnings: 0 0.000 sec
18 11:14:45 UPDATE CULTIVATE SET Field_ID = 500 WHERE Field_ID = 508 AND Crop_ID = 15 0 row(s) affected Rows matched: 0 Changed: 0 Warnings: 0 0.000 sec
19 11:14:47 DELETE FROM CULTIVATE WHERE Field_ID = 505 AND Crop_ID = 13 1 row(s) affected 0.016 sec

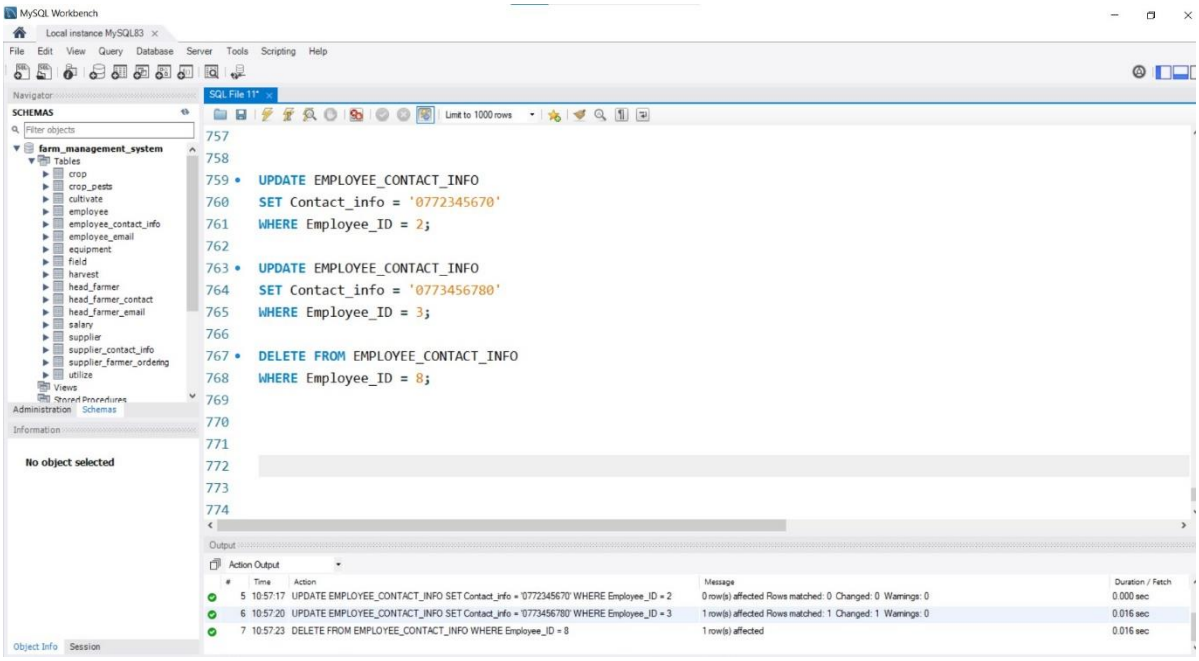

MySQL 8.0 Command Line Client
mysql> select * from cultivate;
+----------+---------+
| Field_ID | Crop_ID |
+----------+---------+
500	10
502	12
503	13
505	15
506	16
507	17
+----------+---------+
6 rows in set (0.00 sec)
mysql>

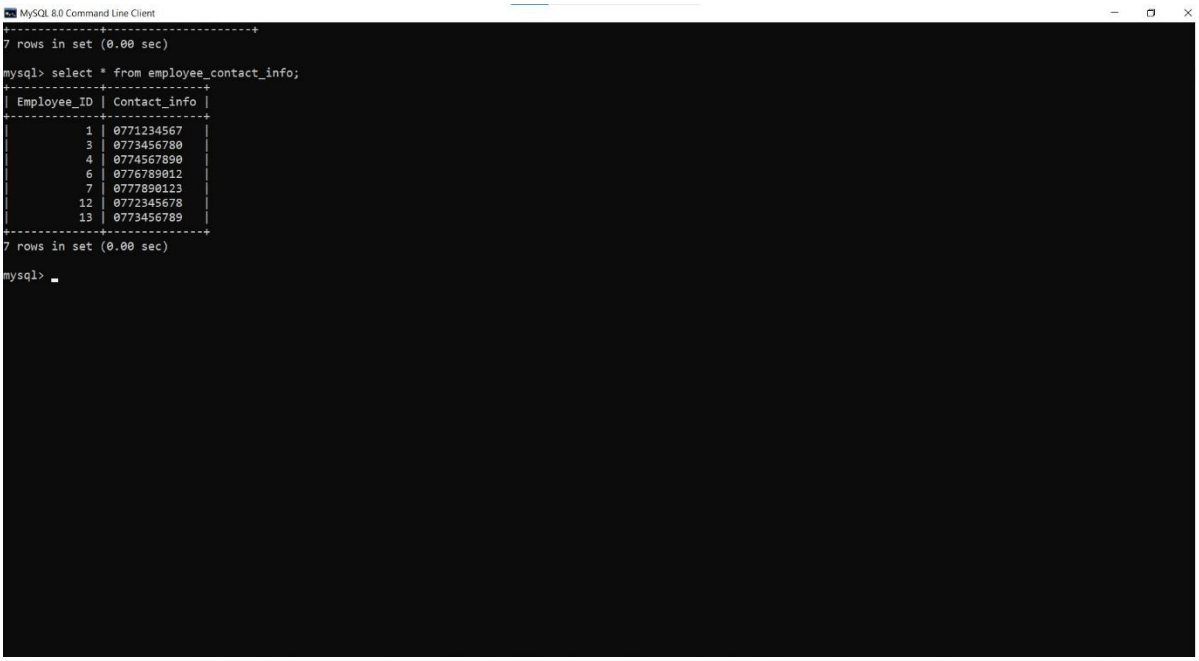
4. Employee


MySQL Workbench
Local instance MySQL83
File Edit View Query Database Server Tools Scripting Help
Navigator
SCHEMAS
Filter objects
farm_management_system
Tables
crop
crop_pests
cultivate
employee
employee_contact_info
employee_email
equipment
field
harvest
head_farmer
head_farmer_contact
head_farmer_email
salary
supplier
supplier_contact_info
supplier_farmer_ordering
utilize
Views
Stored Procedures
Administration Schemas
Information
No object selected
Object Info Session
SQL File 11*
Limit to 1000 rows
729
730 • UPDATE EMPLOYEE
731 SET Employee_name = 'Sandun'
732 WHERE Employee_ID = 2;
733
734 • UPDATE EMPLOYEE
735 SET Working_field = 506
736 WHERE Employee_ID = 12;
737
738
739 • DELETE FROM EMPLOYEE
740 WHERE Employee_ID = 11;
741
742
743
744
745
746
Output
Action Output
Time Action Message Duration / Fetch
1 10:53:05 DELETE FROM EMPLOYEE WHERE Employee_ID = 11 0 row(s) affected 0.000 sec

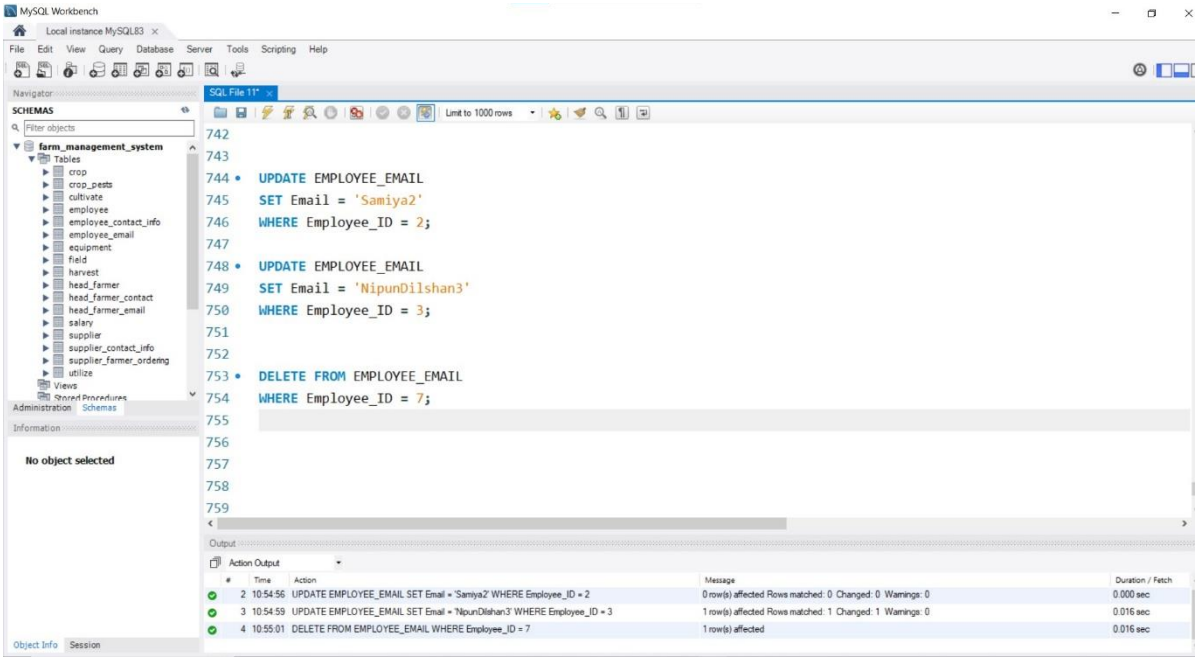

MySQL 8.0 Command Line Client
mysql> select * from employee;
+-------------+---------------+------------+---------------+
| Employee_ID | Employee_name | Supervisor | Working_field |
+-------------+---------------+------------+---------------+
1	Kasun	NULL	500
3	Nipun	NULL	502
4	Ninada	3	503
6	Sanjana	NULL	505
7	Thurunu	NULL	506
8	Geeth	NULL	507
12	Ninada	NULL	506
13	Thisaru	8	507
+-------------+---------------+------------+---------------+
8 rows in set (0.00 sec)
mysql>

5. Employee_contact_info

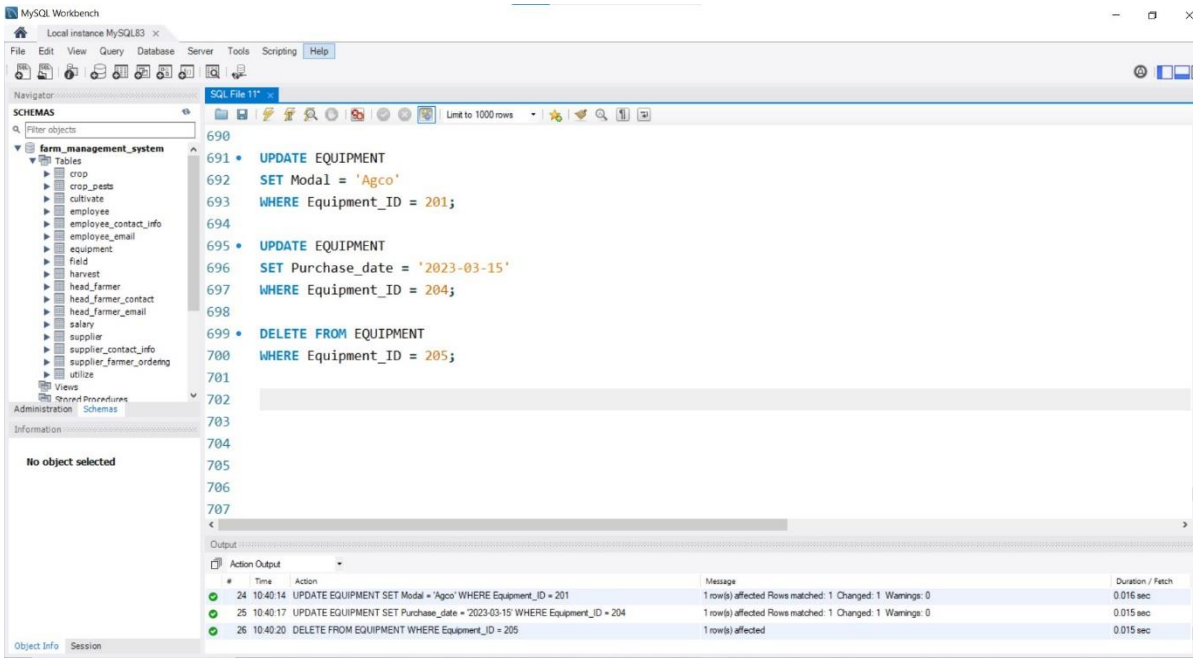


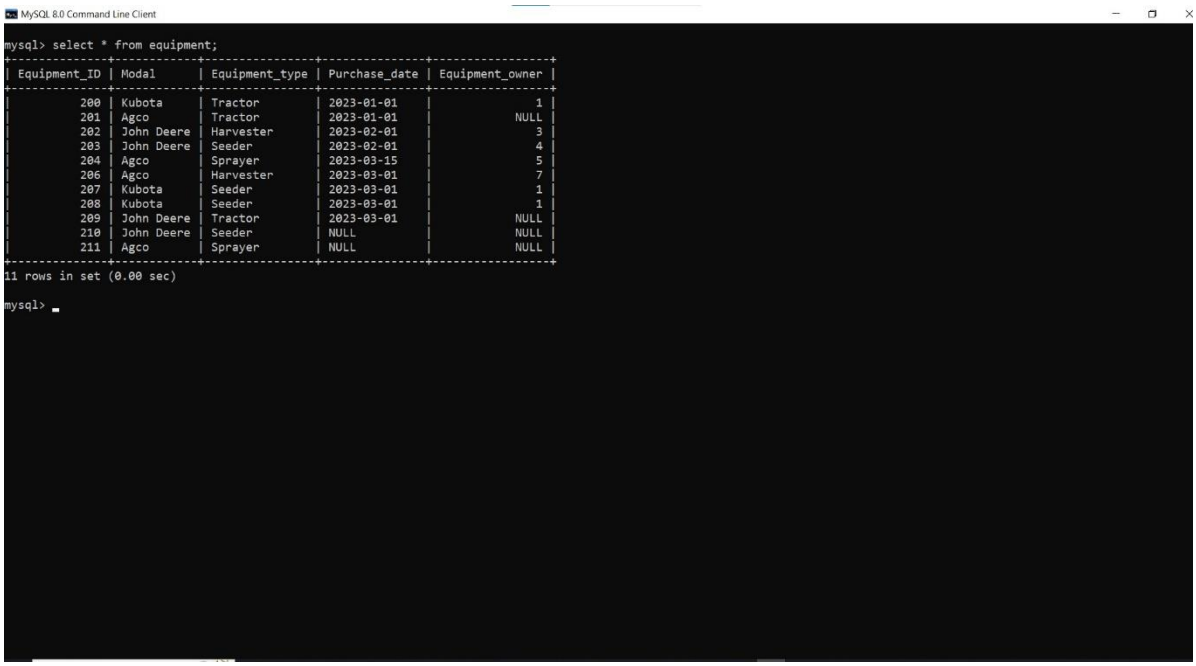


6. Employee_email

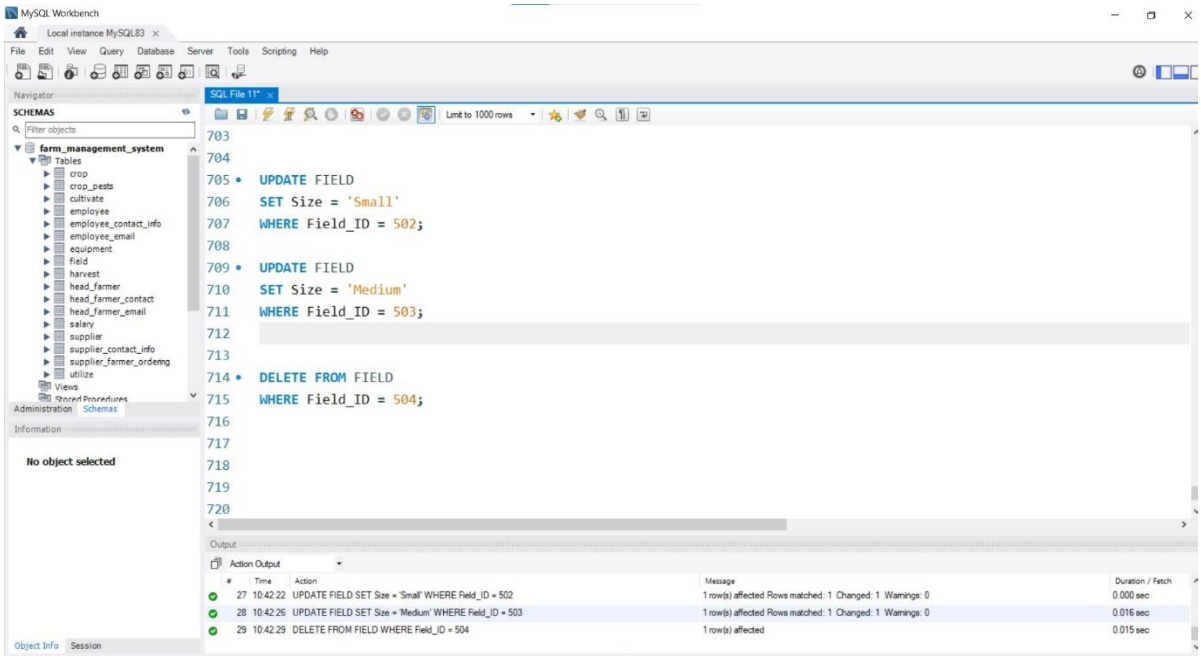


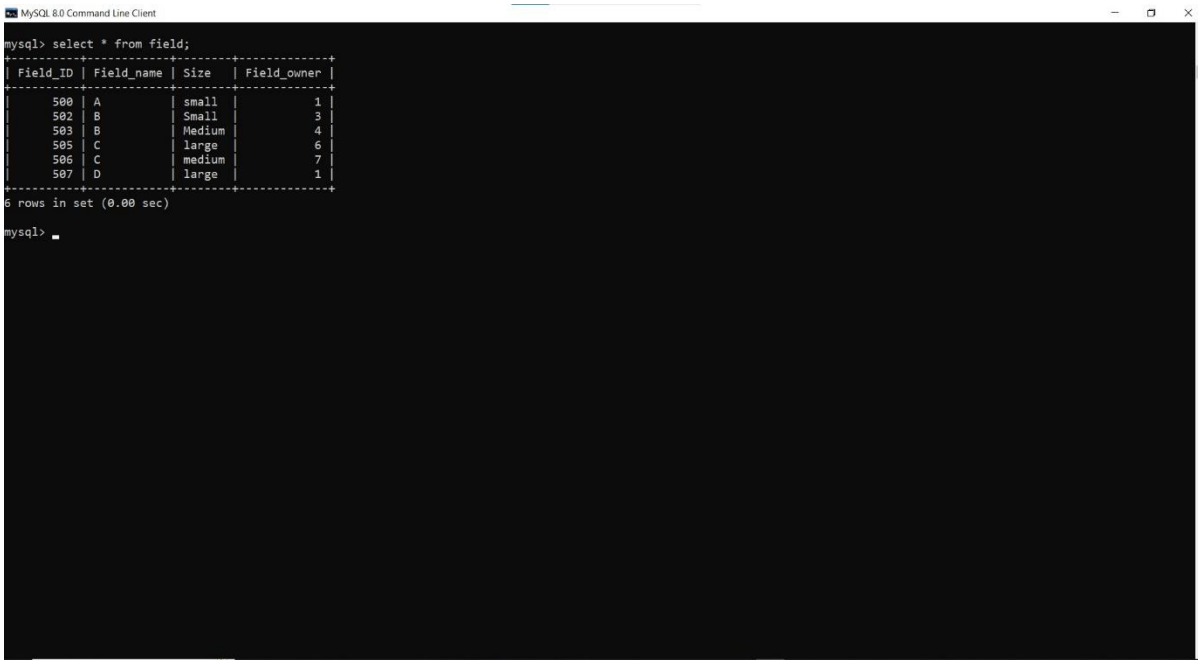
7. Equipment


MySQL Workbench
Local instance MySQL83
File Edit View Query Database Server Tools Scripting Help
SCHEMAS
farm_management_system
Tables
crop
crop_pests
cultivate
employee
employee_contact_info
employee_email
equipment
field
harvest
head_farmer
head_farmer_contact
head_farmer_email
salary
supplier
supplier_contact_info
supplier_farmer_ordering
utilize
Views
Stored Procedures
Administration Schemas
Information
No object selected
Object Info Session
SQL File 11*
Limit to 1000 rows
690
691 • UPDATE EQUIPMENT
692 SET Modal = 'Agco'
693 WHERE Equipment_ID = 201;
694
695 • UPDATE EQUIPMENT
696 SET Purchase_date = '2023-03-15'
697 WHERE Equipment_ID = 204;
698
699 • DELETE FROM EQUIPMENT
700 WHERE Equipment_ID = 205;
701
702
703
704
705
706
707
Output
Action Output
Time Action Message Duration / Fetch
24 10:40:14 UPDATE EQUIPMENT SET Modal = 'Agco' WHERE Equipment_ID = 201 1 row(s) affected Rows matched: 1 Changed: 1 Warnings: 0 0.016 sec
25 10:40:17 UPDATE EQUIPMENT SET Purchase_date = '2023-03-15' WHERE Equipment_ID = 204 1 row(s) affected Rows matched: 1 Changed: 1 Warnings: 0 0.015 sec
26 10:40:20 DELETE FROM EQUIPMENT WHERE Equipment_ID = 205 1 row(s) affected 0.015 sec

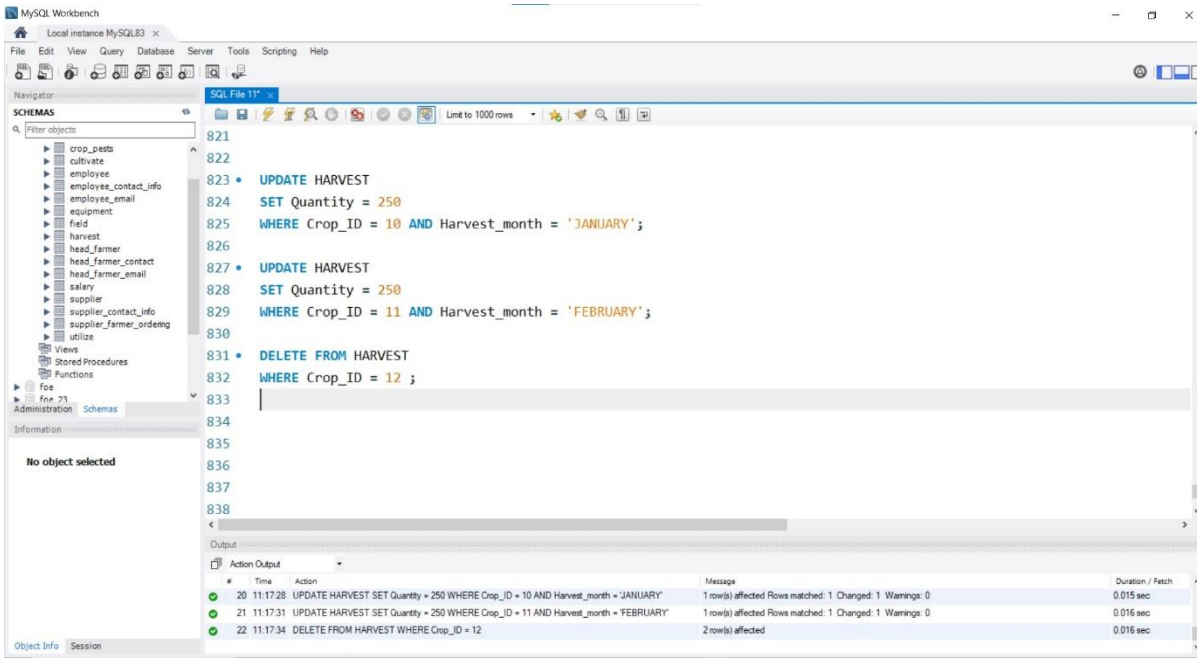

MySQL 8.0 Command Line Client
mysql> select * from equipment;
Equipment_ID	Modal	Equipment_type	Purchase_date	Equipment_owner
200	Kubota	Tractor	2023-01-01	1
201	Agco	Tractor	2023-01-01	NULL
202	John Deere	Harvester	2023-02-01	3
203	John Deere	Seeder	2023-02-01	4
204	Agco	Sprayer	2023-03-15	5
206	Agco	Harvester	2023-03-01	7
207	Kubota	Seeder	2023-03-01	1
208	Kubota	Seeder	2023-03-01	1
209	John Deere	Tractor	2023-03-01	NULL
210	John Deere	Seeder	NULL	NULL
211	Agco	Sprayer	NULL	NULL
11 rows in set (0.00 sec)
mysql>

8. Field


MySQL Workbench
Local instance MySQL83
File Edit View Query Database Server Tools Scripting Help
SCHEMAS
farm_management_system
Tables
crop
crop_pests
cultivate
employee
employee_contact_info
employee_email
equipment
field
harvest
head_farmer
head_farmer_contact
head_farmer_email
salary
supplier
supplier_contact_info
supplier_farmer_ordering
utilize
Views
Stored Procedures
Administration Schemas
Information
No object selected
Object Info Session
SQL File 11*
Limit to 1000 rows
703
704
705 • UPDATE FIELD
706 SET Size = 'Small'
707 WHERE Field_ID = 502;
708
709 • UPDATE FIELD
710 SET Size = 'Medium'
711 WHERE Field_ID = 503;
712
713
714 • DELETE FROM FIELD
715 WHERE Field_ID = 504;
716
717
718
719
720
Output
Action Output
Time Action Message Duration / Fetch
27 10:42:22 UPDATE FIELD SET Size = 'Small' WHERE Field_ID = 502 1 row(s) affected Rows matched: 1 Changed: 1 Warnings: 0 0.000 sec
28 10:42:26 UPDATE FIELD SET Size = 'Medium' WHERE Field_ID = 503 1 row(s) affected Rows matched: 1 Changed: 1 Warnings: 0 0.016 sec
29 10:42:29 DELETE FROM FIELD WHERE Field_ID = 504 1 row(s) affected 0.015 sec

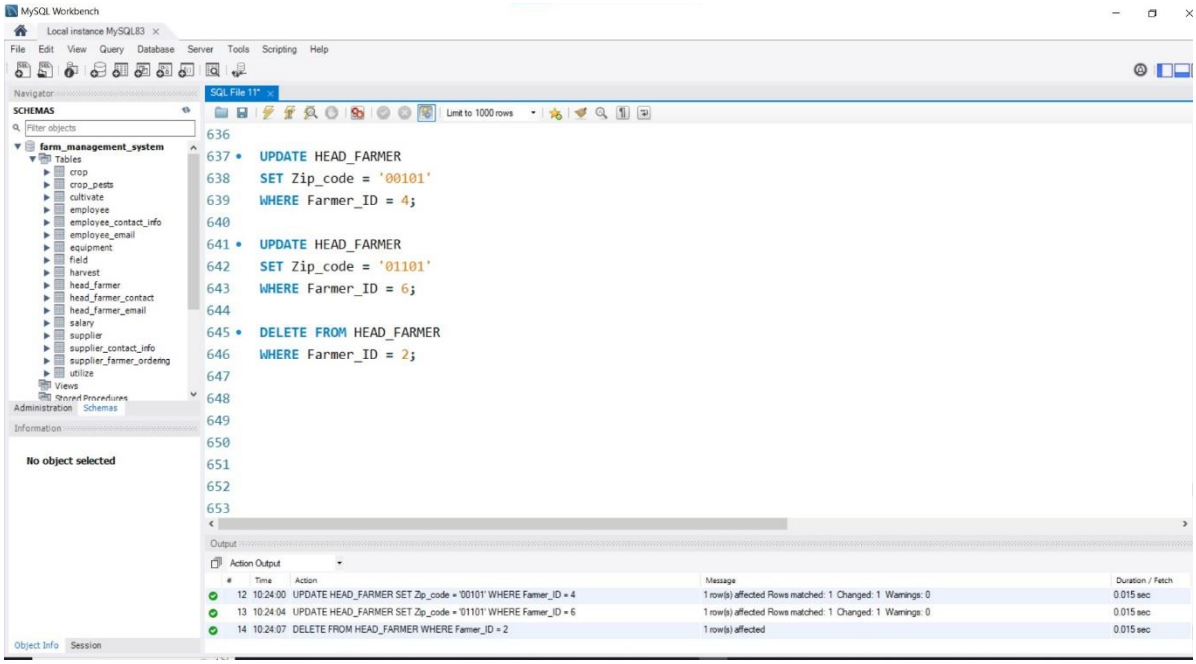

MySQL 8.0 Command Line Client
mysql> select * from field;
+----------+------------+--------+-------------+
| Field_ID | Field_name | Size | Field_owner |
+----------+------------+--------+-------------+
500	A	small	1
502	B	Small	3
503	B	Medium	4
505	C	large	6
506	C	medium	7
507	D	large	1
+----------+------------+--------+-------------+
6 rows in set (0.00 sec)
mysql>

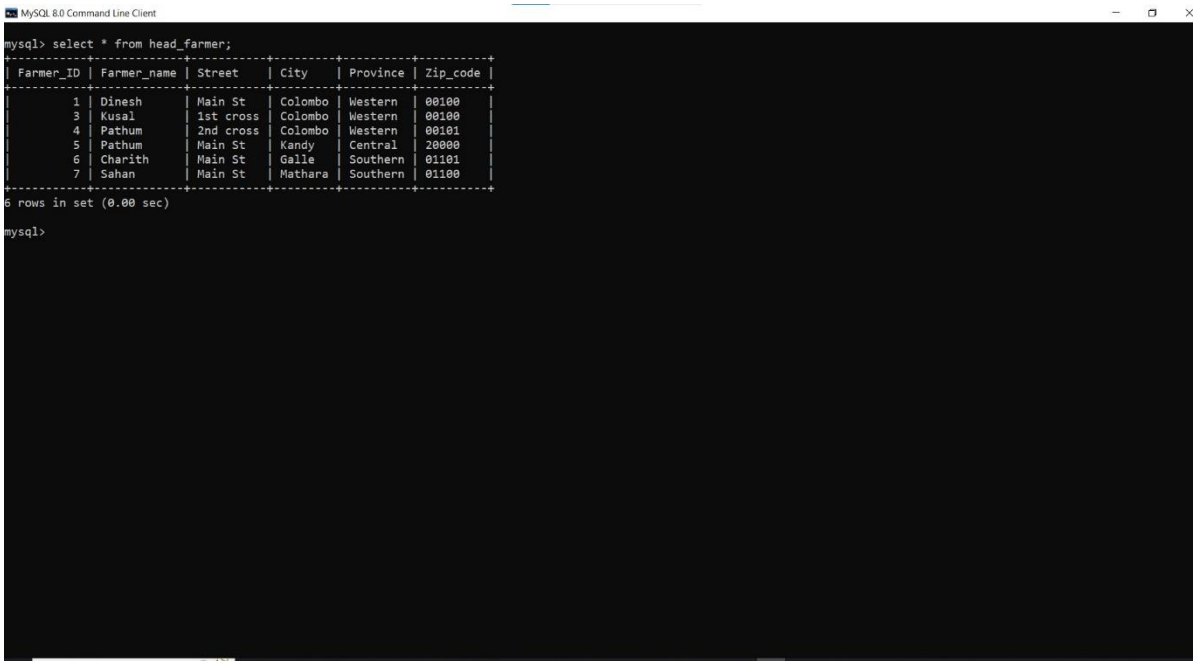
9. Harvest


MySQL Workbench
Local instance MySQL83
File Edit View Query Database Server Tools Scripting Help
SCHEMAS
crop_pests
cultivate
employee
employee_contact_info
employee_email
equipment
field
harvest
head_farmer
head_farmer_contact
head_farmer_email
salary
supplier
supplier_contact_info
supplier_farmer_ordering
utilize
Views
Stored Procedures
Functions
Administration Schemas
Information
No object selected
Object Info Session
SQL File 11*
Limit to 1000 rows
821
822
823 • UPDATE HARVEST
824 SET Quantity = 250
825 WHERE Crop_ID = 10 AND Harvest_month = 'JANUARY';
826
827 • UPDATE HARVEST
828 SET Quantity = 250
829 WHERE Crop_ID = 11 AND Harvest_month = 'FEBRUARY';
830
831 • DELETE FROM HARVEST
832 WHERE Crop_ID = 12 ;
833
834
835
836
837
838
Output
Action Output
Time Action Message Duration / Fetch
20 11:17:28 UPDATE HARVEST SET Quantity = 250 WHERE Crop_ID = 10 AND Harvest_month = 'JANUARY' 1 row(s) affected Rows matched: 1 Changed: 1 Warnings: 0 0.015 sec
21 11:17:31 UPDATE HARVEST SET Quantity = 250 WHERE Crop_ID = 11 AND Harvest_month = 'FEBRUARY' 1 row(s) affected Rows matched: 1 Changed: 1 Warnings: 0 0.016 sec
22 11:17:34 DELETE FROM HARVEST WHERE Crop_ID = 12 2 row(s) affected 0.016 sec

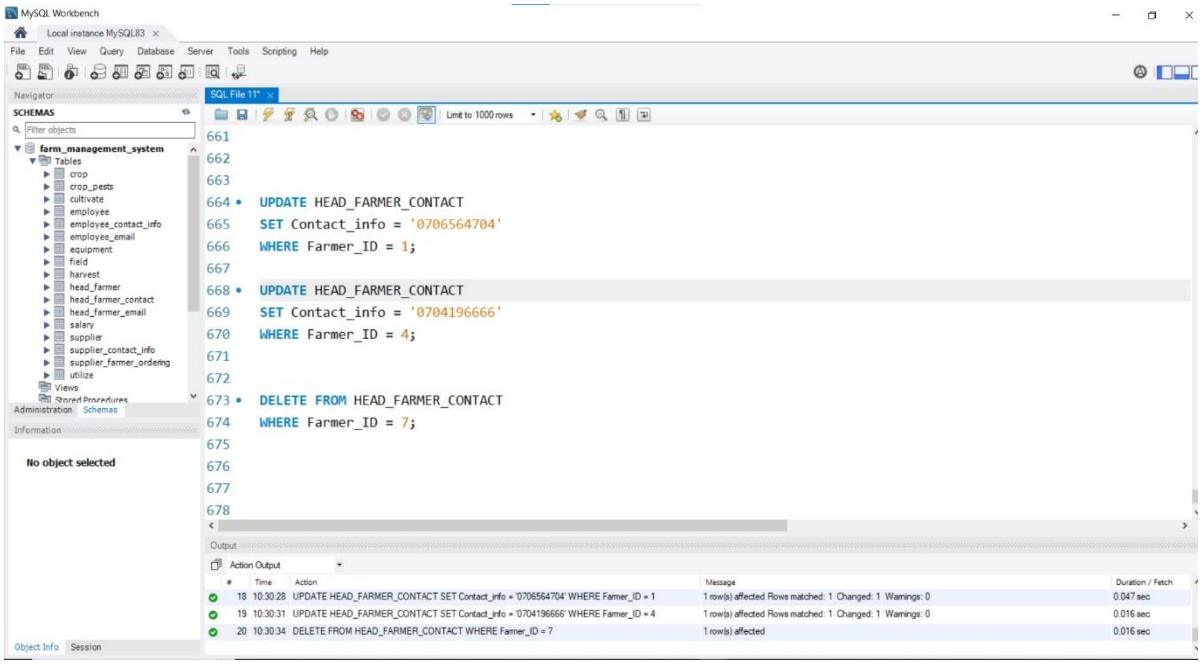

MySQL 8.0 Command Line Client
6 rows in set (0.00 sec)
mysql> select * from harvest;
+---------+--------------+----------+
| Crop_ID | Harvest_month | Quantity |
+---------+--------------+----------+
10	FEBRUARY	200
10	JANUARY	250
11	FEBRUARY	250
11	JANUARY	100
13	FEBRUARY	300
13	JANUARY	200
15	FEBRUARY	400
15	JANUARY	300
16	FEBRUARY	450
16	JANUARY	350
17	FEBRUARY	500
17	JANUARY	400
18	FEBRUARY	500
18	JANUARY	400
19	FEBRUARY	NULL
19	JANUARY	NULL
20	FEBRUARY	NULL
20	JANUARY	NULL
+---------+--------------+----------+
18 rows in set (0.00 sec)
mysql>

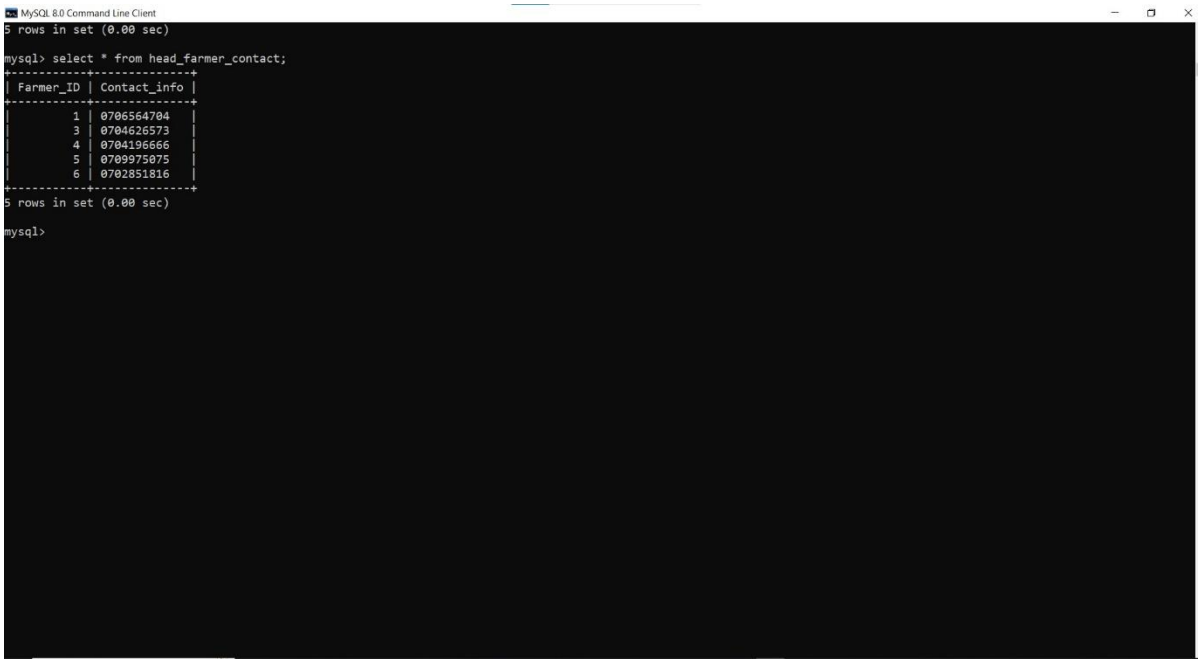
10.Head_farmer



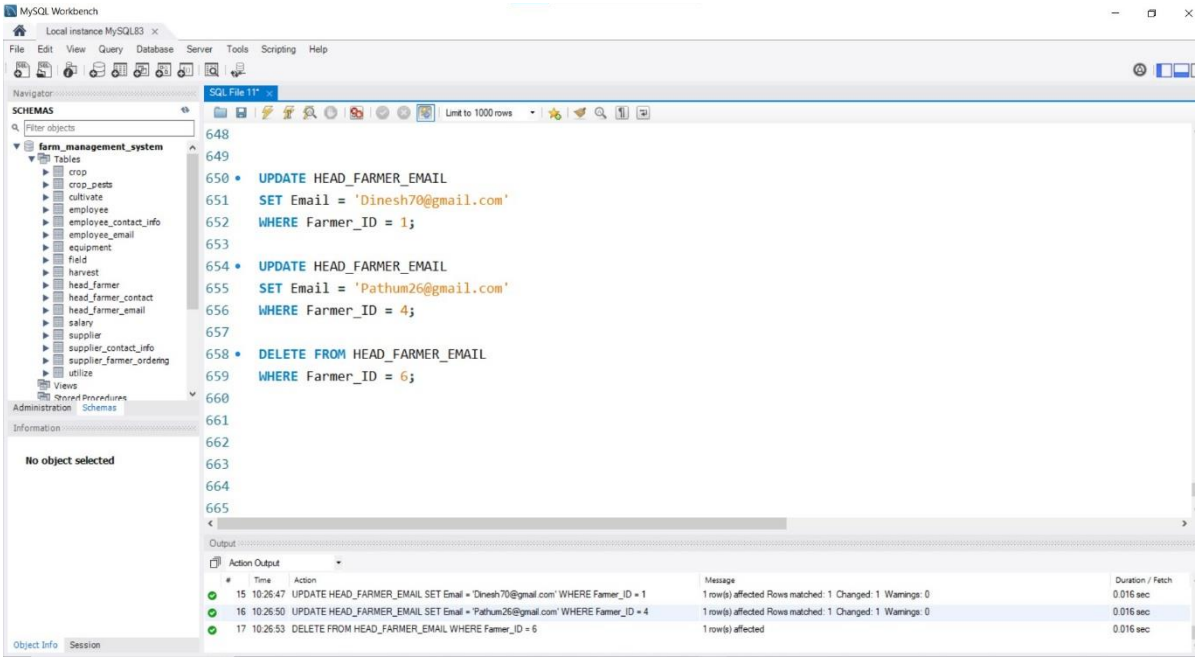


11.Head_farmer_contact

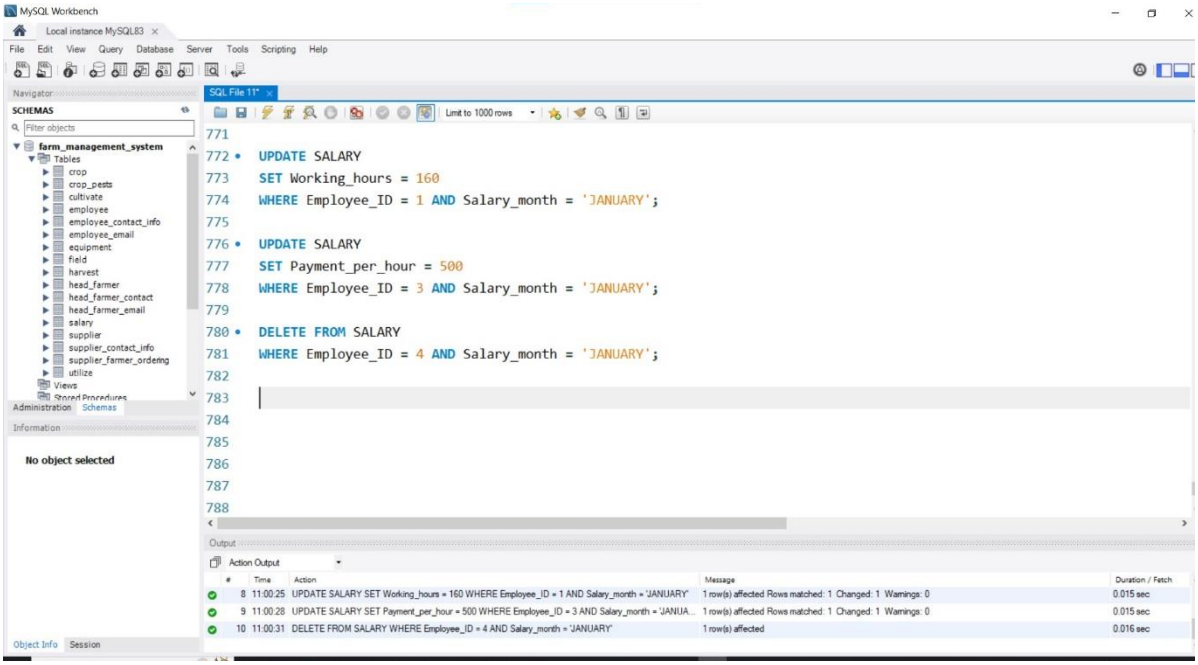


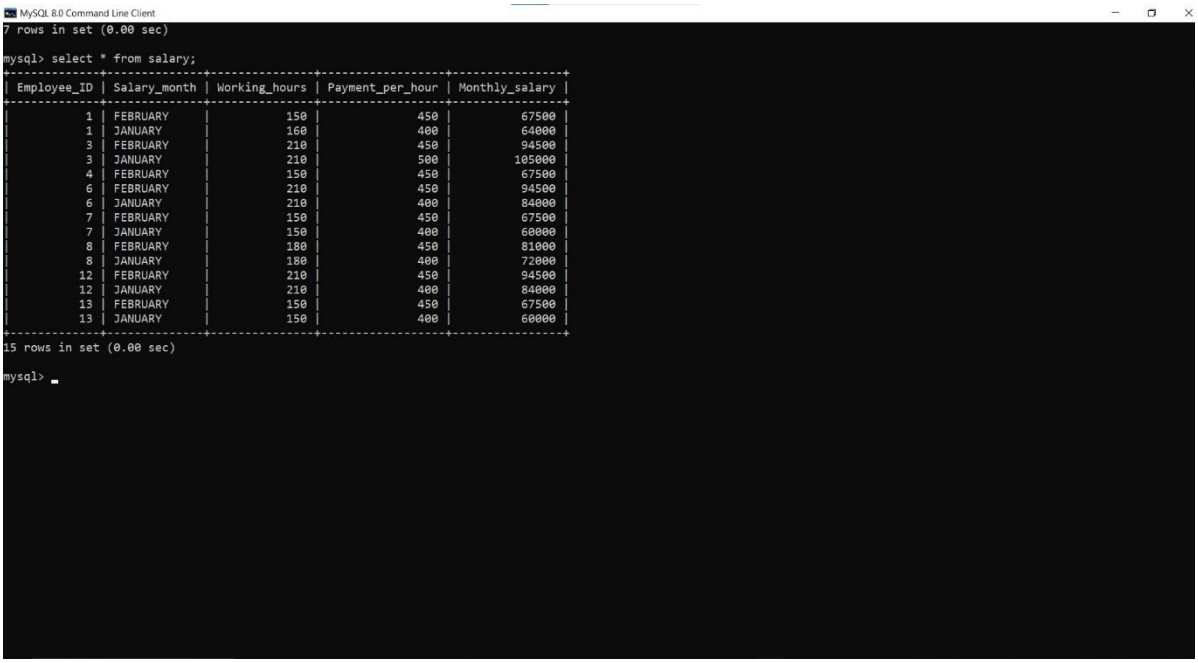


12.Head_farmer_email

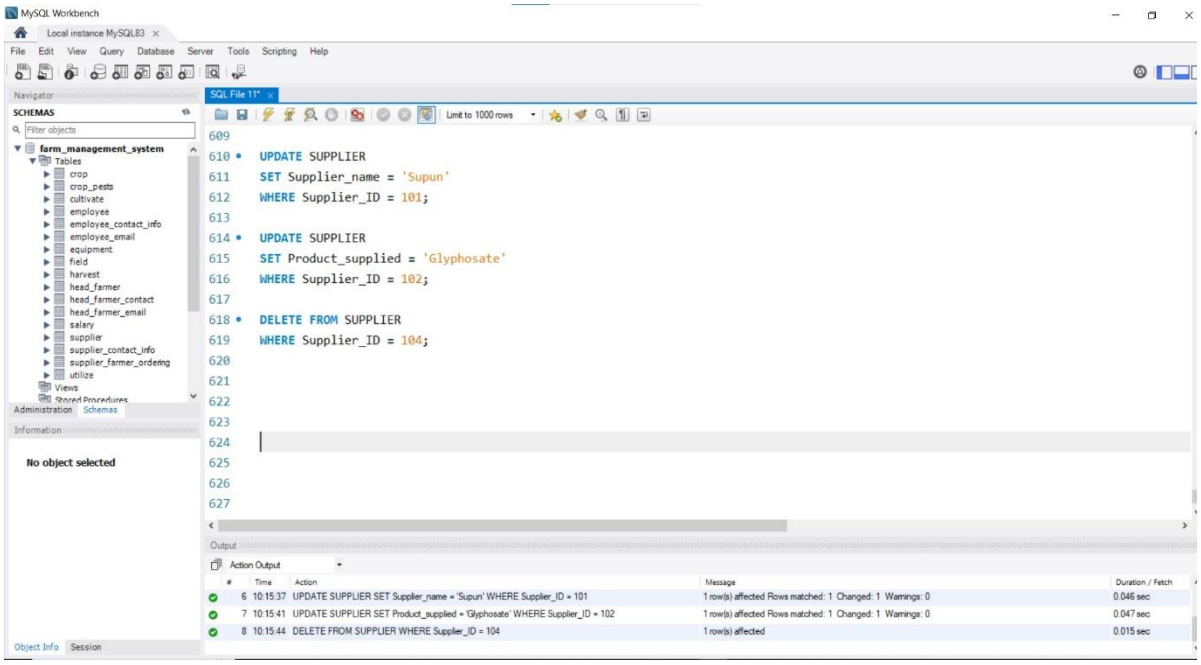


13.Salary


MySQL Workbench
Local instance MySQL83
File Edit View Query Database Server Tools Scripting Help
SCHEMAS
farm_management_system
Tables
crop
crop_pests
cultivate
employee
employee_contact_info
employee_email
equipment
field
harvest
head_farmer
head_farmer_contact
head_farmer_email
salary
supplier
supplier_contact_info
supplier_farmer_ordering
utilize
Views
Stored Procedures
Administration Schemas
Information
No object selected
Object Info Session
SQL File 11*
Limit to 1000 rows
771
772 • UPDATE SALARY
773 SET Working_hours = 160
774 WHERE Employee_ID = 1 AND Salary_month = 'JANUARY';
775
776 • UPDATE SALARY
777 SET Payment_per_hour = 500
778 WHERE Employee_ID = 3 AND Salary_month = 'JANUARY';
779
780 • DELETE FROM SALARY
781 WHERE Employee_ID = 4 AND Salary_month = 'JANUARY';
782
783
784
785
786
787
788
Output
Action Output
Time Action Message Duration / Fetch
8 11:00:25 UPDATE SALARY SET Working_hours = 160 WHERE Employee_ID = 1 AND Salary_month = 'JANUARY' 1 row(s) affected Rows matched: 1 Changed: 1 Warnings: 0 0.015 sec
9 11:00:28 UPDATE SALARY SET Payment_per_hour = 500 WHERE Employee_ID = 3 AND Salary_month = 'JANUA... 1 row(s) affected Rows matched: 1 Changed: 1 Warnings: 0 0.015 sec
10 11:00:31 DELETE FROM SALARY WHERE Employee_ID = 4 AND Salary_month = 'JANUARY' 1 row(s) affected 0.016 sec

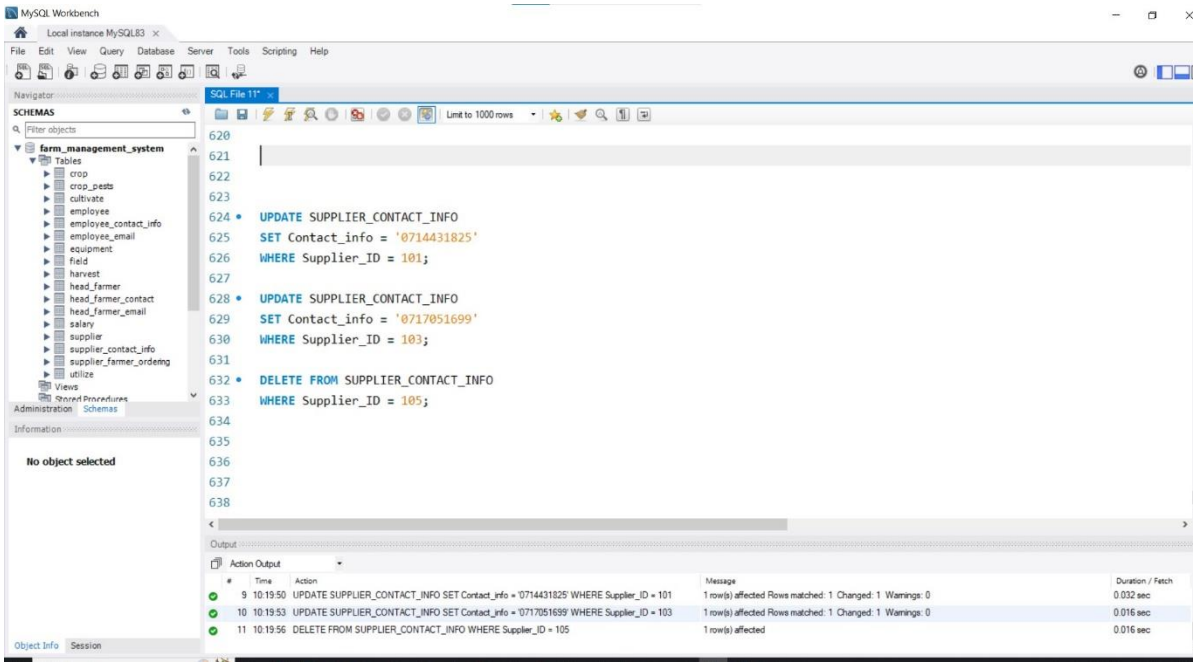

MySQL 8.0 Command Line Client
7 rows in set (0.00 sec)
mysql> select * from salary;
Employee_ID	Salary_month	Working_hours	Payment_per_hour	Monthly_salary
1	FEBRUARY	150	450	67500
1	JANUARY	160	400	64000
3	FEBRUARY	210	450	94500
3	JANUARY	210	500	105000
4	FEBRUARY	150	450	67500
6	FEBRUARY	210	450	94500
6	JANUARY	210	400	84000
7	FEBRUARY	150	450	67500
7	JANUARY	150	400	60000
8	FEBRUARY	180	450	81000
8	JANUARY	180	400	72000
12	FEBRUARY	210	450	94500
12	JANUARY	210	400	84000
13	FEBRUARY	150	450	67500
13	JANUARY	150	400	60000
15 rows in set (0.00 sec)
mysql>

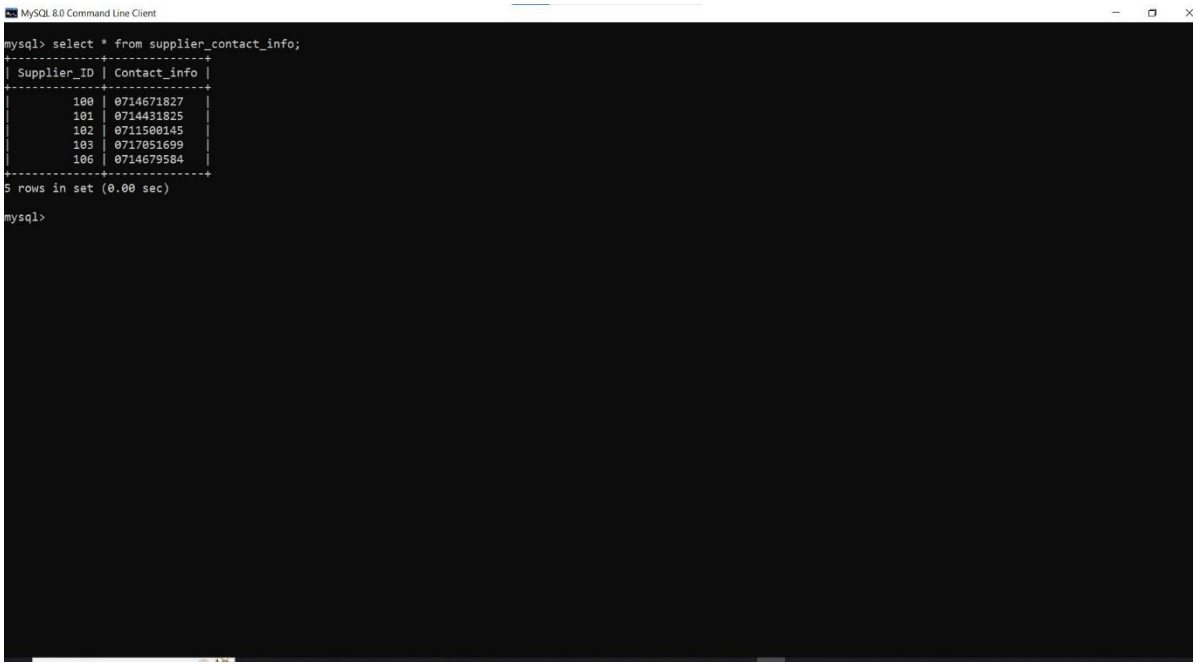
14.Supplier


MySQL Workbench
Local instance MySQL83
File Edit View Query Database Server Tools Scripting Help
SCHEMAS
farm_management_system
Tables
crop
crop_pests
cultivate
employee
employee_contact_info
employee_email
equipment
field
harvest
head_farmer
head_farmer_contact
head_farmer_email
salary
supplier
supplier_contact_info
supplier_farmer_ordering
utilize
Views
Stored Procedures
Administration Schemas
Information
No object selected
Object Info Session
SQL File 11*
Limit to 1000 rows
609
610 • UPDATE SUPPLIER
611 SET Supplier_name = 'Supun'
612 WHERE Supplier_ID = 101;
613
614 • UPDATE SUPPLIER
615 SET Product_supplied = 'Glyphosate'
616 WHERE Supplier_ID = 102;
617
618 • DELETE FROM SUPPLIER
619 WHERE Supplier_ID = 104;
620
621
622
623
624
625
626
627
Output
Action Output
Time Action Message Duration / Fetch
6 10:15:37 UPDATE SUPPLIER SET Supplier_name = 'Supun' WHERE Supplier_ID = 101 1 row(s) affected Rows matched: 1 Changed: 1 Warnings: 0 0.046 sec
7 10:15:41 UPDATE SUPPLIER SET Product_supplied = 'Glyphosate' WHERE Supplier_ID = 102 1 row(s) affected Rows matched: 1 Changed: 1 Warnings: 0 0.047 sec
8 10:15:44 DELETE FROM SUPPLIER WHERE Supplier_ID = 104 1 row(s) affected 0.015 sec

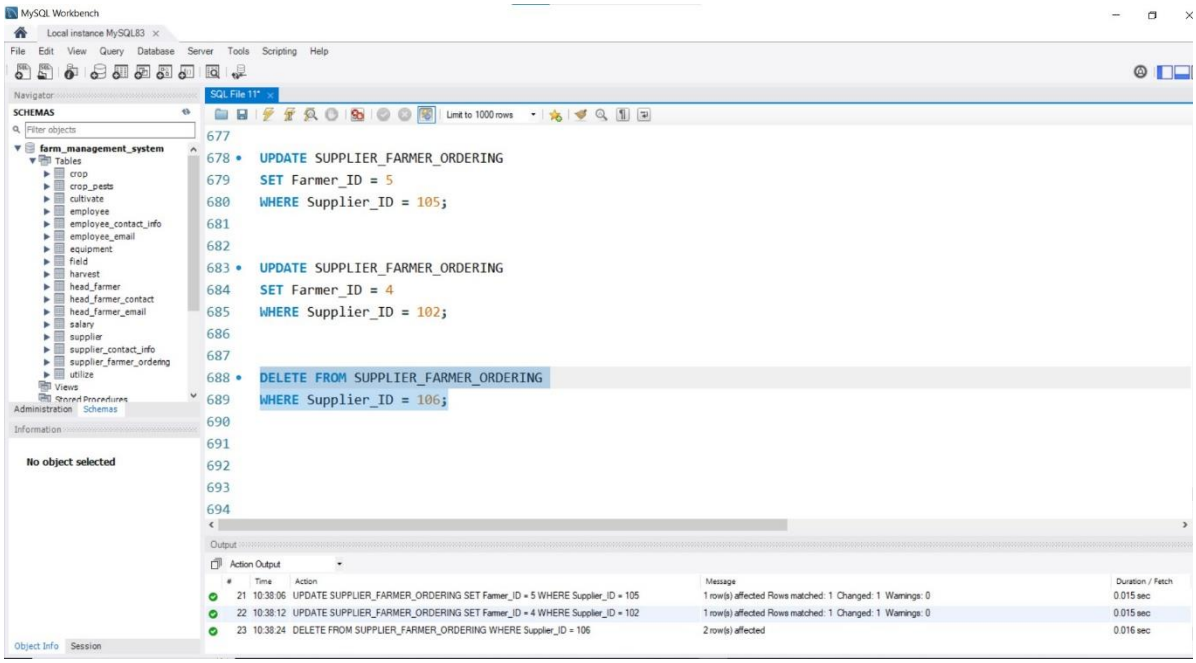

MySQL 8.0 Command Line Client
22 rows in set (0.00 sec)
mysql> select * from supplier;
Supplier_ID	Supplier_name	Product_supplied
100	Saman	Urea
101	Supun	Urea
102	Mahinda	Glyphosate
103	Anura	Potassium Nitrate
105	Ranil	Glyphosate
106	Ranil	Potassium Nitrate
6 rows in set (0.00 sec)
mysql>

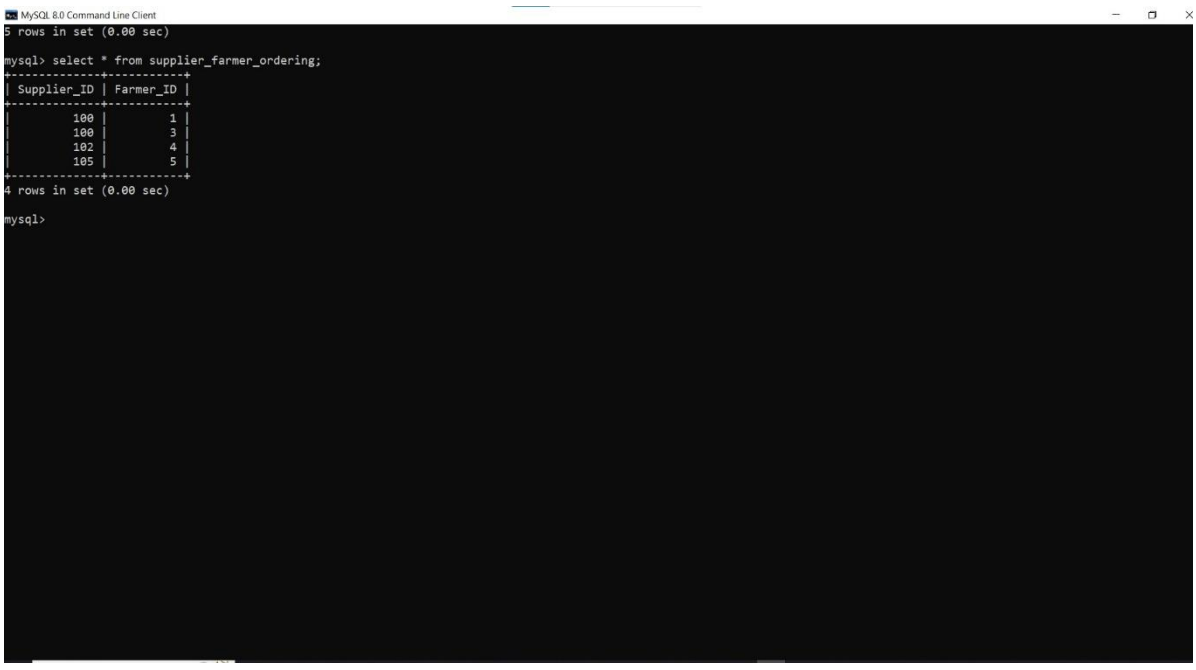
15.Supplier_contact_info



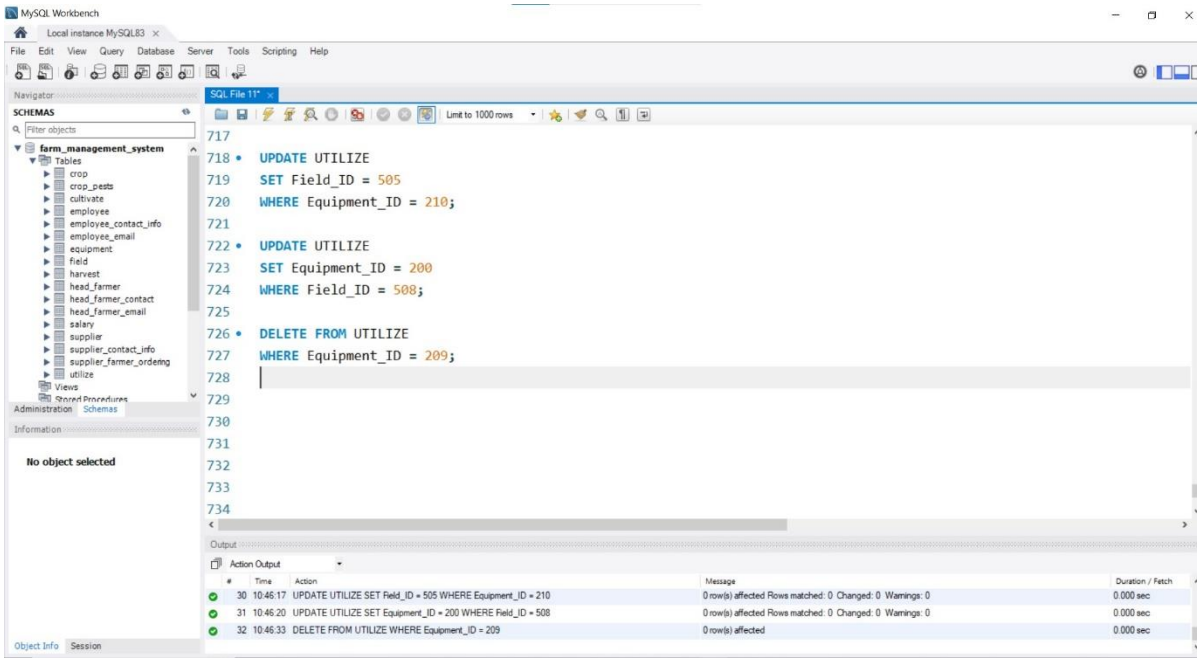


16.Supplier_farmer_ordering





17.Utilize

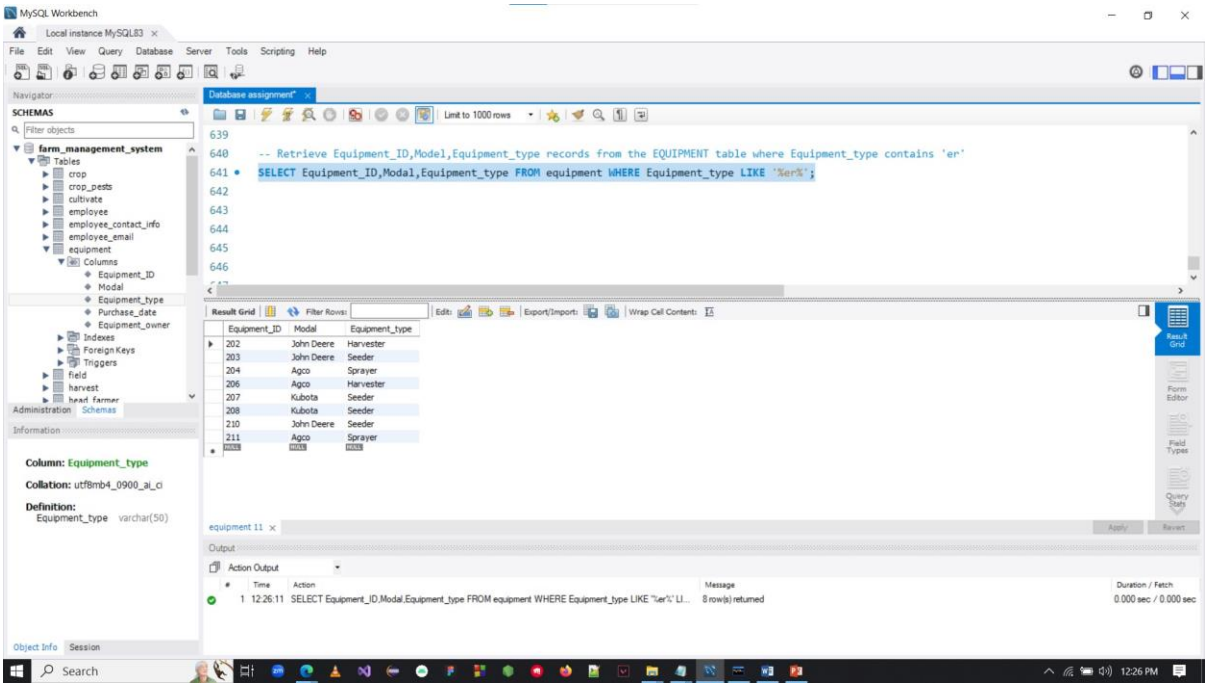

MySQL Workbench
Local instance MySQL83
File Edit View Query Database Server Tools Scripting Help
SCHEMAS
farm_management_system
Tables
crop
crop_pests
cultivate
employee
employee_contact_info
employee_email
equipment
field
harvest
head_farmer
head_farmer_contact
head_farmer_email
salary
supplier
supplier_contact_info
supplier_farmer_ordering
utilize
Views
Stored Procedures
Administration Schemas
Information
No object selected
Object Info Session
SQL File 11*
Limit to 1000 rows
717
718 • UPDATE UTILIZE
719 SET Field_ID = 505
720 WHERE Equipment_ID = 210;
721
722 • UPDATE UTILIZE
723 SET Equipment_ID = 200
724 WHERE Field_ID = 508;
725
726 • DELETE FROM UTILIZE
727 WHERE Equipment_ID = 209;
728
729
730
731
732
733
734
Output
Action Output
Time Action Message Duration / Fetch
30 10:46:17 UPDATE UTILIZE SET Field_ID = 505 WHERE Equipment_ID = 210 0 row(s) affected Rows matched: 0 Changed: 0 Warnings: 0 0.000 sec
31 10:46:20 UPDATE UTILIZE SET Equipment_ID = 200 WHERE Field_ID = 508 0 row(s) affected Rows matched: 0 Changed: 0 Warnings: 0 0.000 sec
32 10:46:33 DELETE FROM UTILIZE WHERE Equipment_ID = 209 0 row(s) affected 0.000 sec


MySQL 8.0 Command Line Client
6 rows in set (0.00 sec)
mysql> select * from utilize;
+--------------+----------+
| Equipment_ID | Field_ID |
+--------------+----------+
200	500
202	502
203	503
211	505
206	506
200	507
207	507
+--------------+----------+
7 rows in set (0.00 sec)
mysql>

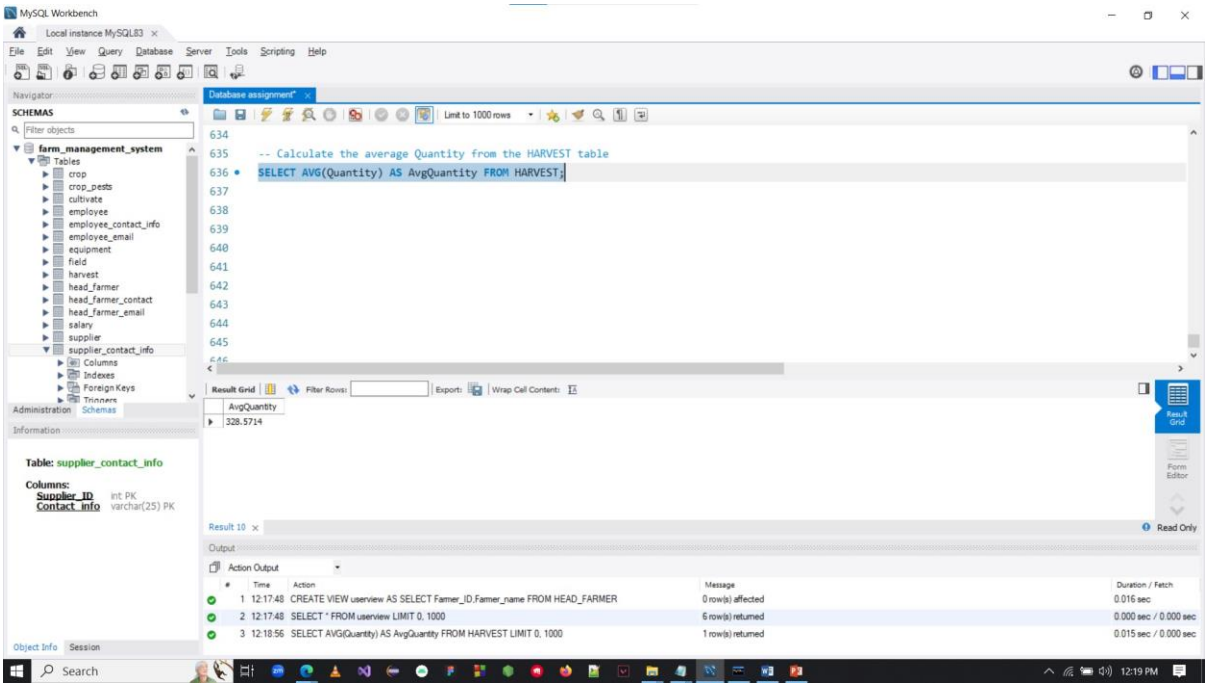
TRANSACTIONS

Simple Quarries

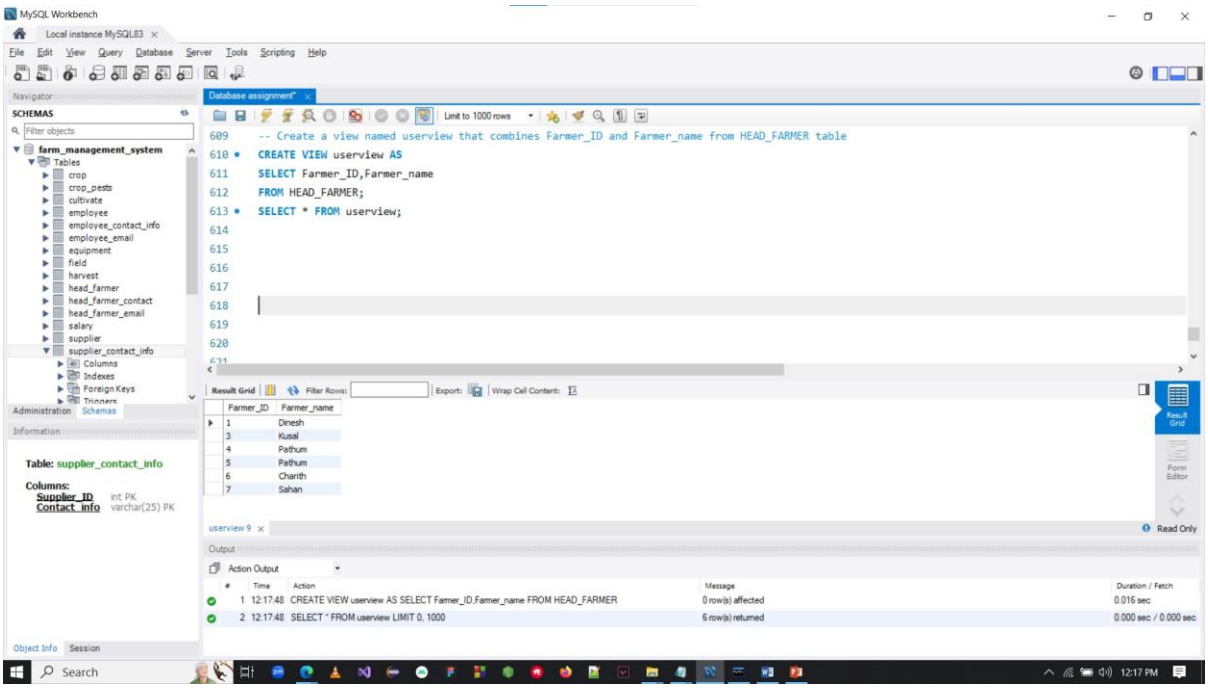
1. Like



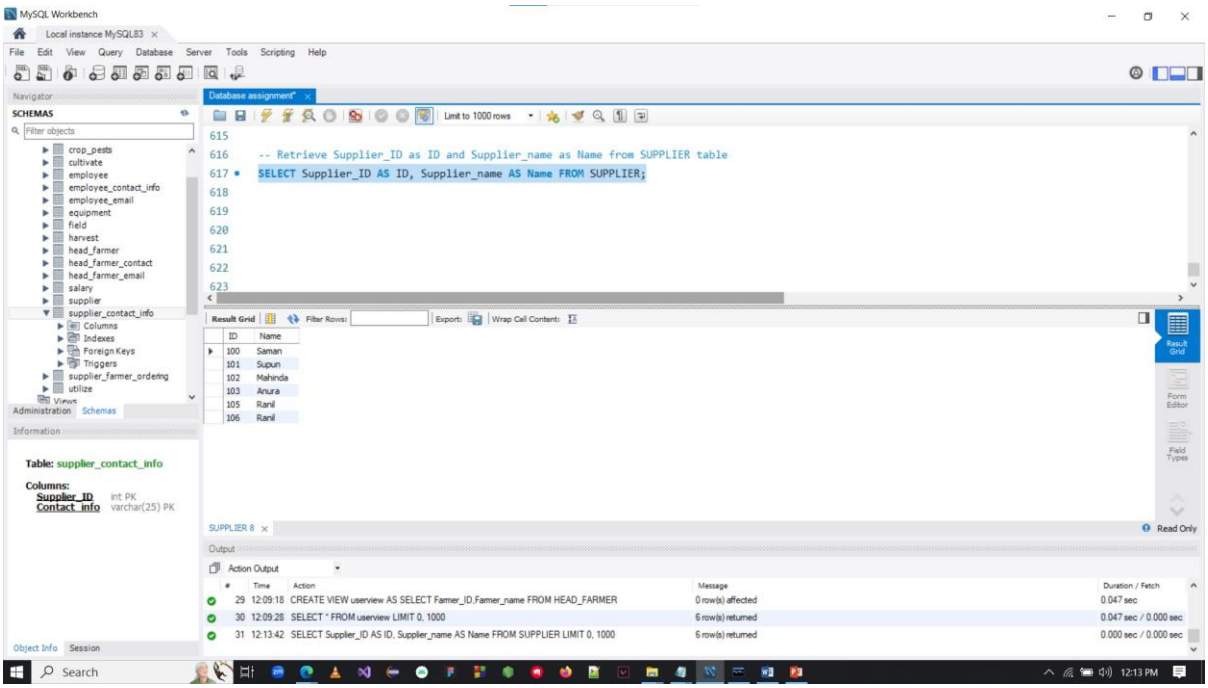
2. Aggregation function



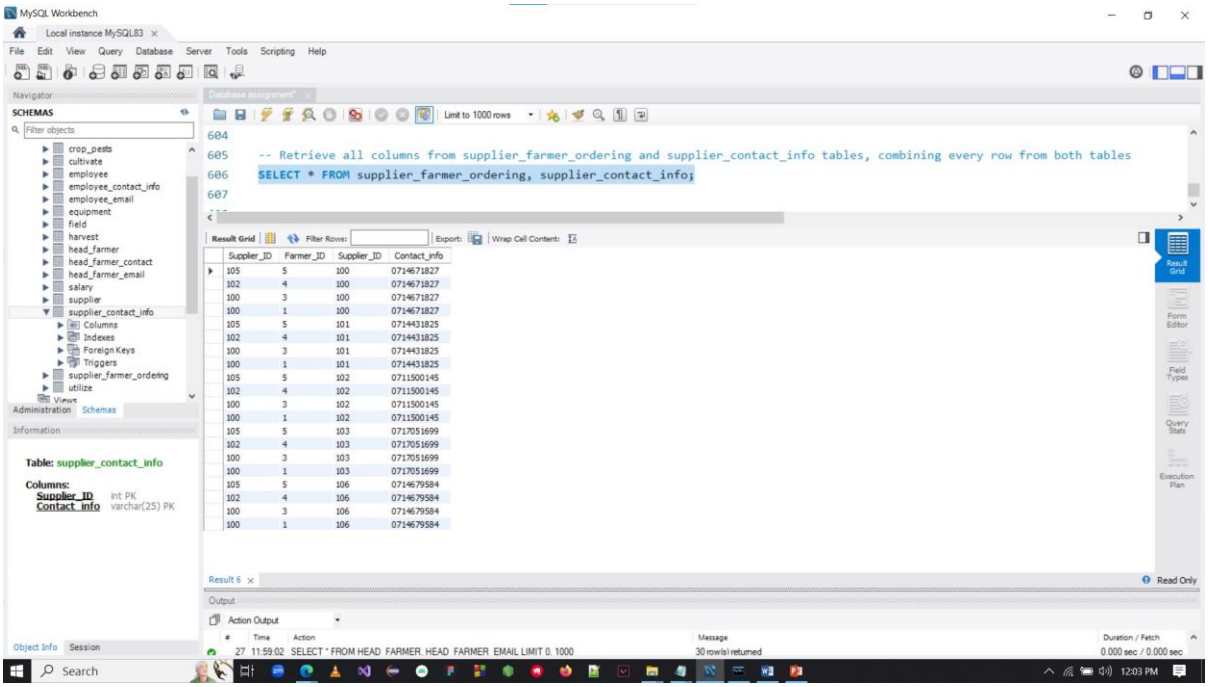
3. User view



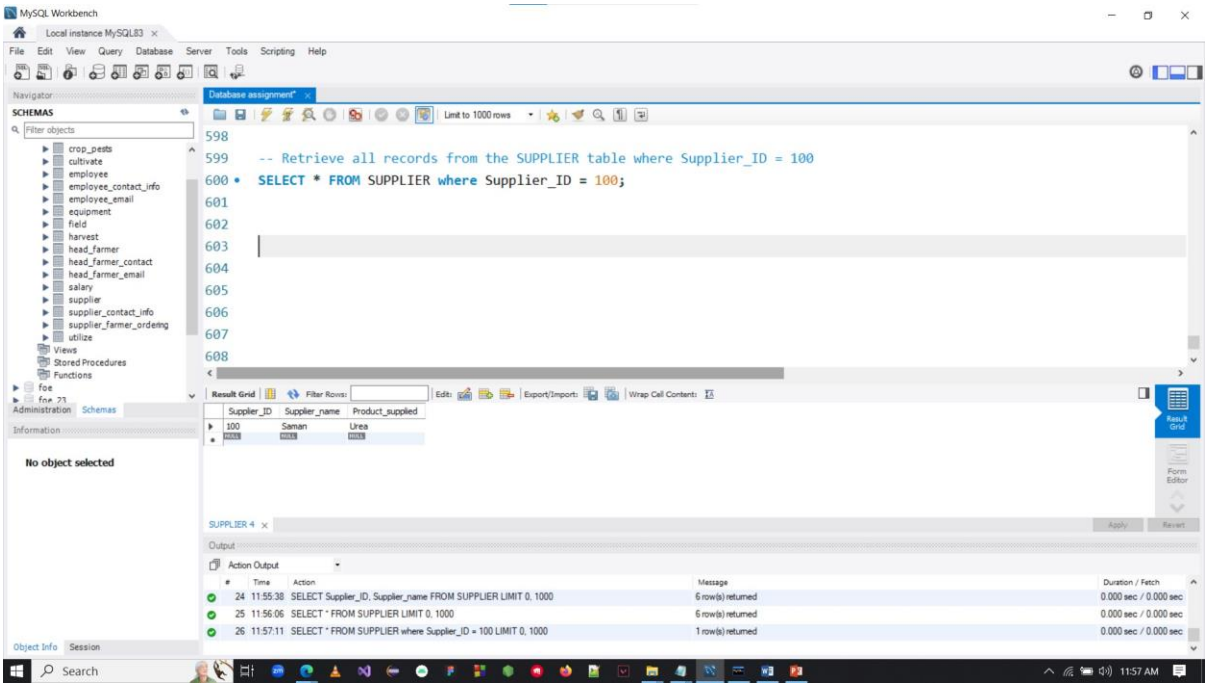
4. Rename



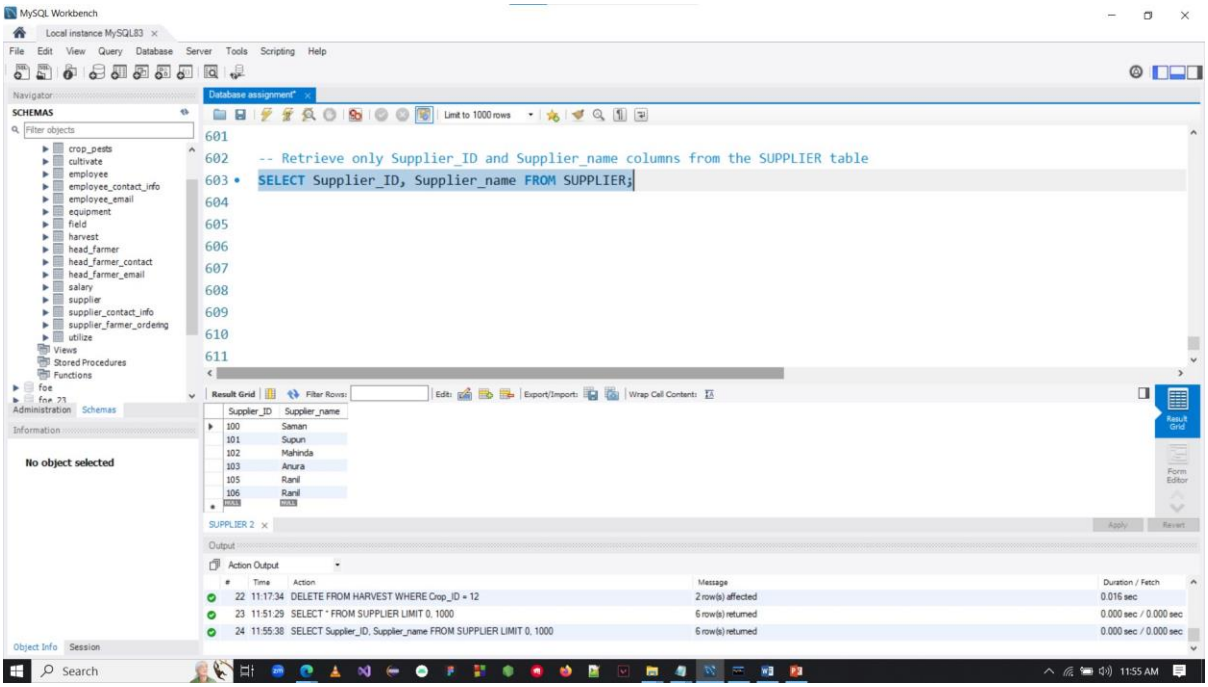
5. Cartesian product



6. Select

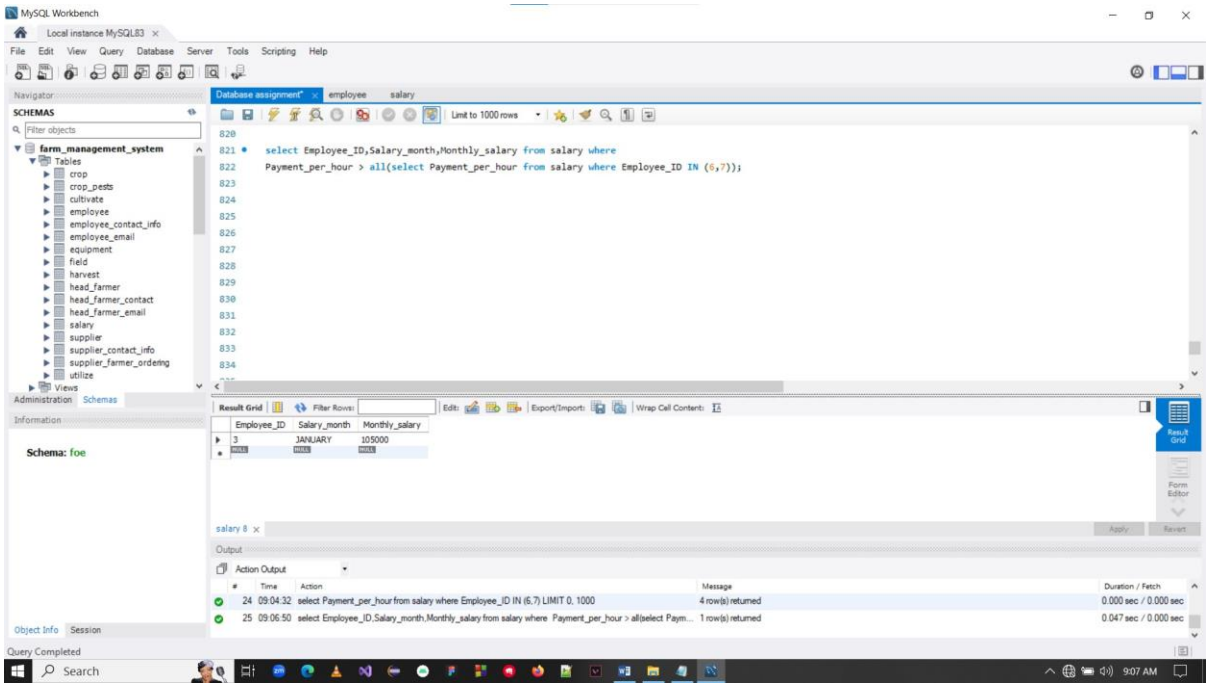


7. Project

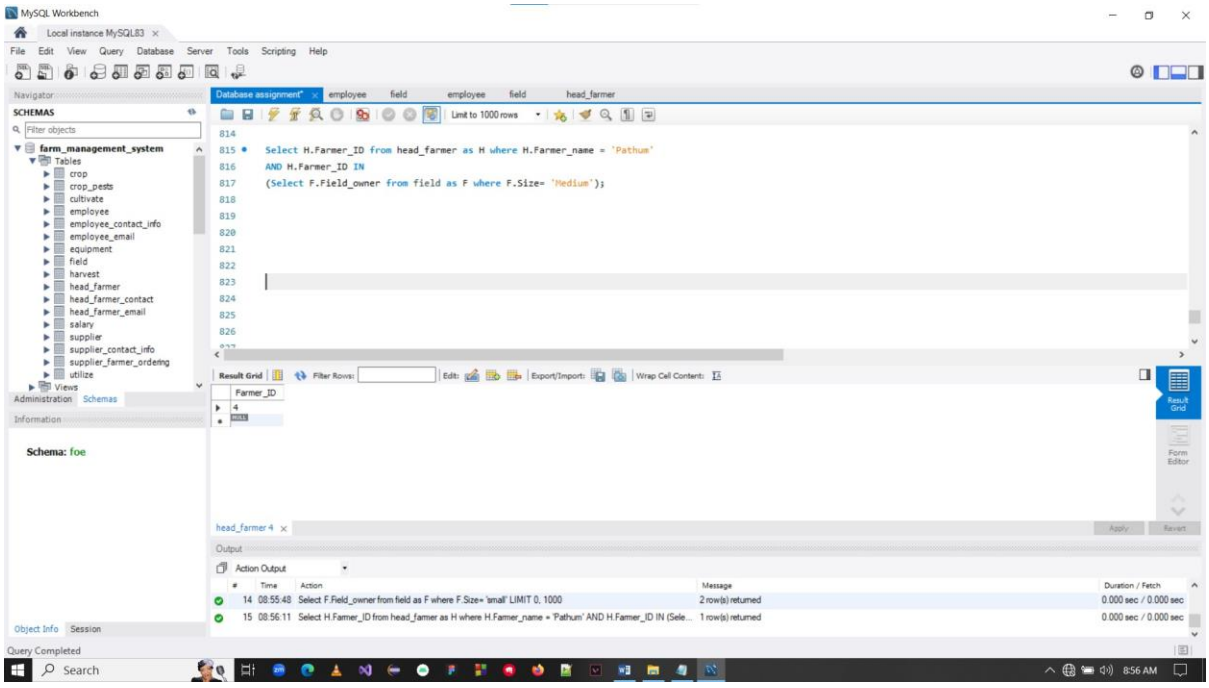

MySQL Workbench
Local instance MySQL83
File Edit View Query Database Server Tools Scripting Help
Database assignment*
SCHEMAS
crop_pests
cultivate
employee
employee_contact_info
employee_email
equipment
field
harvest
head_farmer
head_farmer_contact
head_farmer_email
salary
supplier
supplier_contact_info
supplier_farmer_ordering
utilize
Views
Stored Procedures
Functions
No object selected
601
602 -- Retrieve only Supplier_ID and Supplier_name columns from the SUPPLIER table
603 • SELECT Supplier_ID, Supplier_name FROM SUPPLIER;
Supplier_ID Supplier_name
100 Saman
101 Supun
102 Mahinda
103 Anura
105 Ranil
106 Ranil
SUPPLIER 2
Output
Action Output
22 11:17:34 DELETE FROM HARVEST WHERE Crop_ID = 12 2 row(s) affected 0.016 sec
23 11:51:29 SELECT * FROM SUPPLIER LIMIT 0, 1000 6 row(s) returned 0.000 sec / 0.000 sec
24 11:55:38 SELECT Supplier_ID, Supplier_name FROM SUPPLIER LIMIT 0, 1000 6 row(s) returned 0.000 sec / 0.000 sec
Search
11:55 AM

Complex Quarries

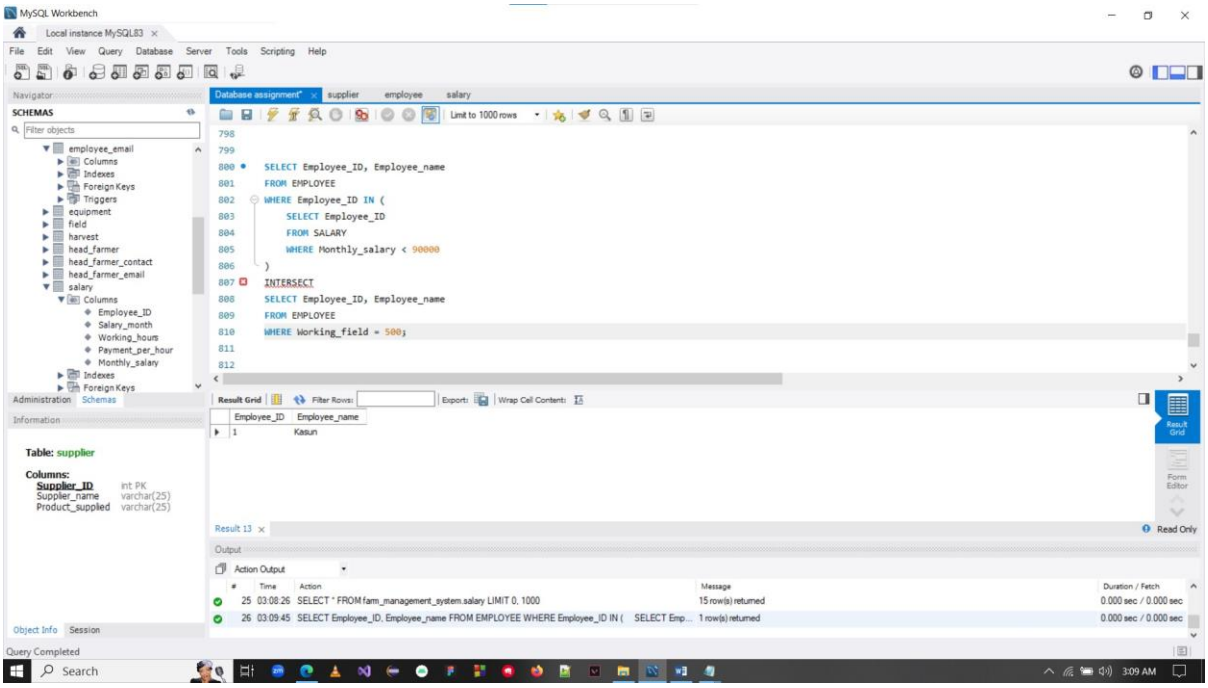
1. Nested 1



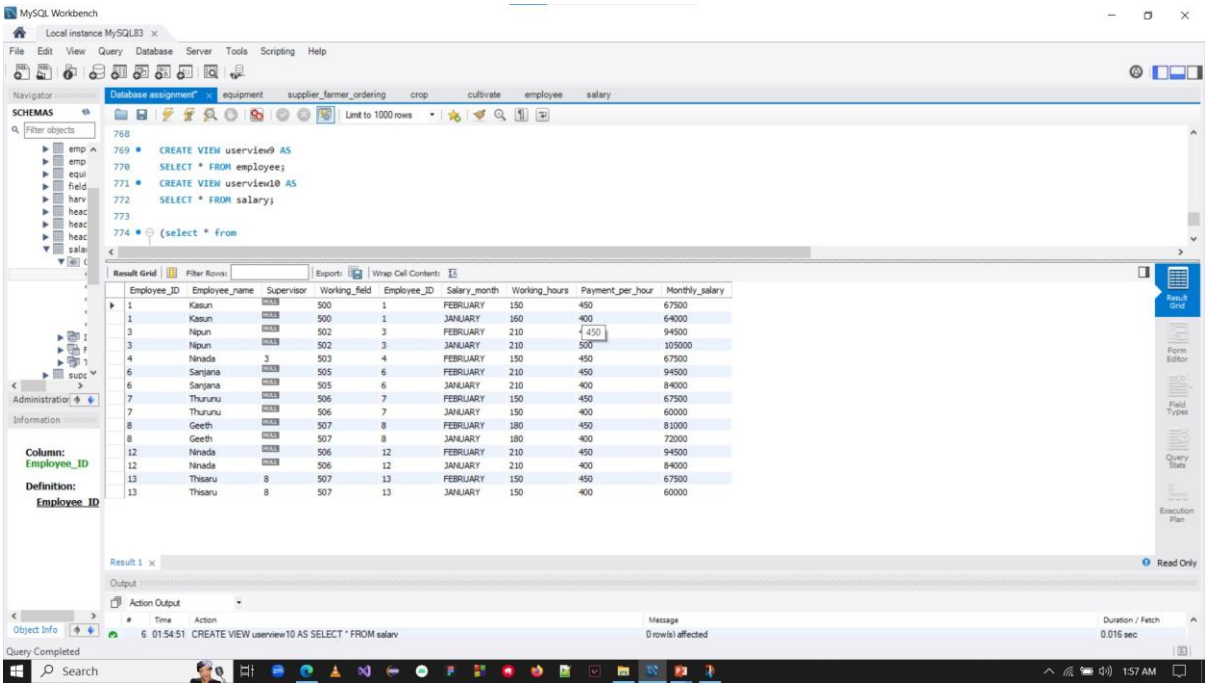
2. Nested 2

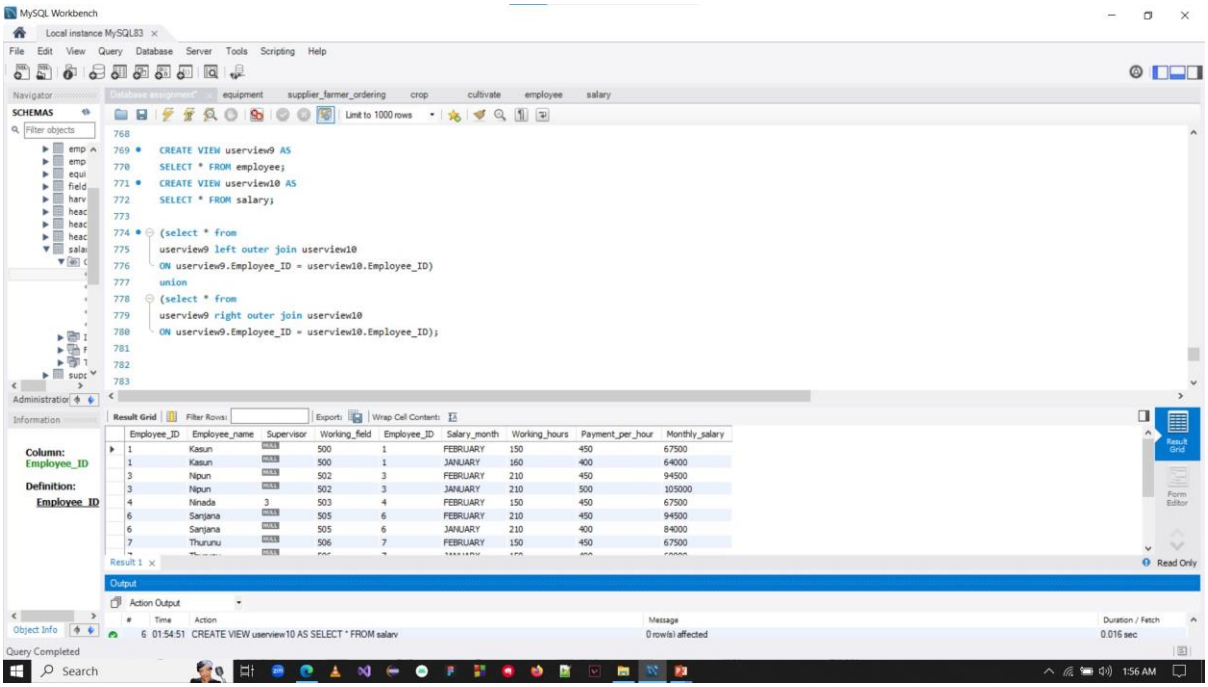


3. Nested 3

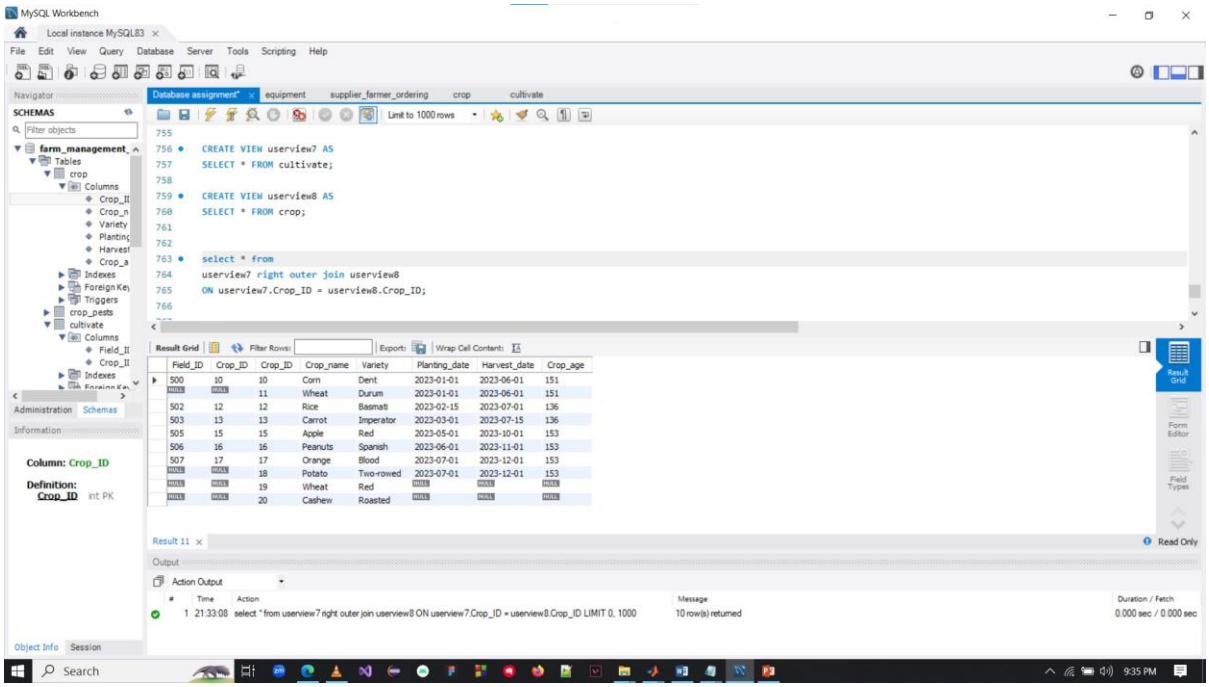

MySQL Workbench
Local instance MySQL83
File Edit View Query Database Server Tools Scripting Help
Navigator
SCHEMAS
Filter objects
employee_email
Columns
Indexes
Foreign Keys
Triggers
equipment
field
harvest
head_farmer
head_farmer_contact
head_farmer_email
salary
Columns
Employee_ID
Salary_month
Working_hours
Payment_per_hour
Monthly_salary
Indexes
Foreign Keys
Administration Schemas
Information
Table: supplier
Columns:
Supplier_ID int PK
Supplier_name varchar(25)
Product_supplied varchar(25)
Object Info Session
Database assignment* supplier employee salary
Limit to 1000 rows
798
799
800 SELECT Employee_ID, Employee_name
801 FROM EMPLOYEE
802 WHERE Employee_ID IN (
803 SELECT Employee_ID
804 FROM SALARY
805 WHERE Monthly_salary < 90000
806)
807 INTERSECT
808 SELECT Employee_ID, Employee_name
809 FROM EMPLOYEE
810 WHERE Working_field = 500;
811
812
Result Grid Filter Rows: Export: Wrap Cell Content:
Employee_ID Employee_name
1 Kasun
Result Grid
Form Editor
Read Only
Result 13
Output
Action Output
Time Action Message Duration / Fetch
25 03:08:26 SELECT * FROM farm_management_system.salary LIMIT 0, 1000 15 row(s) returned 0.000 sec / 0.000 sec
26 03:09:45 SELECT Employee_ID, Employee_name FROM EMPLOYEE WHERE Employee_ID IN (SELECT Emp... 1 row(s) returned 0.000 sec / 0.000 sec
Query Completed
Search
3:09 AM

4. Full outer join

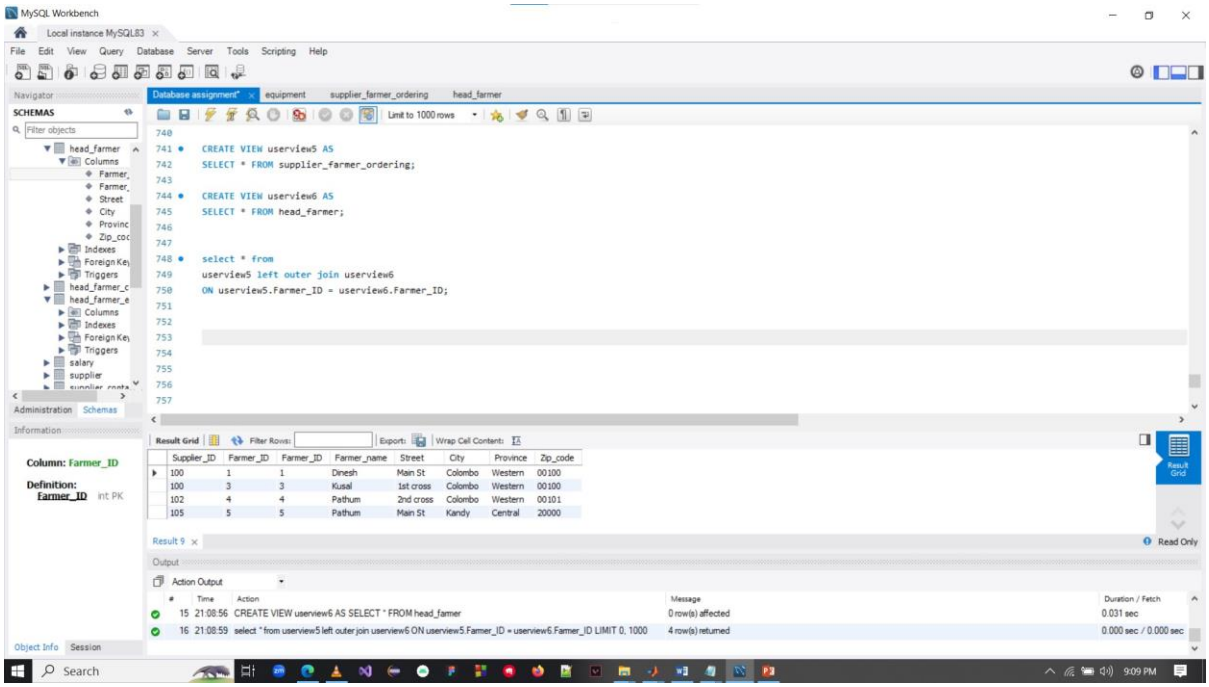




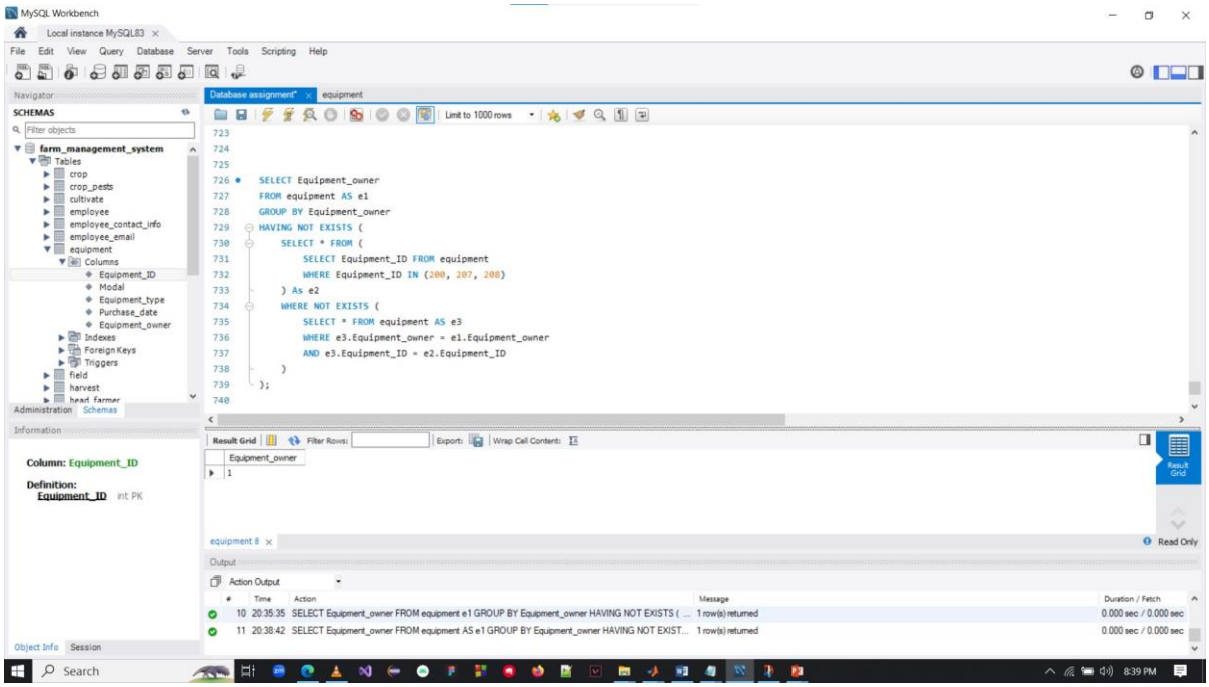
5. Right outer join



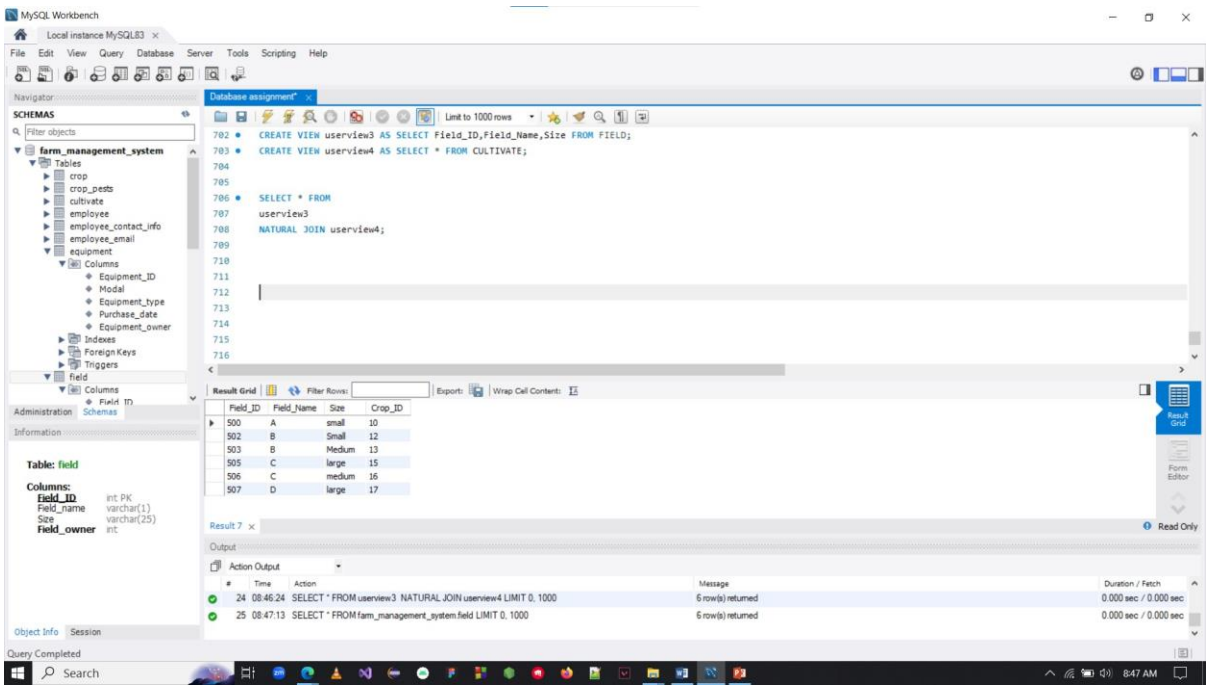
6. Left outer join



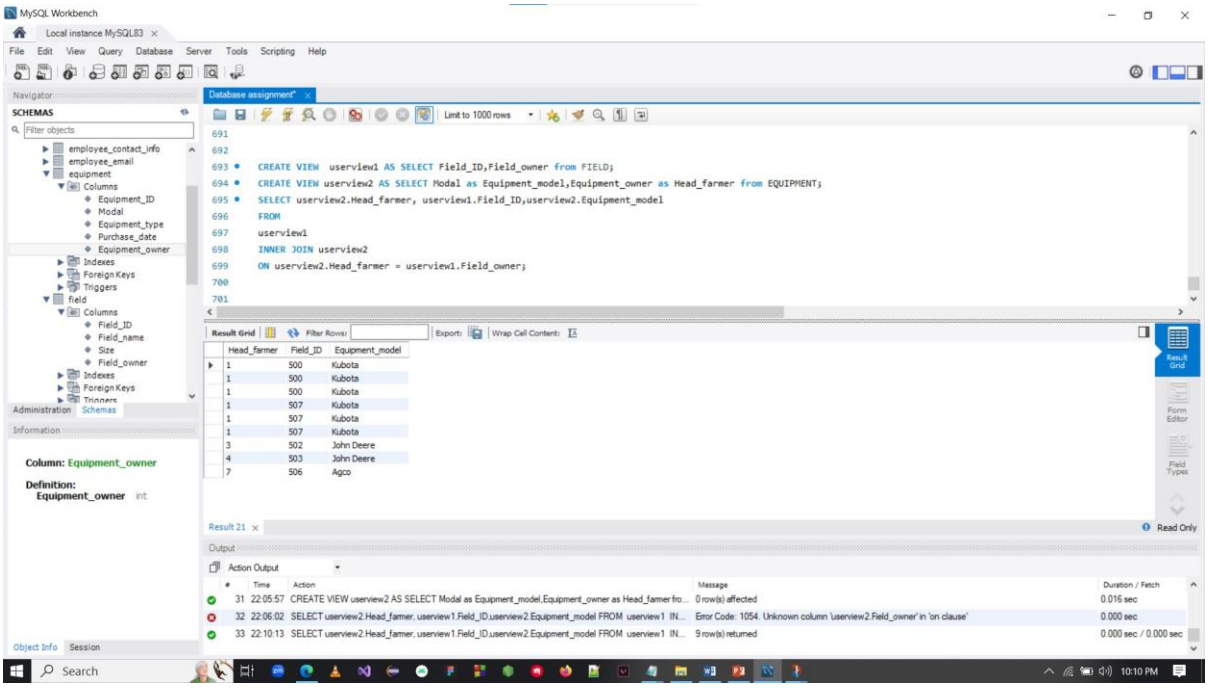
7. Division



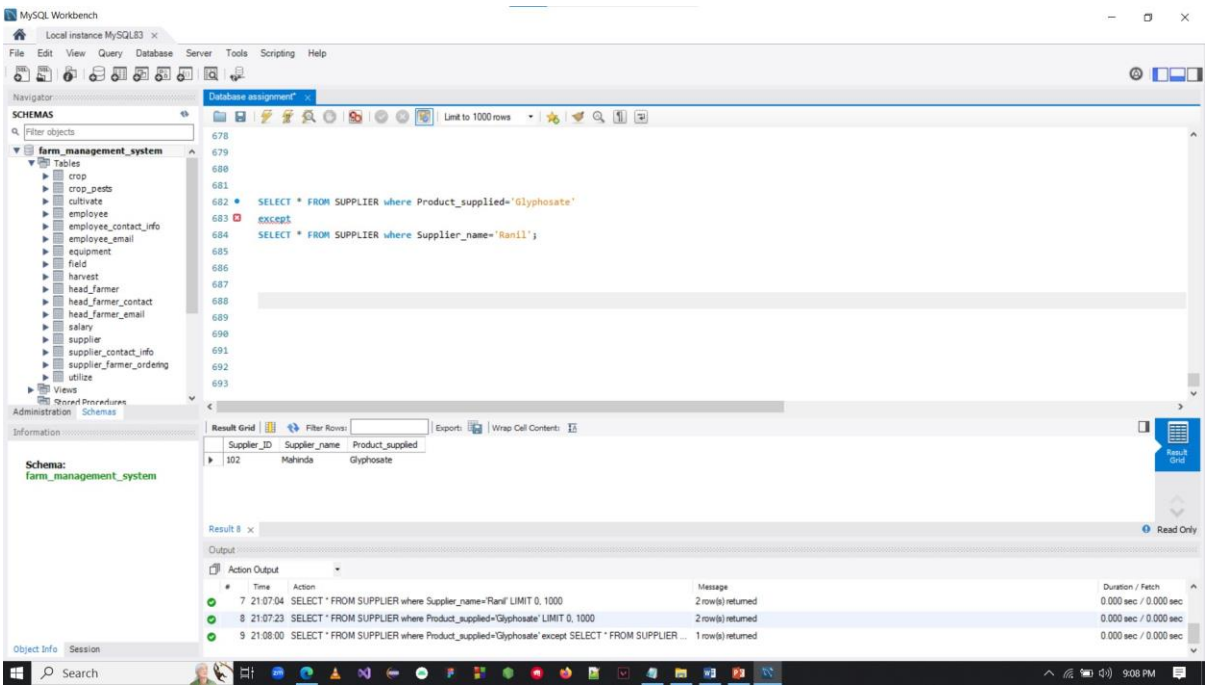
8. Natural join



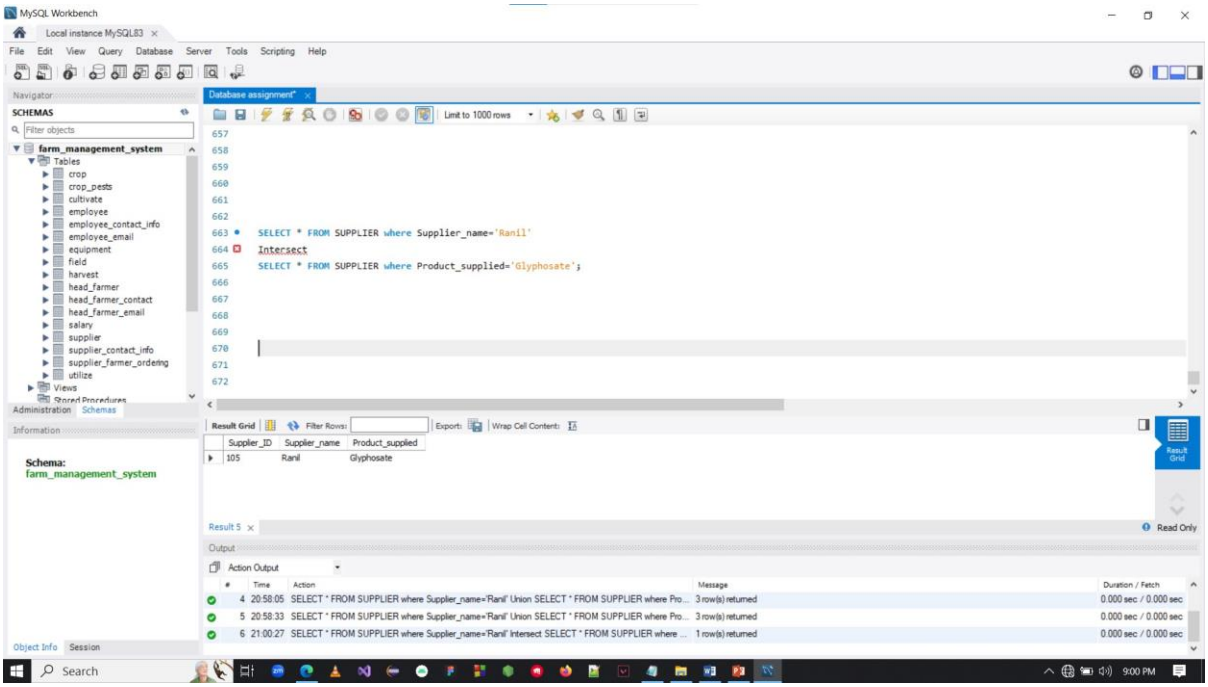
9. Inner join



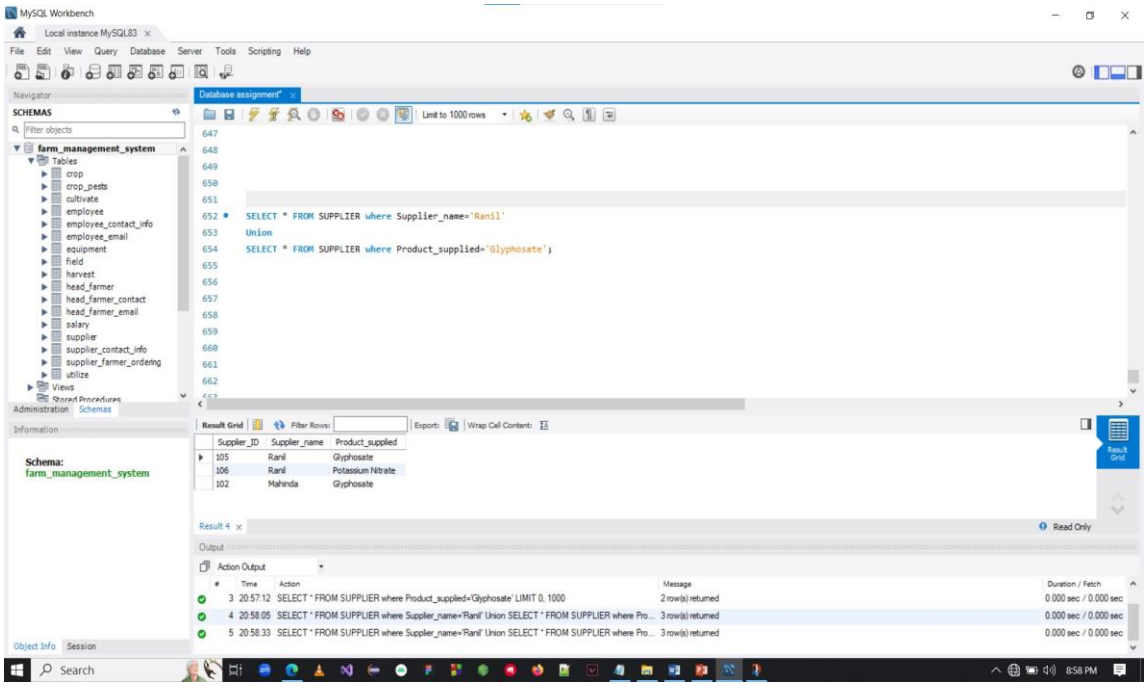
10. Set difference



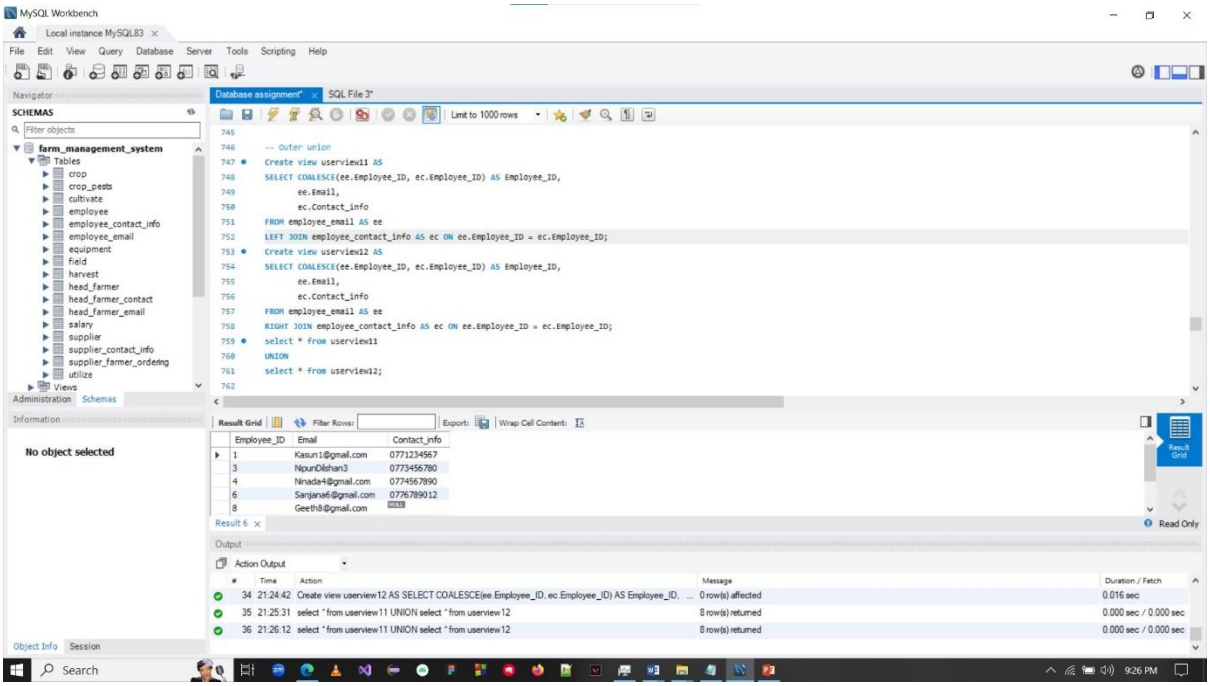
11.Intersect

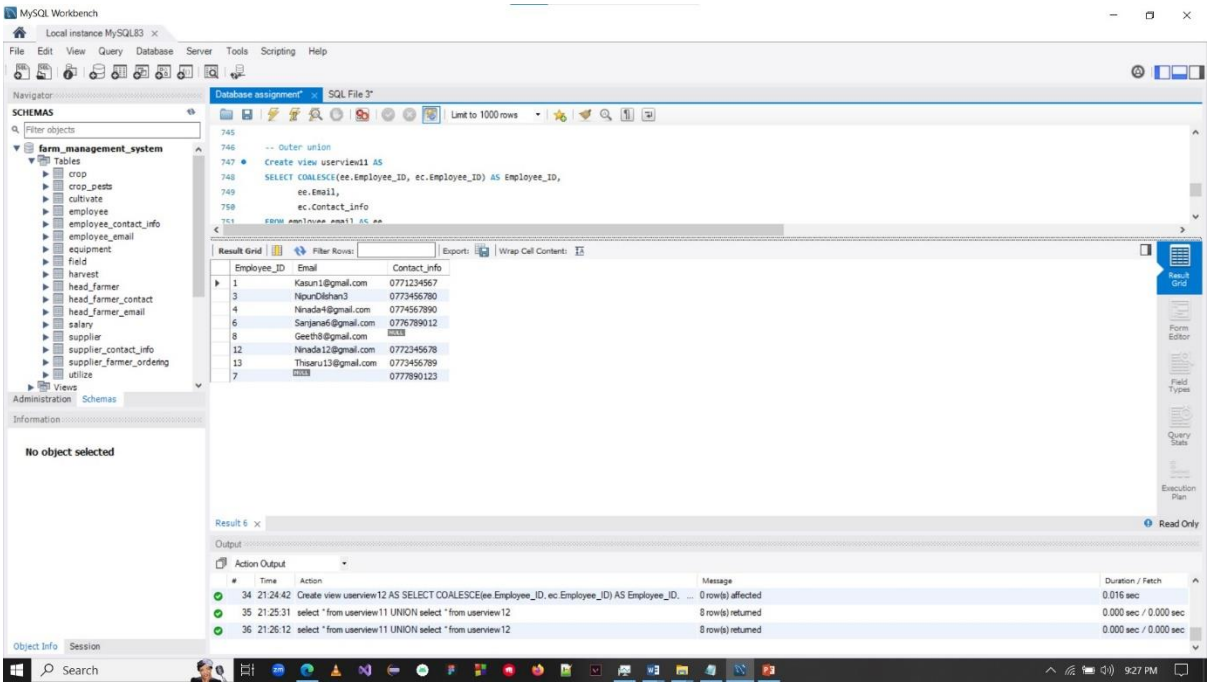


12.Union



13.Outer Union

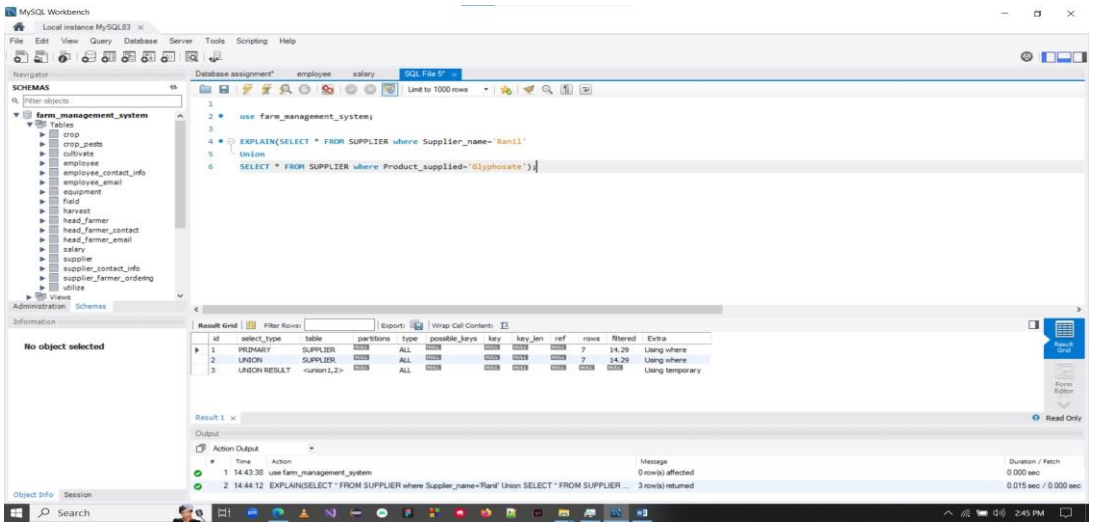




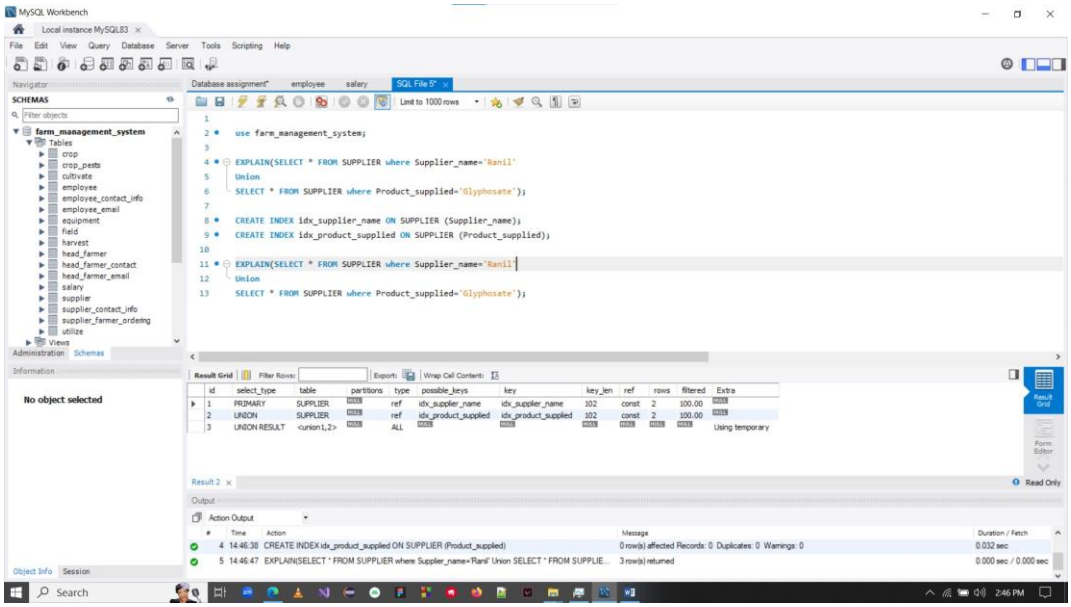
TUNING

Query optimization involves assessing the efficiency of a query by comparing data access before and after implementing an appropriate index. If the number of accessed rows decreases post-index establishment, it indicates successful tuning. All screenshots in the provided list meet this criteria. Each challenging query undergoes optimization through a series of steps for clarity. These steps involve removing existing externally built indexes, creating suitable indexes, and using commands such as EXPLAIN and SHOW INDEX to analyze data access and index structures before and after optimization.

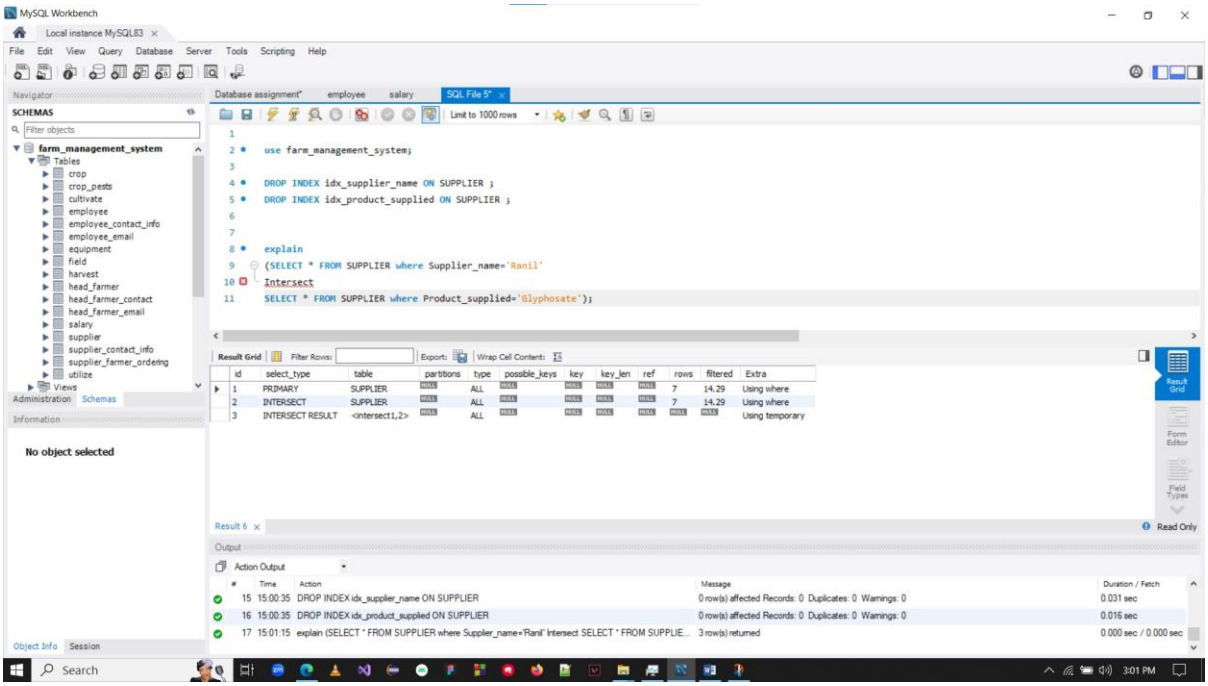
- 1. Union
  - Before



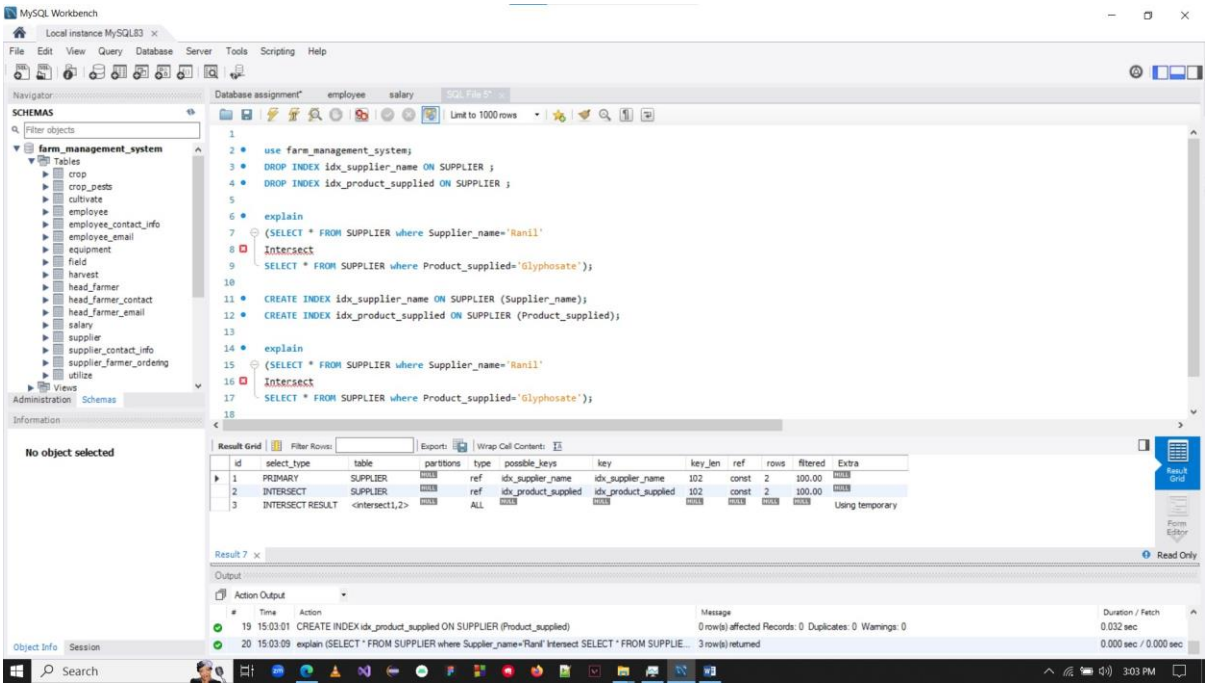
  - After



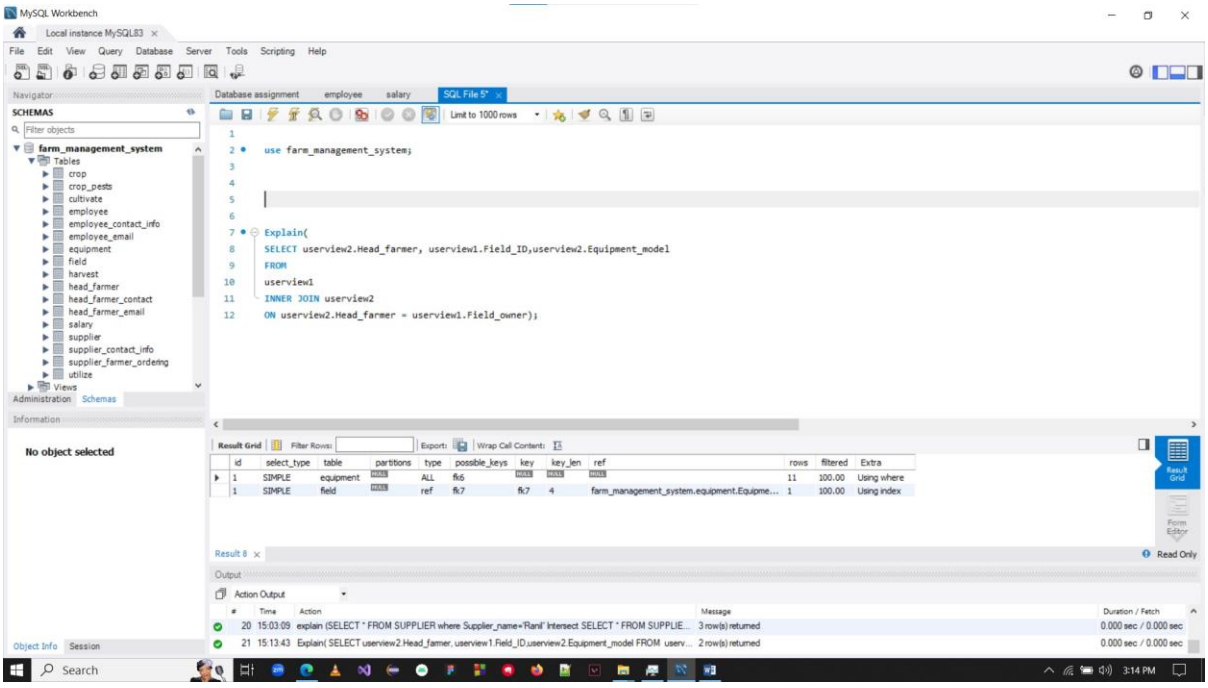
- 2. Intersect
  - Before



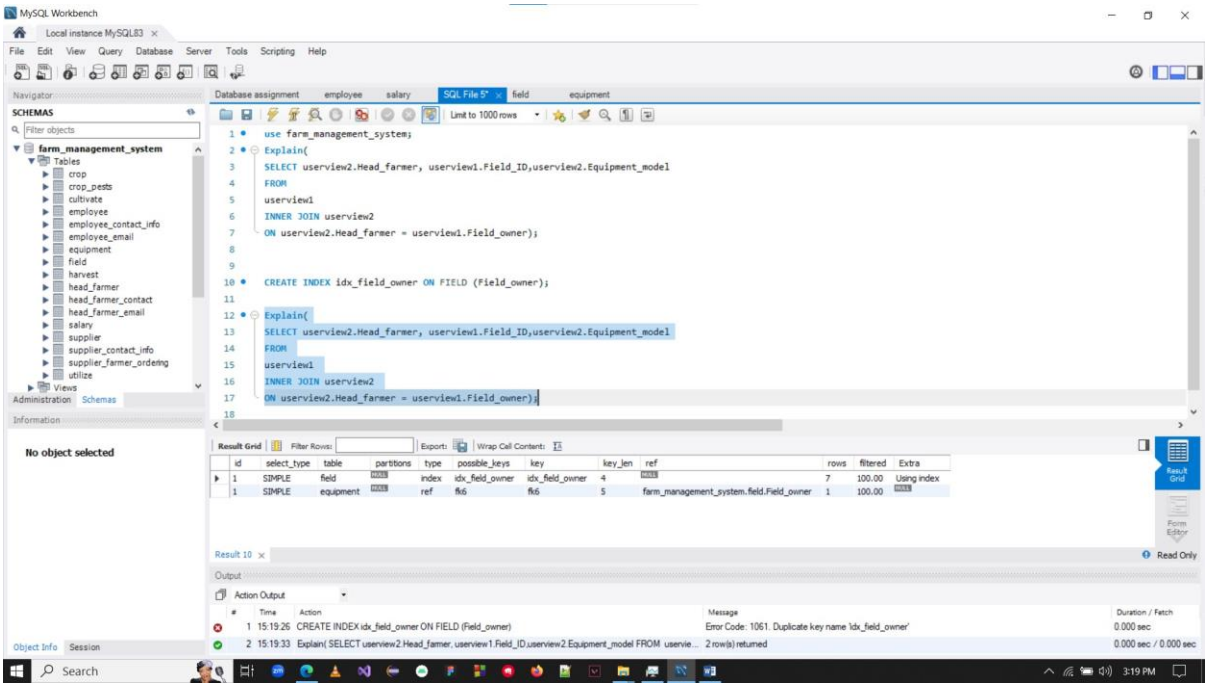
  - After



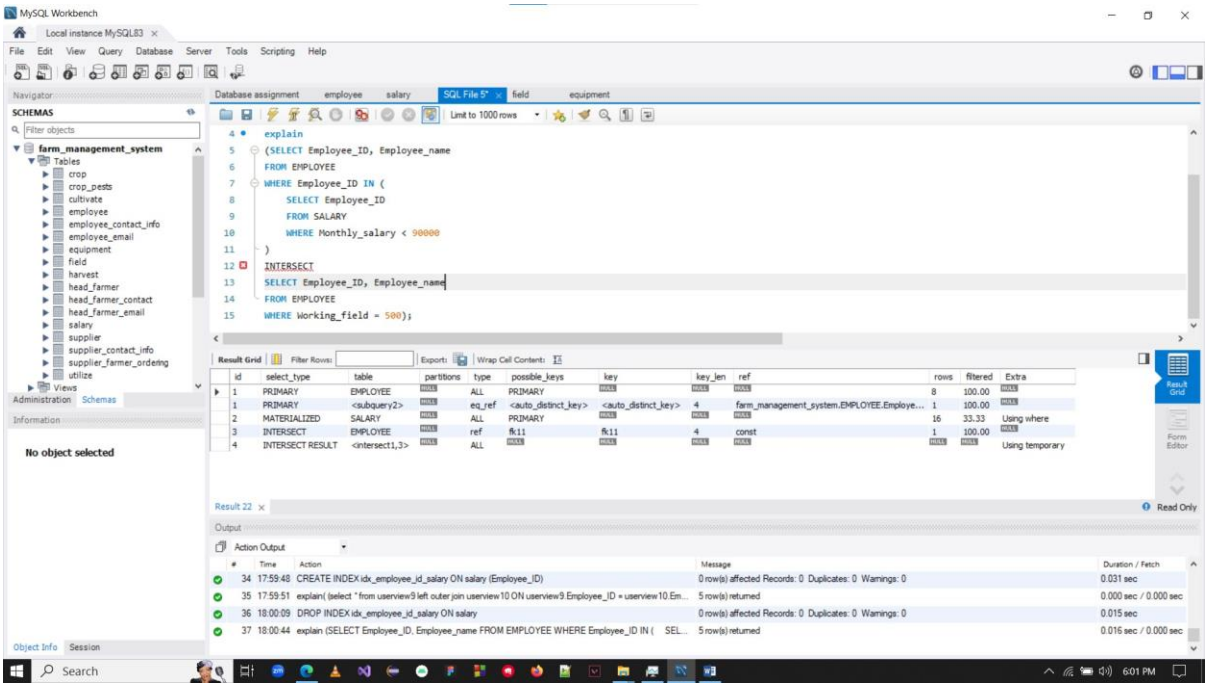
- 3. Inner join
  - Before



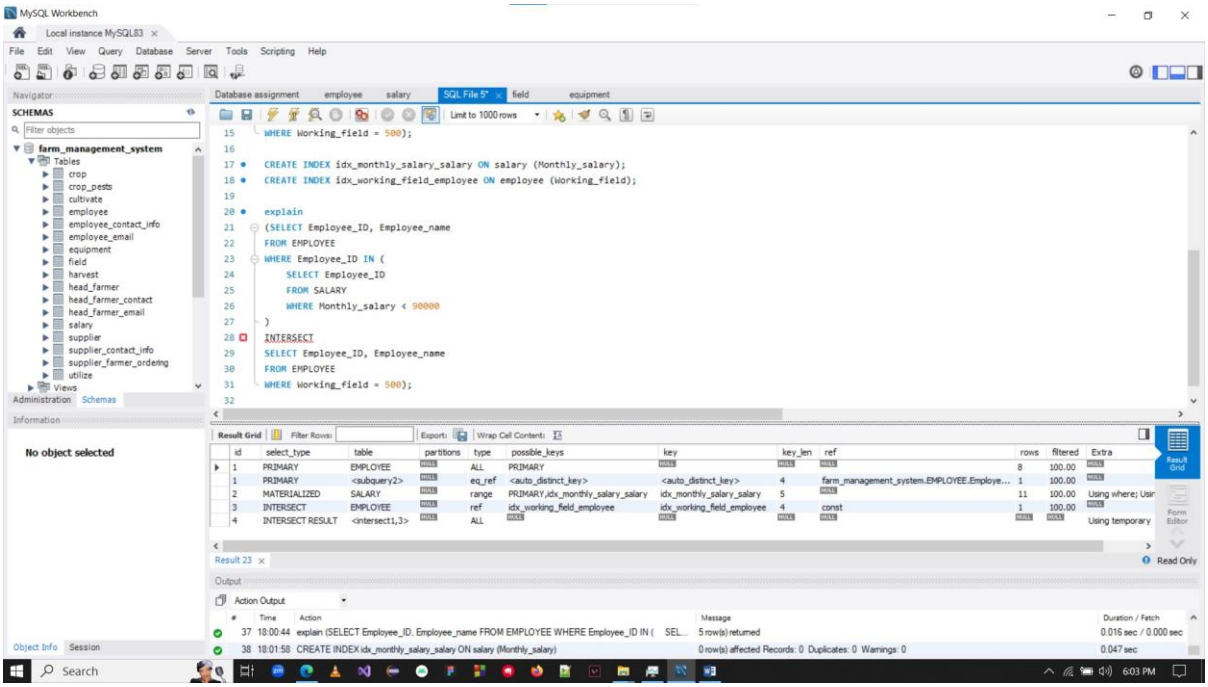
  - After



- 4. Nested 1
  - Before

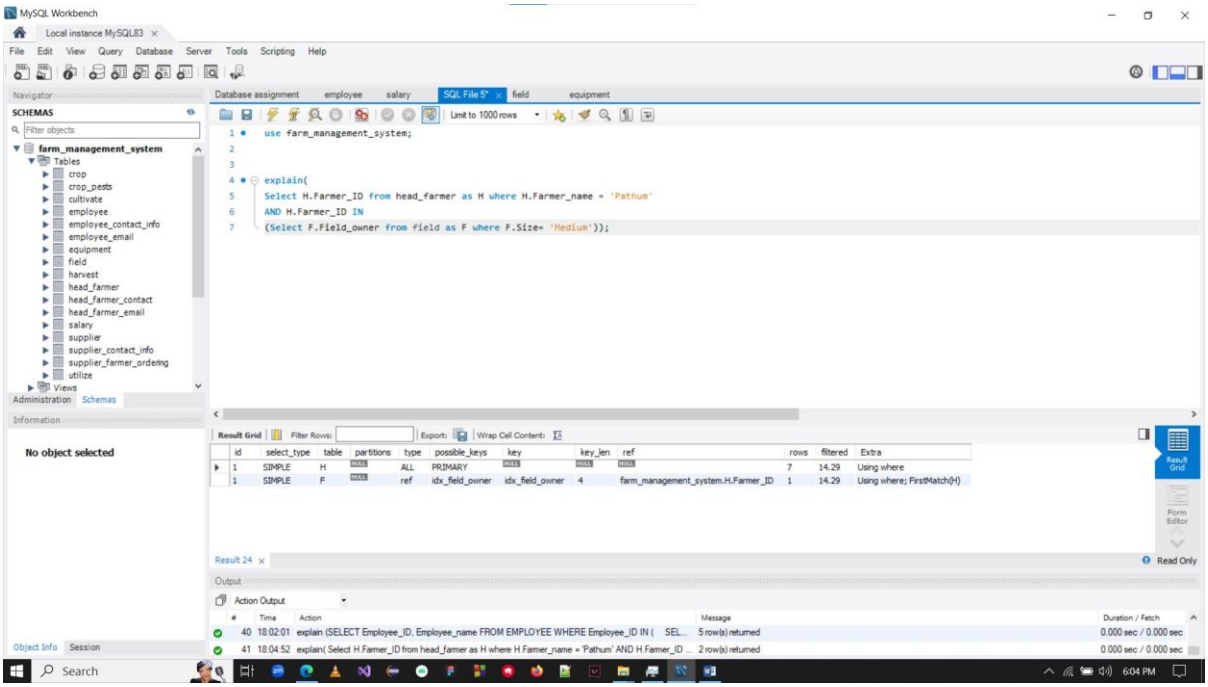


  - After

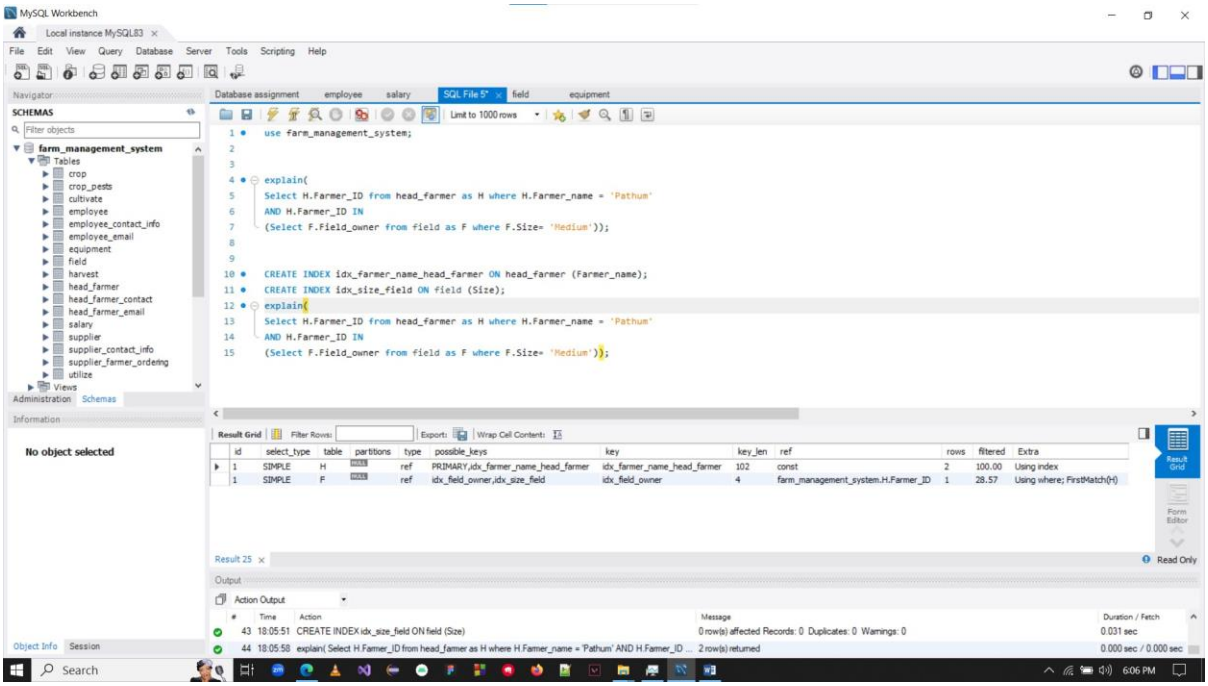


➢ 5. Nested 2

- Before



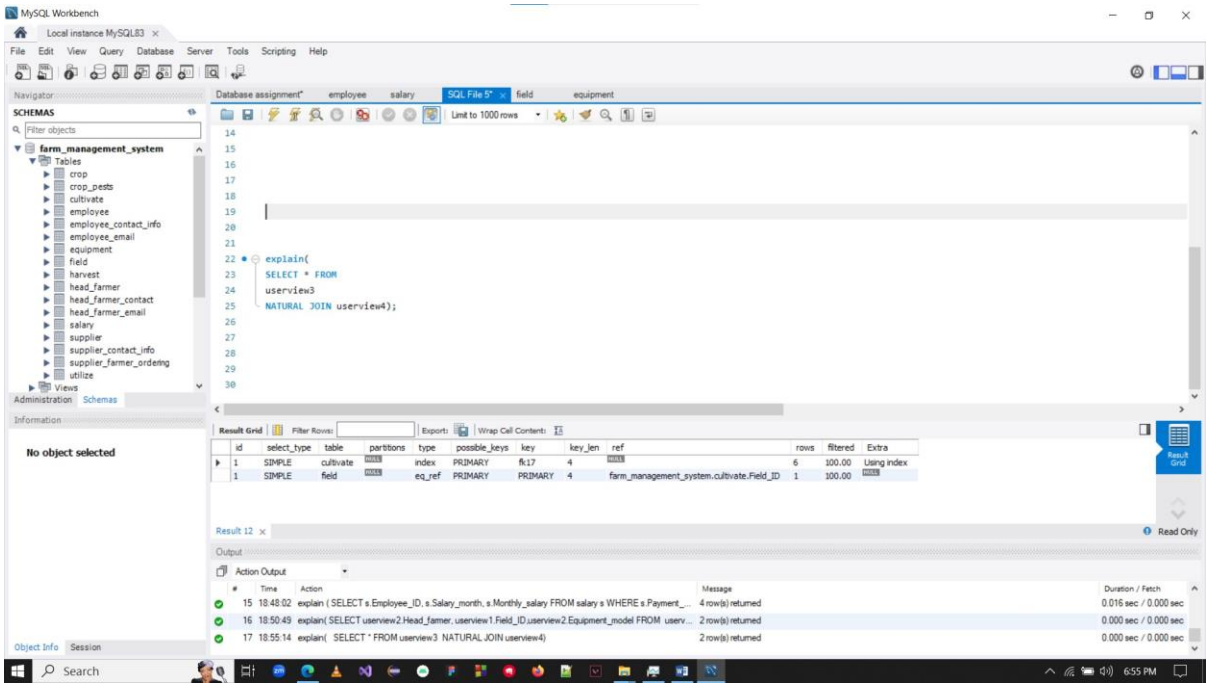
- After



➢ 6. Natural join

- Already Indexed

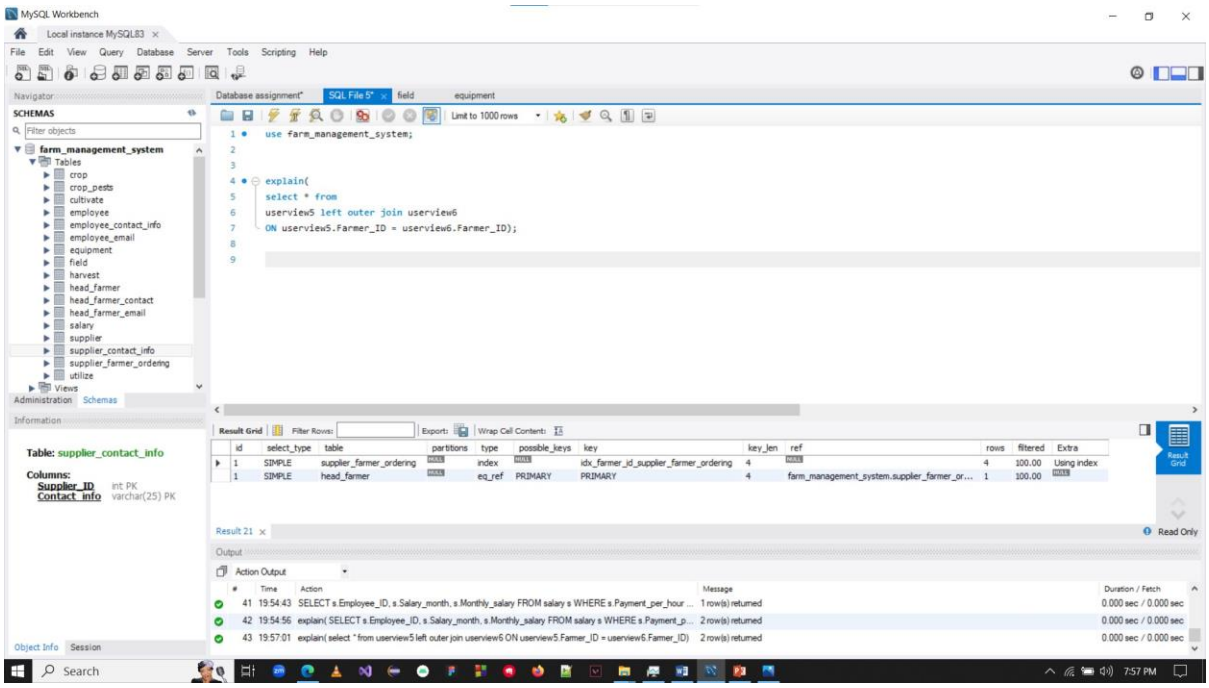
This is already tuned because of primary key.



➢ 7. Left outer join

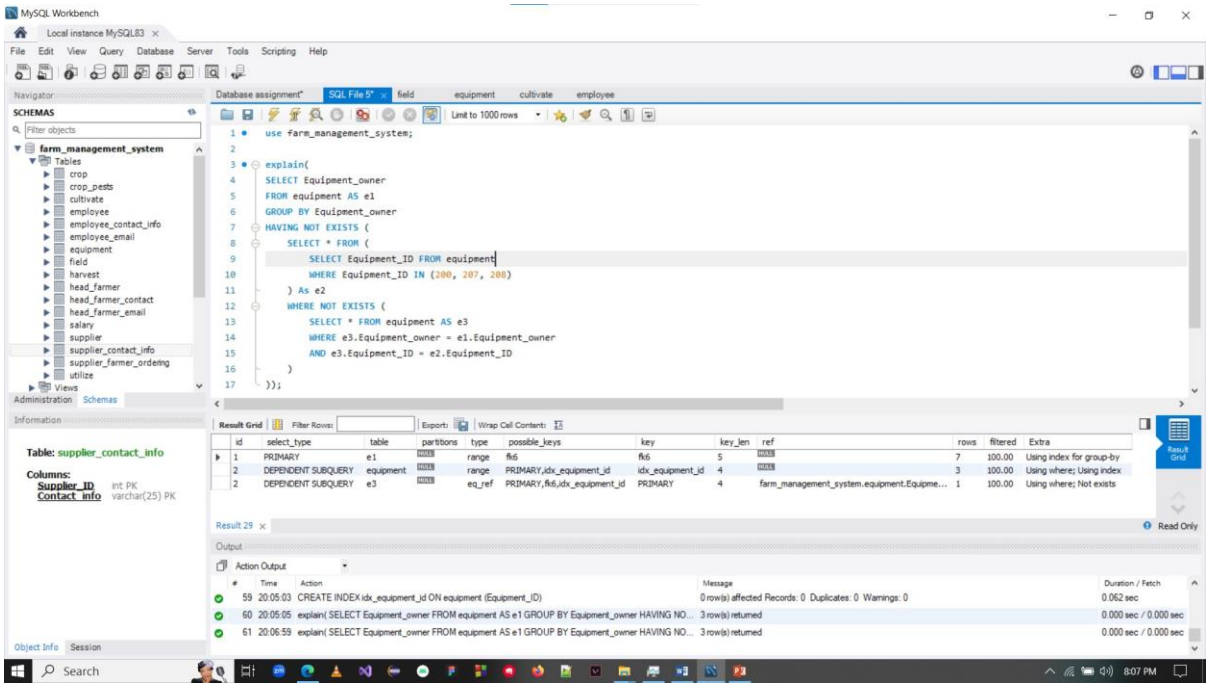
- Already indexed

This is already tuned because of primary key.



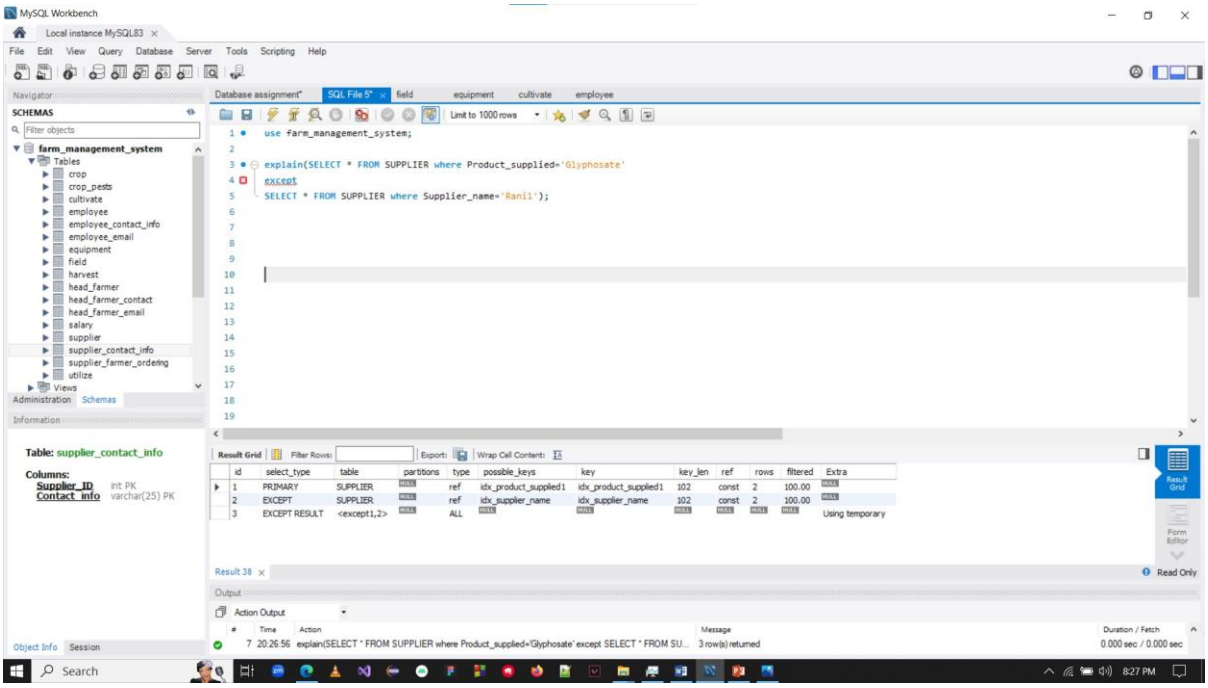
➢ 8. Division

Already indexed.

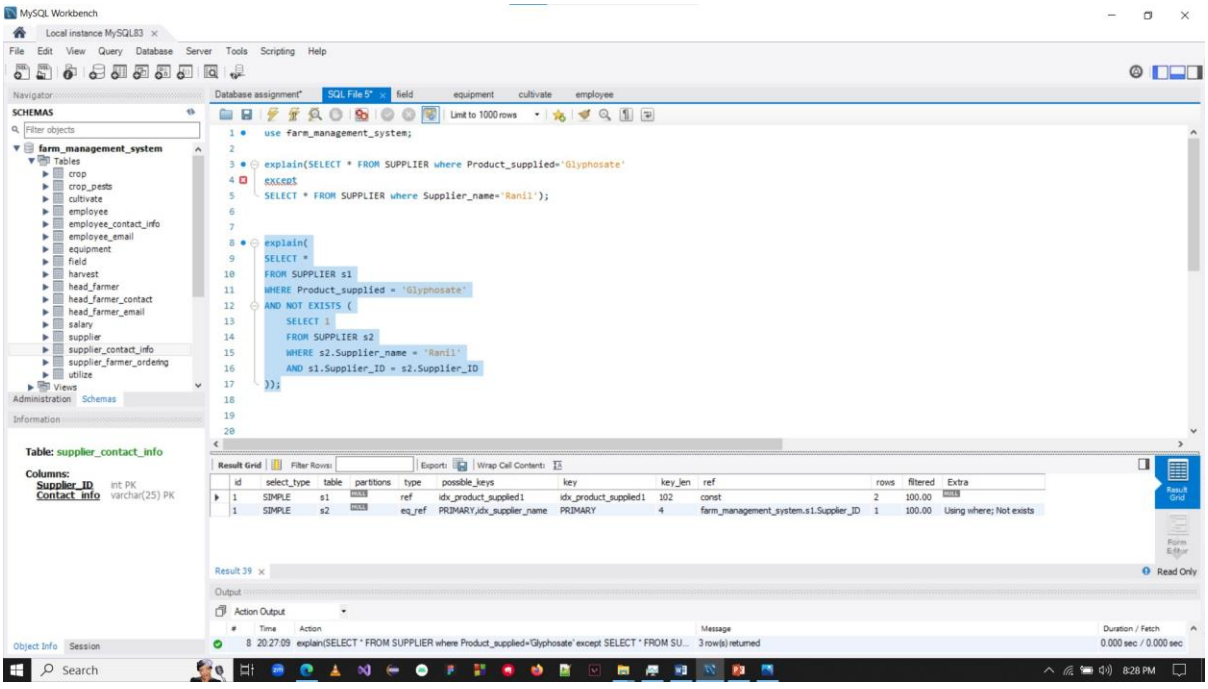


➢ 9. Set difference

- Before

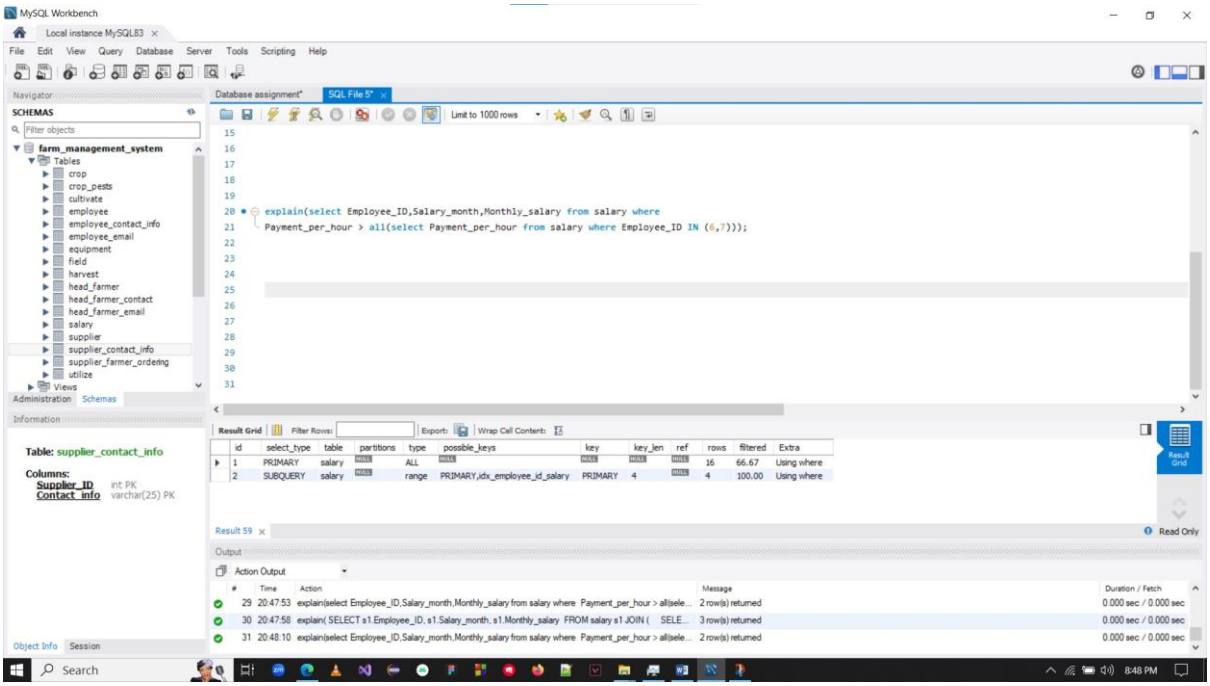


- After



➢ 10. Nested 3

- Before



- After