INSY7213 A1

Tawfeeq Gallie

ST10434369

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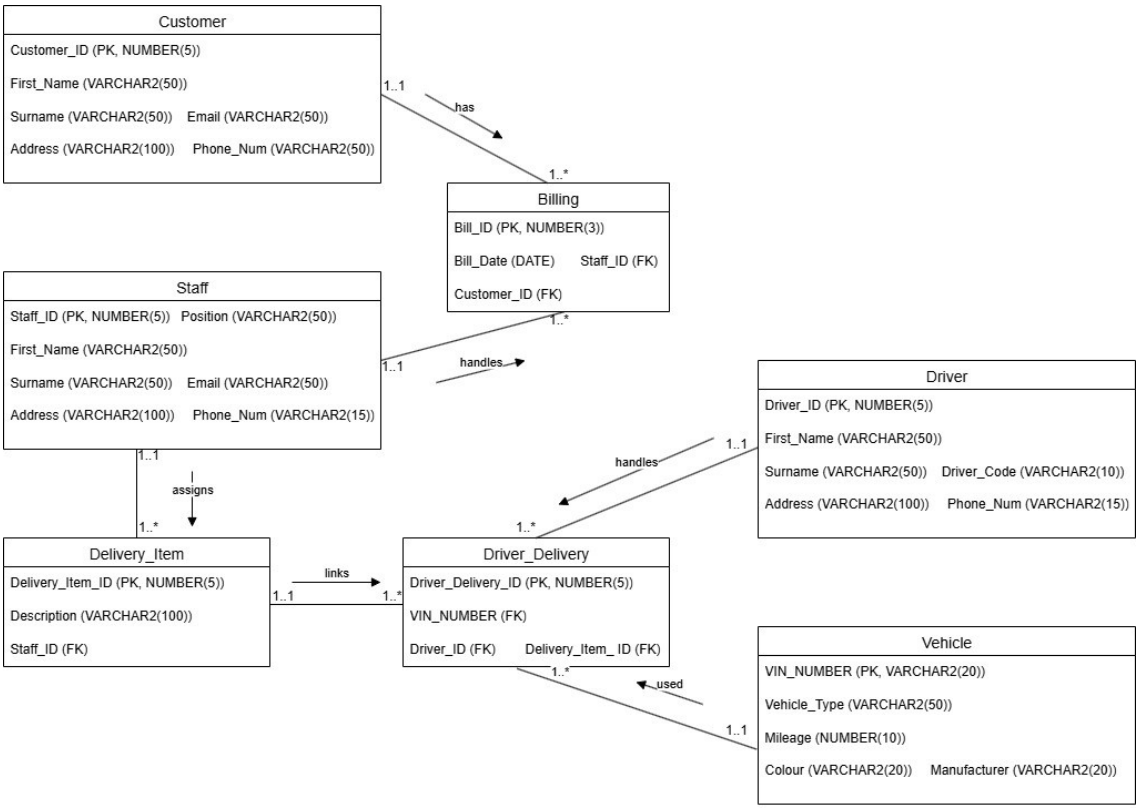
Question 1



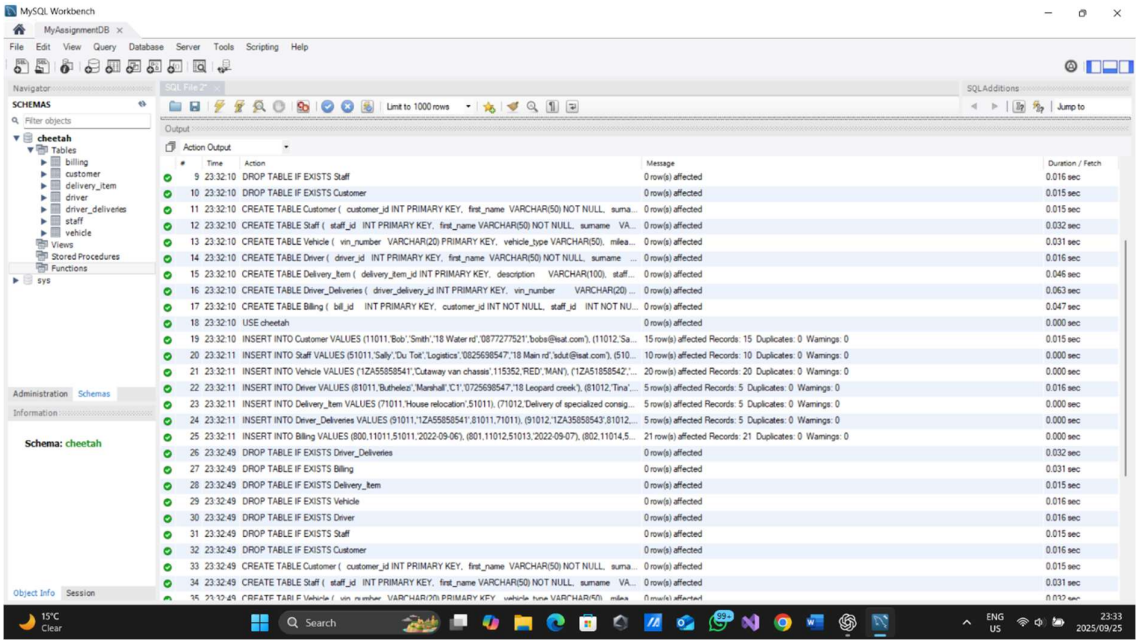
My assumptions for the ERD:

Different entities (Customers, Staff, Billing, Delivery_Items, Drivers, Vehicles, Driver_Deliveries) are represented by the flat files. To eliminate repetition, I normalized to 3NF (for instance, distinguishing between drivers and staff since the former have distinct variables like DRIVER_CODE and the latter do not share responsibilities like "Logistics" and "CRM").

Foreign keys and Primary keys:

For Primary Keys (PKs), use the provided IDs (for example, Customer_ID as NUMBER(5)). Assuming they are distinct and automatically produced if required, import them precisely as is. References for billing Two instances of foreign keys (FKs) are Customer (Customer_ID) and Staff (Staff_ID). Employee References for Delivery Items (Staff_ID, presuming employees assign or handle items). Driver_Deliveries References Vehicle (VIN_NUMBER), Driver (Driver_ID), and Delivery Items (DELIVERY_ITEM as DELIVERY_ITEM_ID). No extra connections beyond those that are suggested (for instance, there is no direct connection between the delivery and the client; deliveries are presumed to be monitored using Billing and Items for efficiency monitoring).

Question 2


MySQL Workbench
MyAssignmentDB
File Edit View Query Database Server Tools Scripting Help
SCHEMAS
cheetah
Tables
billing
customer
delivery_item
driver
driver_deliveries
staff
vehicle
Views
Stored Procedures
Functions
sys
Schema: cheetah
Action Output
Time Action Message Duration / Fetch
9 23:32:10 DROP TABLE IF EXISTS Staff 0 row(s) affected 0.016 sec
10 23:32:10 DROP TABLE IF EXISTS Customer 0 row(s) affected 0.015 sec
11 23:32:10 CREATE TABLE Customer (customer_id INT PRIMARY KEY, first_name VARCHAR(50) NOT NULL, surna... 0 row(s) affected 0.015 sec
12 23:32:10 CREATE TABLE Staff (staff_id INT PRIMARY KEY, first_name VARCHAR(50) NOT NULL, surname VA... 0 row(s) affected 0.032 sec
13 23:32:10 CREATE TABLE Vehicle (vin_number VARCHAR(20) PRIMARY KEY, vehicle_type VARCHAR(50), milea... 0 row(s) affected 0.031 sec
14 23:32:10 CREATE TABLE Driver (driver_id INT PRIMARY KEY, first_name VARCHAR(50) NOT NULL, surname ... 0 row(s) affected 0.016 sec
15 23:32:10 CREATE TABLE Delivery_Item (delivery_item_id INT PRIMARY KEY, description VARCHAR(100), staff... 0 row(s) affected 0.046 sec
16 23:32:10 CREATE TABLE Driver_Deliveries (driver_delivery_id INT PRIMARY KEY, vin_number VARCHAR(20) ... 0 row(s) affected 0.063 sec
17 23:32:10 CREATE TABLE Billing (bill_id INT PRIMARY KEY, customer_id INT NOT NULL, staff_id INT NOT NU... 0 row(s) affected 0.047 sec
18 23:32:10 USE cheetah 0 row(s) affected 0.000 sec
19 23:32:10 INSERT INTO Customer VALUES (11011,'Bob','Smith','18 Water rd','0877277521','bobs@isat.com'), (11012,'Sa... 15 row(s) affected Records: 15 Duplicates: 0 Warnings: 0 0.015 sec
20 23:32:11 INSERT INTO Staff VALUES (51011,'Sally','Du Toit','Logistics','0825698547','18 Main rd','sdut@isat.com'), (510... 10 row(s) affected Records: 10 Duplicates: 0 Warnings: 0 0.000 sec
21 23:32:11 INSERT INTO Vehicle VALUES ('1ZA55858541','Cutaway van chassis',115352,'RED','MAN'), ('1ZA51858542','... 20 row(s) affected Records: 20 Duplicates: 0 Warnings: 0 0.000 sec
22 23:32:11 INSERT INTO Driver VALUES (81011,'Butheleziy','Marshall','C1','0725698547','18 Leopard creek'), (81012,'Tina',... 5 row(s) affected Records: 5 Duplicates: 0 Warnings: 0 0.016 sec
23 23:32:11 INSERT INTO Delivery_Item VALUES (71011,'House relocation',51011), (71012,'Delivery of specialized consig... 5 row(s) affected Records: 5 Duplicates: 0 Warnings: 0 0.000 sec
24 23:32:11 INSERT INTO Driver_Deliveries VALUES (91011,'1ZA55858541',81011,71011), (91012,'1ZA35858543',81012... 5 row(s) affected Records: 5 Duplicates: 0 Warnings: 0 0.000 sec
25 23:32:11 INSERT INTO Billing VALUES (800,11011,51011,'2022-09-06'), (801,11012,51013,'2022-09-07'), (802,11014,5... 21 row(s) affected Records: 21 Duplicates: 0 Warnings: 0 0.000 sec
26 23:32:49 DROP TABLE IF EXISTS Driver_Deliveries 0 row(s) affected 0.032 sec
27 23:32:49 DROP TABLE IF EXISTS Billing 0 row(s) affected 0.031 sec
28 23:32:49 DROP TABLE IF EXISTS Delivery_Item 0 row(s) affected 0.015 sec
29 23:32:49 DROP TABLE IF EXISTS Vehicle 0 row(s) affected 0.016 sec
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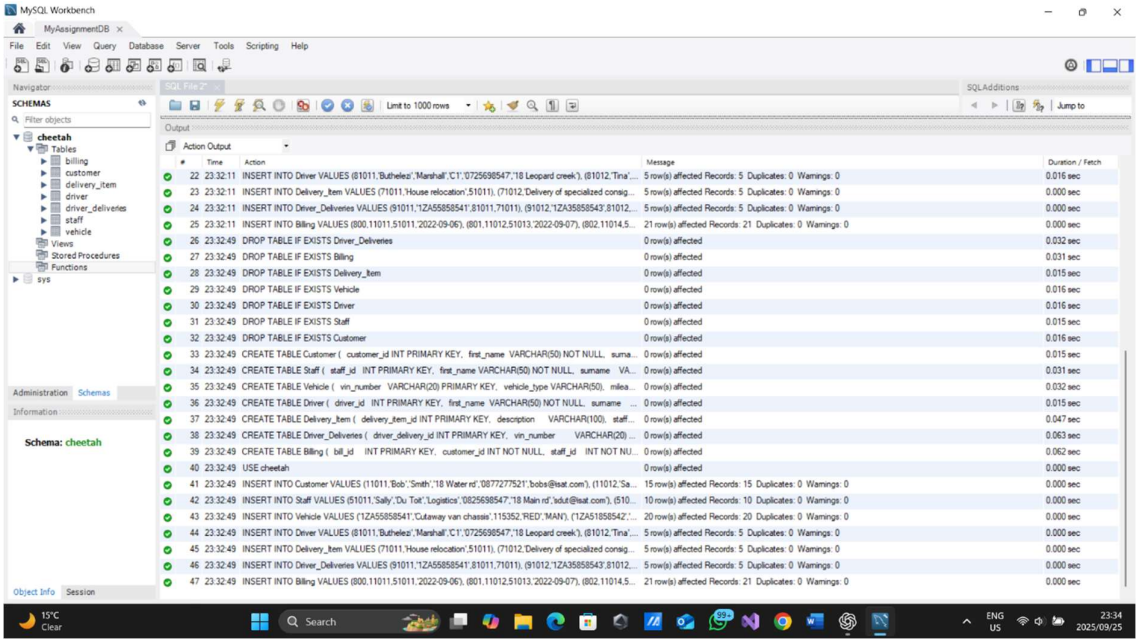
31 23:32:49 DROP TABLE IF EXISTS Staff 0 row(s) affected 0.015 sec
32 23:32:49 DROP TABLE IF EXISTS Customer 0 row(s) affected 0.016 sec
33 23:32:49 CREATE TABLE Customer (customer_id INT PRIMARY KEY, first_name VARCHAR(50) NOT NULL, surna... 0 row(s) affected 0.015 sec
34 23:32:49 CREATE TABLE Staff (staff_id INT PRIMARY KEY, first_name VARCHAR(50) NOT NULL, surname VA... 0 row(s) affected 0.031 sec
15°C Clear
Search
ENG US
23:33 2025/09/25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Action Output
Time Action Message Duration / Fetch
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39 23:32:49 CREATE TABLE Billing (bill_id INT PRIMARY KEY, customer_id INT NOT NULL, staff_id INT NOT NU... 0 row(s) affected 0.062 sec
40 23:32:49 USE cheetah 0 row(s) affected 0.000 sec
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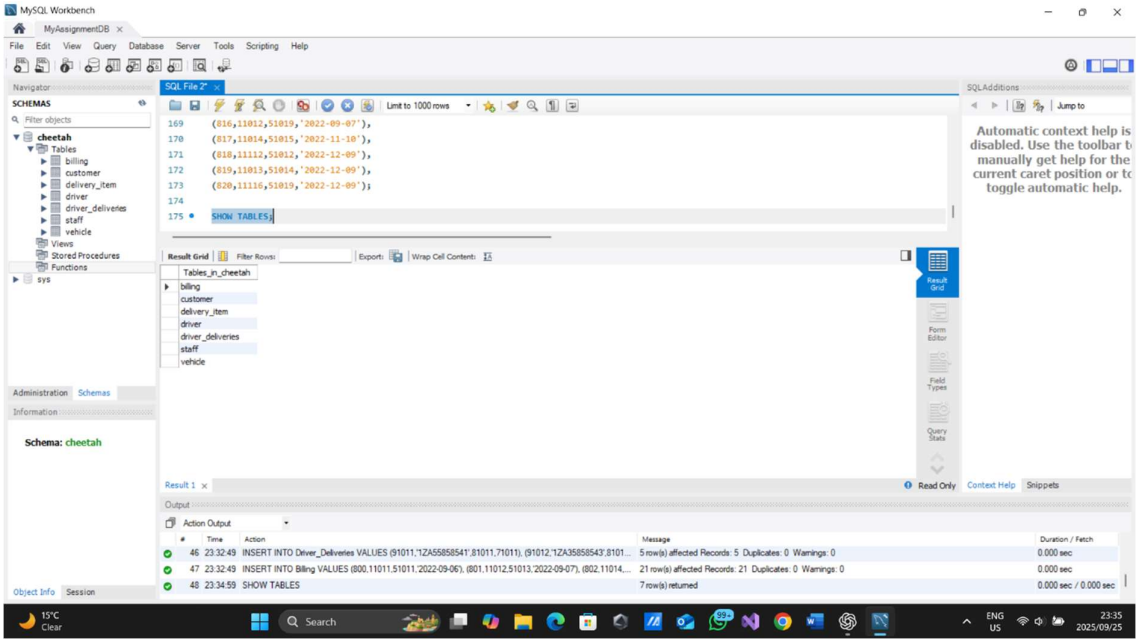
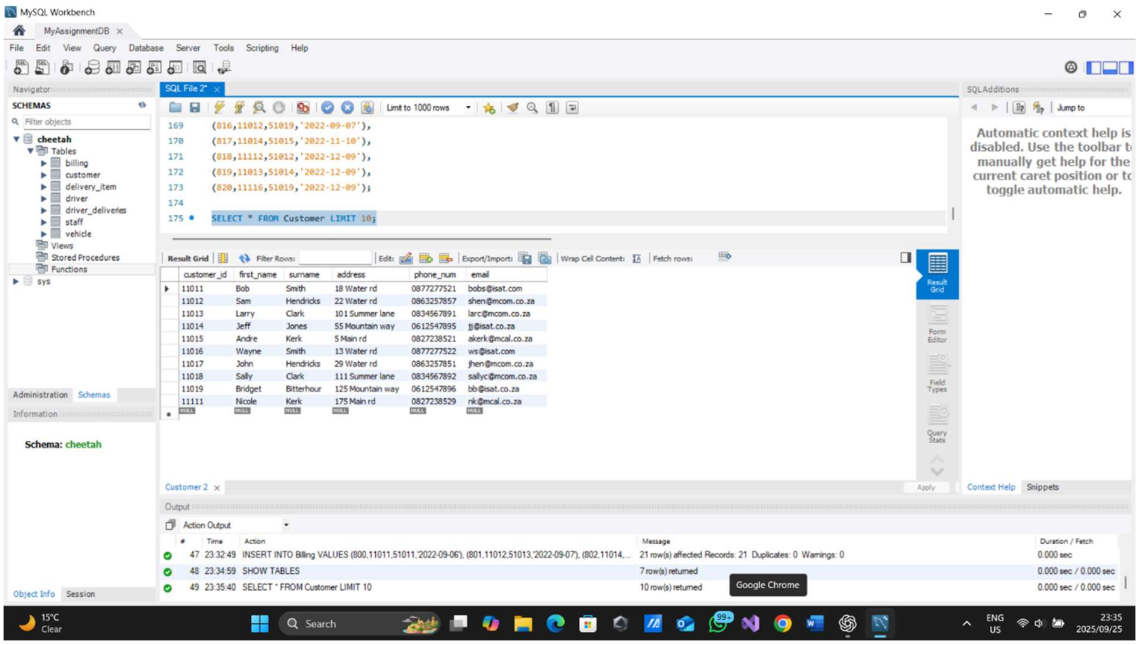
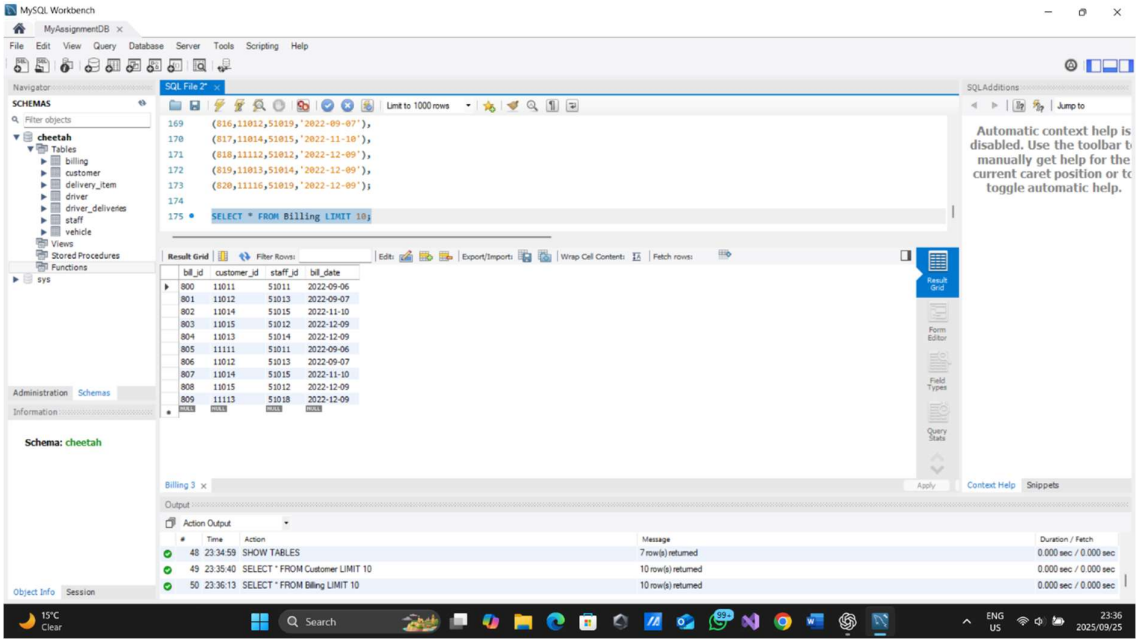
46 23:32:49 INSERT INTO Driver_Deliveries VALUES (91011,'1ZA55858541',81011,71011), (91012,'1ZA35858543',81012... 5 row(s) affected Records: 5 Duplicates: 0 Warnings: 0 0.000 sec
47 23:32:49 INSERT INTO Billing VALUES (800,11011,51011,'2022-09-06'), (801,11012,51013,'2022-09-07'), (802,11014,5... 21 row(s) affected Records: 21 Duplicates: 0 Warnings: 0 0.000 sec
15°C Clear
Search
ENG US
23:34 2025/09/25

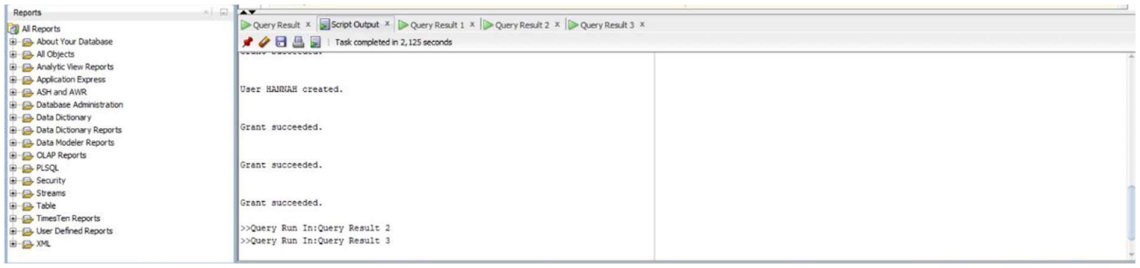

MySQL Workbench
MyAssignmentDB
File Edit View Query Database Server Tools Scripting Help
SCHEMAS
cheetah
Tables
billing
customer
delivery_item
driver
driver_deliveries
staff
vehicle
Views
Stored Procedures
Functions
sys
SQL File 2*
169 (816,11012,51019,'2022-09-07'),
170 (817,11014,51015,'2022-11-10'),
171 (818,11112,51012,'2022-12-09'),
172 (819,11013,51014,'2022-12-09'),
173 (820,11116,51019,'2022-12-09');
175 SHOW TABLES;
Result Grid
Tables_in_cheetah
billing
customer
delivery_item
driver
driver_deliveries
staff
vehicle
Schema: cheetah
Output
Action Output
46 23:32:49 INSERT INTO Driver_Deliveries VALUES (91011,'1ZA55858541',81011,71011), (91012,'1ZA35858543',8101... 5 row(s) affected Records: 5 Duplicates: 0 Warnings: 0 0.000 sec
47 23:32:49 INSERT INTO Billing VALUES (800,11011,51011,'2022-09-06'), (801,11012,51013,'2022-09-07'), (802,11014,... 21 row(s) affected Records: 21 Duplicates: 0 Warnings: 0 0.000 sec
48 23:34:59 SHOW TABLES 7 row(s) returned 0.000 sec / 0.000 sec


MySQL Workbench
MyAssignmentDB
File Edit View Query Database Server Tools Scripting Help
SCHEMAS
cheetah
Tables
billing
customer
delivery_item
driver
driver_deliveries
staff
vehicle
Views
Stored Procedures
Functions
sys
SQL File 2*
169 (816,11012,51019,'2022-09-07'),
170 (817,11014,51015,'2022-11-10'),
171 (818,11112,51012,'2022-12-09'),
172 (819,11013,51014,'2022-12-09'),
173 (820,11116,51019,'2022-12-09');
175 SELECT * FROM Customer LIMIT 10;
Result Grid
customer_id first_name surname address phone_num email
11011 Bob Smith 18 Water rd 0877277521 bobs@isat.com
11012 Sam Hendricks 22 Water rd 0863257857 shen@mcom.co.za
11013 Larry Clark 101 Summer lane 0834567891 larc@mcom.co.za
11014 Jeff Jones 55 Mountain way 0612547895 jj@isat.co.za
11015 Andre Kerk 5 Main rd 0827238521 akerk@mcal.co.za
11016 Wayne Smith 13 Water rd 0877277522 ws@isat.com
11017 John Hendricks 29 Water rd 0863257851 jhen@mcom.co.za
11018 Sally Clark 111 Summer lane 0834567892 sallyc@mcom.co.za
11019 Bridget Bitterhour 125 Mountain way 0612547896 bb@isat.co.za
11111 Nicole Kerk 175 Main rd 0827238529 nk@mcal.co.za
Schema: cheetah
Output
Action Output
47 23:32:49 INSERT INTO Billing VALUES (800,11011,51011,'2022-09-06'), (801,11012,51013,'2022-09-07'), (802,11014,... 21 row(s) affected Records: 21 Duplicates: 0 Warnings: 0 0.000 sec
48 23:34:59 SHOW TABLES 7 row(s) returned 0.000 sec / 0.000 sec
49 23:35:40 SELECT * FROM Customer LIMIT 10 10 row(s) returned 0.000 sec / 0.000 sec
Google Chrome


MySQL Workbench
MyAssignmentDB
File Edit View Query Database Server Tools Scripting Help
Navigator
SCHEMAS
cheetah
Tables
billing
customer
delivery_item
driver
driver_deliveries
staff
vehicle
Views
Stored Procedures
Functions
sys
Administration Schemas
Information
Schema: cheetah
Object Info Session
SQL File 2*
Limit to 1000 rows
169 (816,11012,51019,'2022-09-07'),
170 (817,11014,51015,'2022-11-10'),
171 (818,11112,51012,'2022-12-09'),
172 (819,11013,51014,'2022-12-09'),
173 (820,11116,51019,'2022-12-09');
174
175 SELECT * FROM Billing LIMIT 10;
Result Grid
Filter Rows:
Edit:
Export/Import:
Wrap Cell Content:
Fetch rows:
bill_id customer_id staff_id bill_date
800 11011 51011 2022-09-06
801 11012 51013 2022-09-07
802 11014 51015 2022-11-10
803 11015 51012 2022-12-09
804 11013 51014 2022-12-09
805 11111 51011 2022-09-06
806 11012 51013 2022-09-07
807 11014 51015 2022-11-10
808 11015 51012 2022-12-09
809 11113 51018 2022-12-09
Billing 3
Apply
SQL Additions
Jump to
Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.
Context Help Snippets
Output
Action Output
Time Action Message Duration / Fetch
48 23:34:59 SHOW TABLES 7 row(s) returned 0.000 sec / 0.000 sec
49 23:35:40 SELECT * FROM Customer LIMIT 10 10 row(s) returned 0.000 sec / 0.000 sec
50 23:36:13 SELECT * FROM Billing LIMIT 10 10 row(s) returned 0.000 sec / 0.000 sec
15°C Clear
Search
ENG US
23:36 2025/09/25

Question 3

3.1)

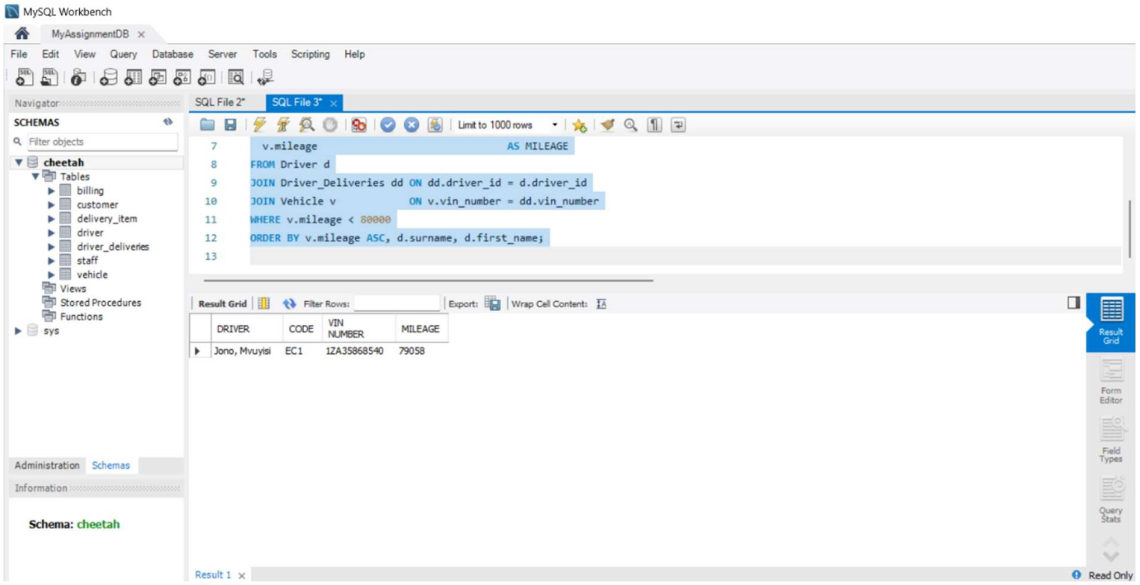


3.2) Separation of Duties

Separation of duties stops a single user from carrying out contradictory tasks that can result in fraud or unnoticed mistakes. Assigning Hannah insert access (INSERT ANY TABLE) and John read-only access (SELECT ANY TABLE) promotes responsibility, lowers risk, and upholds the least privilege principle (Bowman, 2021).

Question 4

4.1) Driver Report for Vehicles < 80,000 Mileage

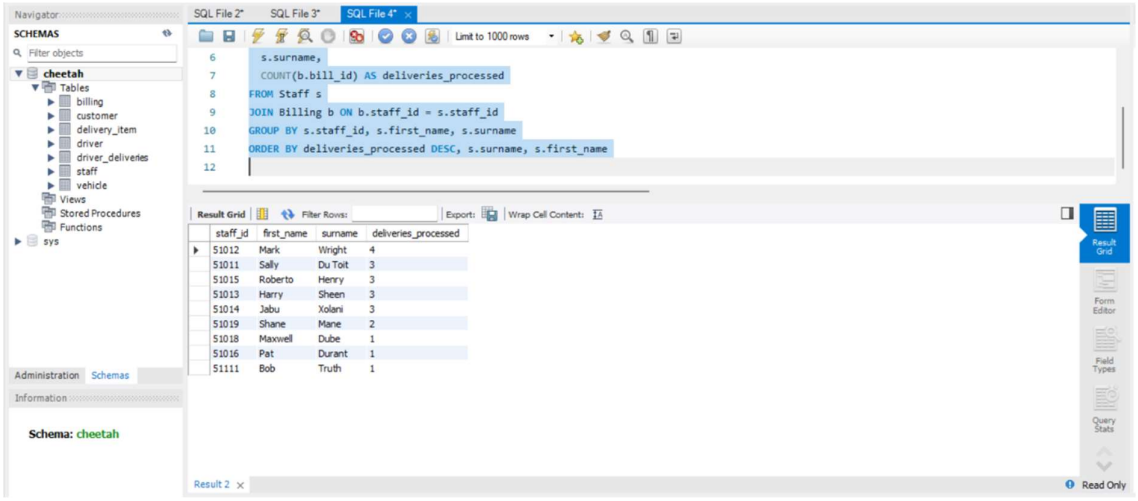


4.2) Flat File vs Relational

- Flat File: Stores all data in single tables or text files, no constraints, lots of duplication (Coronel, 2023).
- Relational: Organises data into linked tables using PK/FK, supports integrity, scalability, and fast querying (Coronel, 2023).
- Better for Cheetah Deliveries: Reduces redundancy (e.g. staff, customers stored once), ensures accurate billing/delivery linking, improves reporting for decision-making.

Question 5

5.1)



5.2)

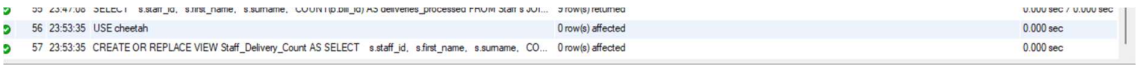
DECLARE: optional. Define variables/cursors used later.

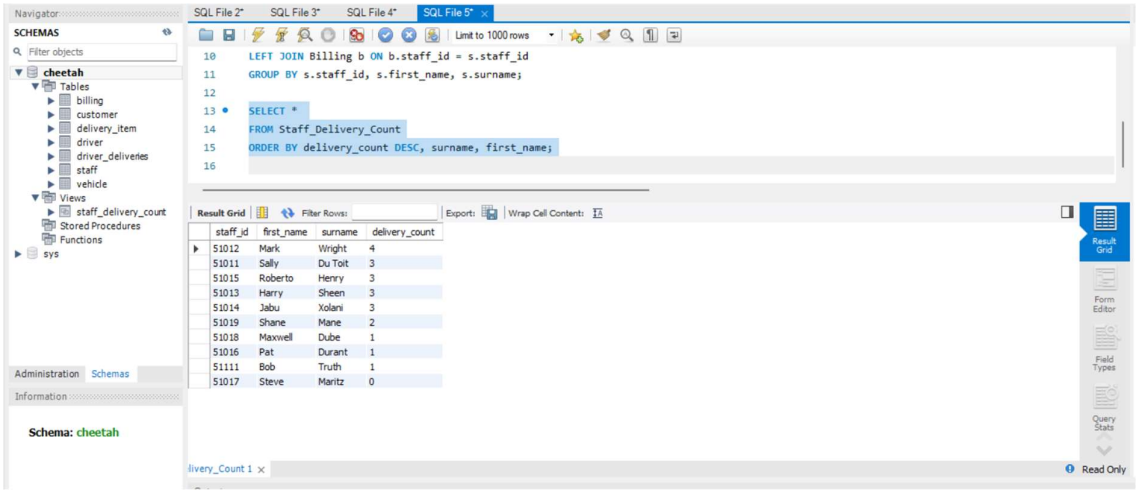
BEGIN … END: executable logic (queries, loops, prints).

EXCEPTION: optional error handling (e.g., “no row found”).
Mapping to MySQL: we’d use variables + stored procedures; errors are handled via handlers (DECLARE … HANDLER).

5.3.1) A View is a saved SQL query that behaves like a virtual table. It simplifies access for managers they can query delivery counts without writing JOINs, ensuring consistent and secure reporting (Coronel, 2023).

5.3.2) Create View




Navigator
SCHEMAS
Filter objects
cheetah
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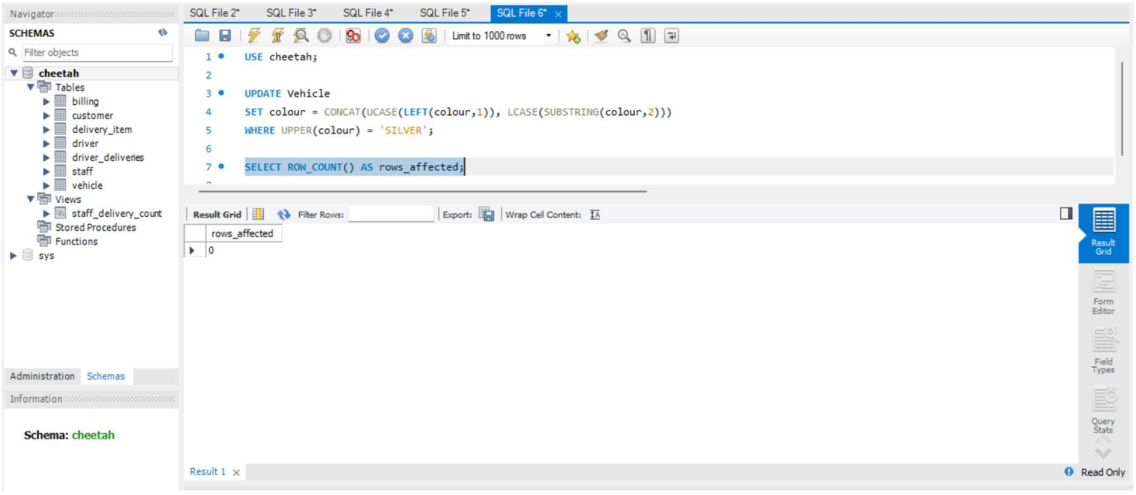
billing
customer
delivery_item
driver
driver_deliveries
staff
vehicle
Views
staff_delivery_count
Stored Procedures
Functions
sys
Administration
Schemas
Information
Schema: cheetah
SQL File 2*
SQL File 3*
SQL File 4*
SQL File 5*
Limit to 1000 rows
10 LEFT JOIN Billing b ON b.staff_id = s.staff_id
11 GROUP BY s.staff_id, s.first_name, s.surname;
12
13 SELECT *
14 FROM Staff_Delivery_Count
15 ORDER BY delivery_count DESC, surname, first_name;
16
Result Grid
Filter Rows:
Export:
Wrap Cell Content:
staff_id first_name surname delivery_count
51012 Mark Wright 4
51011 Sally Du Toit 3
51015 Roberto Henry 3
51013 Harry Sheen 3
51014 Jabu Xolani 3
51019 Shane Mane 2
51018 Maxwell Dube 1
51016 Pat Durant 1
51111 Bob Truth 1
51017 Steve Maritz 0
livery_Count 1
Read Only

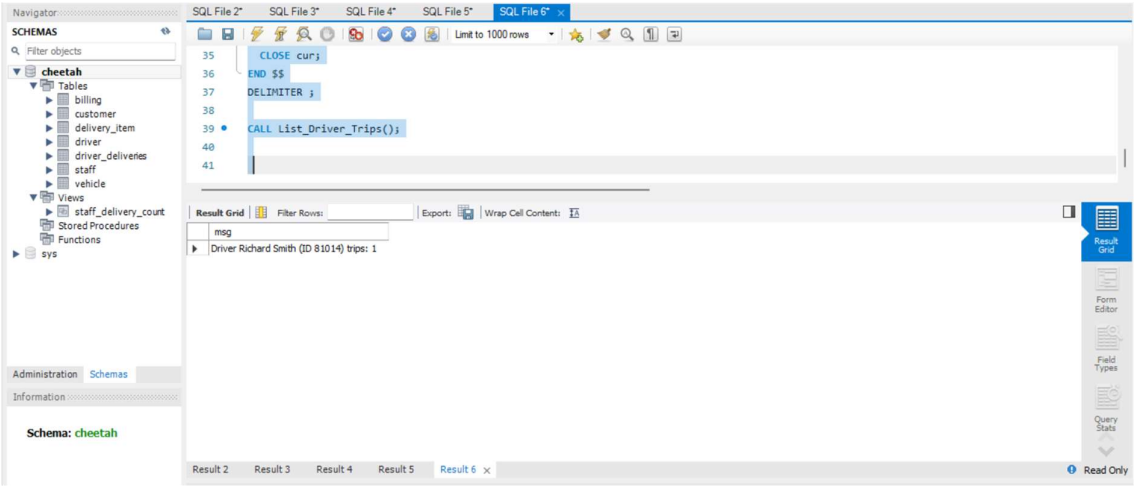
Question 6

6.1) Implicit & Explicit Cursor Attributes

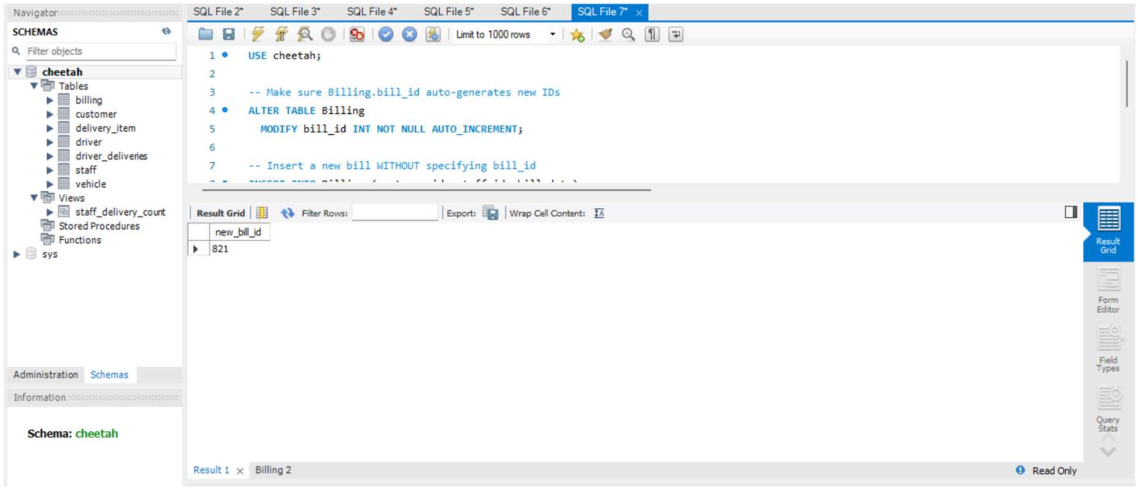
Implicit Cursor Example:

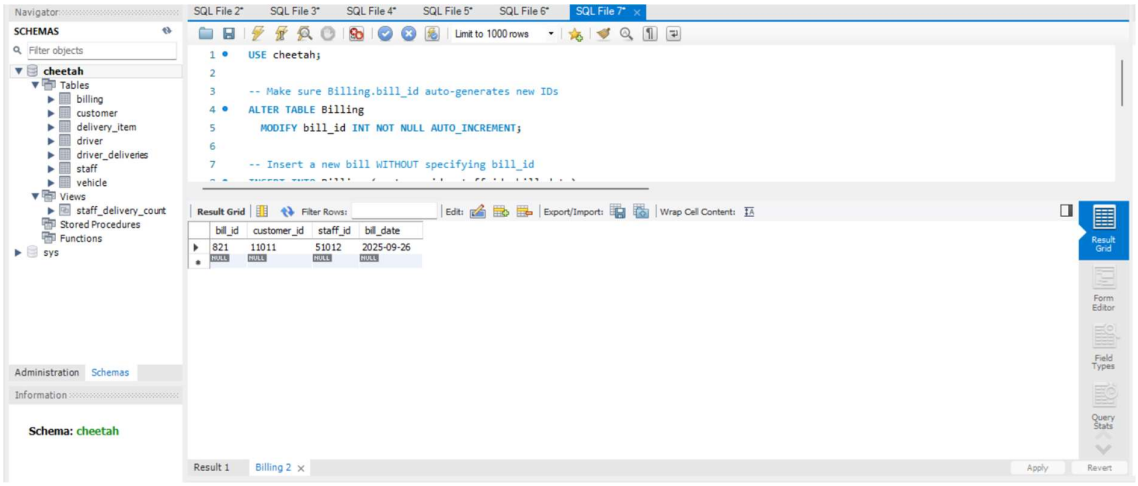


Explicit Cursor Example:



6.2) Sequence Example





References

Bowman, K., 2021. *Pathlock*. [Online]
Available at: https://pathlock.com/learn/separation-of-duties-security-ensuring-security-supports-sod/?utm_source=chatgpt.com

Coronel, C., 2023. *Database Systems: Design, Implementation, & Management*. s.l.:s.n.