Car Rental Database Management System
Final Report

ICT200
Introduction to Database Design

SEMESTER OCTOBER 2024 – FEBRUARY 2025

GROUP: CS1103E

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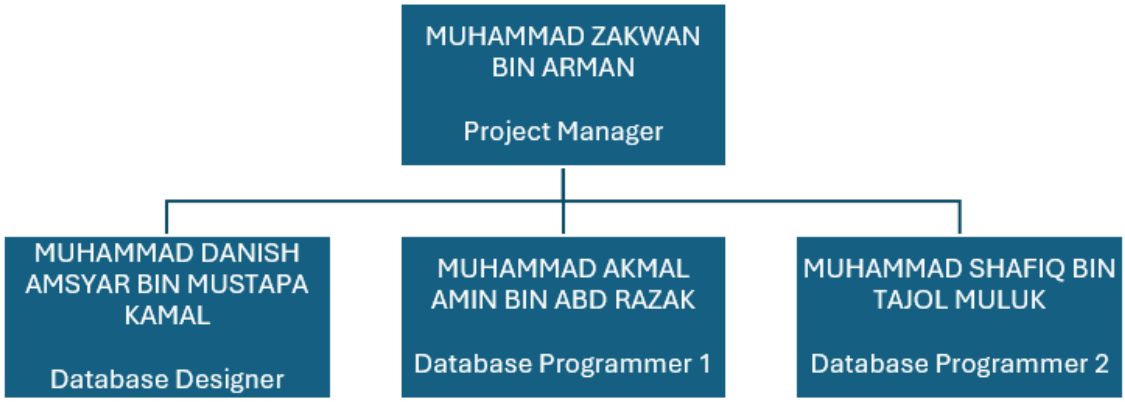
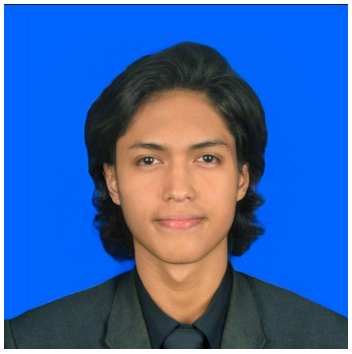
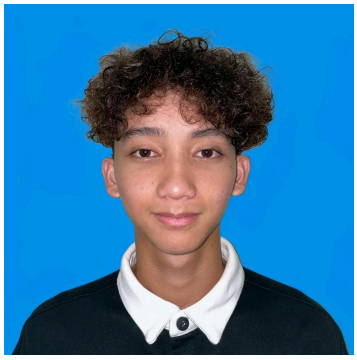


Member 1

	**Name:** Muhammad Zakwan Bin Arman **Student ID:** 2023804732 **Program:** CDCS110 **Group:** 3E **School:** Sekolah Sains Sultan Haji Ahmad Shah, Pekan, Pahang **SPM Achievement:** 6A **SPM Course:** Science Stream & Accounting **CGPA:** 3.68

Member 2

	**Name:** Muhammad Akmal Amin Bin Abd Razak **Student ID:** 2023604474 **Program:** CDCS110 **Group:** 3E **School:** SMK Dato' Undang Haji Adnan, Rembau, Negeri Sembilan **SPM Achievement:** 7A **SPM Course:** Business & Literature **CGPA:** 3.12

Member 3

	**Name:** Muhammad Shafiq Bin Tajol Muluk **Student ID:** 2023641492 **Program:** CDCS110 **Group:** 3E **School:** SMK Jalan Reko, Kajang, Selangor **SPM Achievement:** 6A **SPM Course:** Account **CGPA:** 3.25

Member 4

	**Name:** Muhammad Danish Amsyar bin Mustapa Kamal **Student ID:** 2023868056 **Program:** CDCS110 **Group:** 3E **School:** SMK Abdul Jalil, Hulu Langat, Selangor **SPM Achievement:** 5A **SPM Course:** Computer Science **CGPA:** 3.52

2.0 Company Background

Kuala Lumpur-based KLezcar, launched in 2014, was founded by brothers. At the helm of the company are International Islamic University Malaysia(IIUM) engineering graduates Mr. Amad Fuad Zainal Abidin, Chief Executive Officer, and Mr. Muhamad Shahril Sidek, Chief Operating Officer, with the company rapidly expanding its presence in the car rental industry.

The idea started with the purpose of helping university students with car rentals. Presently, KLezcar operates over 1300 branches throughout the country and maintains a fleet of 1,500 cars. It aims to provide easy access to daily or monthly car rentals throughout Malaysia, using car-sharing as its tool.

KLezcar wants to create a more empowered community, providing an opportunity for people to earn some extra income by renting their cars out. In return, customers are able to enjoy more flexible transportation options. KLezcar offers all types of vehicles to accommodate varied needs, whether in city centers or suburban areas.

Mr. Amad Fuad Zainal Abidin believes car-sharing can ease financial problems. The idea is all about choosing the right car for the customers according to time and convenience. Due to word-of-mouth, especially in Kuala Lumpur and the rest of Malaysia, the company's growth has been very rapid. He also uses building good relations with partners through sharing business management tips and knowledge-sharing sessions.

KLezcar is an active member of the Bumiputra Travel and Tours Association, BUMITRA. The company covers large areas in Malaysia with good customer services so as to ensure that people can see parts of the country that are less familiar.

Vision

To become a leading force in Malaysia's car-sharing and car rental industry, empowering people with flexible, affordable, and reliable mobility solutions, while contributing to the growth of local communities and enhancing the travel experience across Malaysia.

Mission

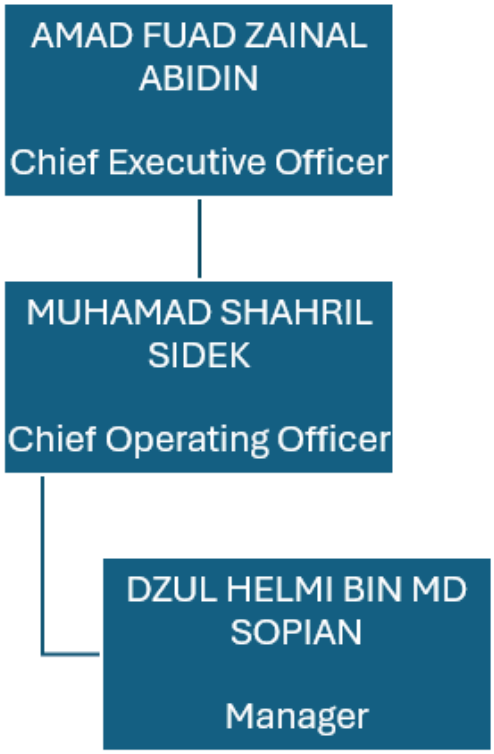
To empower communities by creating income opportunities for individuals through car-sharing.

1. To enhance mobility for customers by providing a wide range of vehicles for daily or monthly rentals across Malaysia.
2. To deliver exceptional customer service that ensures customer satisfaction anytime and anywhere.
3. To build strong personal relationships with stakeholders, including partners, and customers, through consistent support, knowledge sharing, and excellent service.

Company's Objectives

1. Expand Nationwide Reach: To grow KLezcar's operations and expand its branch network throughout Malaysia, enhancing accessibility in both urban and suburban areas.
2. Increase Fleet Size: To support growing demand by increasing the fleet to accommodate a wide range of customer preferences.
3. Empower Economic Growth: To provide income opportunities to individuals by enabling them to rent out their cars, contributing to community economic empowerment.
4. Promote Car-Sharing: To educate the public on the benefits of car-sharing as a means of reducing financial burdens and promoting sustainable transportation.
5. Deliver Customer Satisfaction: To uphold high standards in customer service, ensuring that every customer has a positive and convenient rental experience.
6. Strengthen Brand Presence: To leverage word-of-mouth marketing and continue to build a strong brand reputation across Malaysia, especially in the Kuala Lumpur metropolitan area.
7. Support Partners: To provide partners with the necessary tools and knowledge for successful business management through regular engagement and knowledge-sharing sessions.

Company Organizational Chart



3.0 Current System Description

Klezcar is a company that serve car rental services with a details process to ensure efficient operations and customer satisfaction. This company has outline their specific steps for process and finalized car rentals as detail below :

CUSTOMER

- Customers who want to rent a car must have a valid driving license. The license should be at least two years.
- Customers will be told about rental rules, fines, and deposit amounts. The deposit depends on the type of car.
- Customers can choose extra services like car delivery or pickup outside business hours for RM100.

RENTAL PROCESS

- The system starts the rental process by showing the rental price and checking the customer's driving license.
- Customers must agree to the rental rules and conditions before continuing.
- Extra options like Collision Damage Waiver (CDW) and theft protection are available. Customers are also given steps to report incidents within 24 hours.
- Once the rental is confirm, customers are reminded to refuel the car and follow the agreement.

VEHICLE USAGE

- Customers get the car and use it according to the agreed rules.
- During the rental, customers must follow all the rules in the agreement.

RETURN PROCESS

- When customer returns the car, staff will check for damage and cleanliness.
- If any rules are broken, extra charges will be applied. Serious violations may lead to the customer’s name being blacklisted.
- The last step is staff have finalize the rental agreement and process all charges.

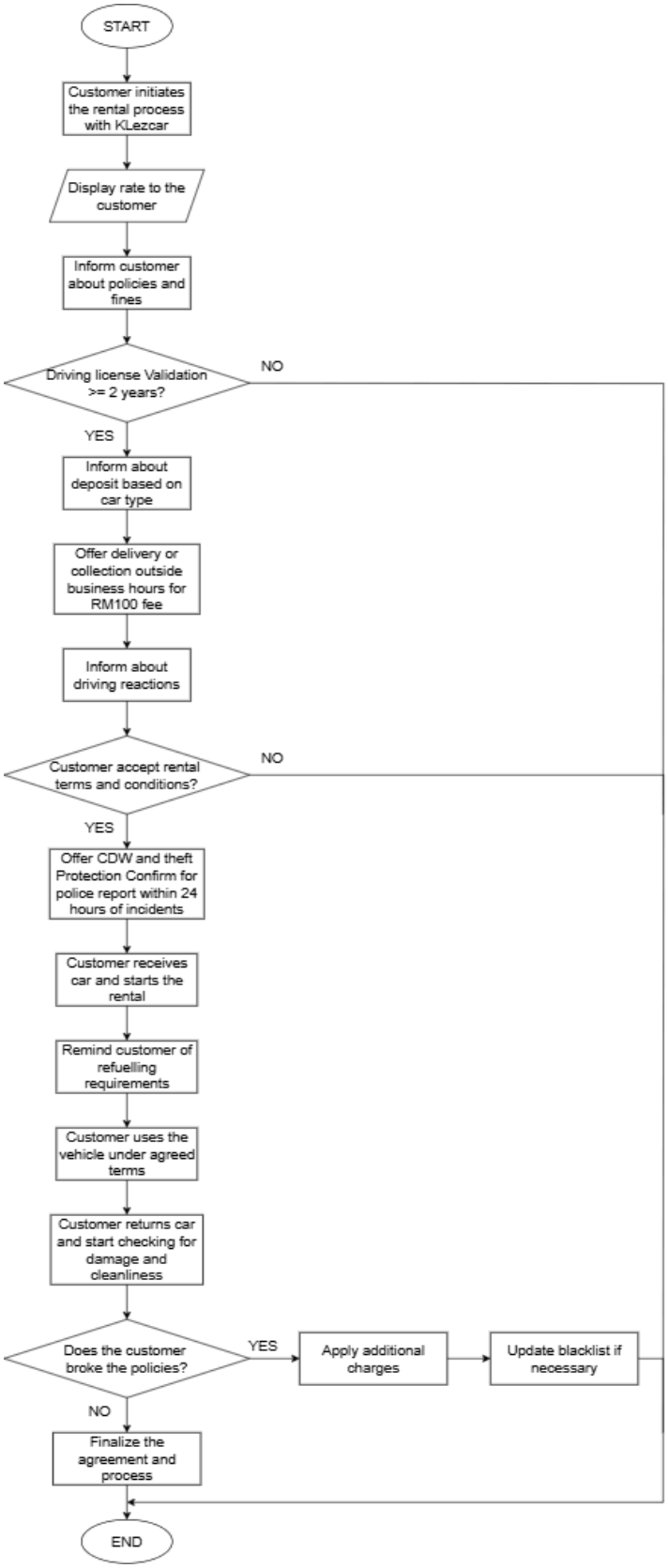
PAYMENT

- Payments include the rental fee, extra services, and any fines for breaking the rules.
- Customers need to pay the deposit and other fees before the rental starts. The system handles all payment methods.

STAFF

- Staff will check if customers are qualified, process rentals, and inspect cars when they are returned.
- Staff will make sure all rules are followed and handle extra charges or blacklisting if needed.
- Staff information, like ID, name, role, and contact details, is store in system to manage their work.

Flowchart


START
Customer initiates the rental process with KLezcar
Display rate to the customer
Inform customer about policies and fines
Driving license Validation >= 2 years?
NO
YES
Inform about deposit based on car type
Offer delivery or collection outside business hours for RM100 fee
Inform about driving reactions
Customer accept rental terms and conditions?
NO
YES
Offer CDW and theft Protection Confirm for police report within 24 hours of incidents
Customer receives car and starts the rental
Remind customer of refuelling requirements
Customer uses the vehicle under agreed terms
Customer returns car and start checking for damage and cleanliness
Does the customer broke the policies?
YES
Apply additional charges
Update blacklist if necessary
NO
Finalize the agreement and process
END

4.0 Problem Statement

Data Redundancy and Inconsistency

- There is much duplication across several files hence, the maintenance of consistency of data across various records is difficult to achieve.
- Customer data may be maintained in one file, vehicle information in another, and rental transactions in yet another.
- Usually, changes are made to one file, but this more often than not leads to inconsistency.
- It requires higher storage due to the presence of redundancy. Secondly, such redundancy results in data inconsistency that further leads to the following:
    - Incorrect billing.
    - Non-updating of the latest information related to a customer.
    - Conflict in rental information.

Insufficient Data Sharing and Accessibility

- Operating over 130+ branches with 1,500 cars, easy access to up-to-date information by an intern across all its branches is one of the success factors.
- A decentralized, file-based system prohibits the staff from knowing the current data concerning the availability of the vehicle, rental extensions, or routine maintenance.
- The resulting features are:
    - Slow customer service.
    - Inefficient vehicle assignment.
    - Inconsistent policy adherences among the different branches.

Data Security and Privacy Concerns

- Without any sort of access control in the file-based system, sensitive data related to customers and rentals, including personal identification and payment information, are all vulnerable.
- The system is open to unauthorized access, tampering with data, and accidental loss of data.
- The policies involving blacklisting or informing the authorities must be done in a secure manner, which the present system may not allow.

- The above-mentioned security gaps pose a very high risk for:
    - Data breach.
    - Customer privacy violation.
    - Legal and ethical non-compliance

Summary

- The current file-based system has gradually become insufficient for the growing activities undertaken by KLezcar.
- The solution developed must be capable of responding to the identified challenges with improvements in efficiency, data security, and customer satisfaction through advanced data management.

5.0 Database Objective

Improve Data Integrity and Eliminate Duplication

- Set up all the information related to customer, vehicle, and rental all at one place.
- No duplication of data must be allowed to avoid data redundancy.
- Avoid data duplication and ensure consistency of information across any change in customer information, vehicle status, or rental contract status must immediately get updated at all branches.

Ease of Data Accessibility and Operational Efficiency

- All branches must be given access to real-time information about vehicle availability, customer records, and rental histories from any location.
- Improve operational efficiency to reduce delays and increase customer service.
- Allow the staff to timely respond to all queries, process rentals, extensions, etc., and access to correct and timely information.

Enhanced Data Security and Privacy

- Create role-based limitation of access and frequent backups by encrypting the data to enhance security.
- Keep sensitive customer information, such as personal data or any information on payment aspects, unexposed to unauthorized parties.
- Share data with authentic authorities in a legally compliant manner and maintain the sovereignty of customer’s privacy.

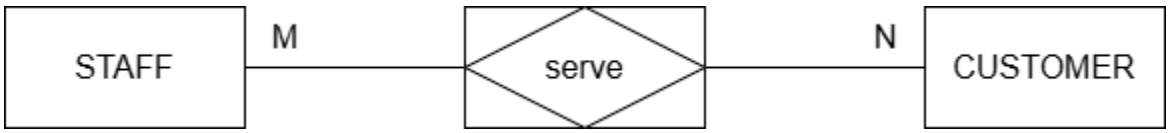
6.0 Business Rules

Entity Relationship Model

Business rules description:

- Each CUSTOMER can make many PAYMENTS
- Each PAYMENT can only be made by one CUSTOMER

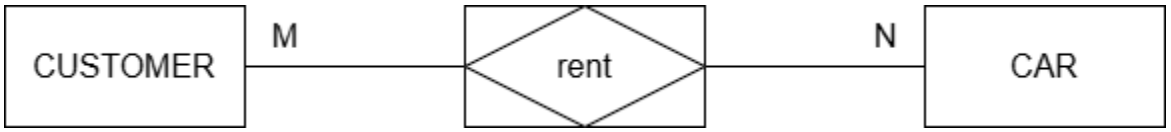
Entity Relationship Model



Business rules description:

- Each STAFF can serve many CUSTOMERS
- Each CUSTOMER can only be served by more than one STAFFS

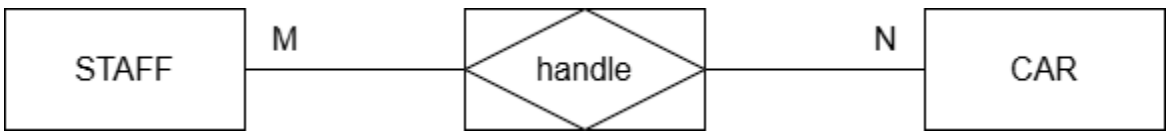
Entity Relationship Model



Business rules description:

- Each CUSTOMER can rent more than one CARS
- Each CAR can be rented by more than one CUSTOMERS

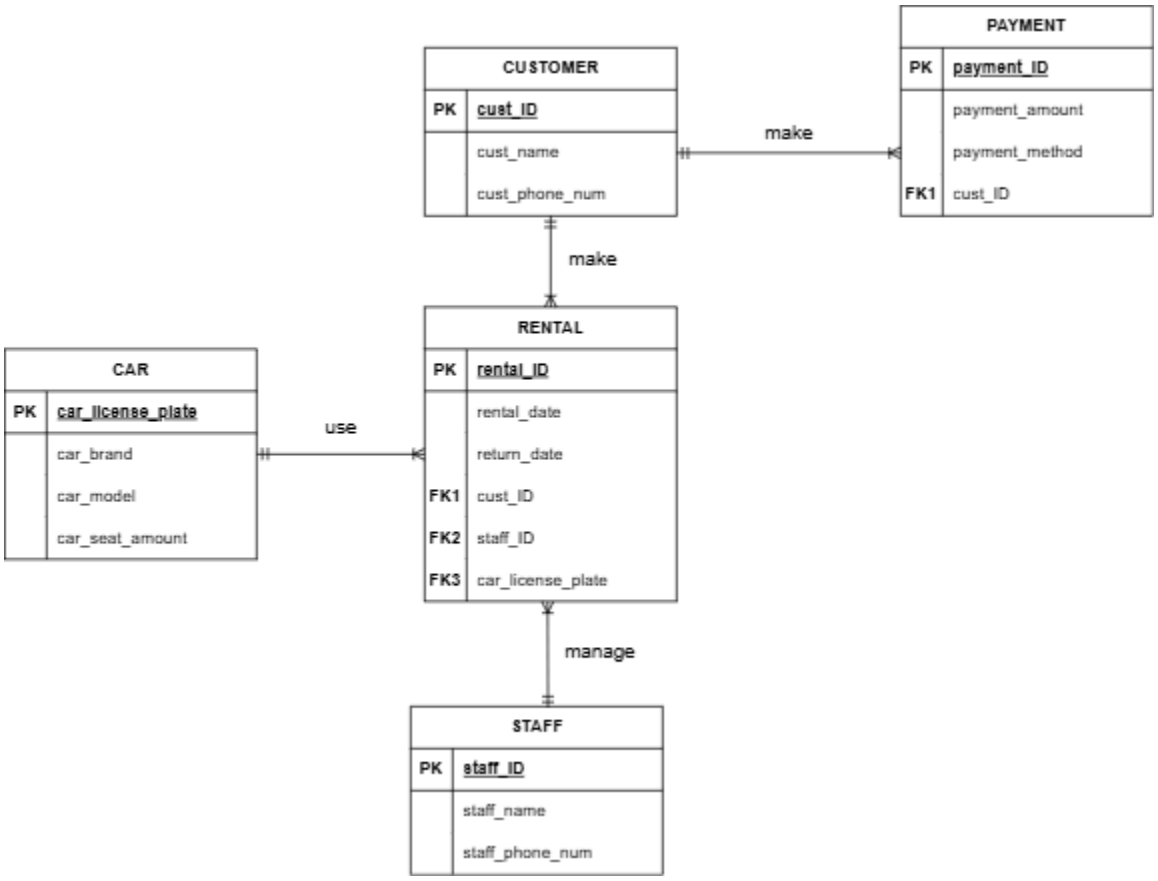
Entity Relationship Model



Business rules description:

- Each STAFF can handle many CARS
- Each CAR can be handled by more than one STAFFS

7.0 Finalized Entity Relationship Diagram (ERD)



8.0 3NF Relational Schema

CUSTOMER (cust_ID, cust_name, cust_phone_num)

PAYMENT (payment_ID, payment_amount, payment_method, cust_ID*)

CAR (car_license_plate, car_brand, car_model, car_seat_amount)

STAFF (staff_ID, staff_name, staff_phone_num)

RENTAL (rental_ID, rental_date, return_date, cust_ID*, staff_ID*, car_license_plate*)

9.0 Data Dictionary

Table Name	Attribute Name	Datatype	Nullable	PK or FK	Reference Table
CUSTOMER	cust_ID	Varchar(12)	No	PK	
	cust_name	Varchar(100)	No		
	cust_phone_num	Varchar(12)	No		
PAYMENT	payment_ID	Varchar(10)	No	PK	
	payment_amount	Decimal(10,2)	No		
	payment_method	Varchar(100)	No		
	cust_ID	Varchar(12)	No	FK	CUSTOMER
CAR	car_license_plate	Varchar(20)	No	PK	
	car_brand	Varchar(100)	No		
	car_model	Varchar(100)	No		
	car_seat_amount	Varchar(8)	No		
STAFF	staff_ID	Varchar(10)	No	PK	
	staff_name	Varchar(100)	No		
	staff_phone_num	Varchar(12)	No		
RENTAL	rental_ID	Varchar(10)	No	PK	
	rental_date	Date	No		
	return_date	Date	No		
	cust_ID	Varchar(12)	No	FK	CUSTOMER
	staff_ID	Varchar(10)	No	FK	STAFF
	car_license_plate	Varchar(20)	No	FK	CAR

10.0 Data Definition Language (DDL)

Customer

```
CREATE DATABASE klezcar;
USE klezcar;
CREATE TABLE CUSTOMER (
    cust_id VARCHAR(12) NOT NULL,
    cust_name VARCHAR(100) NOT NULL,
    cust_phone_num VARCHAR(12) NOT NULL,
    PRIMARY KEY (cust_id)
);
```

Car

```
CREATE TABLE CAR (
    car_license_plate VARCHAR(20) NOT NULL,
    car_brand VARCHAR(100) NOT NULL,
    car_model VARCHAR(100) NOT NULL,
    car_seat_amount INTEGER NOT NULL,
    PRIMARY KEY (car_license_plate)
);
```

Staff

```
CREATE TABLE STAFF (
    staff_id VARCHAR(10) NOT NULL,
    staff_name VARCHAR(100) NOT NULL,
    staff_phone_num VARCHAR(12) NOT NULL,
    PRIMARY KEY (staff_id)
);
```

Payment

```sql
CREATE TABLE PAYMENT (
    payment_id VARCHAR(10) NOT NULL,
    payment_amount DECIMAL(10 , 2 ) NOT NULL,
    payment_method VARCHAR(100) NOT NULL,
    cust_id VARCHAR(12) NOT NULL,
    PRIMARY KEY (payment_id),
    FOREIGN KEY (cust_id)
        REFERENCES customer (cust_id)
        ON DELETE CASCADE
);
```

Rental

```sql
CREATE TABLE rental(
rental_id VARCHAR(10) NOT NULL,
rental_date VARCHAR(20) NOT NULL,
return_date VARCHAR(20) NOT NULL,
cust_id VARCHAR(12) NOT NULL,
staff_id VARCHAR(10) NOT NULL,
car_license_plate VARCHAR(20) NOT NULL,
PRIMARY KEY(rental_id),
FOREIGN KEY(cust_id) REFERENCES customer(cust_id) ON DELETE CASCADE,
FOREIGN KEY(staff_id) REFERENCES staff(staff_id) ON DELETE CASCADE,
FOREIGN KEY(car_license_plate) REFERENCES car(car_license_plate) ON DELETE CASCADE);

SET SQL_SAFE_UPDATES = 0;
UPDATE rental
SET
    rental_date = str_to_date(rental_date, '%d-%m-%Y');
UPDATE rental
SET
    return_date = STR_TO_DATE(return_date, '%d-%m-%Y');
```

11.0 Data Manipulation Language (DML) – Sets of SQL Questions, Commands and Output

- **5 queries for topic *Retrieving Data from Multiple Tables (Joining Database Tables)**

SET 1

Question

Retrieve all customers informations such as customer id, customer name, and customer phone number along with their rental car license plate. Show the rental date after 02-01-2025.

SQL Command

```
1 •  SELECT c.cust_id, c.cust_name, c.cust_phone_num, r.car_license_plate, r.rental_date, r.return_date
2    FROM customer c, rental r, car ca
3    WHERE c.cust_id = r.cust_id AND r.car_license_plate = ca.car_license_plate AND r.rental_date > '02-01-2025';
```

Output

cust_id	cust_name	cust_phone_num	car_license_plate	rental_date	return_date
040430104567	Fandi Ahmad	0137890123	KOP4321	10-01-2025	14-01-2025
040720073456	Nicholas Jackson	0192376099	MNO4321	11-01-2025	15-01-2025
050209036789	Amri Yahya	0110028755	MNP1234	12-01-2025	16-01-2025
910715091234	Syafiq Hafiz	0173121298	MRS8901	13-01-2025	17-01-2025
920101141234	Nur Aisyah	0174416729	PNQ4321	14-01-2025	18-01-2025
930501107890	Hafiz Rahman	0142345678	STV8901	15-01-2025	19-01-2025
940508044567	Sharifah Aina	0137029851	TIJ8901	16-01-2025	20-01-2025

Number Of Records

1 20:05:06 SELECT c.cust_id, c.cust_name, c.cust_phone_num, r.car_license_plate, r.rental_date, r.return_date FROM cus... 37 row(s) returned

SET 2

Question

Retrieve staff details such as staff id, staff name and staff phone numbers along with the customers they assisted, the rented car license plate and its rental date .

SQL Command

```
SELECT s.staff_id, s.staff_name, s.staff_phone_num, c.cust_name, r.car_license_plate, r.rental_date
FROM staff s
JOIN rental r ON s.staff_id = r.staff_id
JOIN customer c ON r.cust_id = c.cust_id;
```

Output

staff_id	staff_name	staff_phone_num	cust_name	car_license_plate	rental_date
1	Ahmad Hafiz	0123456789	Nicholas Jackson	MNO4321	11-01-2025
1	Ahmad Hafiz	0123456789	Sharifah Aina	TIJ8901	16-01-2025
1	Ahmad Hafiz	0123456789	Arif Aiman	WBA5678	21-01-2025
1	Ahmad Hafiz	0123456789	Amira Zainal	CDH8901	26-01-2025
1	Ahmad Hafiz	0123456789	Aina Sofia	KLM1234	31-01-2025
1	Ahmad Hafiz	0123456789	Andrew Fong	PNQ4321	05-02-2025
2	Nur Aisyah	0134567890	Amri Yahya	MNP1234	12-01-2025

Number Of Records

SET 3

Question

Retrieve all payment id, payment amount and payment method made by the each customers. Show the customers name along with their rented car license plate. The payment amount must be more than RM150 and the rented car license plate is KOP4321.

SQL Command

```
SELECT
    p.payment_id,
    c.cust_name,
    p.payment_amount,
    p.payment_method,
    r.car_license_plate
FROM
    payment p,
    customer c,
    car ca,
    rental r
WHERE
    p.cust_id = c.cust_id
        AND r.cust_id = c.cust_id
        AND r.car_license_plate = ca.car_license_plate
        AND r.car_license_plate = 'KOP4321'
        AND p.payment_amount > 150;
```

Output

payment_id	cust_name	payment_amount	payment_method	car_license_plate
10	Fandi Ahmad	180.50	Debit Card	KOP4321
2	Diyana Roslan	200.00	Debit Card	KOP4321

Number Of Records

1 10:14:41 SELECT p.payment_id, c.cust_name, p.payment_amount, p.payment_method, r.car_license_plate ... 2 row(s) returned

SET 4

Question

Provide a complete list of all the cars that have been rented out, its rental date including detailed information about each car such as its brand and model, as well as the names of the customers who have rented these vehicles.

SQL Command

```
SELECT
    r.car_license_plate,
    ca.car_brand,
    ca.car_model,
    c.cust_name,
    r.rental_date
FROM
    rental r,
    car ca,
    customer c
WHERE
    r.car_license_plate = ca.car_license_plate
        AND r.cust id = c.cust id;
```

Output

car_license_plate	car_brand	car_model	cust_name	rental_date
ABF5678	Proton	Preve	Aina Sofia	01-01-2025
ABF5678	Proton	Preve	Shafiqah Zainal	23-01-2025
BCD1234	Proton	Exora	Diyana Roslan	02-01-2025
BCD1234	Proton	Exora	Ameer Hafeez	24-01-2025
BYZ5678	Honda	Jazz	Yusof Osman	25-01-2025
BYZ5678	Honda	Jazz	Hafizah Ali	03-01-2025

Number Of Records

1 02:49:46 SELECT r.car_license_plate, ca.car_brand, ca.car_model, c.cust_name, r.rental_date FROM rental r JOIN car c... 40 row(s) returned

SET 5

Question

Retrieve all customers who made payments using "Cash" and show their name, phone number, car license plate and also payment amount of their rentals.

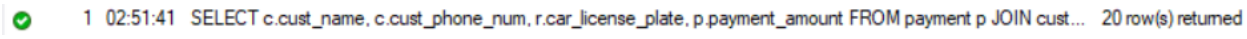
SQL Command

```
SELECT
    c.cust_name,
    c.cust_phone_num,
    r.car_license_plate,
    p.payment_amount
FROM
    payment p,
    customer c,
    rental r
WHERE
    c.cust_id = r.cust_id
        AND c.cust_id = p.cust_id
        AND p.payment_method = 'Cash';
```

Output

cust_name	cust_phone_num	car_license_plate	payment_amount
Nicholas Jackson	0192376099	MNO4321	95.75
Nur Aisyah	0174416729	PNQ4321	300.75
Sharifah Aina	0137029851	TIJ8901	80.00
Muhammad Iqbal	0165678901	VRW5678	170.75
Arif Aiman	0178218654	WBA5678	310.25
Ameer Hafeez	0199427604	BCD1234	190.75

Number Of Records



- **5 queries for topic Simple SQL Queries (SELECT,WHERE,ORDER BY,DISTINCT) that include the following subtopics:**
    - **Comparison Operators (=,<,<=,>,>=,<>)**
    - **Logical Operators (AND,OR,NOT)**
    - **Special Operators (BETWEEN,LIKE,IS NULL,IN,DISTINCT)**

SET 1

Comparison Operators (=)

Question

Retrieve all the details of customers from the CUSTOMER table whose phone number is exactly 0119012349. This includes their ID, name, and phone number, ensuring you find the specific customer with the given phone number.

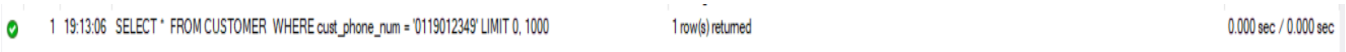
SQL Command

```
1    SELECT *
2    FROM CUSTOMER
3    WHERE cust_phone_num = '0119012349';
```

Output

	cust_id	cust_name	cust_phone_num
▶	020108116789	Zakuwan Nazurin	0119012349
*	NULL	NULL	NULL

Number Of Records



SET 2

Using Logical Operators (AND, OR)

Question

Retrieve a list of cars that have more than 4 seats and are from the brand Toyota or Honda. Ensure the results include the car license plate, brand, model, and number of seats for each matching car, filtering out cars that do not meet the specified criteria.

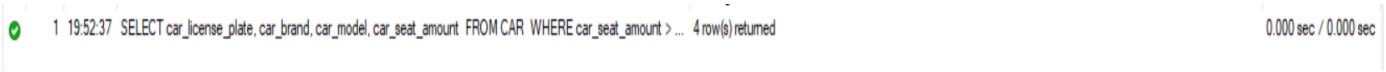
SQL Command

```
1 •   SELECT car_license_plate, car_brand, car_model, car_seat_amount
2     FROM CAR
3     WHERE car_seat_amount > 4
4       AND (car_brand = 'Toyota' OR car_brand = 'Honda');
```

Output

	car_license_plate	car_brand	car_model	car_seat_amount
▶	BYZ5678	Honda	Jazz	5
	DEF4321	Toyota	Avanza	7
	GHI1234	Honda	City	5
	MRS8901	Toyota	Vios	5
*	NULL	NULL	NULL	NULL

Number Of Records



SET 3

Using Special Operators (BETWEEN, DISTINCT)

Question

Identify the distinct customers and their payment amount for who made payments where the payment amount was between RM50 and RM200, inclusive. This query ensures that each customer ID is listed only once, and it excludes payments that fall outside this range. Order by payment amount ascending.

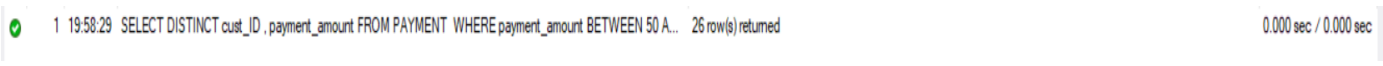
SQL Command

```
1 •   SELECT DISTINCT cust_ID , payment_amount
2     FROM PAYMENT
3     WHERE payment_amount BETWEEN 50 AND 200
4     ORDER BY payment_amount ASC;
```

Output

cust_ID	payment_amount
950520148901	50.00
020108116789	50.25
970814028901	60.00
940508044567	80.00
960304045678	85.50
020323128901	90.00
980103112345	90.50
020323128901	95.00
040720073456	95.75
990510109933	100.00
000416132345	100.50

Number Of Records



SET 4

Using Special Operators (IN)

Question

Retrieve all rental records handled by staff members with IDs 3, 4, or 5. Ensure the results include the rental ID, rental date, return date, customer ID, and staff ID, focusing only on rentals managed by these specific staff members.

SQL Command

```
1 •   SELECT rental_ID, rental_date, return_date, cust_ID, staff_ID
2     FROM RENTAL
3     WHERE staff_ID IN (3,4,5);
```

Output

rental_ID	rental_date	return_date	cust_ID	staff_ID
1	01-01-2025	05-01-2025	000416132345	3
10	10-01-2025	14-01-2025	040430104567	5
13	13-01-2025	17-01-2025	910715091234	3
14	14-01-2025	18-01-2025	920101141234	4
15	15-01-2025	19-01-2025	930501107890	5
18	18-01-2025	22-01-2025	950306056789	3
19	19-01-2025	23-01-2025	950405122345	4
20	20-01-2025	24-01-2025	950520148901	5
23	23-01-2025	27-01-2025	960707087890	3
24	24-01-2025	28-01-2025	960825133456	4
25	25-01-2025	29-01-2025	970623061234	5
28	28-01-2025	01-02-2025	981115055678	3
29	29-01-2025	02-02-2025	990102085678	4
3	03-01-2025	07-01-2025	010211087890	3
30	30-01-2025	03-02-2025	990510109933	5

Number Of Records

1 14:51:23 SELECT rental_ID, rental_date, return_date, cust_ID, staff_ID FROM rental WHERE staff_ID in (3,4,5) LIMIT 0, ... 25 row(s) returned

SET 5

Using Special Operators (LIKE)

Question

Retrieve all cars from the CAR table whose brand starts with the letter T (e.g., Toyota). Include the car license plate, brand, model, and the number of seats in the results.

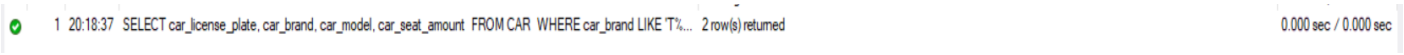
SQL Command

```
1 •   SELECT car_license_plate, car_brand, car_model, car_seat_amount
2     FROM CAR
3     WHERE car_brand LIKE 'T%';
```

Output

	car_license_plate	car_brand	car_model	car_seat_amount
▶	DEF4321	Toyota	Avanza	7
	MRS8901	Toyota	Vios	5
*	NULL	NULL	NULL	NULL

Number Of Records



- **3 queries for Column Functions and Grouping (SUM,AVG,MIN,MAX,COUNT(*),COUNT(DISTINCT),GROUP BY,HAVING,ORDER BY)**

SET 1

Question

Find all staff members who have processed more than 5 rentals, displaying their staff ID and the number of rentals they processed. The results should be ordered by the number of rentals in descending order."

SQL Command

```
SELECT staff_ID, COUNT(*) AS rental_count
FROM RENTAL
GROUP BY staff_ID
HAVING rental_count > 5
ORDER BY rental_count DESC;
```

Output

staff_ID	rental_count
1	8
2	8
3	8
4	8
5	8

Number Of Records

#	Time	Action	Message
1	12:15:00	SELECT staff_ID, COUNT(*) AS rental_count FRO...	5 row(s) returned

SET 2

Question

Calculate the average of total payment by customer. Display the customer id and show the total payment made by each customers.

SQL Command

```
SELECT cust_ID, SUM(payment_amount) AS total_payment
FROM PAYMENT
GROUP BY cust_ID
ORDER BY total_payment DESC;
```

Output

cust_ID	total_payment
920101141234	571.00
030808064567	400.00
950306056789	400.00
950405122345	381.50
910715091234	366.00
970814028901	365.00
010211087890	350.75
960707087890	350.00

381.50

Result 13

Number Of Records

✓	2	12:22:17	SELECT cust_ID, SUM(payment_amount) AS total_...	30 row(s) returned

SET 3

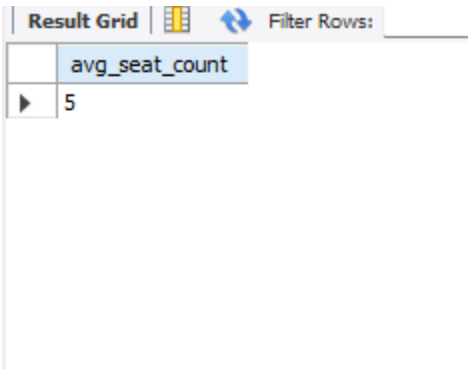
Question

Find the average number of seats in cars, rounded to the nearest whole number?

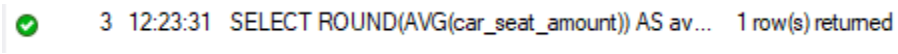
SQL Command

```
SELECT ROUND(AVG(car_seat_amount)) AS avg_seat_count
FROM CAR;
```

Output



Number Of Records



- **3 queries for Using Subqueries (WHERE,HAVING,IN)**

SET 1

Question

Retrieve the license plates and the seat counts of all cars in the 'CAR' table that have a seat count greater than the average number of seats across all cars in the database. The query should calculate the average seat count dynamically and use it as a comparison threshold for filtering the results."

SQL Command

```
SELECT car_license_plate, car_seat_amount
FROM CAR
WHERE car_seat_amount > (SELECT AVG(car_seat_amount) FROM CAR)
```

Output

car_license_plate	car_seat_amount
BCD1234	7
DEF4321	7
VFG5678	7
NULL	NULL

Number Of Records

#	Time	Action	Message
1	12:42:26	SELECT car_license_plate, car_seat_amount FRO...	3 row(s) returned

SET 2

Question

Show license plate number that has been rented more than once.Which means we will retrieve the information of car license plate from RENTAL entity and we can find how many car license plate has been rented more than once.

SQL Command

```
SELECT car_license_plate
FROM RENTAL
GROUP BY car_license_plate
HAVING COUNT(*) > 1;
```

Output

car_license_plate
MNO4321
MNP1234
MRS8901
PNQ4321
STV8901
TIJ8901
VBC1242
VFG5678

Number Of Records

#	Time	Action	Message
1	12:44:57	SELECT car_license_plate FROM RENTAL GROU...	18 row(s) returned

SET 3

Question

Display the rental id and return date that has been handled by a specific staff name. For example, staff name is NUR AISYAH and then the result will show the rental id and return of date that has been handled by her.

SQL Command

```
SELECT rental_ID, rental_date
FROM RENTAL
WHERE staff_ID IN (SELECT staff_ID FROM STAFF WHERE staff_name LIKE 'NUR AISYAH');
```

Output

	rental_ID	rental_date
▶	12	12-01-2025
	17	17-01-2025
	2	02-01-2025
	22	22-01-2025
	27	27-01-2025
	32	01-02-2025
	37	06-02-2025
	7	07-01-2025

Number Of Records

#	Time	Action	Message
1	12:47:45	SELECT rental_ID, rental_date FROM RENTAL WHERE staff_ID IN (SELECT staff_ID FROM...	8 row(s) returned

12.0 References

Book:

Silva, R. (2023). *MySQL crash course: A hands-on introduction to database development*. No Starch Press.

Website:

KLezcar. (2024). *About us.* KLezcar. from https://www.klezcar.com/about-us

Interview:

Dzulhelmi Bin Md Sopian, personal communication, 2024.

13.0 Appendices

Diagram 13.1 Shows Mr. Amad Fuad Zainal Abidin (CEO) and Mr. Muhamad Shahril Sidek (COO)

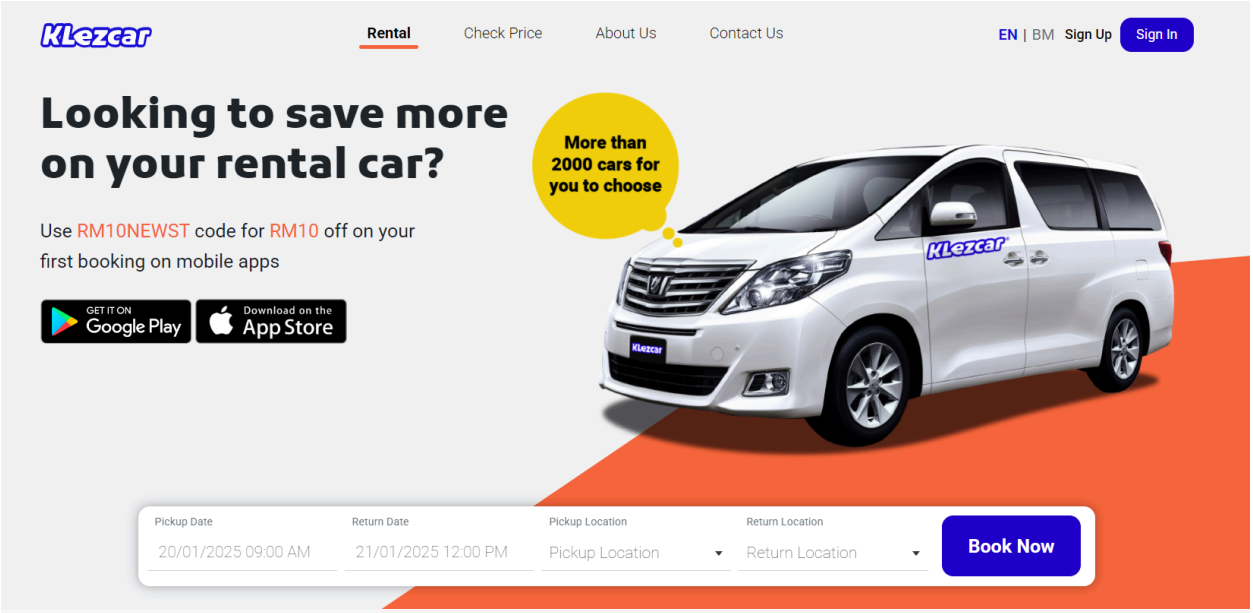


Diagram 13.2 Shows the website page

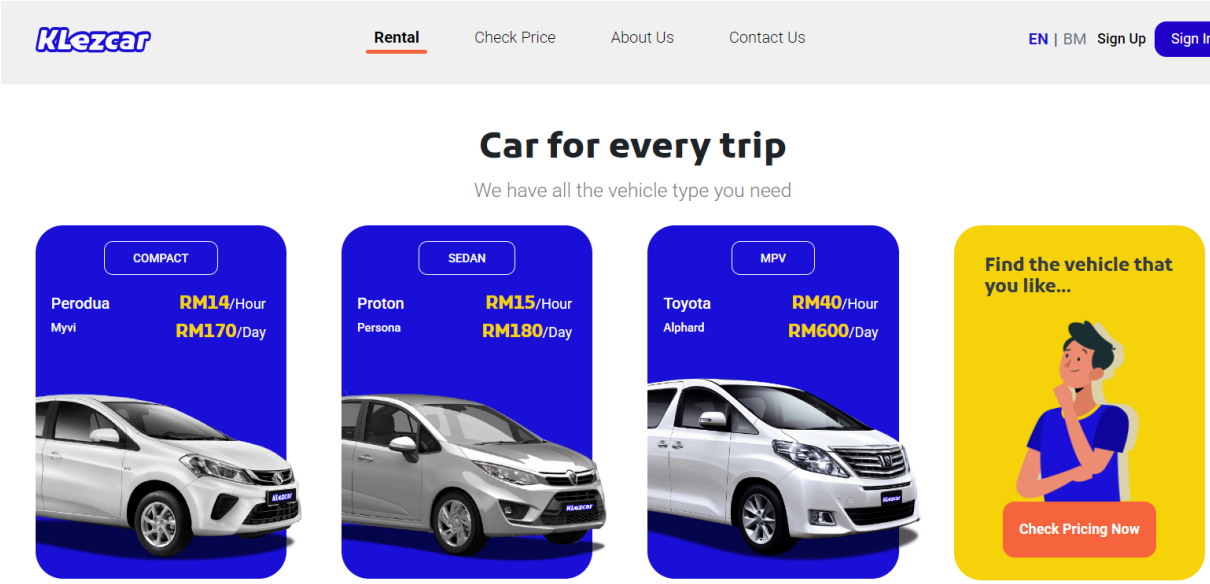


Diagram 13.3 Shows some of the car they has with their pricing