



**UNIVERSITI MALAYSIA SARAWAK**

**Faculty of Computer Science and Information Technology**

## Assignment/Project/Report Cover Sheet

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Course Code: TMF 2034		Course Name: Database Concept and Design	
Assignment/Project/ Report Title:	Group Project	Lecturer:	Dr Lee Nung Kion
Due Date: 21 June 2025		Date Submitted: 21 June 2025	

This cover sheet must be completed, signed and firmly attached to the front of the submission. All work must be submitted by the due date. If an extension of work is granted, an extension acknowledgement slip must be signed by the lecturer/tutor and attached to the assignment/project/report. Please note that it is your responsibility to retain copies of your assignment.

**Plagiarism and Collusion are methods of cheating that are addressed in the Peraturan Akademik Universiti Malaysia Sarawak para 11: Etika Akademik**

### Plagiarism

Plagiarism is the presentation of work which has been copied in whole or in part from another person's work, or from any other source such as the Internet, published books or periodicals without due acknowledgement given in the text.

### Collusion

Collusion is the presentation of work that is the result in whole or in part of unauthorized collaboration with another person or persons.

Where there are reasonable grounds for believing that cheating has occurred, the only action that may be taken when plagiarism or collusion is detected is for the staff member not to mark the item of work and to report or refer the matter to the Dean. This may result in work being disallowed and given a fail grade or if the circumstances warrant, the matter may be referred to a Committee of inquiry for investigation. Such investigation may result in the matter being referred to the University Discipline Committee, which has the power to exclude a student.

**Upon placing signature above, I certify that I have not plagiarized the work of others or participated in unauthorized collusion when preparing this assignment.**

**I also certify that I have taken proper care in safeguarding my work and have made all reasonable efforts to ensure that my work is not able to be copied.**

**MARK :**

## **Relational Database Diagram**

(a) Based on Assignment 1 (ERD Design), convert your ERD into relational database schema.

You are allowed to update the previous ERD design with justifications, and it should be aligned with the database application detailed in Section 2.

(b) Re-examine the database structure and perform normalization (1NF, 2NF, 3NF) to eliminate

anomalies in the database design.

(c) Finalize and create a Crow's Foot relational database diagram

## **Relational Database Schema**

### **1. Customer Table:**

- CUSTOMER (Cust\_ID PK, Full\_Name, Phone\_Num, Date\_of\_Birth, Nationality, License\_Num, Member\_Type)

### **2. Free\_Member Table:**

- FREE\_MEMBER (Cust\_ID PK FK, Eligible\_Promo)
  - FK (Cust\_ID) REFERENCES CUSTOMER (Cust\_ID)

### **3. Premium\_Member Table:**

- FK (Cust\_ID) REFERENCES CUSTOMER (Cust\_ID)

### **4. Promo\_Code:**

- PROMO\_CODE (Promo\_Code PK, Description, Discount\_Amount, Expiry\_Date)

### **5. Vehicle Table:**

- VEHICLE (Vehicle\_ID PK, Plate\_Num, Model, Type, Brand, Vehicles\_Type, Seat\_Capacity, Availability)

### **6. Rental\_Booking Table:**

- RENTAL\_BOOKING (Booking\_ID PK, Cust\_ID FK, Vehicle\_ID FK, Promo\_Code FK, Start\_Date, End\_Date, Pickup\_Location, Return\_Location, Booking\_Status)Payment Table
  - FK (Cust\_ID) REFERENCES CUSTOMER(Cust\_ID)
  - FK (Vehicle\_ID) REFERENCES VEHICLE(Vehicle\_ID)
  - FK (Promo\_Code) REFERENCES PROMO\_CODE(Promo\_Code)

### **7. Payment Table:**

- PAYMENT (Payment\_ID PK, Booking\_ID FK, Amount, Deposit\_Paid, Payment\_Date, Payment\_Method, Payment\_Status)
  - FK (Booking\_ID) REFERENCES RENTAL\_BOOKING(Booking\_ID)

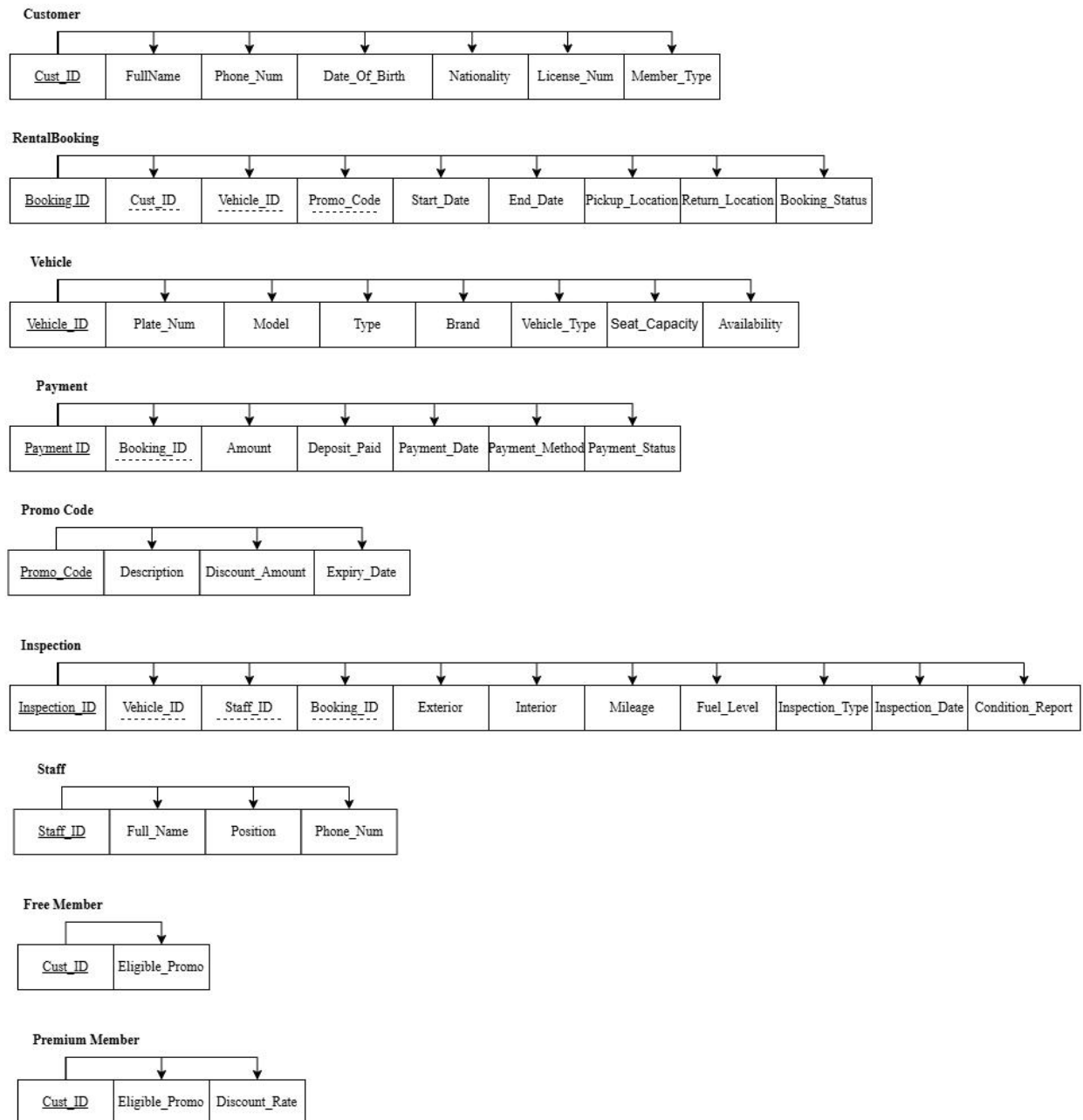
### **8. Staff Table:**

- STAFF (Staff\_ID PK, Full\_Name, Position, Phone\_Num)

### **9. Inspection Table:**

- INSPECTION (Inspection\_ID PK, Vehicle\_ID FK, Staff\_ID FK, Booking\_ID FK, Exterior, Interior, Mileage, Fuel\_Level, Inspection\_Type, Inspection\_Date, Condition\_Report)
  - FK (Vehicle\_ID) REFERENCES VEHICLE(Vehicle\_ID)
  - FK (Staff\_ID) REFERENCES STAFF(Staff\_ID)
  - FK (Booking\_ID) REFERENCES RENTAL\_BOOKING(Booking\_ID)

## Normalization



## Normalization Result

**Customer**

<u>Cust_ID</u>	FullName	Phone_Num	Date_Of_Birth	Nationality	License_Num	Member_Type
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**RentalBooking**

<u>Booking_ID</u>	<u>Cust_ID</u>	<u>Vehicle_ID</u>	<u>Promo_Code</u>	Start_Date	End_Date	Pickup_Location	Return_Location	Booking_Status
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**Vehicle Instance**

<u>Vehicle_ID</u>	Plate_Num	<u>Model_ID</u>	Availability
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**Vehicle Model Details**

<u>Model_ID</u>	Model	Brand	Vehicle_Type	Seat_Capacity
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**Payment**

<u>Payment_ID</u>	<u>Booking_ID</u>	Amount	Deposit_Paid	Payment_Date	Payment_Method	Payment_Status
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**Promo Code**

<u>Promo_Code</u>	Description	Discount_Amount	Expiry_Date
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**Inspection Event**

<u>Inspection_ID</u>	<u>Vehicle_ID</u>	<u>Staff_ID</u>	<u>Booking_ID</u>
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**Booking Inspection Details**

<u>BookingInspect_ID</u>	<u>Inspection_ID</u>	Exterior	Interior	Mileage	Fuel_Level	Inspection_Date	Condition_Report
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**Staff**

<u>Staff_ID</u>	Full_Name	Position	Phone_Num
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**Free Member**

<u>Cust_ID</u>	Eligible_Promo
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**PremiumMember Info**

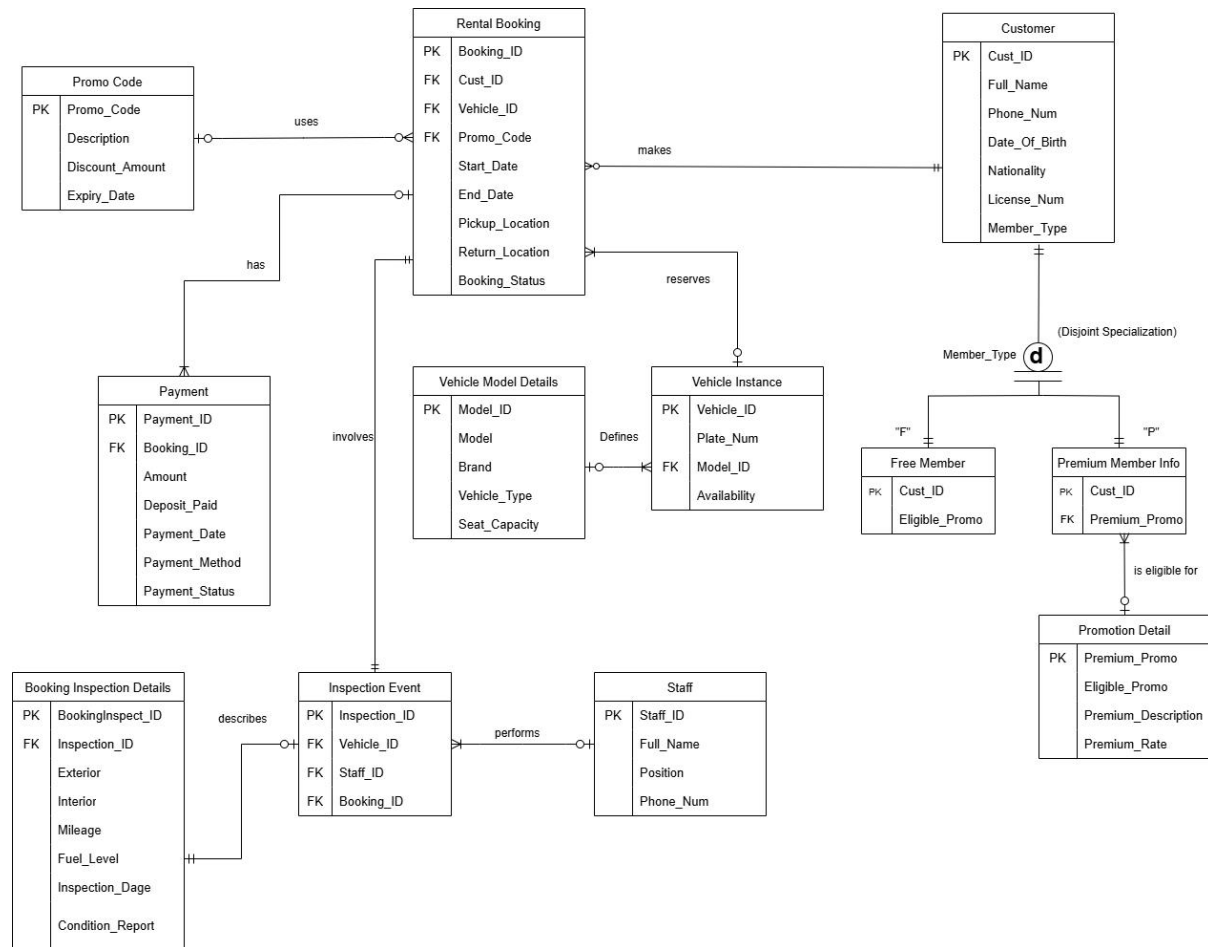
<u>Cust_ID</u>	<u>Premium_Promo</u>
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**Promotion Detail**

<u>Premium_Promo</u>	Eligible_Promo	Premium_Description	Premium_Rate
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**Finalize**

## d Crow's Foot relational database diagram



## Data Manipulations

1) All customer list with total number of rentals, total promo codes used and total amount spent for each customer

--- Customer Report ---				
Cust_ID	Full_Name	TotalRentals	TotalPromoCodesUsed	TotalAmountSpent
101	Siti Nurhaliza Binti Abdullah	1	1	150.00
102	Ahmad Bin Hassan	1	1	300.00
103	Lim Wei Jie	1	1	200.00
104	Preeti Kaur A/P Singh	1	1	80.00
105	Mohd Ali Bin Bakar	1	1	250.00
106	SarahTan	0	0	None
999	Mohd Haziq	2	2	900.00

2) All vehicles with total rental, total rental frequency and availability status (available/booked)

--- Vehicle Report ---						
Vehicle_ID	Plate_Num	Brand	Model	TotalRentals	TotalRentalDays	AvailabilityStatus
201	VBE1234	Perodua	Myvi	2	4	Available
202	WQR5678	Proton	X70	1	6	Available
203	JCL9012	Honda	City	1	4	Available
204	PKA3456	Perodua	Alza	1	1	Available
205	TSE7890	Toyota	Hilux	1	2	Available
206	abc100	Honda	Civic	0	None	Available
999	QAA7175D	Toyota	Vios	0	None	Available

3) Staff Inspection Reports (staff name, total pick-ups, total returns & missed inspections for each staff)

--- Staff Inspection Report ---				
Staff_ID	Full_Name	TotalPickUps	TotalReturns	OtherInspections
501	Encik Zul Fikri	0	0	0
502	Cik Amy Lee	0	0	0
503	Encik Ravi Shankar	4	1	0
505	Mr. Tan Kok Leong	0	0	0

4) Monthly rental sales

--- Monthly Rental Sales ---	
RentalMonth	MonthlySales
2025-03	900.00
2025-06	480.00
2025-07	300.00
2025-08	200.00



### 5) Top 5 most rented vehicle types

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--- Top 5 Most Rented Vehicle Types ---
Brand | Model | RentalCount
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Perodua | Myvi | 2
Proton | X70 | 1
Honda | City | 1
Perodua | Alza | 1
Toyota | Hilux | 1
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