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Car Rental Database System Final Project

Introduction and Database Description (Yohana)

In today's fast-paced, tech-driven world, data plays a critical role in keeping businesses organized and efficient. For a car rental company, managing details about vehicles, customers, rental transactions, tiered discounts, and insurance requirements can quickly become overwhelming without a proper system in place. This is where a well-designed database comes in.

The purpose of this project is to build a smart, user-friendly database system that helps a car rental company stay on top of its day-to-day operations. Whether it's checking which cars are available, keeping customer records up to date, or making sure proper insurance is in place, our database is designed to handle it all.

What this database does:

- Keeps track of customers, cars, and locations.
- Logs every rental transaction, including pickup and return details.
- Records insurance information and applies discounts.
- Helps staff answer questions and solve problems faster.
- Sets the stage for future growth, like adding more vehicles, adding more discount tiers, developing online booking, and/or mobile access.

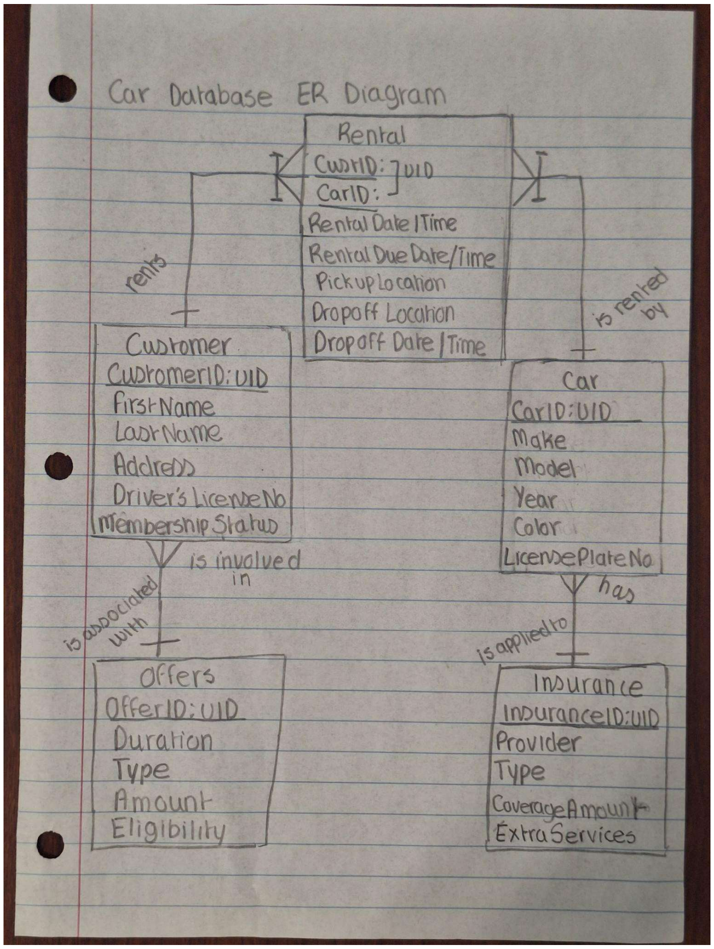
Tasks:

ER Diagram - Sabrina

Relational Schema - Yohana

3NF Review (Normalization) - Melissa

ER diagram description and functionality between entities (Sabrina)



The picture above is a copy of the Entity Relationship (ER) diagram made for the car rental database. The following entities include Offers, Customer, Rental, Car, and Insurance. Since there consists a many-to-many function between the Customer and Car entity, this resulted in the creation of the Rental associative entity. This rental entity marks important information about a customer's rental vehicle such as the dates for pickup and dropoff as well as the locations in which the rental vehicle(s) will be in.

Each customer can be eligible for an offer that can reduce the total amount due for a rental. The amount discount (in dollars) varies depending on the membership status of the customer. A type of offer can be given out to several customers, however, each customer can only be involved in one type of offer. For more information, a customer can only apply one offer at a given time to their account.

Another example of two entities sharing a one-to-many relationship is the insurance and the car entity. An insurance type can belong to many cars at a given time, but each car only has one insurance type associated with it. The type of insurance refers to whether the customer is utilizing their own insurance or whether the rental company is providing insurance for them. For the extra services attribute, it refers to whether the insurance includes any additional service such as roadside assistance or covering damage done to the exterior of the vehicle.

Relational Model With Keys - Final Format (Yohana)

Customer

Column Name
CustomerID
FirstName
LastName
Address
DriversLicenseNo
MembershipStatus
Customer.OfferID --> Offers.OfferID

Car

Column Name
CarID
Make
Model
Year

Color
LicensePlateNo
InsuranceID --> Insurance.InsuranceID

Rental

Column Name
Rental.CustID --> Customer.CustomerID
Rental.CarID --> Car.CarID
RentalDateTime
RentalDueDateTime
PickupLocation
DropoffLocation
DropoffDateTime

Offers

Column Name
OfferID
Duration
Type
Amount
Eligibility

Insurance

Column Name

InsuranceID
Provider
Type
CoverageAmount
ExtraServices

Confirming Relational Model is in 3NF (Melissa)

Customer (**CustomerID**, FirstName, LastName, Address, DriversLicenseNo, MembershipStatus, CustomerOfferID(FK))

Car (**CarID**, Make, Model, Year, Color, LicensePlateNo, InsuranceID(FK))

Rental **(CustID**(FK), **CarID**(FK), RentalDateTime, RentalDueDateTime, PickupLocation, DropoffLocation, DropoffDateTime)

Offers (**OfferID**, Duration, Type, Amount, Eligibility)

Insurance (**InsuranceID,** Provider, Type, CoverageAmount, ExtraServices)

Table Creation using SQL in Oracle

Table Creation SQL

-- Customer Table

```
CREATE TABLE Customer (

CustomerID INT PRIMARY KEY,

FirstName VARCHAR(50),

LastName VARCHAR(50),

Address VARCHAR(100),

DriversLicenseNo VARCHAR(20),
MembershipStatus VARCHAR(20),
OfferID INT,
FOREIGN KEY (OfferID) REFERENCES Offer(OfferID)
);
-- Car Table
CREATE TABLE Car (
CarID INT PRIMARY KEY,
Make VARCHAR(30),
Model VARCHAR(30),
Year INT,
Color VARCHAR(20),
LicensePlateNo VARCHAR(15),
InsuranceID INT,
FOREIGN KEY (InsuranceID) REFERENCES Insurance(InsuranceID)
);
-- Rental Table
CREATE TABLE Rental (
CustID INT,
CarID INT,
RentalDateTime DATE,
RentalDueDate DATE,
PickupLocation VARCHAR(100),
DropoffLocation VARCHAR(100),
DropoffTime DATE,
PRIMARY KEY (CustID, CarID),
FOREIGN KEY (CustID) REFERENCES Customer(CustomerID),
FOREIGN KEY (CarID) REFERENCES Car(CarID)
);
-- Offers Table
CREATE TABLE Offers (
OfferID INT PRIMARY KEY,
Duration VARCHAR(20),
Type VARCHAR(30),
Amount DECIMAL(10, 2),
Eligibility VARCHAR(50)
);
-- Insurance Table
CREATE TABLE Insurance (
InsuranceID INT PRIMARY KEY,
Provider VARCHAR(30),
Type VARCHAR(20),
CoverageAmount DECIMAL(10, 2),
ExtraServices VARCHAR(3)
);
```

Insert Tuples

Customer:

```
insert into customer values (123123, 'Alice', 'Walker', '123 Main St', 'D1234567', 'Gold', 201);

insert into customer values (234234, 'Bob', 'Smith', '456 Oak Ave', 'D7654321', 'Silver', 202);

insert into customer values (345345, 'Carlos', 'Mendez', '789 Pine Rd', 'D2468101', 'None', 203);

insert into customer values (456456, 'Diana', 'Nguyen', '321 Birch Blvd', 'D1357913', 'Gold', 204);

insert into customer values (567567, 'Eli', 'Chen', '654 Cedar Ln', 'D1122334', 'Silver', 205);

insert into customer values (678678, 'Fatima', 'Rahman', '987 Spruce Ct', 'D55667788', 'None', 206);
```

Car:

```
insert into car values (101, 'Toyota', 'Corolla', 2020, 'White', 'ABC1234', 123456);

insert into car values (102, 'Honda', 'Civic', 2019, 'Black', 'XYZ5678', 456789);

insert into car values (103, 'Tesla', 'Model 3', 2021, 'Red', 'TES2021', 789012);

insert into car values (104, 'Ford', 'Focus', 2018, 'Blue', 'FOC8888', 432109);

insert into car values (105, 'Chevrolet', 'Malibu', 2022, 'Silver', 'CHE2022', 654321);

insert into car values (106, 'Hyundai', 'Elantra', 2023, 'Gray', 'HYN1234', 765432);
```

Rental:

```
insert into rental values (123123, 101, TO_DATE('2025-04-01 09:00:00', 'YYYY-MM-DD HH24:MI:SS'), TO_DATE('2025-04-05 09:00:00', 'YYYY-MM-DD HH24:MI:SS'), 'Downtown Branch', 'Airport Branch', TO_DATE('2025-04-05 08:45:00', 'YYYY-MM-DD HH24:MI:SS'));

insert into rental values (234234, 102, TO_DATE('2025-04-02 10:30:00', 'YYYY-MM-DD HH24:MI:SS'), TO_DATE('2025-04-06 10:30:00', 'YYYY-MM-DD HH24:MI:SS'), 'Airport Branch', 'Mall Branch', TO_DATE('2025-04-06 09:50:00', 'YYYY-MM-DD HH24:MI:SS'));
insert into rental values (345345, 103, TO_DATE('2025-04-03 08:00:00', 'YYYY-MM-DD HH24:MI:SS'), TO_DATE('2025-04-04 08:00:00', 'YYYY-MM-DD HH24:MI:SS'), 'Mall Branch', 'Downtown Branch', TO_DATE('2025-04-04 07:45:00', 'YYYY-MM-DD HH24:MI:SS'));

insert into rental values (456456, 104, TO_DATE('2025-04-01 14:15:00', 'YYYY-MM-DD HH24:MI:SS'), TO_DATE('2025-04-03 14:15:00', 'YYYY-MM-DD HH24:MI:SS'), 'Downtown Branch', 'Downtown Branch', TO_DATE('2025-04-03 13:50:00', 'YYYY-MM-DD HH24:MI:SS'));

insert into rental values (567567, 105, TO_DATE('2025-04-04 12:00:00', 'YYYY-MM-DD HH24:MI:SS'), TO_DATE('2025-04-07 12:00:00', 'YYYY-MM-DD HH24:MI:SS'), 'Mall Branch', 'Airport Branch', TO_DATE('2025-04-07 11:30:00', 'YYYY-MM-DD HH24:MI:SS'));

insert into rental values (678678, 106, TO_DATE('2025-04-05 11:00:00', 'YYYY-MM-DD HH24:MI:SS'), TO_DATE('2025-04-10 11:00:00', 'YYYY-MM-DD HH24:MI:SS'), 'Airport Branch', 'Downtown Branch', TO_DATE('2025-04-10 10:45:00', 'YYYY-MM-DD HH24:MI:SS'));
```

Offers:

```
insert into offers values (201, '1 Day', 'Weekend Special', 20.00, 'All Members');

insert into offers values (202, '3 Days', 'Midweek Deal', 50.00, 'Gold Members Only');

insert into offers values (203, '1 Week', 'Family Package', 100.00, 'All');

insert into offers values (204, '2 Days', 'Business Plan', 40.00, 'Silver/Gold');

insert into offers values (205, '5 Days', 'Adventure Pack', 80.00, 'Gold Only');

insert into offers values (206, 'Weekend', 'Late Return Flex', 25.00, 'None');
```

Insurance:

```
insert into insurance values (123456, 'State Farm', 'Customer', 100000.00, 'No');

insert into insurance values (456789, 'Allstate', 'Agency', 150000.00, 'Yes');

insert into insurance values (789012, 'Progressive', 'Agency', 50000.00, 'No');
insert into insurance values (432109, 'Farmers', 'Customer', 75000.00, 'Yes');
insert into insurance values (654321, 'GEICO', 'Customer', 300000.00, 'Yes');
insert into insurance values (765432, 'Nationwide', 'Agency', 150000.00, 'No');
```

Queries

Query 1: List Customers with their Rental Cars (Yohana)

```
SELECT
        c.FirstName,
        c.LastName,
        ca.Make,
        ca.Model,
        r.RentalDateTime,
        r.DropoffTime
FROM Customer c
JOIN Rental r ON c.CustomerID = r.CustID
JOIN Car ca ON r.CarID = ca.CarID;
```

Results: displayed each customer (first and last name), the make and model of the car they rented along with the rental date and drop off date.

Query 2: List Detailed Rental Transactions with Customer, Car, Offer, Location, Payment, and Staff Info (Yohana)

```
SELECT
        ca.CarID,
        ca.Make,
        ca.Model,
        ca.Year,

        ca.Color,

        c.CustomerID,

        CONCAT(c.FirstName, ' ', c.LastName) AS CustomerName,

        o.Type AS OfferType,

        o.Amount AS OfferAmount,

        r.RentalID,

        r.RentalDate,

        r.ReturnDate,

        DATEDIFF(r.ReturnDate, r.RentalDate) AS RentalDurationDays,

        l.LocationName AS RentalLocation,

        p.PaymentID,

        p.PaymentDate,

        p.Amount AS PaymentAmount,

        p.PaymentMethod,

        s.StaffID,

        CONCAT(s.FirstName, ' ', s.LastName) AS StaffName

FROM Car ca

JOIN Rental r ON ca.CarID = r.CarID

JOIN Customer c ON r.CustomerID = c.CustomerID

JOIN Offers o ON c.OfferID = o.OfferID

JOIN Location l ON r.LocationID = l.LocationID

JOIN Payment p ON r.RentalID = p.RentalID
JOIN Staff s ON r.StaffID = s.StaffID

ORDER BY r.RentalDate DESC;
```

Result:

This query provides a complete view of each rental transaction by combining information from cars, customers, offers, rental dates, payment details, rental locations, and staff.
It shows which car was rented, by whom, what offer was applied, when and where the rental happened, how it was paid for, and who handled the rental.
This integrated view helps with customer service, financial tracking, staff performance evaluation, and offer effectiveness analysis.

Query 3: Find Rentals by Members with "Gold" Status (Yohana)

```
SELECT

        c.FirstName,

        c.LastName,

        r.RentalDateTime,

        r.PickupLocation

FROM Customer c

JOIN Rental r ON c.CustomerID = r.CustID

WHERE c.MembershipStatus = 'Gold';
```

Results: produced Alice Walker and Diana Nguyen with rental dates of 4/1/2025 and both picked up at the Downtown Branch.

Query 4: List the driver's license numbers and the last name of the customers who made a car rental after April 2nd or starting April 3rd (Sabrina)

```
SELECT

c.DriversLicenseNo, c.LastName
```

```
FROM
Customer c JOIN Rental rent
        ON c.Customer = rent.CustomerID
WHERE
        rent.RentalDateTime > 4/3/2025;
```

Results: Listed customers Mendez, Chen, and Rahman since they rented on dates 4/3/2025, 4/4/2025, and 4/5/2025 respectively.

Query 5: List cars where customers used their own insurance for the rental (Melissa)

```
SELECT
ca.make, ca.model
FROM
Car ca JOIN Insurance i ON ca.InsuranceID = i.InsuranceID
WHERE
i.Type =  'Customer';
```

Results: Ford Focus, Toyota Corolla, Chevrolet Malibu.

Query 6: List customers who returned their rental cars to the Downtown Branch (Melissa)

```
SELECT
c.FirstName, c.LastName
FROM
Customer c JOIN Rental r ON c.CustomerID = r.custID
```

```
WHERE

r.DropoffLocation =  'Downtown Branch';
```

Results: Carlos Mendez, Diana Nguyen, and Fatima Rahman.

Query 7: Find license plate numbers that end in 1234 (Sabrina)

```
SELECT

CarID, Make, LicensePlateNo

FROM

Car

WHERE

LicensePlateNo LIKE ‘%1234’

ORDER BY

Make;
```

Results: Created listings of the Hyundai and Toyota cars since they have a license plate number ending in 1234.

Query 8: List the discount amounts in ascending order for numbers that are greater than 25 for the offer table (Sabrina)

```
SELECT

Amount

FROM

Offers

WHERE
```

```
Amount > 25

ORDER BY

Amount asc;
```

Results: Listed numbers 40, 50, 80 in ascending order.

Query 9: List the insurance companies and insurance ID numbers that carry coverage over $100,000 (Melissa)

```
SELECT

InsuranceID, Provider

FROM

Insurance

WHERE

CoverageAmount >  ‘100000.00’;
```

Results: Listed Nationwide with insurance ID 765432, Allstate with insurance ID 456789, and Geico with insurance ID 654321.