Reading Discussion

1.Purpose:

Help customer find and purchase vehicles

2. Sentence by sentence

- As one of Sydney's premier automotive dealerships since 1995,Sydney Automotive Group (SAG) has built a reputation for offering an extensive range of new and pre-owned vehicles at competitive prices.The company is about to design a database system and has employed you as their database consultant.Your task is to design a conceptual ER model to capture the description of their business operations.

ZMJ: Mainly introduces SAG's main function (vehicle trading platform), and the main task (database)

LYH: ok

XDY: Design conceptual model to capture business operations

Summary: Mainly introduces functionality

- The primary focus of SAG is to help customers find and purchase vehicles that meet their needs.

LYH: SAG & Customer & Vehicles \ find & purchase

XDY: Entities - customer, vehicles, purchase

ZMJ: Entities: customers, vehicles. Two verbs 'Find' and 'Purchase' can be considered candidate relationships

Summary: Two entities identified, two relationships uncertain

- Each vehicle in the system, whether new or pre-owned, is uniquely identified by the Vehicle Identification Number (VIN) and includes detailed information such as make, model, build year, odometer reading (mileage), colour, transmission type and listed price.

ZMJ: Vehicle attributes: ... Doubt about pre-owned car? Consider 'ISA' relationship between pre-owned and new

LYH: vehicles ➡️ new / pre-owned + vehicle attributes

XDY: Vehicle fundamental information

Summary: Basic attributes of vehicles, and based on the text below, determine a “generalization” relationship

- In addition, pre-owned has a previous owner and their name stored.

ZMJ: Relationship between pre-owned car and previous owner

LYH: pre_owned ➡️ pre_owner/name. Since there are separate attributes later, both should be standalone entities

XDY: pre-owner’s previous_owner_name is the key

Summary: Relationship between pre-owned cars and previous owners

- The previous owner may or may not be a customer of SAG.

LYH: Should we represent a company under the pre_owner's attribute? Is it to show a relationship between previous owner and SAG, or between previous owner and SAG's customers?

XDY: previous_owner is not a primary entity

ZMJ: previous_owner and customer are unrelated (super set), a separate table is needed

Summary: As ZMJ said

- To help attract potential buyers, each vehicle listing is accompanied by a detailed description, and still images of the car, providing customers with access to comprehensive details before deciding.

LYH: detailed description ➡️ images (within vehicle or as a new entity?)

XDY: Keys inside vehicles

ZMJ: detailed description of vehicle (attribute? new entity?)

Summary: For query performance and multiple images, it may require a new table

- When a customer expresses interest in a vehicle, a test drive of that vehicle is scheduled with a salesperson.

LYH: customer (test) vehicle salesperson (scheduled) (Is this a relationship between three entities? Or four, including schedule?)

XDY: customer and vehicle – test drive

ZMJ: Identify entities: customer, vehicle, testDrive, salesperson. Customer participates in testDrive, vehicle is included in testDrive, salesperson schedules the testDrive

- The customer will test drive at least one vehicle during a visit to the SAG.

LYH: customer (1) ➡️ (n) vehicles

XDY: one to many

ZMJ: one-to-many relationship

Summary: Agreement reached

- The system records the date and time of the test drive along with feedback for each vehicle, helping the sales team correlate the customer's test drive to the likelihood of a car sale being achieved.

LYH: schedule (test drive) / date & time & feedback

XDY: test drive – date/time/feedback, test drive vs vehicle = one vs many; a vehicle can be used by different drivers but each test drive uses only one vehicle

ZMJ: Multiple attributes of testDrive. Since feedback is for a single vehicle, should it be in a separate table?

- Once the sale is finalized, customers must register their details, including their first name, last name, mobile number, email address, residential address, and unique driver's licence number.

LYH: customer attributes

XDY: customer – first name / last name ... all are entity properties

ZMJ: customer attributes

- As part of the purchase, customers typically negotiate with the salesperson for a discount.

LYH: discount (which entity should it belong to?)

XDY: salesperson vs customer: 1 vs n

ZMJ: Purchase involves discount

- Once both parties agree on the terms, the sale is finalized, and the system records the base price, discount price, and final price of the sale, along with the sale date.

LYH: sale attributes + discount

XDY: Data attributes: base price, discount price, final price, sale date

ZMJ: Entity sale, including attributes

- The customer has also the option of trading in their own vehicle.

LYH: Is trade-in a relationship or entity? New entity: own_vehicle?

XDY: trading vehicle vs customer: 1 vs 1

ZMJ: customer (who can also be a previous_owner) and pre-owned relationship: trading

- The final price is derived using the discount price from the base price plus the cost of after-market options and deducing the agreed traded-in vehicle price if applicable.

LYH: If customer trades in a previous vehicle, there will be a trade-in value

XDY: final price = base price + aftermarket options - discount price - traded-in vehicle value

ZMJ: Formula for calculating final price

- The salesperson for the sale is also recorded, as this information is important for tracking the salesperson performance and calculating their commission.

LYH: Are performance and commission recorded in the salesperson table?

XDY: salesperson vs sale: 1 vs n; commission range: 0–1 or 0–100%

ZMJ: Attribute of sale: salesperson ID

- Each salesperson at SAG has their details recorded in the system, including their full name, email, mobile number, annual gross salary, and their commission rate.

LYH: salesperson attributes

XDY: salesperson attributes: full name, email, mobile number, annual gross salary, commission rate

ZMJ: salesperson attributes

- We assume that a customer can only make one single vehicle purchase per day but may make additional vehicle purchases from SAG any day.

LYH: customer and sale table relation is 1:1? Or should the constraint be enforced in SQL?

XDY: Ensure each customer can only purchase once per day

ZMJ: Only one sale per day (constraint)

- To provide further service to SAG’s customers, these can select up to eight aftermarket car options per sale to personalize their vehicle to better match their preferences and needs.

LYH: New entity (aftermarket car options) ≤8:1 sale

XDY: sale vs aftermarket: n vs n, but sale's option limited to 8

ZMJ: Entity aftermarket, sale → aftermarket is 0...8

- These options include accessories, extended warranties, service packages, and insurance add-ons etc.

LYH: aftermarket car options attributes

XDY: aftermarket options attributes

ZMJ: aftermarket attributes

- Each aftermarket option is described by a name and description.

LYH: New entity or how to represent?

XDY: Name is mandatory but description can be optional

ZMJ: aftermarket option should be a new table

- The cost of these aftermarket options varies based on the vehicle being purchased—for instance, the price of tinted windows may differ between a high-end luxury sedan and an economy hatchback.

LYH: Descriptive, mostly irrelevant

XDY: aftermarket options can be another entity

ZMJ: Need a new table to record vehicle type and aftermarket relationship

- Note that these aftermarket options are not available for pre-owned cars.

LYH: Only for new cars

XDY: Limiting condition for pre-owned cars

ZMJ: Only for new cars (constraint?)

- As part of the convenience provided to customers, SAG offers options to trade-in the customer’s present vehicle (limited to one per purchase).

LYH: Trade-in (relationship between old car and vehicle? Or between old car and sale?)

XDY: Each sale related to one vehicle

ZMJ: Can trade-in be merged with previous content on pre-owned? For example, record trade-in ID in table to offset payment?

- The customer needs to bring in their vehicle for an inspection to determine the final offered price for the trade-in.

LYH: own_vehicle / offered price

XDY: Another attribute: vehicle inspection, to record inspection details

ZMJ: Doesn’t matter

- The trade-in vehicle is also uniquely identified by its Vehicle Identification Number (VIN).

LYH: Primary key VIN

XDY: VIN – unique identification

ZMJ: VIN also needed for pre-owned vehicles

- The vehicle’s condition is assessed based on the make, model, year, odometer reading (mileage), colour, transmission type, mechanical and body conditions.

LYH: own_vehicle attributes

XDY: Other vehicle attributes

ZMJ: pre-owned vehicles' attributes

- The mechanical condition is assessed by the SAG as either poor, fair, good, or excellent.

LYH: 4 evaluation options

XDY: mechanical condition: 4 assessment standards

ZMJ: Constraint

- The same type of assessment is applied to the vehicle body condition.

LYH: body condition

XDY: body condition, same evaluation standard as mechanical condition

ZMJ: Constraint

- The trade-in value is computed according to a formula that takes into account all the above information regarding the traded-in vehicle.

LYH: Is trade-in value an attribute or entity?

XDY: trade-in value depends on all information of traded-in vehicle

ZMJ: Pricing determinants

- We assume that once the vehicle is traded in, it will be put on sale immediately.

LYH: own_vehicle status attribute traded_in/not; if traded_in, the whole row moves to vehicle table

XDY: Immediately – trade-in car quickly enters sale car system, same as others

ZMJ: If it directly enters the sale system, maybe the trade-in vehicle can be considered as pre-owned vehicles

- The traded-in vehicle should be registered to the buyer's name.

LYH: Buyer's name

XDY: traded-in vehicle related to buyer

ZMJ: Ownership of trade-in vehicle. Possibly not needed in database

- As previously indicated, the agreed final price of the traded-in vehicle will be deducted from the final price of the sold vehicle.

LYH: Formula / relationship

XDY: final price calculation

ZMJ: Final price valuation (assertion?)

- To accommodate different customer needs, SAG offers multiple payment options, including cash, credit card, bank transfer, bank financing or any combination of these forms of payments.

LYH: New entity payment options and attributes

XDY: One sale can involve multiple forms of payment

ZMJ: payment – weak entity of sale

- SAG records the amount and date of each payment.

LYH: payment (sale) attributes

XDY: payment attributes

ZMJ: payment attributes

- Once the full outstanding amount is paid, the sale status will be updated from pending to completed.

LYH: sale attribute sale_status has two states: pending or completed

XDY: sale attribute – pending and completed

ZMJ: sale attribute and constraint

- The customer is responsible for arranging and securing bank financing.

LYH: bank financing (new entity?)

XDY: bank financing related to customer and sale

ZMJ: customer can apply for a loan, but not clear – see below

- The sale is not finalized until the full amount is paid which includes a proof that the customer has secured bank financing, if applicable.

LYH: Difference between full amount and bank financing?

XDY: sale only finalized after full payment

ZMJ: sale status (new attribute?)

- Up to one single bank financing is assumed for each sale transaction.

LYH: Relationship between bank financing and sale? Or a constraint in the sale table?

XDY: One sale transaction relates to one bank financing

ZMJ: Agreed

- While bank financing related application is independent from SAG operations and is not part of the SAG ERD, SAG still requires basic information for bookkeeping purposes.

LYH: A table for bank financing is still needed

XDY: bank financing is an entity, but not core part of ERD, relatively less important

ZMJ: Need to record bank financing details (relation table includes user ID, bank ID, price, etc.)

- The system tracks which bank is involved, the date of application, a loan term which ranges from 12 to 50 months, interest rate and loan amount.

LYH: Attributes of bank financing

XDY: bank attributes

ZMJ: Detailed attributes of bank financing

- For recording purposes, the customer should present a bank proof of approval to SAG.

LYH: bank proof (document) – mentioned before, which table should it go into?

XDY: customer – bank approval – SAG

ZMJ: Proof document as an attribute?