1. For the time of the test drive, should it need to be a start_time and end_time, or just a duration of the test dirve by the customer?

customer will test drive at least one vehicle during a visit to the SAG. 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. Once the sale is finalized, customers must register their details, including their first name,

2. is trade-in condition only for assess the value of the vehicle？should it include all the pre-owned vehicles or just for the vehicle which will be traded in?

As part of the convenience provided to customers, SAG offers options to trade-in the customer's present vehicle (limited to one per purchase). The customer needs to bring in their vehicle for an inspection to determine the final offered price for the trade-in. The trade-in vehicle is also uniquely identified by its Vehicle Identification Number (VIN). The vehicle's condition is assessed based on the make, model, year, odometer reading (mileage), colour, transmission type, mechanical and body conditions. The mechanical condition is assessed by the SAG as either poor, fair, good, or excellent. The same type of assessment is applied to the vehicle body condition. The trade-in value is

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computed according to a formula that takes into account all the above information regarding the traded-in vehicle. We assume that once the vehicle is traded in, it will be put on sale immediately. The traded-in vehicle should be registered to the buyer's name. As previously indicated, the agreed final price of the traded-in vehicle will be deducted from the final price of the sold vehicle.

3. Do the date and loan amount of bank financing duplicate the date and amount in the payment?

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. SAG records the amount and date of each payment. Once the full outstanding amount is paid, the sale status will be updated from pending to completed. The customer is responsible for arranging and securing bank financing. The sale is not finalized until the full amount is paid which include a proof that the customer has secured bank financing, if applicable. Up to one single bank financing is assumed for each sale transaction. 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 purpose. 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. For recording purposes, the customer should present a bank proof of approval to SAG.

New Questions
1. TestDrive 和 SAG_Customer之间应该用exactly one还是at least one
   a. 我觉得是at least one, 因为在TestDrive表里面只要保证每个SAG_Customer至少试驾了一次就好
2. vehicle listing example : https://www.carsales.com.au/cars/family-lifestyles/
3. between a weak entity and a strong entity, we must use double diamond for relationship, right?

Shen Lihang
1. Aggregation "testdrive" relationship among vehiclelisting, sag_customer, salesperson
2. trade-in relationship

Assumption
1. VIN and driver license is 10 digits int.
2. We assume the build year of the vehicle is between 1950 and 2025.
3. We assume the description of vehicle listing cannot be longer than 255 varchar.
4. We assume the images in vehicle listings are stored as Bytea.
5. We assume in TestDriveRecord, the feedback cannot exceed 255 characters.
6. We assume that People store names separately in first name and last name.
7. We assume that SAGcustomer stores addresses divided into state, street, city, and ZipCode.
8. We assume that in BankFinancing, a value of true for proof approval indicates that it has been secured bank financing.
9. We assume that duplicate options cannot be selected in the aftermarket options — that is, options with the same name but different IDs are not allowed.
10. We assume that a vehicle listing may contain multiple images, but not allowed do not contain any images.
11. We assume that each vehicle can have at most one vehicle listing, as in the case of a resale, it is sufficient to update the existing listing using the foreign key VIN.
12. We assume that people can be both a SAG customer and a salesperson at the same time.
13. We assume that different customers may share the same phone number, as some might change their numbers without updating their records promptly.
14. Due to ambiguity of the description, we decided to assume Discount price just means the discount, we will use Final Price = (Base Price - Discount Price) + After-Market Options Cost - Trade-In Vehicle Price (if applicable) to calculate
15. Since the formula for calculating the trade-in value is unclear, we chose to store it directly in the Sale table, with a one-to-one relationship to each sale.
16. We assume that a payment will only set the balance to zero; if the balance is less than or greater than zero, the sale will not be marked as complete.
17. Refer to 'A vehicle can only be sold to one single customer.' in the additional relationship constraints. Since the statement is not very clear, we assume that once a vehicle is sold, it will not be sold a second time in any form.
18. Since the trade-in price and discount might not be applicable, we assume that their values are set to be greater than or equal to 0.

19. all entity that use FK need to insert before its target entity in a transaction, it is to make sure the relationship "at least one"

检查unique

根据erd检查at least

组合主键在RA里面有问题, 要再检查一遍

All attributes in a tuple relating to details about a price should always have positive values

rm和code都不包含derived, 只有erd包含

枚举,CHECK字段要NOT NULL

New questions
1. 插入数据时候是否要手动对别的derived列进行更新
    a. 比如A表中有x,y；B表中有z, 其中z是derived variable z=x+y。那么会不会出现我们只更新了x, y而需要手动更新z的情况
2. at least one, at most one, exactly one 关系是否要在schema里体现出来
3. 对于attribute, 我们是不是允许为null, 比如aftermarket option price为null

SLH修改

Trade in price是derived, 因为在assignment上有写是通过公式计算的

key constraint
　　　　foreign key 都是initially deferrable, 最后再看on delete cascade
　　　　　　　　a. 在newcar里面的一定在vehicle, 同时是PK
　　　　　　　　b. 在preowned里面的一定在vehicle, 同时是PK
　　　　　　　　c. 在trade-incar里面的一定在preowned, 同时是PK
　　　　　　　　d. vehicle Listing必须对应1辆车(d1)和 1辆车可以有0到1个vehicle listing(d2) 通过NOT NULL, UNIQUE 和 FK
　　　　　　　　k. Customer最多可以对应一个SAG(k.1), 每个SAG必须对应一个Customer（k.2) NOT NULL, UNIQUE 和 FK
　　　　　　　　L：每个testdriverecord对应一个vehicle(L1) COMPOSITE PK, 一个customer(L2) NOT NULL composite key + FK
　　　　　　　　M ScheduleBy对应一个vehicle(M1), 一个salesperson(M2), 一个TESTDRIVERECORD(M3) FK+NOT NULL
　　　　　　　　Q TradeIncar必须对应一个sale (Q1)NOT NULL, 每个Sale最多对应一个TradeInCar (Q2) UNIQUE 和 FK

　　　　composite PK
　　　　　　　　e. Image对应一vehicle Listing,一个vehicle Listing不能有重复的image, FK
　　　　　　　　f. image不能是empty的

　　　　　　　　O 一个sale对应一个sagcustomer(O1), 一个Vehicle(O2), 一个salesperson(O3)
　　　　　　　　R 一个payment必须对应一个sale

　　　　NOT NULL
　　　　　　　　g. vehicle listing 里面的description不能为空
　　　　　　　　j. all people related info should be not null
　　　　UNIQUE
　　　　　　　　h. email is unique
　　　　　　　　i. driver licence
　　　　　　　　N 一个customer一天只能有一个订单
　　　　　　　　P 一个Vehicle只能被最多卖给一个SAGCustomer (貌似和9作用一样)

　　　　CHECK
　　　　　　　　18 COMMISION RATE 0< r < 0.1

function

　　　　　　　　~~无法解决, 我的建议是检查test drive车必须on sale,~~
　　　　~~4. 每个vehicle belongs to either new or preowned~~
　　　　　　　　~~无法解决 1 … 2 People和SAG,SALESPERSON~~
　　　~~5~~
　　　　　　　　~~每个customer至少有一条testDriveRecord~~
　　　　　　　　~~6~~
　　　　　　　　~~每个customer至少有一条sale记录~~

8

trigger

Before Insert

check_vin_not_in_preowned
1. 在newcar里面的一定不在preowned
check_vin_not_in_newcar
2. 在preowned里面的一定不在newcar

7. 只能卖正在on sale的车

9 被卖的的车会变成 has been sold即使订单还是pending状态

10 当trade-in car被第一次添加到表后，其必须为on sale（10.1），后续*update*不用管（10.2）

11 Payment总和满足totalprice后把sale的Status改为completed，计算公式Final Price = (**Base Price** - Discount Price) + **After-Market Options Cost** - Trade-In Vehicle Price (if applicable) to calculate

12 SID 对应的AfterMarket Option 最多8个

13 一个loan只能有一个bank finance UNIQUE（13.1）一个bankfinancing只能对应一个Payment（13.2）NOT NULL + FK – 没有CHECK

15在插入或者修改前的时候，一个sid必须没有bank financing

16 loan类型的必须绑定一个bank financing的record，不管proofofApproval是否为true即proof是applicable就给，不是强制的

19 Aftermarket只能由newcar选

After Insert – not allowed to use Deferable
3. vehicle listing 至少有一个图片

17 检查父类中的必须在子类，用trigger，记得assumption说明下
17.1 vehicle -》new,old
17.2 每个Customer必须有至少一个TestDriveRecord
17.3 每个people必须是SAG或者SalesPerson或者两个都是
17.4 每个SAGCustomer必须有一条Sale

20 TradeIncar的名字必须对应SALE里面SAG的名字

21 只能驾驶正在卖的车

22 for sale的车一定有vehicle listing

Assumptions

- VIN and driver license are 10-digit integers.

- We assume the build year of the vehicle is between 1950 and 2025.

- We assume the description of a vehicle listing cannot exceed 255 characters (`VARCHAR(255)`).

- We assume the images in vehicle listings are stored as `BYTEA`.

- We assume that in `TestDriveRecord`, the feedback cannot exceed 255 characters.

- We assume that `People` store names separately in `FirstName` and `LastName`.

- We assume that `SAGCustomer` stores addresses divided into `State`, `Street`, `City`, and `ZipCode`.

- We assume that in `BankFinancing`, a value of `TRUE` for `ProofOfApproval` indicates that secured bank financing has been obtained.

- We assume that duplicate options cannot be selected in the aftermarket options — that is, options with the same name but different IDs are not allowed.

- We assume that a vehicle listing may contain multiple images, but it must contain at least one image.

- We assume that each vehicle can have at most one vehicle listing. In the case of a resale, it is sufficient to update the existing listing using the foreign key `VIN`.

- We assume that `People` can be both a `SAGCustomer` and a `Salesperson` at the same time.

- We assume that different customers may share the same phone number, as some might change their numbers without updating their records promptly.

- Due to the ambiguity of the description, we assume that the discount price refers only to the discount amount. We calculate the final price as:
  Final Price = (Base Price - Discount Price) + Aftermarket Options Cost - TradeIn Vehicle Price (if applicable)

- Since the formula for calculating the trade-in value is unclear, we chose to store it directly in the `Sale` table, assuming a one-to-one relationship with each sale.

- We assume that payments will only set the balance to zero; if the balance is less than or greater than zero, the sale will not be marked as complete.

- Referencing "A vehicle can only be sold to one single customer" from the additional relationship constraints — since the statement is vague, we assume that once a vehicle is sold, it will not be sold again in any form. In addition, a car can only be sold to one customer in the Sale record.

- Since the trade-in price and discount might not be applicable, we assume that their values are set to be greater than or equal to 0.

- All entities that use a foreign key must be inserted **before** their referenced target entities within a transaction. This ensures that the "at least one" relationship is maintained. The clause for it is DEFERRABLE INITIALLY DEFERRED