This Project includes the introduction, ER Diagram and Relational model.

CPIS-240 DB Group Project (Fall 2021)

Ahmad Khojah || 1935813

Mohammed Sabanu || 1851789

Ahmad Al-Ghamdi || 1742213

Mohammed Al-Zahrani || 1847340

Instructor: Dr. Muhammad Binsawad

Assessment rubric

Item	Grade	
Introduction	4	
ERD	8	
Mapping	8	
SQL	12	
Technical report	8	
Total	40	

Table of Contents

Introduction:

The project's goal is to create a complete ER diagram of a scenario and the relational schema to explain how and why it was shown in that way. The SQL code was also written in SQLDeveloper to create the database based on the ER diagram.

SuperMotors is a company that sells new and used cars and offers services such as car maintenance and a repair shop. SuperMotors has two types of employees; salespeople and mechanics that both work for the customer, which can be a buyer or want to repair his or her car. If the customer chooses to repair or service his or her car, a service ticket is generated. Due to company policy, a salesperson must write an invoice for each car they sell to a customer. The car shop also has a service history so they can reference each car by its serial number.
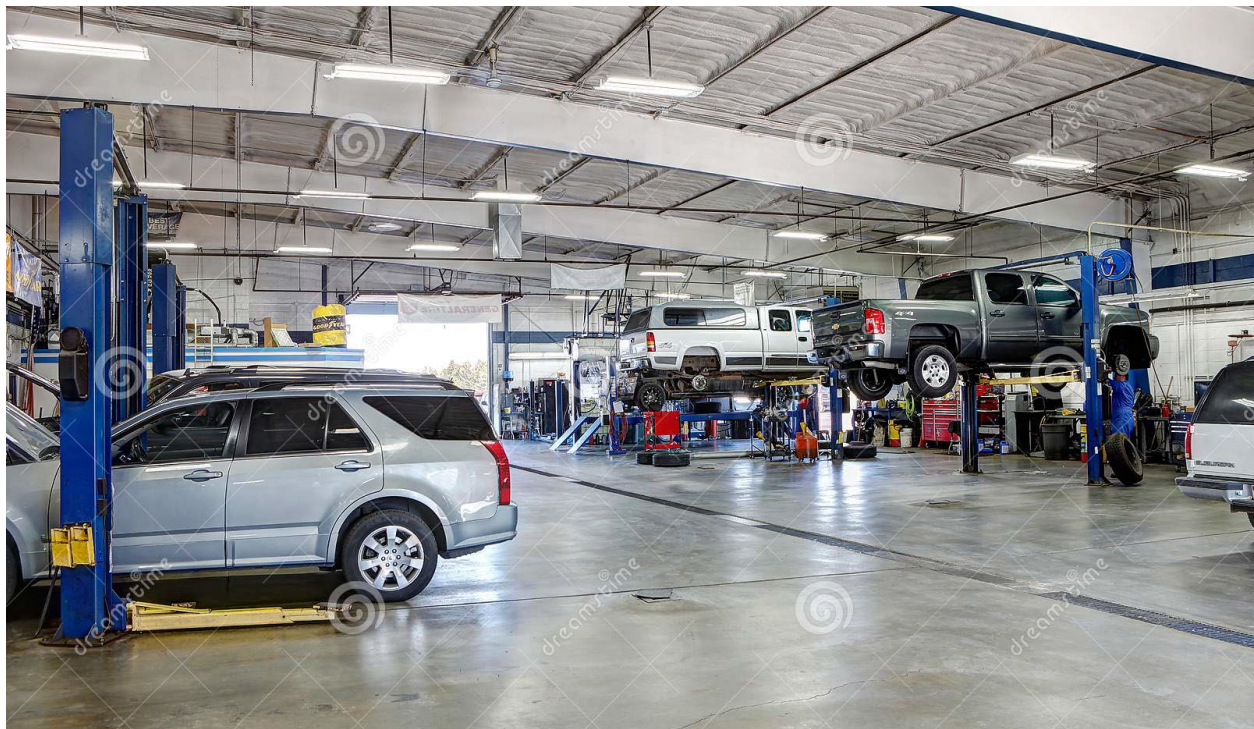
Scenario:

The company is SuperMotors that sells used and new cars and services. Salespeople sell cars to customers. For each sales transaction (in which one or more cars are sold) an invoice is generated. Every service transaction generates a different kind of invoice (denoting one or more serviced cars). The following are the additional business requirements.

1. Salespeople can sell many cars, but each such car that is sold is linked maximum to 3 salespeople (each one will get a commission of 2% of the sale amount). A salesperson's basic salary is 10,000 SAR plus 2000SAR for each year they have been part of the company, their total salaries are not stored and are calculated by adding the basic salary and commission amounts.
2. Each car is bought by only one customer.
3. Salespersons write one invoice for each car they sell
4. A customer gets an invoice for each car they buy.
5. A customer may come in just to have his or her car serviced; so, they do not need to buy a car to be a customer.
6. Each service/repair leads to one "service ticket" being generated for each car.
7. The car shop has a service history for each of the cars serviced. The service records are referenced by the car's serial number.
8. A car brought in for service can be worked on by many mechanics, and each mechanics may work on many cars.
9. A car that is repaired may or may not need parts additional parts (such as seats, wheels, windows).

Description:

Num	Entity	Type	Attributes
1	Salespeople	Strong	SEmployeeID, Salary, Hire Date, Fname, Lname
2	Costumer	Strong	SSN. Pnumber, Email, Gender, Fname, Lname
3	Car	Strong	SerialNum, LicNum, Color, Year, Model, Price, Make, Condition
4	Car Shop	Strong	BranchName, Location, PartNum, PartName
5	Mechanic	Strong	MEmployeeID, Salary, Fname, Lname
6	Service Ticket	Strong	SerialNum, SSN, TicketNum, Cost, Date Received, Description
7	Invoice	Strong	SerialNum, Price, InvoiceNum
8	Service History	Weak	Serial Num, TicketNum, Description/Parts, BranchName

Key Attribute
Simple
Composite
Multivalued
Partial

Num	Relationship	Type	Between	Cardinality	Participation
1	Sell	Normal	Salespeople, Car	Many to Many	Partial to Total
2	Buy	Normal	Car, Customer	One to Many	Partial to Partial
3	Service	Normal	Customer, Service Ticket, Car Shop	One to One to Many	Total to Total to Total
4	Work_on	Normal	Mechanic, Car	Many to Many	Partial to Partial
5	Works_At	Normal	Mechanic, Car Shop	Many to Many	Total to Total
6	Write/Get	Normal	Salespeople, Invoice, Costumer	One to One to One	Partial to Total to Total
7	Car Record	Identifying	Car Shop, Service History	One to One	Total to Total

Entity

Num	Description
1	Because it is independent and has a primary key
2	Because it is independent and has a primary key
3	Because it is independent and has a primary key
4	Because it is independent and has a primary key
5	Because it is independent and has a primary key
6	Because it is independent and has a primary key
7	Because it is independent and has a primary key
8	Because it is completely depended on the existence of the strong entity and has a partial key

Relationship

Num	Description
1	It is partial to total because one or a max of three salesperson can sell a car and each car must be sold by a salesperson
2	It is partial to partial because each car can be bought by one customer one customer can buy one or many cars
3	It is total to total to total because each customer can service his car and only get one service ticket for each car serviced/repaired and every car must be serviced in the car shop
4	It is partial to partial because one or many mechanics can work on one car and one or more cars can be worked on by one or many mechanics
5	It is total to total because each mechanic works at the car shop and the car shop has each mechanic working in it
6	It is partial to total to total because each salespeople can write only one invoice for each car they sell, and a customer gets an invoice for each car they buy
7	It is total to total because it is an identifying relationship and must have total participation and only one service history can be included for each car serviced in the car shop

Entity/Relation	Num	Attribute	Description
Salesperson			
	1	SEmployeeID	1- Simple because cannot be divided and only has a single value at a time 2- It has a unique value and direct relation to the entity 3- It is a characteristic of an entity and is dependent on it
	2	Salary	1- Simple because cannot be divided and only has a single value at a time 2- It has a direct relation to the entity 3- It is a characteristic of an entity and is dependent on it
	3	Hire Date	1- Simple because cannot be divided and only has a single value at a time 2- It has a direct relation to the entity 3- It is a characteristic of an entity and is dependent on it
	4	Cname	1- Composite because it can be subdivided to additional attributes 2- It has a direct relation to the entity 3- It is a characteristic of an entity and is dependent on it
Car			
	5	SerialNum	1- Simple because cannot be divided and only has a single value at a time 2- It has a unique value and direct relation to the entity 3- It is a characteristic of an entity and is dependent on it
	6	Color	1- Multivalued because it has many values and several attributes 2- It has a unique value and direct relation to the entity 3- It is a characteristic of an entity and is dependent on it
	7	Model	1- Simple because cannot be divided and only has a single value at a time 2- It has a direct relation to the entity 3- It is a characteristic of an entity and is dependent on it
	8	Make	1- Simple because cannot be divided and only has a single value at a time 2- It has a direct relation to the entity 3- It is a characteristic of an entity and is dependent on it
	9	LicNum	1- Simple because cannot be divided and only has a single value at a time 2- It has a direct relation to the entity 3- It is a characteristic of an entity and is dependent on it
	10	Year	1- Simple because cannot be divided and only has a single value at a time 2- It has a direct relation to the entity 3- It is a characteristic of an entity and is dependent on it
	11	Price	1- Simple because cannot be divided and only has a single value at a time 2- It has a direct relation to the entity

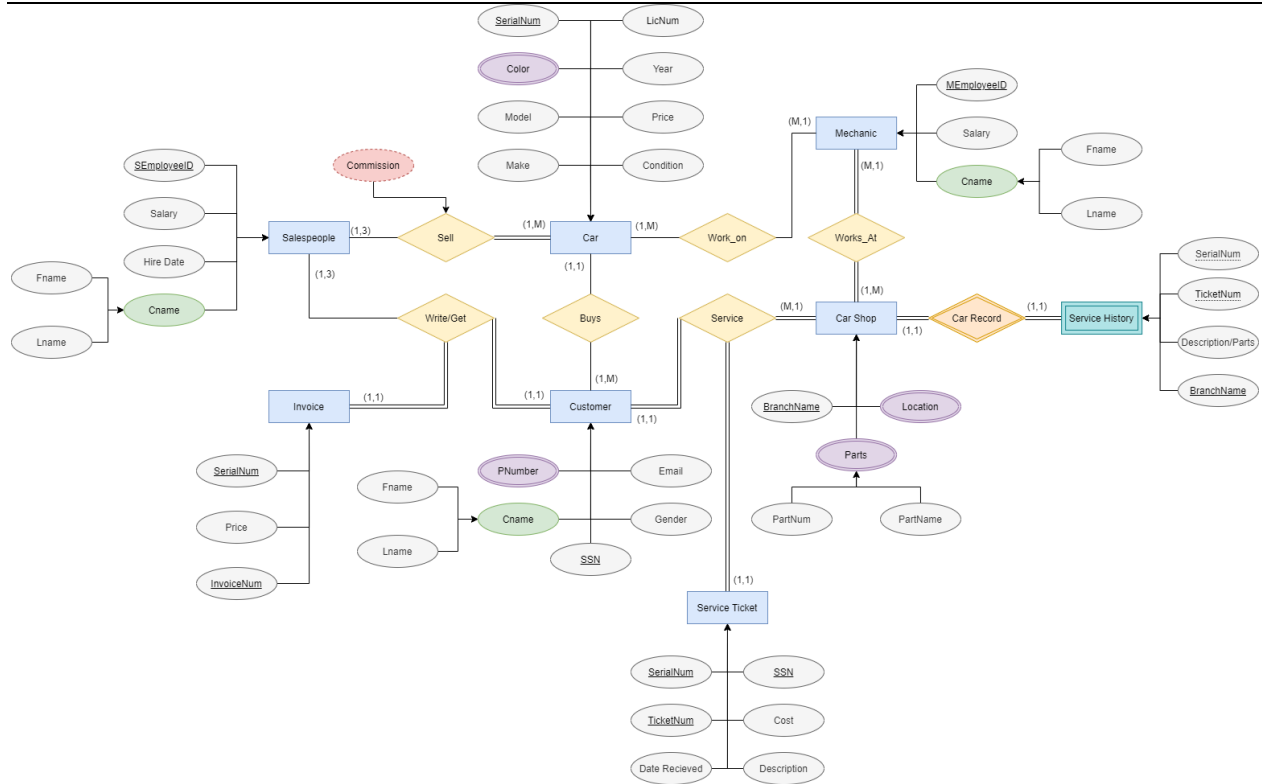|				
			3-	It is a characteristic of an entity and is dependent on it
	12	Condition	1-	Simple because cannot be divided and only has a single value at a time
			2-	It has a direct relation to the entity
			3-	It is a characteristic of an entity and is dependent on it
Sell				
	13	Commission	1-	Derived is calculated from another attribute which is 2% of an invoice price
			2-	It can only be used if the salespeople sell a car
			3-	It is a characteristic of a relationship and is dependent on it
Invoice				
	14	SerialNum	1-	Simple because cannot be divided and only has a single value at a time
			2-	It has a unique value and direct relation to the entity
			3-	It is a characteristic of an entity and is dependent on it
	15	Price	1-	Simple because cannot be divided and only has a single value at a time
			2-	It has a direct relation to the entity
			3-	It is a characteristic of an entity and is dependent on it
	16	InvoiceNum	1-	Simple because cannot be divided and only has a single value at a time
			2-	It has a unique value and direct relation to the entity
			3-	It is a characteristic of an entity and is dependent on it
Customer				
	17	PNumber	1-	Multivalued because it has many values and several attributes
			2-	It has a unique value and direct relation to the entity
			3-	It is a characteristic of an entity and is dependent on it
	18	Cname	1-	Composite because it can be subdivided to additional attributes
			2-	It has a direct relation to the entity
			3-	It is a characteristic of an entity and is dependent on it
	19	Email	1-	Simple because cannot be divided and only has a single value at a time
			2-	It has a direct relation to the entity
			3-	It is a characteristic of an entity and is dependent on it
	20	Gender	1-	Simple because cannot be divided and only has a single value at a time
			2-	It has a direct relation to the entity
			3-	It is a characteristic of an entity and is dependent on it
	21	SSN	1-	Simple because cannot be divided and only has a single value at a time
			2-	It has a unique value and direct relation to the entity
			3-	It is a characteristic of an entity and is dependent on it
Mechanic				
	22	MEmployeeID	1-	Simple because cannot be divided and only has a single value at a time

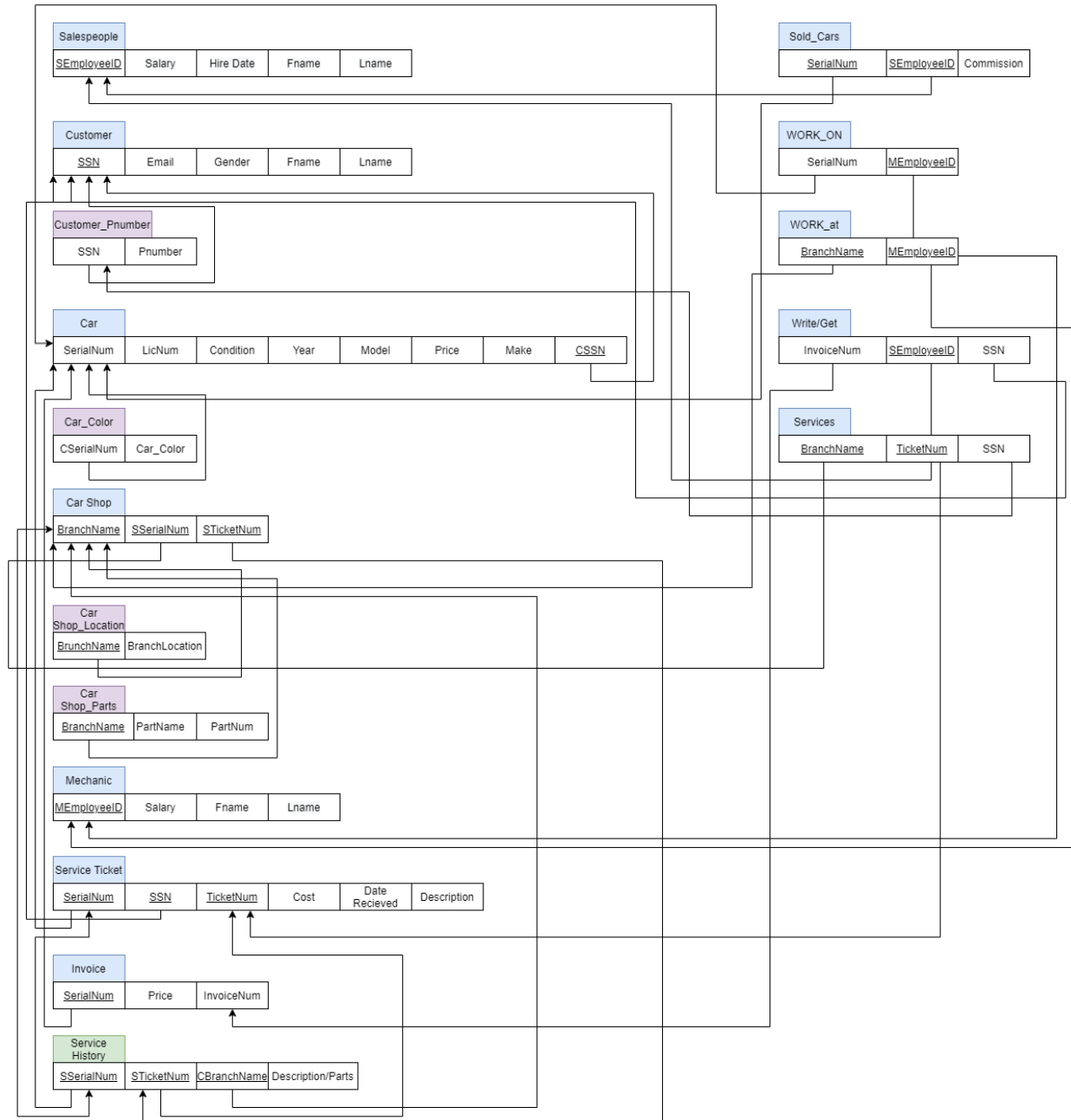|			
			2- It has a unique value and direct relation to the entity 3- It is a characteristic of an entity and is dependent on it
	23	Salary	1- Simple because cannot be divided and only has a single value at a time 2- It has a direct relation to the entity 3- It is a characteristic of an entity and is dependent on it
	24	Cname	1- Composite because it can be subdivided to additional attributes 2- It has a direct relation to the entity 3- It is a characteristic of an entity and is dependent on it
Car Shop			
	25	BranchName	1- Simple because cannot be divided and only has a single value at a time 2- It has a direct relation to the entity 3- It is a characteristic of an entity and is dependent on it
	26	Location	1- Multivalued because it has many values and several attributes 2- It has a unique value and direct relation to the entity 3- It is a characteristic of an entity and is dependent on it
	27	Parts	1- Complex because it has composite and multivalued attributes 2- It has a direct relation to the entity 3- It is a characteristic of an entity and is dependent on it
Service Ticket			
	28	SerialNum	1- Simple because cannot be divided and only has a single value at a time 2- It has a unique value and direct relation to the entity 3- It is a characteristic of an entity and is dependent on it
	29	SSN	1- Simple because cannot be divided and only has a single value at a time 2- It has a unique value and direct relation to the entity 3- It is a characteristic of an entity and is dependent on it
	30	TicketNum	1- Simple because cannot be divided and only has a single value at a time 2- It has a unique value and direct relation to the entity 3- It is a characteristic of an entity and is dependent on it
	31	Cost	1- Simple because cannot be divided and only has a single value at a time 2- It has a direct relation to the entity 3- It is a characteristic of an entity and is dependent on it
	32	Date Recieved	1- Simple because cannot be divided and only has a single value at a time 2- It has a direct relation to the entity 3- It is a characteristic of an entity and is dependent on it
	33	Description	1- Simple because cannot be divided and only has a single value at a time

			2- It has a direct relation to the entity 3- It is a characteristic of an entity and is dependent on it
Service History			
	34	SerialNum	1- Partial because cannot be divided and only has a single value at a time and is related to the strong entity which has a relation to the weak entity 2- It has a direct relation to the entity 3- It is a characteristic of an entity and is dependent on it
	35	TicketNum	1- Partial because cannot be divided and only has a single value at a time and is related to the strong entity which has a relation to the weak entity 2- It has a direct relation to the entity 3- It is a characteristic of an entity and is dependent on it
	36	Description/Parts	1- Simple because cannot be divided and only has a single value at a time 2- It has a direct relation to the entity 3- It is a characteristic of an entity and is dependent on it
	37	BranchName	1- Partial because cannot be divided and only has a single value at a time and is related to the strong entity which has a relation to the weak entity 2- It has a direct relation to the entity 3- It is a characteristic of an entity and is dependent on it

ER Diagram:

Relational model

Salespeople

SEmployeeID	Salary	Hire Date	Fname	Lname

Sold_Cars

SerialNum	SEmployeeID	Commission

Customer

SSN	Email	Gender	Fname	Lname

WORK_ON

SerialNum	MEmployeeID

Customer_Pnumber

SSN	Pnumber

WORK_at

BranchName	MEmployeeID

Car

SerialNum	LicNum	Condition	Year	Model	Price	Make	CSSN

Write/Get

InvoiceNum	SEmployeeID	SSN

Car_Color

CSerialNum	Car_Color

Services

BranchName	TicketNum	SSN

Car Shop

BranchName	SSerialNum	STicketNum

Car Shop_Location

BrunchName	BranchLocation

Car Shop_Parts

BranchName	PartName	PartNum

Mechanic

MEmployeeID	Salary	Fname	Lname

Service Ticket

SerialNum	SSN	TicketNum	Cost	Date Recieved	Description

Invoice

SerialNum	Price	InvoiceNum

Service History

SSerialNum	STicketNum	CBranchName	Description/Parts

SQL Code

```sql
CREATE TABLE salespeople
(SEmployeeID NUMBER(10) CONSTRAINT SEmployeeID primary key,
Salary NUMBER (6) CONSTRAINT Salary_Min check(salary =10000),
hiredate DATE not null,
Fname VARCHAR2(25),
Lname VARCHAR2(25));



INSERT INTO salespeople (SEmployeeID,Salary,hiredate,Fname,Lname)
VALUES (1041323267 ,10000,TO_DATE( 'JAN 8 , 1990 ' , ' MM DD , YYYY') ,'Mohammed','Fahad');

INSERT INTO salespeople (SEmployeeID,Salary,hiredate,Fname,Lname)
VALUES (1231323267 ,10000,TO_DATE( 'MAY 3 , 1997 ' , ' MM DD , YYYY') ,'Khalid','Faris');

INSERT INTO salespeople (SEmployeeID,Salary,hiredate,Fname,Lname)
VALUES (1129132327 ,10000,TO_DATE( 'OCT 24 , 2000 ' , ' MM DD , YYYY') ,'Turki','Mohammed');

INSERT INTO salespeople (SEmployeeID,Salary,hiredate,Fname,Lname)
VALUES (1976132367 ,10000,TO_DATE( 'NOV 14 , 1999 ' , ' MM DD , YYYY') ,'Yasser','Ali');


UPDATE Salepeople
SET
Salary =
salary + (salary +2000)
where hiredate=hiredate+1;
salary
;
```

```sql
CREATE TABLE Mechanic
(MEmployeeID NUMBER(10) CONSTRAINT MEmployeeID primary key,
Salary NUMBER(9,2),
Fname VARCHAR2(25),
Lname VARCHAR2(25));

INSERT INTO Mechanic (MEmployeeID, Salary, Fname, Lname)
VALUES (1853848903, 8000, 'Ahmad','Khojah');


INSERT INTO Mechanic (MEmployeeID, Salary, Fname, Lname)
VALUES (1934729433, 8500, 'Mohammed','Alzahrani');


INSERT INTO Mechanic (MEmployeeID, Salary, Fname, Lname)
VALUES (1738930949, 7000, 'Mohammed','Sabanu');


INSERT INTO Mechanic (MEmployeeID, Salary, Fname, Lname)
VALUES (2034978908, 8000, 'Ahamed','Alghamadi');
```

```sql
CREATE TABLE CarShop
(BranchName VARCHAR2(25)CONSTRAINT BranchName_pk  primary key,
Branch_Location VARCHAR2(25),
PartName VARCHAR2(25),
PartNum VARCHAR2(25));

 INSERT INTO CarShop ( BranchName,Branch_Location,PartName,PartNum)
 VALUES ('TOP GEAR1','Jeddah','Front pumper','FP2322');

INSERT INTO CarShop ( BranchName,Branch_Location,PartName,PartNum)
 VALUES ('TOP GEAR3','Makkah','Gear','G001');

INSERT INTO CarShop ( BranchName,Branch_Location,PartName,PartNum)
 VALUES ('TOP GEAR2','Jeddah','Engine','EN13476');

INSERT INTO CarShop ( BranchName,Branch_Location,PartName,PartNum)
 VALUES ('TOP GEAR9','Albahah','Engine','EN13476');

CREATE TABLE Customer
(SSN NUMBER (10)CONSTRAINT SSN primary key,
Email VARCHAR2(25),
Gender VARCHAR2(25),
PNumber INT,
Fname VARCHAR2(25),
Lname VARCHAR2(25)
);
```

```sql
CREATE TABLE Car
(SerialNum VARCHAR2(25) CONSTRAINT SerialNum primary key,
LicNum NUMBER(5),
Color VARCHAR2(25),
YearB NUMBER (5),
Price NUMBER(7),
car_Model VARCHAR2(25),
Condition VARCHAR2(25),
Make VARCHAR2(25));


INSERT INTO car (SerialNum,LicNum, Color,yearB,Price, car_Model,Condition,Make )
VALUES ('TRUSC28N341016582' ,4321,'Blue',2004,25000,'Audi TT','Used','Audi');

INSERT INTO car (SerialNum,LicNum, Color,yearB,Price,car_Model,Condition,Make )
VALUES ('1GKLVKED8AJ155580' ,9902,'White',2010,45000,'Acadia','Used','GMC');

INSERT INTO car (SerialNum,LicNum, Color,yearB,Price,car_Model,Condition,Make )
VALUES ('1C3BC55D0CG133270' ,4441,'RED',2022,130000,'Camry','New','Toyota');

INSERT INTO car (SerialNum,LicNum, Color,yearB,Price,car_Model,Condition,Make )
VALUES ('4T1BE30K12U058669' ,2222,'BLACK',2022,108000,'Sonata','New','hyundai');
```

```sql
CREATE TABLE Invoice
  (InvoiceNum NUMBER(4)CONSTRAINT InvoiceNum PRIMARY key,
  Price NUMBER(5),
  SerialNum VARCHAR2(25))
  ;


CREATE TABLE Work_on (
    MEmployeeID NUMBER(10),
    SerialNum VARCHAR(25),
    PRIMARY KEY(MEmployeeID, SerialNum),
    FOREIGN KEY(MEmployeeID) REFERENCES Mechanic,
    FOREIGN KEY(SerialNum) REFERENCES Car);


CREATE TABLE Work_at (
    MEmployeeID NUMBER(10),
    BranchName VARCHAR(25),
    PRIMARY KEY(MEmployeeID, BranchName),
    FOREIGN KEY(MEmployeeID) REFERENCES Mechanic,
    FOREIGN KEY(BranchName) REFERENCES carshop);



    CREATE TABLE Sell (
    SEmployeeID NUMBER(10),
    SerialNum VARCHAR(25),
    Commission NUMERIC,
    PRIMARY KEY(SEmployeeID, SerialNum),
    FOREIGN KEY(SEmployeeID) REFERENCES Salespeople,
    FOREIGN KEY(SerialNum) REFERENCES Car);


select
sum (if(Salary,0)+if(Commission,0.02)
```

```sql
);

INSERT INTO Customer(SSN, Email, Gender, PNumber ,Fname ,Lname )
VALUES (1234567890, 'emailyyy@GG-d.com', 'Male',987654321,'Ahmad','Alghamdi');

INSERT INTO Customer(SSN, Email, Gender, PNumber ,Fname ,Lname )
VALUES (2234567890, 'emailyxy@GG-d.com', 'female',987654322,'NOOR','Alghamdi');

INSERT INTO Customer(SSN, Email, Gender, PNumber ,Fname ,Lname )
VALUES (3234567890, 'emailxyy@GG-d.com', 'Male',987654323,'Fares','Binan');

INSERT INTO Customer(SSN, Email, Gender, PNumber ,Fname ,Lname )
VALUES (4234567890, 'emailyyx@GG-d.com', 'female',987654324,'Aisha','jameel');


CREATE TABLE ServiceHistory(
SerialNum VARCHAR2(25),
TicketNum NUMBER(4),
Description_Parts VARCHAR2(25),
Branchname VARCHAR(25),
PRIMARY KEY(TicketNum, BranchName,SerialNum),
FOREIGN KEY(SerialNum) REFERENCES Car,
    FOREIGN KEY(TicketNum) REFERENCES ServiceTicket,
    FOREIGN KEY(BranchName) REFERENCES carshop);


INSERT INTO ServiceHistory ( SerialNum,TicketNum,Description_Parts,Branchname)
 VALUES (SerialNum,TicketNum,'window',Branchname);

 INSERT INTO ServiceHistory ( SerialNum,TicketNum,Description_Parts,Branchname)
 VALUES (SerialNum,TicketNum,'bumper',Branchname);

 INSERT INTO ServiceHistory ( SerialNum,TicketNum,Description_Parts,Branchname)
 VALUES (SerialNum,TicketNum,'rearbumper',Branchname);

 INSERT INTO ServiceHistory ( SerialNum,TicketNum,Description_Parts,Branchname)
 VALUES (SerialNum,TicketNum,'wheel',Branchname);
```

```sql
CREATE TABLE ServiceTicket
( TicketNum NUMBER(4)CONSTRAINT TicketNum primary key,
T_Cost NUMBER (4),
DateRecieved DATE not null,
Description VARCHAR2(100),
SerialNum VARCHAR2(25),
SSN NUMBER (10)
);


INSERT INTO ServiceTicket(TicketNum,cost,DateRecieved,Description,SerialNum,SSN)
VALUES(TicketNum,1111,TO_DATE( 'JAN 8 , 1990 ' , ' MM DD , YYYY'),'head light 1',SerialNum,SSN);


INSERT INTO ServiceTicket(TicketNum,cost,DateRecieved,Description,SerialNum,SSN)
VALUES(TicketNum,2222,TO_DATE( 'JAN 6 , 1990 ' , ' MM DD , YYYY'),'head light 2',SerialNum,SSN);


INSERT INTO ServiceTicket(TicketNum,cost,DateRecieved,Description,SerialNum,SSN)
VALUES(TicketNum,3333,TO_DATE( 'JAN 15 , 1990 ' , ' MM DD , YYYY'),'head light 3',SerialNum,SSN);


INSERT INTO ServiceTicket(TicketNum,cost,DateRecieved,Description,SerialNum,SSN)
VALUES(TicketNum,4444,TO_DATE( 'JAN 3 , 1990 ' , ' MM DD , YYYY'),'head light 4',SerialNum,SSN);
```