Homework 1

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Q1

1. Integrity constraints violations

a. `Sex` must have type *CHAR*

b. There were no tuple with `Dnumber = 2` in **DEPARTMENT** yet so `Dnum` can't reference it

c. There is already a department with `Dnumber = 4` and since `Dnumber` is the only attribute of the primary key, it must be unique

d.

   i. There were no tuple with `Ssn = 6776789899` in **EMPLOYEE** yet so `Essn` can't reference it

   ii. `Pno` must not be *NULL* since it's a part of the primary key

   iii. `Hours` should have type *FLOAT*

e. `Relationship = 'spouse'` doesn't respect the format of other existing tuples' `Relationship`

f. None

g. Can't delete the **EMPLOYEE** tuple with `Ssn = '987654321'` since it's referenced by:

   i. `Mgr_ssn` in **DEPARTMENT**

   ii. `Essn` in **WORKS_ON**

   iii. `Essn` in **DEPENDENT**

h. Can't delete the **PROJECT** tuple with `Pname = 'ProductX'` since it's referenced by `Pno = 1` in **WORKS_ON**

i. None

j. There were no tuple with `Ssn = '943775543'` in **EMPLOYEE** yet so `Super_ssn` can't reference it

k. `Hours` should have type *FLOAT*

2. Ways of enforcing

a. Change `M` to `'M'`

b. Insert a tuple with `Dnumber = 2` to **DEPARTMENT**

c. Use a number that's not already used by other tuples in **DEPARTMENT**

d.

   i. Add a tuple with `Ssn = 6776789899` to **EMPLOYEE**

   ii. Use an existing `Pnumber` in **PROJECT** for `Pno`

   iii. Change `'40.0'` to `40.0`

e. `<'453453453', 'John', 'M', '1990-12-12', 'Spouse'>`

f. None

g. Delete these tuples first:

   i. `Mgr_ssn = '987654321'` in **DEPENDENT**

   ii. `Essn = '987654321'` in **WORKS_ON** and **DEPENDENT**

h. Delete all tuples with `Pno = 1` in **WORKS_ON** first

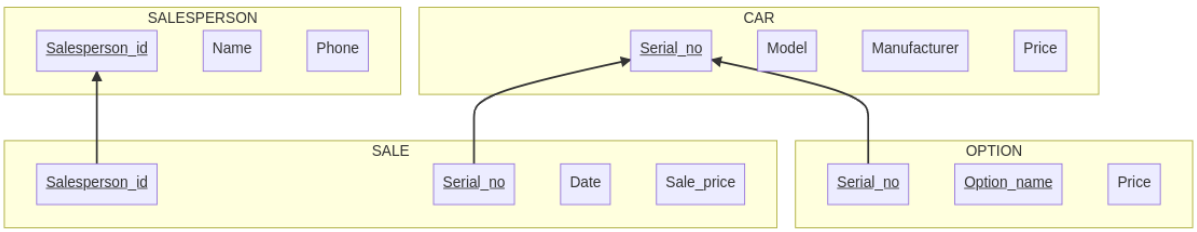
i. None

j. Insert a tuple with `Ssn = '943775543'` to **EMPLOYEE**

k. Change `'5.0'` to `5.0`

Q2

1. Foreign keys



2. Assumptions

1. All `Serial_no` is the serial number of a car
2. `Price` in **CAR** is independent from `Price` in **OPTION**
3. `Sale_price` in **SALE** is the sum of the car's price and all optional equipment installed on it

3. Populate

CAR

Serial_no	Model	Manufacture	Price
AUDI_080	A8 V12 2.6L Quattro	Audi	120000
MERC_005	S500 2.8L Turbo	Mercedes	210000
NISS_012	GT-R Nissmo 3.2L	Nissan	70000

OPTION

Serial_no	Option_name	Price
AUDI_080	Sport rim	500
AUDI_080	Spoiler	4000
MERC_005	Heated seat	2000
NISS_012	Track tires	1000
NISS_012	Advanced aero package	10000

SALE

Salesperson_id	Serial_no	Date	Sale_price
EMP_001	NISS_012	2022-01-12	81000
EMP_001	MERC_005	2022-02-15	216000
EMP_003	AUDI_080	2022-05-20	120500
EMP_002	NISS_012	2022-06-12	71000

SALESPERSON

Salesperson_id	Name	Phone
EMP_001	Jack	012034056
EMP_002	John	098076054
EMP_003	Joe	132457680

4. Insertion example

- **Violates:**
  - **SALE:** <’EMP_005’, ‘NISS_022’, ‘2022-07-30’, 70000>
  - **SALESPERSON:** <’EMP_001’, ‘Jule’, ‘112233445’>
- **Not violates:**
  - **SALE:** <’EMP_001’, ‘MERC_005’, ‘2022-08-20’, 21000>
  - **SALESPERSON:** <’EMP_005’, ‘Jess’, ‘142536470’>