Česká zemědělská univerzita v Praze

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Provozně ekonomická fakulta

Semestral project (house complex parking system)

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Outline

1. Introduction

This database can be useful for any housing complex which has parking lots that are used only by the people who live there. For example, if the housing complex will have cameras which recognize car plates – residents can spend less money on the house maintenance, as there is no need to hire person who will check every plate manually, or even if they will have such person, he/she can easily find if the car is permitted by looking at this database. Also, people who are in charge of housing complex can find owner of the car just by its plate, if f.e. this person has violated rules and parked his car on the lot that wasn't supposed for him/her.

Some definitions and assumptions according to my project:

- It's okay, if f.e. Parking lot will have several plates for one number, I assume that family can own parking space/s and park whichever car they want, the main goal is to check if car with that number plate is allowed.

- I assume that family can own 2 cars, but only 1 parking space, as It was written above, no matter how many 'plates' are allowed to 'park' on specific parking lot, because in real life, person can park one car outside the parking lot, and one inside of it

- I assume that every person will definitely belong to some family ID, even if this 'family' is described by only one person

- I inserted into every 'ownership' attribute a foreign key which is related to family ID, to simplify queries and to avoid many-to-many relationship in some cases

Please note!: This project can be implemented in real life systems, but it has very simple view on the problem, as its goal is to show how such system can be potentially implemented in real world.

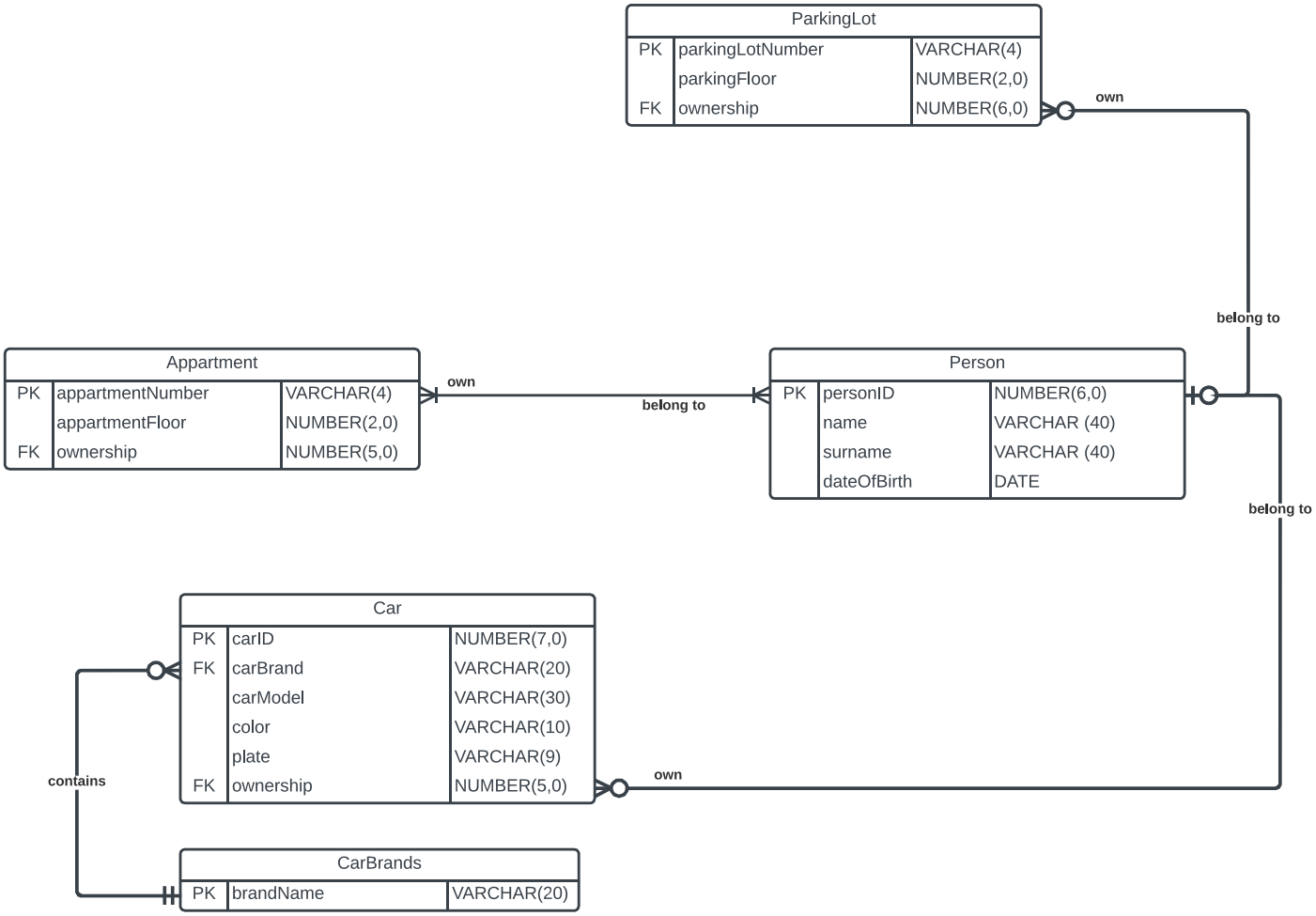
2. Possible use cases

- Find specific car and its parking lot number
- Find owner of the car by its plate (if this owner is registered in the housing complex)
- Count how many parking spaces are occupied
- Find number of the appartment of the owner of the car (if f.e. it was parked in wrong spot)
- Find which cars are allowed to park on specific parking space
- Count on how many parking spaces a specific car is allowed to park

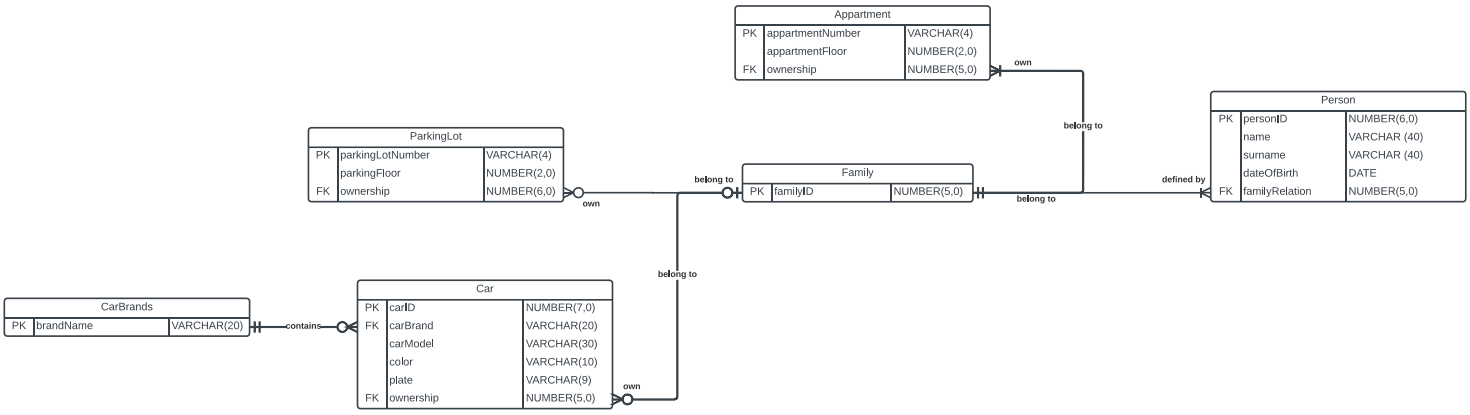
3. Entity relationship diagrams

Those diagrams were created in Lucidchart Web App

3.1 Conceptual ERD



3.2 Physical ERD



4. SQL Implementation

Database was implemented in Oracle Apex 22.2.00 Web App

4.1 DDL: Defining the database objects

CREATE TABLE CarBrands (brandName VARCHAR(20) PRIMARY KEY);

CREATE TABLE Family (familyID NUMBER(5,0) PRIMARY KEY);

CREATE TABLE Person (personID NUMBER(6,0) PRIMARY KEY, name VARCHAR (40), surname VARCHAR (40), dateOfBirth DATE, familyRelation NUMBER(5,0), FOREIGN KEY (familyRelation) REFERENCES Family(familyID));

```
CREATE TABLE ParkingLot (parkingLotNumber VARCHAR(4) PRIMARY KEY,
parkingFloor NUMBER(2,0), ownership NUMBER(6,0), FOREIGN KEY
(ownership) REFERENCES Family(familyID));


CREATE TABLE Car (carID NUMBER(7,0) PRIMARY KEY,
   carBrand VARCHAR(20),
   carModel VARCHAR(30),
   color VARCHAR(10),
   plate VARCHAR(9),
   ownership NUMBER(5,0),
   FOREIGN KEY (ownership) REFERENCES Family(familyID),
   FOREIGN KEY (carBrand) REFERENCES CarBrands(brandName)
);


CREATE TABLE Appartment (
  appartmentNumber VARCHAR(4) PRIMARY KEY,
  appartmentFloor NUMBER(2,0),
  ownership NUMBER(5,0),
  FOREIGN KEY (ownership) REFERENCES Family(familyID)
);
```

4.2 DML: Inserting the examples of data

```
INSERT INTO CarBrands VALUES ('BMW')
INSERT INTO CarBrands VALUES ('Mercedes-Benz')
INSERT INTO CarBrands VALUES ('Audi')
INSERT INTO CarBrands VALUES ('Skoda')
```

```
INSERT INTO Family VALUES (998)
INSERT INTO Family VALUES (777)
INSERT INTO Family VALUES (533)

INSERT INTO Person VALUES (332, 'Anton', 'Voronov', '12.30.1995', 998)
INSERT INTO Person VALUES (36677, 'Oleksii', 'Tkachenko', '10.23.1989', 777)
INSERT INTO Person VALUES (2931, 'Samantha', 'Cruze', '03.12.2002', 533)
INSERT INTO Person VALUES (4522, 'Cartman', 'Cruze', '12.30.2000', 533)
INSERT INTO Person VALUES (7342, 'Mariia', 'Voronova', '06.04.1998', 998)

INSERT INTO ParkingLot VALUES ('334B', 4, 777)
INSERT INTO ParkingLot VALUES ('18A', 2, 998)
INSERT INTO ParkingLot VALUES ('18O', 2, 998)
INSERT INTO ParkingLot VALUES ('88C', 3, 533)
INSERT INTO ParkingLot VALUES ('89C', 3, 533)

INSERT INTO Car VALUES(33444, 'BMW', 'M5', 'Black', '5SD7044', 533);
INSERT INTO Car VALUES(4454, 'BMW', 'X5M', 'White', '8AA7733', 533);
INSERT INTO Car VALUES(28, 'Mercedes-Benz', 'S350 W221', 'Red', 'BT8888AT',
777);
INSERT INTO Car VALUES(223, 'Audi', 'Q7', 'Silver', 'MHEBE3ET', 998);
INSERT INTO Car VALUES(2999, 'Skoda', 'Octavia', 'Blue', 'BH5432KA', 998);

INSERT INTO Appartment VALUES('77BA', 8, 998)
INSERT INTO Appartment VALUES('7A', 1, 777)
```

INSERT INTO Appartment VALUES('32K', 4, 533)

4.3 SQL Queries

- **Select every parking space to see all allowed plates on every specific parking space**

SELECT p.parkingLotNumber, c.plate FROM Car c, ParkingLot p WHERE c.ownership = p.ownership ORDER BY p.parkingLotNumber ASC

- **Count how many parking spaces are allowed for specific plate number**

SELECT COUNT(park.ParkingLotNumber) FROM ParkingLot park, Car c WHERE park.ownership = c.ownership AND c.plate = 'BT8888AT'

- **Find which spaces exact person owns**

SELECT DISTINCT park.ParkingLotNumber FROM ParkingLot park, Person p WHERE park.ownership = p.familyRelation AND p.personID = 332

- **Display information about car which are allowed to park on specific parking space**

SELECT * FROM Car c LEFT JOIN ParkingLot p ON c.ownership = p.ownership WHERE p.parkingLotNumber = '89C'

- **Find number of apartment where owner of the specific car with specific number plate is living**

```
SELECT a.appartmentNumber FROM ((Appartment a INNER JOIN Family f ON
f.familyID = a.ownership) INNER JOIN Car c ON c.ownership = a.ownership) WHERE
c.plate = '5SD7044'
```

5. Conclusion

This project contains basic implementation of the car parking lot system for any housing complex which has its own parking lot. It contains basic elements of database and also, it shows interaction with such database using SQL language and SQL Queries. It can be potentially used in a real life systems.