Assignment 2

Chalkiopoulos Georgios | $p3352124$

December 19, 2021

Business Case

Design a database for an automobile company to provide to its dealers to assist them in maintaining customer records and dealer inventory and to assist sales staff in ordering cars.
Each vehicle is identified by a vehicle identification number (VIN). Each individual vehicle is a particular model of a particular brand offered by the company (e.g., the XF is a model of the car brand Jaguar of Tata Motors). Each model can be offered with a variety of options, but an individual car may have only some (or none) of the available options. The database needs to store information about models, brands, and options, as well as information about individual dealers, customers, and cars.

Question 1 *Design the respective simple E-R diagram. Provide the schema diagram that you have created.*

The corresponding E-R diagram may be found in Table 1.

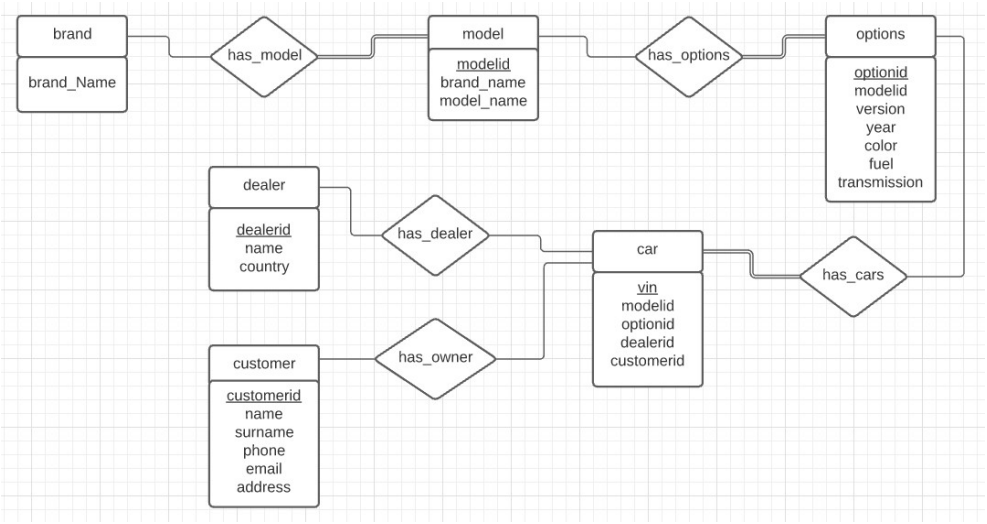


Figure 1: E-R Diagram for the "Company" database

The company (which will be the name of the database) has specific brands (ex. WV, Audi) and each of these brands have specific models. This is demonstrated with the first relation (starting from top-left) in which each model must have a brand. It is not possible to have a model without a brand. The same logic applies to the options and car relations. The options are referencing a specific model (not possible to have an option without specifying the model) and each car should include the available options. Regarding the Dealers and Customers it is possible to have a car that has not been assigned (yet) to a dealer or customer. That being said, each car will only have one dealer/customer.

Question 2 *Implement the database in the database system of your choice and fill it with sample data.*
a) Provide the .SQL file with the DDL statements (create table, indices, etc.) and
b) the SQL file that fills the table with sample data.

Both files are provided in the submitted zip file. Specifically:
a) The DDL file is the `Company_postgres_create.sql`
b) The file that is used to fill the tables is `Company_postgres_drop.sql`

Question 3 *Identify queries that you expect to be asked more often and implement any indexes that can optimize their execution*
Provide the .SQL file that creates the indices and contains the required SELECT statements/views, etc.

We will index all tables based on the search term that will be used most often. The indexes created may be found below:

```
CREATE INDEX Brand_name_index ON Brand(Brand_name);
CREATE INDEX Modelid_index ON model(Modelid);
CREATE INDEX Model_Name_index ON model(Model_Name);
CREATE INDEX Optionid_index ON Options(Optionid);
CREATE INDEX VIN_index ON Car(VIN);
CREATE INDEX Dealerod_index ON Dealer(Dealerid);
CREATE INDEX Customerid_index ON Car(Customerid);
```

The queries we expect to be used more often are:

```
SELECT m.* FROM model m, brand b
WHERE m.Brand_name = b.Brand_name AND b.Brand_name = [*value*]
```

```
SELECT * FROM model m, Options o
WHERE m.Modelid = o.Modelid AND m.Model_Name = [*value*]
```

```
SELECT * FROM Car c, model m
WHERE c.Modelid = m.Modelid AND m.Model_Name = [*value*]
```

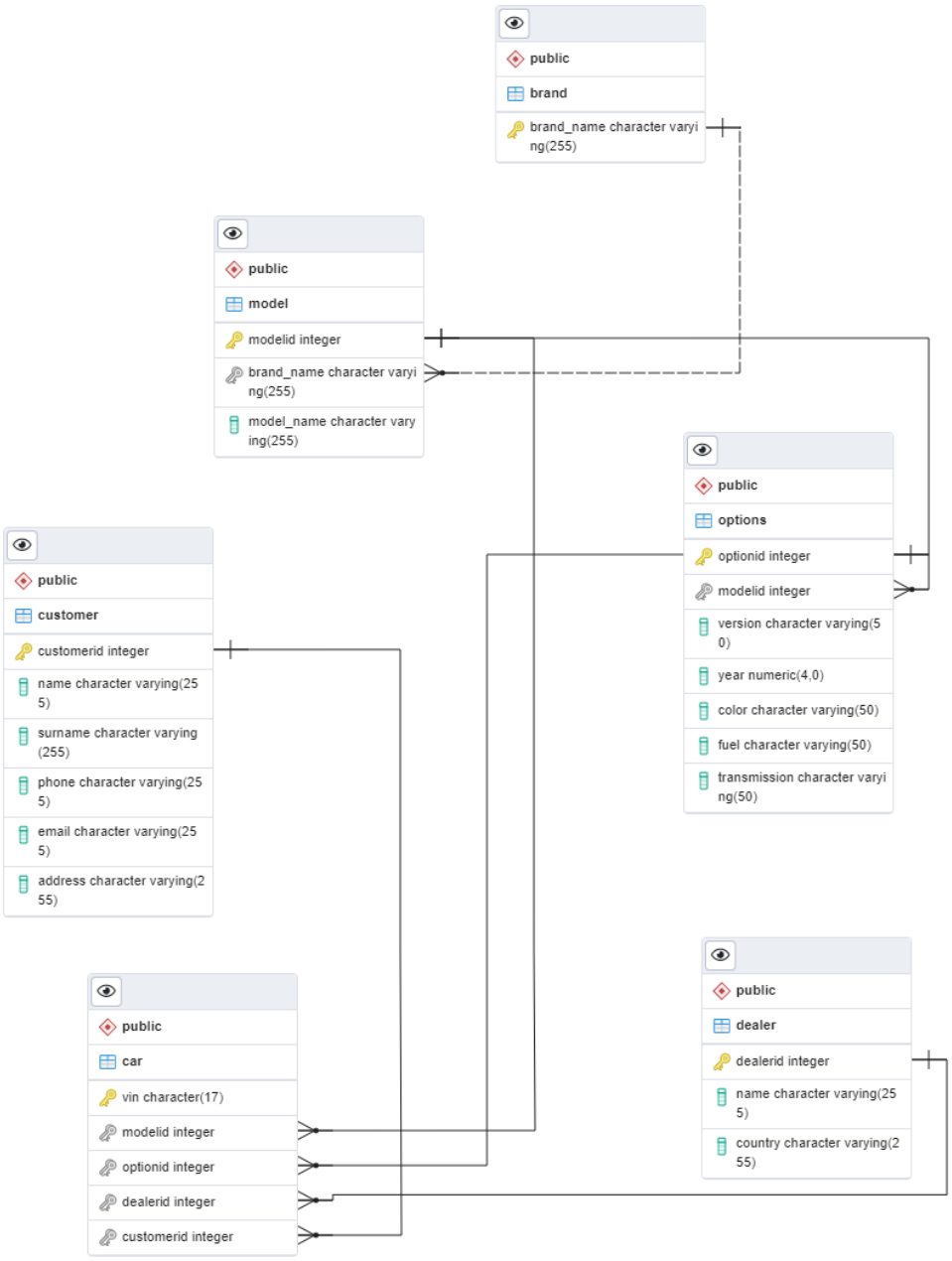
```
SELECT * FROM Car c, Customer cu, model m
WHERE c.Customerid = cu.Customerid AND c.Modelid = m.Modelid
AND m.Model_Name = [*value*]
```

```
SELECT * FROM Dealer d, Car c, model m
WHERE d.dealerid = c.dealerid AND c.Modelid = m.Modelid
AND m.Brand_name = 'Posche'
```

Other Queries like searching an ID in each table has been indexed and, but nor presented for the sake of simplicity.

Question 4 *The python program is provided in the submitted folder.*

To operate the python file, the database needs to be created along with the insert statements. Then in the line 78 of the script the username, pass and db name need to be specified.


public
brand
brand_name character varying(255)
public
model
modelid integer
brand_name character varying(255)
model_name character varying(255)
public
options
optionid integer
modelid integer
version character varying(50)
year numeric(4,0)
color character varying(50)
fuel character varying(50)
transmission character varying(50)
public
customer
customerid integer
name character varying(255)
surname character varying(255)
phone character varying(255)
email character varying(255)
address character varying(255)
public
car
vin character(17)
modelid integer
optionid integer
dealerid integer
customerid integer
public
dealer
dealerid integer
name character varying(255)
country character varying(255)