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| МИНОБРНАУКИ РОССИИ |
| Федеральное государственное бюджетное образовательное учреждение высшего образования **«МИРЭА − Российский технологический университет»**  **РТУ МИРЭА** |

**Институт информационных технологий (ИИТ)**

**Кафедра практической и прикладной информатики (ППИ)**

**ОТЧЕТ ПО ПРАКТИЧЕСКОЙ РАБОТЕ**

по дисциплине «Разработка баз данных»

**Практическое задание № 1**

|  |  |  |  |
| --- | --- | --- | --- |
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| Отчет представлен | «23» сентября 2023 г. | |  | |

Москва 2023 г.

**Отчёт**

**Цель**: создание базы данных и таблицы в ней по теме «Каршеринг», на основе разработанных моделей.

**Результат работы:**

Разработанная модель в нотации IDEF1X представлена на рисунке 1.

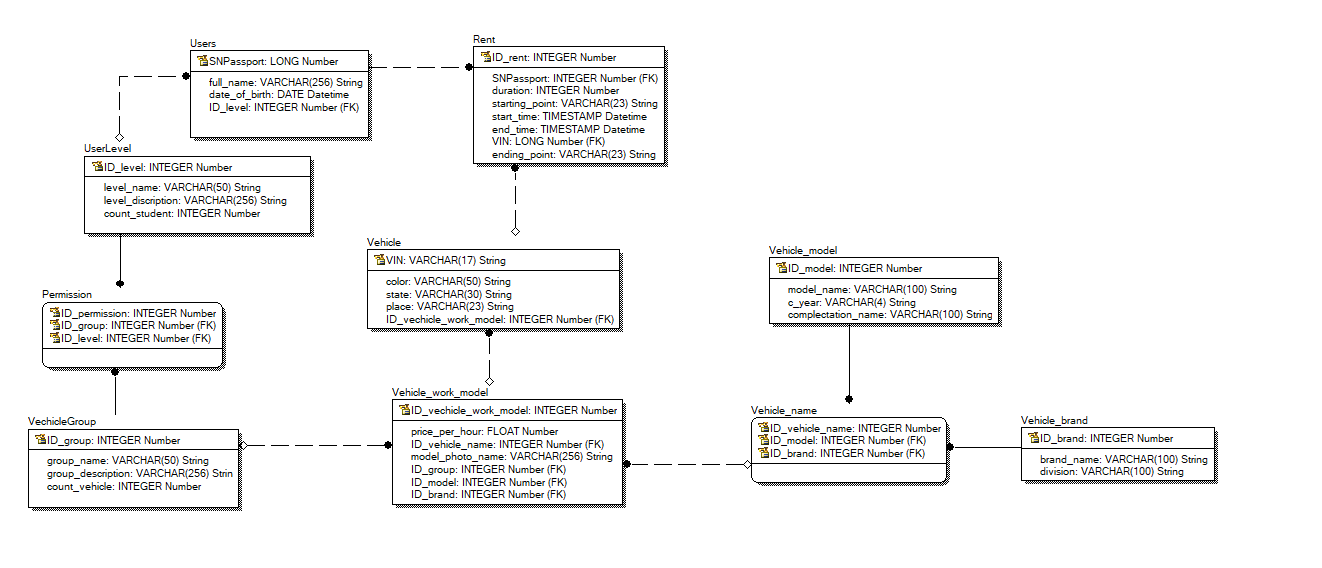


Рисунок 1 – Разработанная модель в нотации IDEF1X

Для реализации базы данных использовалась СУБД MySQL. Все последующие команды были выполнены в MySQL command line. С помощью команд была создана база данных “carsharing” и таблицы в ней, процесс создания представлен на рисунках 2-6.



Рисунок 2 – Создание базы данных и создание части таблиц



Рисунок 3 – Создание таблиц в базе данных “carsharing”

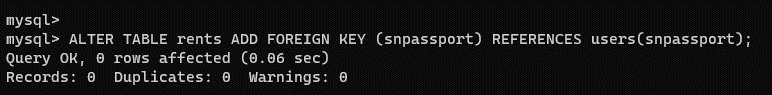


Рисунок 4 – Добавление внешнего ключа к таблицам базы данных “carsharing”

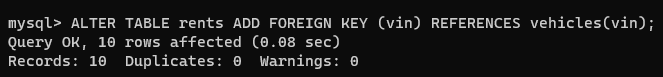


Рисунок 5 – Добавление внешнего ключа к таблицам базы данных “carsharing”

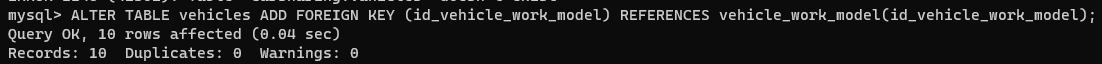


Рисунок 6 – Добавление внешнего ключа к таблицам базы данных “carsharing”

Результаты создания таблиц представлены на рисунках 7 – 9.

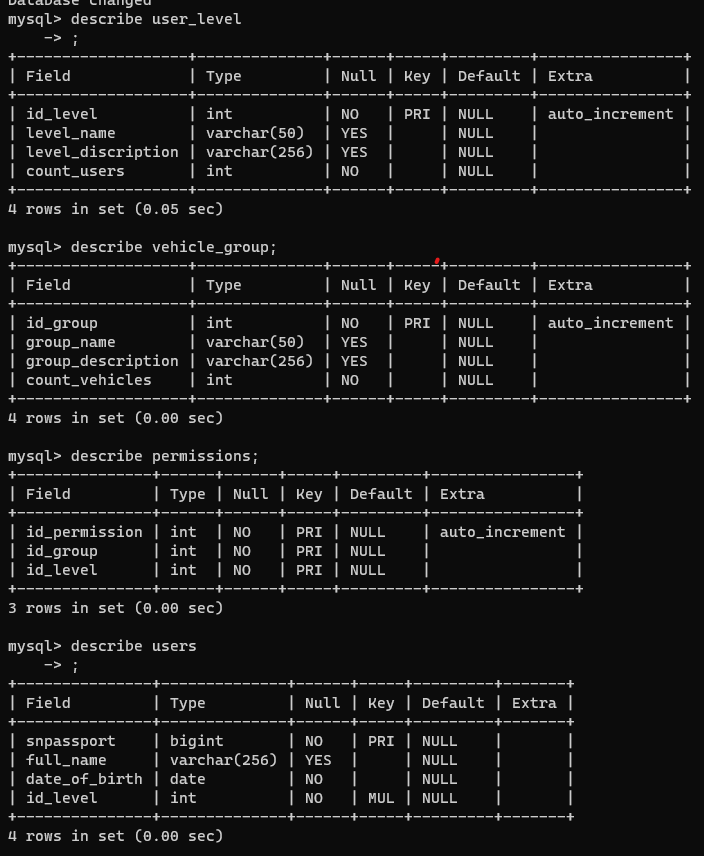


Рисунок 6 – Структура некоторых таблиц базы данных “carsharing”

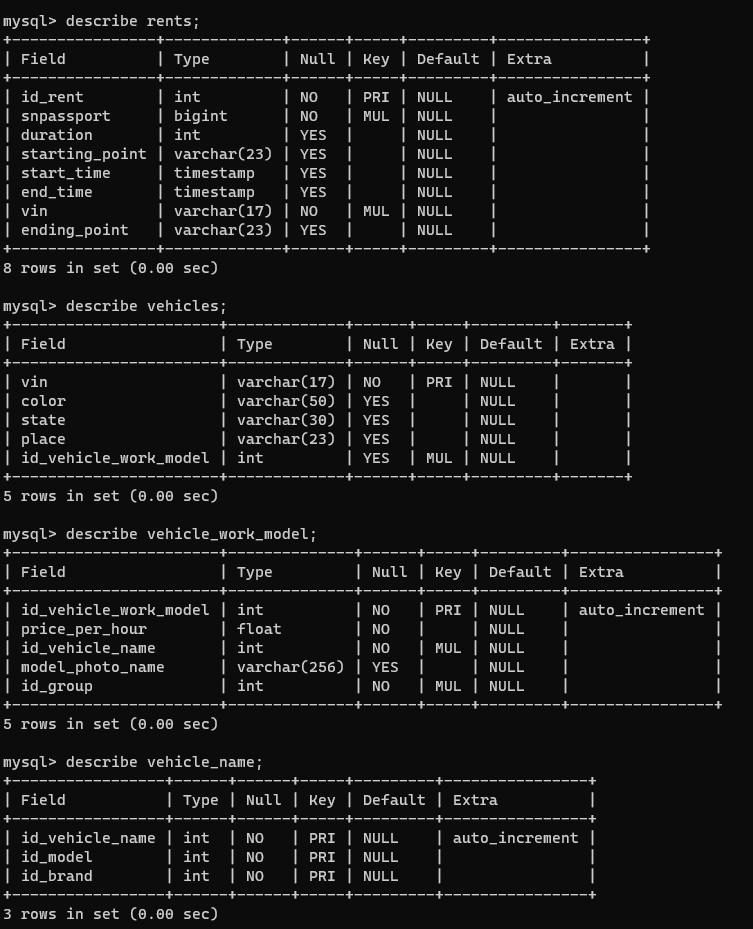


Рисунок 7 - Структура некоторых таблиц базы данных “carsharing”

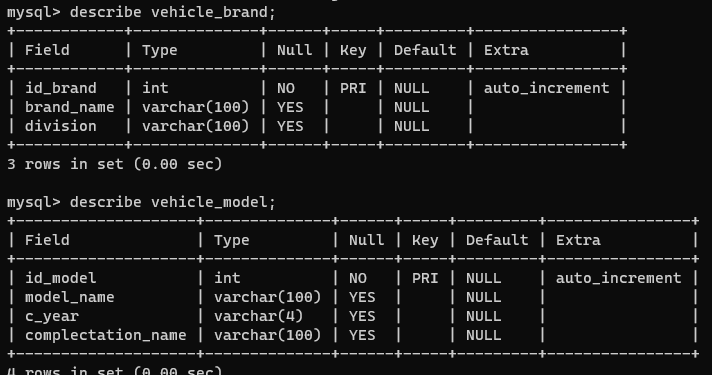


Рисунок 8 - Структура некоторых таблиц базы данных “carsharing”

Также с помощью MySQL Workbench была сгенерирована диаграмма по уже созданной базе данных (рис.10).

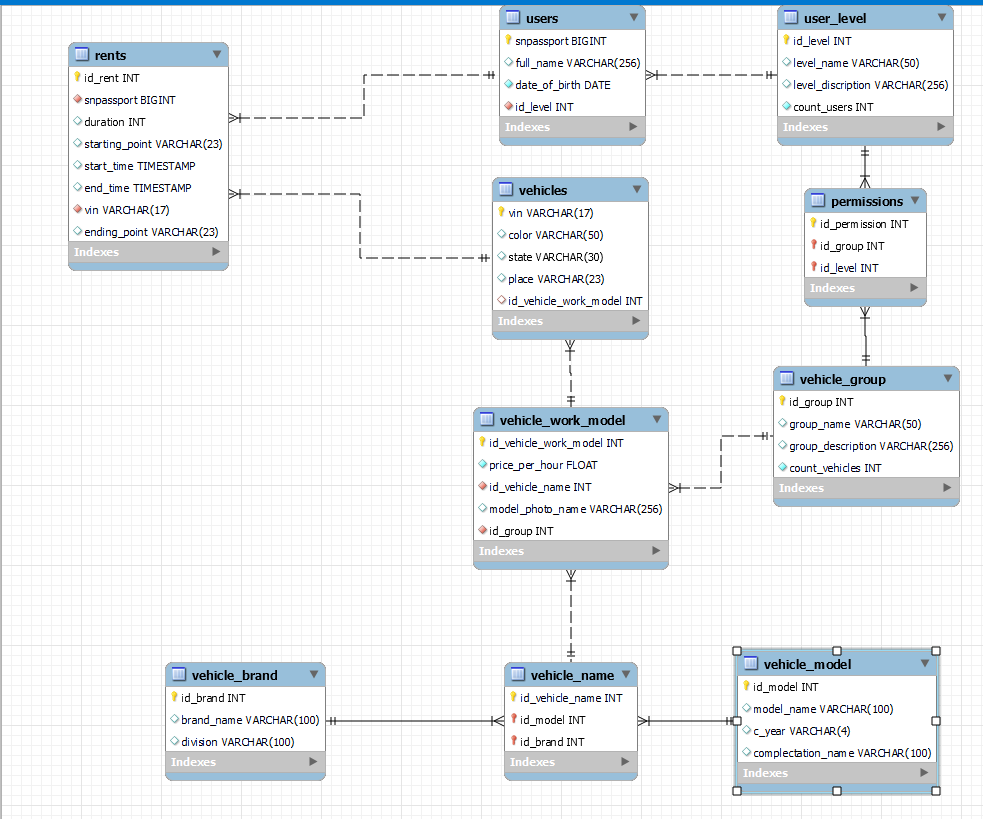


Рисунок 10 – Сгенерированная модель базы данных

Для создания базы данных использовался код представленный в листинге 1.

Листинг 1 – Создание базы данных.

 CREATE DATABASE IF NOT EXISTS carsharing;

 USE carsharing;

 CREATE TABLE IF NOT EXISTS users(

    snpassport BIGINT PRIMARY KEY,

    full\_name VARCHAR(256),

    date\_of\_birth DATE NOT NULL,

    id\_level INT NOT NULL

);

CREATE TABLE IF NOT EXISTS user\_level(

    id\_level INT AUTO\_INCREMENT PRIMARY KEY,

    level\_name VARCHAR(50),

    level\_discription VARCHAR(256),

    count\_users INTEGER NOT NULL

);

ALTER TABLE users ADD FOREIGN KEY (id\_level) REFERENCES user\_level(id\_level);

Продолжение листинга 1

CREATE TABLE IF NOT EXISTS vehicle\_group(

    id\_group INT AUTO\_INCREMENT PRIMARY KEY,

    group\_name VARCHAR(50),

    group\_description VARCHAR(256),

    count\_vehicles INT NOT NULL

);

CREATE TABLE IF NOT EXISTS permissions(

    id\_permission INT AUTO\_INCREMENT,

    id\_group INT,

    id\_level INT,

    primary key(id\_permission, id\_group, id\_level)

);

ALTER TABLE permissions ADD FOREIGN KEY (id\_group) REFERENCES user\_level(id\_level);

ALTER TABLE permissions ADD FOREIGN KEY (id\_level) REFERENCES vehicle\_group(id\_group);

CREATE TABLE IF NOT EXISTS vehicle\_model(

    id\_model INTEGER AUTO\_INCREMENT PRIMARY KEY,

    model\_name VARCHAR(100),

    c\_year VARCHAR(4),

    complectation\_name VARCHAR(100)

);

CREATE TABLE IF NOT EXISTS vehicle\_brand(

    id\_brand INTEGER AUTO\_INCREMENT PRIMARY KEY,

    brand\_name VARCHAR(100),

    division VARCHAR(100)

);

CREATE TABLE IF NOT EXISTS vehicle\_name(

    id\_vehicle\_name INTEGER AUTO\_INCREMENT,

    id\_model INT,

    id\_brand INT,

    PRIMARY KEY (id\_vehicle\_name, id\_model, id\_brand)

);

ALTER TABLE vehicle\_name ADD FOREIGN KEY (id\_model) REFERENCES vehicle\_model(id\_model);

ALTER TABLE vehicle\_name ADD FOREIGN KEY (id\_brand) REFERENCES vehicle\_brand(id\_brand);

CREATE TABLE IF NOT EXISTS vehicle\_work\_model(

    id\_vehicle\_work\_model INTEGER AUTO\_INCREMENT PRIMARY KEY,

    price\_per\_hour FLOAT NOT NULL,

    id\_vehicle\_name INT NOT NULL,

    model\_photo\_name VARCHAR(256),

Продолжение листинга 1

id\_group INT NOT NULL

);

ALTER TABLE vehicle\_work\_model ADD FOREIGN KEY (id\_vehicle\_name) REFERENCES vehicle\_name(id\_vehicle\_name);

ALTER TABLE vehicle\_work\_model ADD FOREIGN KEY (id\_group) REFERENCES vehicle\_group(id\_group);

CREATE TABLE IF NOT EXISTS vehicles(

    vin VARCHAR(17) NOT NULL PRIMARY KEY,

    color VARCHAR(50),

    state VARCHAR(30),

    place VARCHAR(23),

    id\_vehicle\_work\_model INT

);

CREATE TABLE IF NOT EXISTS rents(

    id\_rent INT AUTO\_INCREMENT PRIMARY KEY,

    snpassport BIGINT NOT NULL,

    duration INT,

    starting\_point VARCHAR(23),

    start\_time TIMESTAMP,

    end\_time TIMESTAMP,

    vin VARCHAR(17) NOT NULL,

    ending\_point VARCHAR(23)

);

ALTER TABLE rents ADD FOREIGN KEY (snpassport) REFERENCES users(snpassport);

ALTER TABLE rents ADD FOREIGN KEY (vin) REFERENCES vehicles(vin);

ALTER TABLE vahicles ADD FOREIGN KEY (id\_vehicle\_work\_model) REFERENCES vehicle\_work\_model(id\_vehicle\_work\_model);

После создания базы данных было произведено заполнение полей базы с помощью команды INSERT, процесс представлен на рисунках 11 – 20.

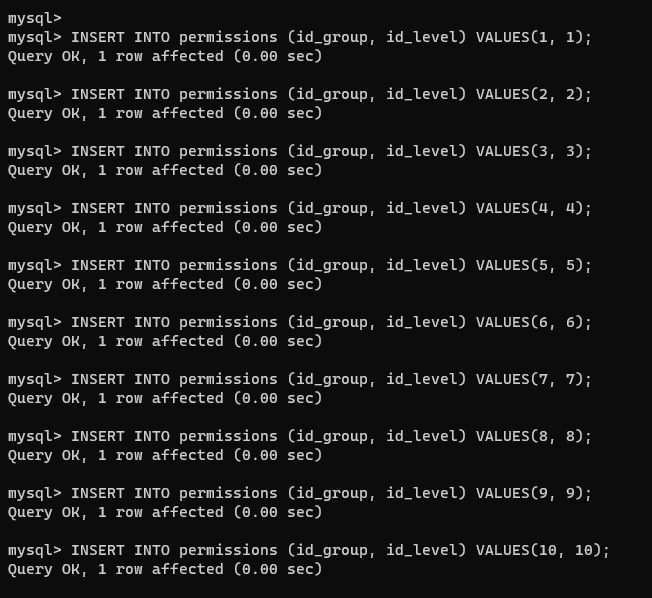


Рисунок 11 – Заполнение таблицы “permissions”

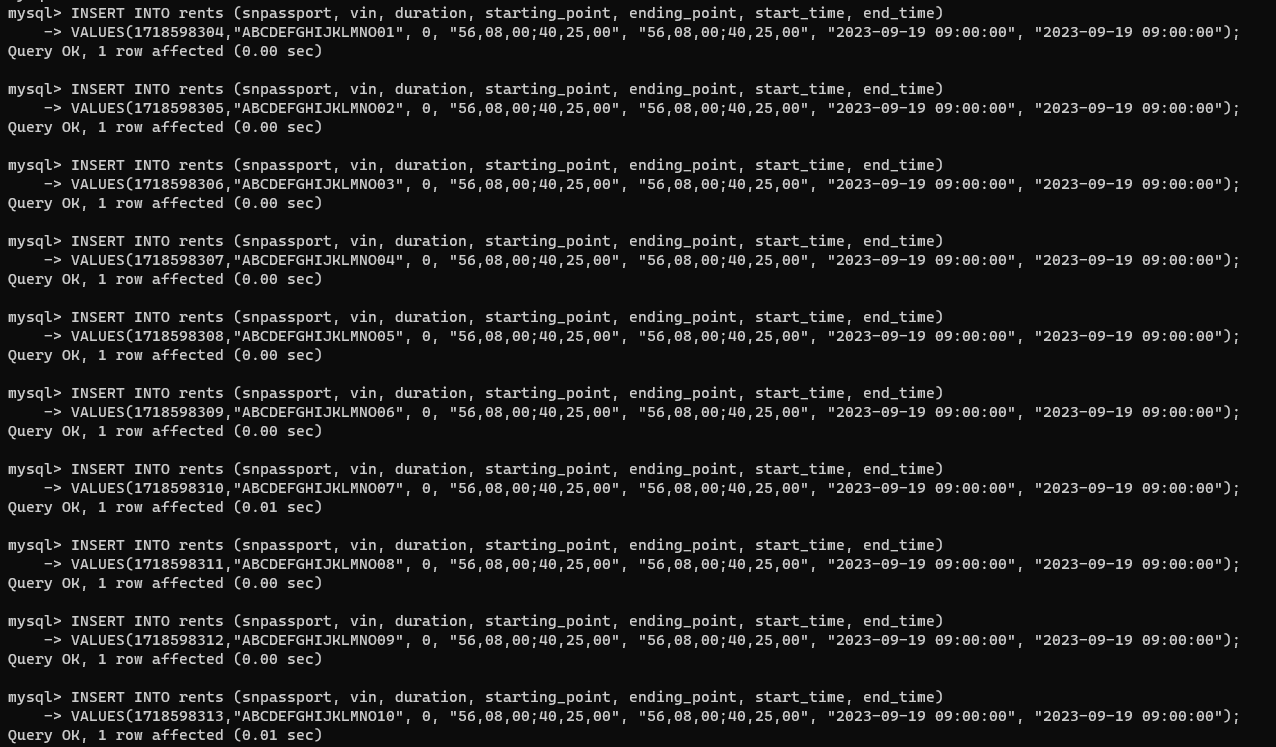


Рисунок 12 – Заполнение таблицы “rents”

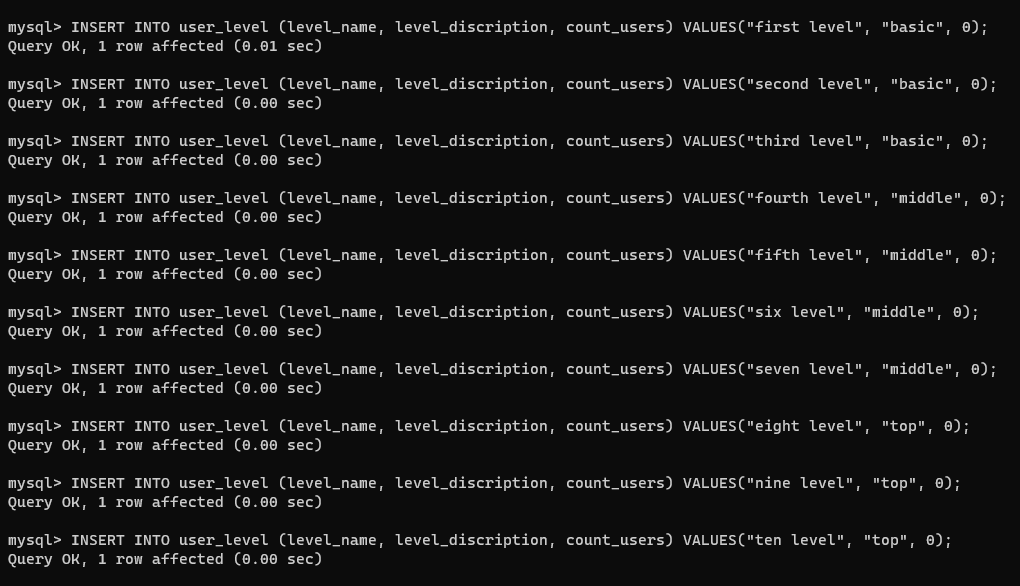


Рисунок 13 – Заполнение таблицы “user\_level”

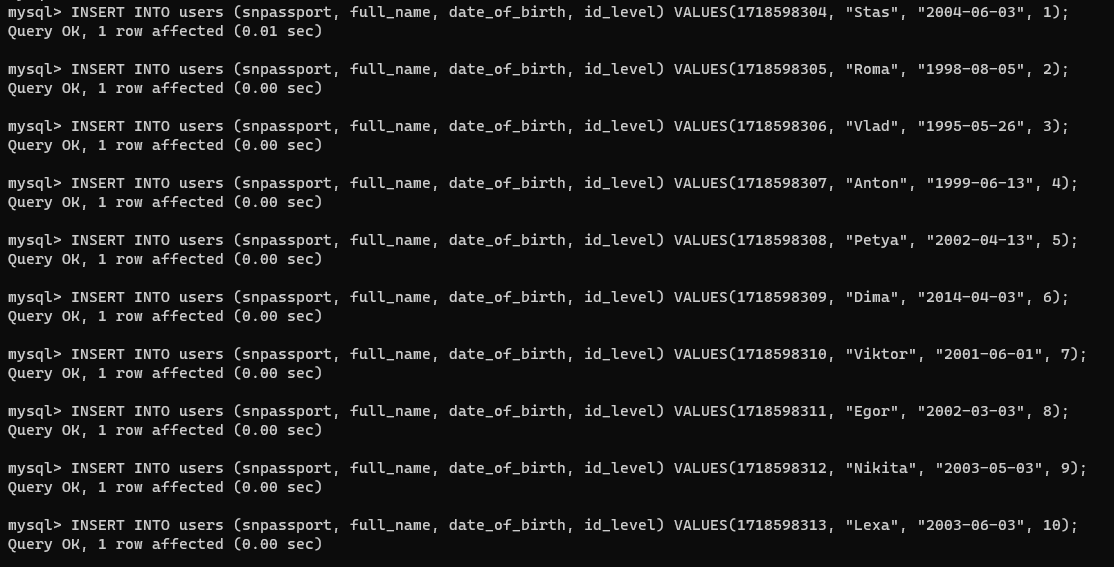


Рисунок 14 – Заполнение таблицы “users”



Рисунок 15 – Заполнение таблицы “vehicles”

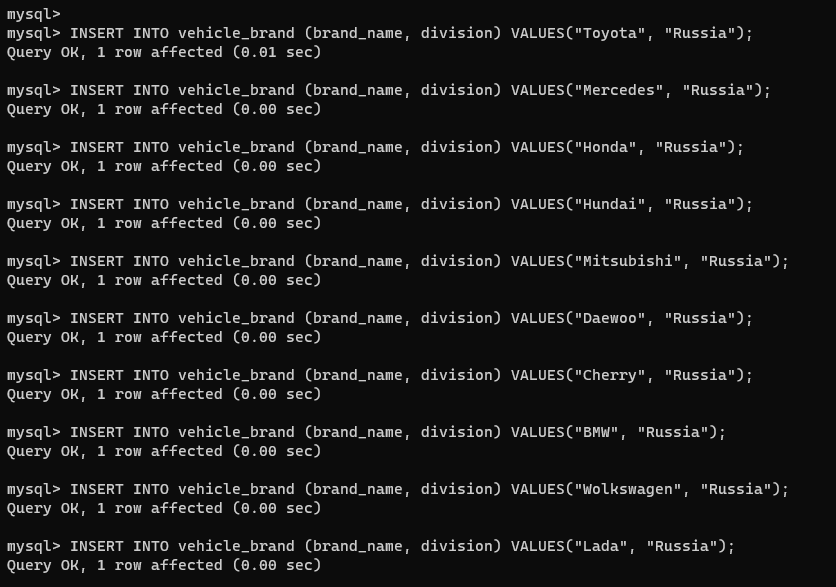


Рисунок 16 – Заполнение таблицы “vehicle\_brand”

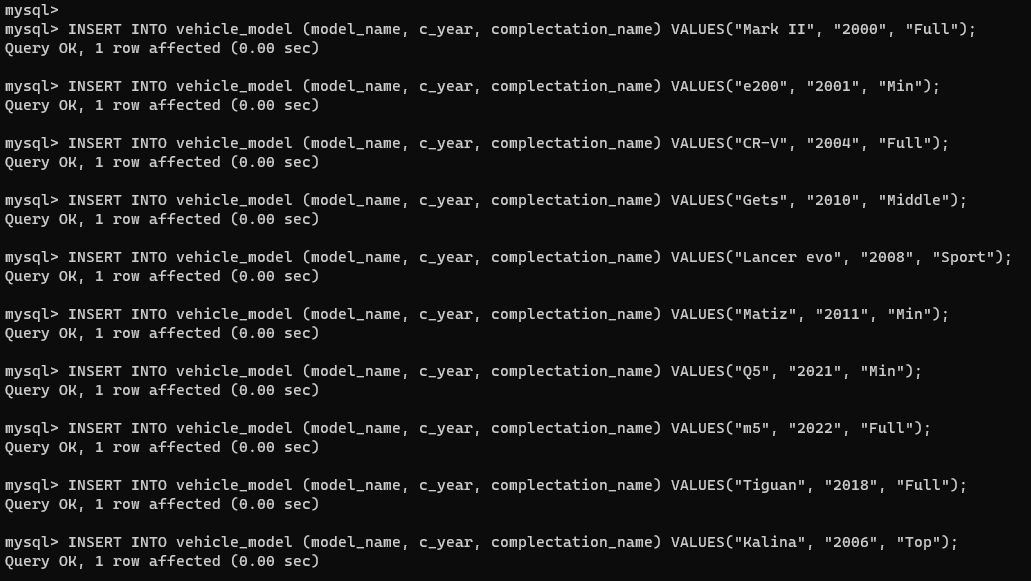


Рисунок 17 – Заполнение таблицы “vehicle\_model”

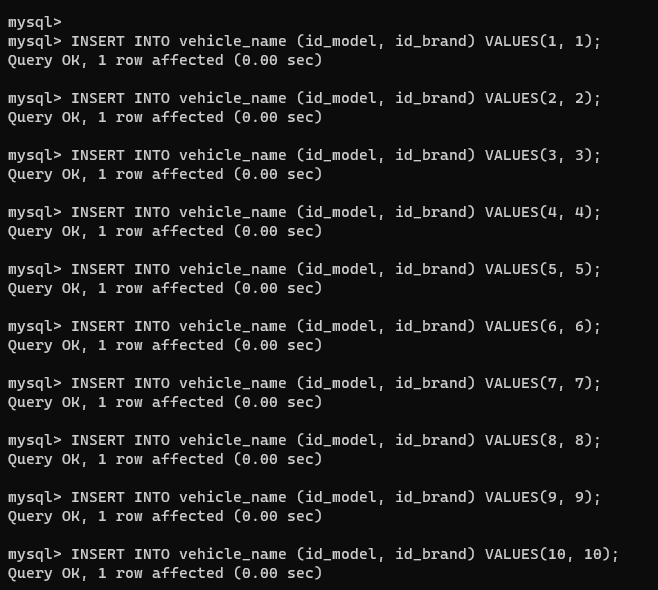


Рисунок 18 – Заполнение таблицы ‘vehicle\_name’



Рисунок 19 – Заполнение таблицы “vehicle\_work\_model”

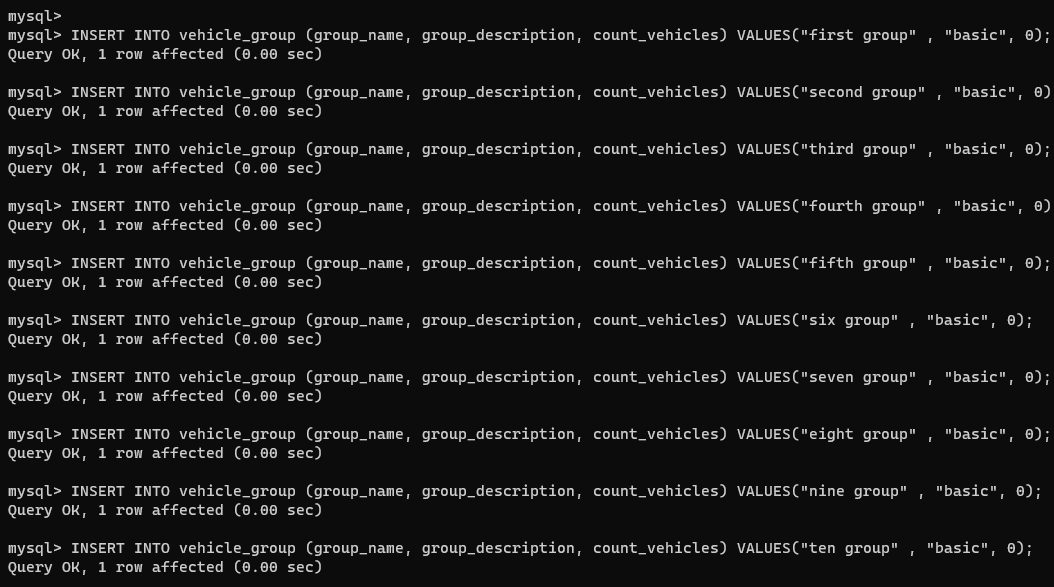


Рисунок 20 – Заполнение таблицы “vehicle\_group”

Результат заполнения представлен на рисунках 21 – 24.

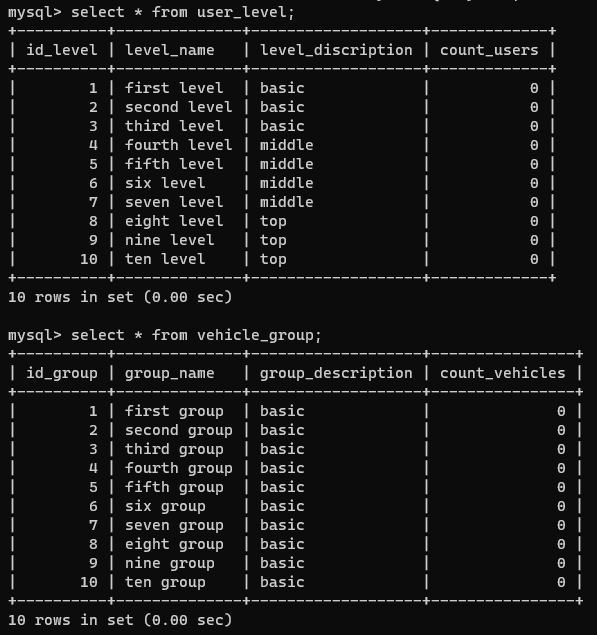


Рисунок 21 – Содержимое части таблиц

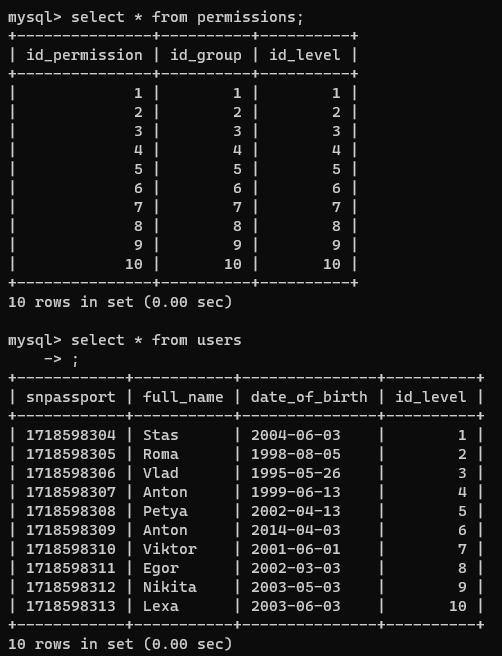


Рисунок 22 – Содержимое части таблиц

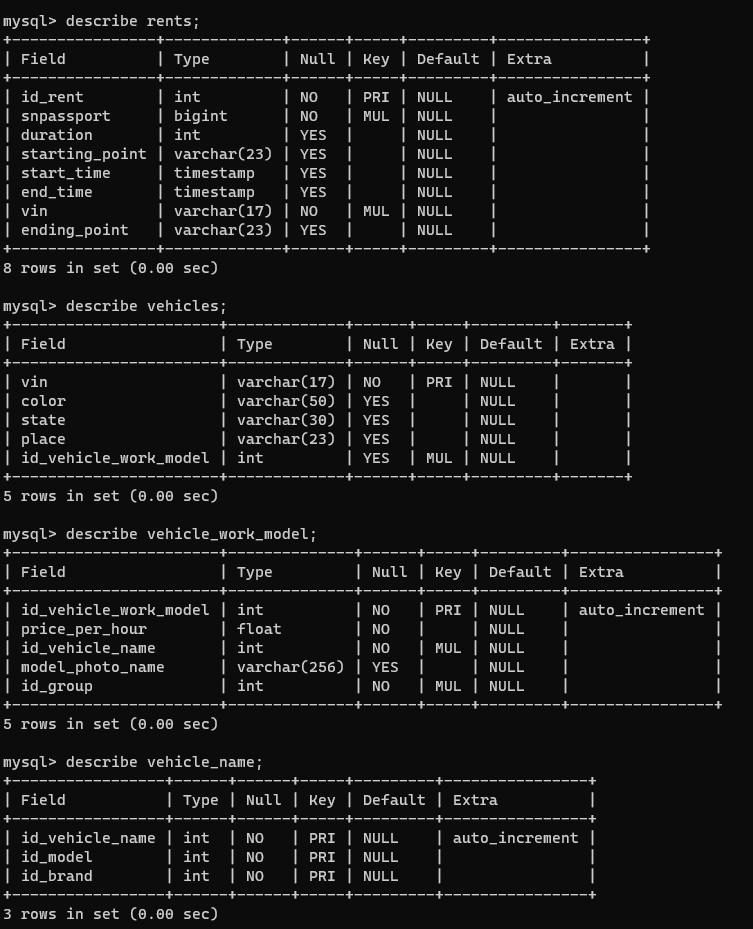


Рисунок 23 – Содержимое части таблиц

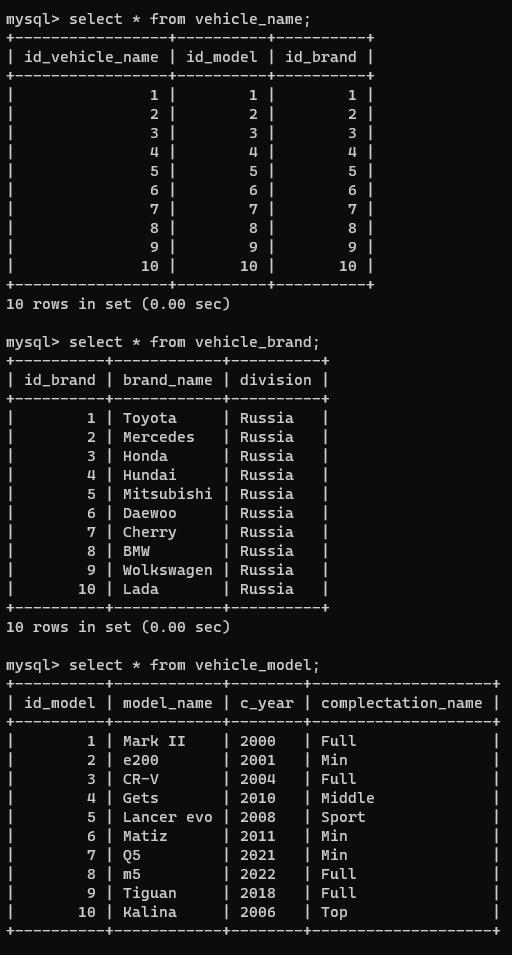


Рисунок 24 – Содержимое части таблиц

Для заполнения таблиц использовался код, представленный в листинге 2.

Листинг 2 – Код заполнения таблиц базы данных.

USE carsharing;

INSERT INTO user\_level (level\_name, level\_discription, count\_users) VALUES("first level", "basic", 0);

INSERT INTO user\_level (level\_name, level\_discription, count\_users) VALUES("second level", "basic", 0);

INSERT INTO user\_level (level\_name, level\_discription, count\_users) VALUES("third level", "basic", 0);

INSERT INTO user\_level (level\_name, level\_discription, count\_users) VALUES("fourth level", "middle", 0);

Продолжение листинга 2.

INSERT INTO user\_level (level\_name, level\_discription, count\_users) VALUES("fifth level", "middle", 0);

INSERT INTO user\_level (level\_name, level\_discription, count\_users) VALUES("six level", "middle", 0);

INSERT INTO user\_level (level\_name, level\_discription, count\_users) VALUES("seven level", "middle", 0);

INSERT INTO user\_level (level\_name, level\_discription, count\_users) VALUES("eight level", "top", 0);

INSERT INTO user\_level (level\_name, level\_discription, count\_users) VALUES("nine level", "top", 0);

INSERT INTO user\_level (level\_name, level\_discription, count\_users) VALUES("ten level", "top", 0);

INSERT INTO vehicle\_group (group\_name, group\_description, count\_vehicles) VALUES("first group" , "basic", 0);

INSERT INTO vehicle\_group (group\_name, group\_description, count\_vehicles) VALUES("second group" , "basic", 0);

INSERT INTO vehicle\_group (group\_name, group\_description, count\_vehicles) VALUES("third group" , "basic", 0);

INSERT INTO vehicle\_group (group\_name, group\_description, count\_vehicles) VALUES("fourth group" , "basic", 0);

INSERT INTO vehicle\_group (group\_name, group\_description, count\_vehicles) VALUES("fifth group" , "basic", 0);

INSERT INTO vehicle\_group (group\_name, group\_description, count\_vehicles) VALUES("six group" , "basic", 0);

INSERT INTO vehicle\_group (group\_name, group\_description, count\_vehicles) VALUES("seven group" , "basic", 0);

INSERT INTO vehicle\_group (group\_name, group\_description, count\_vehicles) VALUES("eight group" , "basic", 0);

INSERT INTO vehicle\_group (group\_name, group\_description, count\_vehicles) VALUES("nine group" , "basic", 0);

INSERT INTO vehicle\_group (group\_name, group\_description, count\_vehicles) VALUES("ten group" , "basic", 0);

INSERT INTO permissions (id\_group, id\_level) VALUES(1, 1);

INSERT INTO permissions (id\_group, id\_level) VALUES(2, 2);

INSERT INTO permissions (id\_group, id\_level) VALUES(3, 3);

INSERT INTO permissions (id\_group, id\_level) VALUES(4, 4);

INSERT INTO permissions (id\_group, id\_level) VALUES(5, 5);

INSERT INTO permissions (id\_group, id\_level) VALUES(6, 6);

INSERT INTO permissions (id\_group, id\_level) VALUES(7, 7);

INSERT INTO permissions (id\_group, id\_level) VALUES(8, 8);

INSERT INTO permissions (id\_group, id\_level) VALUES(9, 9);

INSERT INTO permissions (id\_group, id\_level) VALUES(10, 10);

INSERT INTO vehicle\_model (model\_name, c\_year, complectation\_name) VALUES("Mark II", "2000", "Full");

INSERT INTO vehicle\_model (model\_name, c\_year, complectation\_name) VALUES("e200", "2001", "Min");

Продолжение листинга 2.

INSERT INTO vehicle\_model (model\_name, c\_year, complectation\_name) VALUES("CR-V", "2004", "Full");

INSERT INTO vehicle\_model (model\_name, c\_year, complectation\_name) VALUES("Gets", "2010", "Middle");

INSERT INTO vehicle\_model (model\_name, c\_year, complectation\_name) VALUES("Lancer evo", "2008", "Sport");

INSERT INTO vehicle\_model (model\_name, c\_year, complectation\_name) VALUES("Matiz", "2011", "Min");

INSERT INTO vehicle\_model (model\_name, c\_year, complectation\_name) VALUES("Q5", "2021", "Min");

INSERT INTO vehicle\_model (model\_name, c\_year, complectation\_name) VALUES("m5", "2022", "Full");

INSERT INTO vehicle\_model (model\_name, c\_year, complectation\_name) VALUES("Tiguan", "2018", "Full");

INSERT INTO vehicle\_model (model\_name, c\_year, complectation\_name) VALUES("Kalina", "2006", "Top");

INSERT INTO vehicle\_brand (brand\_name, division) VALUES("Toyota", "Russia");

INSERT INTO vehicle\_brand (brand\_name, division) VALUES("Mercedes", "Russia");

INSERT INTO vehicle\_brand (brand\_name, division) VALUES("Honda", "Russia");

INSERT INTO vehicle\_brand (brand\_name, division) VALUES("Hundai", "Russia");

INSERT INTO vehicle\_brand (brand\_name, division) VALUES("Mitsubishi", "Russia");

INSERT INTO vehicle\_brand (brand\_name, division) VALUES("Daewoo", "Russia");

INSERT INTO vehicle\_brand (brand\_name, division) VALUES("Cherry", "Russia");

INSERT INTO vehicle\_brand (brand\_name, division) VALUES("BMW", "Russia");

INSERT INTO vehicle\_brand (brand\_name, division) VALUES("Wolkswagen", "Russia");

INSERT INTO vehicle\_brand (brand\_name, division) VALUES("Lada", "Russia");

INSERT INTO vehicle\_name (id\_model, id\_brand) VALUES(1, 1);

INSERT INTO vehicle\_name (id\_model, id\_brand) VALUES(2, 2);

INSERT INTO vehicle\_name (id\_model, id\_brand) VALUES(3, 3);

INSERT INTO vehicle\_name (id\_model, id\_brand) VALUES(4, 4);

INSERT INTO vehicle\_name (id\_model, id\_brand) VALUES(5, 5);

INSERT INTO vehicle\_name (id\_model, id\_brand) VALUES(6, 6);

INSERT INTO vehicle\_name (id\_model, id\_brand) VALUES(7, 7);

INSERT INTO vehicle\_name (id\_model, id\_brand) VALUES(8, 8);

INSERT INTO vehicle\_name (id\_model, id\_brand) VALUES(9, 9);

INSERT INTO vehicle\_name (id\_model, id\_brand) VALUES(10, 10);

INSERT INTO vehicle\_work\_model (price\_per\_hour, id\_vehicle\_name, model\_photo\_name, id\_group) VALUES(20.0, 1, "toymarkii2000", 1);

INSERT INTO vehicle\_work\_model (price\_per\_hour, id\_vehicle\_name, model\_photo\_name, id\_group) VALUES(25.5, 1, "mere2002001", 2);

INSERT INTO vehicle\_work\_model (price\_per\_hour, id\_vehicle\_name, model\_photo\_name, id\_group) VALUES(30.0, 1, "honcrv2004", 3);

INSERT INTO vehicle\_work\_model (price\_per\_hour, id\_vehicle\_name, model\_photo\_name, id\_group) VALUES(35.5, 1, "hungets2010", 4);

INSERT INTO vehicle\_work\_model (price\_per\_hour, id\_vehicle\_name, model\_photo\_name, id\_group) VALUES(40.0, 1, "mitlancerevo2008", 5);

Продолжение листинга 2.

INSERT INTO vehicle\_work\_model (price\_per\_hour, id\_vehicle\_name, model\_photo\_name, id\_group) VALUES(45.5, 1, "daematiz2011", 6);

INSERT INTO vehicle\_work\_model (price\_per\_hour, id\_vehicle\_name, model\_photo\_name, id\_group) VALUES(50.0, 1, "cherq52021", 7);

INSERT INTO vehicle\_work\_model (price\_per\_hour, id\_vehicle\_name, model\_photo\_name, id\_group) VALUES(55.5, 1, "bmwm52022", 8);

INSERT INTO vehicle\_work\_model (price\_per\_hour, id\_vehicle\_name, model\_photo\_name, id\_group) VALUES(60.0, 1, "woltiguan2018", 9);

INSERT INTO vehicle\_work\_model (price\_per\_hour, id\_vehicle\_name, model\_photo\_name, id\_group) VALUES(65.5, 1, "ladakalina2006", 10);

INSERT INTO vehicles (vin, color, state, place, id\_vehicle\_work\_model) VALUES("ABCDEFGHIJKLMNO01", "red", "inactive", "56,08,00;40,25,00", 1);

INSERT INTO vehicles (vin, color, state, place, id\_vehicle\_work\_model) VALUES("ABCDEFGHIJKLMNO02", "green", "inactive", "56,08,00;40,25,00", 2);

INSERT INTO vehicles (vin, color, state, place, id\_vehicle\_work\_model) VALUES("ABCDEFGHIJKLMNO03", "black", "inactive", "56,08,00;40,25,00", 3);

INSERT INTO vehicles (vin, color, state, place, id\_vehicle\_work\_model) VALUES("ABCDEFGHIJKLMNO04", "blue", "inactive", "56,08,00;40,25,00", 4);

INSERT INTO vehicles (vin, color, state, place, id\_vehicle\_work\_model) VALUES("ABCDEFGHIJKLMNO05", "blue", "inactive", "56,08,00;40,25,00", 5);

INSERT INTO vehicles (vin, color, state, place, id\_vehicle\_work\_model) VALUES("ABCDEFGHIJKLMNO06", "black", "inactive", "56,08,00;40,25,00", 6);

INSERT INTO vehicles (vin, color, state, place, id\_vehicle\_work\_model) VALUES("ABCDEFGHIJKLMNO07", "green", "inactive", "56,08,00;40,25,00", 7);

INSERT INTO vehicles (vin, color, state, place, id\_vehicle\_work\_model) VALUES("ABCDEFGHIJKLMNO08", "red", "inactive", "56,08,00;40,25,00", 8);

INSERT INTO vehicles (vin, color, state, place, id\_vehicle\_work\_model) VALUES("ABCDEFGHIJKLMNO09", "green", "inactive", "56,08,00;40,25,00", 9);

INSERT INTO vehicles (vin, color, state, place, id\_vehicle\_work\_model) VALUES("ABCDEFGHIJKLMNO10", "blakc", "inactive", "56,08,00;40,25,00", 10);

INSERT INTO users (snpassport, full\_name, date\_of\_birth, id\_level) VALUES(1718598304, "Stas", "2004-06-03", 1);

INSERT INTO users (snpassport, full\_name, date\_of\_birth, id\_level) VALUES(1718598305, "Roma", "1998-08-05", 2);

INSERT INTO users (snpassport, full\_name, date\_of\_birth, id\_level) VALUES(1718598306, "Vlad", "1995-05-26", 3);

INSERT INTO users (snpassport, full\_name, date\_of\_birth, id\_level) VALUES(1718598307, "Anton", "1999-06-13", 4);

INSERT INTO users (snpassport, full\_name, date\_of\_birth, id\_level) VALUES(1718598308, "Petya", "2002-04-13", 5);

INSERT INTO users (snpassport, full\_name, date\_of\_birth, id\_level) VALUES(1718598309, "Dima", "2014-04-03", 6);

INSERT INTO users (snpassport, full\_name, date\_of\_birth, id\_level) VALUES(1718598310, "Viktor", "2001-06-01", 7);

INSERT INTO users (snpassport, full\_name, date\_of\_birth, id\_level) VALUES(1718598311, "Egor", "2002-03-03", 8);

Продолжение листинга 2.

INSERT INTO users (snpassport, full\_name, date\_of\_birth, id\_level) VALUES(1718598312, "Nikita", "2003-05-03", 9);

INSERT INTO users (snpassport, full\_name, date\_of\_birth, id\_level) VALUES(1718598313, "Lexa", "2003-06-03", 10);

INSERT INTO rents (snpassport, vin, duration, starting\_point, ending\_point, start\_time, end\_time)

VALUES(1718598304,"ABCDEFGHIJKLMNO01", 0, "56,08,00;40,25,00", "56,08,00;40,25,00", "2023-09-19 09:00:00", "2023-09-19 09:00:00");

INSERT INTO rents (snpassport, vin, duration, starting\_point, ending\_point, start\_time, end\_time)

VALUES(1718598305,"ABCDEFGHIJKLMNO02", 0, "56,08,00;40,25,00", "56,08,00;40,25,00", "2023-09-19 09:00:00", "2023-09-19 09:00:00");

INSERT INTO rents (snpassport, vin, duration, starting\_point, ending\_point, start\_time, end\_time)

VALUES(1718598306,"ABCDEFGHIJKLMNO03", 0, "56,08,00;40,25,00", "56,08,00;40,25,00", "2023-09-19 09:00:00", "2023-09-19 09:00:00");

INSERT INTO rents (snpassport, vin, duration, starting\_point, ending\_point, start\_time, end\_time)

VALUES(1718598307,"ABCDEFGHIJKLMNO04", 0, "56,08,00;40,25,00", "56,08,00;40,25,00", "2023-09-19 09:00:00", "2023-09-19 09:00:00");

INSERT INTO rents (snpassport, vin, duration, starting\_point, ending\_point, start\_time, end\_time)

VALUES(1718598308,"ABCDEFGHIJKLMNO05", 0, "56,08,00;40,25,00", "56,08,00;40,25,00", "2023-09-19 09:00:00", "2023-09-19 09:00:00");

INSERT INTO rents (snpassport, vin, duration, starting\_point, ending\_point, start\_time, end\_time)

VALUES(1718598309,"ABCDEFGHIJKLMNO06", 0, "56,08,00;40,25,00", "56,08,00;40,25,00", "2023-09-19 09:00:00", "2023-09-19 09:00:00");

INSERT INTO rents (snpassport, vin, duration, starting\_point, ending\_point, start\_time, end\_time)

VALUES(1718598310,"ABCDEFGHIJKLMNO07", 0, "56,08,00;40,25,00", "56,08,00;40,25,00", "2023-09-19 09:00:00", "2023-09-19 09:00:00");

INSERT INTO rents (snpassport, vin, duration, starting\_point, ending\_point, start\_time, end\_time)

VALUES(1718598311,"ABCDEFGHIJKLMNO08", 0, "56,08,00;40,25,00", "56,08,00;40,25,00", "2023-09-19 09:00:00", "2023-09-19 09:00:00");

INSERT INTO rents (snpassport, vin, duration, starting\_point, ending\_point, start\_time, end\_time)

VALUES(1718598312,"ABCDEFGHIJKLMNO09", 0, "56,08,00;40,25,00", "56,08,00;40,25,00", "2023-09-19 09:00:00", "2023-09-19 09:00:00");

INSERT INTO rents (snpassport, vin, duration, starting\_point, ending\_point, start\_time, end\_time)

VALUES(1718598313,"ABCDEFGHIJKLMNO10", 0, "56,08,00;40,25,00", "56,08,00;40,25,00", "2023-09-19 09:00:00", "2023-09-19 09:00:00");

Итоговый список таблиц представлен на рисунке 25.

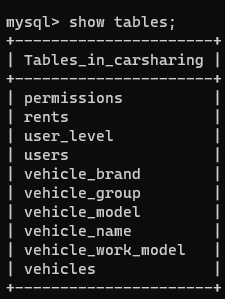


Рисунок 25 – Итоговый список таблиц

**Вывод:**

В результате данной практической работы была создана база данных, а также было произведено наполнение её тестовыми данными.