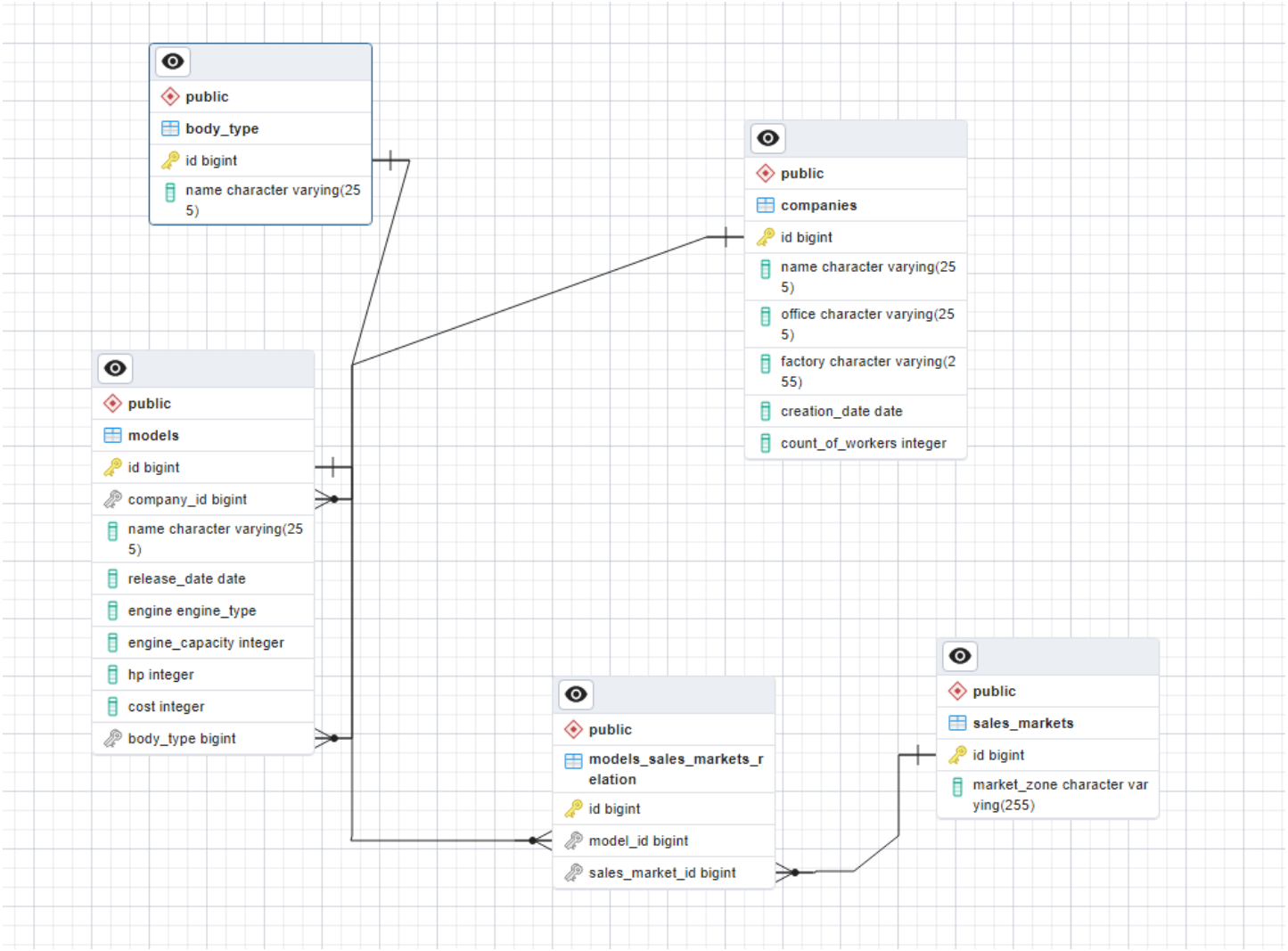
# Описание базы данных "Автомобильный журнал"

## Схема базы данных




## DDL SQL создание БД + заполнение данными:

```
DROP TABLE IF EXISTS models;
DROP TABLE IF EXISTS sales_markets;
DROP TABLE IF EXISTS companies;
DROP TABLE IF EXISTS models_range;
DROP TABLE IF EXISTS models_sales_markets_relation;
DROP TABLE IF EXISTS body_type;
DROP TYPE IF EXISTS engine_type;

CREATE TYPE engine_type AS ENUM (
    'hybrid',
    'electric',
```

```
    'internal combustion engine'
);

CREATE TABLE body_type (
    id bigserial primary key,
    name varchar(255) NOT NULL
);

CREATE TABLE companies(
    id bigserial primary key,
    name varchar(255) NOT NULL,
    office varchar(255) NOT NULL,
    factory varchar(255),
    creation_date date NOT NULL,
    count_of_workers int
);

CREATE TABLE models (
    id bigserial primary key,
    company_id bigint NOT NULL,
    name varchar(255) NOT NULL,
    release_date date,
    engine engine_type,
    engine_capacity int,
    HP int,
    cost int,
    body_type bigint NOT NULL,
    FOREIGN KEY (body_type) REFERENCES body_type
    ON DELETE SET NULL
    ON UPDATE CASCADE,
    FOREIGN KEY (company_id) REFERENCES companies
    ON DELETE SET NULL
    ON UPDATE CASCADE
);

CREATE TABLE sales_markets (
    id bigserial primary key,
    market_zone varchar(255) NOT NULL
);

CREATE TABLE models_sales_markets_relation (
    id bigserial primary key,
    model_id bigint NOT NULL,
    sales_market_id bigint NOT NULL,
    FOREIGN KEY (model_id) REFERENCES models
    ON DELETE CASCADE
    ON UPDATE CASCADE,
    FOREIGN KEY (sales_market_id) REFERENCES sales_markets
    ON DELETE CASCADE
    ON UPDATE CASCADE
);
```

```
CREATE UNIQUE INDEX IF NOT EXISTS uix_companies_name ON companies (name);
CREATE UNIQUE INDEX IF NOT EXISTS uix_body_type_name ON body_type (name);
CREATE UNIQUE INDEX IF NOT EXISTS uix_sales_market_market_zone ON sales_markets (market_zone);
CREATE UNIQUE INDEX IF NOT EXISTS uix_models_sales_markets_relation ON models_sales_markets_re

INSERT
INTO sales_markets (market_zone) VALUES
('Europe'),
('Russia'),
('Asia'),
('China'),
('USA'),
('South America'),
('Africa');

INSERT
INTO body_type (name) VALUES
('Hatchback'),
('Coupe'),
('Sedan'),
('Station wagon'),
('Kammback'),
('Cabriolet'),
('Roadster'),
('Targa'),
('CrossOver'),
('Jeep'),
('Pickup'),
('Limousine'),
('Minivan'),
('Campervan');

INSERT
INTO companies (name, office, factory, creation_date, count_of_workers) VALUES
('Volkswagen', 'Wolfsburg', 'Wolfsburg', '28.05.1937', 670000),
('Audi', 'Ingolstadt', 'Ingolstadt', '16.07.1909', 87000),
('Porsche', 'Stuttgart', 'Zuffenhausen', '06.03.1931', 36359),
('Ford', 'Las Vegas', 'Tehas', '16.06.1903', 183000),
('BMW', 'Munich', 'Munich', '07.03.1916', 118909),
('Mercedes-Benz', 'Stuttgart', 'Sindelfingen', '28.06.1926', 145436),
('Mazda', 'Hiroshima', 'Hiroshima', '30.01.1920', 49786),
('Maserati', 'Modena', 'Modena', '01.12.1914', 1100);


INSERT
INTO models (company_id, name, release_date, body_type) VALUES
(1, 'Golf', '01.01.1974', 1),
(1, 'ID.4', '01.01.2020', 9),
(2, 'A1', '01.01.2010', 1),
(2, 'A2', '01.01.1999', 1),
(2, 'A4', '01.01.1994', 3),
(2, 'A5', '01.06.2007', 2),
(2, 'A6', '01.01.1994', 3),
```

```
(2, 'A7', '01.01.2010', 5),
(2, 'A8', '01.01.1994', 3),
(3, 'Cayenne', '01.12.2002', 9),
(3, '911', '01.01.1965', 8),
(4, 'Focus', '01.01.1998', 1),
(4, 'F-150', '01.01.1979', 11),
(5, '3 Series', '01.01.1975', 4),
(5, '7 Series', '01.01.1977', 3),
(6, 'E-Class', '01.01.1993', 3),
(6, 'A-Class', '01.01.1997', 1),
(7, 'MX-5', '01.01.1989', 7),
(7, 'RX-7', '01.01.1978', 2),
(8, 'Ghibli', '01.01.1967', 3);

INSERT
INTO models_sales_markets_relation (model_id, sales_market_id) VALUES
(1, 1),
(1, 2),
(1, 3),
(1, 4),
(1, 5),
(1, 6),
(2, 1),
(2, 2),
(2, 4),
(2, 5),
(3, 1),
(3, 2),
(3, 4),
(4, 1),
(4, 3),
(5, 1),
(5, 4),
(6, 1),
(6, 2),
(6, 4),
(6, 5),
(7, 1),
(7, 2),
(7, 3),
(7, 4),
(7, 5),
(7, 7),
(8, 1),
(8, 2),
(8, 3),
(8, 4),
(8, 5),
(8, 7),
(9, 1),
(9, 2),
(9, 5),
(10, 1),
```

```
  (10, 2),
  (10, 4),
  (10, 5),
  (11, 1),
  (11, 2),
  (11, 4),
  (11, 5),
  (12, 1),
  (12, 2),
  (12, 5),
  (12, 6),
  (12, 7),
  (13, 5),
  (13, 6),
  (14, 1),
  (14, 2),
  (14, 4),
  (14, 5),
  (15, 1),
  (15, 4),
  (15, 5),
  (16, 1),
  (16, 2),
  (16, 5),
  (17, 1),
  (17, 2),
  (18, 1),
  (18, 3),
  (18, 4),
  (18, 5),
  (18, 6),
  (18, 7),
  (19, 3),
  (19, 4),
  (20, 1),
  (20, 2),
  (20, 5);
```

# Запросы к базе данных "Автомобильный журнал"

## Реляционные и булевы операторы

Запрос 1:

- Назначение: Узнать компании, в которых количество работников меньше 100K человек

- Запрос:

```
SELECT * from companies where count_of_workers < 100000
```

- Результат:

| | id [PK] bigint | name character varying (255) | office character varying (255) | factory character varying (255) | creation_date date | count_of_workers integer |
|---|---|---|---|---|---|---|
| 1 | 2 | Audi | Ingolstadt | Ingolstadt | 1909-07-16 | 87000 |
| 2 | 3 | Porsche | Stuttgart | Zuffenhausen | 1931-03-06 | 36359 |
| 3 | 7 | Mazda | Hiroshima | Hiroshima | 1920-01-30 | 49786 |
| 4 | 8 | Maserati | Modena | Modena | 1914-12-01 | 1100 |

Запрос 2:

- Назначение: Узнать компании, в которых количество работников больше 100K человек и они были образованы после конца первой мировой войны
- Запрос:

```
SELECT * from companies where count_of_workers > 100000 AND creation_date > '11.11.1918'
```

- Результат:

| | id [PK] bigint | name character varying (255) | office character varying (255) | factory character varying (255) | creation_date date | count_of_workers integer |
|---|---|---|---|---|---|---|
| 1 | 1 | Volkswagen | Wolfsburg | Wolfsburg | 1937-05-28 | 670000 |
| 2 | 6 | Mercedes-Benz | Stuttgart | Sindelfingen | 1926-06-28 | 145436 |

Запрос 3:

- Назначение: Узнать компании, в которых количество работников не меньше 50K человек, а также головной офис и завод компании находятся в одном городе
- Запрос:

```
SELECT * from companies where NOT count_of_workers < 50000 AND office = factory
```

- Результат:

| | id [PK] bigint | name character varying (255) | office character varying (255) | factory character varying (255) | creation_date date | count_of_workers integer |
|---|---|---|---|---|---|---|
| 1 | 1 | Volkswagen | Wolfsburg | Wolfsburg | 1937-05-28 | 670000 |
| 2 | 2 | Audi | Ingolstadt | Ingolstadt | 1909-07-16 | 87000 |
| 3 | 5 | BMW | Munich | Munich | 1916-03-07 | 118909 |

# Операторы `IN` `BETWEEN` `LIKE`

Запрос 1:

- Назначение: Узнать компании, головной офис, которых находится в одном из перечисленных городов
- Запрос:

```
SELECT * from companies where office IN ('Wolfsburg', 'Las Vegas', 'Moscow')
```

- Результат:

| | id [PK] bigint | name character varying (255) | office character varying (255) | factory character varying (255) | creation_date date | count_of_workers integer |
|---|---|---|---|---|---|---|
| 1 | 1 | Volkswagen | Wolfsburg | Wolfsburg | 1937-05-28 | 670000 |
| 2 | 4 | Ford | Las Vegas | Tehas | 1903-06-16 | 183000 |

Запрос 2:

- Назначение: Узнать компании, в которых количество работников находится в диапазоне между двух значений
- Запрос:

```
SELECT * from companies where count_of_workers BETWEEN 80000 AND 500000
```

- Результат:

| | id [PK] bigint | name character varying (255) | office character varying (255) | factory character varying (255) | creation_date date | count_of_workers integer |
|---|---|---|---|---|---|---|
| 1 | 2 | Audi | Ingolstadt | Ingolstadt | 1909-07-16 | 87000 |
| 2 | 4 | Ford | Las Vegas | Tehas | 1903-06-16 | 183000 |
| 3 | 5 | BMW | Munich | Munich | 1916-03-07 | 118909 |
| 4 | 6 | Mercedes-Benz | Stuttgart | Sindelfingen | 1926-06-28 | 145436 |

Запрос 3:

- Назначение: Узнать модели автомобилей, название которых начинается с буквы A
- Запрос:

```
SELECT * from models where name LIKE 'A%'
```

- Результат:

| | id [PK] bigint | company_id bigint | name character varying (255) | release_date date | engine engine_type | engine_capacity integer | hp integer | cost integer | body_type bigint |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 2 | A1 | 2010-01-01 | [null] | [null] | [null] | [null] | 1 |
| 2 | 4 | 2 | A2 | 1999-01-01 | [null] | [null] | [null] | [null] | 1 |
| 3 | 5 | 2 | A4 | 1994-01-01 | [null] | [null] | [null] | [null] | 3 |
| 4 | 6 | 2 | A5 | 2007-06-01 | [null] | [null] | [null] | [null] | 2 |
| 5 | 7 | 2 | A6 | 1994-01-01 | [null] | [null] | [null] | [null] | 3 |
| 6 | 8 | 2 | A7 | 2010-01-01 | [null] | [null] | [null] | [null] | 5 |
| 7 | 9 | 2 | A8 | 1994-01-01 | [null] | [null] | [null] | [null] | 3 |
| 8 | 17 | 6 | A-Class | 1997-01-01 | [null] | [null] | [null] | [null] | 1 |

# Агрегирующие функции

Запрос 1:

- Назначение: Посчитать количество моделей Audi начинающихся с буквы A
- Запрос:

```
SELECT count(id) from models
where name LIKE 'A%'
AND models.company_id = (select id from companies where name = 'Audi')
```

- Результат:

| | count bigint |
|---|---|
| 1 | 7 |

Запрос 2:

- Назначение: Узнать среднее количество работников среди компаний с головным офисов в определённых городах
- Запрос:

```
SELECT AVG(count_of_workers) from companies where office IN ('Munich', 'Hiroshima', 'Zuffenhau
```

- Результат:

| | avg numeric |
|---|---|
| 1 | 84347.500000000000 |

Запрос 3:

- Назначение: Узнать название компании с минимальным количество работников

- Запрос:

```
SELECT name from companies where count_of_workers = (select MIN(count_of_workers) from compani
```

- Результат:

| | name<br>character varying (255) |
|---|---|
| 1 | Maserati |

## Форматирование результата

Запрос 1:

- Назначение: Вывести названия моделей вместе с названием их бренда
- Запрос:

```
SELECT FORMAT('%s %s', companies.name, models.name) from models
JOIN companies ON models.company_id = companies.id
```

- Результат:

| | format<br>text |
|---|---|
| 1 | Volkswagen Golf |
| 2 | Volkswagen ID.4 |
| 3 | Audi A1 |
| 4 | Audi A2 |
| 5 | Audi A4 |
| 6 | Audi A5 |
| 7 | Audi A6 |
| 8 | Audi A7 |
| 9 | Audi A8 |
| 10 | Porsche Cayenne |
| 11 | Porsche 911 |
| 12 | Ford Focus |
| 13 | Ford F-150 |
| 14 | BMW 3 Series |
| 15 | BMW 7 Series |
| 16 | Mercedes-Benz E-Class |
| 17 | Mercedes-Benz A-Class |
| 18 | Mazda MX-5 |
| 19 | Mazda RX-7 |
| 20 | Maserati Ghibli |

Запрос 2:

- Назначение: Вывести название компании и год её основания (только год)
- Запрос:

```
SELECT name as company, extract(year from creation_date) AS foundation_year from companies
```

- Результат:

| | company character varying (255) | foundation_year numeric |
|---|---|---|
| 1 | Volkswagen | 1937 |
| 2 | Audi | 1909 |
| 3 | Porsche | 1931 |
| 4 | Ford | 1903 |
| 5 | BMW | 1916 |
| 6 | Mercedes-Benz | 1926 |
| 7 | Mazda | 1920 |
| 8 | Maserati | 1914 |

Запрос 3:

- Назначение: Вывести название компании и дату её основания в формате `ГГГГ-Мес`
- Запрос:

```
SELECT name as company, TO_CHAR(creation_date, 'YYYY-Mon') AS foundation_date from companies
```

- Результат:

| | company character varying (255) | foundation_date text |
|---|---|---|
| 1 | Volkswagen | 1937-May |
| 2 | Audi | 1909-Jul |
| 3 | Porsche | 1931-Mar |
| 4 | Ford | 1903-Jun |
| 5 | BMW | 1916-Mar |
| 6 | Mercedes-Benz | 1926-Jun |
| 7 | Mazda | 1920-Jan |
| 8 | Maserati | 1914-Dec |

## Несколько таблиц в запросе

Запрос 1:

- Назначение: Вывести названия моделей и названия рынков, на которых они продаются
- Запрос:

```
SELECT models.name, sales_markets.market_zone from models, sales_markets, models_sales_markets
WHERE (models.id = models_sales_markets_relation.model_id
      AND sales_markets.id = models_sales_markets_relation.sales_market_id)
```

- Результат:

| | name<br>character varying (255) | market_zone<br>character varying (255) |
|---|---|---|
| 1 | Golf | Europe |
| 2 | Golf | Russia |
| 3 | Golf | Asia |
| 4 | Golf | China |
| 5 | Golf | USA |
| 6 | Golf | South America |
| 7 | ID.4 | Europe |
| 8 | ID.4 | Russia |
| 9 | ID.4 | China |
| 10 | ID.4 | USA |
| 11 | A1 | Europe |
| 12 | A1 | Russia |
| 13 | A1 | China |
| 14 | A2 | Europe |
| 15 | A2 | Asia |
| 16 | A4 | Europe |
| 17 | A4 | China |
| 18 | A5 | Europe |
| 19 | A5 | Russia |

| | | |
|---|---|---|
| 59 | E-Class | Europe |
| 60 | E-Class | Russia |
| 61 | E-Class | USA |
| 62 | A-Class | Europe |
| 63 | A-Class | Russia |
| 64 | MX-5 | Europe |
| 65 | MX-5 | Asia |
| 66 | MX-5 | China |
| 67 | MX-5 | USA |
| 68 | MX-5 | South America |
| 69 | MX-5 | Africa |
| 70 | RX-7 | Asia |
| 71 | RX-7 | China |
| 72 | Ghibli | Europe |
| 73 | Ghibli | Russia |
| 74 | Ghibli | USA |

Запрос 2:

- Назначение: Вывести названия моделей вместе с названием их бренда
- Запрос:

```
SELECT companies.name, models.name from models, companies
WHERE companies.id = models.company_id
```

- Результат:

| | name character varying (255) | name character varying (255) |
|---|---|---|
| 1 | Volkswagen | Golf |
| 2 | Volkswagen | ID.4 |
| 3 | Audi | A1 |
| 4 | Audi | A2 |
| 5 | Audi | A4 |
| 6 | Audi | A5 |
| 7 | Audi | A6 |
| 8 | Audi | A7 |
| 9 | Audi | A8 |
| 10 | Porsche | Cayenne |
| 11 | Porsche | 911 |
| 12 | Ford | Focus |
| 13 | Ford | F-150 |
| 14 | BMW | 3 Series |
| 15 | BMW | 7 Series |
| 16 | Mercedes-Benz | E-Class |
| 17 | Mercedes-Benz | A-Class |
| 18 | Mazda | MX-5 |
| 19 | Mazda | RX-7 |
| 20 | Maserati | Ghibli |

Запрос 3:

- Назначение: Вывести название компании и год релиза её самой ранней модели (из БД)
- Запрос:

```
SELECT companies.name, MIN(extract(year from models.release_date))
from companies, models
where companies.id = models.company_id
GROUP BY companies.name
```

- Результат:

| | name character varying (255) | min numeric |
|---|---|---|
| 1 | Ford | 1979 |
| 2 | Maserati | 1967 |
| 3 | Porsche | 1965 |
| 4 | Audi | 1994 |
| 5 | Mercedes-Benz | 1993 |
| 6 | Mazda | 1978 |
| 7 | BMW | 1975 |
| 8 | Volkswagen | 1974 |

## Вложенные запросы

Запрос 1:

- Назначение: Узнать название компании с минимальным количество работников
- Запрос:

```
SELECT name from companies where count_of_workers = (select MIN(count_of_workers) from compani
```

- Результат:

| | name character varying (255) |
|---|---|
| 1 | Maserati |

Запрос 2:

- Назначение: Вывести названия компаний и кол-во работников, где их количество больше среднего значения работников среди всех компаний
- Запрос:

```
SELECT name, count_of_workers from companies
where count_of_workers > (select AVG(count_of_workers) from companies)
```

- Результат:

| | name character varying (255) | count_of_workers integer |
|---|---|---|
| 1 | Volkswagen | 670000 |
| 2 | Ford | 183000 |

Запрос 3:

- Назначение: Вывести название моделей, которые были представлены спустя 70 лет после основания компании производителя
- Запрос:

```
SELECT models.name from models
where models.release_date - (SELECT creation_date from companies
                             where companies.id = models.company_id) > 364 * 70
```

- Результат:

| | name character varying (255) |
|---|---|
| 1 | ID.4 |
| 2 | A1 |
| 3 | A2 |
| 4 | A4 |
| 5 | A5 |
| 6 | A6 |
| 7 | A7 |
| 8 | A8 |
| 9 | Cayenne |
| 10 | Focus |
| 11 | F-150 |
| 12 | A-Class |

## Связанные подзапросы

Запрос 1:

- Назначение: Вывести компании и рынки сбыта, в которых у этой компании представлено наибольшее количество моделей
- Запрос:

```
WITH companies_markets AS (SELECT companies.name, market_zone, COUNT(market_zone) as market_mo
ON models.company_id = companies.id
JOIN models_sales_markets_relation
ON models.id = models_sales_markets_relation.model_id
JOIN sales_markets
ON sales_markets.id = models_sales_markets_relation.sales_market_id
GROUP BY companies.name, market_zone
ORDER BY companies.name)


SELECT name, market_zone from companies_markets CM1 where
market_models = (SELECT MAX(market_models) from companies_markets CM2 WHERE CM1.name = CM2.nam
```

- Результат:

| | name character varying (255) | market_zone character varying (255) |
|---|---|---|
| 1 | Audi | Europe |
| 2 | BMW | China |
| 3 | BMW | Europe |
| 4 | BMW | USA |
| 5 | Ford | South America |
| 6 | Ford | USA |
| 7 | Maserati | Europe |
| 8 | Maserati | Russia |
| 9 | Maserati | USA |
| 10 | Mazda | Asia |
| 11 | Mazda | China |
| 12 | Mercedes-Benz | Europe |
| 13 | Mercedes-Benz | Russia |
| 14 | Porsche | China |
| 15 | Porsche | Europe |
| 16 | Porsche | Russia |
| 17 | Porsche | USA |
| 18 | Volkswagen | China |
| 19 | Volkswagen | Europe |
| 20 | Volkswagen | Russia |
| 21 | Volkswagen | USA |

## Оператор JOIN

Запрос 1:

- Назначение: Полная информация о модели и компании, которой она принадлежит
- Запрос:

```
SELECT * from companies JOIN models ON models.company_id = companies.id
```

- Результат:

| | id bigint | name character varying (255) | office character varying (255) | factory character varying (255) | creation_date date | count_of_workers integer | id bigint | company_id bigint | name character varying (255) | release_date date | engine engine_type | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | Volkswagen | Wolfsburg | Wolfsburg | 1937-05-28 | 670000 | 1 | 1 | Golf | 1974-01-01 | [null] | |
| 2 | 1 | Volkswagen | Wolfsburg | Wolfsburg | 1937-05-28 | 670000 | 2 | 1 | ID.4 | 2020-01-01 | [null] | |
| 3 | 2 | Audi | Ingolstadt | Ingolstadt | 1909-07-16 | 87000 | 3 | 2 | A1 | 2010-01-01 | [null] | |
| 4 | 2 | Audi | Ingolstadt | Ingolstadt | 1909-07-16 | 87000 | 4 | 2 | A2 | 1999-01-01 | [null] | |
| 5 | 2 | Audi | Ingolstadt | Ingolstadt | 1909-07-16 | 87000 | 5 | 2 | A4 | 1994-01-01 | [null] | |
| 6 | 2 | Audi | Ingolstadt | Ingolstadt | 1909-07-16 | 87000 | 6 | 2 | A5 | 2007-06-01 | [null] | |
| 7 | 2 | Audi | Ingolstadt | Ingolstadt | 1909-07-16 | 87000 | 7 | 2 | A6 | 1994-01-01 | [null] | |
| 8 | 2 | Audi | Ingolstadt | Ingolstadt | 1909-07-16 | 87000 | 8 | 2 | A7 | 2010-01-01 | [null] | |
| 9 | 2 | Audi | Ingolstadt | Ingolstadt | 1909-07-16 | 87000 | 9 | 2 | A8 | 1994-01-01 | [null] | |
| 10 | 3 | Porsche | Stuttgart | Zuffenhausen | 1931-03-06 | 36359 | 10 | 3 | Cayenne | 2002-12-01 | [null] | |
| 11 | 3 | Porsche | Stuttgart | Zuffenhausen | 1931-03-06 | 36359 | 11 | 3 | 911 | 1965-01-01 | [null] | |
| 12 | 4 | Ford | Las Vegas | Tehas | 1903-06-16 | 183000 | 12 | 4 | Focus | 1998-01-01 | [null] | |
| 13 | 4 | Ford | Las Vegas | Tehas | 1903-06-16 | 183000 | 13 | 4 | F-150 | 1979-01-01 | [null] | |
| 14 | 5 | BMW | Munich | Munich | 1916-03-07 | 118909 | 14 | 5 | 3 Series | 1975-01-01 | [null] | |
| 15 | 5 | BMW | Munich | Munich | 1916-03-07 | 118909 | 15 | 5 | 7 Series | 1977-01-01 | [null] | |
| 16 | 6 | Mercedes-Benz | Stuttgart | Sindelfingen | 1926-06-28 | 145436 | 16 | 6 | E-Class | 1993-01-01 | [null] | |
| 17 | 6 | Mercedes-Benz | Stuttgart | Sindelfingen | 1926-06-28 | 145436 | 17 | 6 | A-Class | 1997-01-01 | [null] | |
| 18 | 7 | Mazda | Hiroshima | Hiroshima | 1920-01-30 | 49786 | 18 | 7 | MX-5 | 1989-01-01 | [null] | |
| 19 | 7 | Mazda | Hiroshima | Hiroshima | 1920-01-30 | 49786 | 19 | 7 | RX-7 | 1978-01-01 | [null] | |
| 20 | 8 | Maserati | Modena | Modena | 1914-12-01 | 1100 | 20 | 8 | Ghibli | 1967-01-01 | [null] | |

Запрос 2:

- Назначение: Вывод названия моделей и их рынков сбыта
- Запрос:

```
SELECT models.name, market_zone from models JOIN models_sales_markets_relation
ON models.id = models_sales_markets_relation.model_id
JOIN sales_markets ON sales_markets.id = models_sales_markets_relation.sales_market_id
```

- Результат:

| | name character varying (255) | market_zone character varying (255) |
|---|---|---|
| 1 | Golf | Europe |
| 2 | Golf | Russia |
| 3 | Golf | Asia |
| 4 | Golf | China |
| 5 | Golf | USA |
| 6 | Golf | South America |
| 7 | ID.4 | Europe |
| 8 | ID.4 | Russia |
| 9 | ID.4 | China |
| 10 | ID.4 | USA |
| 11 | A1 | Europe |
| 12 | A1 | Russia |
| 13 | A1 | China |
| 14 | A2 | Europe |
| 15 | A2 | Asia |
| 16 | A4 | Europe |
| 17 | A4 | China |
| 18 | A5 | Europe |
| 19 | A5 | Russia |
| 20 | A5 | China |
| 21 | A5 | USA |
| 22 | A6 | Europe |
| 23 | A6 | Russia |

| | name character varying (255) | market_zone character varying (255) |
|---|---|---|
| 52 | 3 Series | Europe |
| 53 | 3 Series | Russia |
| 54 | 3 Series | China |
| 55 | 3 Series | USA |
| 56 | 7 Series | Europe |
| 57 | 7 Series | China |
| 58 | 7 Series | USA |
| 59 | E-Class | Europe |
| 60 | E-Class | Russia |
| 61 | E-Class | USA |
| 62 | A-Class | Europe |
| 63 | A-Class | Russia |
| 64 | MX-5 | Europe |
| 65 | MX-5 | Asia |
| 66 | MX-5 | China |
| 67 | MX-5 | USA |
| 68 | MX-5 | South America |
| 69 | MX-5 | Africa |
| 70 | RX-7 | Asia |
| 71 | RX-7 | China |
| 72 | Ghibli | Europe |
| 73 | Ghibli | Russia |
| 74 | Ghibli | USA |

Запрос 3:

- Назначение: Вывести компании и кол-во представленных ими моделей на каждом из рынков сбыта
- Запрос:

```
WITH companies_markets AS (SELECT companies.name, market_zone, COUNT(market_zone) as market_mo
ON models.company_id = companies.id
JOIN models_sales_markets_relation
ON models.id = models_sales_markets_relation.model_id
JOIN sales_markets
```

```
ON sales_markets.id = models_sales_markets_relation.sales_market_id
GROUP BY companies.name, market_zone
ORDER BY companies.name)


SELECT * from companies_markets
```

- Результат:

| | name character varying (255) | market_zone character varying (255) | market_models bigint |
|---|---|---|---|
| 1 | Audi | Africa | 2 |
| 2 | Audi | Asia | 3 |
| 3 | Audi | China | 5 |
| 4 | Audi | Europe | 7 |
| 5 | Audi | Russia | 5 |
| 6 | Audi | USA | 4 |
| 7 | BMW | China | 2 |
| 8 | BMW | Europe | 2 |
| 9 | BMW | Russia | 1 |
| 10 | BMW | USA | 2 |
| 11 | Ford | Africa | 1 |
| 12 | Ford | Europe | 1 |
| 13 | Ford | Russia | 1 |
| 14 | Ford | South America | 2 |
| 15 | Ford | USA | 2 |
| 16 | Maserati | Europe | 1 |
| 17 | Maserati | Russia | 1 |
| 18 | Maserati | USA | 1 |
| 19 | Mazda | Africa | 1 |
| 20 | Mazda | Asia | 2 |

## Операторы `EXIST` `ANY` `ALL` `SOME`

Запрос 1:

- Назначение: Полная информация о моделях и рынках сбыта, если среди моделей есть названия начинающиеся с A

- Запрос:

```
WITH models_markets AS (SELECT * from models
JOIN models_sales_markets_relation
ON models.id = models_sales_markets_relation.model_id)


SELECT * from models_markets
where EXISTS(select *
             from models_markets
            where name LIKE 'A%')
```

- Результат:

| | id bigint | company_id bigint | name character varying (255) | release_date date | engine engine_type | engine_capacity integer | hp integer | cost integer | body_type bigint | id bigint | model_id bigint | sales_market_id bigint |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | Golf | 1974-01-01 | [null] | [null] | [null] | [null] | 1 | 1 | 1 | 1 |
| 2 | 1 | 1 | Golf | 1974-01-01 | [null] | [null] | [null] | [null] | 1 | 2 | 1 | 2 |
| 3 | 1 | 1 | Golf | 1974-01-01 | [null] | [null] | [null] | [null] | 1 | 3 | 1 | 3 |
| 4 | 1 | 1 | Golf | 1974-01-01 | [null] | [null] | [null] | [null] | 1 | 4 | 1 | 4 |
| 5 | 1 | 1 | Golf | 1974-01-01 | [null] | [null] | [null] | [null] | 1 | 5 | 1 | 5 |
| 6 | 1 | 1 | Golf | 1974-01-01 | [null] | [null] | [null] | [null] | 1 | 6 | 1 | 6 |
| 7 | 2 | 1 | ID.4 | 2020-01-01 | [null] | [null] | [null] | [null] | 9 | 7 | 2 | 1 |
| 8 | 2 | 1 | ID.4 | 2020-01-01 | [null] | [null] | [null] | [null] | 9 | 8 | 2 | 2 |
| 9 | 2 | 1 | ID.4 | 2020-01-01 | [null] | [null] | [null] | [null] | 9 | 9 | 2 | 4 |
| 10 | 2 | 1 | ID.4 | 2020-01-01 | [null] | [null] | [null] | [null] | 9 | 10 | 2 | 5 |
| 11 | 3 | 2 | A1 | 2010-01-01 | [null] | [null] | [null] | [null] | 1 | 11 | 3 | 1 |
| 12 | 3 | 2 | A1 | 2010-01-01 | [null] | [null] | [null] | [null] | 1 | 12 | 3 | 2 |

Запрос 2:

- Назначение: Вывод информации о моделях, продаваемых на азиатском рынке (включая Китай)
- Запрос:

```
WITH models_markets AS (SELECT * from models
JOIN models_sales_markets_relation
ON models.id = models_sales_markets_relation.model_id)


SELECT * from models_markets
where sales_market_id = ANY(select id from sales_markets
                            where market_zone IN ('Asia', 'China'))
```

- Результат:

| | id bigint | company_id bigint | name character varying (255) | release_date date | engine engine_type | engine_capacity integer | hp integer | cost integer | body_type bigint | id bigint | model_id bigint | sales_market_id bigint |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | Golf | 1974-01-01 | [null] | [null] | [null] | [null] | 1 | 3 | 1 | 3 |
| 2 | 1 | 1 | Golf | 1974-01-01 | [null] | [null] | [null] | [null] | 1 | 4 | 1 | 4 |
| 3 | 2 | 1 | ID.4 | 2020-01-01 | [null] | [null] | [null] | [null] | 9 | 9 | 2 | 4 |
| 4 | 3 | 2 | A1 | 2010-01-01 | [null] | [null] | [null] | [null] | 1 | 13 | 3 | 4 |
| 5 | 4 | 2 | A2 | 1999-01-01 | [null] | [null] | [null] | [null] | 1 | 15 | 4 | 3 |
| 6 | 5 | 2 | A4 | 1994-01-01 | [null] | [null] | [null] | [null] | 3 | 17 | 5 | 4 |
| 7 | 6 | 2 | A5 | 2007-06-01 | [null] | [null] | [null] | [null] | 2 | 20 | 6 | 4 |
| 8 | 7 | 2 | A6 | 1994-01-01 | [null] | [null] | [null] | [null] | 3 | 24 | 7 | 3 |
| 9 | 7 | 2 | A6 | 1994-01-01 | [null] | [null] | [null] | [null] | 3 | 25 | 7 | 4 |
| 10 | 8 | 2 | A7 | 2010-01-01 | [null] | [null] | [null] | [null] | 5 | 30 | 8 | 3 |
| 11 | 8 | 2 | A7 | 2010-01-01 | [null] | [null] | [null] | [null] | 5 | 31 | 8 | 4 |
| 12 | 10 | 3 | Cayenne | 2002-12-01 | [null] | [null] | [null] | [null] | 9 | 39 | 10 | 4 |
| 13 | 11 | 3 | 911 | 1965-01-01 | [null] | [null] | [null] | [null] | 8 | 43 | 11 | 4 |
| 14 | 14 | 5 | 3 Series | 1975-01-01 | [null] | [null] | [null] | [null] | 4 | 54 | 14 | 4 |
| 15 | 15 | 5 | 7 Series | 1977-01-01 | [null] | [null] | [null] | [null] | 3 | 57 | 15 | 4 |
| 16 | 18 | 7 | MX-5 | 1989-01-01 | [null] | [null] | [null] | [null] | 7 | 65 | 18 | 3 |
| 17 | 18 | 7 | MX-5 | 1989-01-01 | [null] | [null] | [null] | [null] | 7 | 66 | 18 | 4 |
| 18 | 19 | 7 | RX-7 | 1978-01-01 | [null] | [null] | [null] | [null] | 2 | 70 | 19 | 3 |
| 19 | 19 | 7 | RX-7 | 1978-01-01 | [null] | [null] | [null] | [null] | 2 | 71 | 19 | 4 |

Запрос 3:

- Назначение: Вывести компании, которые были созданы позже ВСЕХ компаний, кол-во сотрудников которых не более 100К
- Запрос:

```
SELECT name from companies
where creation_date >
ALL(SELECT creation_date from companies where count_of_workers <= 100000)
```

- Результат:

| | name character varying (255) |
|---|---|
| 1 | Volkswagen |

Запрос 4:

- Назначение: Вывести модели, которые произведены компаниями с количеством работников не более 100К
- Запрос:

```
SELECT name from models
where company_id =
SOME(SELECT id from companies where count_of_workers <= 100000)
```

- Результат:

| | name character varying (255) |
|---|---|
| 1 | A1 |
| 2 | A2 |
| 3 | A4 |
| 4 | A5 |
| 5 | A6 |
| 6 | A7 |
| 7 | A8 |
| 8 | Cayenne |
| 9 | 911 |
| 10 | MX-5 |
| 11 | RX-7 |
| 12 | Ghibli |

## Операторы `UNION` `INTERSECT` `EXCEPT`

Запрос 1:

- Назначение: Совмещение результатов двух запросов по поиску по компаниям
- Запрос:

```
SELECT * FROM models WHERE company_id IN (1, 2)
UNION
SELECT * FROM models WHERE company_id IN (2, 3)
```

- Результат:

| | id bigint | company_id bigint | name character varying (255) | release_date date | engine engine_type | engine_capacity integer | hp integer | cost integer | body_type bigint |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 6 | 2 | A5 | 2007-06-01 | [null] | [null] | [null] | [null] | 2 |
| 2 | 5 | 2 | A4 | 1994-01-01 | [null] | [null] | [null] | [null] | 3 |
| 3 | 10 | 3 | Cayenne | 2002-12-01 | [null] | [null] | [null] | [null] | 9 |
| 4 | 4 | 2 | A2 | 1999-01-01 | [null] | [null] | [null] | [null] | 1 |
| 5 | 3 | 2 | A1 | 2010-01-01 | [null] | [null] | [null] | [null] | 1 |
| 6 | 1 | 1 | Golf | 1974-01-01 | [null] | [null] | [null] | [null] | 1 |
| 7 | 7 | 2 | A6 | 1994-01-01 | [null] | [null] | [null] | [null] | 3 |
| 8 | 9 | 2 | A8 | 1994-01-01 | [null] | [null] | [null] | [null] | 3 |
| 9 | 8 | 2 | A7 | 2010-01-01 | [null] | [null] | [null] | [null] | 5 |
| 10 | 2 | 1 | ID.4 | 2020-01-01 | [null] | [null] | [null] | [null] | 9 |
| 11 | 11 | 3 | 911 | 1965-01-01 | [null] | [null] | [null] | [null] | 8 |

Запрос 2:

- Назначение: Исключение результатов второго запроса из первого
- Запрос:

```
SELECT * FROM models WHERE company_id IN (1, 2)
EXCEPT
SELECT * FROM models WHERE company_id IN (2, 3)
```

- Результат:

| | id bigint | company_id bigint | name character varying (255) | release_date date | engine engine_type | engine_capacity integer | hp integer | cost integer | body_type bigint |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | Golf | 1974-01-01 | [null] | [null] | [null] | [null] | 1 |
| 2 | 2 | 1 | ID.4 | 2020-01-01 | [null] | [null] | [null] | [null] | 9 |

Запрос 3:

- Назначение: Совмещение результатов двух запросов по поиску по компаниям
- Запрос:

```
SELECT * FROM models WHERE company_id IN (1, 2)
INTERSECT
SELECT * FROM models WHERE company_id IN (2, 3)
```

- Результат:

| | id bigint | company_id bigint | name character varying (255) | release_date date | engine engine_type | engine_capacity integer | hp integer | cost integer | body_type bigint |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 6 | 2 | A5 | 2007-06-01 | [null] | [null] | [null] | [null] | 2 |
| 2 | 5 | 2 | A4 | 1994-01-01 | [null] | [null] | [null] | [null] | 3 |
| 3 | 4 | 2 | A2 | 1999-01-01 | [null] | [null] | [null] | [null] | 1 |
| 4 | 3 | 2 | A1 | 2010-01-01 | [null] | [null] | [null] | [null] | 1 |
| 5 | 7 | 2 | A6 | 1994-01-01 | [null] | [null] | [null] | [null] | 3 |
| 6 | 9 | 2 | A8 | 1994-01-01 | [null] | [null] | [null] | [null] | 3 |
| 7 | 8 | 2 | A7 | 2010-01-01 | [null] | [null] | [null] | [null] | 5 |

## Оператор `GROUP BY`

Запрос 1:

- Назначение: Количество моделей для каждого типа кузова
- Запрос:

```
SELECT body_type.name, COUNT(*) from models
JOIN body_type ON models.body_type = body_type.id
GROUP BY body_type.name
```

- Результат:

| | name character varying (255) | count bigint |
|---|---|---|
| 1 | Station wagon | 1 |
| 2 | Kammback | 1 |
| 3 | Coupe | 2 |
| 4 | CrossOver | 2 |
| 5 | Sedan | 6 |
| 6 | Pickup | 1 |
| 7 | Hatchback | 5 |
| 8 | Roadster | 1 |
| 9 | Targa | 1 |

Запрос 2:

- Назначение: Количество моделей у каждой компании
- Запрос:

```
SELECT companies.name, count(models.id) from models JOIN companies
ON models.company_id = companies.id
GROUP by companies.name
```

- Результат:

| | name character varying (255) | count bigint |
|---|---|---|
| 1 | Ford | 2 |
| 2 | Maserati | 1 |
| 3 | Porsche | 2 |
| 4 | Audi | 7 |
| 5 | Mercedes-Benz | 2 |
| 6 | Mazda | 2 |
| 7 | BMW | 2 |
| 8 | Volkswagen | 2 |

Запрос 3:

- Назначение: Город в котором находится завод и максимальное кол-во работников компании, завод которой находится в этом городе
- Запрос:

```
SELECT factory, MAX(count_of_workers) from models JOIN companies
ON models.company_id = companies.id
GROUP BY factory
```

- Результат:

| | factory character varying (255) | max integer |
|---|---|---|
| 1 | Munich | 118909 |
| 2 | Sindelfingen | 145436 |
| 3 | Modena | 1100 |
| 4 | Wolfsburg | 670000 |
| 5 | Zuffenhausen | 36359 |
| 6 | Hiroshima | 49786 |
| 7 | Ingolstadt | 87000 |
| 8 | Tehas | 183000 |

## Оператор `ORDER BY`

Запрос 1:

- Назначение: Отсортировать компании от новых к старым
- Запрос:

```
SELECT * from companies
ORDER BY creation_date DESC
```

- Результат:

| | id [PK] bigint | name character varying (255) | office character varying (255) | factory character varying (255) | creation_date date | count_of_workers integer |
|---|---|---|---|---|---|---|
| 1 | 1 | Volkswagen | Wolfsburg | Wolfsburg | 1937-05-28 | 670000 |
| 2 | 3 | Porsche | Stuttgart | Zuffenhausen | 1931-03-06 | 36359 |
| 3 | 6 | Mercedes-Benz | Stuttgart | Sindelfingen | 1926-06-28 | 145436 |
| 4 | 7 | Mazda | Hiroshima | Hiroshima | 1920-01-30 | 49786 |
| 5 | 5 | BMW | Munich | Munich | 1916-03-07 | 118909 |
| 6 | 8 | Maserati | Modena | Modena | 1914-12-01 | 1100 |
| 7 | 2 | Audi | Ingolstadt | Ingolstadt | 1909-07-16 | 87000 |
| 8 | 4 | Ford | Las Vegas | Tehas | 1903-06-16 | 183000 |

Запрос 2:

- Назначение: Отсортировать компании по количеству работников по убыванию
- Запрос:

```
SELECT * from companies
ORDER BY count_of_workers DESC
```

- Результат:

| | id [PK] bigint | name character varying (255) | office character varying (255) | factory character varying (255) | creation_date date | count_of_workers integer |
|---|---|---|---|---|---|---|
| 1 | 1 | Volkswagen | Wolfsburg | Wolfsburg | 1937-05-28 | 670000 |
| 2 | 4 | Ford | Las Vegas | Tehas | 1903-06-16 | 183000 |
| 3 | 6 | Mercedes-Benz | Stuttgart | Sindelfingen | 1926-06-28 | 145436 |
| 4 | 5 | BMW | Munich | Munich | 1916-03-07 | 118909 |
| 5 | 2 | Audi | Ingolstadt | Ingolstadt | 1909-07-16 | 87000 |
| 6 | 7 | Mazda | Hiroshima | Hiroshima | 1920-01-30 | 49786 |
| 7 | 3 | Porsche | Stuttgart | Zuffenhausen | 1931-03-06 | 36359 |
| 8 | 8 | Maserati | Modena | Modena | 1914-12-01 | 1100 |

Запрос 3:

- Назначение: Отсортировать модели в алфавитном порядке их названия
- Запрос:

```
SELECT * from models
ORDER BY name
```

- Результат:

| | id [PK] bigint | company_id bigint | name character varying (255) | release_date date | engine engine_type | engine_capacity integer | hp integer | cost integer | body_type bigint |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 14 | 5 | 3 Series | 1975-01-01 | [null] | [null] | [null] | [null] | 4 |
| 2 | 15 | 5 | 7 Series | 1977-01-01 | [null] | [null] | [null] | [null] | 3 |
| 3 | 11 | 3 | 911 | 1965-01-01 | [null] | [null] | [null] | [null] | 8 |
| 4 | 17 | 6 | A-Class | 1997-01-01 | [null] | [null] | [null] | [null] | 1 |
| 5 | 3 | 2 | A1 | 2010-01-01 | [null] | [null] | [null] | [null] | 1 |
| 6 | 4 | 2 | A2 | 1999-01-01 | [null] | [null] | [null] | [null] | 1 |
| 7 | 5 | 2 | A4 | 1994-01-01 | [null] | [null] | [null] | [null] | 3 |
| 8 | 6 | 2 | A5 | 2007-06-01 | [null] | [null] | [null] | [null] | 2 |
| 9 | 7 | 2 | A6 | 1994-01-01 | [null] | [null] | [null] | [null] | 3 |
| 10 | 8 | 2 | A7 | 2010-01-01 | [null] | [null] | [null] | [null] | 5 |
| 11 | 9 | 2 | A8 | 1994-01-01 | [null] | [null] | [null] | [null] | 3 |
| 12 | 10 | 3 | Cayenne | 2002-12-01 | [null] | [null] | [null] | [null] | 9 |
| 13 | 16 | 6 | E-Class | 1993-01-01 | [null] | [null] | [null] | [null] | 3 |
| 14 | 13 | 4 | F-150 | 1979-01-01 | [null] | [null] | [null] | [null] | 11 |
| 15 | 12 | 4 | Focus | 1998-01-01 | [null] | [null] | [null] | [null] | 1 |
| 16 | 20 | 8 | Ghibli | 1967-01-01 | [null] | [null] | [null] | [null] | 3 |
| 17 | 1 | 1 | Golf | 1974-01-01 | [null] | [null] | [null] | [null] | 1 |
| 18 | 2 | 1 | ID.4 | 2020-01-01 | [null] | [null] | [null] | [null] | 9 |
| 19 | 18 | 7 | MX-5 | 1989-01-01 | [null] | [null] | [null] | [null] | 7 |
| 20 | 19 | 7 | RX-7 | 1978-01-01 | [null] | [null] | [null] | [null] | 2 |

# Выражение CASE

Запрос 1:

- Назначение: Определение и характеристика моделей, которые появились в 2000 или раньше
- Запрос:

```
SELECT name, release_date,
    CASE
        WHEN release_date > '1999-12-30' THEN '20XX'
        ELSE '19XX'
    END AS age
FROM models
```

- Результат:

| | name character varying (255) | release_date date | age text |
|---|---|---|---|
| 1 | Golf | 1974-01-01 | 19XX |
| 2 | ID.4 | 2020-01-01 | 20XX |
| 3 | A1 | 2010-01-01 | 20XX |
| 4 | A2 | 1999-01-01 | 19XX |
| 5 | A4 | 1994-01-01 | 19XX |
| 6 | A5 | 2007-06-01 | 20XX |
| 7 | A6 | 1994-01-01 | 19XX |
| 8 | A7 | 2010-01-01 | 20XX |
| 9 | A8 | 1994-01-01 | 19XX |
| 10 | Cayenne | 2002-12-01 | 20XX |
| 11 | 911 | 1965-01-01 | 19XX |
| 12 | Focus | 1998-01-01 | 19XX |
| 13 | F-150 | 1979-01-01 | 19XX |
| 14 | 3 Series | 1975-01-01 | 19XX |
| 15 | 7 Series | 1977-01-01 | 19XX |
| 16 | E-Class | 1993-01-01 | 19XX |
| 17 | A-Class | 1997-01-01 | 19XX |
| 18 | MX-5 | 1989-01-01 | 19XX |
| 19 | RX-7 | 1978-01-01 | 19XX |
| 20 | Ghibli | 1967-01-01 | 19XX |

## Команды `UPDATE` `INSERT` `DELETE`

Запрос 1:

- Назначение: Добавление рынков сбыта
- Запрос:

```
INSERT
INTO sales_markets (market_zone) VALUES
('Europe'),
('Russia'),
('Asia'),
('China'),
('USA'),
```

```
('South America'),
('Africa');
```

- Результат: INSERT 7

Запрос 2:

- Назначение: удаление начинающихся с A рынков
- Запрос:

```
DELETE FROM sales_markets WHERE market_zone LIKE 'A%'
```

- Результат: DELETE 2

Запрос 3:

- Назначение: Изменение названия рынка сбыта
- Запрос:

```
UPDATE sales_markets
SET market_zone = 'RUS'
WHERE market_zone = 'Russia'
```

- Результат: UPDATE 1