▾ Работа с базами данных

Материалы:

- Макрушин С.В. Лекция 6: Работа с базами данных
- https://sqliteonline.com/
- https://docs.python.org/3/library/sqlite3.html
- https://www.geeksforgeeks.org/sql-join-set-1-inner-left-right-and-full-joins/
- https://www.datacamp.com/community/tutorials/group-by-having-clause-sql

▾ Задачи для совместного разбора

1. Работая с базой данных `Chinook_Sqlite.sqlite`, найдите и выведите на экран имена и фамилии всех заказчиков из Канады

2. Найти и вывести на экран названия всех альбомов группы Accept

3. Создайте базу данных с названием вашей группы. В этой базе данных создайте таблицу Student, содержащую 2 столбца: id и name. Добавьте в таблицу Student информацию о студентах, сидящих с вами по соседству.

▾ Лабораторная работа 6

```
from google.colab import drive
drive.mount('/content/gdrive')
```

```
    Mounted at /content/gdrive
```

```
import  sqlite3
sqlite3.apilevel
```

```
    '2.0'
```

```
sqlite3.sqlite_version
```

```
    '3.31.1'
```

1. Создайте файл базы данных с названием `recipes.db`. Создайте объект-курсор.

```
con = sqlite3.connect('gdrive/My Drive/Colab Notebooks/recipes.db')
```

```
cur = con.cursor()
```

2. Напишите и выполните SQL-запрос для создания таблицы рецептов `Recipe`. Таблица должна содержать следующие поля: `id`, `name`, `minutes`, `submitted`, `description`, `n_ingredients`. Определитесь с типами и составом ключевых полей.

```
sql = """
CREATE TABLE Recipe
(
    id integer PRIMARY KEY,
    name text,
    minutes integer,
    submitted  text,
    description text,
    n_ingredients integer
); """
```

```
try:
  cur.executescript(sql)
except sqlite3.DatabaseError as err:
  print('Error: ', err)
else:
  print('Request succeeded')
```

```
    Request succeeded
```

3. Напишите и выполните SQL-запрос для создания таблицы отзывов `Review`. Таблица должна содержать следующие поля: `id`,
   `user_id`, `recipe_id`, `date`, `rating`, `review`. Определитесь с типами полей, набором ключевых полей. При помощи внешнего
   ключа соедините две таблицы.

```
sql = """
CREATE TABLE Review
(
    id integer PRIMARY KEY,
    user_id integer,
    recipe_id integer,
    date text,
    rating integer,
    review text,
    FOREIGN KEY (recipe_id) REFERENCES Recipe (id)
); """

try:
  cur.executescript(sql)
except sqlite3.DatabaseError as err:
  print('Error: ', err)
else:
  print('Request succeeded')
```

```
    Request succeeded
```

4. Загрузите данные из файлов `reviews_sample.csv` (**ЛР2**) и `recipes_sample_with_tags_ingredients.csv` (**ЛР5**) в созданные таблицы

```
import pandas as pd
```

```
reviews_csv = pd.read_csv('gdrive/My Drive/Colab Notebooks/data/reviews_sample.csv')
recipes_csv = pd.read_csv('gdrive/My Drive/Colab Notebooks/files2/recipes_sample_with_tags_ingredients.csv')
```

```
recipes_csv
```

```
reviews_csv
```

```
recipes_csv.to_sql('Recipe_df', con, if_exists='replace', index = False)
```

```
    30000
```

```
cur.execute('''SELECT * FROM Recipe_df''').fetchall()
```

```
cur.execute('''
INSERT INTO Recipe (id, name, minutes, submitted, description, n_ingredients)
SELECT id, name, minutes, submitted, description, n_ingredients
FROM Recipe_df
''')
```

```
    <sqlite3.Cursor at 0x7f38689c58f0>
```

```
# cur.execute('''SELECT * FROM Recipe''').fetchall()
```

```
reviews_csv.to_sql('Review_df', con, if_exists='replace', index = False)
```

```
    126696
```

```
cur.execute('''
INSERT INTO Review (id, user_id, recipe_id, date, rating, review)
```

```
SELECT *
FROM Review_df
''')
```

        <sqlite3.Cursor at 0x7f4658a46ab0>

```
cur.execute('''SELECT * FROM Review''').fetchall()
```

        [(5,
          52282,
          120345,
          '2005-05-21',
          4,
          "very very sweet. after i waited the 2 days i bought 2 more pints of raspberries and added them to the mix. i'm going to add some
        as a cake filling today and will take a photo."),
         (6,
          124416,
          120345,
          '2011-08-06',
          0,
          'Just an observation, so I will not rate. I followed this procedure with strawberries instead of raspberries. Perhaps this is
        the reason it did not work well. Sorry to report that the strawberries I did in August were moldy in October. They were stored in
        my downstairs fridge, which is very cold and infrequently opened. Delicious and fresh-tasting prior to that, though. So, keep a
        sharp eye on them. Personally I would not keep them longer than a month. This recipe also appears as #120345 posted in July 2009,
        which is when I tried it. I also own the Edna Lewis cookbook in which this appears.'),
         (7,
          2000192946,
          120345,
          '2015-05-10',
          2,
          'This recipe was OVERLY too sweet. I would start out with 1/3 or 1/4 cup of sugar and jsut add on from there. Just 2 cups was
        way too much and I had to go back to the grocery store to buy more raspberries because it made so much mix. Overall, I would but
        the long narrow box or raspberries. Its a perfect fit for the recipe plus a little extra. I was not impressed with this recipe.
        It was exceptionally over-sweet. If you make this simple recipe, MAKE SURE TO ADD LESS SUGAR!'),
         (8, 76535, 134728, '2005-09-02', 4, 'Very good!'),
         (9, 273745, 134728, '2005-12-22', 5, 'Better than the real!!'),
         (11,
          190375,
          134728,
          '2007-03-09',
          5,
          'These taste absolutely wonderful!! My son-in-law loves them and requests them often! I followed the recipe exactly. Thanks so
        much for posting this recipe.'),
         (12,
          468945,
          134728,
          '2008-02-20',
          0,
          'Made my own buttermilk w/ vinegar and milk. Used defrosted fresh skinless/boneless chicken fillets. 3 lbs.\r\nThis mix is
        extremely flavorful and its light . I didnt do the bbq thing, but while I cooked homemade to go w/ this I put the chicken in the
        oven to keep warm and served bbq dipping sauce. 10 stars from my kids !'),
         (13,
          255338,
          134728,
          '2008-04-11',
          5,
          'First time using liquid smoke in a recipe. Made this as directed. My kids enjoyed this, so we will make this again. Thank you for
        posting.'),
         (14,
          1171894,
          134728,
          '2009-04-21',
          5,
          "MMMMM! This is so good! I actually soaked the chicken in chicken bouillon first, and it made it super flavorful. I use Sweet Baby
        Ray's bbq sauce (DH's favorite), and cut chicken into nuggets instead of strips. This makes a good amount, so you could really
        freeze some and reeheat in oven later. Those were our plans, but it was so good that it didn't make it to the ziploc bag!"),
```

5. Найдите все рецепты, для выполнения которых нужно ровно 10 ингредиентов. Выведите на экран первые 5 из найденных
   рецептов.

```
cur.execute('''SELECT * FROM Recipe WHERE n_ingredients=10''').fetchmany(5)
```

        [(176, 'cola cake', 55, '1999-08-22', None, 10),
         (246, 'lee s hot crab dip', 45, '1999-09-01', "lee's hot crab dip", 10),
         (289,
          'feijoada brazilian bean soup ii',
          150,
          '1999-10-04',
          'brazilian bean soup',
          10),

```
    (373,
     'tiramisu    balducci s in new york city',
     95,
     '1999-08-17',
     'this is an adopted recipe. i shall be trying it out and then post any additional information if needs be. if you are going to give
  any or no stars, please at least give the reason why so that you can help me improve the recipe. thank you.',
     10),
    (544, 'greek mushroom salad', 38, '1999-08-10', None, 10)]
```

6. Найдите название рецепта, для выполнения которого требуется больше всего времени.

```
cur.execute('''SELECT name, MAX(minutes) FROM Recipe''').fetchall()
```

```
    [('strawberry liqueur', 129615)]
```

7. Запросите у пользователя id рецепта и верните информацию об этом рецепте. Если рецепт отсуствует, выведите
   соответствующее сообщение.

```
user_recipe_id = int(input())
```

```
if cur.execute('''SELECT * FROM Recipe WHERE id=?''', (user_recipe_id, )).fetchall() == []:
  print('There is no recipe with selected id.')
else:
  print(cur.execute('''SELECT * FROM Recipe WHERE id=?''', (user_recipe_id, )).fetchall())
```

```
    44123
    [(44123, 'george s at the cove  black bean soup', 90, '2002-10-25', "an original recipe created by chef scott meskan, george's at the cc
```

8. Найдите кол-во отзывов с рейтингом 5.

```
cur.execute('''
SELECT COUNT(*) FROM Review WHERE rating=5
''').fetchall()[0][0]
```

```
    91361
```

9. Найдите кол-во уникальных рецептов, не имеющих отзывов с рейтингом, меньше 4.

```
cur.execute('''
SELECT COUNT(*) FROM Review WHERE review IS NULL AND rating<4
''').fetchall()[0][0]
```

```
    0
```

```
reviews_csv[reviews_csv['review'].isna()]
```

	Unnamed: 0	user_id	recipe_id	date	rating	review	
8881	56957	2001567544	9054	2017-06-03	5	NaN	
12129	273481	2002120930	167202	2018-04-18	4	NaN	
18578	56955	2001508809	9054	2017-04-26	5	NaN	
21913	783599	2001959957	335709	2018-01-28	5	NaN	
33232	1089381	2002299388	15553	2018-10-13	4	NaN	

```
len(cur.execute('''
    SELECT *
    FROM Review
    WHERE
    rating<4
    AND
    review IS NULL
''').fetchall())
```

    0

10. Найдите кол-во рецептов, опубликованных в 2010 году и имеющих длину не менее 15 минут.

```
len(cur.execute('''
    SELECT * FROM Recipe
    WHERE submitted<'2010-01-01'
    AND minutes>=15
''').fetchall())
```

    22550

```
len(recipes_csv[(recipes_csv.submitted<'2010-01-01') & (recipes_csv.minutes>=15)])
```

    22550

11. Выберите id рецепта, название рецепта, id пользователя, оставившего отзыв, дату отзыва и рейтинг для тех рецептов, которые имеют не менее 3 ингредиентов. Отсортируйте результат по id рецепта.

```
cur.execute('''
  SELECT Recipe.id, Recipe.name, Review.user_id, Review.date, Review.rating
  FROM Recipe
  LEFT JOIN Review
  ON Recipe.id = Review.recipe_id
  WHERE Recipe.n_ingredients>=3
  ORDER BY Recipe.id
''').fetchall()
```

```
    [(48, 'boston cream pie', 32421, '2002-03-15', 0),
     (48, 'boston cream pie', 68674, '2004-05-03', 2),
     (55, 'betty crocker s southwestern guacamole dip', 53959, '2006-01-12', 4),
     (55, 'betty crocker s southwestern guacamole dip', 165567, '2006-03-31', 5),
     (55, 'betty crocker s southwestern guacamole dip', 851190, '2010-05-23', 5),
     (55, 'betty crocker s southwestern guacamole dip', 1060485, '2009-04-07', 5),
     (66, 'black coffee barbecue sauce', 8679, '2003-03-17', 5),
     (66, 'black coffee barbecue sauce', 42938, '2002-10-21', 4),
     (66, 'black coffee barbecue sauce', 124416, '2010-07-08', 5),
     (66, 'black coffee barbecue sauce', 133174, '2010-07-04', 5),
     (66, 'black coffee barbecue sauce', 136004, '2008-06-05', 5),
     (66, 'black coffee barbecue sauce', 136813, '2007-04-14', 5),
     (66, 'black coffee barbecue sauce', 176798, '2010-10-02', 5),
     (66, 'black coffee barbecue sauce', 314792, '2008-02-04', 5),
     (66, 'black coffee barbecue sauce', 330545, '2009-01-02', 5),
     (66, 'black coffee barbecue sauce', 352271, '2007-11-05', 5),
     (66, 'black coffee barbecue sauce', 383346, '2010-07-09', 5),
     (66, 'black coffee barbecue sauce', 498631, '2007-05-11', 5),
     (66, 'black coffee barbecue sauce', 675265, '2009-01-10', 5),
     (66, 'black coffee barbecue sauce', 679953, '2011-03-28', 5),
     (66, 'black coffee barbecue sauce', 744425, '2010-07-11', 5),
     (66, 'black coffee barbecue sauce', 983723, '2010-05-23', 5),
     (66, 'black coffee barbecue sauce', 2300352, '2013-03-05', 5),
     (66, 'black coffee barbecue sauce', 2001180732, '2016-09-24', 5),
     (91, 'brown rice and vegetable pilaf', 52543, '2009-02-22', 5),
     (91, 'brown rice and vegetable pilaf', 92666, '2004-01-30', 4),
```

```
(91, 'brown rice and vegetable pilaf', 194829, '2009-01-29', 5),
(91, 'brown rice and vegetable pilaf', 601227, '2008-05-17', 5),
(94, 'blueberry buttertarts', 236470, '2006-01-01', 5),
(94, 'blueberry buttertarts', 531768, '2007-08-19', 5),
(94, 'blueberry buttertarts', 983811, '2010-05-23', 5),
(94, 'blueberry buttertarts', 1345326, '2009-08-07', 5),
(128, 'caramel apple milkshakes', 804550, '2009-02-01', 5),
(128, 'caramel apple milkshakes', 983863, '2010-05-25', 5),
(148, 'bugwiches', 2156, '2000-06-02', 0),
(153, 'amish friendship bread and starter', 1535, '2008-04-16', 5),
(153, 'amish friendship bread and starter', 3114, '2000-10-30', 4),
(153, 'amish friendship bread and starter', 20375, '2004-02-28', 5),
(153, 'amish friendship bread and starter', 49287, '2002-07-25', 5),
(153, 'amish friendship bread and starter', 51011, '2007-03-21', 5),
(153, 'amish friendship bread and starter', 54697, '2003-10-28', 5),
(153, 'amish friendship bread and starter', 58786, '2010-04-23', 5),
(153, 'amish friendship bread and starter', 72179, '2003-03-31', 5),
(153, 'amish friendship bread and starter', 75020, '2003-04-30', 5),
(153, 'amish friendship bread and starter', 104392, '2006-10-20', 4),
(153, 'amish friendship bread and starter', 110328, '2004-05-29', 5),
(153, 'amish friendship bread and starter', 121497, '2004-02-10', 5),
(153, 'amish friendship bread and starter', 140008, '2006-11-21', 5),
(153, 'amish friendship bread and starter', 177753, '2008-07-10', 5),
(153, 'amish friendship bread and starter', 179471, '2004-12-13', 0),
(153, 'amish friendship bread and starter', 180952, '2010-01-27', 5),
(153, 'amish friendship bread and starter', 210406, '2005-08-20', 5),
(153, 'amish friendship bread and starter', 212714, '2005-06-22', 0),
(153, 'amish friendship bread and starter', 221546, '2005-10-02', 0),
(153, 'amish friendship bread and starter', 227810, '2005-09-05', 5),
(153, 'amish friendship bread and starter', 259154, '2008-09-02', 5),
(153, 'amish friendship bread and starter', 271256, '2005-12-07', 5),
(153, 'amish friendship bread and starter', 281399, '2008-08-25', 5),
```

0s   completed at 7:06 PM