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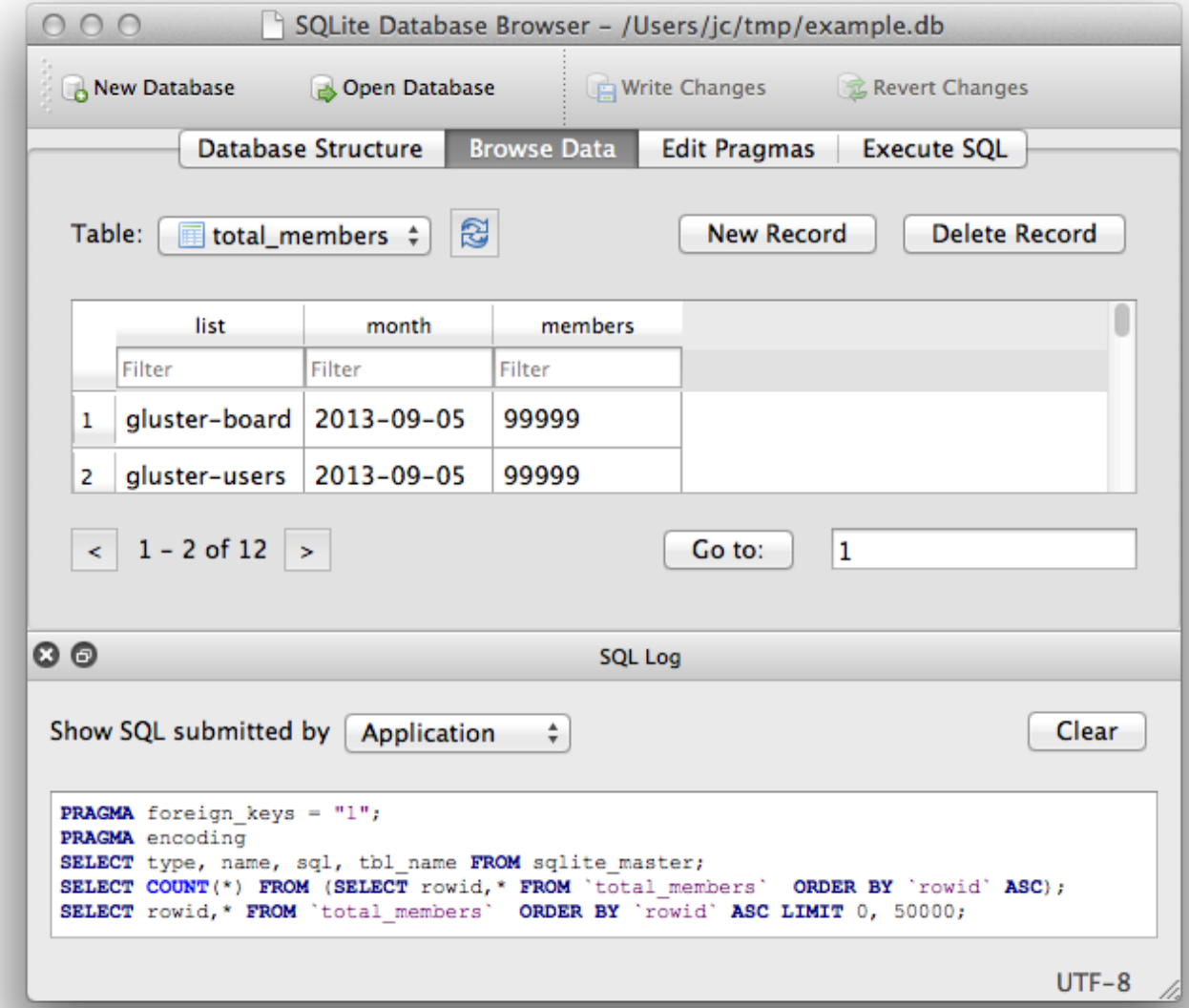
Unit 10

Relational Database and SQLite

SQLite Browser



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http://sqlitebrowser.org/

Relational Databases

Relational databases model data by storing rows and columns in tables. The power of the relational database lies in its ability to efficiently retrieve data from those tables and in particular where there are multiple tables and the relationships between those tables involved in the query.

http://en.wikipedia.org/wiki/Relational_database

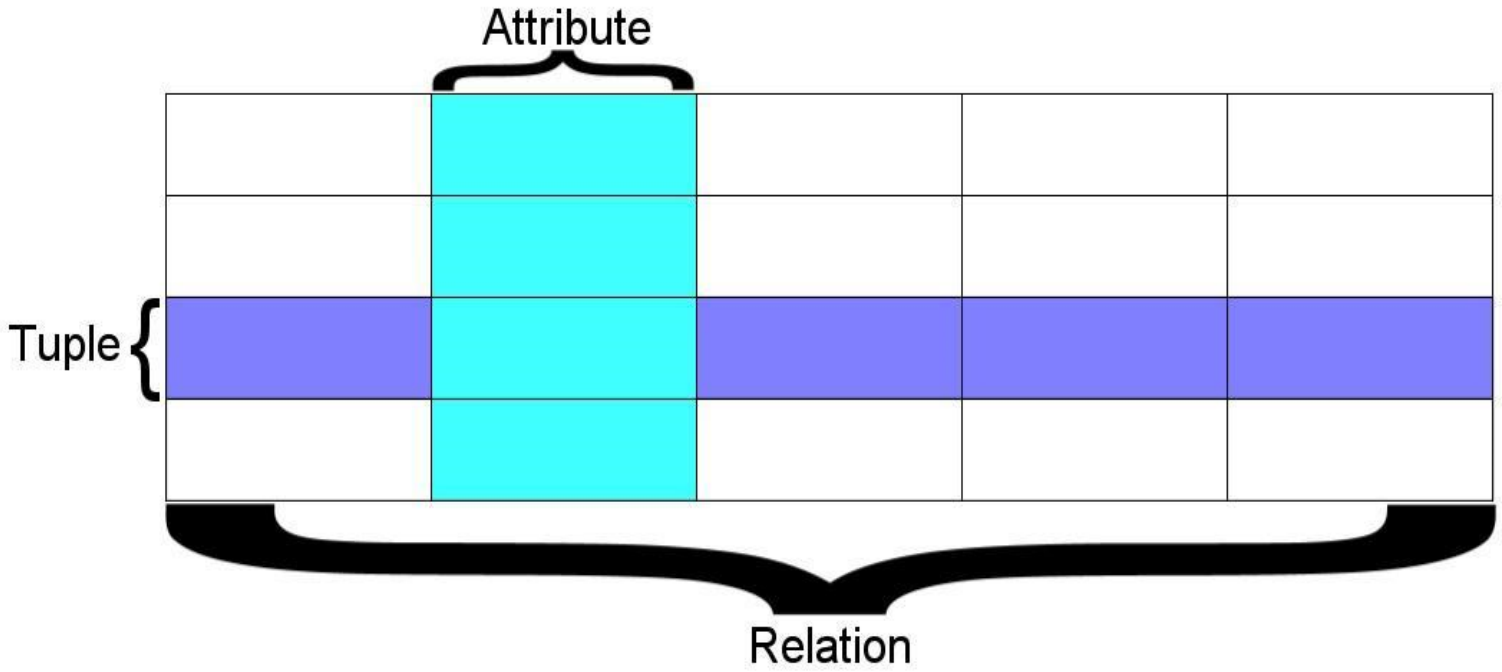
Terminology

Database - contains many tables

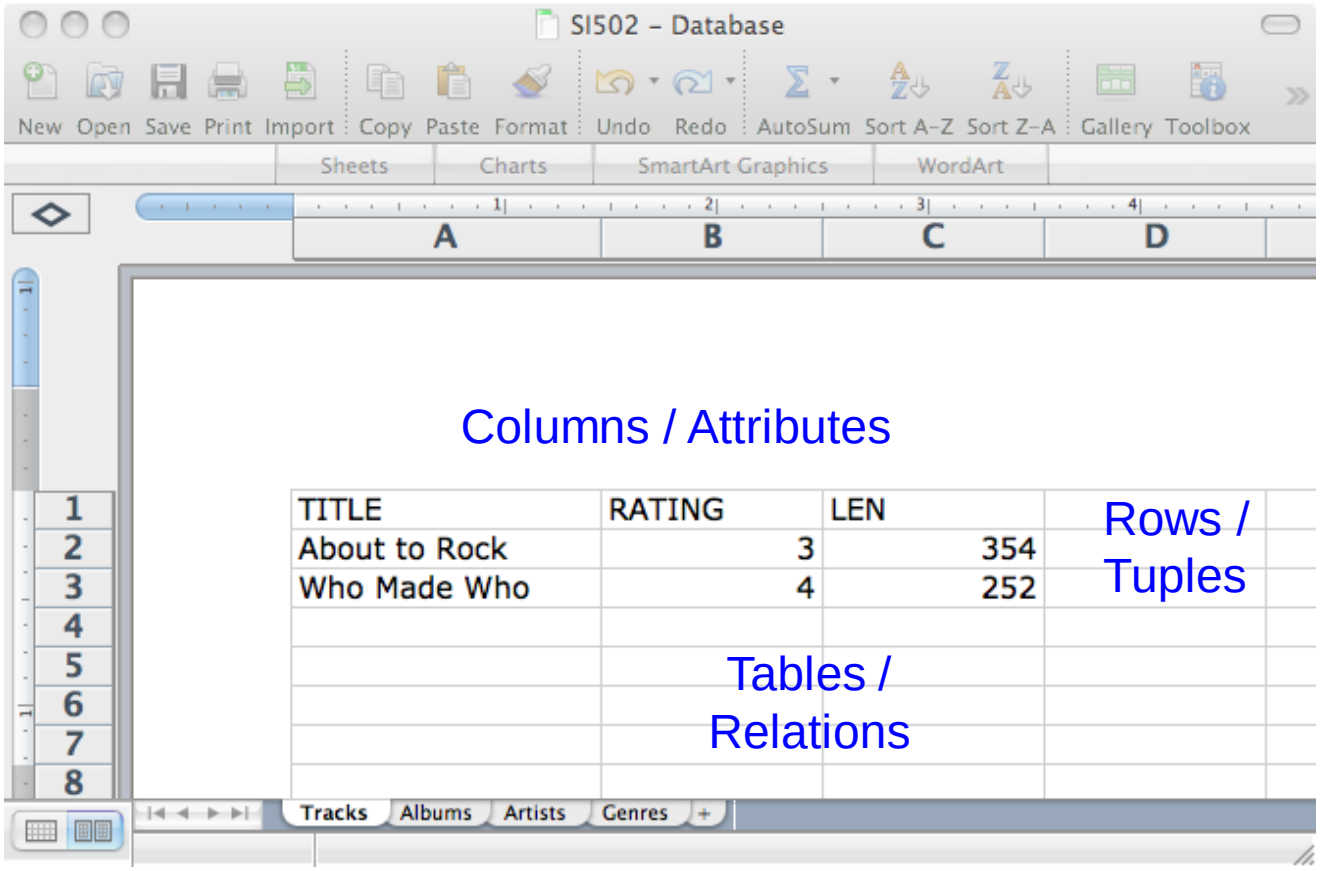
Relation (or table) - contains tuples and attributes

Tuple (or row) - a set of fields that generally represents an “object” like a person or a music track

Attribute (also column or field) one of possibly many elements of data corresponding to the object represented by the row



A relation is defined as a set of tuples that have the same attributes. A tuple usually represents an object and information about that object. Objects are typically physical objects or concepts. A relation is usually described as a table, which is organized into rows and columns. All the data referenced by an attribute are in the same domain and conform to the same constraints. (Wikipedia)

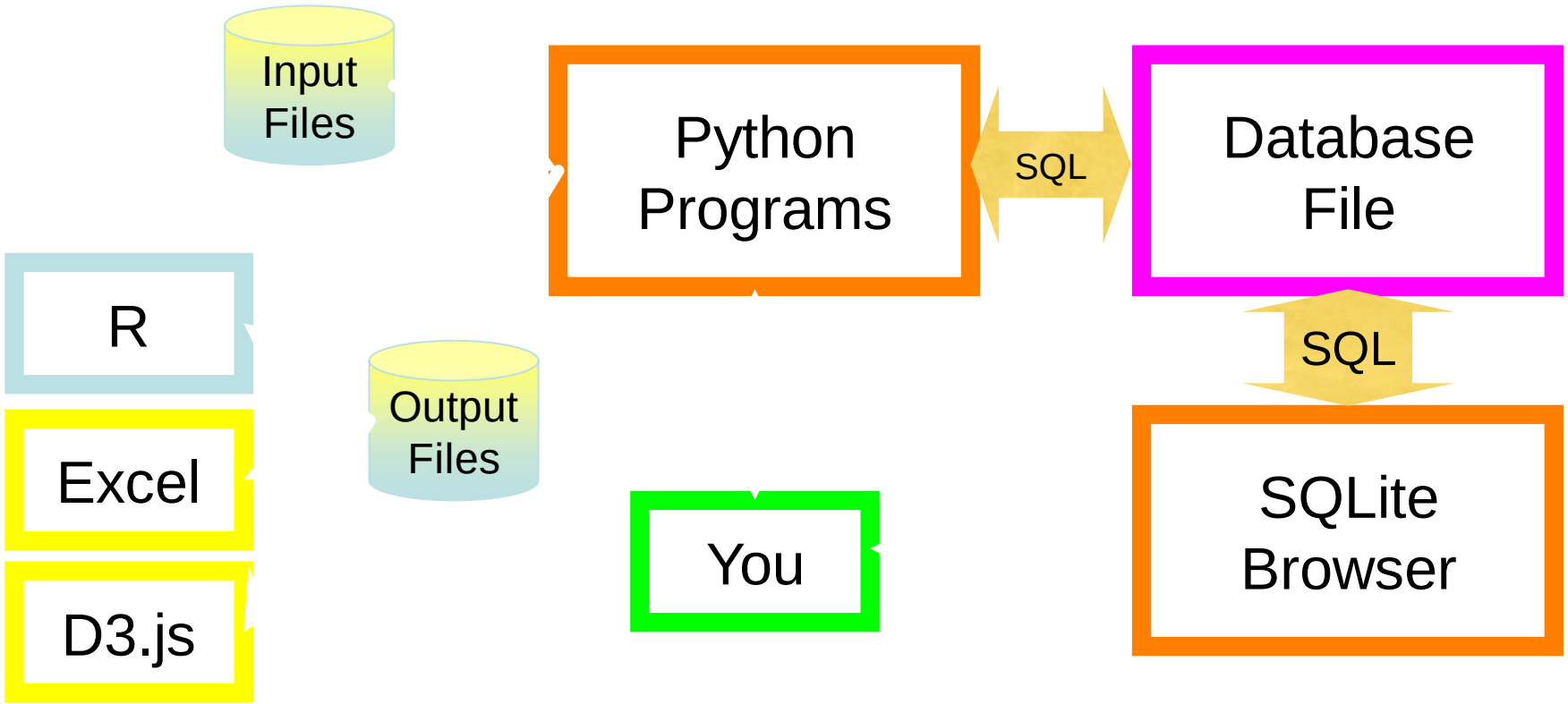

SI502 – Database
New Open Save Print Import Copy Paste Format Undo Redo AutoSum Sort A-Z Sort Z-A Gallery Toolbox
Sheets Charts SmartArt Graphics WordArt
A B C D
Columns / Attributes
TITLE RATING LEN
About to Rock 3 354
Who Made Who 4 252
Rows / Tuples
Tables / Relations
Tracks Albums Artists Genres

SQL

Structured Query Language is the language we use to issue commands to the database

- Create data (a.k.a Insert)
- Retrieve data
- Update data
- Delete data

http://en.wikipedia.org/wiki/SQL


Input Files
Python Programs
SQL
Database File
R
Output Files
SQL
Excel
You
SQLite Browser
D3.js

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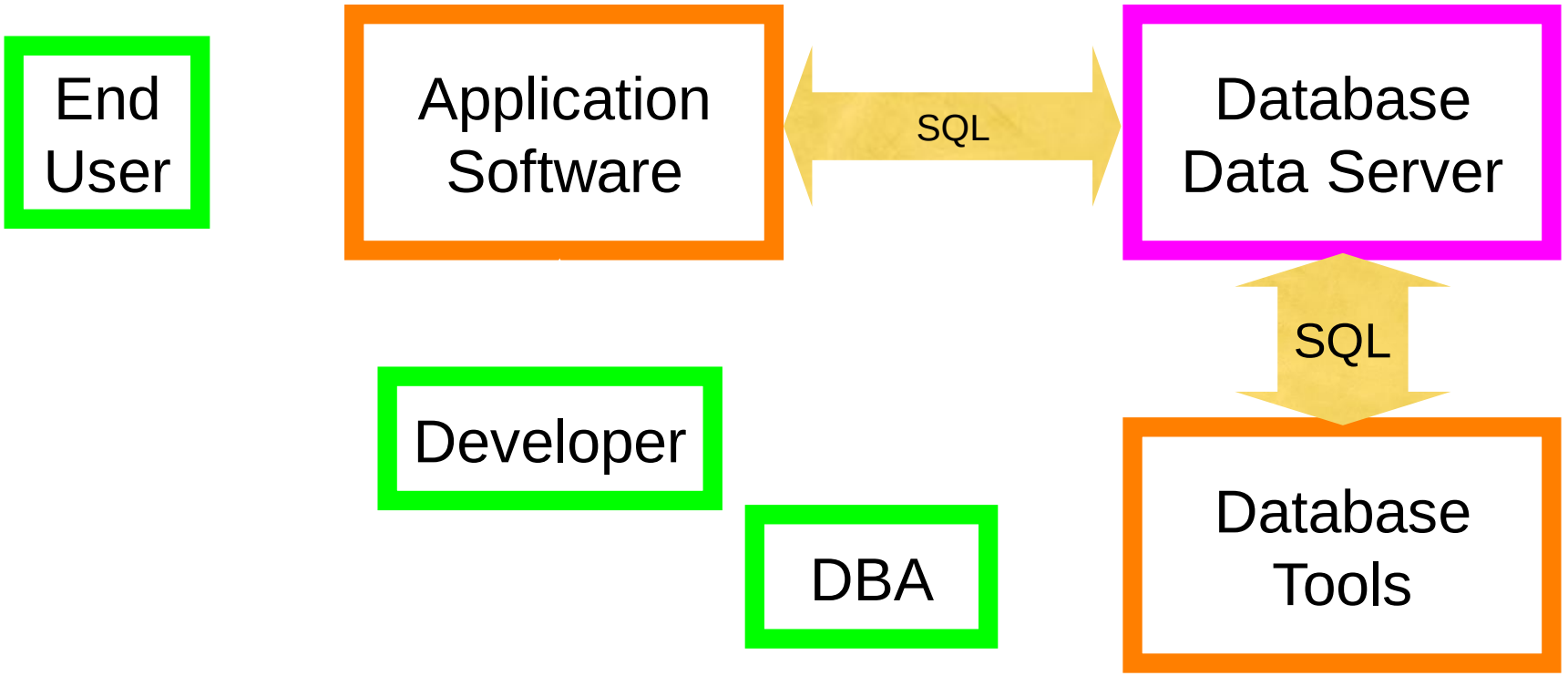
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SQL: Insert

Câu lệnh INSERT Chèn 1 dòng vào bảng

```
INSERT INTO HocVien (HoTen, DienThoai)
    VALUES (‘Nhất Nghệ', '028393 22735')
```

SQL: Delete

Xóa các dòng dựa vào điều kiện chọn

```
DELETE FROM HocVien
WHERE DienThoai='0909123456'
```

SQL: Update

Cập nhật một/một vài cột theo điều kiện

```
UPDATE HocVien SET HoTen='Hồng Anh'
WHERE MaHV=3
```

Retrieving Records: Select

The select statement retrieves a group of records - you can either retrieve all the records or a subset of the records with a WHERE clause

```
SELECT * FROM HocVien
SELECT * FROM HocVien
WHERE DienThoai='0909123456'
```

Sắp xếp với ORDER BY

Sử dụng ORDER BY ở câu lệnh SELECT để lấy kết quả có sắp xếp tăng hay giảm dần theo điều kiện nào đó.

```
SELECT * FROM HocVien ORDER BY HoTen
```

```
SELECT * FROM HocVien ORDER BY DienThoai DESC
```

Python vs SQLite

- Chèn thư viện:

```
import sqlite3
```

- Mở database để thao tác:

```
MyDB=sqlite3.connect('NhatNgheDB.db')
```

→ trả về đối tượng Connection

Đối tượng cursor()

- Đối tượng này trỏ tới các bảng ghi (records/rows) trong tập dữ liệu lấy về và thực thi các câu truy vấn

```
import sqlite3

MyDB = sqlite3.connect('N:\\NhatNgheDb.db')

c = MyDB.cursor()
```

Thực thi truy vấn – execute()

Cú pháp: cursor.**execute**()

Ví dụ: Câu lệnh DDL tạo bảng

```
#create a table of students
c.execute('''
CREATE TABLE HocVien
(
      MaHV text PRIMARY KEY,
      HoTen text,
      DienThoai text,
      NgaySinh date,
      Email text
)
''')
```

Thực thi truy vấn – execute()

Cú pháp: cursor.**execute**()

Ví dụ: Câu lệnh DDL tạo mới dữ liệu

```
#insert data into our table
c.execute('''INSERT INTO HocVien
VALUES ('001','Hien Luong', '0909009900',
    '1/1/1981','hyhien@gmail.com')
''')
```

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Chú ý

Sử dụng hàm **commit()** để lưu các thay đổi và sử dụng hàm **close()** để đóng kết nối.

```
#insert data into our table
c.execute('''INSERT INTO HocVien
VALUES ('001','Hien','Luong','1/1/1981','11W')''')

#Save changes using the commit() function
MyDB.commit()

#Close the database connection
MyDB.close()
```

Phương thức executemany()

- Cho phép thực thi nhiều câu lệnh SQL cùng một lúc
- Ví dụ:

```
products = (
    (1, 'Ti vi', 1234),
    (2, 'Máy giặt', 5712),
    (3, 'Điều hòa', 9000),
    (4, 'Volvo', 29000),
    (5, 'Bentley', 350000),
    (6, 'Hummer', 41400),
    (7, 'Volkswagen', 21600)
)
cursor.executemany("INSERT INTO HangHoa VALUES(?, ?, ?)", products)
```

Truy vấn lấy dữ liệu - SELECT

- Bước 1:

  cursor.**execute**("SELECT statement")

- Bước 2:

  data = cursor.**fetchone()**

  rows = cursor.**fetchall()**

- Bước 3:

  for row in rows:

    print(row)

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Xem thêm

- https://www.sqlitetutorial.net/
- https://www.sqlitetutorial.net/sqlite-python/
- https://www.datacamp.com/community/tutorials/sqlite-in-python