

Lab 4

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Part 1: SQLite using Terminal and SQL

Creating tables

```
sqlite> CREATE TABLE Course (
...>     course_id INTEGER PRIMARY KEY,
...>     course_code TEXT UNIQUE NOT NULL,
...>     course_name TEXT NOT NULL,
...>     credits INTEGER NOT NULL CHECK (credits > 0)
...> );
sqlite> CREATE TABLE Enrollment (
...>     student_id INTEGER NOT NULL,
...>     course_id INTEGER NOT NULL,
...>     enrollment_date TEXT NOT NULL,
...>     PRIMARY KEY (student_id, course_id),
...>     FOREIGN KEY (student_id) REFERENCES Student(student_id),
...>     FOREIGN KEY (course_id) REFERENCES Course(course_id)
...> );
```

```
sqlite> CREATE TABLE student (
...>     student_id INT PRIMARY KEY,
...>     first_name VARCHAR(50) NOT NULL,
...>     email VARCHAR(100) NOT NULL UNIQUE,
...>     major VARCHAR(50) NOT NULL
...> );
sqlite>
sqlite> INSERT INTO student (student_id, first_name, email, major)
...> VALUES
...> (1001, 'Alice', 'alice.johnson@university.edu', 'Computer Science'),
...> (1002, 'Bob', 'bob.smith@university.edu', 'Mathematics'),
...> (1003, 'Carol', 'carol.nguyen@university.edu', 'Physics'),
...> (1004, 'David', 'david.martinez@university.edu', 'Computer Science'),
...> (1005, 'Emma', 'emma.brown@university.edu', 'Biology');
```

Inserting values

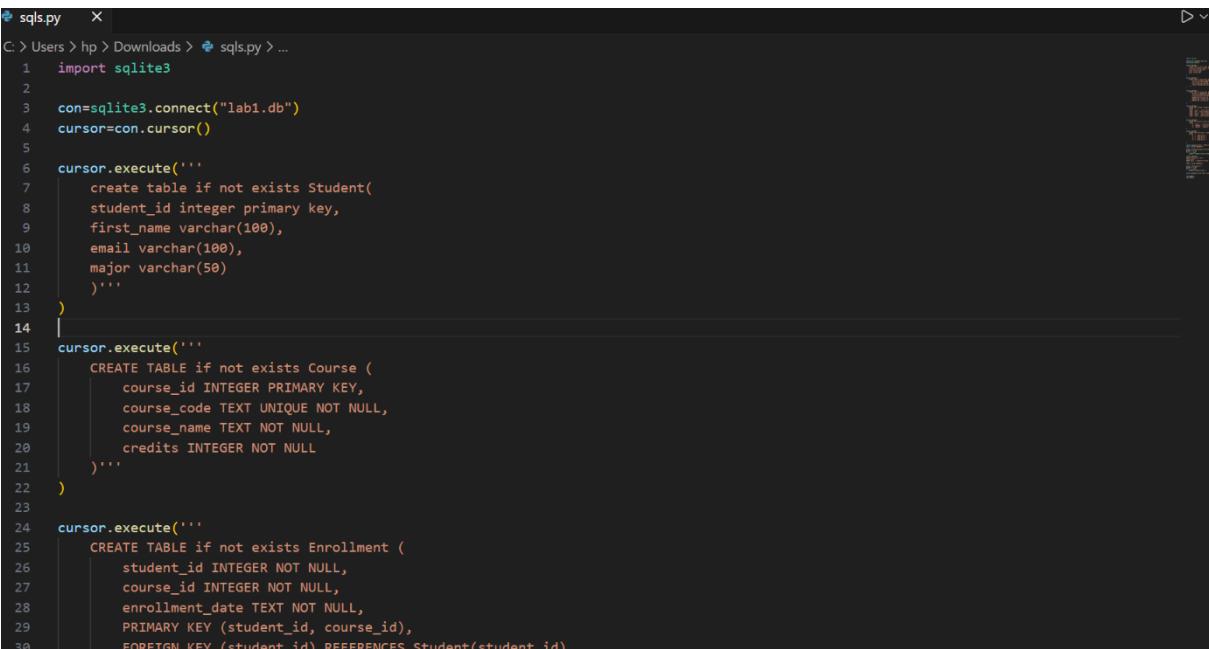
```
:sqlite> select * from student;
|001|Alice|alice.johnson@university.edu|Computer Science
|002|Bob|bob.smith@university.edu|Mathematics
|003|Carol|carol.nguyen@university.edu|Physics
|004|David|david.martinez@university.edu|Computer Science
|005|Emma|emma.brown@university.edu|Biology
:sqlite> INSERT INTO Course (course_id, course_code, course_name, credits)
...>     VALUES
...>     (1, 'CS101', 'Introduction to Computer Science', 3),
...>     (2, 'MATH201', 'Calculus I', 4),
...>     (3, 'ENG150', 'Academic Writing', 2);
:sqlite> INSERT INTO Enrollment (student_id, course_id, enrollment_date)
...>     VALUES
...>     (1, 1, '2025-01-10'),
...>     (1, 2, '2025-01-10'),
...>     (2, 1, '2025-01-11'),
...>     (3, 3, '2025-01-12');
:sqlite> ALTER TABLE Student
...>     ADD COLUMN date_of_birth TEXT;
:sqlite> select * from Course
...> ;
|CS101|Introduction to Computer Science|3
|MATH201|Calculus I|4
|ENG150|Academic Writing|2
:sqlite> select * from Enrollment;
|1|2025-01-10
|2|2025-01-10
|1|2025-01-11
|3|2025-01-12
```

Altering tables and sql commands

```
sqlite> ALTER TABLE Student
...> ADD COLUMN date_of_birth TEXT;
sqlite> select * from Course
...> ;
1|CS101|Introduction to Computer Science|3
2|MATH201|Calculus I|4
3|ENG150|Academic Writing|2
sqlite> select * from Enrollment;
1|1|2025-01-10
1|2|2025-01-10
2|1|2025-01-11
3|3|2025-01-12
sqlite> select * from student
...> ;
1001|Alice|alice.johnson@university.edu|Computer Science|
1002|Bob|bob.smith@university.edu|Mathematics|
1003|Carol|carol.nguyen@university.edu|Physics|
1004|David|david.martinez@university.edu|Computer Science|
1005|Emma|emma.brown@university.edu|Biology|
sqlite> .header on
sqlite> select * from student;
student_id|first_name|email|major|date_of_birth
1001|Alice|alice.johnson@university.edu|Computer Science|
1002|Bob|bob.smith@university.edu|Mathematics|
1003|Carol|carol.nguyen@university.edu|Physics|
1004|David|david.martinez@university.edu|Computer Science|
1005|Emma|emma.brown@university.edu|Biology|
sqlite> UPDATE Student
...> SET date_of_birth = '2002-05-14'
...> WHERE student_id = 1;
sqlite> select * from student;
student_id|first_name|email|major|date_of_birth
1001|Alice|alice.johnson@university.edu|Computer Science|
1002|Bob|bob.smith@university.edu|Mathematics|
1003|Carol|carol.nguyen@university.edu|Physics|
1004|David|david.martinez@university.edu|Computer Science|
1005|Emma|emma.brown@university.edu|Biology|
sqlite> UPDATE Student
...> SET date_of_birth = '2002-05-14'
...> WHERE student_id = 1001;
sqlite> select * from student;
student_id|first_name|email|major|date_of_birth
1001|Alice|alice.johnson@university.edu|Computer Science|2002-05-14
1002|Bob|bob.smith@university.edu|Mathematics|
1003|Carol|carol.nguyen@university.edu|Physics|
1004|David|david.martinez@university.edu|Computer Science|
1005|Emma|emma.brown@university.edu|Biology|
```

```
sqlite> select * from student where student_id > 1002;
student_id|first_name|email|major|date_of_birth
1003|Carol|carol.nguyen@university.edu|Physics|
1004|David|david.martinez@university.edu|Computer Science|
1005|Emma|emma.brown@university.edu|Biology|
sqlite>
```

Part 2: Using python



```
sqls.py  X | C: > Users > hp > Downloads > sqls.py > ...
1 import sqlite3
2
3 con=sqlite3.connect("lab1.db")
4 cursor=con.cursor()
5
6 cursor.execute('''
7     create table if not exists Student(
8         student_id integer primary key,
9         first_name varchar(100),
10        email varchar(100),
11        major varchar(50)
12     )'''
13 )
14
15 cursor.execute('''
16     CREATE TABLE if not exists Course (
17         course_id INTEGER PRIMARY KEY,
18         course_code TEXT UNIQUE NOT NULL,
19         course_name TEXT NOT NULL,
20         credits INTEGER NOT NULL
21     )'''
22 )
23
24 cursor.execute('''
25     CREATE TABLE if not exists Enrollment (
26         student_id INTEGER NOT NULL,
27         course_id INTEGER NOT NULL,
28         enrollment_date TEXT NOT NULL,
29         PRIMARY KEY (student_id, course_id),
30         FOREIGN KEY (student_id) REFERENCES Student(student_id)
```

```
File Edit Selection View Go ... < > Search

sqls.py x

C: > Users > hp > Downloads > sqls.py > ...

30     FOREIGN KEY (student_id) REFERENCES Student(student_id),
31     FOREIGN KEY (course_id) REFERENCES Course(course_id)
32 )
33 """
34
35 cursor.execute('''
36     INSERT INTO student (student_id, first_name, email, major)
37     VALUES
38         (1001, 'Alice', 'alice.johnson@university.edu', 'Computer Science'),
39         (1002, 'Bob', 'bob.smith@university.edu', 'Mathematics'),
40         (1003, 'Carol', 'carol.nguyen@university.edu', 'Physics'),
41         (1004, 'David', 'david.martinez@university.edu', 'Computer Science'),
42         (1005, 'Emma', 'emma.brown@university.edu', 'Biology')'''
43 )
44
45 cursor.execute('''
46     INSERT INTO Course (course_id, course_code, course_name, credits)
47     VALUES
48         (1, 'CS101', 'Introduction to Computer Science', 3),
49         (2, 'MATH201', 'Calculus I', 4),
50         (3, 'ENG150', 'Academic Writing', 2)'''
51 )
52
53 cursor.execute('''
54     INSERT INTO Enrollment (student_id, course_id, enrollment_date)
55     VALUES
56         (1, 1, '2025-01-10'),
57         (1, 2, '2025-01-10'),
58         (2, 1, '2025-01-11'),
59         (3, 3, '2025-01-12')
```

The screenshot shows a Python code editor with a dark theme. The file 'sqls.py' is open, containing the following code:

```
File Edit Selection View Go ... ⏪ Search ↻ 🔍 sqls.py x C: > Users > hp > Downloads > sqls.py > ... 62 63 cursor.execute("SELECT * FROM Student") 64 rows = cursor.fetchall() 65 66 print("ID\tName\tEmail\t\tMajor") 67 print("-" * 70) 68 for r in rows: 69 | print(f"{r[0]}\t{r[1]}\t{r[2]}\t{r[3]}") 70 71 cursor.execute(""" 72 SELECT first_name, major 73 FROM Student 74 WHERE major = 'Computer Science' 75 """) 76 rows = cursor.fetchall() 77 78 print("\nName\tMajor") 79 print("-" * 30) 80 for r in rows: 81 | print(f"{r[0]}\t{r[1]}") 82 83 cursor.execute("ALTER TABLE Student ADD COLUMN phone VARCHAR(15)") 84 85 con.commit() 86 con.close()
```

The status bar at the bottom shows the following information: 27°C, Mostly cloudy, Ln 14, Col 1, Tab Size: 4, UTF-8, LF, Python, 3.11.9 64-bit (Microsoft Store), ENG IN, 08-02-2026, 14:56.

```
PS C:\Users\hp\downloads> python sqls.py
ID      Name           Email            Major
-----
1001    Alice   alice.johnson@university.edu  Computer Science
1002    Bob     bob.smith@university.edu    Mathematics
1003    Carol   carol.nguyen@university.edu  Physics
1004    David   david.martinez@university.edu Computer Science
1005    Emma    emma.brown@university.edu    Biology

Name    Major
-----
Alice   Computer Science
David   Computer Science
PS C:\Users\hp\downloads>
```