CMPSC 312
Database Systems
Spring 2019

Lab 4 Assignment:
Coding Abstraction for Sql Interaction
Submit deliverables through your assignment GitHib repository.
Place source code in `src/` directory

Objectives

To learn how to write code in Python to automate database management. Your program will ask for user input and then will create the correct commands to pass to the `sqlite3` library for making insertions and table edits. Your working database will be the campus database for which you have a build file.

GitHub Starter Link

https://classroom.github.com/a/X2eIRdHL

To use this link, please follow the steps below.

- Click on the link and accept the assignment
- Once the importing task has completed, click on the created assignment link which will take you to your newly created GitHub repository for this lab,
- Clone this repository (bearing your name) and work locally
- As you are working on your lab, you are to commit and push regularly. The commands are the following.
  - `git add -A`
  - `git commit -m ‘‘Your notes about commit here’’`
  - `git push`

Introduction

The term, *abstraction* is commonly used in computer science to describe the simplicity created by a program that does something very complicated. This simplicity may result from a software that is able automate complicated tasks by preparing relevant software code or, by writing and inputting instructions for the task. Such software may be necessary to help computer users who many not have much experience with a particular type of software used to complete the operations that they submit.

When working with databases, it is common to see types of software working to abstract the tasks of control, updating and maintenance. The abstraction software works by taking simple user-instructions and then translates them into the database's language for execution. Abstraction software allows all users to be *expert* coders of the database's language since they are no longer required to know all the syntax of the language itself, only what the task is to do. Furthermore, we note that having software help to produce the correct code helps to complete database maintenance in less time since there is less code to that the user has to submit.

In our recent course lessons, we spent some time to write Python code to connect with a SQlite3 database and make queries and insertions. In this lab, you are to reuse and modify this code to assist in **inserting data** and also in **editing data** of tables in the database. Our database will be the campus database for which you have the build file from class. In case the database is accidentally destroyed during your testing, you can use the build file to re-create the whole base.

The user of your program will never need to know how to write SQL code to work with the SQL database. Instead, all the user has to do is to answer a series of questions and the program will do the requested work. These questions determine which table to edit, and what attributes are involved. If your program is inserting data, then, again, it will pose appropriate questions to determine how to make the insertion correctly.

To interact with the user, you will have to use the `input()` command from python to gather user input to know what to do to the database. You are free to be creative in determining how your program with get its inputs. Some of the information that your program will have to manage is the following.

- **Inserting data into a table**
- Sample code: `INSERT INTO TableName VALUES ('X','Y')`
  - Which table gets the insertion
  - Which attributes are being added. Note, for this, you will have to find a way of allowing the user to indicate all necessary attributes to insert into a table.
- **Editing data of a table**:
- Sample code: `UPDATE TableName SET attrib= 'X' WHERE attrib == 'Y'"`
  - Which table to edit
  - What is the old data
  - What is the new data

Sample Output

```
## Sample Output
For both the INSERT and the Editing of data,
your program should have a similar function
to the one shown below.
```

Sample program usage:

```
python3 myQueryProgram.py

Welcome to my database automation program!
Enter table name: Instructor
 + Note: There are < 5 > attributes associated with table < instructor >.

Enter ID value       : 11111
Enter name value     : Stephenson
Enter student value  : S13
Enter deptName value : CompBio
Enter salary value   : 120000

 + Instructor table BEFORE insert:
       ...

 + Instructor table AFTER insert:
11111|Stephenson|S13|CompBio|120000

End of program
```

Tasks

- **Coding**: You are to write a working Python program that your instructor will be able to run to grade your work. Your code is to conduct Insert and Edit statements into the campus database that we have been using in class. Use the source code from class, as well as your handouts and slides from class for reference.

    1. **Table Query**: You are to create a method in your code to run a general query of a user-requested table (`select * from table`). This will be used to show the contents before and after each table modification to show changes.
    2. **Insert**: Ask the user which table, and what corresponding data, to insert into the database. Note, each table will need to have data entered for each of its attributes. Your program will have to ask for user input on each attribute. See the example code in your assignment repository for an idea.
    3. **Edit**: Ask the user which table, and what corresponding data, to edit in the database. You will again need to know which table to work with and what data is to be replaced by new data. It is up to your creativity to solve these types of issues throughout the code.

1 Summary of the Required Deliverables

1. Update the given file `src/myQueryProgram.py` with the necessary code to connect with your database file and enable the inserts and queries. This source code should be free of bugs and be ready-to-run to show your queries and updates.

2. The output file `src/myOutput.md` of running your program. For this part, you are to describe how the program looks as it is running by copying and pasting the program's output contents into your markdown file.

In adherence to the Honor Code, students should complete this assignment on an individual basis. While it is appropriate for students in this class to have high-level conversations about the assignment, it is necessary to distinguish carefully between the student who discusses the principles underlying a problem with others and the student who produces assignments that are identical to, or merely variations on, someone else's work. Deliverables that are nearly identical to the work of others will be taken as evidence of violating Allegheny College's Honor Code.