Tutorial on how to Use SQLite3 to incorporate a SQL database right inside Python.

– In this tutorial you will learn how to develop a database system in python using the “sqlite3” package – with a GUI interface using the “tkinter” package.

– The first thing you need to do is to install and import the sqlite3 package in your python development environment. You will also need to import the tkinter, pandas, and numpy packages.

– Then you need to create a connection for your sqlite3 database with the sqlite3.connect command. This takes as an argument the string of the name of the file to which you want to store the data, followed by the “.db” file extension.

– Next you need to open a cursor to write into the database file. Once you have this all set up, you are ready to begin writing your SQL statements to create your database right in python.

– In this example, I have developed a database of whales that have been tagged with GPS sensors to keep track of their location throughout their life. This way scientists can learn more about their behavior and discover new ways to care for our worlds largest mammals. In this database we will have two tables

– Table whales includes tracking number, length, weight, latitude, longitude, species and body of water.

– Table waters includes the name of the body of water, its average depth, and whether it has saltwater or freshwater.

– You use the cursor.execute python statement to run the SQL commands and queries. They can either be in the form of a doc- string – inside 3 quotation marks – or just as a string inside one quotation mark.

– To create a database in SQL you first create all the tables you will need by issuing the “CREATE TABLE” command.

– Within the create table command you set up all the columns of your table, what type of variable they will be – and, in the case of strings, how long they can be.

– You can also set up some key constraints using the primary key & foreign key commands.

– Finally, you can use the insert into command to add entries into the database tables that you created. These are just some sample entries to get an interesting data set for us to query later. Don’t forget to put a semi-colon at the end of the SQL statements before closing the quotation or doc-string.

– To execute the SQL, you can either – pass the sql string directly into the cursor.execute statement, or you can pass a variable that is equal to the string or doc-string that is the sql statement into it.

– When these SQL statements execute they set up the database.

– In the next part of the program, I have set up the GUI interface using the “tkinter” package which should already be installed with python. You set up a class and initialize it. Then read the data from the prompts.

– To set up the class I initialize it with the infrastructure for all the windows, frames, labels, prompts and buttons you need to capture new values in the database. In this case I made this window to take values of new whales that are being tracked. You will also need to pack each of the labels, buttons, and prompts into the frames and each frame into the window.

– In the “enter” method you: 1) Read in all the values from the prompts, 2) Enter them into the SQL statement and then 3) Clear all the values so that more different values can be entered.

– Show the GUI

– The real power of the database comes in the queries or – Select – statements.

– You can select based upon any one of the columns in a table as seen in this statement, and can answer questions like what is the average length of the blue whales in the database? And there is the result of this query.

– You can also join two or more tables to get *more* interesting information, to answer the question What whales have unsafely navigated into fresh water environments? There is the result.

– Finally you can drop tables if desired, but you should be sure to commit transactions to the database and close the connection within your program.

– run program – **** – Insert Data – **** – Show results – **** – Drop Tables if desired

– I hope that this has given you some ideas about how you might use SQL in python. If you have questions let me know. Thank You.

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INSERT INTO WHALES:
9, 21, 10, 77.5311,43.9969, “Beluga”,“Great_Lakes”

Code can be found at: https://github.com/mgolferk/Data_Lab_DB_Tutorial.