
Applied Cyber Security

Programming

Assignment 1



Module Code: IY1S408

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Release Date: 10th October, 2022

Submission Date: 13th January 2023




Introduction

To create a to-list for personal tasks. Due to this development of a to-do list written in Python. Will be done to ensure tasks are being documented.

Aims

- ☐ 1.500 word Technical Report
- ☐ Python Application (To-Do Tasks App)
- ☐ Make the program secure



In order to ensure that the tasks will be catalogued, the program will have to design a python application which stores the data in an SQL database as it is a good way of sorting data like this. The database will also need to be password protected to strengthen the security.

Software Development Life Cycle

The life cycle goes as followed: Requirements → System design → Development → Testing → Deployment and Maintenance.

Software Life Cycle Models are categorised into two categories: heavyweight(Predictive) and Lightweight (Adaptive/Agile).

Predictive

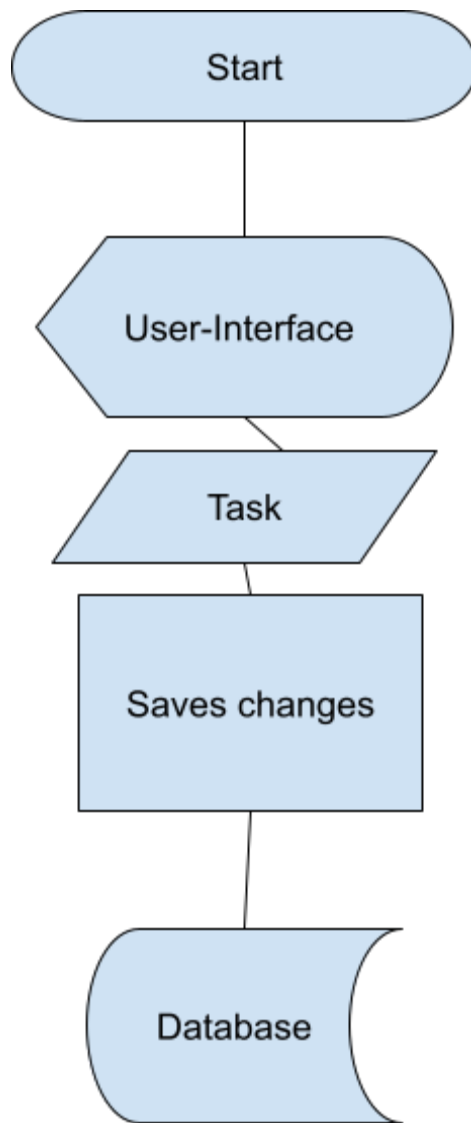
The predictive method is your traditional waterfall method where you complete each step 3 and then continue on. All requirements of each step need to be met before continuing on to the next step. The advantage of this is that you know that each step is fully done and therefore you can move on without worry however due to the nature of this it does result in a longer development cycle.

Agile

Agile is a forward thinking approach to development that is different from the waterfall approach. Rather than completing each stage fully, agile iterative development results in a barebone product, known as a Minimum Viable Product (MVP). This would be very much like a game coming out but lacking the multiplayer on day one and updates will come improving the controls and adding new features.

The goal of Agile is the simplest that people want to use or can fully utilise to their needs. Once the product has been released developers will continue applying the Agile methodology by fixing bugs, sending out updates and patches, making improvements and adding new features.

Flow Chart



Prototype Coding Stage

Pseudocode

#password protection

username is "1234"

password = "password"

user's input(*Enter username*)

Userpass is input(*Enter password*)

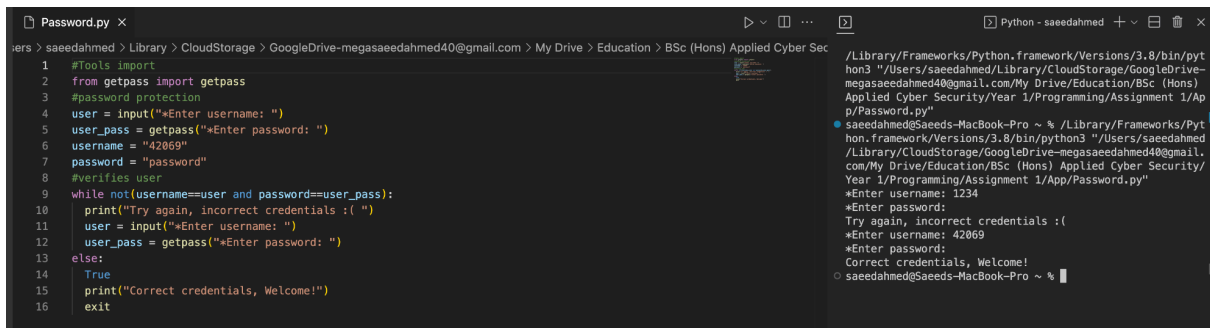
#verifies user

if not(*username equal to user and password equal to userpass*):

print("Try again, incorrect credentials :(")

Exit

Coding



The screenshot shows a Python script named 'Password.py' in a code editor. The script implements a password protection system. It imports 'getpass' from 'getpass', sets a username of '42069' and a password of 'password'. It then enters a loop where it prompts the user for their username and password. If the entered credentials do not match the stored ones, it prints 'Try again, incorrect credentials :(' and loops back. If they match, it prints 'Correct credentials, Welcome!' and exits. The terminal output on the right shows the script being run, with the user entering '1234' for the username and '42069' for the password, resulting in the 'Try again, incorrect credentials :(' message.

```
1 #Tools import
2 from getpass import getpass
3 #password protection
4 user = input("Enter username: ")
5 user_pass = getpass("Enter password: ")
6 username = "42069"
7 password = "password"
8 #verifies user
9 while not(username==user and password==user_pass):
10     print("Try again, incorrect credentials :( ")
11     user = input("Enter username: ")
12     user_pass = getpass("Enter password: ")
13 else:
14     True
15     print("Correct credentials, Welcome!")
16     exit
```

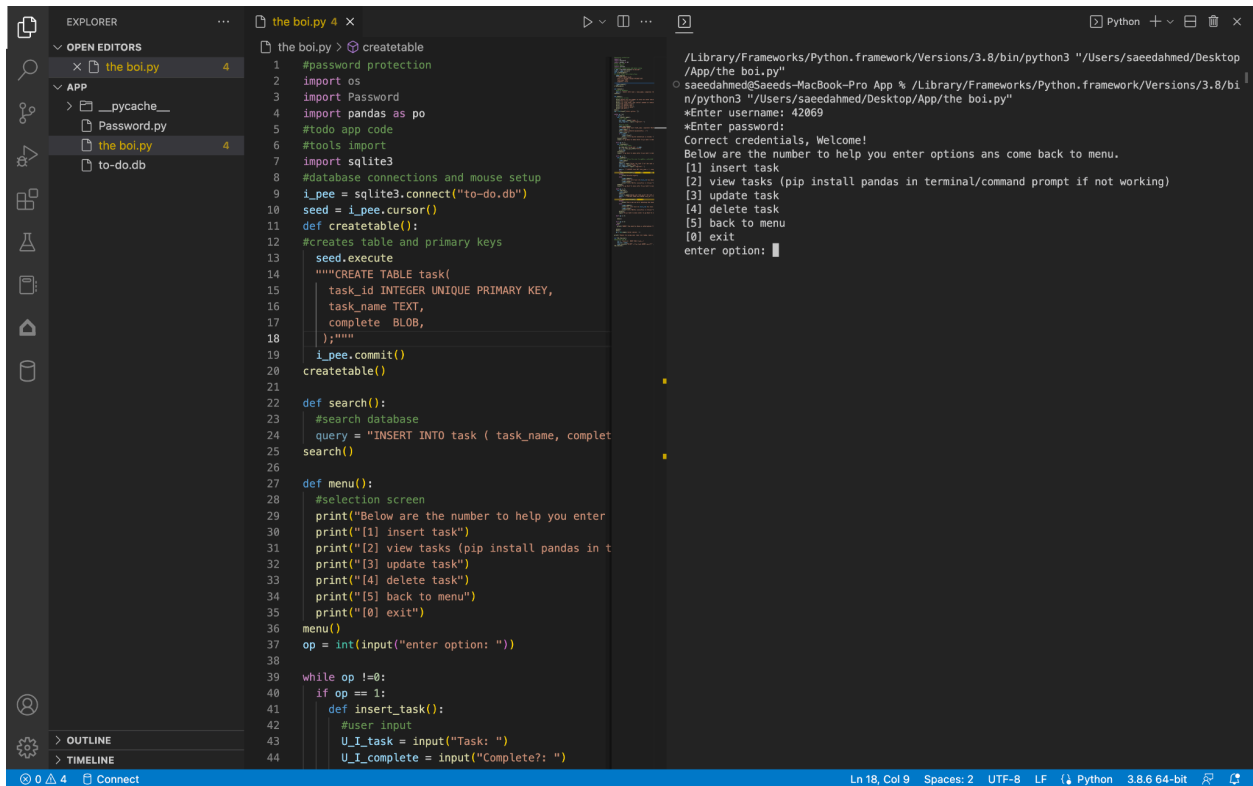
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saeedahmed@Saeeds-MacBook-Pro ~ % /Library/Frameworks/Python.framework/Versions/3.8/bin/python3 ~/Library/CloudStorage/GoogleDrive-megasaeedahmed40@gmail.com/My Drive/Education/BSc (Hons) Applied Cyber Security/Year 1/Programming/Assignment 1/App/Password.py
*Enter username: 1234
*Enter password:
Try again, incorrect credentials :(
*Enter username: 42069
*Enter password:
Correct credentials, Welcome!
saeedahmed@Saeeds-MacBook-Pro ~ %
```

To ensure certain tasks which the user needs to do such as getting a person a present is kept secret, a password protect was implemented. In this the user enters their username and password. If those credentials are not matching then the user will get a message as seen in the image above. This is a separate program which gets imported in to ensure that no confusion is presented.

```
1 #password protection
2 import os
3 import Password
4 #todo app code
5 #tools import
6 import sqlite3
7 #user input for later
8 def user_input():
9     U_I_task = input("Task: ")
10    U_I_complete = input("Complete?: ")
11    #database connections and mouse setup
12    i_pee = sqlite3.connect(todo.db)
13
14    seed = i_pee.cursor()
15    def createtable():
16        #creates table and primary keys
17        """CREATE TABLE task (
18            task_id INTEGER PRIMARY KEY AUTOINCREMENT UNIQUE,
19            task_name TEXT,
20            complete BOOLEAN
21        );"""
22        i_pee.commit()
23    def tasks():
24        #insert tasks
25        seed.executemany("INSERT INTO task (task_name, complete) VALUES (?,?)", (U_I_task, U_I_complete))
26        i_pee.commit()
27        print("Data entered successfully. :)")
28        i_pee.close()
29        if i_pee:
30            i_pee.close()
31            print("\nThe SQLite connection is closed.")
32
33    def search():
34        query = "INSERT INTO task ( task_name, complete) VALUES (?, ?)"
35
36    def update():
37        #This will allow the user to update a selected task with the task id
38        viewtask()
39        TaskID = input("Enter the task ID of the task you wish to update: ")
40        U_I_task = input("Task: ")
41        U_I_complete = input("Complete?: ")
42        query = "UPDATE task SET task_name = ?, complete = ? WHERE task_id = ?"
```

```
1 #password protection
2 import os
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23    def tasks():
24        #insert tasks
25        seed.executemany("INSERT INTO task (task_name, complete) VALUES (?,?)", (U_I_task, U_I_complete))
26        i_pee.commit()
27        print("Data entered successfully. :)")
28        i_pee.close()
29        if i_pee:
30            i_pee.close()
31            print("\nThe SQLite connection is closed.")
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33    def search():
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40        U_I_task = input("Task: ")
41        U_I_complete = input("Complete?: ")
42        query = "UPDATE task SET task_name = ?, complete = ? WHERE task_id = ?"
```

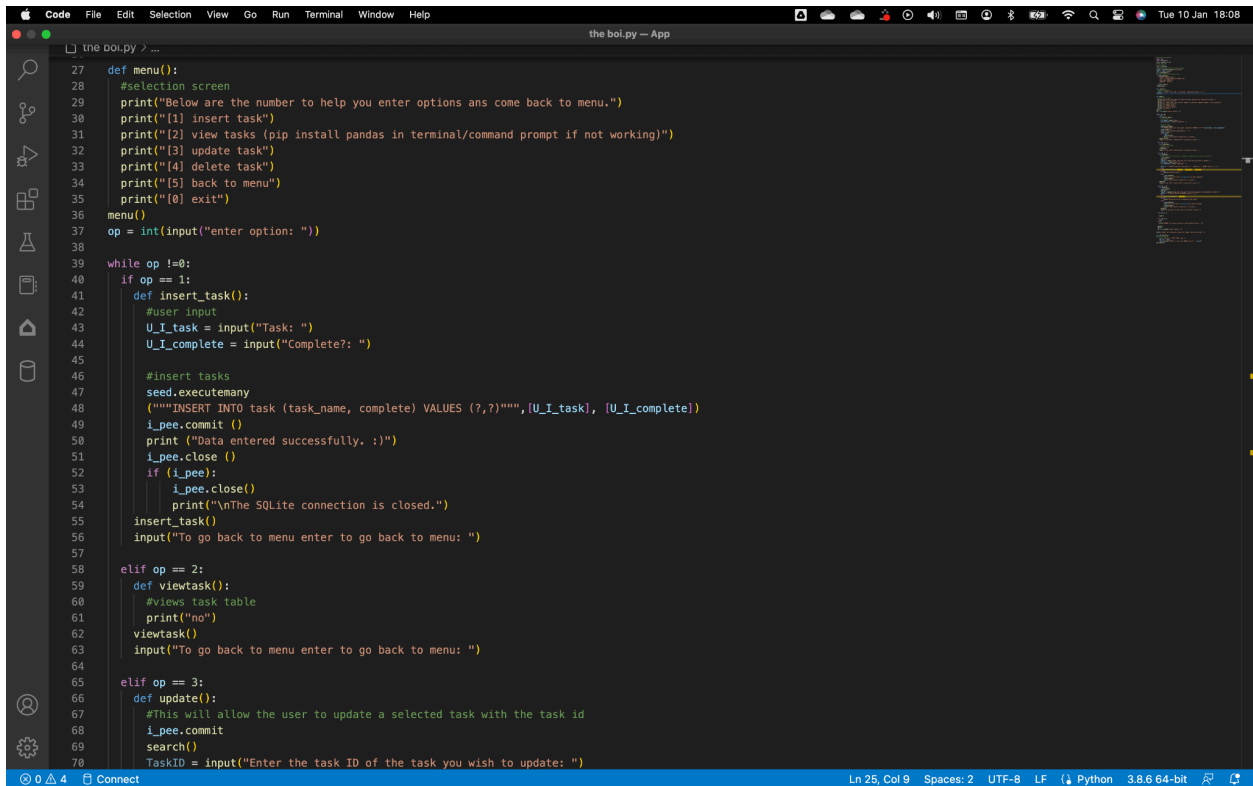
Due to an error of connecting the database file, this could have been due to the use of cloud storage. A second attempt was done with the application on local storage. The results of this showed that. The issue was not due to cloud storage.



```
1 #password protection
2 import os
3 import Password
4 import pandas as po
5 #todo app code
6 #tools import
7 import sqlite3
8 #database connections and mouse setup
9 i_pee = sqlite3.connect("to-do.db")
10 seed = i_pee.cursor()
11 def createtable():
12     #creates table and primary keys
13     seed.execute
14     """CREATE TABLE task(
15         task_id INTEGER UNIQUE PRIMARY KEY,
16         task_name TEXT,
17         complete BLOB,
18     );"""
19     i_pee.commit()
20 createtable()
21
22 def search():
23     #search database
24     query = "INSERT INTO task ( task_name, complet
25     search()
26
27 def menu():
28     #selection screen
29     print("Below are the number to help you enter
30     print("[1] insert task")
31     print("[2] view tasks (pip install pandas in t
32     print("[3] update task")
33     print("[4] delete task")
34     print("[5] back to menu")
35     print("[0] exit")
36
37 menu()
38 op = int(input("enter option: "))
39
40 while op !=0:
41     if op == 1:
42         def insert_task():
43             #user input
44             U_I_task = input("Task: ")
45             U_I_complete = input("Complete?: ")
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```

The screenshot shows a VS Code editor with a file named 'the boi.py' open. The file contains a Python script for a to-do list application. The script includes a menu function that prompts the user to enter an option (0-5). The options are: [1] insert task, [2] view tasks (pip install pandas in terminal/command prompt if not working), [3] update task, [4] delete task, [5] back to menu, and [0] exit. The script also includes a search function and a createtable function. The terminal output shows the execution of the script, including the creation of the database and the execution of the menu function.

After structure in the code into a more organised format, the missing part of the task inserts code with fixed. Thanks to the restructuring of the program a menu was implemented for the sake of ease of use. This vehicle allows the user to have an easier time to update or delete records within the to-do list.



```
27 def menu():
28     #selection screen
29     print("Below are the number to help you enter options ans come back to menu.")
30     print("[1] insert task")
31     print("[2] view tasks (pip install pandas in terminal/command prompt if not working)")
32     print("[3] update task")
33     print("[4] delete task")
34     print("[5] back to menu")
35     print("[0] exit")
36
37 menu()
38 op = int(input("enter option: "))
39
40 while op !=0:
41     if op == 1:
42         def insert_task():
43             #user input
44             U_I_task = input("Task: ")
45             U_I_complete = input("Complete?: ")
46
47             #insert tasks
48             seed.executemany
49             ("""INSERT INTO task (task_name, complete) VALUES (?,?)""" ,[U_I_task], [U_I_complete])
50             i_peek.commit ()
51             print ("Data entered successfully. :)")
52             i_peek.close ()
53             if (i_peek):
54                 i_peek.close()
55                 print("\nThe SQLite connection is closed.")
56             insert_task()
57             input("To go back to menu enter to go back to menu: ")
58
59     elif op == 2:
60         def viewtask():
61             #views task table
62             print("no")
63             viewtask()
64             input("To go back to menu enter to go back to menu: ")
65
66     elif op == 3:
67         def update():
68             #This will allow the user to update a selected task with the task id
69             i_peek.commit
70             search()
71             TaskID = input("Enter the task ID of the task you wish to update: ")
```

The functionality of the menu system is as follows, application loads it will print the following;

“ Below are the numbers to help you enter options and come back to the menu.

[1] insert task

[2] view tasks (pip install pandas in terminal/command prompt if not working)

[3] update task

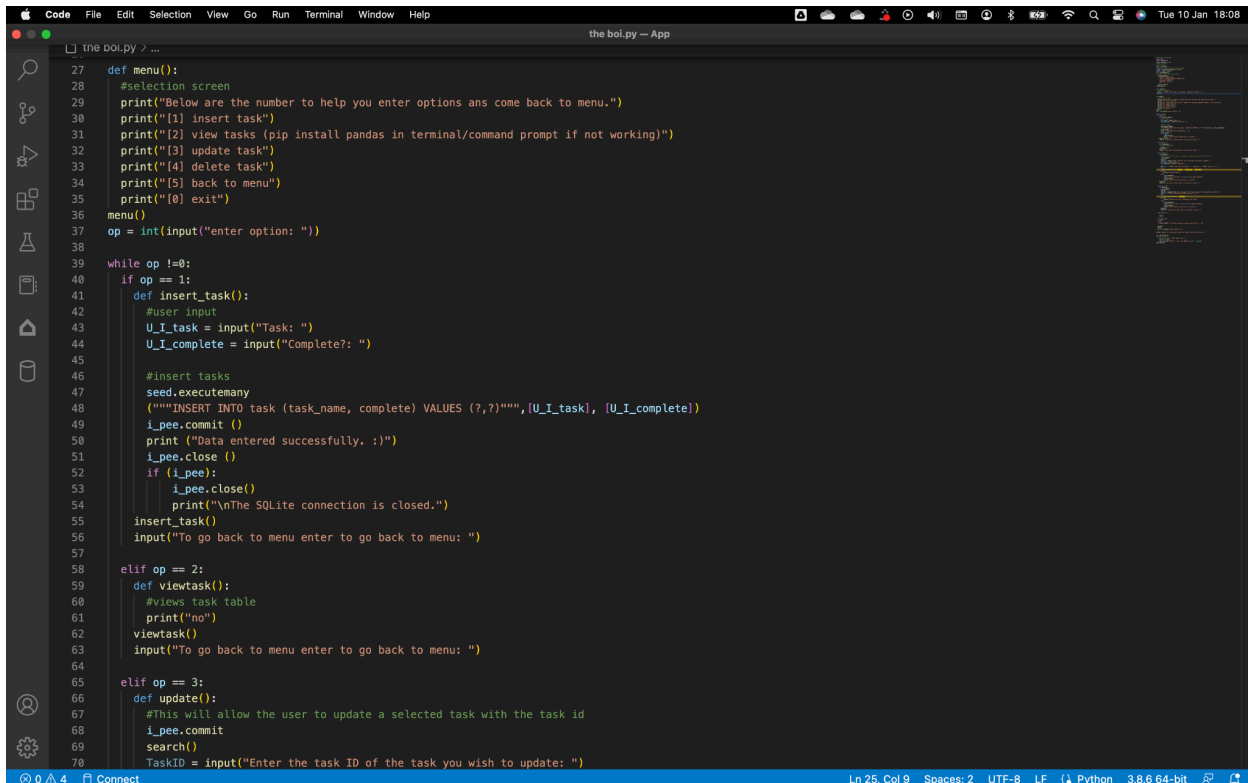
[4] delete task

[5] back to menu

[0] exit

enter option: “

The user would therefore enter one of the numbers listed above for example if they wish to enter a task you would enter one and then it will load into the questions such as what name is a task and is it complete. Once completed with your entry they would press enter on the keyboard and be sent back to the menu where they will select another option.

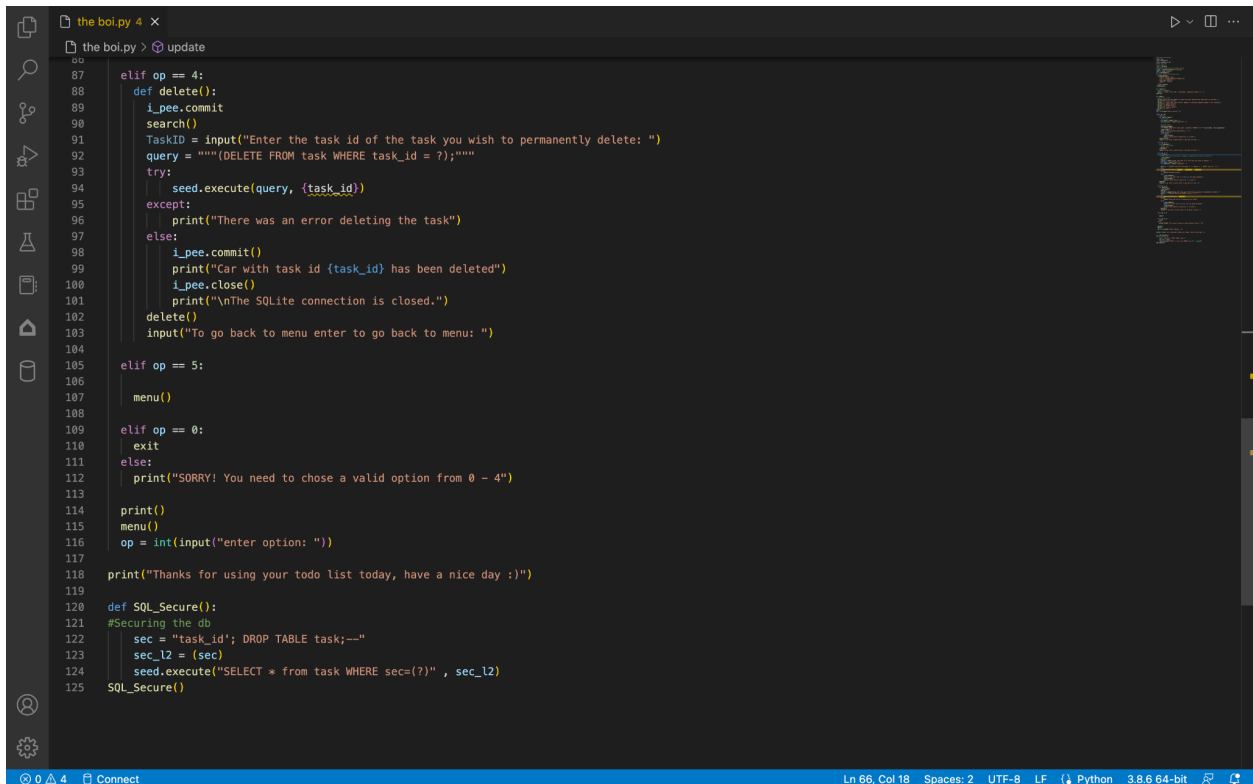


```
27 def menu():
28     #selection screen
29     print("Below are the number to help you enter options ans come back to menu.")
30     print("[1] insert task")
31     print("[2] view tasks (pip install pandas in terminal/command prompt if not working)")
32     print("[3] update task")
33     print("[4] delete task")
34     print("[5] back to menu")
35     print("[0] exit")
36     menu()
37     op = int(input("enter option: "))
38
39 while op !=0:
40     if op == 1:
41         def insert_task():
42             #user input
43             U_I_task = input("Task: ")
44             U_I_complete = input("Complete?: ")
45
46             #insert tasks
47             seed.executemany
48             ("""INSERT INTO task (task_name, complete) VALUES (?,?)""", [U_I_task], [U_I_complete])
49             i_peek.commit ()
50             print ("Data entered successfully. :)")
51             i_peek.close ()
52             if i_peek:
53                 i_peek.close()
54                 print("\nThe SQLite connection is closed.")
55             insert_task()
56             input("To go back to menu enter to go back to menu: ")
57
58     elif op == 2:
59         def viewtask():
60             #views task table
61             print("no")
62             viewtask()
63             input("To go back to menu enter to go back to menu: ")
64
65     elif op == 3:
66         def update():
67             #This will allow the user to update a selected task with the task id
68             i_peek.commit
69             search()
70             TaskID = input("Enter the task ID of the task you wish to update: ")
```

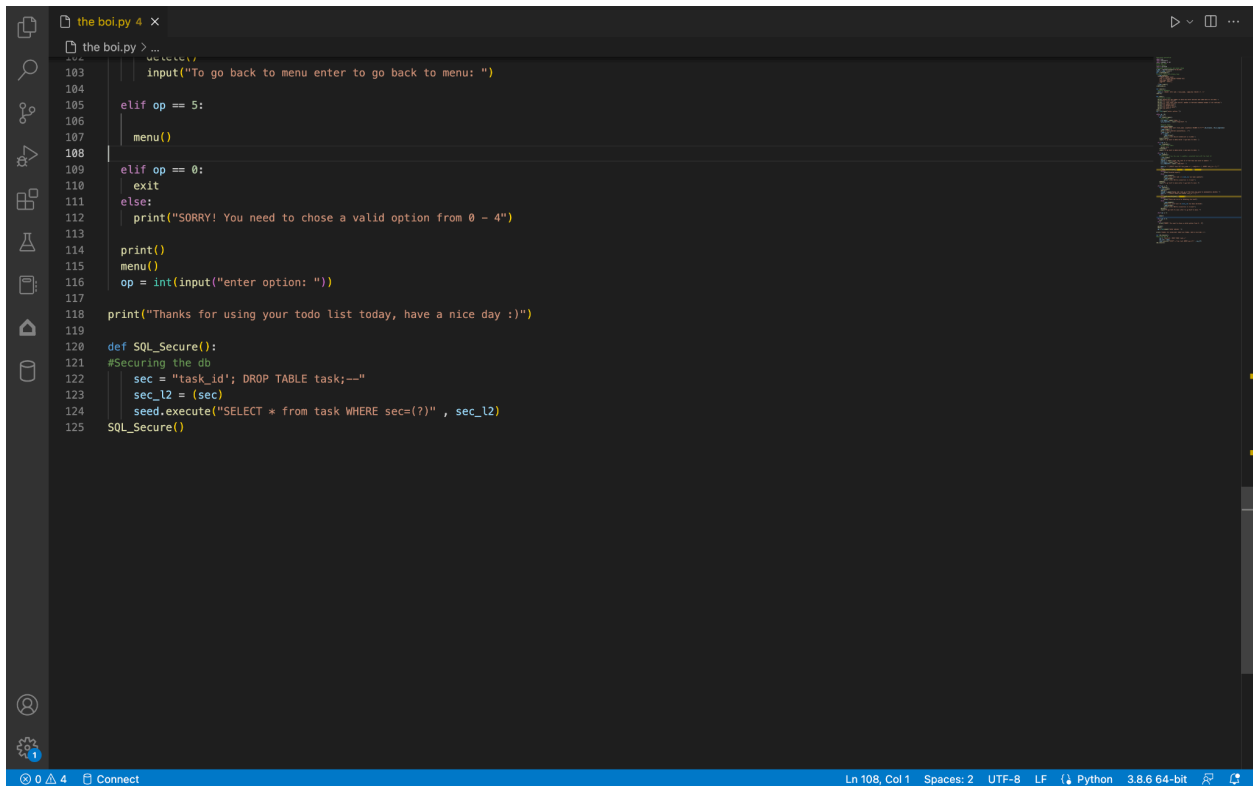
The insert task code runs when the user enters 1 and insert task uses variables to connect to the columns within the database for example U_I_task which stands for user input task would be BA task that you would enter which will go in the task name column the task table. U_I_complete is the equivalent for the column complete within the table. The complete column within the table uses boolean but because of sqlite lack of support of boolean there was a work around implemented. Blob was used in the place of boolean and is a data type used in SQLite which saves the data as exactly as inputted. Once the data entry is complete, the program will then close the database.



```
the boi.py 4 x
the boi.py > update
64
65
66 elif op == 3:
67     def update():
68         #This will allow the user to update a selected task with the task id
69         i_pee.commit()
70         search()
71         TaskID = input("Enter the task ID of the task you wish to update: ")
72         U_I_task = input("Task: ")
73         U_I_complete = input("Complete?: ")
74
75         query = """(UPDATE task SET task_name = ?, complete = ?, WHERE task_id = ?);"""
76         try:
77             seed.execute(query,[task_id], [task_name], [complete])
78         except:
79             print("Invalid input")
80         else:
81             i_pee.commit()
82             print("task with task id {task_id} has been updated")
83             i_pee.close()
84             print("\nThe SQLite connection is closed.")
85         update()
86         input("To go back to menu enter to go back to menu: ")
87
88 elif op == 4:
89     def delete():
90         i_pee.commit()
91         search()
92         TaskID = input("Enter the task id of the task you wish to permanently delete: ")
93         query = """(DELETE FROM task WHERE task_id = ?);"""
94         try:
95             seed.execute(query, {task_id})
96         except:
97             print("There was an error deleting the task")
98         else:
99             i_pee.commit()
100             print("Car with task id {task_id} has been deleted")
101             i_pee.close()
102             print("\nThe SQLite connection is closed.")
103             delete()
104             input("To go back to menu enter to go back to menu: ")
105
106 elif op == 5:
107     menu()
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Option 4 in the menu is delete. The function of these works very similar to update as it runs research using the task ID in by the user. When it is found, the operation of the code will then delete the record within the database. to ensure that the deletion is correct the primary key that is the task ID was utilised.



```
the bol.py 4 x
the bol.py >...
103     input("To go back to menu enter to go back to menu: ")
104
105     elif op == 5:
106         menu()
107
108
109     elif op == 0:
110         exit()
111     else:
112         print("SORRY! You need to chose a valid option from 0 - 4")
113
114     print()
115     menu()
116     op = int(input("enter option: "))
117
118     print("Thanks for using your todo list today, have a nice day :)")
119
120     def SQL_Secure():
121         #Securing the db
122         sec = "task_id"; DROP TABLE task;--"
123         sec_l2 = (sec)
124         seed.execute("SELECT * from task WHERE sec=(?)" , sec_l2)
125     SQL_Secure()
```

Option 0 is a very simple operation within the program as it simply just exits to use it from the application. option 5 is an option which is not actually listed on the menu as it primarily to allow users to exit from option 1-4 the primary menu of the program however simply just inputting the enter button returns the user back to the menu making this redundant. But In the case where pressing enter does not work, using will be then sent back. to ensure that users are only entering lifted anything else other than option 0,1, 2, 3, 4 and 5 the user will be presented with an error message.



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Appendix

1. See.....Test Plan
2. See.....the boi.py