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Foundations of Programming: Python

Assignment 06

<https://github.com/trickyUW/IntroToProg-Python-Mod06>

To Do List (Using Functions)

Introduction

Module 06 was all about functions. I learned about functions, parameters, return, global vs. local variables, and classes. I also learned how to debug in PyCharm and create a GitHub website. Assignment 06 is the To Do List script from Assignment 05, except the code is more organized by using functions. A starter file was given, and I added code to make the script work.

Understanding Functions

Functions are a way of grouping one or more statements together. The function can then be called later in different parts of the script. Big scripts can be split up and organized better when using functions. Once you understand the order in which code executes and where to look when functions are called, scripts become more readable. Functions can split statements into smaller chunks and also be reused without copying and pasting a lot. The main body of the script becomes more digestible and closer to pseudo code, making it easier to understand.

Adding Code

A starter Python file was given for Assignment 06. It was already organized and had a good amount of code. The script was almost the same as Assignment 05 but implemented differently. There were spots in the script that were commented with, “# To Do,” where I had to add code. Most of the spots were in the functions, such as `add_data_to_list` or `input_new_task_and_priority`. The functions were grouped into two classes, `Processor`, and `IO`. Then in the main body of the script, the functions were called when needed. All I had to do was add code from Assignment 05 to the functions in Assignment 06. For example, in Assignment 05 step 4 (Adding a new item to the list), there was code I needed for the `input_new_task_and_priority` and the `add_data_to_list` function.

Error Handling

When I first tried to test the script, there was no `ToDoList.txt` file, so I got an error right away. To fix this, I needed to create the file and populate it with data. To have better error handling, I wanted to add a `Try-Except` block since I didn't in Assignment 05. In the `read_data_from_file` function, I put the code for opening the file and adding rows to the list in a `Try-Except` block.

Practice

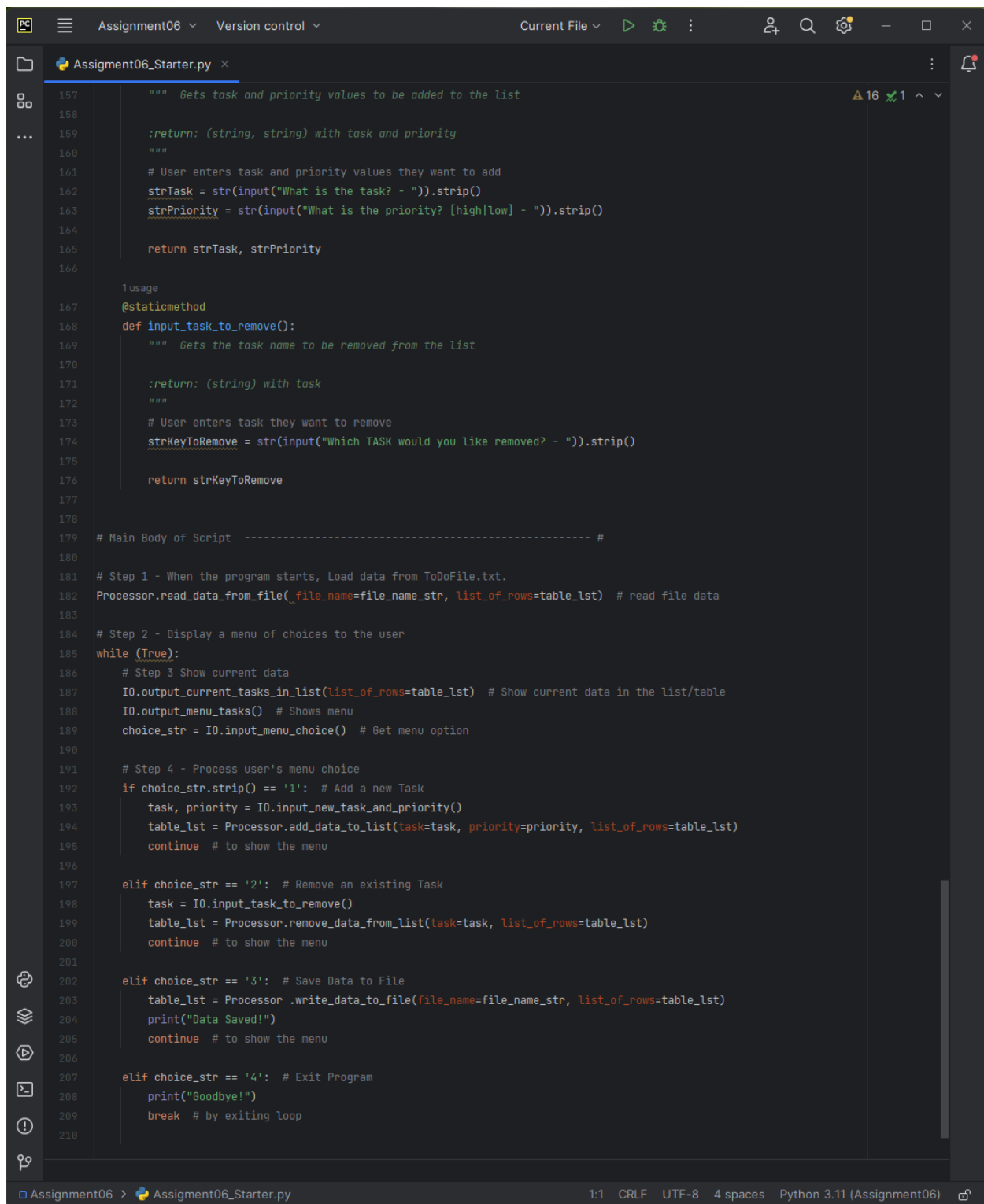
Modifying and adding to existing code is good practice for the real world. It's a good way to learn and can feel like a puzzle to me. Concepts like functions and classes are important to programming. When the code is already there for me, it can be hard to remember later or when I need to create my own script from scratch. I will try to look over the code that was already given in Assignment 06 to better understand how and why things were done the way they were.

Summary

Assignment 06's To Do List script was like a puzzle to me. The script had a similar output to Assignment 05 but organized the code better by using classes and functions. Using what I learned from Module 06, I added code to get the script to work.

```
Assignment06  Version control  Current File  16 1 16
Assignment06_Starter.py
1 | ----- #
2 # Title: Assignment 06
3 # Description: Working with functions in a class,
4 #             When the program starts, load each "row" of data
5 #             in "ToDoToDoList.txt" into a python Dictionary.
6 #             Add each dictionary "row" to a python list "table"
7 # ChangeLog (Who,When,What):
8 # RRoot,1.1.2030,Created started script
9 # PChuy,8.15.23,Modified code to complete assignment 06
10 # ----- #
11
12 # Data ----- #
13 # Declare variables and constants
14 file_name_str = "ToDoFile.txt" # The name of the data file
15 file_obj = None # An object that represents a file
16 row_dic = {} # A row of data separated into elements of a dictionary {Task,Priority}
17 table_list = [] # A list that acts as a 'table' of rows
18 choice_str = "" # Captures the user option selection
19
20
21 # Processing ----- #
22 4 usages
23 class Processor:
24     """ Performs Processing tasks """
25
26     1 usage
27     @staticmethod
28     def read_data_from_file(file_name, list_of_rows):
29         """ Reads data from a file into a list of dictionary rows
30
31         :param file_name: (string) with name of file:
32         :param list_of_rows: (list) you want filled with file data:
33         :return: (list) of dictionary rows
34         """
35
36         # Try-Except block for when ToDoFile.txt does not exist
37         try:
38             list_of_rows.clear() # clear current data
39             file = open(file_name, "r")
40             for line in file:
41                 task, priority = line.split(",")
42                 row = {"Task": task.strip(), "Priority": priority.strip()}
43                 list_of_rows.append(row)
44             file.close()
45         except:
46             print("An error occurred when trying to open file.")
47
48         return list_of_rows
49
50     1 usage
51     @staticmethod
52     def add_data_to_list(task, priority, list_of_rows):
53         """ Adds data to a list of dictionary rows
54
55         :param task: (string) with name of task:
56         :param priority: (string) with name of priority:
57         :param list_of_rows: (list) you want to add more data to:
58         :return: (list) of dictionary rows
59         """
60
61         row = {"Task": str(task).strip(), "Priority": str(priority).strip()}
62         # Add dictionary row of task, priority parameters to list
63         list_of_rows.append(row)
64
65         return list_of_rows
66
67     1 usage
68     @staticmethod
69     def remove_data_from_list(task, list_of_rows):
70         """ Removes data from a list of dictionary rows
71
72         :param task: (string) with name of task:
73         :param list_of_rows: (list) you want filled with file data:
74         :return: (list) of dictionary rows
75         """
76
77         blnItemRemoved = False # Use this to verify that the data was found and removed
78         for row in list_of_rows:
79             list_task, list_priority = dict(row).values()
80             # If task parameter was found in list, remove row
81             if list_task.lower() == task.lower():
82                 list_of_rows.remove(row)
83                 blnItemRemoved = True
```

```
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Assignment06_Starter.py ×
...
81 # Update user on the status
82 if bIsItemRemoved == True:
83     print("The task was removed.")
84 else:
85     print("I'm sorry, but I could not find that task.")
86
87 return list_of_rows
88
89
90 @staticmethod
91 def write_data_to_file(file_name, list_of_rows):
92     """ Writes data from a list of dictionary rows to a File
93
94     :param file_name: (string) with name of file:
95     :param list_of_rows: (list) you want filled with file data:
96     :return: (list) of dictionary rows
97     """
98
99     # Ask if they want save that data
100     if "y" == str(input("Save this data to file? (y/n) - ")).strip().lower():
101         file = open(file_name, "w")
102         for dicRow in list_of_rows:
103             file.write(dicRow["Task"] + ", " + dicRow["Priority"] + "\n")
104         file.close()
105         input("Data saved to file! Press the [Enter] key to return to menu.")
106     else:
107         input("New data was NOT Saved, but previous data still exists! Press the [Enter] key to return to menu.")
108
109 return list_of_rows
110
111 # Presentation (Input/Output) ----- #
112
113
114 5 usages
115 class IO:
116     """ Performs Input and Output tasks """
117
118     @staticmethod
119     def output_menu_tasks():
120         """ Display a menu of choices to the user
121
122         :return: nothing
123         """
124         print('')
125         print('Menu of Options')
126         print('1) Add a new Task')
127         print('2) Remove an existing Task')
128         print('3) Save Data to File')
129         print('4) Exit Program')
130         print('')
131         print() # Add an extra line for looks
132
133     @staticmethod
134     def input_menu_choice():
135         """ Gets the menu choice from a user
136
137         :return: string
138         """
139         choice = str(input("Which option would you like to perform? [1 to 4] - ")).strip()
140         print() # Add an extra line for looks
141         return choice
142
143     @staticmethod
144     def output_current_tasks_in_list(list_of_rows):
145         """ Shows the current Tasks in the list of dictionaries rows
146
147         :param list_of_rows: (list) of rows you want to display
148         :return: nothing
149         """
150         print("\n***** The current tasks ToDo are: *****")
151         for row in list_of_rows:
152             print(row["Task"] + " (" + row["Priority"] + ")")
153         print("*****")
154         print() # Add an extra line for looks
155
156     @staticmethod
157     def input_new_task_and_priority():
158         """ Gets task and priority values to be added to the list
159
160         :return: (list) of dictionary rows
161         """
162         task = input("Enter a task: ")
163         priority = input("Enter a priority: ")
164         new_row = {"Task": task, "Priority": priority}
165         return new_row
166
167
168 if __name__ == '__main__':
169     # Create a list of dictionary rows
170     list_of_rows = []
171
172     # Create a menu of choices
173     menu = {
174         1: IO.output_menu_tasks,
175         2: IO.remove_task,
176         3: IO.write_data_to_file,
177         4: IO.exit_program,
178     }
179
180     # Run the program
181     while True:
182         IO.output_menu_tasks()
183         choice = IO.input_menu_choice()
184
185         if choice == "1":
186             new_row = IO.input_new_task_and_priority()
187             list_of_rows.append(new_row)
188             IO.output_current_tasks_in_list(list_of_rows)
189
190         elif choice == "2":
191             task_to_remove = input("Enter a task to remove: ")
192             list_of_rows = IO.remove_task(list_of_rows, task_to_remove)
193             IO.output_current_tasks_in_list(list_of_rows)
194
195         elif choice == "3":
196             IO.write_data_to_file("tasks.txt", list_of_rows)
197             IO.output_current_tasks_in_list(list_of_rows)
198
199         elif choice == "4":
200             IO.exit_program()
201             break
202
203     # Print the final list of rows
204     IO.output_current_tasks_in_list(list_of_rows)
205
206     # Print the status of the program
207     print("Program ended. Press the [Enter] key to return to menu.")
208     input()
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```



The image shows a PyCharm IDE window with a Python script named 'Assignment06_Starter.py'. The script is a task manager application with the following structure:

- Line 157-166:** A function that gets task and priority values to be added to the list. It prompts the user for a task and a priority (high/low) and returns them as a tuple.
- Line 167-178:** A static method that gets the task name to be removed from the list. It prompts the user for a task to remove and returns it.
- Line 179:** A comment indicating the start of the main body of the script.
- Line 181-183:** Step 1: Load data from 'ToDoFile.txt' using the 'Processor' class.
- Line 184-186:** Step 2: Display a menu of choices to the user.
- Line 187-190:** Step 3: Show current data in the list/table and get the menu option.
- Line 191-196:** Step 4: Process user's menu choice. If '1', add a new task and priority to the list.
- Line 197-200:** If '2', remove an existing task from the list.
- Line 201-206:** If '3', save data to file and print 'Data Saved!'.
- Line 207-210:** If '4', exit the program by breaking the loop.

The bottom status bar shows the file encoding as UTF-8, 4 spaces indentation, and Python 3.11 interpreter.

Figure 1: Script in PyCharm

```
Assignment06  Version control  Current File  Assignment06_Starter.py  Run  Assignment06_Starter  C:\_PythonClass\Assignment06\venv\Scripts\python.exe C:\_PythonClass\Assignment06\Assignment06_S

***** The current tasks ToDo are: *****
work (high)
school (high)
*****

Menu of Options
1) Add a new Task
2) Remove an existing Task
3) Save Data to File
4) Exit Program

Which option would you like to perform? [1 to 4] - p

***** The current tasks ToDo are: *****
work (high)
school (high)
*****

Menu of Options
1) Add a new Task
2) Remove an existing Task
3) Save Data to File
4) Exit Program

Which option would you like to perform? [1 to 4] - 1

What is the task? - sleep
What is the priority? [high|low] - low

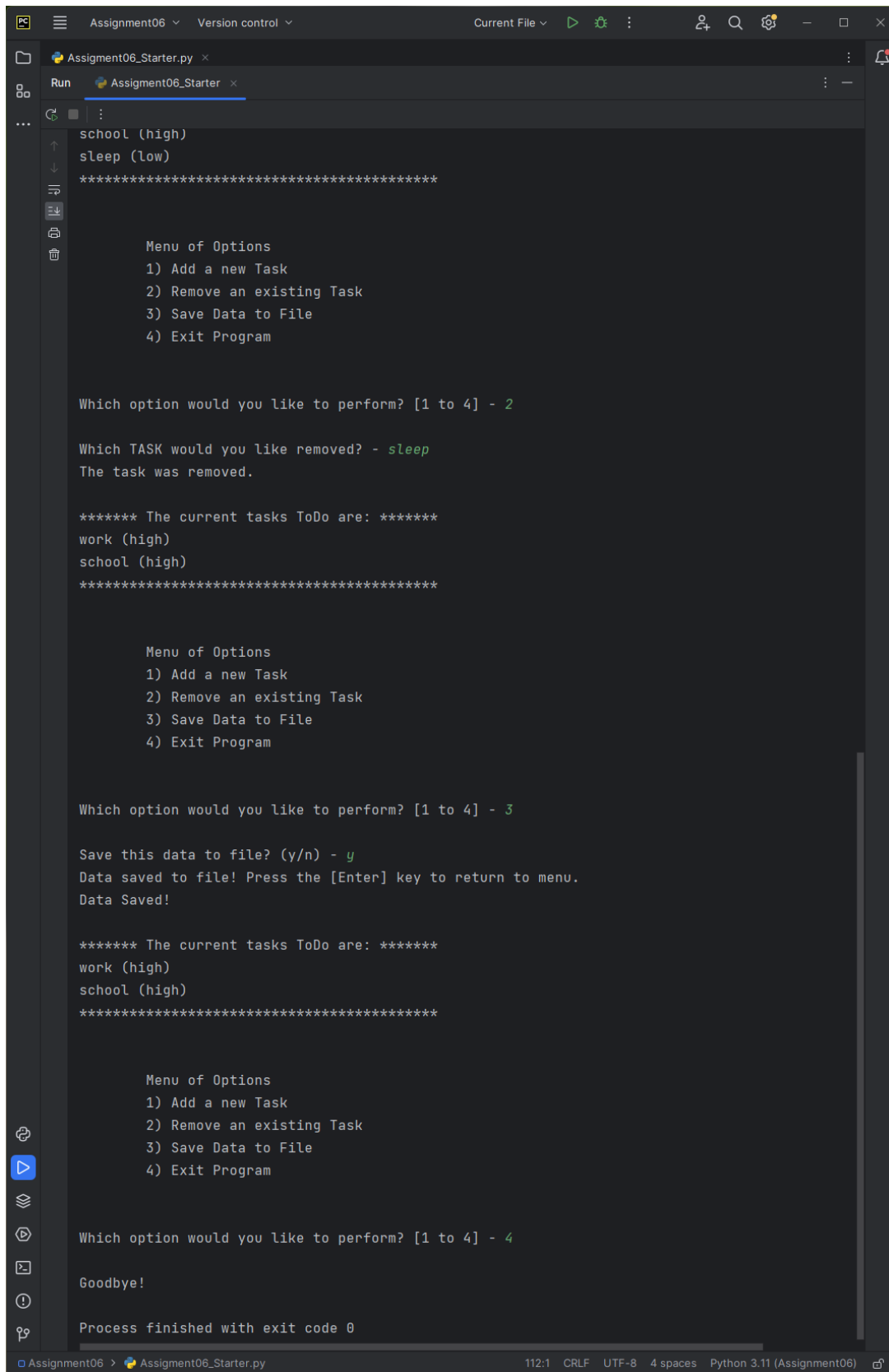
***** The current tasks ToDo are: *****
work (high)
school (high)
sleep (low)
*****

Menu of Options
1) Add a new Task
2) Remove an existing Task
3) Save Data to File
4) Exit Program

Which option would you like to perform? [1 to 4] - 2

Which TASK would you like removed? - clean
I'm sorry, but I could not find that task.

***** The current tasks ToDo are: *****
work (high)
school (high)
sleep (low)
*****
```



The image shows the PyCharm IDE interface with a dark theme. The top toolbar includes icons for file operations, running, and debugging. The 'Run' tab is active, displaying the output of the script 'Assignment06_Starter.py'. The script's execution is as follows:

```
school (high)
sleep (low)
*****

Menu of Options
1) Add a new Task
2) Remove an existing Task
3) Save Data to File
4) Exit Program

Which option would you like to perform? [1 to 4] - 2

Which TASK would you like removed? - sleep
The task was removed.

***** The current tasks ToDo are: *****
work (high)
school (high)
*****

Menu of Options
1) Add a new Task
2) Remove an existing Task
3) Save Data to File
4) Exit Program

Which option would you like to perform? [1 to 4] - 3

Save this data to file? (y/n) - y
Data saved to file! Press the [Enter] key to return to menu.
Data Saved!

***** The current tasks ToDo are: *****
work (high)
school (high)
*****

Menu of Options
1) Add a new Task
2) Remove an existing Task
3) Save Data to File
4) Exit Program

Which option would you like to perform? [1 to 4] - 4

Goodbye!

Process finished with exit code 0
```

The bottom status bar indicates the file path 'Assignment06 > Assignment06_Starter.py', the cursor position '112:1', and the encoding 'CRLF UTF-8'. It also shows '4 spaces' and the Python version 'Python 3.11 (Assignment06)'.

Figure 2: Script running in PyCharm

```
C:\WINDOWS\system32\cmd. X + v
Microsoft Windows [Version 10.0.22621.1992]
(c) Microsoft Corporation. All rights reserved.

C:\Users\patrc>CD C:\_PythonClass\Assignment06

C:\_PythonClass\Assignment06>Python Assignment06_Starter.py

***** The current tasks ToDo are: *****
work (high)
school (high)
*****

Menu of Options
1) Add a new Task
2) Remove an existing Task
3) Save Data to File
4) Exit Program

Which option would you like to perform? [1 to 4] - c

***** The current tasks ToDo are: *****
work (high)
school (high)
*****

Menu of Options
1) Add a new Task
2) Remove an existing Task
3) Save Data to File
4) Exit Program

Which option would you like to perform? [1 to 4] - 1

What is the task? - sleep
What is the priority? [high|low] - low

***** The current tasks ToDo are: *****
work (high)
school (high)
sleep (low)
*****

Menu of Options
1) Add a new Task
2) Remove an existing Task
3) Save Data to File
4) Exit Program

Which option would you like to perform? [1 to 4] - 2

Which TASK would you like removed? - cook
I'm sorry, but I could not find that task.

***** The current tasks ToDo are: *****
work (high)
school (high)
sleep (low)
*****

Menu of Options
1) Add a new Task
2) Remove an existing Task
3) Save Data to File
4) Exit Program

Which option would you like to perform? [1 to 4] - 2

Which TASK would you like removed? - sleep
The task was removed.

***** The current tasks ToDo are: *****
work (high)
school (high)
*****

Menu of Options
1) Add a new Task
2) Remove an existing Task
3) Save Data to File
4) Exit Program

Which option would you like to perform? [1 to 4] - 3

Save this data to file? (y/n) - y
Data saved to file! Press the [Enter] key to return to menu.
Data Saved!

***** The current tasks ToDo are: *****
work (high)
school (high)
*****

Menu of Options
1) Add a new Task
2) Remove an existing Task
3) Save Data to File
4) Exit Program

Which option would you like to perform? [1 to 4] - 4

Goodbye!

C:\_PythonClass\Assignment06>
```


Figure 3: Script running in CMD

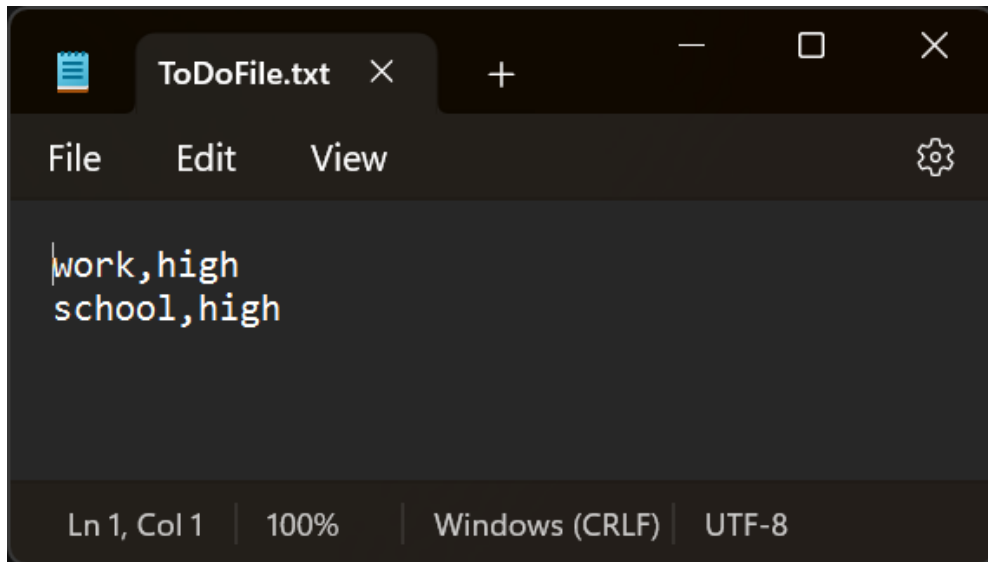


Figure 4: Text file