Andrew Li
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Foundations of Programming: Python
Assignment06
https://github.com/idrew4u/IntroToProg-Python-Mod06

Working with Functions

Introduction

For this assignment, we were asked to organize a python script. We were given a starting template, and then tasked to use functions to help organize the code. The overall code was basically given from the previous assignment, and it just needed to be converted to the newly provided script.

Creating the Script

Script Header

The first thing we should do is write a header for the script. The header is the first thing you see and gives us a basic idea what the script is trying to accomplish. It asks for the title of the program, a description of what it does, and logs changes to the script (Figure 1). The logs should include who made the change, the date it was changed, and what was changed in the script. In this situation, the originator already started the script header, we just had to modify the information to allow other viewers we made updates and changes to the script.

```
# ------------------------------------------------------------------------ #
# Title: Assignment 06
# Description: Working with functions in a class,
#              When the program starts, load each "row" of data
#              in "ToDoToDoList.txt" into a python Dictionary.
#              Add the each dictionary "row" to a python list "table"
# ChangeLog (Who,When,What):
# RRoot,1.1.2030,Created started script
# RRoot,1.1.2030,Added code to complete assignment 5
# ALi,Nov 24, 2020,Modified code to complete assignment 6
# ------------------------------------------------------------------------ #
```

Figure 1: The header includes the title, description, and log changes.

Functions

We use functions in scripts to help group one or more statements. Functions basically works in two parts. The first part of the function is defining it. When you define the function, you are giving the function a script to run (Figure 2).

```python
def input_new_task_and_priority():
    # Added from Assignment05_Answer.py #ALi
    strTask = str(input("What is the task? - ")).strip()
    strPriority = str(input("What is the priority? [high|low] - ")).strip()
```

Figure 2: An example of defining the function. The function "input_new_task_and_priority executes the code below.

Secondly, you must call the function in order to execute it (Figure 3). When you call the function, you are using the script that was defined and running it.

```python
if strChoice.strip() == '1':  # Add a new Task
    # Converted to Function #ALi
    IO.input_new_task_and_priority()
```

Figure 3: An example of calling the function to execute. We execute the "input_new_task_and_priority function that we defined earlier.

Using functions can help declutter a messy script and allow you to reuse the script without having the rewrite the full script again (Figure 4a-b.).

```python
if strChoice.strip() == '1':  # Add a new Task
    # Converted to Function #ALi
    IO.input_new_task_and_priority()
    IO.input_press_to_continue(strStatus)
    continue  # to show the menu

elif strChoice == '2':  # Remove an existing Task
    # Converted to Function #ALi
    IO.input_task_to_remove()
    IO.input_press_to_continue(strStatus)
    continue  # to show the menu

elif strChoice == '3':   # Save Data to File
    strChoice = IO.input_yes_no_choice("Save this data to file? (y/n) - ")
    if strChoice.lower() == "y":
        # Converted to Function #ALi
        Processor.write_data_to_file(strFileName, lstTable)
        IO.input_press_to_continue(strStatus)
    else:
        IO.input_press_to_continue("Save Cancelled!")
    continue  # to show the menu
```

Figure 4a: In this example, you can see us calling the "input_press_to_continue" multiple times.

```
def input_press_to_continue(optional_message=''):
    """ Pause program and show a message before continuing

    :param optional_message:  An optional message you want to display
    :return: nothing
    """
    print(optional_message)
    input('Press the [Enter] key to continue.')
```

Figure 4b: When we call the function "input_press_to_continue", it would print out "Press the [Enter] key to continue." without us having the copy and paste that script multiple times.

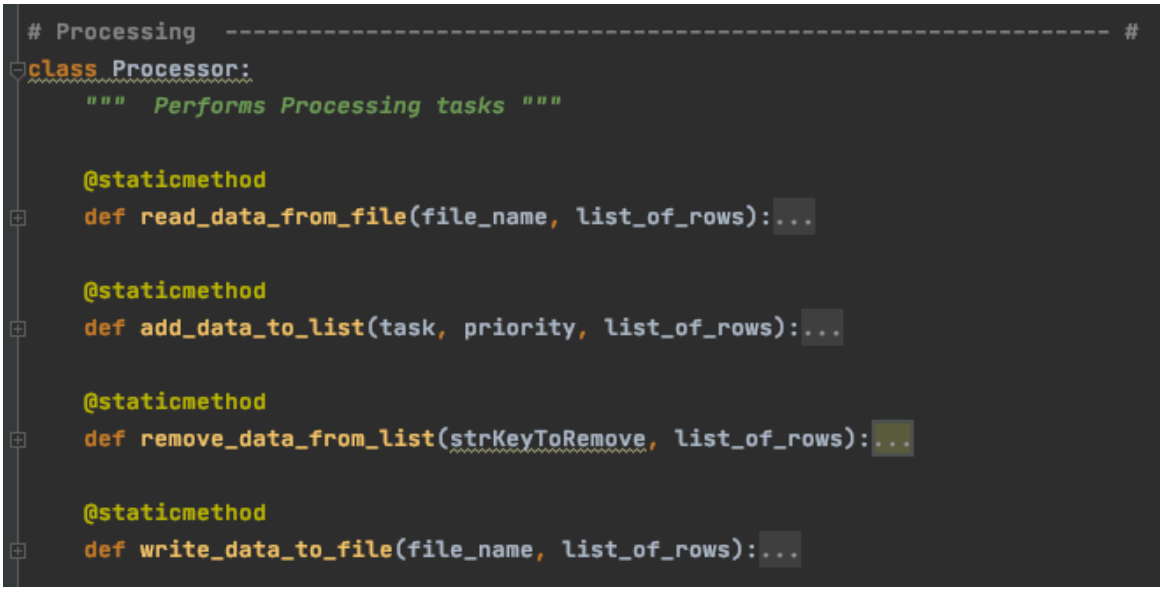
The assignment gave us the two resources: 1) the code which needed to be reorganized with functions and 2) the "answers" where the script was fully written out. Although we have the solution, it can be very daunting to look at at first sight. It is a lot of code and may take a while to decipher. By converting the code into functions, we are able to cleanly label the code and easily hide the script when we are done with it (Figure 5).

```
    @staticmethod
    def read_data_from_file(file_name, list_of_rows):...

    @staticmethod
    def add_data_to_list(task, priority, list_of_rows):...

    @staticmethod
    def remove_data_from_list(strKeyToRemove, list_of_rows):...

    @staticmethod
    def write_data_to_file(file_name, list_of_rows):...
```

Figure 5: Some of the functions collapsed to hide the lines of code that the function executes.

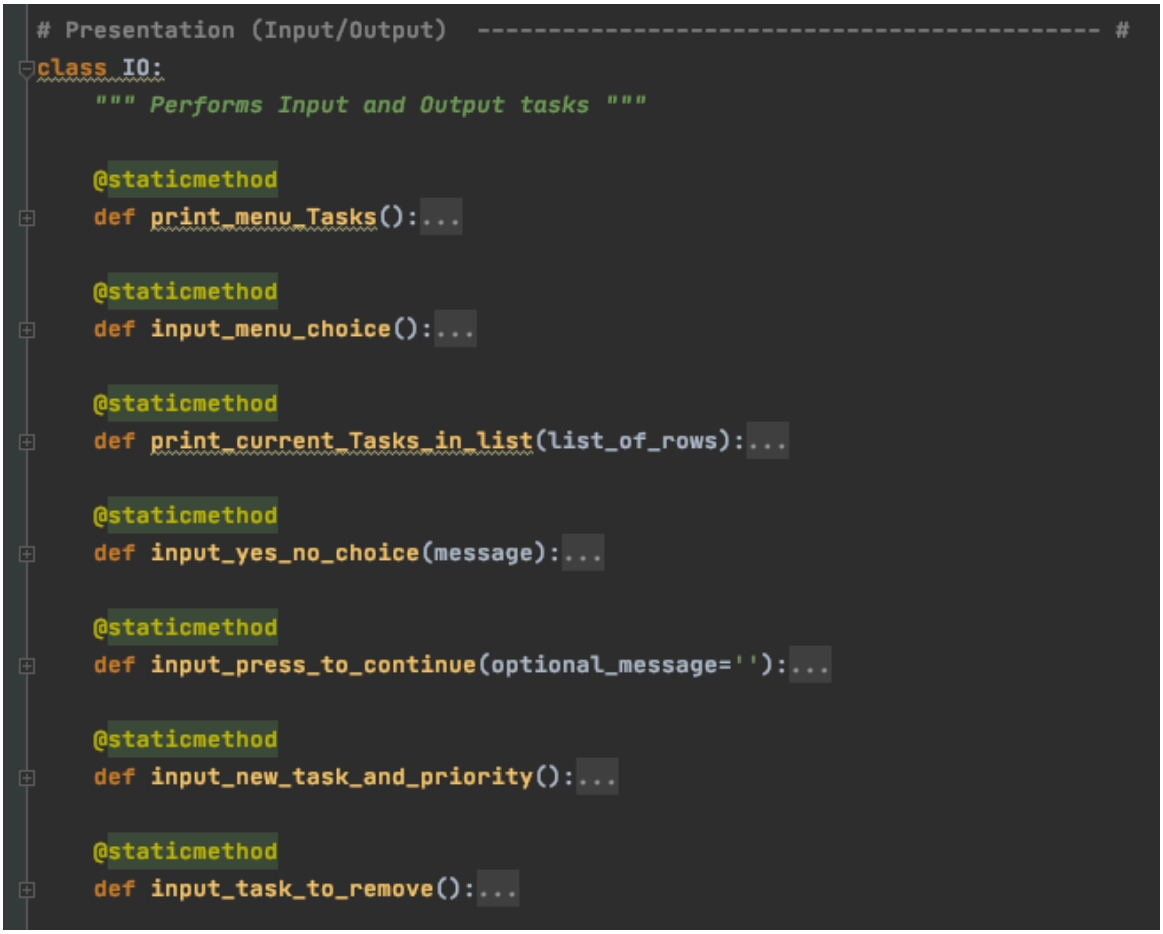
Classes

Classes are another way we can help organize the code. They can be used to help group functions, variables, and constants. It allows us to group together the script by sections. In our case, the originator broke up the code into Processor (processing) and IO (presentation, input/output) classes. It helps us compartmentalize each section, making it easier to navigate and clarify what section we are working on (Figure 6a-b). By defining these classes, it gives us an idea what the section is responsible for, allowing us to pinpoint what section we need to tackle for certain tasks.



```
# Processing  ------------------------------------------------------------ #
class Processor:
    """  Performs Processing tasks """

    @staticmethod
    def read_data_from_file(file_name, list_of_rows):...

    @staticmethod
    def add_data_to_list(task, priority, list_of_rows):...

    @staticmethod
    def remove_data_from_list(strKeyToRemove, list_of_rows):...

    @staticmethod
    def write_data_to_file(file_name, list_of_rows):...
```

Figure 6a:The Processor (processing) class and the functions included within the class.



```
# Presentation (Input/Output)  ------------------------------------------- #
class IO:
    """ Performs Input and Output tasks """

    @staticmethod
    def print_menu_Tasks():...

    @staticmethod
    def input_menu_choice():...

    @staticmethod
    def print_current_Tasks_in_list(list_of_rows):...

    @staticmethod
    def input_yes_no_choice(message):...

    @staticmethod
    def input_press_to_continue(optional_message=''):...

    @staticmethod
    def input_new_task_and_priority():...

    @staticmethod
    def input_task_to_remove():...
```

Figure 6b: The IO (presentation, input/output) class and the functions included within the class.

Running the Program

After creating the script, we verified the program is working properly by running it in PyCharm (Figure 7a-c) and the terminal command window on macOS (Figure 11a-b).

```
/Users/li.andrew/Documents/_PythonClass/Assignment06/venv/bin/python
******* The current Tasks ToDo are: *******
*******************************************


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


Which option would you like to perform? [1 to 5] - 1

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

Press the [Enter] key to continue.
******* The current Tasks ToDo are: *******
aaa (high)
*******************************************


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


Which option would you like to perform? [1 to 5] - 1

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

Press the [Enter] key to continue.
******* The current Tasks ToDo are: *******
aaa (high)
bbb (low)
*******************************************
```

Figure 7a

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


Which option would you like to perform? [1 to 5] - 2

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

Press the [Enter] key to continue.
******* The current Tasks ToDo are: *******
bbb (low)
*******************************************
```

Figure 7b

Figure 7a-b: The results after running our program in the PyCharm IDE, first and second options from menu.

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


Which option would you like to perform? [1 to 5] - 3

Save this data to file? (y/n) - y

Press the [Enter] key to continue.
******* The current Tasks ToDo are: *******
bbb (low)
*******************************************


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


Which option would you like to perform? [1 to 5] - 5

Goodbye!

Process finished with exit code 0
```

Figure 7c: The results after running our program in the PyCharm IDE, third and fifth options from menu.

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


Which option would you like to perform? [1 to 5] - 2

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

Press the [Enter] key to continue.
******* The current Tasks ToDo are: *******
ddd (low)
*****************************************


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


Which option would you like to perform? [1 to 5] - 3

Save this data to file? (y/n) - y

Press the [Enter] key to continue.
******* The current Tasks ToDo are: *******
ddd (low)
*****************************************


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


Which option would you like to perform? [1 to 5] - 5

Goodbye!
(base) Andrews-MacBook-Pro-4:Assignment06 li.andrew$
```

Figure 8a

```
(base) Andrews-MacBook-Pro-4:Documents li.andrew$ cd ./_PythonClass/
(base) Andrews-MacBook-Pro-4:Assignment06 li.andrew$ python3 /Users/
y
******* The current Tasks ToDo are: *******
*****************************************


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


Which option would you like to perform? [1 to 5] - 1

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

Press the [Enter] key to continue.
******* The current Tasks ToDo are: *******
ccc (high)
*****************************************


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


Which option would you like to perform? [1 to 5] - 1

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

Press the [Enter] key to continue.
******* The current Tasks ToDo are: *******
ccc (high)
ddd (low)
*****************************************
```

Figure 8b

Figure 8a-b: The results after running our program in the terminal command shell.

Summary

We were able to complete and "clean up" the code from the originator using functions and classes. Both were used to help organize the script to be more legible. Functions allow us to define the script which we later called and pulled to execute. It also allowed us to use the same script without having the copy and paste or retype the whole script, making the code easier to read and decipher. Classes allowed us to organize our thoughts and compartmentalize parts of the script so it is easy to navigate.