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03/05/2025

Foundations of Programming: Python

Assignment 06

https://github.com/jaeuw

Functions and Classes

Introduction

In this document I will be creating a program that uses constants, variables and print statements to display a message about a student's registration for a Python course. I will also be incorporating three common techniques for improving my scripts with the use of functions, classes, and using the separation of concerns programming pattern.

Declarations in Python

Global vs Local Variables

Variables can be categorized as either local or global depending on the location where they are declared. Local variables are declared within a function and can only be accessed/used within that same function. (figure 1) Global variables are declared outside of a function and can be accessed and modified from anywhere in the script. (figure 2)

```
@staticmethod  1 usage
def input_menu_choice():
    """
    This function gets a menu choice from the user
    ChangeLog: (Who, When, What)
    JBarnett,03/05/2025,Created Class
    :return: string with the users choice
    """
    choice = "0"
    try:
        choice = input("Enter your menu choice number: ")
        if choice not in ("1","2","3","4"):
            raise Exception("Please, choose only 1,2,3,4")
    except Exception as e:
        IO_output_error_messages(e.__str__())
    return choice
```

Figure 1: Local variable example

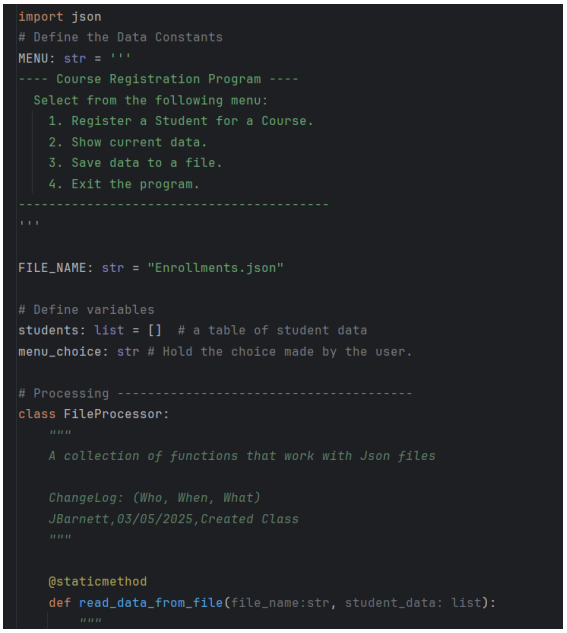


Figure 2: Global variable example

Functions

Functions allow you to group a set of programming statements and later reference those blocks of code by the name you gave them. The two we focused on this week were Modularity and Reusability – per the mod06 notes, they are both defined as the following:

- **Modularity:** Functions allow you to break down a large program into smaller, more manageable pieces. Each function can focus on a specific task, making the code easier to
- **Reusability:** Once you've defined a function, you can use its code multiple times throughout your program without having to rewrite the same code. This promotes code reuse and helps prevent redundancy.

You declare a function by defining it with the “def” keyword followed by the name of the function and the function itself. For example

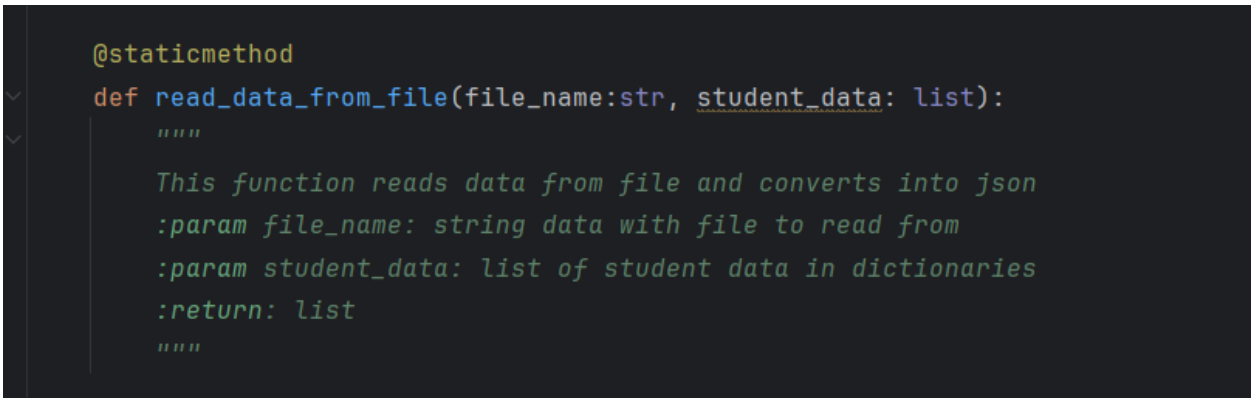


Figure 3: Defined function named read_data_from_file()

Another notable keyword is the “pass” keyword which is used as a placeholder statement when Python requires a statement, but you aren’t ready to write one at the time. It is intended to do what it says, to recognize the function but to ignore/pass by and continue until you add code to the function later. An example of this would be:

```
def write_data_to_file():
    pass
```

Classes

In Python classes are another way to organize your code by grouping functions, variables and constants under a class name. For this assignment we used two classes, the FileProcessor and IO which house the @staticmethod decorator.

FILE PROCESSOR: This class can be found in the processing layer. This class houses functions like opening, reading, writing and closing the json file.

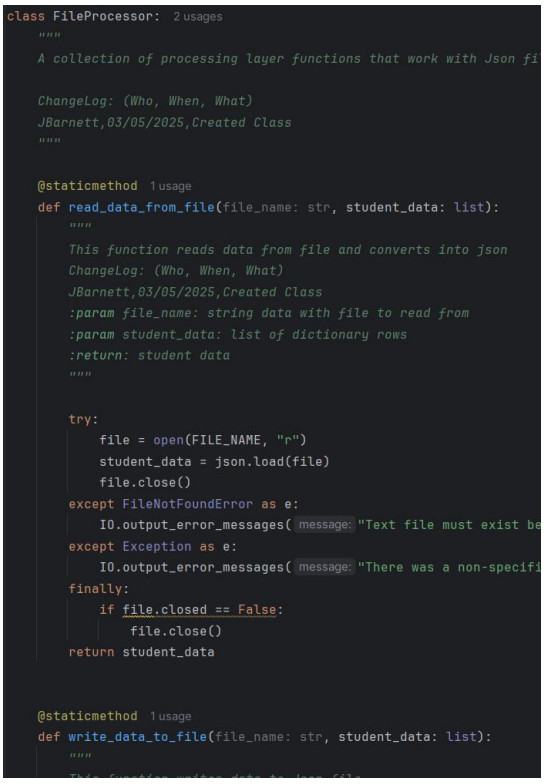
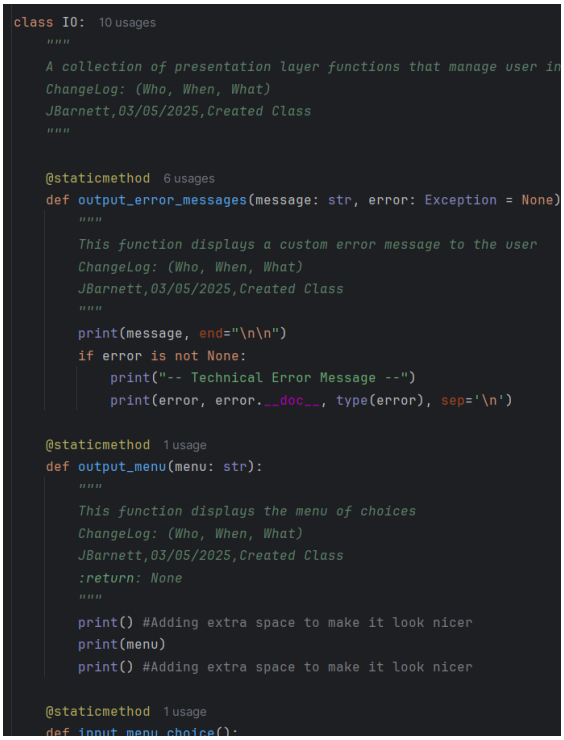


Figure 4: FileProcessor class

IO: This class can be found in the presentation layer. This class contains the functions that control input and output a user interacts with. For example, error messages, menu options, user input, etc.



```
class IO:  10 usages
    """
    A collection of presentation layer functions that manage user in
    ChangeLog: (Who, When, What)
    JBarnett,03/05/2025,Created Class
    """

    @staticmethod  6 usages
    def output_error_messages(message: str, error: Exception = None)
        """
        This function displays a custom error message to the user
        ChangeLog: (Who, When, What)
        JBarnett,03/05/2025,Created Class
        """
        print(message, end="\n\n")
        if error is not None:
            print("-- Technical Error Message --")
            print(error, error.__doc__, type(error), sep='\n')

    @staticmethod  1 usage
    def output_menu(menu: str):
        """
        This function displays the menu of choices
        ChangeLog: (Who, When, What)
        JBarnett,03/05/2025,Created Class
        :return: None
        """
        print() #Adding extra space to make it look nicer
        print(menu)
        print() #Adding extra space to make it look nicer

    @staticmethod  1 usage
    def input_menu_choice():
```

Figure 5: IO class

Summary

The classes and functions are useful in creating scripts that are easier to read. I appreciated the explanation of functions because it would prove very useful if I was an outsider reading or reflecting on the program myself. As the program becomes more complex, sectioning each of the segments would prove to be a significant improvement. I also found debugging to be easier when the functions are streamlined.