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IT FDN 110B: Foundations of Programming: Python

Assignment 05

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# Creating a Python Script for Menu-Driven User Choices using Dictionaries and Error Handling

## Introduction

The goal of Assignment 05 was to create a Python program using PyCharm that presents the user with a menu from which he/she can choose to enter the student's data, present the current data, read from and save the data to a file, or exit the program. The assignment builds on the concepts learned in Assignment 04, incorporating dictionaries to store the data read from a file and the new data entered by the user. It also adds error handling on reading input files and checks for unallowed characters for students' first name, last name, and course. This document outlines the steps taken to complete the assignment.

## Preparation

To prepare for this assignment, I read the Module 05 notes on dictionaries and error handling. The notes extended the module 04 learnings on working with files, as well as how to feed data from files into the code and vice versa. The notes samples on working with files and dictionaries were particularly useful in preparation for the coding assignment.

## Writing and executing Module 5 Python script

After finishing reading module 05, watched the module 05 YouTube videos from Professor Arya Ref [1] (see Figure 1), and having tried out the example Python code in the folders "Demos" and "LabAnswers," (see Figure 2), I felt prepared to start the programming assignment.

I used the provided Assignment05-Starter.py file, which gave me a good overview of what was expected for the coding task. The readings and videos made writing the script (Figure 3) quite straightforward. The definitions of constants, variables, user input storage, and writing to a file were quite similar to those of the forth assignment, with the addition of reading data from a file, storing it in a dictionary, and writing back the current data to a file. The steps I followed can be described as:

1. *Update the header:* with my name and current date
2. *Define constants:* set the constant for the menu options ('MENU') and the file name ('FILE\_NAME') where the data will be stored.

3. *Define variables:* initialized variables to store user input, such as the student's first name, last name, course name, and the dictionary of students data.
4. *Check for existing data:* Attempt to open and read from the file (Enrollments.csv). If the file exists, load its content into the students list. If the file doesn't exist, handle the `FileNotFoundError` by starting with an empty list.
5. *Display the menu:* Use a `while True` loop to continuously display the menu and prompt the user to select an option (register a student, show current data, save data to a file, or exit the program).
6. *Handle user choices:* Based on the user's selection, perform the following:
  - Register a student: Prompt the user to enter the student's first name, last name, and course name. Store this information in the students dictionary.
  - Added validation to ensure names only contain letters and hyphens, raising a `ValueError` if they contain numbers, spaces, or special characters (except hyphens), or if they are empty.
  - Show current data: Display the list of all registered students.
  - Save data to a file: Save the current `csv_data` to the `Enrollments.csv` file.
  - Exit the program: Break out of the loop to end the program.
7. *Test the Program:* run the program in PyCharm (Figure 4) and from the console (Figure 5) to ensure it worked as expected. Verified that the output was saved correctly in the `Enrollments.csv` file (Figure 6).

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## Mod05 Videos ▲

| Module | Titles                         | Link  |
|--------|--------------------------------|---|
| 5      | Mod05 - Exceptions             | <a href="https://www.youtube.com/watch?v=O46YoSo477Y">https://www.youtube.com/watch?v=O46YoSo477Y</a><br> |
| 5      | Mod05 - Github                 | <a href="https://www.youtube.com/watch?v=xmIAW_wJlB4">https://www.youtube.com/watch?v=xmIAW_wJlB4</a><br> |
| 5      | Mod05 - Dictionaries And Files | <a href="https://www.youtube.com/watch?v=Kgh2TZ0tf28">https://www.youtube.com/watch?v=Kgh2TZ0tf28</a><br> |
| 5      | Mod05 - JSON Files             | <a href="https://www.youtube.com/watch?v=XDDyhzRFDuc">https://www.youtube.com/watch?v=XDDyhzRFDuc</a><br> |
| 5      | Mod05 - Lab01                  | <a href="https://www.youtube.com/watch?v=xURgU2Z8HpY">https://www.youtube.com/watch?v=xURgU2Z8HpY</a><br> |
| 5      | Mod05 - Lab02                  | <a href="https://www.youtube.com/watch?v=Dkf6mLujM08">https://www.youtube.com/watch?v=Dkf6mLujM08</a><br> |
| 5      | Mod05 - Lab03                  | <a href="https://www.youtube.com/watch?v=1f3Aug4-3PY">https://www.youtube.com/watch?v=1f3Aug4-3PY</a><br> |

Figure 1 Module 05 Videos (screenshot from video's list in Canvas)

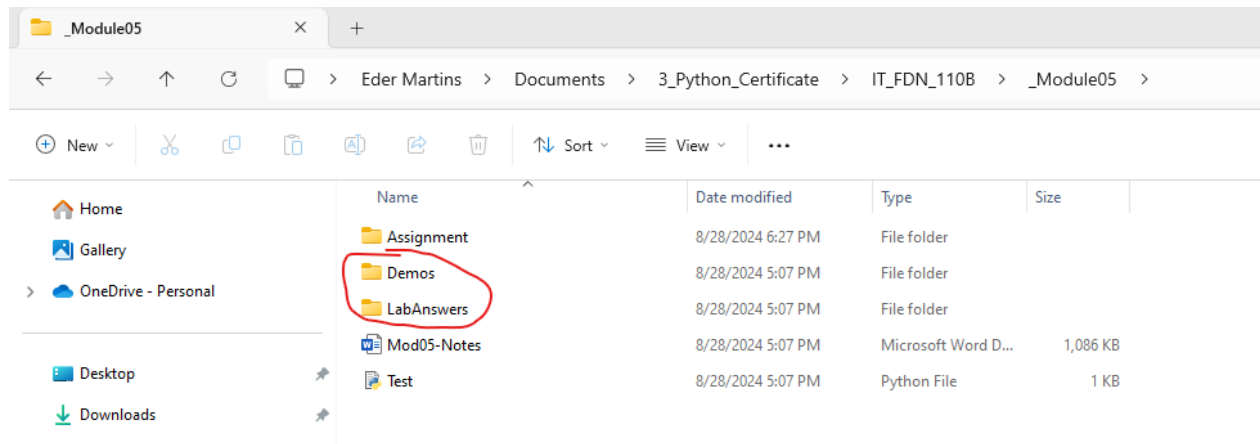


Figure 2 Module 05 subfolders "Demos" and "LabAnswers" highlighted

```
HW5 Version control
Project assignment_05.py
C:\Users\marti\Documents
Assignment05_Eder_Mar
assignment_05.py
Enrollments.csv
Assignment05_Eder_Mar
External Libraries
Scratches and Consoles

1 # ----- #
2 # Title: Assignment05
3 # Desc: This assignment demonstrates using dictionaries, files, and exception handling
4 # Change Log: (Who, When, What)
5 #   Eder Martins, 8/28/2024, Created Script
6 # ----- #
7
8 import re # Importing the regular expression module
9
10 # Define the Data Constants
11 MENU: str = '''
12 ---- Course Registration Program ----
13 Select from the following menu:
14 1. Register a Student for a Course.
15 2. Show current data.
16 3. Save data to a file.
17 4. Exit the program.
18 -----
19 '''
20 # Define the Data Constants
21 FILE_NAME: str = "Enrollments.csv"
22
23 # Define the Data Variables and constants
24 student_first_name: str = '' # Holds the first name of a student entered by the user.
25 student_last_name: str = '' # Holds the last name of a student entered by the user.
26 course_name: str = '' # Holds the name of a course entered by the user.
27 csv_data: str = '' # Holds combined string data separated by a comma.
28 file = None # Holds a reference to an opened file.
29 menu_choice: str # Hold the choice made by the user.
30 student_data: dict = {} # dictionary rows of student data
31 students: list = [] # a two-dimensional list table (a list of dictionary rows)
32 student_info: list = [] # Temporary list to hold data read from file.
33 name_pattern = re.compile(r"^[A-Za-z-]+\s*$") # Regular expression pattern to validate names (only letters and hyphens)
34
35 # When the program starts, read the file data into a list of lists (table)
36 # Extract the data from the file
37 try:
38     file = open(FILE_NAME, "r") # Open file in read mode
39     for row in file.readlines():
40         # Transform the data from the file into a dictionary
41         student_info = row.strip().split(',')
42         student_data = {"First Name": student_info[0], "Last Name": student_info[1], "Course": student_info[2]}
43         # Load it into our collection (list of dictionaries)
44         students.append(student_data)
45     file.close()
46 except FileNotFoundError:
47     print(f"{FILE_NAME} not found. Starting with an empty list.")
48 except Exception as e:
49     print(f"An error occurred while reading the file: {e}")
50
51 # Present and Process the data
52 while (True):
53
54     # Present the menu of choices
55     print(MENU)
56     menu_choice = input("What would you like to do: ")
57
58     # Input user data
59     if menu_choice == "1": # This will not work if it is an integer!
60         try:
61             student_first_name = input("Enter the student's first name: ").strip()
62             if not student_first_name:
63                 raise ValueError("First name cannot be empty.")
64             if not name_pattern.match(student_first_name):
65                 raise ValueError("First name cannot contain numbers, spaces, or special characters "
66                                     "(except hyphens).")
67
68             student_last_name = input("Enter the student's last name: ").strip()
69             if not student_last_name:
70                 raise ValueError("Last name cannot be empty.")
71             if not name_pattern.match(student_last_name):
72                 raise ValueError("Last name cannot contain numbers, spaces, or special characters "
```

```

73                                     "(except hyphens).")
74
75     course_name = input("Please enter the name of the course: ").strip()
76     if not course_name:
77         raise ValueError("Course name cannot be empty.")
78
79     # Create a dictionary for student data
80     student_data = {"First Name": student_first_name, "Last Name": student_last_name, "Course": course_name}
81     students.append(student_data)
82     print(f"You have registered {student_first_name} {student_last_name} for {course_name}.")
83
84     except ValueError as e:
85         print(f"Input Error: {e}")
86         continue
87
88     # Present the current data
89     elif menu_choice == "2":
90
91         # Process the data to create and display a custom message
92         print("-"*50)
93         for student in students:
94             print(f"Student {student['First Name']} {student['Last Name']} is enrolled in {student['Course']}")
95         print("-"*50)
96         continue
97
98     # Save the data to a file
99     elif menu_choice == "3":
100         try:
101             file = open(FILE_NAME, "w")
102             for student in students:
103                 csv_data = f"{student['First Name']},{student['Last Name']},{student['Course']}\n"
104                 file.write(csv_data)
105             file.close()
106             print("The following data was saved to file!")
107             for student in students:
108                 print(f"Student {student['First Name']} {student['Last Name']} is enrolled in {student['Course']}")
109
110         except Exception as e:
111             print(f"An error occurred while writing to the file: {e}")
112             continue
113
114     # Stop the loop
115     elif menu_choice == "4":
116         break # out of the loop
117     else:
118         print("Please only choose option 1, 2, or 3")
119
120 print("Program Ended")

```

Figure 3 Python Script in PyCharm using conditional logic, looping, file reading&writing, and data collections

```
Run assignment_05 <
...
---- Course Registration Program ----
Select from the following menu:
1. Register a Student for a Course.
2. Show current data.
3. Save data to a file.
4. Exit the program.
-----

What would you like to do: 2
-----
Student Eder Martins is enrolled in Python 100
Student John Smith is enrolled in Math 101
Student Peter Pan is enrolled in Hist 305
Student John Martin-smith is enrolled in Geo 101
-----

---- Course Registration Program ----
Select from the following menu:
1. Register a Student for a Course.
2. Show current data.
3. Save data to a file.
4. Exit the program.
-----

What would you like to do: 1
Enter the student's first name: Paul
Enter the student's last name: Colman56
Input Error: Last name cannot contain numbers, spaces, or special characters (except hyphens).

---- Course Registration Program ----
Select from the following menu:
1. Register a Student for a Course.
2. Show current data.
3. Save data to a file.
4. Exit the program.
-----
```

```
...
What would you like to do: 1
Enter the student's first name: 'Gx'
Input Error: First name cannot contain numbers, spaces, or special characters (except hyphens).

---- Course Registration Program ----
Select from the following menu:
1. Register a Student for a Course.
2. Show current data.
3. Save data to a file.
4. Exit the program.
-----

What would you like to do: 1
Enter the student's first name: Mary
Enter the student's last name: Moore
Please enter the name of the course: English 175
You have registered Mary Moore for English 175.

---- Course Registration Program ----
Select from the following menu:
1. Register a Student for a Course.
2. Show current data.
3. Save data to a file.
4. Exit the program.
-----

What would you like to do: 2
-----
Student Eder Martins is enrolled in Python 100
Student John Smith is enrolled in Math 101
Student Peter Pan is enrolled in Hist 305
Student John Martin-smith is enrolled in Geo 101
Student Mary Moore is enrolled in English 175
-----
```

```
---- Course Registration Program ----
Select from the following menu:
1. Register a Student for a Course.
2. Show current data.
3. Save data to a file.
4. Exit the program.
-----

What would you like to do: 3
The following data was saved to file:
Student Eder Martins is enrolled in Python 100
Student John Smith is enrolled in Math 101
Student Peter Pan is enrolled in Hist 305
Student John Martin-smith is enrolled in Geo 101
Student Mary Moore is enrolled in English 175

---- Course Registration Program ----
Select from the following menu:
1. Register a Student for a Course.
2. Show current data.
3. Save data to a file.
4. Exit the program.
-----

What would you like to do: 4
Program Ended

Process finished with exit code 0
|
```

Figure 4 Executing Python Script in PyCharm

```
Command Prompt
C:\Users\marti\Documents\3_Python_Certificate\IT_FDN_110B\HW5>Python assignment_05.py
An error occurred while reading the file: list index out of range

---- Course Registration Program ----
Select from the following menu:
1. Register a Student for a Course.
2. Show current data.
3. Save data to a file.
4. Exit the program.

-----

What would you like to do: 2

-----
Student Eder Martins is enrolled in Python 100
Student John Smith is enrolled in Math 101
Student Peter Pan is enrolled in Hist 305
Student John Martin-smith is enrolled in Geo 101
-----

---- Course Registration Program ----
Select from the following menu:
1. Register a Student for a Course.
2. Show current data.
3. Save data to a file.
4. Exit the program.

-----

What would you like to do: 1
Enter the student's first name: Paul
Enter the student's last name: Colman56
Input Error: Last name cannot contain numbers, spaces, or special characters (except hyphens).

---- Course Registration Program ----
Select from the following menu:
1. Register a Student for a Course.
2. Show current data.
3. Save data to a file.
4. Exit the program.

-----

What would you like to do: 1
Enter the student's first name: ^&*
Input Error: First name cannot contain numbers, spaces, or special characters (except hyphens).

---- Course Registration Program ----
Select from the following menu:
1. Register a Student for a Course.
2. Show current data.
3. Save data to a file.
4. Exit the program.

-----

What would you like to do: 1
Enter the student's first name: Mary
Enter the student's last name: Moore
Please enter the name of the course: English 175
You have registered Mary Moore for English 175.

---- Course Registration Program ----
Select from the following menu:
1. Register a Student for a Course.
2. Show current data.
3. Save data to a file.
4. Exit the program.

-----

What would you like to do: 2

-----
Student Eder Martins is enrolled in Python 100
Student John Smith is enrolled in Math 101
Student Peter Pan is enrolled in Hist 305
Student John Martin-smith is enrolled in Geo 101
Student Mary Moore is enrolled in English 175
-----

---- Course Registration Program ----
Select from the following menu:
1. Register a Student for a Course.
2. Show current data.
3. Save data to a file.
4. Exit the program.

-----

What would you like to do: 3
The following data was saved to file!
Student Eder Martins is enrolled in Python 100
Student John Smith is enrolled in Math 101
Student Peter Pan is enrolled in Hist 305
Student John Martin-smith is enrolled in Geo 101
Student Mary Moore is enrolled in English 175

---- Course Registration Program ----
Select from the following menu:
1. Register a Student for a Course.
2. Show current data.
3. Save data to a file.
4. Exit the program.

-----

What would you like to do: 4
Program Ended
```

Figure 5 Executing Python Script in the Command Prompt



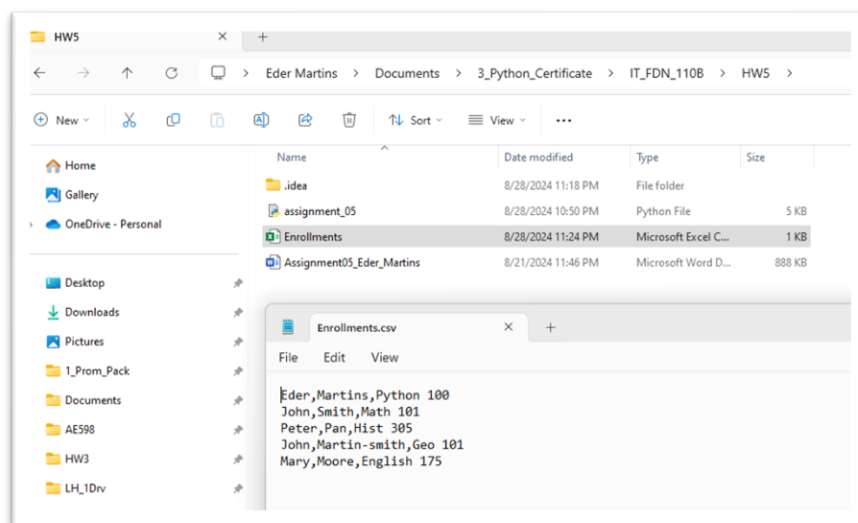
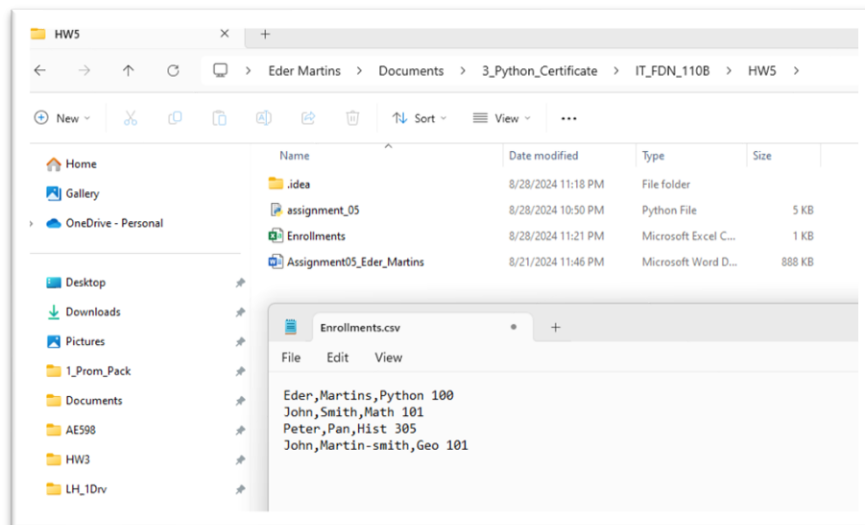


Figure 6 Enrollments.csv file content before and after running the script

## Summary

To complete Assignment 05, I followed a series of steps that involved both learning new concepts and applying previously acquired ones. The new concepts included using dictionaries for data organization, validating user input with regular expressions, and handling exceptions effectively. I also applied concepts from earlier assignments, such as comparison operators, conditional logic, and looping. I gained the necessary skills to create a functional Python program by thoroughly reading the module notes, watching tutorial videos, and running code samples. The final program successfully displayed a menu with various options, validated user input to ensure it met specified criteria (such as not containing numbers, spaces, or special characters other than hyphens), and handled errors gracefully. The program collected user input, formatted it into dictionaries for each student's data, printed the results on the screen, and saved the data in a CSV file. It utilized lists to manage collections of student records and demonstrated how to work with files to store and retrieve this data. By effectively integrating these new concepts, I was able to create a robust and user-friendly application that manages course registration efficiently.

## Reference

- [1] Arya, Anubhaw, *Module 05 Videos*. Available at YouTube: [www.youtube.com/@arya0-uw](https://www.youtube.com/@arya0-uw)