

2022 Spring -- CSCI 1300L

Lab 04: Programming with decision structures

Introduction

In this lab, you will write a Python program to determine the letter grade based on the user input of a score between 0 and 100. Specifically, you must use decision structures, including if, elif, and/or else to implement the program. Additionally, you will understand and use Boolean expressions when you write the conditions of the decision structure.

Lab objectives

After completing this lab, you will be able to:

- (1) understand the importance of a program's logic before the code implementation
- (2) write the simple pseudocode that reflects the design a program.
- (3) understand and construct Boolean expressions involving variables, Boolean operators, and comparison operators, and
- (4) use if, elif, and/or else statements in Python to control the program execution

Assignment

Assume that a professor wants to determine a student's final letter grade (i.e. A, B, C, D, F) based on a numeric value of the grade, from 0 to 100 (both 0 and 100 are included). The determination/translation is as follows:

[90, 100]: A

[80, 90): B

[70, 80): C

[60, 70): D

[0, 60): F

Note that the symbols [and] mean "inclusive"; (and) mean "exclusive".

For simplicity, there are only five letter grades. There is no "+" or "-" grade or incomplete grade or any other letters. We further assume that the input of the numeric value is a valid number, either an integer or a float point number.

If the input is within the valid range (0~100), the output will be a letter grade according to the above grading standard. However, if the input is outside the valid range, e.g. a negative number or a number greater than 100, there should be an error message such as "Invalid Input: outside the range."

Your program should first prompt the user to input a number by displaying a message. Then, the user can input the number. Next, the program determines the letter grade according to the input value and display that letter grade (or error message) in the screen. Finally, the program exits. Your program only needs to be executed ONCE for this lab assignment. No loops will be needed for repeated executions.

The program should be executed like the following examples. Note that the highlighted number is from the user's input.

Example 1:

Please enter the score (0~100):

90

The letter grade is A.

Example 2:

Please enter the score (0~100):

89.99

The letter grade is B.

Example 3:

Please enter the score (0~100):

-1

Invalid Input: outside the range.

We recommend, but do not seriously require, that you first write the pseudocode somewhere else to figure out the program's logic. Next, you convert the pseudocode into the actual Python code. Finally, do test your program multiple times: each time, try with a different input and examine if the output is the desired one. Do not forget that different data types may have to be handled in the program.

For this assignment, it is your freedom to design the program logic in a way that you think is reasonable. It is also your freedom to use if, elif, or else statements wherever they are suitable. You do not have to use all these three kinds of statements in your program. However, your program must be in working condition. Moreover, consider, and if necessary, modify the code to make it most efficient and readable.

Your program's output does not need to be exactly the same as the example output. However, your program must:

- (1) handle the user input of a number successfully,
- (2) contain at least one of the if, elif, else statements,
- (3) display the relevant message so that the user is notified what to see/do next,
- (4) correctly determine and display the letter grade based on the user input value, and
- (5) correctly process a user input value that is outside the valid range.

Submission instruction

After you have completed the assignment, upload and submit the Python source code file *Lab04.py* to eLC. Always double check that your submission was successful on eLC.

Grading

A score between 0 and 5 will be assigned, with a minimum of 1 point increment.

1. The program can successfully accept an end user's number input. (1 point)
2. The program's logic makes sense. In other words, there should be no logical error whenever the decision structures are used. (1 point)
3. The determination of a letter grade or the error message is correct based on the user input. (2 points: 1 point for the correct processing of any letter grade; 1 point for the correct processing of the error message)
4. Only a single source code file is submitted and no other file is submitted (0.5) and the entire Python program can be executed without any additional error (0.5). (1 point)

Special notice regarding the submission:

Late submission penalty. Points will be deducted from the original grade. If your submission is after the posted deadline...

- (1) within 24 hours: -2
- (2) between 24 hours and 48 hours: -3
- (3) between 48 hours and 72 hours: -4
- (4) after 72 hours: assignment will not be accepted.