

EE1003 Introduction to Computer I

Programming Assignment 2: Divide Treasures

(Due: 2020/12/06 23:59:59)

Introduction

This homework asks you to write a recursion program to divide treasures.

Three good friends went hiking together. They found a treasure box on the way up the mountain, which contained a lot of treasures. Each treasure has the same size but with different value. These three guys wanted to take the treasures home, but they don't want to fight for the treasures. After a long discussion, they decided that they will take the treasures if they can divide the treasures equally with respect to value. Otherwise, they will leave the treasures. Moreover, the size of each person's backpack is identical and limited. The number of treasures each of them can take should be equal or less than the size of the backpack. You are asked to write a program to tell these three people whether they can successfully divide the treasures equally or not.

Problem Specification:

Input: (1) An integer for the number of treasures. (2) An integer for the size of backpack. (Here we assume the size of the backpack is the same for all three persons) (3) The value of each treasure. If the integer for the number of treasures is equal to -1, the program will be terminated.

Output: the machine will show a welcome message and prompting message at the beginning. Next, it will show the prompt to let user enter the number of treasures and size of backpack. After that, the program will ask the user to enter the value of each treasure. If they can successfully distribute the treasure, please output "YES" and show which treasures they get. If they can't successfully distribute the treasure, please output "NO". The program then shows the ending message.

Sample input/output:

Welcome to NCU-EE Mediation Committee

Please enter the number of treasures or -1 to end the program: 10

Please enter the size of backpack: 4

Treasure 1 (\$): 1

Treasure 2 (\$): 2

Treasure 3 (\$): 3

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Treasure 4 ($):  4
Treasure 5 ($):  5
Treasure 6 ($):  6
Treasure 7 ($):  7
Treasure 8 ($):  8
Treasure 9 ($):  9
Treasure 10 ($): 0
.....Distribution.....Distribution.....Distribution.....
YES
People 1 : Treasure 1  Treasure 5  Treasure 9
People 2 : Treasure 3  Treasure 4  Treasure 8  Treasure 10
People 3 : Treasure 2  Treasure 6  Treasure 7

***Thanks and Come Again***

      ***Welcome to NCU-EE Mediation Committee***
Please enter the number of treasures or -1 to end the program: 4
Please enter the size of backpack: 1
Treasure 1 ($):  2
Treasure 2 ($):  2
Treasure 3 ($):  4
Treasure 4 ($):  4
.....Distribution.....Distribution.....Distribution.....
NO

***Thanks and Come Again***

      ***Welcome to NCU-EE Mediation Committee***
Please enter the number of treasures or -1 to end the program: -1
***Bye-Bye***
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Bonus:

Anything which you think is not described within the problem specification but is implemented in your program, please write it in your document and TA will judge the amount of bonus you will get (at most 10% of this assignment).

Requirements:

You are asked to use two approaches, the iteration one and the recursion one, to solve the problem. In the iteration approach, you can use any loop/conditional control as you want. In the recursion one, you have to use either direct or implicit recursion (a function calls itself with different arguments).

You have to submit a **source code** named as StudID_iteration_PA2.cpp and StudID_recursion_PA2.cpp. You also need to submit a **report** named StudID_PA2_report.pdf (in pdf format). In your report, you have to describe 1) Which loop/conditional controls you are used in the iteration approach, and the base cases you are used in the iteration approach; 2) The structure of your program; 3) Hardness of this assignment and how you overcome it; 4) The runtime comparison of the two different approaches with different size of testcases, and 5) Bonus function(s) you implement if any.

Your program will be judged with Code::Blocks 20.03 and GNU GCC Compiler.

The grading is as follows:

- (1) Correctness of your code 50%
- (2) Readability of your code 10%
- (3) The report 10%
- (4) Demo session 30%
- (5) Bonus (at most) 10%

BE SURE to **follow the naming rule mentioned above. Otherwise, your program will be not graded.**

Note:

1. Please submit your assignment on time. Otherwise, the penalty rule will apply:
 - Within 3 day delay: 20% off
 - More than 3 days: 0 point
2. You have to attend a demo session (the time will be announced later).
3. If you have questions, please E-mail me.