Ethan Dunham

dunhamet

CS 161

Assignment 3.a

Project plan

**Understanding:**

The assignment is asking me to take a previously undetermined number of inputs and find the highest and lowest of those numbers. The user will define the number of inputs(x) at the beginning of the program. Number of loops will be set to 0 at the beginning of the program. Then, the user will be prompted to enter x numbers. The first number would be inputted into the highest and lowest variable prior to a loop because it would be the current highest and lowest number. The program would then use a loop, a newly learned technique this week, to run a loop x-1 times by setting the loop parameters equal to x-1=number of loops. Each loop would take the next number as an input and compare the current value of high and low variables to the new number and replace that value with a new value if applicable using an if statement, which is also new this week. The if would compare if new number > than old high, then it would put the new number in high. Then a second if statement would compare new number < old low, if true, it would input the new number as low. The end of the loop would add 1 to the number of times the loop has been run so that an endless loop is not created. Once it runs the loop x-1 times (x-1 because the first number is used outside the loop), it will output the final values for lowest and highest. The loop is needed in this program since the number of inputs is not set and the task of finding the low and high must be done for each number relative to the last number. After testing, I discovered that a negative or 0 entered for x causes an endless loop. To correct this, I will add an extra loop after x is found that makes sure that x >=1 and asks for a positive number if it is not.

**Testing Plan:**

| **Description of Test** | **Expected results** |
|---|---|
| The user enters 5 for the number of numbers.<br>User enters 12 23 10 5 6 | Program asks for 5 numbers.<br>Program puts 12 as current high and low values.<br>Loop runs 4 times, once for each of the rest of the numbers<br>Program puts 23 at current high value.<br>Program puts 10 for current low values.<br>Program puts 5 at current low value.<br>Program ignores 6 because it is not low or high. |
| The user enters 4 for the number of numbers.<br>User enters 12.2 10 -10.5 5.8 | Program asks for 4 numbers.<br>Program puts 12 as current high and low values.<br>Loop runs 3 times, once for each of the rest of numbers.<br>Program puts 2 at current low value from 12.2.<br>Number of loops + 1<br>Program ignores 10 because it is not high or low.<br>Number of loops +1<br>Program puts -10 as low from -10.5. |

| | |
|---|---|
| | Number of loops +1<br>Loop ends because it reaches 3.<br>Program outputs 12 as high and -10 as low.<br>(floats or doubles should be used to make this work, but it is specified to enter integers. So user is at fault. Setting the input number to float would solve this problem and still output an int. However, since the instructions are for ints, if I make inputs as a double, someone following the instructions of inputing numbers as 12.2.10 etc. would run into issues of numbers not being saved as they should.) |
| User enters 1 for number of numbers.<br>User enters 2 | Program asks for 1 numbers.<br>Program puts 2 as current high and low values.<br>Loop does not run because x-1=0 which equals base loop numbers.<br>Program outputs 2 as high and 2 as low. |
| User enters 5 for number of numbers.<br>User enters 3 4 5 3 | Program asks for 5 numbers.<br>Program puts 3 as current high and low values.<br>Loop runs 4 times, once for each of the rest of the numbers<br>Program puts 4 at current high value.<br>Program puts 5 for current high value.<br>Program ignores 3 because it is not high or low.<br>Program waits for 5$^{th}$ number before completing its final loop. |
| User enters 1.1 for number of numbers.<br>User enters 2 | Program asks for 1 numbers because it is a declared int, not long, float, or double.<br>Program puts 2 as current high and low values.<br>Loop does not run because x-1=0 which equals base loop numbers.<br>Program outputs 2 as high and 2 as low. |
| User enters a 0 for number of numbers.<br>User enters 1<br>User enters 2 | Program asks for 0 numbers.<br>Caused an endless loop.<br>Fixed by adding a loop to determine if the number of numbers is 1 or more.<br>Program tells user to enter a positive integer.<br>Program asks for number of numbers again.<br>Program asks for 1 numbers.<br>Program puts 2 as current high and low values.<br>Loop does not run because x-1=0 which equals base loop numbers.<br>Program outputs 2 as high and 2 as low. |
| User enters a -5 for number of numbers.<br>User enters 1<br>User enters 2 | Program asks for -5 numbers.<br>Program tells user to enter a positive integer.<br>Program asks for number of numbers again.<br>Program asks for 1 numbers.<br>Program puts 2 as current high and low values.<br>Program outputs 2 as high and 2 as low. |

**Design:**

Main

Declare numberofloops as an integer

Set Numberfloops to 0;

Declare numOfNums, NumberInput, HighNum, and LowNum as integers

Display a question of how many numbers to run.

Ask for an input numOfNums

Start a loop

While numOfNums less than 1

Display to enter a positive integer for numofnums.

Display a question of how many numbers to run.

Ask for input of numOfNums

End loop

Display to enter numOfNums integers.

Ask for input for NumberInput

Set highNum and lowNum equal to NumberInput

Start loop

While numOfnums minus one does not equal numOfLoops

Ask for input NumberInput

if numberInput is higher than highNum

Set highNum equal to numberInput

if numberInput is less than lowNum)

Set lowNum equal to numberInput

Add 1 to the numOfLoops

end loop

Display the highNum number is max

Display the lowNum number is min.

Return 0

End main