

BIL105E – Introduction to Scientific and Engineering Computing (C)

Spring 2015 - 2016

CRN: 21837

Homework 4

Assignment Subject: Writing a C program that takes data from an input file, manipulates the data and exports the manipulated data to an output file.

Assignment Due Date: **12.05.2016 23:00**

Submission Date: **12.05.2016**

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Introduction Section

First of all, working on the last project of this term was educational like the other. In this project, we were expected to write a C program that reads and takes data from the given text file (height_weight.txt) and make some calculations. After manipulating the taken data, the program should export the data to an output text file (output.txt). Furthermore, in the given text file there were people with their id numbers, height and weight information. In the program, it takes these data's such that the user enters (N) and calculates the BMI (Body Mass Index) for every person ($BMI = \text{weight}/\text{height}^2$). After calculating the BMI, the program takes the threshold (threshold) which is given by the user and for every person's BMI it finds the absolute difference by subtracting threshold from BMI ($|\text{BMI} - \text{Threshold}|$). Finally, when all the calculations finished the program sorts the BMI-threshold section from the greatest to the lowest and prints them to the output.txt file parallel to the person's id, height, weight and BMI as much as the user wants to see (M).

Development Environment

Operating System: **OSX El Capitan**

Programming Language: **C**

Compiler: **GCC**

Source File: My program includes one file c named **150140910.c**, one text file named **height_weight.txt** and **Flowchart Homework 4.pdf**.

Header Files: The header file used is **<stdio.h>**, **<string.h>**, **<stdlib.h>** and **<math.h>**.

I used header files <stdio.h> because it is the default library in order to run default functions, <string.h> for strlen() function to find the string's number to reallocate the memory, <stdlib.h> for atoi() function, malloc(), realloc() and free() functions and <math.h> for fabs() function which calculates the absolute value. After finishing coding my program I used terminal on my MacBook to compile it via gcc. My command was "Korel-MacBook-Pro:~ Korel.Hayrullah\$ gcc 150140910.c". In order to run it I used in terminal "./a.out (string) (string) (string)" to run my program in which the strings here are the arguments taken from the main function. There is an easier way to compile and simultaneously change the name is "gcc 150140910.c -o MyFourthAssignmentC" and then again to run it "./MyFourthAssignmentC (string) (string) (string)". Here are some screenshots to explain this via image and in the meantime my program after run.

Program compilation

```
Korel-MacBook-Pro:Assignment 4 Korel$ gcc 150140910.c -o MyFourthAssignmentC
Korel-MacBook-Pro:Assignment 4 Korel$ ./MyFourthAssignmentC 30 20 10
Korel-MacBook-Pro:Assignment 4 Korel$
```

If the third argument (M) is greater than the second argument (N) the program will give an error.

```
Korel-MacBook-Pro:Assignment 4 Korel$ ./MyFourthAssignmentC 30 40 10
WARNING!!! Second argument(N) can not be greater than the Third argument(M).
Korel-MacBook-Pro:Assignment 4 Korel$
```

If the second argument is greater than the actual number of people provided in the input text file, the program will warn the user. In the screenshot below the total number of people in the provided text file is 1729.

```
Korel-MacBook-Pro:Assignment 4 Korel$ gcc 150140910.c -o MyFourthAssignmentC
Korel-MacBook-Pro:Assignment 4 Korel$ ./MyFourthAssignmentC 1730 50 10
WARNING!!! The second argument(N) is bigger than the total people in the provided input text file.
Korel-MacBook-Pro:Assignment 4 Korel$
```

Finally, after the program run the expected output is created.

Person_id	Height(cm)	Weight(kg)	BMI	BMI-Threshold
27	112	89	70.95	60.95
14	119	93	65.67	55.67
6	129	98	58.89	48.89
9	124	80	52.03	42.03
3	123	71	46.93	36.93
21	146	82	38.47	28.47
25	155	91	37.88	27.88
1	123	57	37.68	27.68
15	146	77	36.12	26.12
29	164	91	33.83	23.83
23	136	62	33.52	23.52
4	164	89	33.09	23.09
8	175	99	32.33	22.33
2	133	56	31.66	21.66
16	172	88	29.75	19.75
24	192	100	27.13	17.13
17	147	57	26.38	16.38
22	185	90	26.30	16.30
10	177	80	25.54	15.54
18	165	69	25.34	15.34

Data Structure and Variables

```
typedef struct{  
    int personId;  
    double height;  
    double weight;  
    double BMI;  
    }person; //declaring a structure with typedef with the name person
```

```
FILE *in; //file pointer for input file
```

```
FILE *out; //file pointer for output file
```

```
int argc //argument counter type integer in which the main function takes
```

```
char** argv //character double pointer argument vector in which the main function takes
```

```
int N; // declaring variable type integer named N for the number of people to choose in  
which the user enters before run
```

```
int M; // declaring variable type integer named M for the number of people to be printed on  
the output.txt file in which the user enters before run
```

```
double threshold; // declaring variable type double named threshold for calculating the  
difference from the people's BMI in which the user enters it before run
```

```
int i; //declaring variable type integer for counter control
```

```
int j; //declaring variable type integer for counter control
```

```
char **titles; //declaring variable type character with double pointer to create an array  
named titles
```

```
double tmp_BMI; // declaring variable type double for holding the BMI in bubble sort  
named tmp_BMI
```

```
double tmp_Height; // declaring variable type double for holding the height in bubble sort  
named tmp_Height
```

```
double tmp_Weight; // declaring variable type double for holding the weight in bubble sort  
named tmp_Weight
```

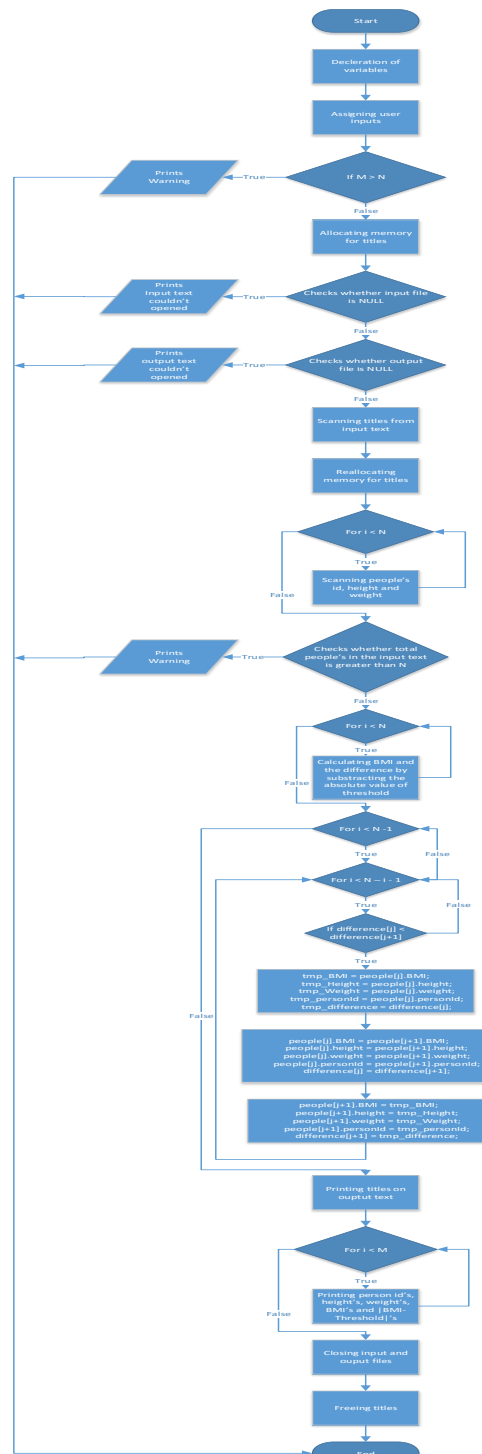
```
double tmp_difference; // declaring variable type double for holding the difference in  
bubble sort named tmp_difference
```

int tmp_personId; // declaring variable type double for holding the person id's in bubble sort named tmp_presonId

person people[N]; // structure array with N size in which the number N is declared from the user

double difference[N]; //array type double with size N in which the number is declared from the user and holds the differences (|BMI-Threshold|) parallel to the person's id's, height's, weight's and BMI's.

Program Flow(Flowchart of the main function)



*If the flowchart is not readable, you can see the Flowchart Homework 4.pdf file in hw4.zip.

Conclusion

All in all, working on this project was as fun as the previous ones. It was the last project on this course in which I worked like on the other projects. To be honest, this project was kind of easy comparing to the other projects or it may seem to me easy because I have improved my knowledge in which this a positive thing to me. This course taught me a lot of things because before this course I didn't have any knowledge about programming languages and C. As a computer engineer, I can say that this course was the introduction to computer engineering. After this course, with the knowledge I gained from this course I will continue to expertise myself. Also, this course made me understand the working principle of a program which now I can learn other programming languages much easier. I don't know if I am going to succeed this course this term but, I hope that I will succeed. And if I fail, it doesn't matter, maybe next time I am going to learn the ones which I missed. See you next time...