Embedded Programing (Lab 5)

zyBooks Chapter 3,4 & Visual Studio

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INTRODUCTION

- In this lab, we used a combination of practices. We finish reading chapter 3 and begin reading chapter 4 of "Embedded Systems Programming" in zyBooks. Following the reading, we wrote two separate programs in Visual Studio. The first one was to compute the average game score of a bowling game and to compare it to the user's last week average game score. The second one was to compute a quadratic operation where a, b and c are inputted by the user.

OBJECTIVES

- Further enhance our understanding in C.
- Develop more efficient ways to create code in C.
- Further more understand control structures (while loop) in C.

MATERIAL USED

- (1x) computer for zyBooks and Visual Studio.

PROCEDURE

- *Step 1:* Read the instructions outlined in the **lab paper**.
- *Step 2:* Follow the instructions given from the **lab paper** (Follow the order of given instructions *i.e. "Read zyBooks first then do the C code"*).

RESULTS AND DISCUSSION

(Continued on next page)

C code for Question 1

```
//////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
//This program calculates the average game score from a user and compares it to the previous average game score for that user (bowling).//
//Embedded Systems Programming                                                                                                  //
//Subash Handa                                                                                                                  //
//Lab 5, Question 1                                                                                                             //
//Program made by: Leonardo Fusser (1946995)                                                                                    //
//////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
#include <stdio.h>

void main() {

    //variable definitions
    int TW_total_score; //this week total score
    int Avg_LWscore; //last week average score
    int Avg_TWscore; //this week average score
    int Game1;
    int Game2;
    int Game3;
    int i = 0; //loop variable


    printf("Enter last weeks average score: ");
    scanf_s("%d", &Avg_LWscore); //entered last weeks average score

    //1 iterations
    while (i < 3) {

        printf("Enter the score of game number 1: ");
        scanf_s("%d", &Game1); //entered this week game 1 score

        printf("Enter the score of game number 2: ");
        scanf_s("%d", &Game2); //entered this week game 2 score

        printf("Enter the score of game number 3: ");
        scanf_s("%d", &Game3); //entered this week game 3 score

        printf("-------------------------------------\n");

        i = +2; //increment
```

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```
    }

    TW_total_score = (Game1 + Game2 + Game3); //this week total score
    printf("Total score for your 3 games this week is: %d points.\n", TW_total_score);

    Avg_TWscore = ((TW_total_score) / 3); //average this week score
    printf("Your avrage score for this weeks game is: %d points.\n", Avg_TWscore);

    printf("-------------------------------------\n");

    //if better or worse
    if (Avg_TWscore > Avg_LWscore) {
        printf("You did better than last week. Well done!");
    }
    else {
        printf("You did worse. Better luck next time!");
    }
    return 0;
}
```

C code output for Question 1

```
Enter last weeks average score: 90
Enter the score of game number 1: 87
Enter the score of game number 2: 42
Enter the score of game number 3: 50
-----------------------------------
Total score for your 3 games this week is: 179 points.
Your avrage score for this weeks game is: 59 points.
-----------------------------------
You did worse. Better luck next time!
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ual Studio 2019\Projects\Embedded Systems Programming\Lab 5 (Question 1)\x64\Debug\Lab 5 (Question 1).exe (process 22128
) exited with code 0.
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```

C code for Question 2

```
////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
//This program calculates a quadratic formula where a, b and c are inputted by the user.                                              //
//Embedded Systems Programming                                                                                                        //
//Subash Handa                                                                                                                        //
//Lab 5, Question 2                                                                                                                   //
//Program made by: Leonardo Fusser (1946995)                                                                                          //
////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////

#include <stdio.h>
#include <math.h>  //enable math library

int main()
{
    while (1)
    {
        //quadratic equation format
        printf("Quadratic Equation format: aX^2 + bX + c \n");

        //delcare inputs and outputs and their types
        float a, b, c, determinant, x1, x2, realSolution, imaginarySolution;

        //user input
        printf("Enter the coefficients a, b, c respectively seperated by a comma  \n");
        scanf_s("%f, %f, %f", &a, &b, &c);

        if (a == 0)
        {
            printf("This is not a quadratic equation \n");
            break;
        }

        //calculate the determinant to determine the number and the type of the solutions
        determinant = ((b * b) - (4 * a * c));
        printf(" Determinant = %f \n", determinant);

        if (determinant == 0)
        {
            // if the determinant is zero, then there will be one solution
            x1 = x2 = (-b) / (2 * a);
            printf("One real solution and it is %0.1f \n", x1);
        }
```

```
42          else if (determinant > 0)
43          {
44              x1 = ((-b) + sqrtf(determinant)) / (2 * a);
45              x2 = ((-b) - sqrtf(determinant)) / (2 * a);
46
47              printf("Two distinct real solutions and they are %0.1f, and %0.1f \n", x1, x2);
48          }
49          else
50          {
51              //if the determinant is negative, then the solutions will contain an imaginary part
52              realSolution = -b / (2 * a);
53              imaginarySolution = sqrtf(-determinant) / (2 * a);
54
55              printf(" Complex Solutions, and they are %0.1f + %0.1fi and %0.1f - %0.1fi \n", realSolution, imaginarySolution, realSolution, imaginarySolution);
56          }
57      }
58  }
```

C code output for Question 2

```
Quadratic Equation format: aX^2 + bX + c
Enter the coefficients a, b, c respectively seperated by a comma
3,4,5
 Determinant = -44.000000
 Complex Solutions, and they are -0.7 + 1.1i and -0.7 - 1.1i
Quadratic Equation format: aX^2 + bX + c
Enter the coefficients a, b, c respectively seperated by a comma

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ual Studio 2019\Projects\Embedded Systems Programming\Lab 5 (Question 2)\Debug\Lab 5 (Question 2).exe (process 21884) ex
ited with code -1073741510.
Press any key to close this window . . .
```