Embedded Programing (Lab 3)

zyBooks Chapter 2 & Visual Studio

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INTRODUCTION

- In this lab, we used a combination of practices. We read chapter 2 of "Embedded Systems Programming" in zyBooks. Following the reading, we wrote two separate programs in Visual Studio. The first one was to calculate the time sound would travel through different mediums (The user inputted the distance in feet and selected the medium). The second one deals with calculating an employee's commission and so fourth. Below outlines the work in greater detail.

OBJECTIVES

- Further enhance our understanding in C.
- Further enhance our understanding with the math module in C.
- Develop more efficient ways to create code 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

```c
////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
//This program calculates the time it takes for sound to travel through a certain medium. The type of medium and distance (in feet) the sound will travel, will be inputted by the user.//
//Embedded Systems Programming (Lab 3)(Question 1)                                                                                                                                      //
//Subash Handa                                                                                                                                                                          //
//Program made by: Leonardo fusser (1946995)                                                                                                                                            //
////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////


#include <stdio.h>

void main() {
    //variable definitions
    const int time_air = 1100;
    const int time_water = 4900;
    const int time_steel = 16400;
    double dist_air;
    double dist_water;
    double dist_steel;
    int usr_input;
    double usr_distance;

    //print menu to user
    printf("Medium:         Speed (feet per second): \n");
    printf("Air             1'100\n");
    printf("Water           4'900\n");
    printf("Steel           16'400\n");
    printf("-------------------------------------------------------------\n"); //line break

    //user selection from menu
    printf("Select 1 (for Air), 2 (for Water) or 3 (for Steel): ");
    scanf_s("%d", &usr_input);
    printf("-------------------------------------------------------------\n");//line break

    //user distance input
    printf("Enter the number of feet for the distance: ");
    scanf_s("%lf", &usr_distance);
    printf("-------------------------------------------------------------\n");//line break

    //input validation & calculations
    if (usr_input >= 1 && usr_input <= 3 && usr_distance > 0) {

        //if user selects 1st option
        if (usr_input == 1) {
            dist_air = usr_distance / time_air;
            printf("Time for sound to travel through 'air' as a medium: %lf seconds.\n", dist_air);//print distance in seconds (air)
            printf("-------------------------------------------------------------\n");//line break
        }
        }
        //if user selects 2nd option
        else if (usr_input == 2) {
            dist_water = usr_distance / time_water;
            printf("Time for sound to travel through 'water' as a medium: %lf seconds.\n", dist_water);//print distance in seconds (water)
            printf("-------------------------------------------------------------\n");//line break
        }
        //if user selects 3rd option
        else if (usr_input == 3) {
            dist_steel = usr_distance / time_steel;
            printf("Time for sound to travel through 'steel' as a medium: %lf seconds.\n", dist_steel);//print distance in seconds (steel)
            printf("-------------------------------------------------------------\n");//line break
        }

    }
    //if (IF statement) above fails
    else {
        printf("Please check you inputs and try again!\n");
        printf("-------------------------------------------------\n");//line break
    }
}
```

C code output for Question 1

Microsoft Visual Studio Debug Console

```
Medium:         Speed (feet per second):
Air             1'100
Water           4'900
Steel           16'400
------------------------------------------------------------
Select 1 (for Air), 2 (for Water) or 3 (for Steel): 1
------------------------------------------------------------
Enter the number of feet for the distance: 20
------------------------------------------------------------
Time for sound to travel through 'air' as a medium: 0.018182 seconds.
------------------------------------------------------------

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ual Studio 2019\Projects\Embedded Systems Programming\Lab 3 (Question 1)\Debug\Lab 3 (Question 1).exe (process 10140) ex
ited with code 0.
Press any key to close this window . . .
```

Microsoft Visual Studio Debug Console

```
Medium:         Speed (feet per second):
Air             1'100
Water           4'900
Steel           16'400
------------------------------------------------------------
Select 1 (for Air), 2 (for Water) or 3 (for Steel): 3
------------------------------------------------------------
Enter the number of feet for the distance: -0.2345
------------------------------------------------------------
Please check you inputs and try again!
-------------------------------------------------

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ual Studio 2019\Projects\Embedded Systems Programming\Lab 3 (Question 1)\Debug\Lab 3 (Question 1).exe (process 11000) ex
ited with code 0.
Press any key to close this window . . .
```

C code for Question 2

```c
//////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
//This program calculates the commision of an employee with other conditions (advanced pay) taken into account. The employee's total sales are provided by themselves.        //
//Embedded Systems Programming (Lab 3)(Question 2)                                                                                                                            //
//Subash Handa                                                                                                                                                                //
//Program made by: Leonardo fusser (1946995)                                                                                                                                  //
//////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////

#include <stdio.h>

void main() {
    //variable definitions
    double employeeAdvance;
    double userInput_Sales;
    double employeeMustPay;
    double ammountDifference;
    double employeeSalary;

    //user inputs
    printf("Enter the sales for this month (in dollars): \n");
    scanf_s("%lf", &userInput_Sales);
    printf("-----------------------------------------------\n");
    printf("Enter the amount of money you would like to take in advance: \n");
    scanf_s("%lf", &employeeAdvance);
    printf("-----------------------------------------------\n");

    //input validation and calculations
    if (userInput_Sales <= 0) {
        printf("Please check your inputs and try again! *Note: sales amount has to be bigger than 0 dollars!\n");
        printf("-----------------------------------------------\n");
    }
    //if sales less than $10'000
    else if (userInput_Sales < 10000) {
        employeeMustPay = employeeAdvance - (userInput_Sales * 0.05);
        printf("Sales person's commsion is: %lf dollars.\n", userInput_Sales * 0.05);
        printf("Employee must pay %lf dollars to the company!\n", employeeMustPay);
        printf("-----------------------------------------------\n");
    }
    //if sales greater than or equal to $10'000 and less than $15'000
    else if (userInput_Sales >= 10000 && userInput_Sales < 15000) {
        employeeMustPay = employeeAdvance - (userInput_Sales * 0.1);
        printf("Sales person's commision is: %lf dollars.\n", userInput_Sales * 0.1);
        printf("Employee must pay %lf dollars to the company!\n", employeeMustPay);
        printf("-----------------------------------------------\n");
    }
```

```c
    //if sales greater than or equal to $15'000 and less than $18'000
    else if (userInput_Sales >= 15000 && userInput_Sales < 18000) {
        employeeSalary = (userInput_Sales * 0.12) - employeeAdvance;
        printf("Sales person's commision is: %lf dollars.\n", userInput_Sales * 0.12);
        printf("Employee deserves %lf dollars from the company!\n.", employeeSalary);
        printf("-----------------------------------------------\n");
    }
    //if sales greater than or equal to $18'000 and less than $22'000
    else if (userInput_Sales >= 18000 && userInput_Sales < 22000) {
        employeeSalary = (userInput_Sales * 0.14) - employeeAdvance;
        printf("Sales person's commision is: %lf dollars.\n", userInput_Sales * 0.14);
        printf("Employee deserves %lf dollars from the company!\n.", employeeSalary);
        printf("-----------------------------------------------\n");
    }
    //if sales greater than or equal to $22'000
    else if (userInput_Sales >= 22000) {
        employeeSalary = (userInput_Sales * 0.16) - employeeAdvance;
        printf("Sales person's commision is: %lf dollars.\n", userInput_Sales * 0.16);
        printf("Employee deserves %lf dollars from the company!\n", employeeSalary);
        printf("-----------------------------------------------\n");
    }
    //if all above fails
    else {
        printf("An error occured. Please try again!\n");
        printf("-----------------------------------------------\n");
    }
}
```

C code output for Question 2

```
Microsoft Visual Studio Debug Console
Enter the sales for this month (in dollars):
15000
-----------------------------------------------
Enter the amount of money you would like to take in advance:
120
-----------------------------------------------
Sales person's commision is: 1800.000000 dollars.
Employee deserves 1680.000000 dollars from the company!
.-----------------------------------------------

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ual Studio 2019\Projects\Embedded Systems Programming\Lab 3 (Question 2)\Debug\Lab 3 (Question 2).exe (process 9572) exi
ted with code 0.
Press any key to close this window . . .
```