CL-1004
Object Oriented Programming
Lab No 4

Objectives:
- Recursion
- Structures
- Dynamic array of Structures

Note: Carefully read the following instructions (*Each instruction contains a weightage*)

1. There must be a block of comments at start of every question's code by students; the block should contain brief description about functionality of code.
2. Comment on every function and about its functionality.
3. Mention comments where necessary such as comments with variables, loop, classes etc to increase code understandability.
4. Use understandable name of variables.
5. Proper indentation of code is essential.
6. Write a code in C++ language.
7. Make a Microsoft Word file and paste all of your C++ code with all possible screenshots of every task **output in Microsoft Word and submit word file. Do not submit .cpp file.**
8. First think about statement problems and then write/draw your logic on copy.
9. After copy pencil work, code the problem statement on MS Studio C++ compiler.
10. At the end when you done your tasks, attached C++ created files in MS word file and make your submission on Google Classroom. (Make sure your submission is completed).
11. Please submit your file in this format **20F1234_L1**.
12. Do not submit your assignment after deadline. Late submission is not accepted.
13. Do not copy code from any source otherwise you will be penalized with negative marks.

Problem 1: (Structure, pointer to structure, Structure variable array, dynamic memory allocation)

Write a program that simulates a soft drink machine. The program should use a structure that stores the following data:

Drink Name

Drink Cost

Number of Drinks in Machine

The program should create a dynamic array of four structures. The elements should be initialized with the following data:

Drink Name	Cost	Number in Machine
Cola	.75	20
Root Beer	.75	20
Grape Soda	.80	20
Cream Soda	.80	20

Each time the program runs, it should enter a loop that performs the following steps:

- A list of drinks is displayed on the screen
- The user should be allowed to either quit the program or pick a drink.
- If the user selects a drink, he or she will next enter the amount of money according to the cost shown into the drink machine.
- The program should display the amount of change that would be returned and subtract one from the number of that drink left in the machine.
- If the user selects a drink that has sold out, a message should be displayed. The loop then repeats.
- When the user chooses to quit the program, it should display the total amount of money the machine earned.

Input Validation: When the user enters an amount of money, do not accept negative values, or values greater than $1.00.
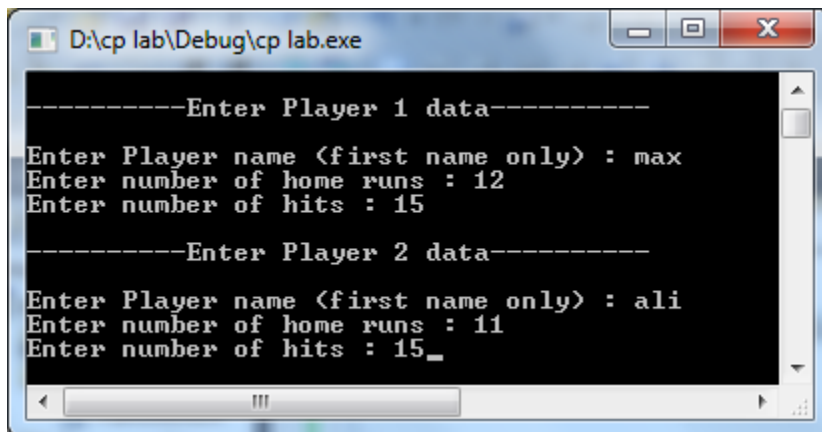
Problem 2: | (Nested structure, pointers) | 25 Mins

In FAST-NU Faisalabad our Director want to make a Data Base system for student of Computer Science Department. The data base must contain

1) Name of Student

2) Address (House #, Street #, City Name, Province Name).

3) Age

4) GPA

Create a structure of **Student** which must has nested structure of **Address**. Take input for as many students as user wants. Then out put the final data in proper order.

Problem 3: | Structured array

Write a program that declares a struct to store the data of a baseball player **(player's name, number of home runs, number of hits** and **findHighestRunsPlayer)**. Declare an array of 3 components to store the data of 3 baseball players. Your program must contain a function to **input** data and a function to **output** data. Add functions to **search** the array to find the index of a specific player and **update** the data of a player. Before the program terminates, give the user the option to save data in a **file** (You may assume that input data is stored in a file.). Your program should be **menu driven**, giving the user various choices.

```
D:\cp lab\Debug\cp lab.exe

----------Enter Player 1 data----------

Enter Player name (first name only) : max
Enter number of home runs : 12
Enter number of hits : 15

----------Enter Player 2 data----------

Enter Player name (first name only) : ali
Enter number of home runs : 11
Enter number of hits : 15_
```

```
D:\cp lab\Debug\cp lab.exe

----------Player 1 data----------

NAME : max
Home runs : 12
Total hits : 15

----------Player 2 data----------

NAME : ali
Home runs : 11
Total hits : 15


1.Search and update player contents
2.Save players contents to file
What you want to do ( 1 or 2 ) : 1_
```

```
D:\cp lab\Debug\cp lab.exe
Enter player name you want to search : ali


----------Updating Player ali data----------

Enter Player name (first name only) : john
Enter number of home runs : 1
Enter number of hits : 2
Want to store data in file (y/n): _
```
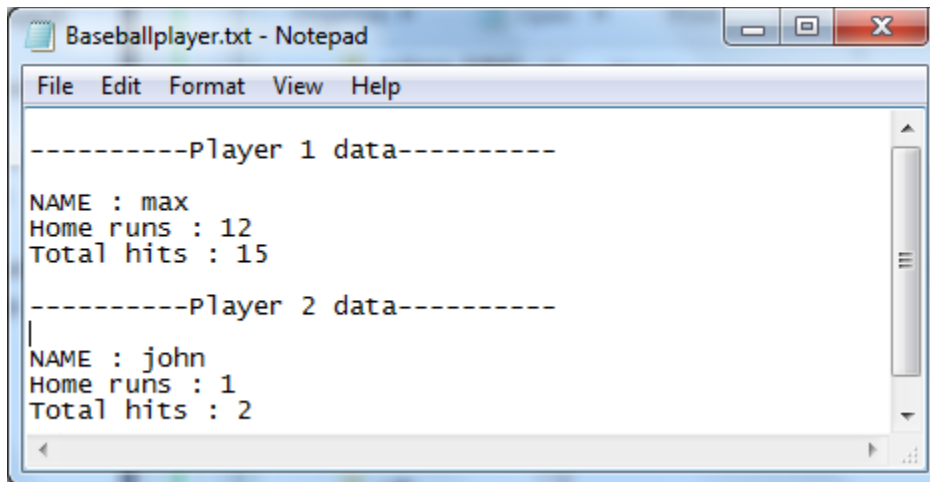
```
D:\cp lab\Debug\cp lab.exe
**********************Updating Contents**********************

----------Player 1 data----------

NAME : max
Home runs : 12
Total hits : 15

----------Player 2 data----------

NAME : john
Home runs : 1
Total hits : 2
Press any key to continue . . .
```

```
Baseballplayer.txt - Notepad

File  Edit  Format  View  Help

----------Player 1 data----------

NAME : max
Home runs : 12
Total hits : 15

----------Player 2 data----------
|
NAME : john
Home runs : 1
Total hits : 2
```

Problem 4: | (Unions) | 15 Min

Write a C++ program for the following problem:

Create a union Person_Record which will contain three members i.e. Name, Address and Phone.

For input purpose, give user the option to enter either name, address, or phone number. If the user chooses to input name set the field to 1, if the user choses to input address set the field to 2 and if the user choses to input phone set field to 3.

Proper code indentation will hold extra marks !

Best of luck 😊

You are done with your exercise, submit on classroom at given time.