CL-1004
Object Oriented Programming
Lab No 4

Objectives:

- Structures
- Dynamic array of Structures
- Class, object and member functions
- Class private data members

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: | (Recursion, Group Task) | Group Task 30 Min

Write recursive code of Tower of Hanoi for 2,3 and 4 disks. Explain how the recursive code works

Problem 2: | (Structure, Structure variable, static memory allocation) | 20 Min

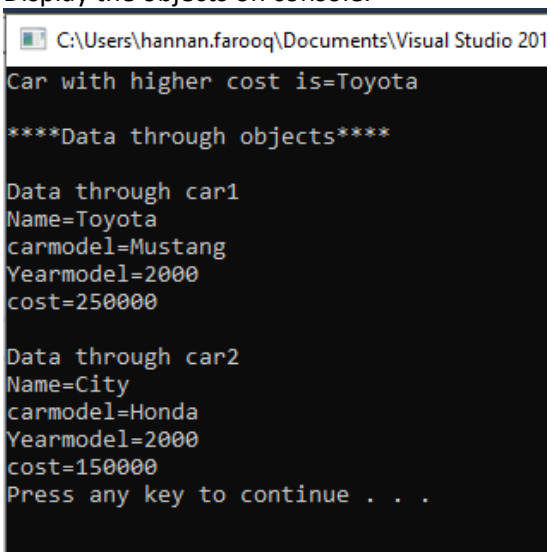
The structure Car is declared as follows:

```
struct Car
{
char carName[20];
 char carModel[20];
 int yearModel;
 double cost;
};
```

1. Write a definition statement that defines a Car structure variable car1 and initialized with the following data

Name	Toyota
Model	Mustang
Year Model	2000
Price	$25000

2. Define another object car2 and initialize it with any valid data.
3. Compare the cost of both objects and print the name of car with higher cost.
4. Display the objects on console.



Problem 3: (Structure, Structure object) | 20 Min

Write a program in C++ that shows the area of 3 room's. Using Structure namely "distance".

1. Take input of feet & inches from user for variable d1 (feet & inches),
2. Assign variable d2 = {10, 5.25} values.
3. Now add feet and inches of d1 & d2 and store in d3.
4. Display d1 (feet & inches) d2 (feet & inches) d3 (feet & inches) separately.
5. Put Condition if d1 & d2 inches increase by 12 it become a foot.
6. Display the objects d1, d2 and d3 on console.

Problem 4: (Structure, pointer to structure, Structure variable array, dynamic memory allocation) | 30 Min

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:

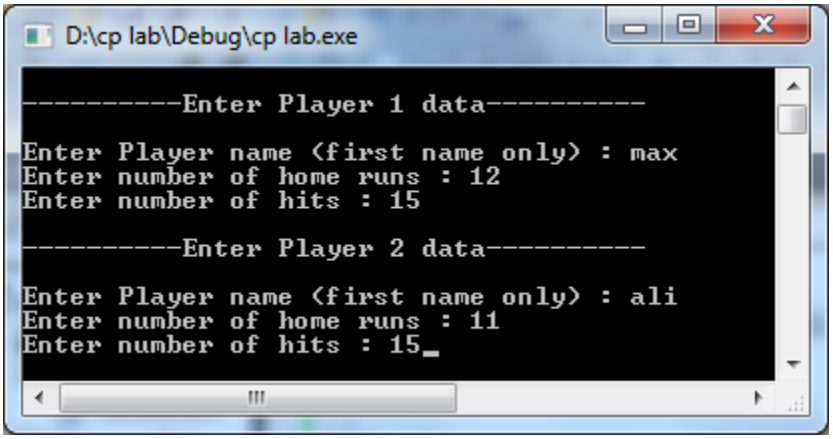
- A list of drinks is displayed on the screen
- The user should be allowed to either quit the program or pick a drink.
- If the user selects a drink, he or she will next enter the amount of money according to the cost shown into the drink machine.
- The program should display the amount of change that 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.

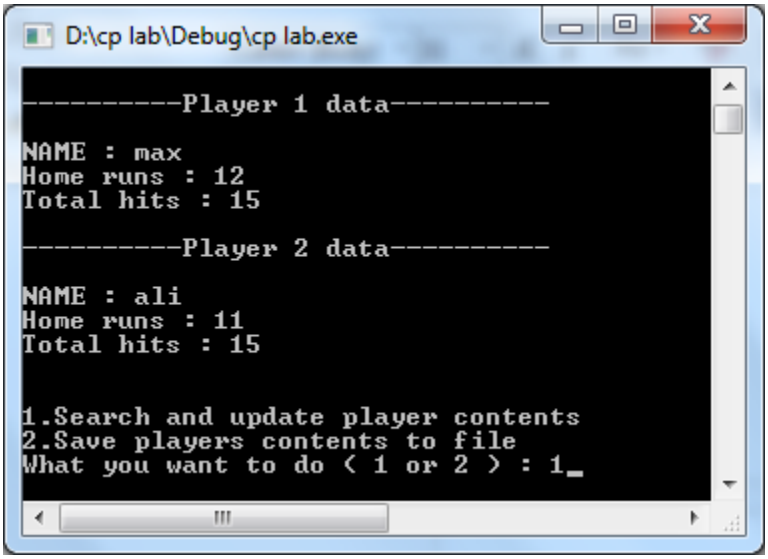
- When the user chooses to quit the program, it should display the total amount of money the machine earned.

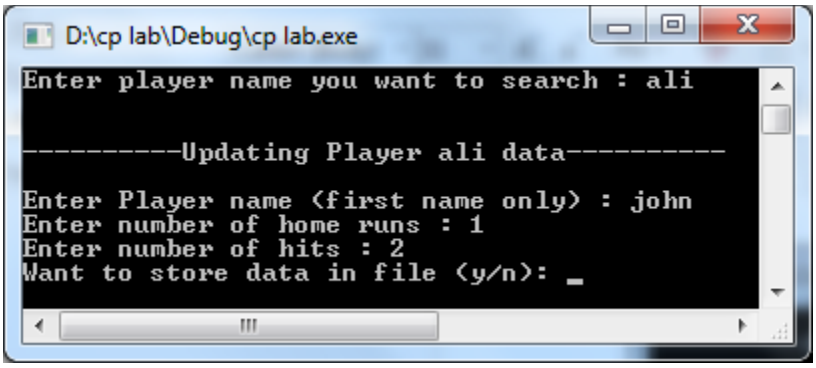
Input Validation: When the user enters an amount of money, do not accept negative values, or values greater than $1.00.

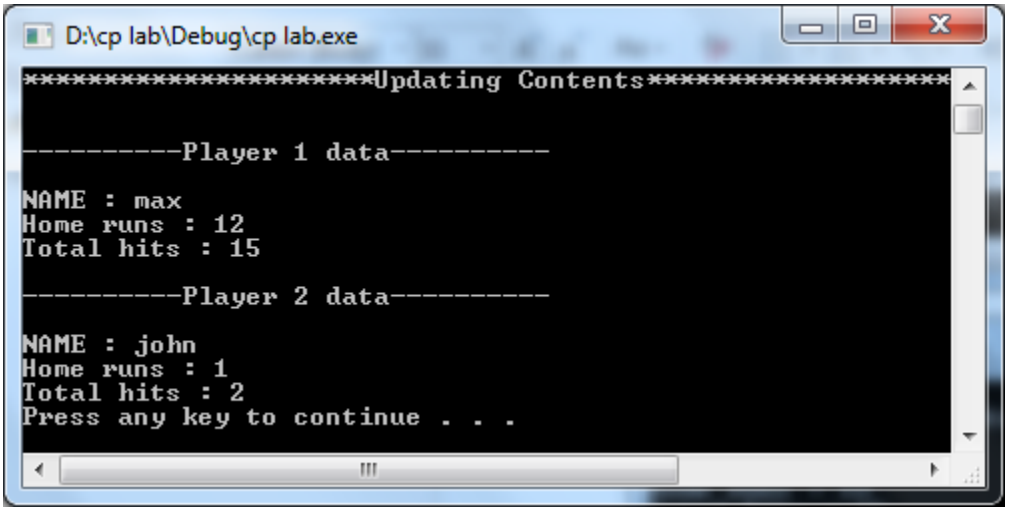
Problem 5: | Structured array | 30 Min

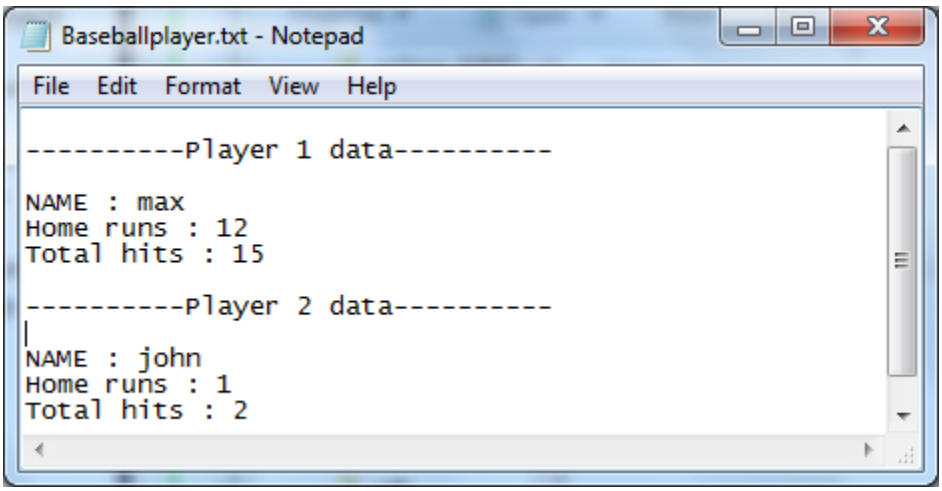
Write a program that declares a struct to store the data of a baseball player **(player's name, number of home runs, and number of hits**). Declare an array of 3 components to store the data of 3 baseball players. Your program must contain a function to **input** data and a function to **output** data. 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 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 5: | (Nested structure, pointers) | 30 Min

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.

Proper code indentation will hold extra marks !

Best of luck ☺

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