Lab 11 – Structures

Task 01:

Make a structure BookRec, which stores the following details of a book: title of the book, Author's name, its publisher and price in it. Write a program to take input of 2 books and display it on the console.

Code:

```
#include<iostream>
#include<string>
using namespace std;

struct bookRec{
    string title, author, pub;
    float price = 0.00;
};

int main(){
    bookRec bd;

    for(int i = 0; i < 2; i++){
        cout << "\nEnter title: ";
        getline(cin, bd.title);
        cout << "Enter the name author: ";
        getline(cin, bd.author);
        cout << "Enter the name of publisher: ";
        getline(cin, bd.pub);
        cout << "Enter price: ";
        cin >> bd.price;
        cin.ignore();
    }

    cout << "\nDetails: " << endl;
    for(int i = 0; i < 2; i++){
        cout << "\nBook no. " << (i+1) << endl;
        cout << "\tTitle: " << bd.title <<endl;
        cout << "\tAuthor: " << bd.author << endl;
        cout << "\tPublisher: " << bd.pub << endl;
        cout << "\tPrice: " << bd.price << endl;
    }
}
```

Output:

```
PS D:\Hasan\cpp\university\lab11-Structures> g++ task01.cpp
PS D:\Hasan\cpp\university\lab11-Structures> ./a.exe

Enter title: Random Book
Enter the name author: No one
Enter the name of publisher: 0
Enter price: 100

Enter title: Second Book
Enter the name author: Anonymous
Enter the name of publisher: Gaba Publisher
Enter price: 800

Details:

Book no. 1
        Title: Second Book
        Author: Anonymous
        Publisher: Gaba Publisher
        Price: 800

Book no. 2
        Title: Second Book
        Author: Anonymous
        Publisher: Gaba Publisher
        Price: 800
PS D:\Hasan\cpp\university\lab11-Structures>
```

Task 02:

You are tasked with developing a software system to manage a library of books. The system should store information about each book and its author, allow users to search for books by title or author name, There should be at least 15 user input and display the result

Code:

```
#include<iostream>
#include<string>
#include<iomanip>
using namespace std;

struct bookDetails{
    string title, author;
    int pubYear = 0;
};

/*1. to add books*/
void addBook(bookDetails bd[], int size, int count){
    cout << "Enter title: ";
    getline(cin, bd[count].title);
    cout << "Enter the name of author: ";
    getline(cin, bd[count].author);
    cout << "Enter the year of publication: ";
    cin >> bd[count].pubYear;
    cin.ignore();
}

/*2. to search by title*/
void searchByTitle(bookDetails bd[], int size, int count){
    string targetTitle;
    bool found = false;
    cout << "Enter title of book which you want to find: ";
    getline(cin, targetTitle);

    for(int i = 0; i < count; i++){
        if(bd[i].title == targetTitle){
            cout << endl;
            cout << "Book found! Details." << endl;
            cout << "Title          Author         Publication Year" << endl;
            for(int i = 0; i < 46; i++) cout << "-";
            cout << endl;
            cout << left;
            cout
<<setw(15)<<bd[i].title<<setw(15)<<bd[i].author<<setw(16)<<bd[i].pubYear<<endl;
```

```
            found = true;
            break;
        }
    }
    if(!found){
        cout <<"\nBook not found." << endl << endl;
    }
}

/*3. to search by author*/
void searchByAuthor(bookDetails bd[], int size, int count){
    string targetAuthor;
    bool found = false;
    cout << "Enter title of book which you want to find: ";
    getline(cin, targetAuthor);

    for(int i = 0; i < count; i++){
        if(bd[i].author == targetAuthor){
            cout << endl;
            cout << "Book found! Details." << endl;
            cout << "Title          Author         Publication Year" << endl;
            for(int i = 0; i < 46; i++) cout << "-";
            cout << endl;
            cout << left;
            cout
<<setw(15)<<bd[i].title<<setw(15)<<bd[i].author<<setw(16)<<bd[i].pubYear<<endl;
            found = true;
            break;
        }
    }
    if(!found){
        cout <<"\nBook not found." << endl << endl;
    }
}

/*4. to view sorted books*/
void viewSortedbooks(bookDetails bd[], int size, int count){

    for(int i = 0; i < count; i++){
        for(int j = 0; j < (count-1-i); j++){

            // int(bd[j].title.substr(0,1)) > int(bd[j+1].title.substr(0,1)) ->
this will consider character as string
            if(int(bd[j].title[0]) > int(bd[j+1].title[0])){
```

```
                string Title = bd[j].title;
                bd[j].title = bd[j+1].title;
                bd[j+1].title = Title;

                string Author = bd[j].author;
                bd[j].author = bd[j+1].author;
                bd[j+1].author = Author;

                int tempYear = bd[j].pubYear;
                bd[j].pubYear = bd[j+1].pubYear;
                bd[j+1].pubYear = tempYear;
            }
        }
    }

    cout << "Details of all books." << endl;
    cout << "S.No.   Title          Author         Publication Year" << endl;
    for(int i = 0; i < 54; i++) cout << "-";
    cout << endl;
    cout << left;

    for(int i = 0, sNo = 1; i < count; i++, sNo++){
        cout
<<setw(8)<<sNo<<setw(15)<<bd[i].title<<setw(15)<<bd[i].author<<setw(16)<<bd[i].pu
bYear<<endl;
    }
}

/*5. to display all books*/
void displayAllBooks(bookDetails bd[], int size, int count){
    cout << "Details of all books." << endl;
    cout << "S.No.   Title          Author         Publication Year" << endl;
    for(int i = 0; i < 54; i++) cout << "-";
    cout << endl;
    cout << left;

    for(int i = 0, sNo = 1; i < count; i++, sNo++){
        cout
<<setw(8)<<sNo<<setw(15)<<bd[i].title<<setw(15)<<bd[i].author<<setw(16)<<bd[i].pu
bYear<<endl;
    }

}

int main(){
```

```
bookDetails bd[15];
int bookCount = 0;
bool firstBookAdded = false;
int choice = 0;
cout << "***Library Management System***" << endl;
do{
    cout << endl;
    cout << "\t---MENU---" << endl;
    cout << "1. Add a new book." << endl;
    cout << "2. Search book by title." << endl;
    cout << "3. Search book by author." << endl;
    cout << "4. Sort books by title." << endl;
    cout << "5. Display all books." << endl;
    cout << "6. Exit" << endl;
    cout << "Enter choice: ";
    cin >> choice;
    cin.ignore();

    if(choice == 1){
        if(bookCount >= 15){
            cout << "\nLibrary filled!" << endl;
        }
        else{
            cout << endl;
            addBook(bd, 15, bookCount);
            bookCount++;
            firstBookAdded = true;
        }
    }

    else if(choice == 2){
        if(!firstBookAdded){
            cout << "\nPlease add book first!" << endl;
        }
        else{
            cout << endl;
            searchByTitle(bd, 15, bookCount);
        }
    }

    else if(choice == 3){
        if(!firstBookAdded){
            cout << "\nPlease add book first!" << endl;
        }
        else{
```

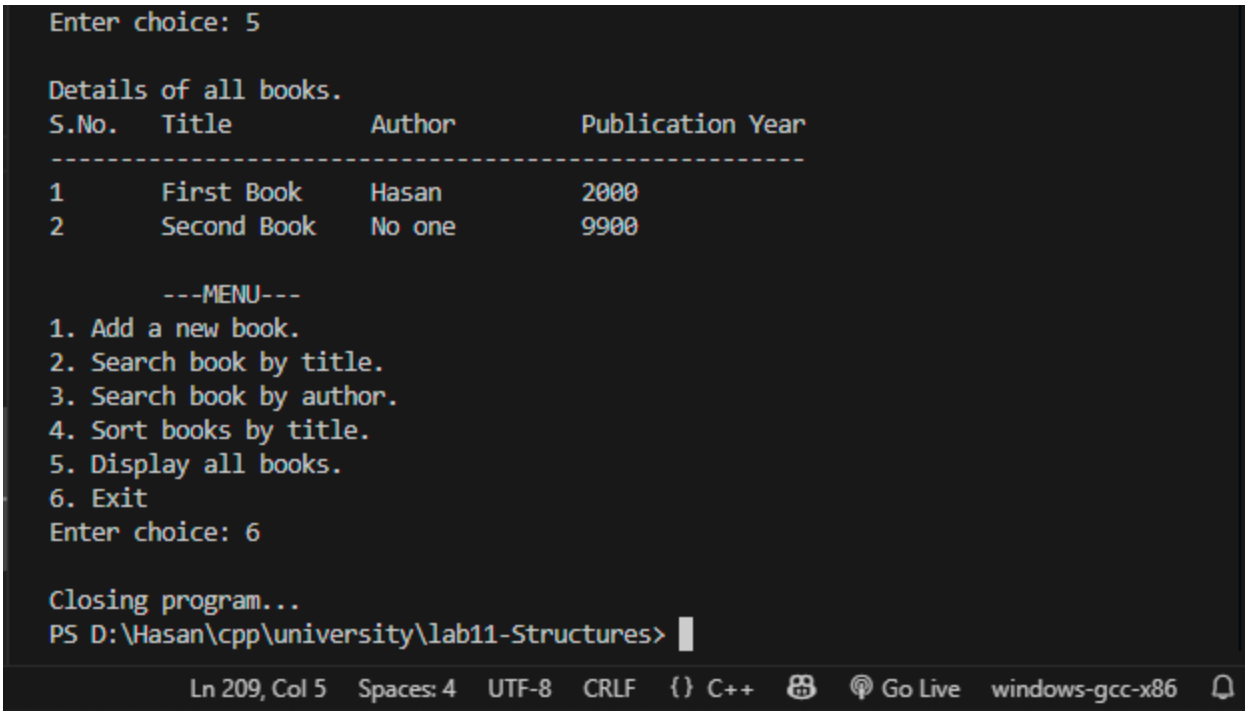
```
                cout << endl;
                searchByAuthor(bd, 15, bookCount);
            }
        }

        else if(choice == 4){
            if(!firstBookAdded){
                cout << "\nPlease add book first!" << endl;
            }
            else{
                cout << endl;
                viewSortedbooks(bd, 15, bookCount);
            }
        }

        else if(choice == 5){
            if(!firstBookAdded){
                cout << "\nPlease add book first!" << endl;
            }
            else{
                cout << endl;
                displayAllBooks(bd, 15, bookCount);
            }
        }

        else if(choice == 6){
            cout << "\nClosing program..." << endl;
        }

        else{
            cout << "\nInvalid choice!" << endl;
        }
    }while(choice != 6);
}
```

Output:

```
PS D:\Hasan\cpp\university\lab11-Structures> ./a.exe
***Library Management System***

        ---MENU---
1. Add a new book.
2. Search book by title.
3. Search book by author.
4. Sort books by title.
5. Display all books.
6. Exit
Enter choice: 3

Please add book first!

        ---MENU---
1. Add a new book.
2. Search book by title.
3. Search book by author.
4. Sort books by title.
5. Display all books.
6. Exit
Enter choice: 1

Enter title: First Book
Enter the name of author: Hasan
Enter the year of publication: 2000

        ---MENU---
1. Add a new book.
2. Search book by title.
3. Search book by author.
4. Sort books by title.
5. Display all books.
6. Exit
Enter choice: 1

Enter title: Second Book
```

```
5. Display all books.
6. Exit
Enter choice: 1

Enter title: Second Book
Enter the name of author: No one
Enter the year of publication: 9900

        ---MENU---
1. Add a new book.
2. Search book by title.
3. Search book by author.
4. Sort books by title.
5. Display all books.
6. Exit
Enter choice: 2

Enter title of book which you want to find: First Book

Book found! Details.
Title          Author         Publication Year
-----------------------------------------------
First Book     Hasan          2000

        ---MENU---
1. Add a new book.
2. Search book by title.
3. Search book by author.
4. Sort books by title.
5. Display all books.
6. Exit
Enter choice: 3

Enter title of book which you want to find: No one
```

```
Enter choice: 3

Enter title of book which you want to find: No one

Book found! Details.
Title          Author         Publication Year
-----------------------------------------------
Second Book    No one         9900

        ---MENU---
1. Add a new book.
2. Search book by title.
3. Search book by author.
4. Sort books by title.
5. Display all books.
6. Exit
Enter choice: 4

Details of all books.
S.No.   Title          Author         Publication Year
-------------------------------------------------------
1       First Book     Hasan          2000
2       Second Book    No one         9900

        ---MENU---
1. Add a new book.
2. Search book by title.
3. Search book by author.
4. Sort books by title.
5. Display all books.
6. Exit
Enter choice: 5
```


Enter choice: 5
Details of all books.
S.No. Title Author Publication Year
1 First Book Hasan 2000
2 Second Book No one 9900
---MENU---
1. Add a new book.
2. Search book by title.
3. Search book by author.
4. Sort books by title.
5. Display all books.
6. Exit
Enter choice: 6
Closing program...
PS D:\Hasan\cpp\university\lab11-Structures>
Ln 209, Col 5 Spaces: 4 UTF-8 CRLF {} C++ Go Live windows-gcc-x86

Task 03:

Write a C++ program that compute Net Salary of Employee. Program contains two user defined functions empSalary() and display().

1. Create a structure of Employee that contains following data members:
   - EmployeeNumber, Name, BasicSalary, HouseAllowance, MedicalAllowance,Tax, GrossPay and NetSalary - Employeenumber, name and basicsalary must be taken input from the user.
2. empSalary() compute salary with given criteria:
   - HouseAllowence = 12% of BasicSalary
   - Medical Allowence = 8% of Basic Salary
   - Tax = 5% of Basic Salary
   - GrossSalary = Basic+HouseAllowence+MedicalAllowence
   - NetSalary = GrossSalary – Tax
3. display() for displaying details of Empolyee

Code:

```
#include<iostream>
#include<string>
#include<iomanip>
using namespace std;

struct employee{
    string name;
    int empNum = 0;
    float basicSal = 0.00, houseAll = 0.00, medAll = 0.00, tax = 0.00, grossSal =
0.00, netSal = 0.00;
};

void calculateSal(employee &eDetails){
    eDetails.houseAll += (eDetails.basicSal*(12/100.0));
    eDetails.medAll += (eDetails.basicSal*(8/100.0));
    eDetails.tax += (eDetails.basicSal*(5/100.00));
    eDetails.grossSal = (eDetails.basicSal + eDetails.houseAll + eDetails.medAll
+ 0.0);
    eDetails.netSal = (eDetails.grossSal - eDetails.tax) + 0.00;
}

void display(employee ed){
    cout << "\nPay Slip:" <<endl <<endl;
    cout << "Emp No.  Name           Basic Salary   House Allowence(12%)  Medical
Allowence(8%) Tax(5%)  Gross Salary Net Salary\n";
    for(int i = 0; i < 115; i++) cout << "-";
    cout << endl;
```

```
    cout << left;

    cout<<setw(9)<<ed.empNum<<setw(15)<<ed.name<<setw(15)<<ed.basicSal<<setw(22)<
<ed.houseAll<<setw(22)<<ed.medAll<<setw(9)<<ed.tax<<setw(13)<<ed.grossSal<<setw(1
0)<<ed.netSal<<endl;
}

int main(){
    employee eDetail;

    cout << "Enter employee number: ";
    cin >> eDetail.empNum;
    cin.ignore();
    cout << "Enter employee name: ";
    getline(cin, eDetail.name);
    cout << "Enter basic salary: ";
    cin >> eDetail.basicSal;

    calculateSal(eDetail);
    display(eDetail);
}
```

Output:

```
PS D:\Hasan\cpp\university\lab11-Structures> ./a.exe
Enter employee number: 1234
Enter employee name: Muhammad Hasan
Enter basic salary: 120000

Pay Slip:

Emp No.  Name           Basic Salary   House Allowence(12%)  Medical Allowence(8%) Tax(5%)  Gross Salary Net Salary
-------------------------------------------------------------------------------------------------------------------
1234     Muhammad Hasan 120000         14400                 9600                  6000     144000       138000
PS D:\Hasan\cpp\university\lab11-Structures>
```