Lab 14

User Defined Variables using Structures

https://github.com/mmujtaba25/cs-110

Muhammad Mujtaba

CMD ID: 540040

mmujtaba.bese25seecs@seecs.edu.pk

Class: BESE 16B

Batch: 2k25

Task 1: [CLO2]

CODE

```cpp
#include <iostream>

struct Point
{
    double x;
    double y;
};

int main()
{
    Point p1 = {3.0, 4.0};
    Point p2 = {6.0, 8.0};

    double distance = std::sqrt((p2.x - p1.x) * (p2.x - p1.x) + (p2.y - p1.y) * (p2.y -
p1.y));

    std::cout << "Point 1: (" << p1.x << ", " << p1.y << ")\n";
    std::cout << "Point 2: (" << p2.x << ", " << p2.y << ")\n";
    std::cout << "Distance between points: " << distance << std::endl;

    return 0;
}
```

OUTPUT

```
obscure@Obscures-MacBook-Air output % ./"task1"
Point 1: (3, 4)
Point 2: (6, 8)
Distance between points: 5
obscure@Obscures-MacBook-Air output %
```

Task 2: [CLO 2]

CODE

```
#include <iostream>

struct Clock
{
    int hours;
    int minutes;
    int seconds;
};

int main()
{
    Clock time;

    std::cout << "Enter -1 to exit at any time." << std::endl;
    std::string input = "0";
    while (std::stoi(input) != -1)
    {
        std::cout << "Enter hours: ";
        std::cin >> input;
        if (std::stoi(input) == -1)
            break;
        time.hours = std::stoi(input);
        if (time.hours < 0 || time.hours > 23)
        {
            std::cout << "Invalid hours. Please enter a value between 0 and 23." << std::endl;
            continue;
        }

        std::cout << "Enter minutes: ";
        std::cin >> input;
        if (std::stoi(input) == -1)
            break;
        time.minutes = std::stoi(input);
        if (time.minutes < 0 || time.minutes > 59)
        {
            std::cout << "Invalid minutes. Please enter a value between 0 and 59." << std::endl;
            continue;
        }

        std::cout << "Enter seconds: ";
        std::cin >> input;
        if (std::stoi(input) == -1)
            break;
        time.seconds = std::stoi(input);
        if (time.seconds < 0 || time.seconds > 59)
        {
            std::cout << "Invalid seconds. Please enter a value between 0 and 59." << std::endl;
            continue;
        }

        std::cout << "Time: " << time.hours << ":" << time.minutes << ":" << time.seconds <<
std::endl;
    }

    std::cout << "Exiting program." << std::endl;

    return 0;
}
```

OUTPUT

```
obscure@Obscures-MacBook-Air output % ./"task2"
Enter -1 to exit at any time.
Enter hours: 14
Enter minutes: 30
Enter seconds: 45
Time: 14:30:45
Enter hours: 25
Invalid hours. Please enter a value between 0 and 23.
Enter hours: -1
Exiting program.
obscure@Obscures-MacBook-Air output %
```

Task 3: [CLO 3]

CODE

```cpp
#include <iostream>

struct Student
{
    std::string name;
    int rollNumber;
    float marks;
};

int main()
{
    Student students[3];
    float totalMarks = 0;

    for (int i = 0; i < 3; ++i)
    {
        std::cout << "Enter name for student " << i + 1 << ": ";
        std::cin >> students[i].name;

        std::cout << "Enter roll number: ";
        std::cin >> students[i].rollNumber;

        std::cout << "Enter marks: ";
        std::cin >> students[i].marks;

        totalMarks += students[i].marks;
    }

    float averageMarks = totalMarks / 3;
    std::cout << "Class average marks: " << averageMarks << std::endl;

    return 0;
}
```

OUTPUT

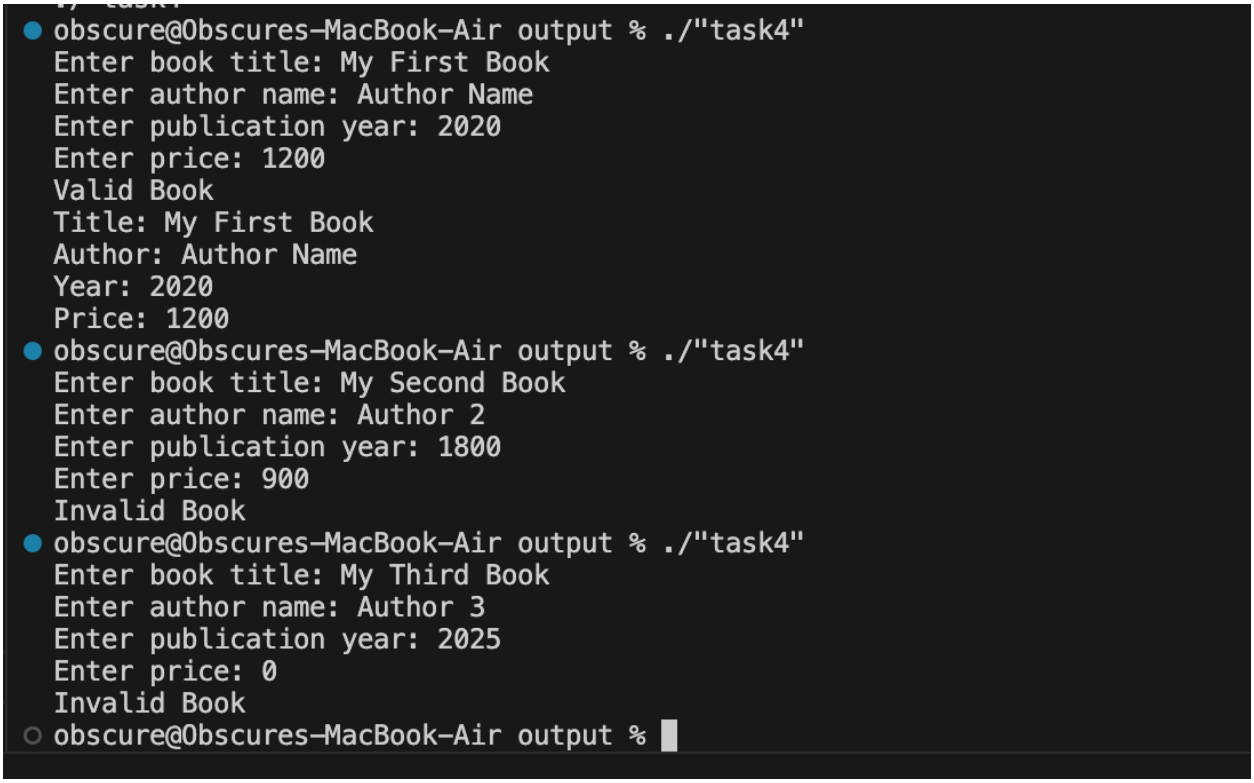
```
obscure@Obscures-MacBook-Air output % ./"task3"
Enter name for student 1: Alice
Enter roll number: 101
Enter marks: 85.5
Enter name for student 2: Bob
Enter roll number: 102
Enter marks: 92.0
Enter name for student 3: Charlie
Enter roll number: 103
Enter marks: 78.5
Class average marks: 85.3333
obscure@Obscures-MacBook-Air output %
```

Task 4: [CLO 3]

CODE

```cpp
#include <iostream>

struct Book
{
    char title[50];
    char author[30];
    int year;
    float price;
};

bool isValidBook(const Book &b)
{
    // check year
    if (b.year < 1900 || b.year > 2023)
        return false;
    // check price
    if (b.price <= 0)
        return false;
    // check title
    if (b.title[0] == '\0') // for char array, it ends when it reaches null character
        return false;
    return true;
}

int main()
{
    Book book;

    std::cout << "Enter book title: ";
    std::cin.getline(book.title, 50);

    std::cout << "Enter author name: ";
    std::cin.getline(book.author, 30);

    std::cout << "Enter publication year: ";
    std::cin >> book.year;

    std::cout << "Enter price: ";
    std::cin >> book.price;

    if (isValidBook(book))
    {
        std::cout << "Valid Book" << std::endl;
        std::cout << "Title: " << book.title << std::endl;
        std::cout << "Author: " << book.author << std::endl;
        std::cout << "Year: " << book.year << std::endl;
        std::cout << "Price: " << book.price << std::endl;
    }
    else
    {
        std::cout << "Invalid Book" << std::endl;
    }

    return 0;
}
```

OUTPUT


obscure@Obscures-MacBook-Air output % ./"task4"
Enter book title: My First Book
Enter author name: Author Name
Enter publication year: 2020
Enter price: 1200
Valid Book
Title: My First Book
Author: Author Name
Year: 2020
Price: 1200
obscure@Obscures-MacBook-Air output % ./"task4"
Enter book title: My Second Book
Enter author name: Author 2
Enter publication year: 1800
Enter price: 900
Invalid Book
obscure@Obscures-MacBook-Air output % ./"task4"
Enter book title: My Third Book
Enter author name: Author 3
Enter publication year: 2025
Enter price: 0
Invalid Book
obscure@Obscures-MacBook-Air output %