



Institute of Geographical Information Systems

CS-212 - Object Oriented Programming LAB

Semester: Fall 2025

Class: SCEE-IGIS - 2024

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LAB 03: Introduction to Classes

Question No 1:

Define a class Complex_No that has two member variables; Real and Imaginary. Also include following in the class.

1. A method SetReIm that sets values of Real and Imaginary
2. A method Display that shows the value of complex number in appropriate format.
3. A method Magnitude that calculates the magnitude of complex number

Screenshot:

The screenshot shows the Visual Studio Code interface with the following details:

- Code Editor:** Displays the source code for `Problem1.cpp`. The code defines a class `Complex_No` with private members `Real` and `Imaginary`, and public methods `SetReIm`, `Display`, and `Magnitude`.
- Terminal:** Shows the command-line output of the build process:

```
cd "/Users/alinawaz/Developer/Development/OOP/Week-03/" && g++ Problem1.cpp -o Problem1 && "/Users/alinawaz/Developer/Development/OOP/Week-03/"Problem1
$ alinawaz@Ali's-MacBook-Air: ~ % cd "/Users/alinawaz/Developer/Development/OOP/Week-03/" && g++ Problem1.cpp -o Problem1 && "/Users/alinawaz/Developer/Development/OOP/Week-03/"Problem1
$ alinawaz@Ali's-MacBook-Air: ~ % source /Users/alinawaz/Developer/Development/.venv/bin/activate
$ (.venv) alinawaz@Ali's-MacBook-Air: Week-03 %
```
- File Explorer:** Shows the project structure with files like `Problem1.cpp`, `Problem2.cpp`, `Problem3.cpp`, and `Week02-526123.zip`.

Question No 2:

Define a class Student that has following attributes:

- Name: an array of char
 - Rollno: an integer.
 - Marks: a double type array of 5 elements.
 - Percentage: a float

Also include following methods:

- SetData: that takes values of Name, Rollno and Marks from user as input.
 - CalculatePercentage: that adds all 5 elements of array Marks and calculate percentage according to formula Percentage = (Total marks/ 500)*100 and stores result in member variable Percentage.
 - Grade: that calls CalculatePercentage method and displays the grade accordingly.

Screenshot:

The screenshot shows a Microsoft Visual Studio Code interface with the following details:

- Left Panel (Explorer):** Shows a tree view of the project structure. The root folder is "Development". It contains "OOP" which has "Week-03", "Week-01", "Week-02", and "Week-03". "Week-03" contains "Problem1.cpp", "Problem2.cpp", and "Problem3.cpp". "Week-01" contains "CMakeLists.txt", "index.cpp", and "main.cpp". "Week-02" contains "OOP LAB02 - 526123.pdf", "Problem1.cpp", "Problem2.cpp", "Problem3.cpp", and "Week02-526123.zip". "Week-03" contains "Problem1.cpp", "Problem2.cpp", "Problem3.cpp", and "index.cpp".
- Code Editor:** Displays the content of "Problem3.cpp". The code defines a class "Student" with private members "name", "rollno", "marks", and "percentage", and a public member function "SetData()". The code uses standard input-output streams and includes headers <iostream> and <cstring>.
- Bottom Status Bar:** Shows file paths like "alinaawaz@Ali's-MacBook-Air: Week-03", line numbers (Ln 13, Col 8), and other development-related metrics.

Question No 3:

Create a class Book with the following specifications:

Private Data Members:

- title
- author
- price

Public Member Functions:

- sets the title, author, and price of the book.
- calculates the discount amount, subtracts it from the price, and also displays how much money was saved.
- shows the book details (title, author, and current price).

Test the class in main() by:

- Creating two Book objects.
- Setting their details using SetData().
- Applying a discount of 10% on the first book and 20% on the second book.
- Displaying book details before and after applying the discount.

Screenshot:

The screenshot shows the Visual Studio Code interface with the following details:

- Code Editor:** The main editor window contains the code for `Problem3.cpp`. The code defines a `Book` class with private members `title`, `author`, and `price`, and public member functions `SetData`, `ApplyDiscount`, and `ShowDetails`.
- Terminal:** The terminal at the bottom shows the command-line output of the program. It starts with the command `g++ Problem3.cpp -o Problem3`, followed by the execution of the program. The program's output shows the initial state of the book (Title: Clean Code, Author: Robert C. Martin, Price: 1500), then applies a 10% discount to the first book (Title: Programming, Author: Bjarne Stroustrup, Price: 900), and finally applies a 20% discount to the second book (Title: C++ Programming, Author: Bjarne Stroustrup, Price: 900). The final output shows the books after the discounts.
- File Explorer:** On the right side, the file explorer shows the project structure under `Development`. It includes files like `Problem1.cpp`, `Problem2.cpp`, `Problem3.cpp`, `CMakeLists.txt`, and `index.cpp`, along with subfolders for `OOP` and `Week-01` to `Week-03`.

```
1 #include <iostream>
2 #include <string>
3 using namespace std;
4
5 class Book
6 {
7 private:
8     string title;
9     string author;
10    float price;
11
12 public:
13     void SetData(string t, string a, float p)
14     {
15         title = t;
16         author = a;
17         price = p;
18     }
19
20     void ApplyDiscount(float percentage)
21     {
22         float discountAmount = (price * percentage) / 100;
23         cout << "Discount Applied: " << discountAmount << " saved!" << endl;
24         price -= discountAmount;
25     }
26
27     void ShowDetails()
28     {
29         cout << "Title: " << title << endl;
30     }
31 };
32
33 int main()
34 {
35     Book book1("Clean Code", "Robert C. Martin", 1500);
36     Book book2("Programming", "Bjarne Stroustrup", 900);
37
38     cout << "Before Discount:" << endl;
39     cout << "Title: " << book1.title << endl;
40     cout << "Author: " << book1.author << endl;
41     cout << "Price: " << book1.price << endl;
42
43     cout << endl;
44
45     cout << "After Discount:" << endl;
46     cout << "Title: " << book1.title << endl;
47     cout << "Author: " << book1.author << endl;
48     cout << "Price: " << book1.price << endl;
49 }
```

```
alinawaz@Alis-MacBook-Air Week-03 % cd "/Users/alinawaz/Developer/Development/OOP/Week-03/" && g++ Problem3.cpp -o Problem3 && ./Users/alinawaz/Developer/Development/OOP/Week-03/"Problem3
Title: Clean Code
Author: Robert C. Martin
Price: 1500
_____
Applying Discounts...
Discount Applied: 100 saved!
Discount Applied: 300 saved!
After Discount:
Title: Programming
Author: Bjarne Stroustrup
Price: 900
```