



Institute of Geographical Information Systems

CS-212 - Object Oriented Programming LAB

Semester: Fall 2025

Class: SCEE-IGIS - 2024

Name: Ali Nawaz

CMS ID : 00000526123

Submitted to: Ma'am Alvina Anjum

Due Date: Nov 26, 2025

LAB 11: Friends Function

Lab Task 1:

Create a class Complex with private real & imaginary parts.

Make a friend function addComplex(Complex, Complex) that returns sum as a new object.

Display result using show().

Extension: overload friend Complex operator+(Complex, Complex);

Screenshot:

```
1  #include <iostream>
2
3  class Complex {
4  private:
5      float real, imag;
6
7  public:
8      Complex() {
9          real = 0;
10         imag = 0;
11     }
12
13     Complex(float r, float i) {
14         real = r;
15         imag = i;
16     }
17
18     void show() {
19         cout << real << " + " << imag << "i" << endl;
20     }
21
22     friend Complex addComplex(Complex c1, Complex c2);
23     friend Complex operator+(Complex c1, Complex c2);
24
25 };
26
27 Complex addComplex(Complex c1, Complex c2) {
28     return Complex(c1.real + c2.real, c1.imag + c2.imag);
29 }
30
31 Complex operator+(Complex c1, Complex c2) {
32     return Complex(c1.real + c2.real, c1.imag + c2.imag);
33 }
34
35 int main() {
36     Complex c1(3, 4);
37     Complex c2(2, 5);
38
39     cout << "Using friend function: ";
40     Complex c3 = addComplex(c1, c2);
41     c3.show();
42
43     cout << "Using operator overloading: ";
44     Complex c4 = c1 + c2;
45     c4.show();
46 }
47
```

Output:

PROBLEMS	OUTPUT	DEBUG CONSOLE	TERMINAL
			<pre>● (.venv) alinawaz@Alis-MacBook-Air Week-11 % cd Using friend function: 5 + 9i Using operator overloading: 5 + 9i ○ (.venv) alinawaz@Alis-MacBook-Air Week-11 % █</pre>

Lab Task 2:

The company SkyRoute Logistics uses autonomous drones to deliver parcels. Each drone has a battery level (in %) and unique Drone ID. Sometimes, a drone low on battery may request power transfer from another drone mid-route.

Create a class Drone having private variables droneID, batteryLevel

- constructor to initialize
- functions: setBattery(), setDroneID(), getBattery(), displayStatus()

Write a friend function:

```
void transferPower(Drone &donor, Drone &receiver, double percent);
```

This function will reduce battery from donor and add to receiver.

Demonstration:

Create two drones, charge one, drain one, then use the friend function to transfer energy.

Screenshot:

The screenshot shows the Visual Studio Code interface. The Explorer panel on the left lists files like .env, 100 Days of Python, and various Day-01 to Day-36 files. The main editor displays the code for Problem2.cpp, which defines a Drone class with attributes droneID and batteryLevel, and methods for setting, getting, and displaying these values, as well as a static transferPower function. The Output panel at the bottom shows the execution results of the program.

```
4 class Drone {
5     private:
6         int droneID;
7         double batteryLevel;
8     public:
9         Drone(int id, double battery) {
10             droneID = id;
11             batteryLevel = battery;
12         }
13         void setBattery(double b) {
14             batteryLevel = b;
15         }
16         void setDroneID(int id) {
17             droneID = id;
18         }
19         double getBattery() {
20             return batteryLevel;
21         }
22         void displayStatus() {
23             cout << "Drone ID: " << droneID << endl;
24             cout << "Battery: " << batteryLevel << "%" << endl;
25         }
26         friend void transferPower(Drone &donor, Drone &receiver, double percent);
27     };
28 void transferPower(Drone &donor, Drone &receiver, double percent) {
29     if (donor.batteryLevel < percent) {
30         cout << "Not enough battery to transfer!" << endl;
31         return;
32     }
33     donor.batteryLevel -= percent;
34     receiver.batteryLevel += percent;
35 }
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
(.venv) alinawaz@Alis-MacBook-Air Week-11 % cd "/Users/alinawaz/Developer/00P/Week-11/" && g++ Problem2.cpp -o Problem2 && "/Users/alinawaz/Developer/00P/Week-11/"Problem2
Before transfer:
Drone ID: 101
Battery: 80%
Drone ID: 102
Battery: 20%

Power transferred successfully!

After transfer:
Drone ID: 101
Battery: 65%
Drone ID: 102
Battery: 35%
(.venv) alinawaz@Alis-MacBook-Air Week-11 %
```

Output:

This block provides a detailed view of the terminal output from the previous screenshot. It shows the command to compile and run the C++ program, followed by the program's output, which includes the initial state of two drones and the result of a power transfer operation.

```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
```

```
● (.venv) alinawaz@Alis-MacBook-Air Week-11 % cd "/Users/alinawaz/Developer/00P/Week-11/" && g++ Problem2.cpp -o Problem2 && "/Users/alinawaz/Developer/00P/Week-11/"Problem2
Before transfer:
Drone ID: 101
Battery: 80%
Drone ID: 102
Battery: 20%

Power transferred successfully!

After transfer:
Drone ID: 101
Battery: 65%
Drone ID: 102
Battery: 35%
○ (.venv) alinawaz@Alis-MacBook-Air Week-11 %
```

Lab Task 3:

A content creator tracks engagement on two posts — each has likes and comments.

We need to calculate the total combined engagement across both posts.

Create class Post with likes and comments, a constructor and display function

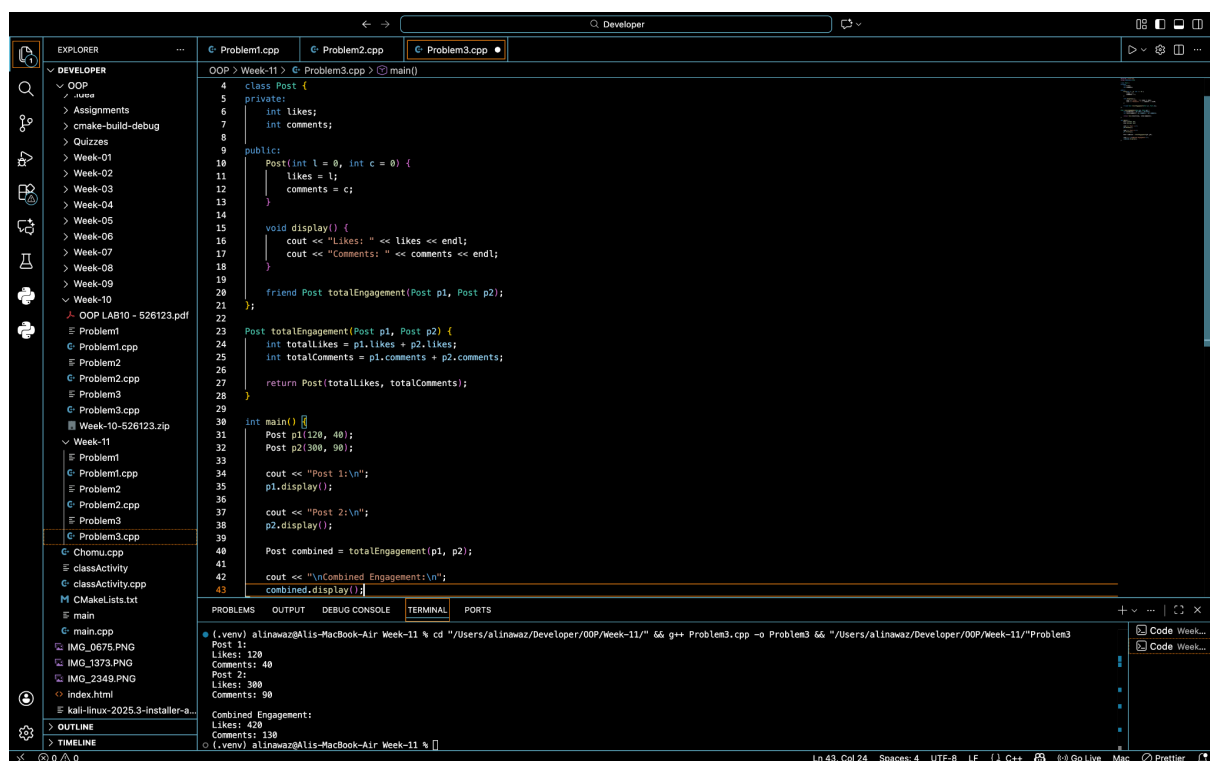
Write a friend function:

Post totalEngagement(Post p1, Post p2);

Return a new Post with summed likes & comments.

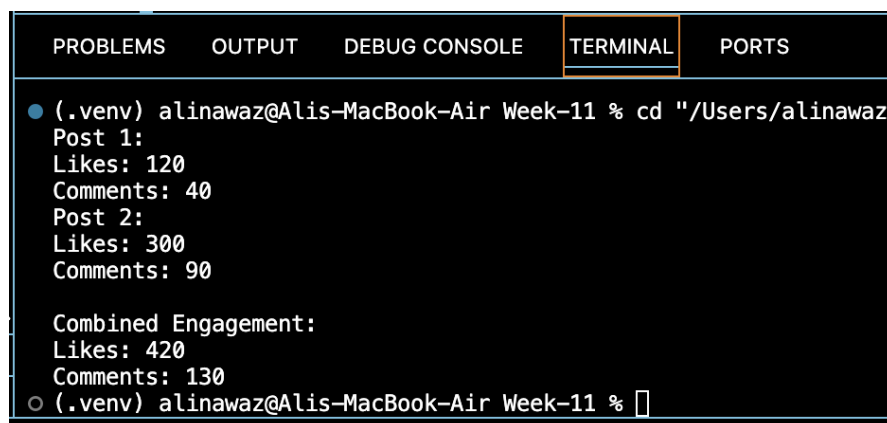
Display the final combined reach.

Screenshot:



```
4 class Post {
5 private:
6     int likes;
7     int comments;
8 public:
9     Post(int l = 0, int c = 0) {
10         likes = l;
11         comments = c;
12     }
13
14     void display() {
15         cout << "Likes: " << likes << endl;
16         cout << "Comments: " << comments << endl;
17     }
18
19     friend Post totalEngagement(Post p1, Post p2);
20 };
21
22 Post totalEngagement(Post p1, Post p2) {
23     int totalLikes = p1.likes + p2.likes;
24     int totalComments = p1.comments + p2.comments;
25     return Post(totalLikes, totalComments);
26 }
27
28 int main() {
29     Post p1(120, 40);
30     Post p2(300, 90);
31
32     cout << "Post 1:\n";
33     p1.display();
34
35     cout << "Post 2:\n";
36     p2.display();
37
38     Post combined = totalEngagement(p1, p2);
39
40     cout << "\nCombined Engagement:\n";
41     combined.display();
42 }
```

Output:



```
● (.venv) alinawaz@Alis-MacBook-Air Week-11 % cd "/Users/alinawaz/
Post 1:
Likes: 120
Comments: 40
Post 2:
Likes: 300
Comments: 90

Combined Engagement:
Likes: 420
Comments: 130
○ (.venv) alinawaz@Alis-MacBook-Air Week-11 %
```