SAVEETHA SCHOOL OF ENGINEERING

SAVEETHA INSTITUTE OF MEDICAL AND TECHNICAL SCIENCES

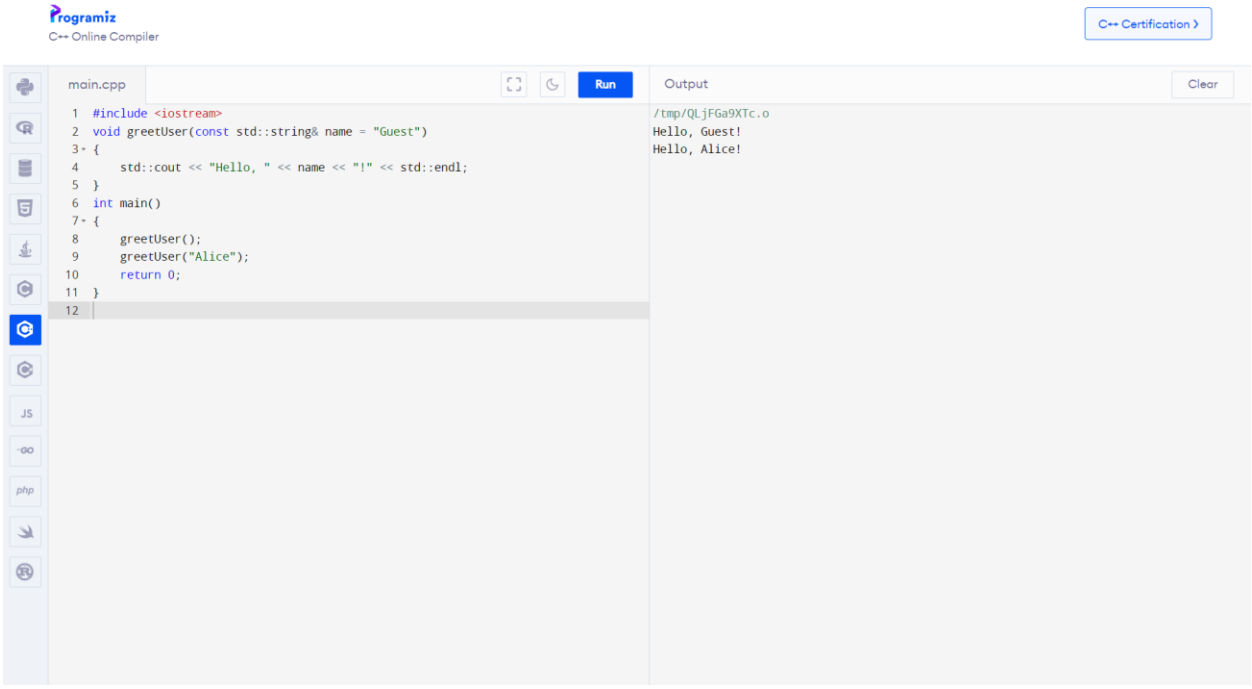
Engineer to Excel

SUB CODE & NAME : DSA01/ Object Oriented Programming with C++

LAB DAY 2/14-03-2024(FN)

EASY

1. Develop a C++ program for default arguments.



2. Develop a program to check the entered user name is valid or not using function. Get both the inputs from the user.

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main.cpp

Run

Output

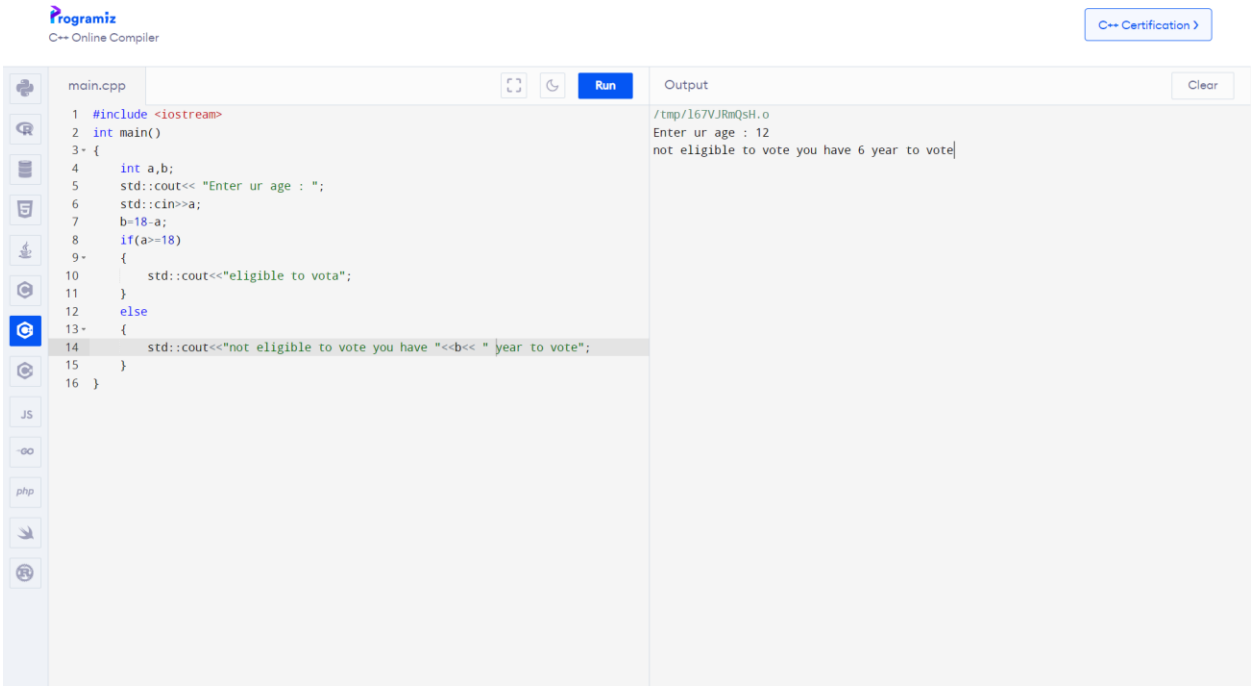
Clear

```cpp
#include <iostream>
#include <string>
#include <cctype>
bool isValidUsername(const std::string& username) {
    if (username.length() < 5) {
        return false;
    }
    for (char ch : username) {
        if (!isalnum(ch)) {
            return false;
        }
    }
    return true;
}
int main() {
    std::string username;
    std::cout << "Enter a username: ";
    std::cin >> username;
    if (isValidUsername(username)) {
        std::cout << "Valid username!" << std::endl;
    } else {
        std::cout << "Invalid username. Please use at least 5 alphanumeric
            characters." << std::endl;
    }
    return 0;
}

```

```
/tmp/hPPKfhkPzp.o
Enter a username: Sravanak2
Valid username!
```

3. Develop a program to find whether the person is eligible for vote or not. And if that particular person is not eligible, then print how many years are left to be eligible.



4. Develop a program using function to calculate the simple interest. Suppose the customer is a senior citizen. He is being offered 12 percent rate of interest; for all other customers, the ROI is 10 percent.

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main.cpp

Run

Output

Clear

```cpp
#include <iostream>
double calculateSimpleInterest(double principal, double rate, int time)
{
    return (principal * rate * time) / 100.0;
}

int main() {
    double principal;
    int time;
    char customerType;
    std::cout << "Enter the principal amount: ";
    std::cin >> principal;
    std::cout << "Enter the time period (in years): ";
    std::cin >> time;
    std::cout << "Are you a senior citizen? (Y/N): ";
    std::cin >> customerType;
    double rate = (customerType == 'Y' || customerType == 'y') ? 12.0 : 10.0;
    double interest = calculateSimpleInterest(principal, rate, time);
    std::cout << "Simple interest: " << interest << std::endl;
    return 0;
}
```

```
/tmp/yXf5qgaXT6.o
Enter the principal amount: 20000
Enter the time period (in years): 5
Are you a senior citizen? (Y/N): y
Simple interest: 12000
```

5. Develop a program using choice to check given string in palindrome or not using inline function.

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main.cpp

Run

Output

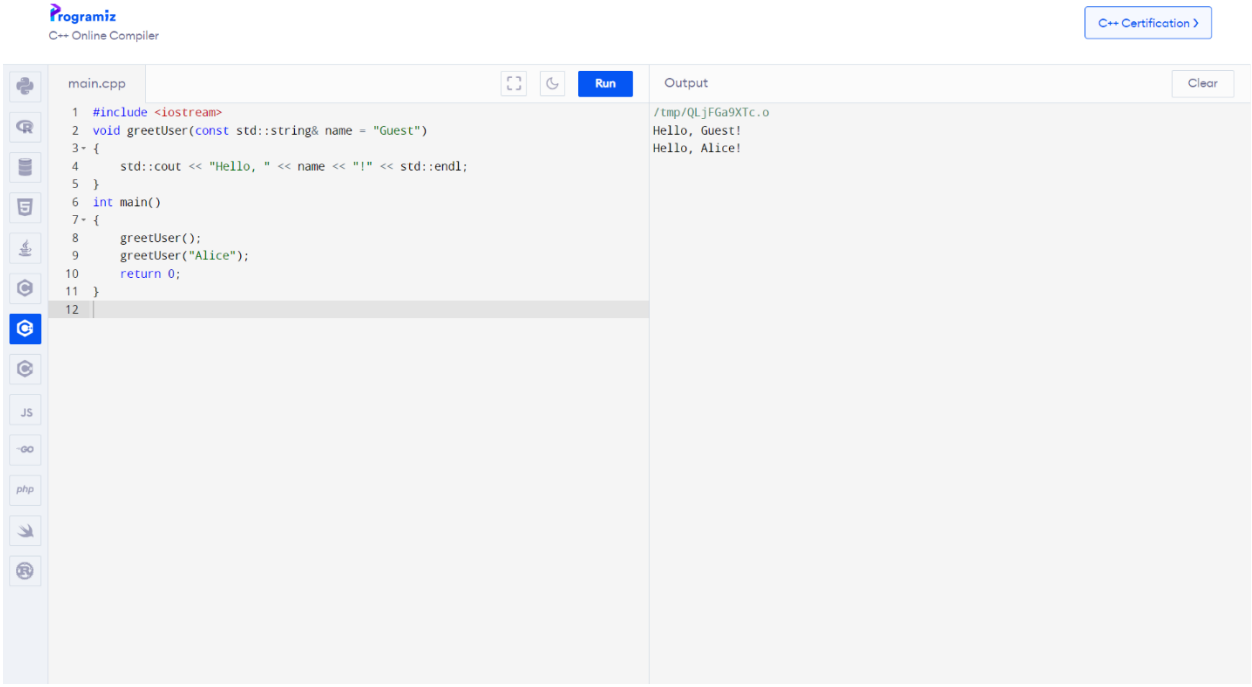
Clear

```cpp
#include <iostream>
#include <string>
#include <algorithm>
inline bool isPalindrome(const std::string& str) {
    std::string reversed = str;
    std::reverse(reversed.begin(), reversed.end());
    return str == reversed;
}
int main() {
    std::string input;
    std::cout << "Enter a string: ";
    std::cin >> input;
    if (isPalindrome(input)) {
        std::cout << "The string is a palindrome." << std::endl;
    } else {
        std::cout << "The string is not a palindrome." << std::endl;
    }
    return 0;
}
```

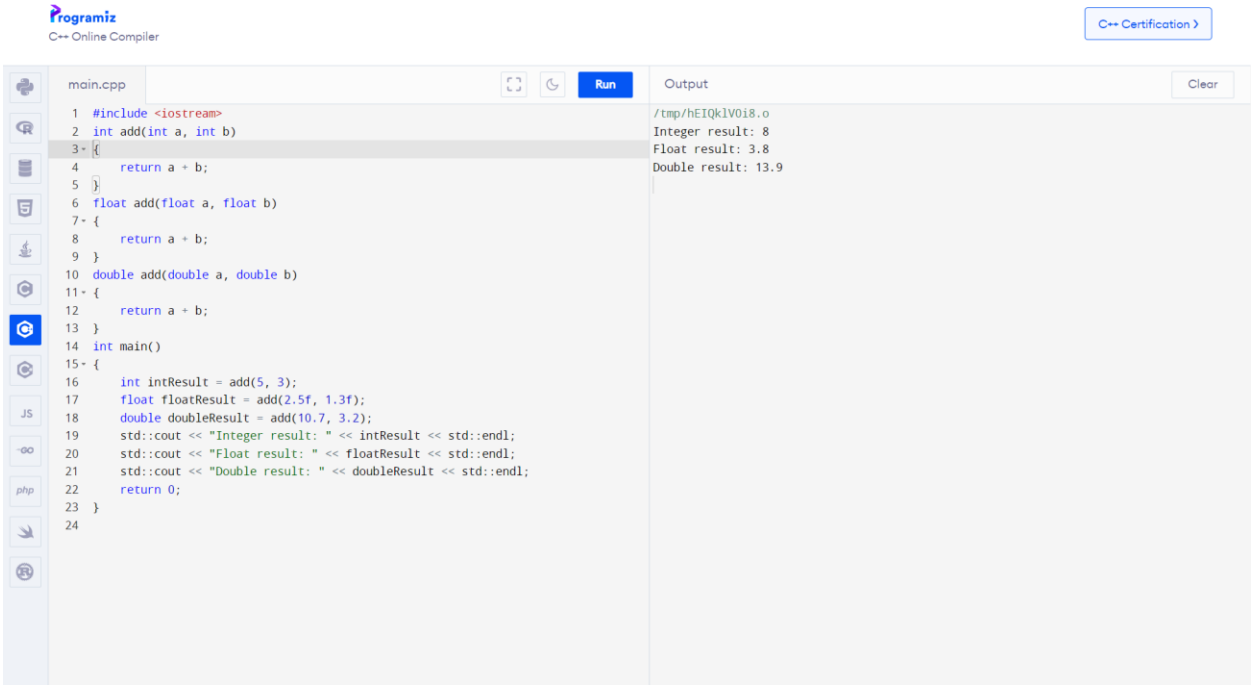
```
/tmp/A085QAFQ1R.o
Enter a string: malayalam
The string is a palindrome.
```

MEDIUM

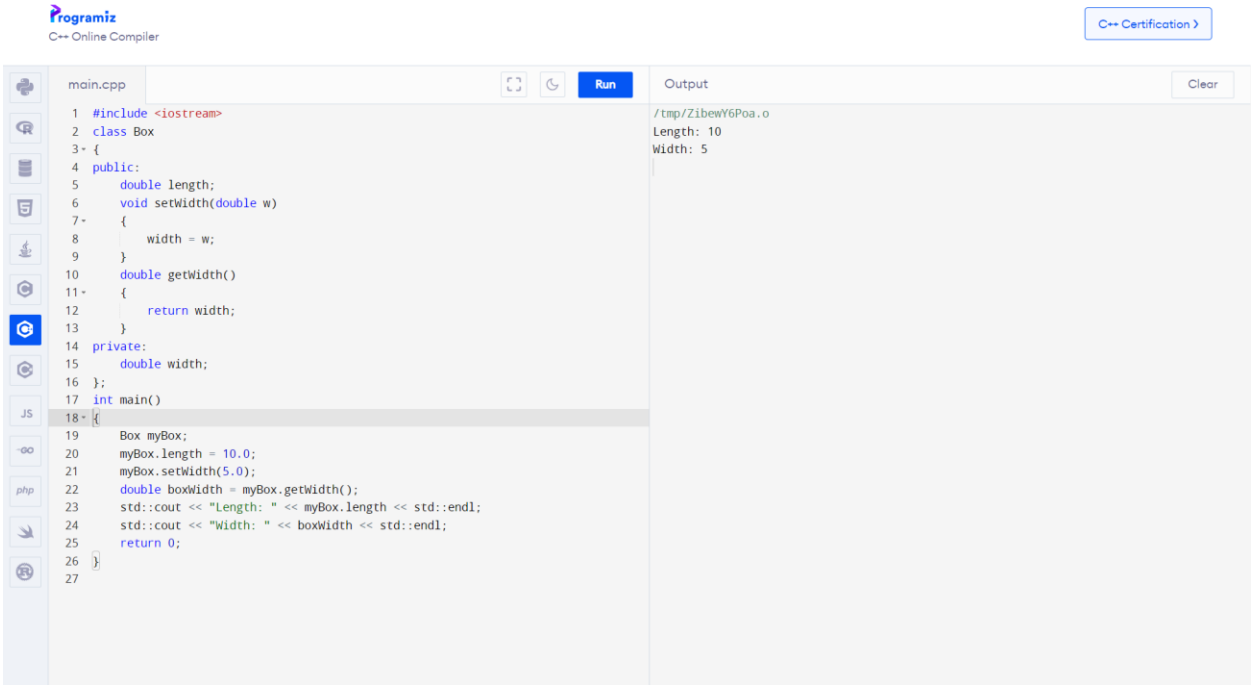
1. Develop a C++ program for default arguments.



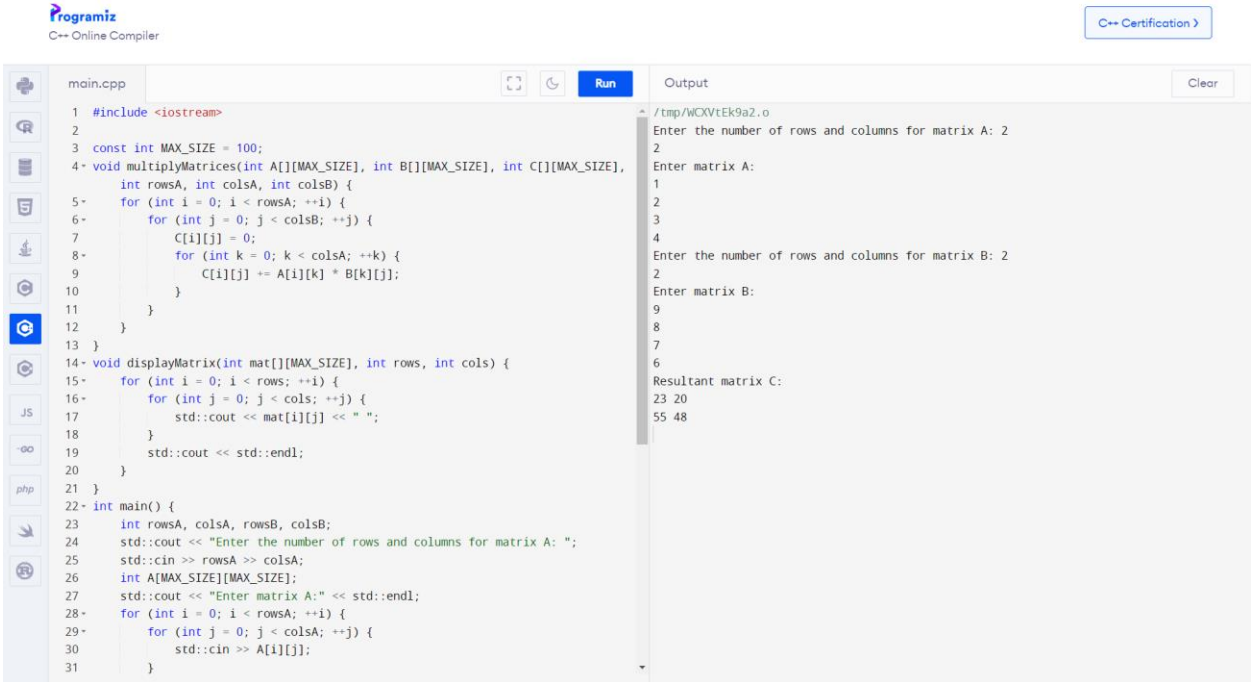
2. Develop a C++ program for adding the number using function overloading concept.



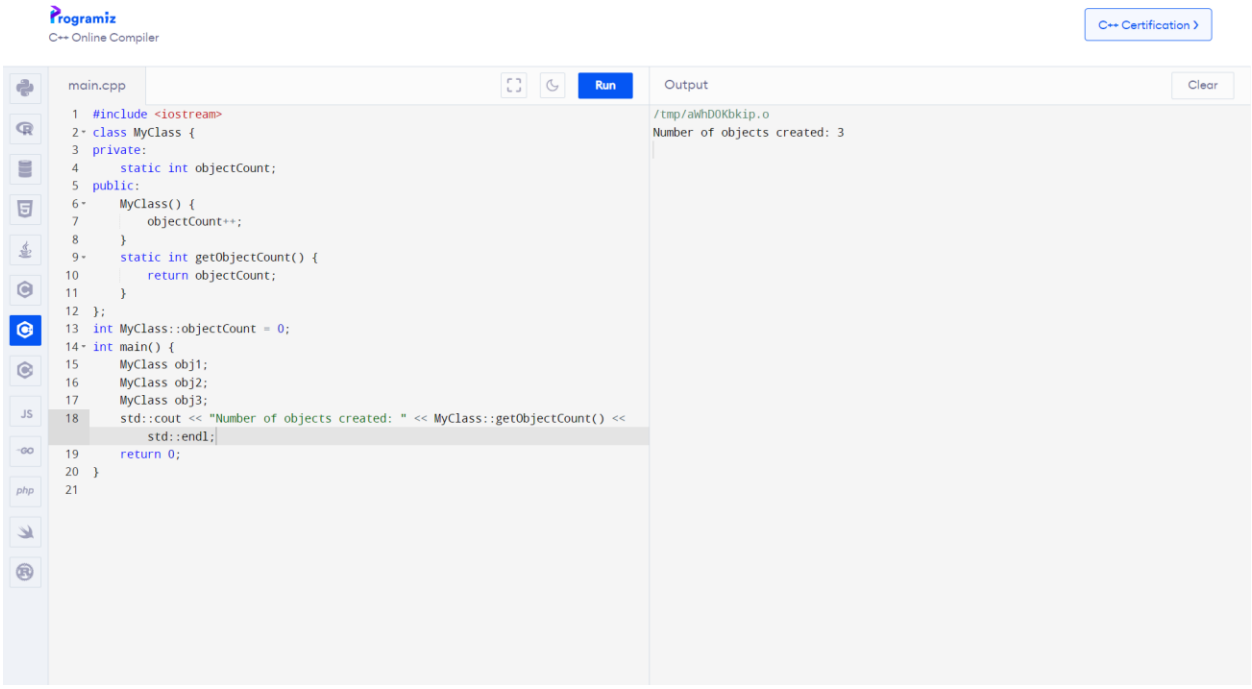
3. Declare a class box, with length (Public variable) and width (Private variable) use set width () and get width () function to set the width and print the length and width.



4. Develop a C++ program for matrix multiplication using arrays.

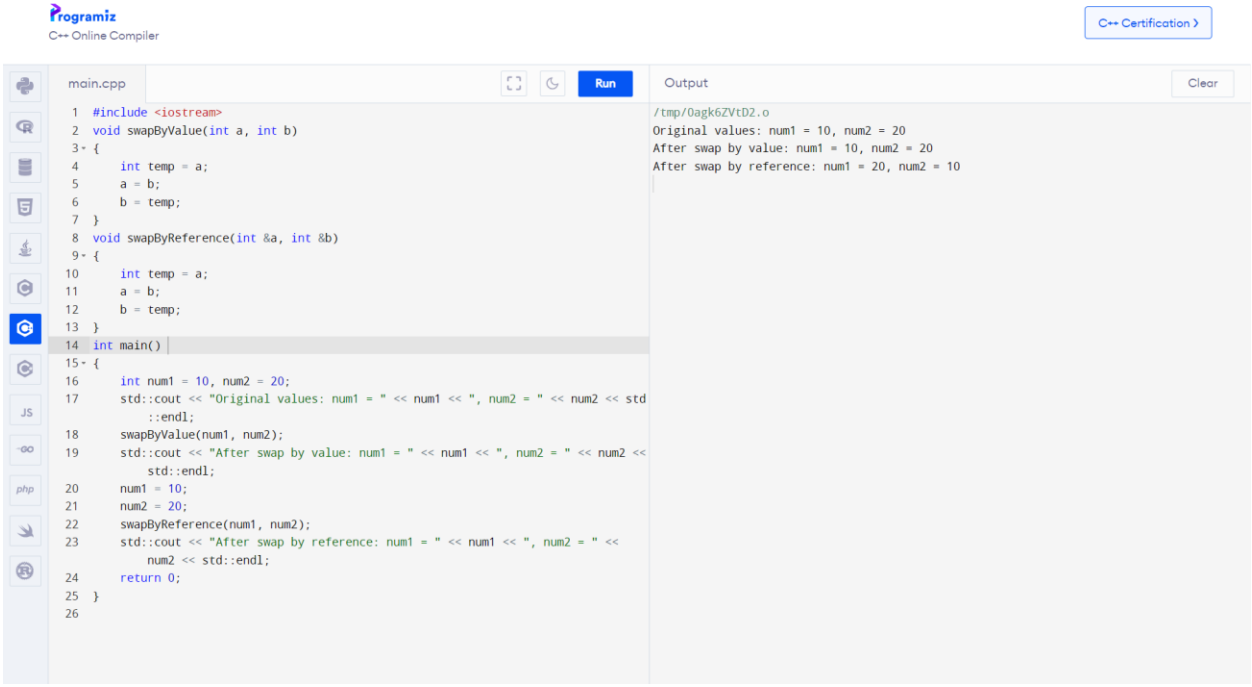


5. Develop a simple program for static field to count the number of objects created using C++.



HARD

1. Develop a C++ program to demonstrate call by value and call by reference mechanism for swapping of number.



2. Build a class series and use member function input () for getting a number and member function show () to print Fibonacci series of a number.

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main.cpp

Run

```
#include <iostream>
class FibonacciSeries
{
private:
    int num;
public:
    void input()
    {
        std::cout << "Enter a positive integer: ";
        std::cin >> num;
    }
    void show() {
        int first = 0, second = 1;
        std::cout << "Fibonacci series up to " << num << " terms:\n";
        std::cout << first << " " << second << " ";
        for (int i = 2; i < num; ++i) {
            int next = first + second;
            std::cout << next << " ";
            first = second;
            second = next;
        }
        std::cout << std::endl;
    }
};
int main() {
    FibonacciSeries fib;
    fib.input();
    fib.show();
    return 0;
}
```

Output

Clear

```
/tmp/mPY62XNawb.o
Enter a positive integer: 8
Fibonacci series up to 8 terms:
0 1 1 2 3 5 8 13
```

3. Develop a class in C++ program to compute a record of 10 students, Read the name, Regno, mark1, mark2, mark3 of the student, calculate the average marks and grade for to display it.
   Test Case Average >90, Grade – S
   Average >80, Grade A
   Average >70, Grade C
   Average >60 Grade D
   Average >50 Grade E
   Average less than 50 Grade F

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main.cpp

Run

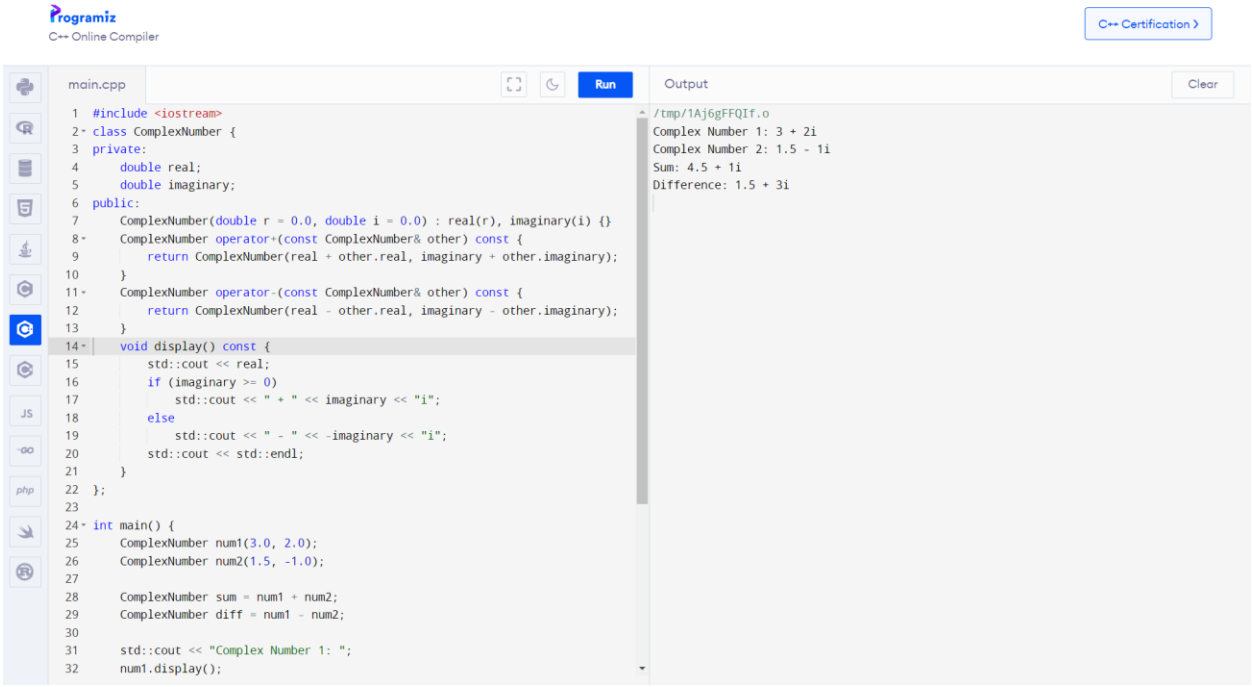
```
#include<iostream>
using namespace std;
int main()
{
    char name;
    int reg,s1,s2,s3,s4,s5,t;
    std::cout<<"Enter ur name : ";
    std::cin>>name;
    std::cout<<"Enter ur Reg No.: "<<endl;
    std::cin>>reg;
    std::cout<<"Subject 1 mark :"<<endl;
    std::cin>>s1;
    std::cout<<"Subject 2 mark : "<<endl;
    std::cin>>s2;
    std::cout<<"Subject 3 mark : "<<endl;
    std::cin>>s3;
    std::cout<<"Subject 4 mark : "<<endl;
    std::cin>>s4;
    std::cout<<"Subject 5 mark : "<<endl;
    std::cin>>s5;
    t=s1+s2+s3+s4+s5;
    if(t>=450)
    {
            std::cout<<"S Grade";
    }
    else if(t>=400)
    {
            std::cout<<"A Grade";
    }
    else if(t>=350)
    {
            std::cout<<"B Grade";
```

Output

Clear

```
/tmp/XeGbbwzkoe.o

Enter details for Student 1:
Enter student name: sravan
Enter registration number (Regno): 192110317
Enter marks for three subjects (separated by spaces): 91 99 93 94 91

Student Record:
Name: sravan
Regno: 192110317
Average Marks: 94.3333
Grade: S
```

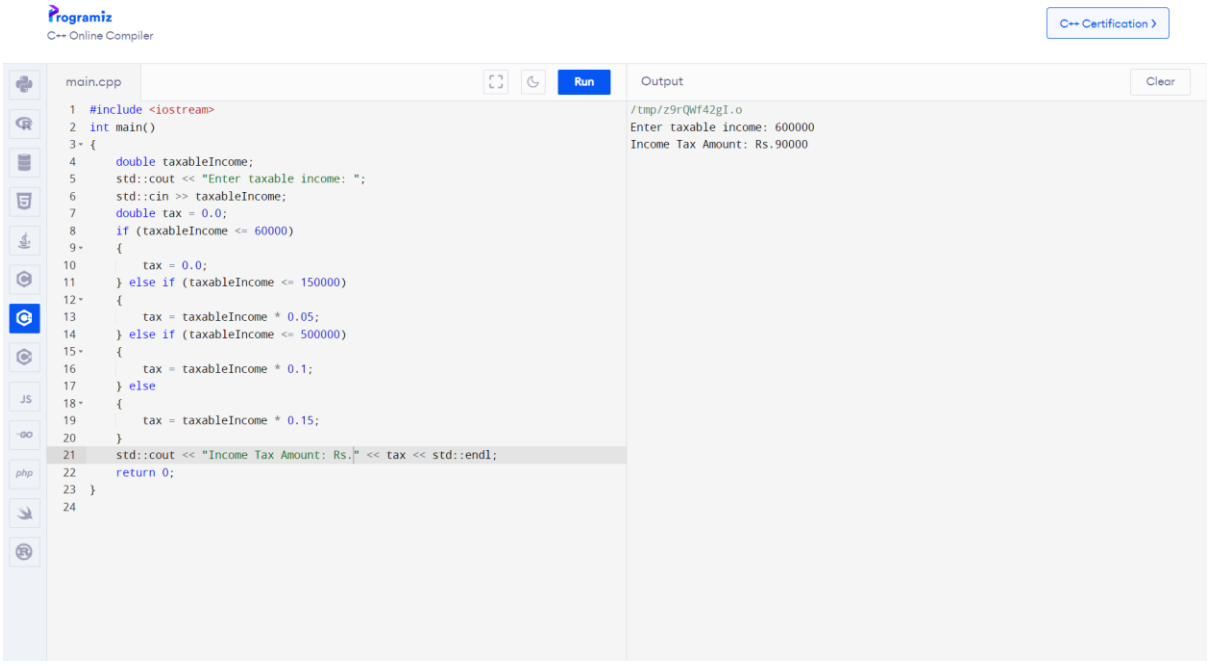
4. Develop a Program for binary operator overloading in C++




```cpp
#include <iostream>
class ComplexNumber {
private:
    double real;
    double imaginary;
public:
    ComplexNumber(double r = 0.0, double i = 0.0) : real(r), imaginary(i) {}
    ComplexNumber operator+(const ComplexNumber& other) const {
        return ComplexNumber(real + other.real, imaginary + other.imaginary);
    }
    ComplexNumber operator-(const ComplexNumber& other) const {
        return ComplexNumber(real - other.real, imaginary - other.imaginary);
    }
    void display() const {
        std::cout << real;
        if (imaginary >= 0)
            std::cout << " + " << imaginary << "i";
        else
            std::cout << " - " << -imaginary << "i";
        std::cout << std::endl;
    }
};

int main() {
    ComplexNumber num1(3.0, 2.0);
    ComplexNumber num2(1.5, -1.0);

    ComplexNumber sum = num1 + num2;
    ComplexNumber diff = num1 - num2;

    std::cout << "Complex Number 1: ";
    num1.display();
```

5. Develop a Program in C++ to calculate income tax for the employee based on the following condition

1 if taxableincome<=60000, tax=0;
2. if taxableincome >60000 and taxableincome <=150000,
tax= taxableincome *0.05;
3.if taxableincome >150000 or taxableincome <=500000)
tax= taxableincome *0.1;
else
tax=tableinc*0.15;




```cpp
#include <iostream>
int main()
{
    double taxableIncome;
    std::cout << "Enter taxable income: ";
    std::cin >> taxableIncome;
    double tax = 0.0;
    if (taxableIncome <= 60000)
    {
        tax = 0.0;
    } else if (taxableIncome <= 150000)
    {
        tax = taxableIncome * 0.05;
    } else if (taxableIncome <= 500000)
    {
        tax = taxableIncome * 0.1;
    } else
    {
        tax = taxableIncome * 0.15;
    }
    std::cout << "Income Tax Amount: Rs." << tax << std::endl;
    return 0;
}
```