



### **Assignment 01**

Name:	Shoukat Ali
Reg No:	Sp22-Bcs-074
Subject:	Data Structure & Algorithm Lab
Submission Date:	10/Sep/2023
Submitted To:	Ma'am Yasmeen Jana

**Comsat University Islamabad Vehari  
Campus**

## Question 01: What a process to Create GitHub account?

Ans: There are six steps to create GitHub account.

- Go to <https://github.com/>.
- Click "Sign up".
- Enter a username, email, and password.
- Complete the CAPTCHA
- Choose a Plan (usually "Free").
- Verify your email.
- Your account is ready to use GitHub!

### 1. Go to the GitHub Website:

Open your web browser and go to the GitHub website by entering the following URL in your browser's address <https://github.com/>.

### 2. Sign Up:

On the GitHub homepage, you will see a "Sign Up" button in the upper-right corner. Click on it to start the registration process.

### 3. Provide Your Username:

Choose a unique username for your GitHub account. GitHub will check the availability of the username as you type it. If your desired username is already taken, you'll need to choose another one.

### 4. Enter Your Email Address:

Provide a valid email address that you have access to. This email address will be associated with your GitHub account and will be used for account-related notifications.

## **5. Choose a Password:**

Create a strong and secure password for your GitHub account. GitHub will provide guidelines to help you create a secure password.

## **6. Verify Your Password:**

Retype the password you just created to confirm it.

## **7. Complete CAPTCHA:**

GitHub might ask you to complete a CAPTCHA to confirm that you are not a robot. Follow the on-screen instructions to complete this step.

## **8. Choose Your Plan:**

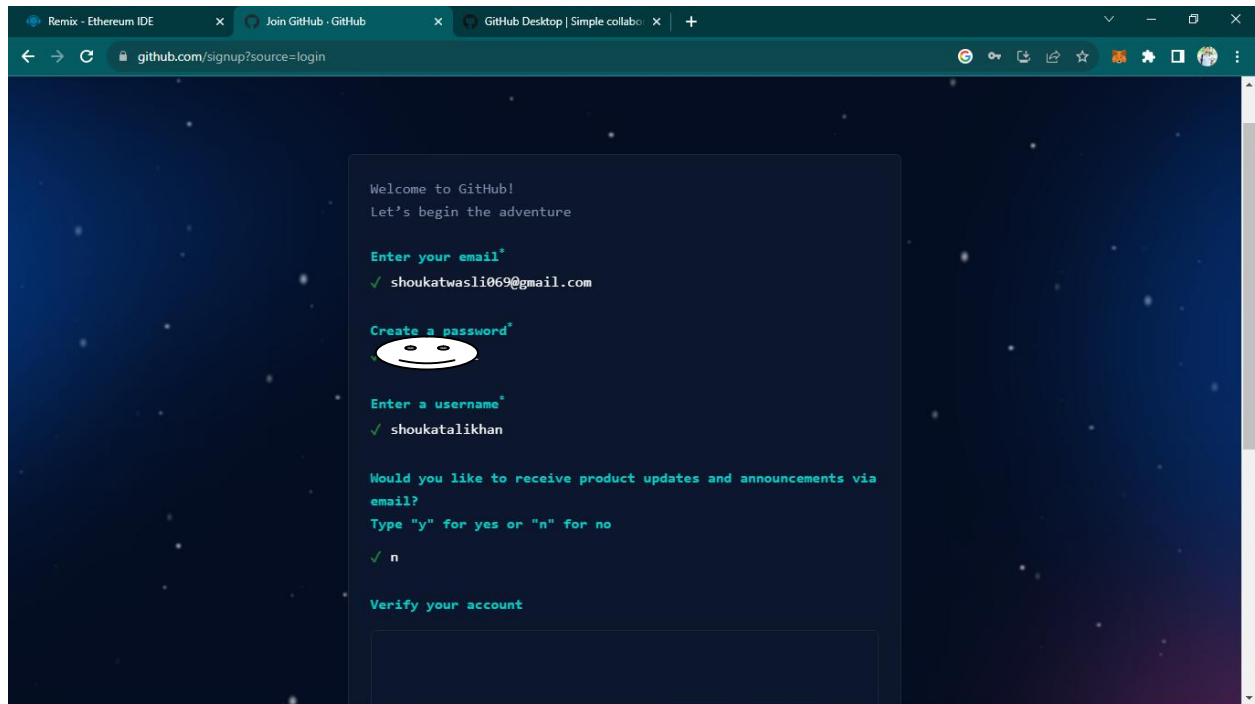
GitHub offers different plans, including a free plan. Choose the plan that best suits your needs. For most users, the free plan is sufficient. Click on the "Free" plan to select it.

## **9. Verify Your Email Address:**

After completing the registration process, GitHub will send a verification email to the email address you provided. Open your email inbox and click on the verification link in the email from GitHub to confirm your email address. If you don't receive the email, check your spam folder.

## **10. Start Using GitHub:**

Congratulations! Your GitHub account is now created. You can start using GitHub to create and collaborate on software projects, contribute to open-source projects, and more.



## Question 02: Write any 15 programs that will explain the concepts of pointer.

1: Pointer declaration and initialization with user input.

```
#include <iostream>
```

```
int main() {
```

```
    int a;
```

```
    int *ptr;
```

```
    std::cout << "Enter an integer: ";
```

```
    std::cin >> a;
```

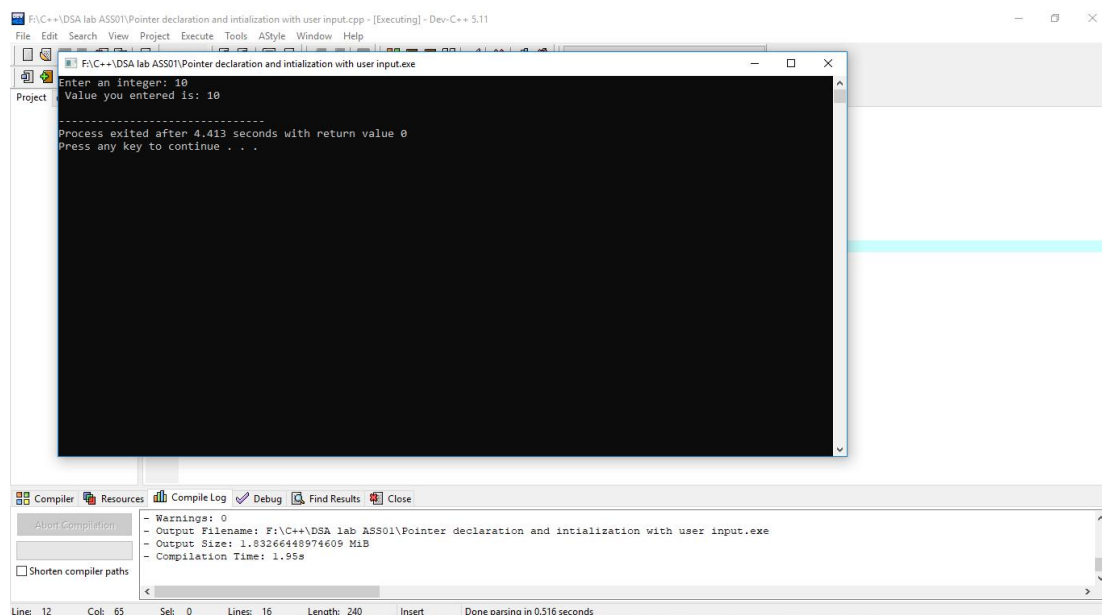
```
    ptr = &a;
```

```
    std::cout << " Value you entered is: " << *ptr << std::endl;
```

```
    return 0;
```

```
}
```

## Output



## 02: Add two numbers.

```
#include <iostream>

int main() {

    int num1, num2;

    int *ptr;

    std::cout << "Enter the first integer: ";

    std::cin >> num1;

    std::cout << "Enter the second integer: ";

    std::cin >> num2;

    ptr = &num1;

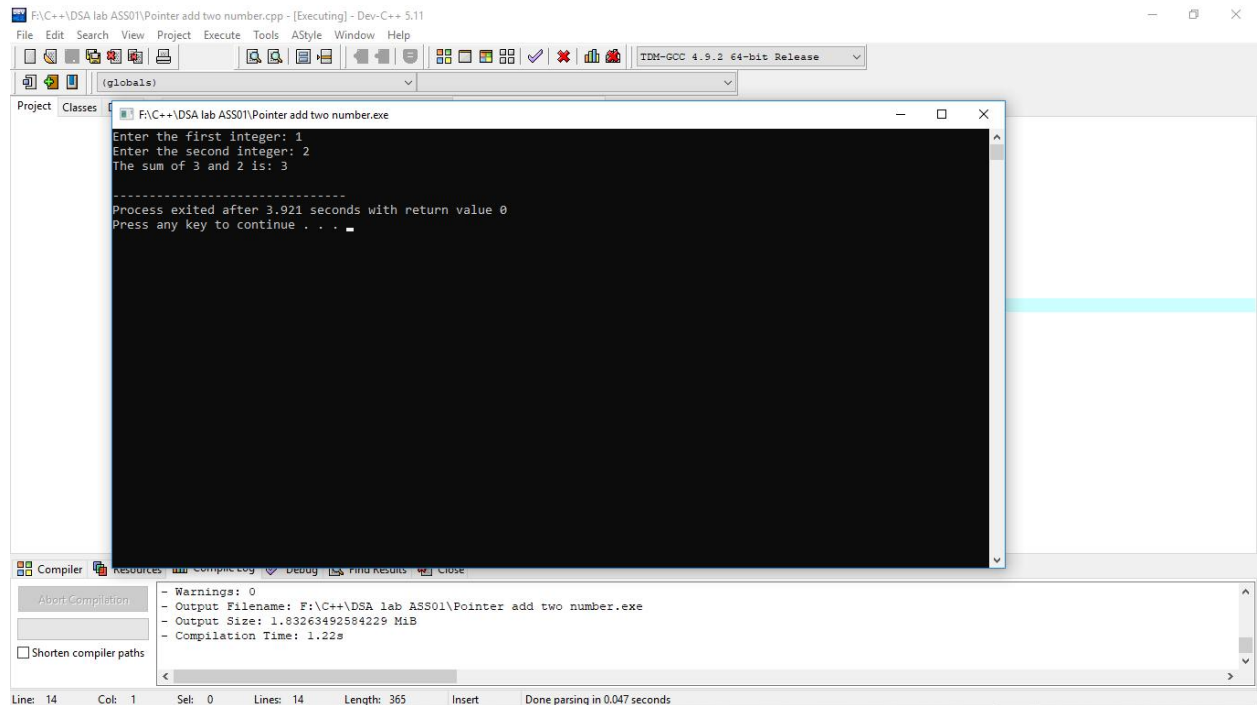
    *ptr += num2;

    std::cout << "The sum of " << num1 << " and " << num2 << " is: " << *ptr << std::endl;

    return 0;

}
```

## Output



### 03: Pointer Arithmetic.

```
#include <iostream>
```

```
int main() {
```

```
    int numbers[] = {10, 20, 30, 40, 50};
```

```
    int *ptr = numbers;
```

```
    for (int i = 0; i < 5; i++) {
```

```
        std::cout << " A " << i << ": " << *ptr << std::endl;
```

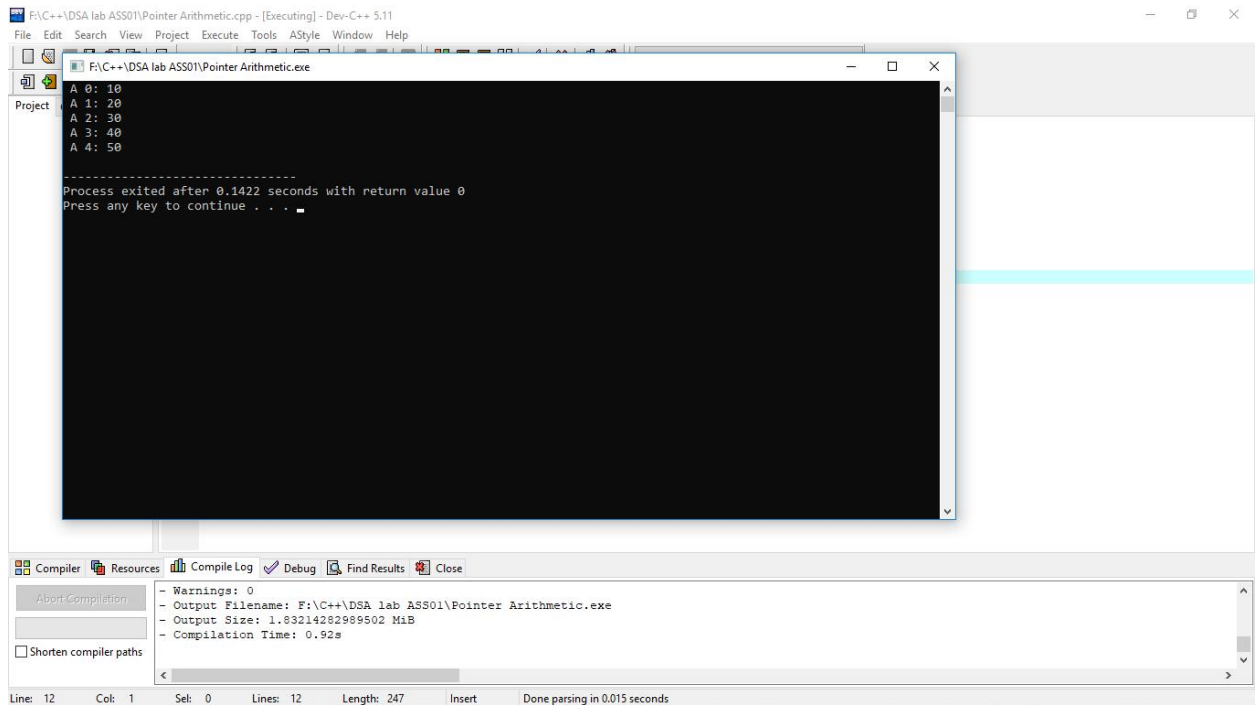
```
        ptr++;
```

```
    }
```

```
return 0;
```

```
}
```

## Output:



```
F:\C++\DSA lab ASS01\Pointer Arithmetic.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
F:\C++\DSA lab ASS01\Pointer Arithmetic.exe
A 0: 10
A 1: 20
A 2: 30
A 3: 40
A 4: 50
-----
Process exited after 0.1422 seconds with return value 0
Press any key to continue . . .
Compiler Resources Compile Log Debug Find Results Close
- Warnings: 0
- Output Filename: F:\C++\DSA lab ASS01\Pointer Arithmetic.exe
- Output Size: 1.83214282989502 MiB
- Compilation Time: 0.92s
Shorten compiler paths
Line: 12 Col: 1 Sel: 0 Lines: 12 Length: 247 Insert Done parsing in 0.015 seconds
```

## 04: Accessing the value.

```
#include <iostream>
```

```
int main() {
```

```
    int number=10000;
```

```
    int *ptr=&number;
```

```
    int value=*ptr;
```

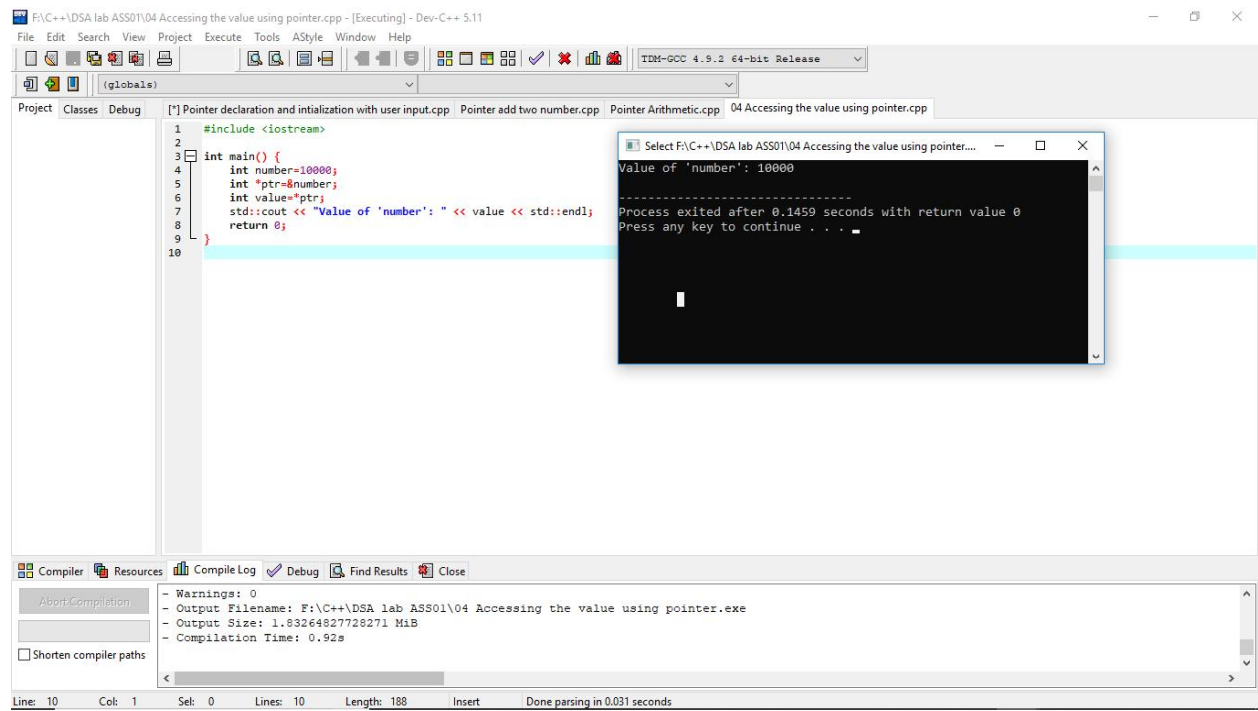
```
    std::cout << "Value of 'number': " << value << std::endl;
```

```
    return 0;
```



}

## Output:



## 05: Function Pointer.

```
#include <iostream>
```

```
int add(int a, int b) {
```

```
    return a + b;
```

```
}
```

```
int subtract(int a, int b) {
```

```
    return a - b;
```

```
}
```

```

int main() {

    int (*operation)(int, int);

    operation = add;

    std::cout << "Addition: " << operation(5, 3) << std::endl;

    operation = subtract;

    std::cout << "Subtraction: " << operation(5, 3) << std::endl;

    return 0;

}

```

Output:

The screenshot displays the Dev-C++ IDE with the following components:

- Source Code:** The code defines two functions, `add` and `subtract`, and a `main` function. The `main` function uses a function pointer `operation` to call `add(5, 3)` and `subtract(5, 3)`, printing the results.
- Output Window:** Shows the program's output:
 

```

      Addition: 8
      Subtraction: 2
      -----
      Process exited after 0.1506 seconds with return value 0
      Press any key to continue . . .
      
```
- Compiler Log:** Shows the compilation details:
 

```

      - Warnings: 0
      - Output Filename: F:\C++\DSA lab ASS01\06 Function Pointer.exe
      - Output Size: 1.83268356323242 MiB
      - Compilation Time: 1.30s
      
```

## 06: Pointer to pointer.

```
#include <iostream>
```

```
int main() {
```

```
    int number = 12;
```

```
    int *ptr1 = &number;
```

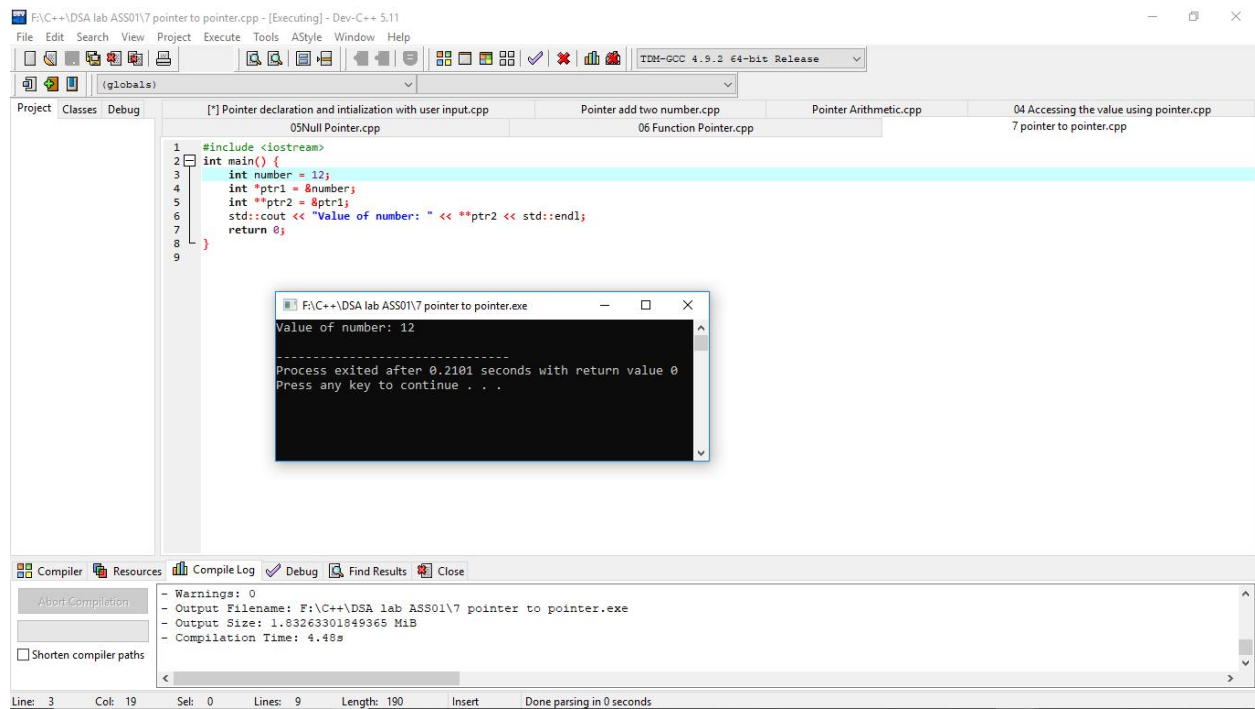
```
    int **ptr2 = &ptr1;
```

```
    std::cout << "Value of number: " << **ptr2 << std::endl;
```

```
    return 0;
```

```
}
```

## Output:



The screenshot shows the Dev-C++ IDE with the following code in the editor:

```
1 #include <iostream>
2 int main() {
3     int number = 12;
4     int *ptr1 = &number;
5     int **ptr2 = &ptr1;
6     std::cout << "Value of number: " << **ptr2 << std::endl;
7     return 0;
8 }
9
```

The output window displays the following text:

```
Value of number: 12
-----
Process exited after 0.2101 seconds with return value 0
Press any key to continue . . .
```

The status bar at the bottom indicates: Line: 3, Col: 19, Sel: 0, Lines: 9, Length: 190, Insert, Done parsing in 0 seconds.

## 07: Array of pointer.

```
#include <iostream>
```

```
int main() {
```

```
    int a = 5, b = 10, c = 15;
```

```
    int *ptrArr[3] = {&a, &b, &c};
```

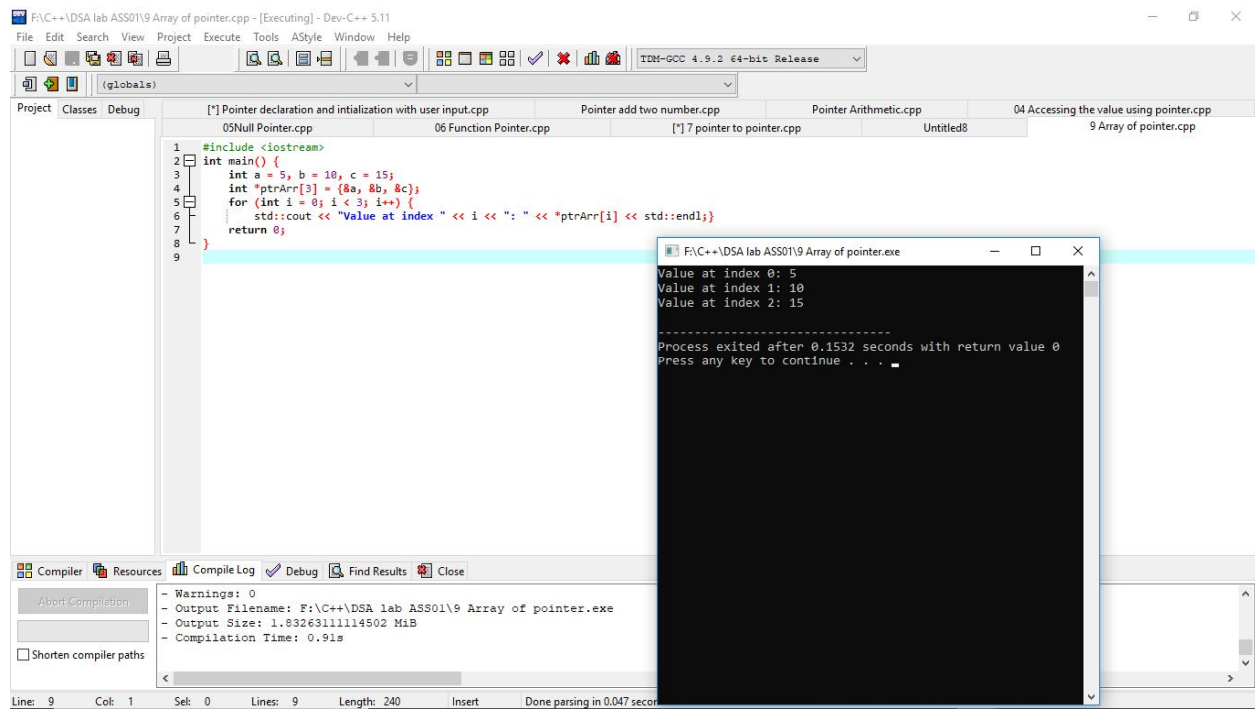
```
    for (int i = 0; i < 3; i++) {
```

```
        std::cout << "Value at index " << i << ": " << *ptrArr[i] << std::endl;
```

```
    return 0;
```

```
}
```

## Output:



The screenshot displays a C++ IDE with the source code for an array of pointers. The code defines three integers (a=5, b=10, c=15) and an array of three pointers, each pointing to one of these integers. A loop prints the value at each index. The output window shows the execution results: 'Value at index 0: 5', 'Value at index 1: 10', and 'Value at index 2: 15'. The compiler window shows no warnings and a successful compilation.

```
1 #include <iostream>
2 int main() {
3     int a = 5, b = 10, c = 15;
4     int *ptrArr[3] = {&a, &b, &c};
5     for (int i = 0; i < 3; i++) {
6         std::cout << "Value at index " << i << ": " << *ptrArr[i] << std::endl;
7     }
8     return 0;
9 }
```

Output:

```
Value at index 0: 5
Value at index 1: 10
Value at index 2: 15

Process exited after 0.1532 seconds with return value 0
Press any key to continue . . .
```

Compiler Output:

```
- Warnings: 0
- Output Filename: F:\C++\DSA lab ASS01\9 Array of pointer.exe
- Output Size: 1.83263111114502 MiB
- Compilation Time: 0.91s
```

## 08: Pointer using Array.

```
#include <iostream>

using namespace std;

int main()
{
    float arr[3];

    float *ptr;

    cout << "Displaying address using arrays: " << endl;

    for (int i = 0; i < 3; ++i)
    {
        cout << "&arr[" << i << "] = " << &arr[i] << endl;
    }

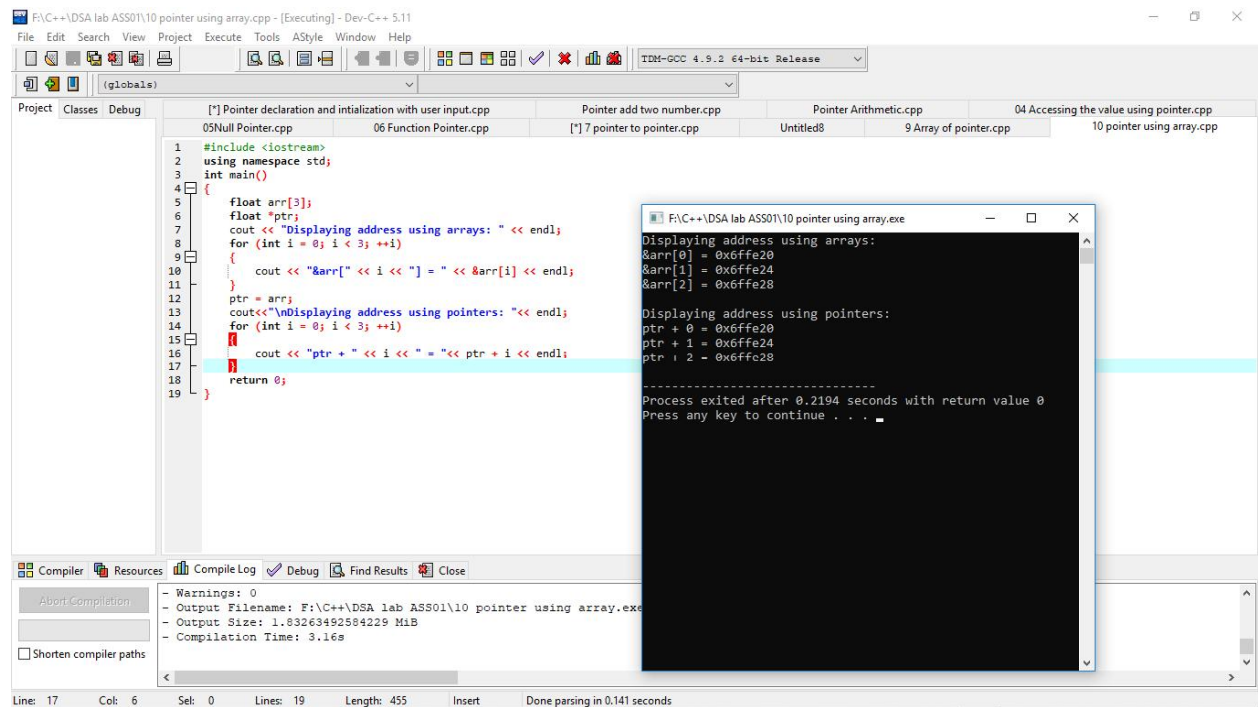
    ptr = arr;

    cout<<"\nDisplaying address using pointers: "<< endl;

    for (int i = 0; i < 3; ++i)
    {
        cout << "ptr + " << i << " = " << ptr + i << endl;
    }

    return 0;
}
```

**Output:**



**09:**

```
#include <iostream>
```

```
int main() {
```

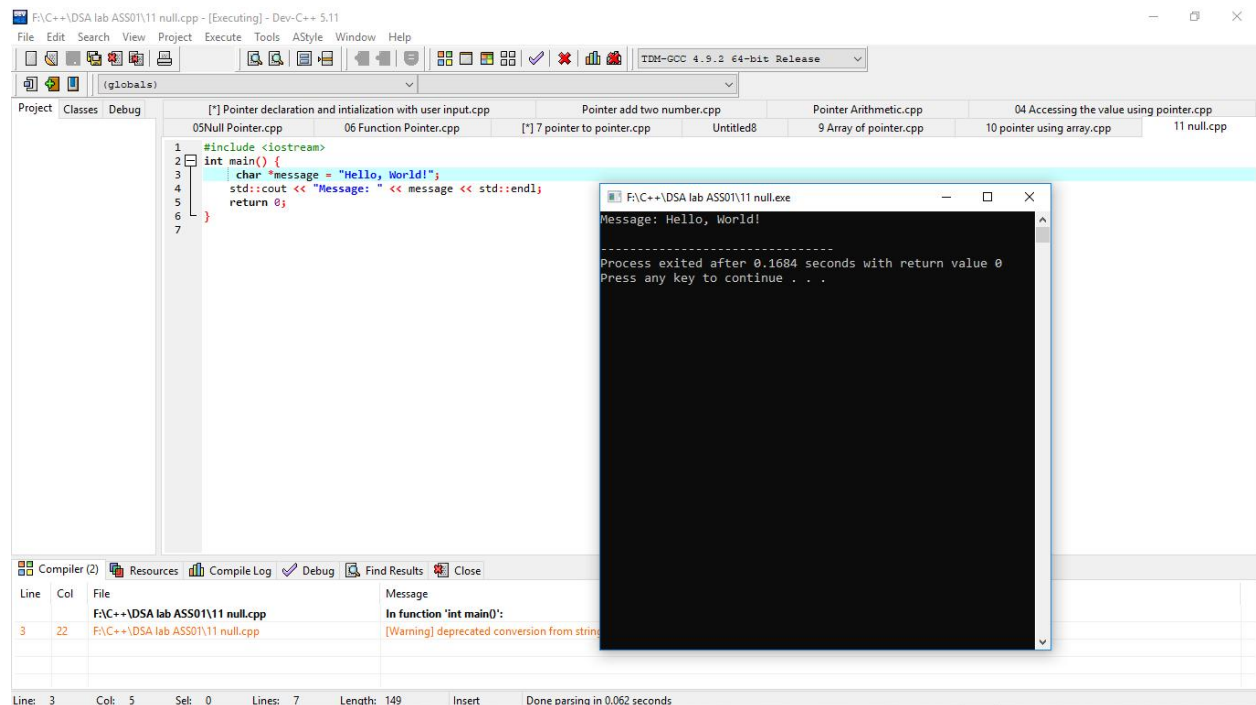
```
    char *message = "Hello, World!";
```

```
    std::cout << "Message: " << message << std::endl;
```

```
    return 0;
```

```
}
```

**Output:**



## 10: Pointer to Object.

```
#include <iostream>
```

```
class MyClass {
```

```
public:
```

```
    int data;
```

```
    MyClass(int val) : data(val) {}
```

```
};
```

```
int main() {
```

```
    MyClass obj(42);
```

```
    MyClass *ptr = &obj;
```

```
    std::cout << "Value of data: " << ptr->data << std::endl;
```

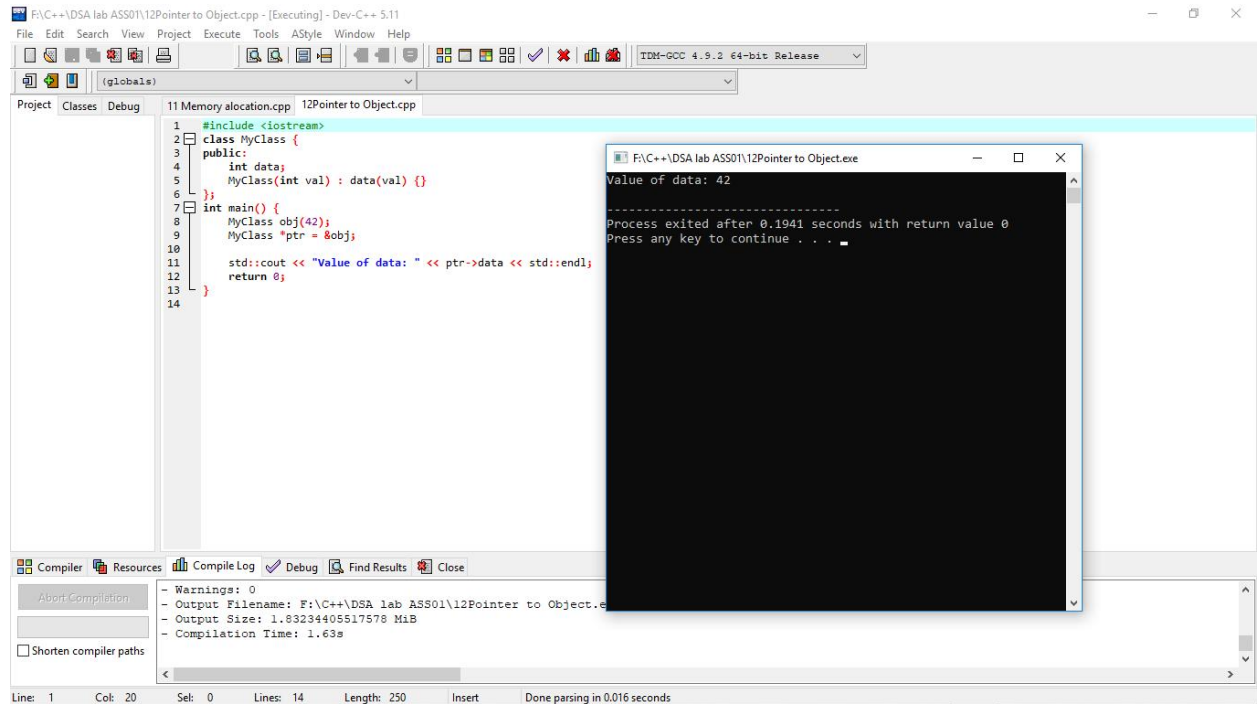
```

return 0;

}

```

## Output:



## 11: Pointer to constant data.

```

#include <iostream>

int main() {

    const int a = 2;

    const int *ptr = &a;


    std::cout << "Value pointed to by ptr: " << *ptr << std::endl;

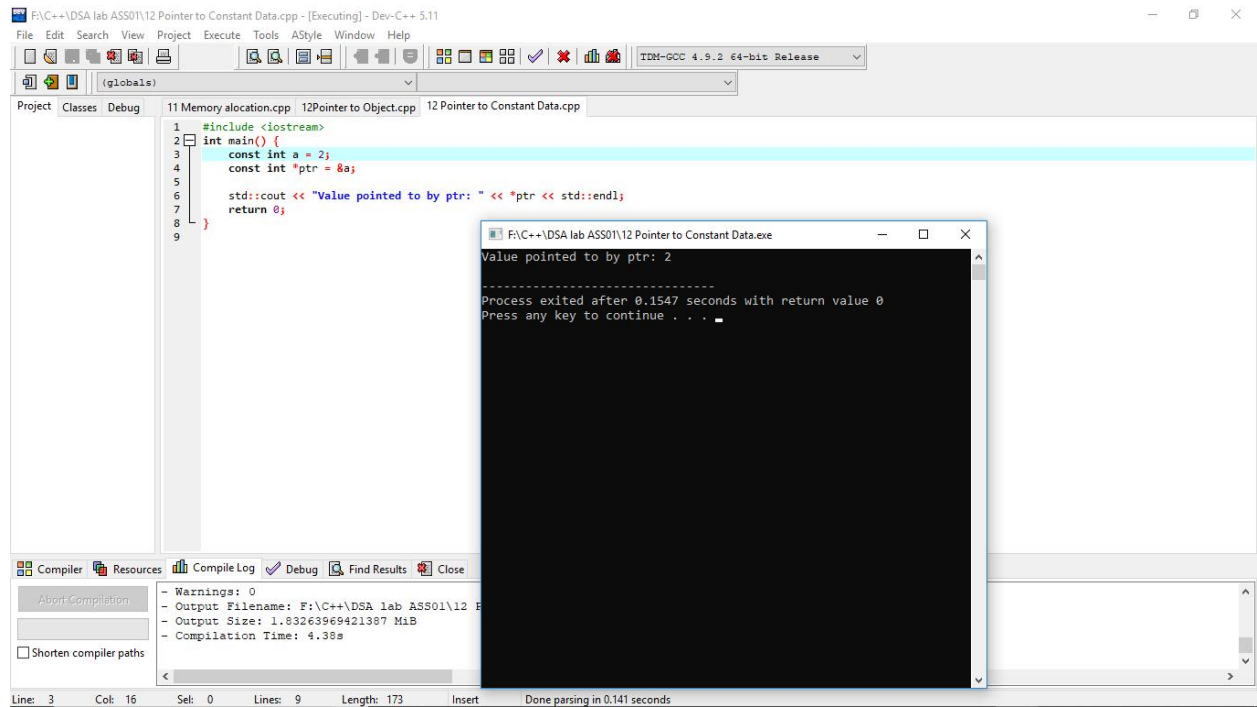
    return 0;

}

```



## Output:



## 12: Pointer to constant pointer.

```
#include <iostream>
```

```
int main() {
```

```
    int x = 10;
```

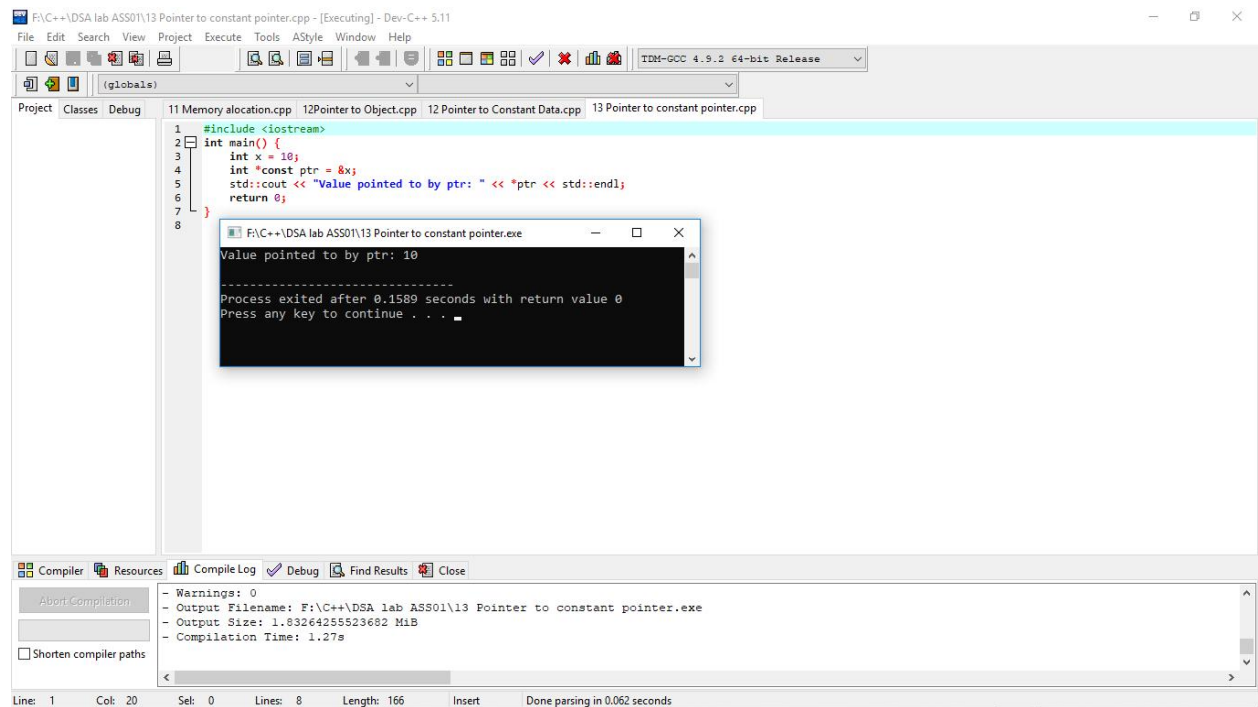
```
    int *const ptr = &x;
```

```
    std::cout << "Value pointed to by ptr: " << *ptr << std::endl;
```

```
    return 0;
```

```
}
```

## Output:



## 13: Pointer to with different function.

```
#include <iostream>
```

```
int add(int a, int b) {
```

```
    return a + b;
```

```
}
```

```
int subtract(int a, int b) {
```

```
    return a - b;
```

```
}
```

```
int main() {
```

```

int (*ptr)(int, int);

ptr = &add;

std::cout << "Result of addition: " << (*ptr)(4, 5) << std::endl;

ptr = &subtract;

std::cout << "Result of subtraction: " << (*ptr)(9, 3) << std::endl;

return 0;

}

```

## Output:

The screenshot shows the Dev-C++ IDE with a C++ program open. The program defines two functions, `add` and `subtract`, and a `main` function that uses pointers to call these functions. The output window shows the results of the program execution.

```

F:\C++\DSA lab ASS01\13 Pointer to with different function.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
((globals))
Project Classes Debug 13 Pointer to with different function.cpp
1 #include <iostream>
2 int add(int a, int b) {
3     return a + b;
4 }
5
6 int subtract(int a, int b) {
7     return a - b;
8 }
9
10 int main() {
11     int (*ptr)(int, int);
12     ptr = &add;
13     std::cout << "Result of addition: " << (*ptr)(4, 5) << std::endl;
14     ptr = &subtract;
15     std::cout << "Result of subtraction: " << (*ptr)(9, 3) << std::endl;
16     return 0;
17 }
18
Compiler Resources Compile Log Debug Find Results Close
- Warnings: 0
- Output Filename: F:\C++\DSA lab ASS01\13 Pointer to with different function.exe
- Output Size: 1.83270072937012 MiB
- Compilation Time: 5.41s
Line: 10 Col: 13 Sel: 0 Lines: 18 Length: 369 Insert Done parsing in 2.328 seconds

```

Output window content:

```

F:\C++\DSA lab ASS01\13 Pointer to with different function.exe
Result of addition: 9
Result of subtraction: 6
-----
Process exited after 0.3429 seconds with return value 0
Press any key to continue . . .

```

## 14: Multiply pointer.

```
#include <iostream>
```

```
int main() {
```

```

int num1 = 5;

int num2 = 7;

int result = 0;

int *ptr1 = &num1;

int *ptr2 = &num2;

result = (*ptr1) * (*ptr2);

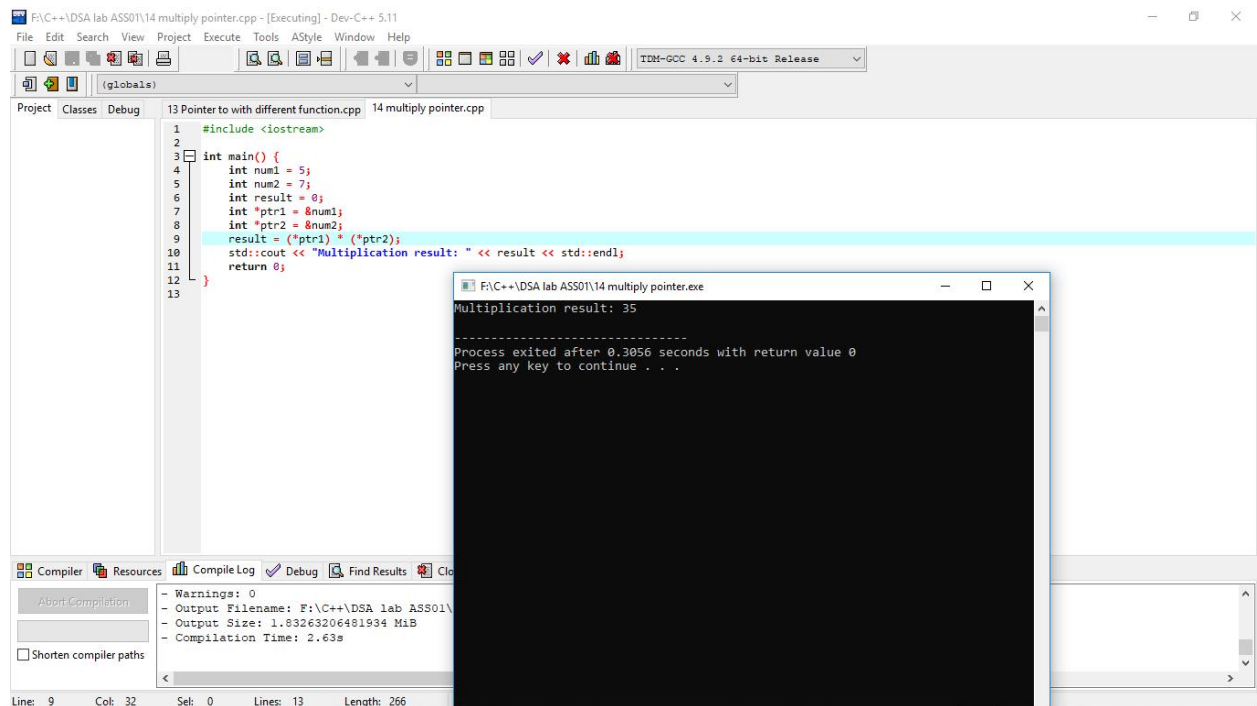
std::cout << "Multiplication result: " << result << std::endl;

return 0;

}

```

## Output:



## 15: Divide function.

```
#include <iostream>
```

```

int main() {

    int num1 = 15;

    int num2 = 7;

    int result = 0;

    int *ptr1 = &num1;

    int *ptr2 = &num2;

    result = (*ptr1) / (*ptr2);

    std::cout << "Divide result: " << result << std::endl;

    return 0;

}

```

## Output:

The screenshot shows a C++ IDE with the following code in the editor:

```

1 #include <iostream>
2
3 int main() {
4     int num1 = 15;
5     int num2 = 7;
6     int result = 0;
7     int *ptr1 = &num1;
8     int *ptr2 = &num2;
9     result = (*ptr1) / (*ptr2);
10    std::cout << "Divide result: " << result << std::endl;
11    return 0;
12 }
13

```

The output window displays the following text:

```

Divide result: 2

Process exited after 0.3386 seconds with return value 0
Press any key to continue . . .

```

The IDE interface includes a menu bar (File, Edit, Search, View, Project, Execute, Tools, AStyle, Window, Help), a toolbar, a project explorer, and a compiler output window at the bottom.