Introduction to Programming
C++ Functions

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Summary

- Function

- Function Types

- Function declaration and Definition

- Syntax

- Programs

- Return type int

- No return type void

- With Parameter and no parameter

Function

In C++, a function is a code segment that performs a particular task. we can reuse it, which means that we can execute it more than once.

Or

A function groups a number of program statements into a unit and gives it a name. This unit can then be invoked/called from other parts of the program.

Function Types in C++

In C++, functions can be categorized based on their behavior, return type, and parameter usage. Here are the main types:

Based on Return Type:
i.   Functions Returning a Value
   - Must specify a return type (int, double, string, etc.).
   - Use the return statement to send back a result.

```cpp
int add(int x, int y)
{
    return x+y;
}
```

ii.   Void Functions (No Return Value)
   - Use void as the return type.
   - Do not return any value.
   - void means that the function does not have a return value.

```cpp
void add() {
    int a, b, c;

    cout << "Enter first number here: ";
    cin >> a;
```

Function Declaration and Definition

A C++ function consists of two parts:
- Declaration: the return type, the name of the function, and parameters (if any)
- Definition: the body of the function (code to be executed)
- A function declaration tells the compiler about a function's return type, name, and parameters before its full definition.

```
int add(int x, int y)// Declaration
{
    return x+y; //body or Definition
}
```

return_type: Type of value the function returns. (**if return some value**)

name: Name assigned to the function.

Function body: Set of statements in curly brackets { } are executed when the function is called.

Function Parameters and Arguments

When calling a function, you can pass input data known as arguments.
To accept these values, the function declares parameters placeholder variables listed inside the function definition's parentheses.
Each parameter must include both its data type and name to properly receive and process the arguments.

```cpp
int add (int x, int y)
{
    return x+y; //body



}
```

```cpp
int main()
{
        cout <<add(5,5)<<endl;
}
```

return_type: Type of value the function returns. (**if return some value**)

name: Name assigned to the function.

Function body: Set of statements in curly brackets { } are executed when the function is called.

Why Use Functions in C++?

Functions are used to minimize the repetition of code, as a function allows you to write the code inside the block. And we can call that block whenever we need that code segment, rather than writing the code repeatedly. It also helps in dividing the program into well-organized segments.

Now, have a look at the syntax of C++ functions.

```
int add(int x, int y)
{
    return x+y; //body
}
```

return_type: Type of value the function returns. (**if return some value**)

name: Name assigned to the function.

Function body: Set of statements in curly brackets { } are executed when the function is called.

C++ Function

```cpp
#include <iostream>

using namespace std;

int add(int x, int y)
{
    return x+y;
}
int sub (int x , int y)
{
    return x-y;
}

int main()
{
    int num1 = 5, num2 = 7;
    int sum = add(num1, num2);
    cout << "Sum: " << sum << endl;

    cout <<"The sub is : " <<sub(10,5)<<endl;

    cout << "I am main Function" << endl;
    return 0;
}
```

Write a function with parameter to add and subtract two numbers

```
Sum: 12
The sub is : 5
I am main Function

Process returned 0 (0x0)    execution
```

C++ Function

```cpp
#include <iostream>

using namespace std;

int sub(int x, int y);

int add(int x, int y)
{
    return x+y;
}

int main()
{
    int num1 = 5, num2 = 7;

    int sum = add(num1, num2);

    cout << "Sum: " << sum << endl;

    cout <<"The sub is : " <<sub(10,5)<<endl;

    cout << "I am main Function" << endl;
    return 0;
}
int sub (int x , int y)
{
    return x-y;
}
```

Method 2: Write a function with parameter to add and subtract two numbers

```
Sum: 12
The sub is : 5
I am main Function

Process returned 0 (0x0)    execution
```

Void Function

Write a function to add two numbers. (Without parameter)

```cpp
#include <iostream>
using namespace std;

void add() {
    int a, b, c;

    cout << "Enter first number here: ";
    cin >> a;

    cout << "Enter 2nd number here: ";
    cin >> b;

    c = a + b;
    cout << "The sum of two numbers you have entered is = " << c << endl;
}

int main() {
    add(); // Calling the function
    return 0;
}
```

```
Enter first number here: 5
Enter 2nd number here: 5
The sum of two numbers you have entered is = 10

Process returned 0 (0x0)    execution time : 4.645 s
Press any key to continue.
```

C++ Function

Write a function to display your name, city, and country.

```cpp
#include <iostream>
#include <string>
using namespace std;

void my_function(string name, string city, string country = "Pakistan") {
    cout << "I am " << name << " from " << country << " (" << city << ")" <<endl;
}

int main() {
    my_function("Ali", "Peshawar");
    my_function("Ahmad", "Islamabad");
    my_function("Kiven", "Oslo", "Norway");  // Overrides default country
    my_function("Jamil", "Karachi");

    return 0;
}
```

```
I am Ali from Pakistan (Peshawar)
I am Ahmad from Pakistan (Islamabad)
I am Kiven from Norway (Oslo)
I am Jamil from Pakistan (Karachi)
```

C++ Function

Write a function to convert days to hours.

```cpp
#include <iostream>
using namespace std;

void conversion(int no_days) {

    int hours = 24;
    int convert_to = no_days * hours;
    cout <<"The number of days is "<<no_days <<" converted to "<<convert_to << " hours" <<  endl;
}
int main() {
    int no_days =2;
    conversion(no_days);  // Will output: 48 converted to hours
    return 0;
}
```

```
The number of days is 2 converted to 48 hours

Process returned 0 (0x0)    execution time : 0.017 s
Press any key to continue.
```

C++ Function

Write a function to convert days to hours.

```cpp
#include <iostream>
using namespace std;

void conversion() {
    int hours = 24;
    int days;
    cout << "Enter number of days: ";
    cin >> days;
    int convert = days * hours;
    cout << "Converted to hours "<< convert  << endl;
}

int main() {
    conversion();  // Calls the func
    return 0;
}
```

```
Enter number of days: 2
Converted to hours 48

Process returned 0 (0x0)   execution time : 2.270 s
Press any key to continue.
```

C++ Function

Write a function to count vowels and consonants

```cpp
#include <iostream>
#include <cctype>// For tolower() and isalpha()
using namespace std;

void count_V_C(string value) {
    int vowels = 0, consonant = 0;
    // value.length() gives the string length
    for (int i = 0; i < value.length(); ++i) {
        char c = tolower(value[i]);
        if (c == 'a' || c == 'e' || c == 'i' || c == 'o' || c == 'u') {
            vowels++;
        }
        else if (isalpha(c)) {  // Only count alphabetic consonants
            consonant++;
        }
    }
    cout << "Vowels: " << vowels << endl;
    cout <<"Consonants: " << consonant <<endl;
}

int main() {
    string input;
    cout << "Enter a string: ";
    getline(cin, input);
    count_V_C(input);
    return 0;
}
```

```
Enter a string: AEIOU D@123
Vowels: 5
Consonants: 1

Process returned 0 (0x0)    execution time : 12.182 s
Press any key to continue.
```

Quiz # 3

Get ready for a surprise

Thanks