C++ Programming Default Arguments (Parameters)

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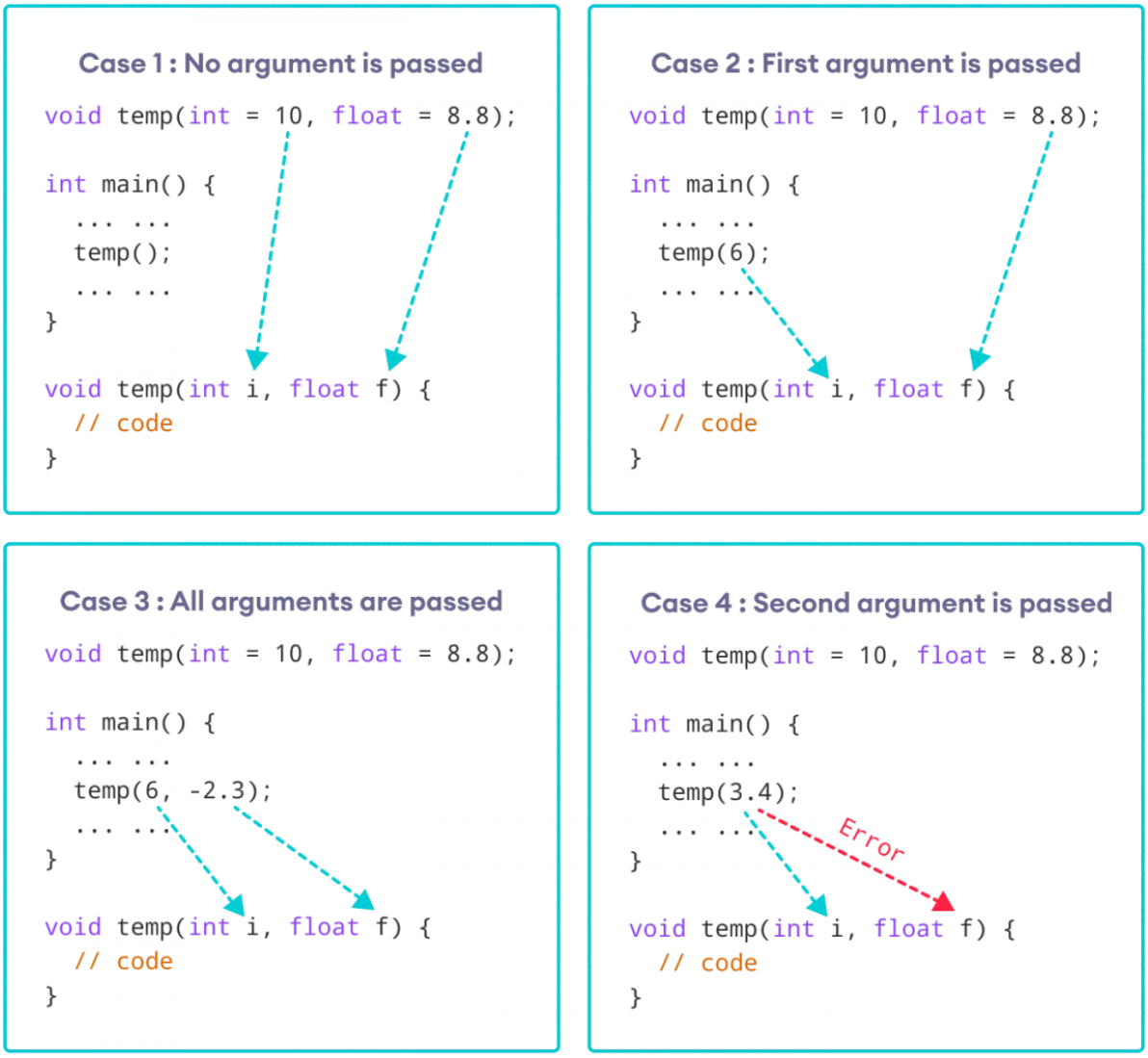
In this tutorial, we will learn C++ default arguments and their working with the help of examples.

In C++ programming, we can provide default values for function parameters.

If a function with default arguments is called without passing arguments, then the default parameters are used.

However, if arguments are passed while calling the function, the default arguments are ignored.

Working of default arguments



How default arguments work in C++

We can understand the working of default arguments from the image above:

1. When `temp()` is called, both the default parameters are used by the function.
2. When `temp(6)` is called, the first argument becomes `6` while the default value is used for the second parameter.
3. When `temp(6, -2.3)` is called, both the default parameters are overridden, resulting in `i = 6` and `f = -2.3`.
4. When `temp(3.4)` is passed, the function behaves in an undesired way because the second argument cannot be passed without passing the first argument.

   Therefore, `3.4` is passed as the first argument. Since the first argument has been defined as `int`, the value that is actually passed is `3`.

Example: Default Argument

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

// defining the default arguments
void display(char = '*', int = 3);

int main() {
    int count = 5;

    cout << "No argument passed: ";
    // *, 3 will be parameters
    display();

    cout << "First argument passed: ";
     // #, 3 will be parameters
    display('#');

    cout << "Both arguments passed: ";
    // $, 5 will be parameters
    display('$', count);

    return 0;
}

void display(char c, int count) {
    for(int i = 1; i <= count; ++i)
    {
        cout << c;
    }
    cout << endl;
}
```

Output

```
No argument passed: ***
First argument passed: ###
Both arguments passed: $$$$$
```

Here is how this program works:

1. `display()` is called without passing any arguments. In this case, `display()` uses both the default parameters `c = '*'` and `n = 1`.
2. `display('#')` is called with only one argument. In this case, the first becomes `'#'`. The second default parameter `n = 1` is retained.
3. `display('#', count)` is called with both arguments. In this case, default arguments are not used.

We can also define the default parameters in the function definition itself. The program below is equivalent to the one above.

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

// defining the default arguments
void display(char c = '*', int count = 3) {
    for(int i = 1; i <= count; ++i) {
        cout << c;
    }
    cout << endl;
}

int main() {
    int count = 5;

    cout << "No argument passed: ";
    // *, 3 will be parameters
    display();

    cout << "First argument passed: ";
     // #, 3 will be parameters
    display('#');

    cout << "Both argument passed: ";
    // $, 5 will be parameters
    display('$', count);

    return 0;
}
```

Things to Remember

1. Once we provide a default value for a parameter, all subsequent parameters must also have default values. For example,

   ```
   // Invalid
   void add(int a, int b = 3, int c, int d);

   // Invalid
   void add(int a, int b = 3, int c, int d = 4);

   // Valid
   void add(int a, int c, int b = 3, int d = 4);
   ```

2. If we are defining the default arguments in the function definition instead of the function prototype, then the function must be defined before the function call.

   ```
   // Invalid code

   int main() {
       // function call
       display();
   }

   void display(char c = '*', int count = 5) {
       // code
   }
   ```