



### Overloading Function Templates

#### Template:

A template is a tool that reduces the efforts in writing the same code as templates can be used at those places.

A template function can be overloaded either by a non-template function or using an ordinary function template.

**Function Overloading:** In function overloading, the function may have the same definition, but with different arguments. Below is the C++ program to illustrate function overloading:

// C++ program to demonstrate the

// function overloading

```
#include <bits/stdc++.h>
```

```
using namespace std;
```

```
// Function to calculate square
```

```
void square(int a)
```

```
{
```

```
    cout << "Square of " << a
```

```
        << " is " << a * a
```

```
        << endl}
```

```
// Function to calculate square
```

```
void square(double a)
```

```
{
```

```
    cout << "Square of " << a
```

```
        << " is " << a * a
```

```
        << endl;}
```

```
// Driver Code
```

```
int main()
```

```
{
```

```
    // Function Call for side as
```

```
    // 9 i.e., integer
```

```
    square(9);
```

```
    // Function Call for side as
```

```
    // 2.25 i.e., double
```

```
    square(2.25);
```

```
    return 0;}
```

#### Output:

Square of 9 is 81

Square of 2.25 is 5.0625

#### Explanation:

In the above code, the **square** is overloaded with different parameters.

The function **square** can be overloaded with other arguments too, which requires the same name and different arguments every time.

To reduce these efforts, C++ has introduced a generic type called **function template**.

**Function Template:** The function template has the same syntax as a regular function, but it starts with a keyword **template** followed by template parameters enclosed inside **angular**



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**brackets <>.**

```
template <class T>
T functionName(T arguments)
{
    // Function definition
    .....
}
```

where, **T** is **template** argument accepting different arguments and **class** is a keyword.

**Template Function Overloading:**

The name of the function templates is the same but called with different arguments is known as **function template overloading**.

If the function template is with the ordinary template, the name of the function remains the same but the number of parameters differs.

When a function template is overloaded with a non-template function, the function name remains the same but the function's arguments are unlike.

```
#include <bits/stdc++.h>
using namespace std;
// Template declaration
template <class T>
// Template overloading of function
void display(T t1)
{
    cout << "Displaying Template: "
         << t1 << "\n";
}
// Template overloading of function
void display(int t1)
{
    cout << "Explicitly display: "
         << t1 << "\n";
}
// Driver Code
int main()
{
    // Function Call with a
    // different arguments
    display(200);
    display(12.40);
    display('G');
    return 0;}

```

**Output:**

Explicitly display: 200

Displaying Template: 12.4

Displaying Template: G