

# Templates

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## Contents

<b>1</b>	<b>Function Templates</b>	<b>2</b>
<b>2</b>	<b>Class Templates</b>	<b>2</b>
<b>3</b>	<b>Template Specialization</b>	<b>2</b>
<b>4</b>	<b>Variadic Templates</b>	<b>2</b>

# 1 Introduction to Templates

A **template** is a *very* powerful tool in C++. The basic idea is to use datatypes as parameters and have the compiler generate the relevant code for us. For example, you may want to write a function `sort()` that works for different datatypes. Rather than writing and maintaining multiple `sort()` functions, we can write a single `sort()` **template** and pass the datatype as a parameter.

## 1.1 How Do Templates Work?

Templates are expanded at compile time similar to macros. The difference is that the compiler does type checking before template expansion.

# 2 Function Templates

## 2.1 Implicit Template Deduction

## 2.2 Template Function Overloading

## 2.3 Function Template Specialization

# 3 Class Templates

## 3.1 Template Instantiation

## 3.2 Class Template Specialization

# 4 Non-Type Template Parameters

# 5 Variadic Templates