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This book explains what metaprogramming is and how it is best used. It provides the foundation you'll need to use the template metaprogramming effectively in your own work. This book is aimed at any programmer who is comfortable with idioms of the Standard Template Library (STL). C++ power-users will gain a new insight into their existing work and a new fluency in the domain of metaprogramming. Intermediate-level programmers who have learned a few advanced template techniques will see where these tricks fit in the big picture and will gain the conceptual foundation to use them with discipline. Programmers who have caught the scent of metaprogramming, but for whom it is still mysterious, will finally gain a clear understanding of how, when, and why it works. All readers will leave with a new tool of unprecedented power at their disposal - the Boost Metaprogramming Library.

C++ Template Metaprogramming sheds light on the most powerful idioms of today's C++, at long last delivering practical metaprogramming tools and techniques into the hands of the everyday programmer. A metaprogram is a program that generates or manipulates program code. Ever since generic programming was introduced to C++, programmers have discovered myriad "template tricks" for manipulating programs as they are compiled, effectively eliminating the barrier between program and metaprogram. While excitement among C++ experts about these capabilities has reached the community at large, their practical application remains out of reach for most programmers. This book explains what metaprogramming is and how it is best used. It provides the foundation you'll need to use the template metaprogramming effectively in your own work. This book is aimed at any programmer who is comfortable with idioms of the Standard Template Library (STL). C++ power-users will gain a new insight into their existing work and a new fluency in the domain of metaprogramming. Intermediate-level programmers who have learned a few advanced template techniques will see where these tricks fit in the big picture and will gain the conceptual foundation to use them with discipline. Programmers who have caught the scent of metaprogramming, but for whom it is still mysterious, will finally gain a clear understanding of how, when, and why it works. All readers will leave with a new tool of unprecedented power at their disposal—the Boost Metaprogramming Library. Note: CD materials are only available with the print edition.

Advanced Metaprogramming in Classic C++ aims to be both an introduction and a reference to C++ template metaprogramming (TMP); TMP is presented in the book as a set of techniques that will bring a new style in C++ and make code exceptionally clear and efficient. The book deals with language aspects, design patterns, examples and applications (seen as case studies). Special emphasis is put on small reusable techniques that will improve the quality of daily work. What makes the book exceptional is the level of understanding of the concepts involved imparted by the author. This is not just a rote overview of metaprogramming. You will truly understand difficult topics like static assertions, how to write metafunctions, overload resolution, lambda expressions, and many others. More than that, you will work through them with practical examples guided by the author's frank explanations. This book requires you to think and to learn and to understand the language so that you can program at a higher level.

Using the implementation of a deep learning framework as an example, C++ Template Metaprogramming in Practice: A Deep Learning Framework explains the application of metaprogramming in a relatively large project and emphasizes ways to optimize systems performance. The book is suitable for developers with a basic knowledge of C++. Developers familiar with mainstream deep learning frameworks can also refer to this book to compare the differences between the deep learning framework implemented with metaprogramming and compile-time computing with deep learning frameworks using object-oriented methods. Consisting of eight chapters, the book starts with two chapters discussing basic techniques of metaprogramming and compile-time computing. The rest of the book's chapters focus on the practical application of metaprogramming in a deep learning framework. It examines rich types and systems, expression templates, and writing complex meta-functions, as well as such topics as: Heterogeneous dictionaries and policy templates An introduction to deep learning Type system and basic data types Operations and expression templates Basic layers Composite and recurrent layers Evaluation and its optimization Metaprogramming can construct flexible and efficient code. For C++ developers who are familiar with object-oriented programming, the main difficulty in learning and mastering C++ metaprogramming is establishing the thinking mode of functional programming. The meta-programming approach involved at compile time is functional, which means that the intermediate results of the construction cannot be changed, and the impact may be greater than expected. This book enables C++ programmers to develop a functional mindset and metaprogramming skills. The book also discusses the development cost and use cost of metaprogramming and provides workarounds for minimizing these costs.

Practical Visual C++ takes a straight forward, no-nonsense approach to teaching C++. You start by learning the basics of Developer Studio with the use of the Wizards, editors, and debuggers. Then move on to the core language, including program flow, data types, functions, classes, object-oriented programming, and more. You then progress into the Microsoft Foundation Classes (MFC), the libraries of pre-build classes that Microsoft provides to make Visual C++ programming much easier. By understanding how to use the classes within MFC, you will be able to create nearly any type of program. Specific coverage includes working with dialogs, objects, controls, document-views, file manipulation, and printing.

Templates are among the most powerful features of C++, but they remain misunderstood and underutilized, even as the C++ language and development community have advanced. In C++ Templates, Second Edition, three pioneering C++ experts show why, when, and how to use modern templates to build software that's cleaner, faster, more efficient, and easier to maintain. Now extensively updated for the C++11, C++14, and C++17 standards, this new edition presents state-of-the-art techniques for a wider spectrum of applications. The authors provide authoritative explanations of all new language features that either improve templates or interact with them, including variadic templates, generic lambdas, class template argument deduction, compile-time if, forwarding references, and user-defined literals. They also deeply delve into fundamental language concepts (like value categories) and fully cover all standard type traits. The book starts with an insightful tutorial on basic concepts and relevant language features. The remainder of the book serves as a comprehensive reference, focusing first on language details and then on coding techniques, advanced applications, and sophisticated idioms. Throughout, examples clearly illustrate abstract concepts and demonstrate best practices for exploiting all that C++ templates can do. Understand exactly how templates behave, and avoid common pitfalls Use templates to write more efficient, flexible, and maintainable software Master today's most effective idioms and techniques Reuse source code without compromising performance or safety Benefit from utilities for generic programming in the C++ Standard Library Preview the upcoming concepts feature The companion website, tmplbook.com, contains sample code and additional updates.

Apply Functional Programming techniques to C++ to build highly modular, testable, and reusable code About This Book Modularize your applications and make them highly reusable and testable Get familiar with complex concepts such as metaprogramming, concurrency, and immutability A highly practical guide to building functional code in C++ filled with lots of examples and real-world use cases Who This Book Is For This book is for C++ developers comfortable with OOP who are interested in learning how to apply the functional paradigm to create robust and testable apps. What You Will Learn Get to know the difference between imperative and functional approaches See the use of first-class functions and pure functions in a functional style Discover various techniques to apply immutable state to avoid side effects Design a recursive algorithm effectively Create faster programs using lazy evaluation Structure code using design patterns to make the design process easier Use concurrency techniques to develop responsive software Learn how to use the C++ Standard Template Library and metaprogramming in a functional way to improve code optimization In Detail Functional programming allows developers to divide programs into smaller, reusable components that ease the creation, testing, and maintenance of software as a whole. Combined with the power of C++, you can develop robust and scalable applications that fulfill modern day software requirements. This book will help you discover all the C++ 17 features that can be applied to build software in a functional way. The book is divided into three modules—the first introduces the fundamentals of functional programming and how it is supported by modern C++. The second module explains how to efficiently implement C++ features such as pure functions and immutable states to build robust applications. The last module describes how to achieve concurrency and apply design patterns to enhance your application's performance. Here, you will also learn to optimize code using metaprogramming in a functional way. By the end of the book, you will be familiar with the functional approach of programming and will be able to use these techniques on a daily basis. Style and approach This book uses a module-based approach, where each module will cover important aspects of functional programming in C++ and will help you develop efficient and robust applications through gaining a practical understanding.

As scientific and engineering projects grow larger and more complex, it is increasingly likely that those projects will be written in C++. With embedded hardware growing more powerful, much of its software is moving to C++, too. Mastering C++ gives you strong skills for programming at nearly every level, from "close to the hardware" to the highest-level abstractions. In short, C++ is a language that scientific and technical practitioners need to know. Peter Gottschling's Discovering Modern C++ is an intensive introduction that guides you smoothly to sophisticated approaches based on advanced features. Gottschling introduces key concepts using examples from many technical problem domains, drawing on his extensive experience training professionals and teaching C++ to students of physics, math, and engineering. This book is designed to help you get started rapidly and then master increasingly robust features, from lambdas to expression templates. You'll also learn how to take advantage of the powerful libraries available to C++ programmers: both the Standard Template Library (STL) and scientific libraries for arithmetic, linear algebra, differential equations, and graphs. Throughout, Gottschling demonstrates how to write clear and expressive software using object orientation, generics, metaprogramming, and procedural techniques. By the time you're finished, you'll have mastered all the abstractions you need to write C++ programs with exceptional quality and performance.