

Advanced C++ 20 Programming - TTCP2175

Explore C++ Templates, Memory Management, Functional Programming, Unit Testing, Modern Features & More

Duration: 3 Days

Skill Level: Intermediate

Available Format: Instructor-Led Online; Instructor-Led, Onsite In Person ; Blended; On Public Schedule

Geared for experienced C++ developers, Advanced C++ 20 Programming is a three-day hands-on course designed to provide you with skills required to write faster, robust C++ code, enhancing your ability to create performance-critical applications ranging from system software, game development, to real-time systems and AI programming.

What You'll Learn

Overview

Geared for experienced C++ developers, Advanced C++ 20 Programming is a three-day hands-on course designed to provide you with skills required to write faster, robust C++ code, enhancing your ability to create performance-critical applications ranging from system software, game development, to real-time systems and AI programming.

Working in a lab-focused learning environment guided by our experienced Instructor, you'll explore a broad spectrum of 'next-level' topics such as SOLID design principles, operator overloading, functional programming, and template usage, all aimed at refining your programming craft. The hands-on work will mirror real-world scenarios, including implementing design patterns and managing threads and tasks. You'll also discover the realms of multi-threading and asynchronous programming, invaluable skills for creating efficient, high-performance applications. These advanced skills have significant application in industries such as finance for high-frequency trading systems, in gaming for building high-performance game engines, or in tech companies for building large scale distributed systems.

By the end of this unique and intensive course, you will be well-equipped to tackle complex coding challenges, contribute more effectively to your team's projects, and deliver high-quality, efficient applications that meet modern business demands.

Objectives

Working in a hands-on learning environment, guided by our expert team you'll learn to:

- **Become a Pro at SOLID Design:** You'll delve into SOLID design principles, mastering how to write clean, maintainable code. By the end, you'll be able to identify and avoid design smells, enhancing the overall quality of your projects.
- **Master the Art of Factory Implementation:** Get hands-on with factories in C++. We'll guide you through the basics and options, including Singleton, to help you understand the critical role of factories in object-oriented design.
- **Up Your Game with Operator Overloading:** You'll learn about operator overloading and its applications. By understanding how to enhance the readability and flexibility of your code, you'll streamline your programming tasks.
- **Unlock the Power of Templates:** We'll dive into the intriguing world of templates, exploring variance, concepts, and the 'auto' keyword. You'll get to implement covariant and contravariant templates, broadening your C++ expertise.
- **Ace Multithreading and Asynchronous Programming:** We'll explore the realms of multithreading and asynchronous programming, equipping you with the tools to create efficient, high-performance applications. You'll get to practice with mutexes, semaphores, atomics, and coroutines, gaining invaluable experience for your future projects.

Audience

This is an intermediate and beyond level development course designed for developers with prior C++ programming experience. Students without prior C++ programming background should take the pre-requisite training.

Pre-Requisites

This is an intermediate and beyond level development course designed for developers with prior C++ programming experience. Students without prior C++ programming background should take the pre-requisite training.

Take Before: Incoming students should have practical skills equivalent to the topics in, or should have recently attended, one of these courses as a prerequisite:

- **TTCP2100** Introduction to C++ Programming / C++ 20

TTCP2100 Introduction to C++ Programming Essentials

Agenda

Please note that this list of topics is based on our standard course offering, evolved from typical industry uses and trends. We will work with you to tune this course and level of coverage to target the skills you need most. Course agenda, topics and labs are subject to adjust during live delivery in response to student skill level, interests and participation.

C++ Quick Review

- Modern C++ - an introduction to new features in C++ 11-20

SOLID Design

- Design Smells
- Project Overview
- Single Responsibility □ Open/Close
- Liskov's Substitution
- Interface Segregation
- Dependency Inversion

Implementing a Factory in C++

- Factory Basics
- Options
- Singleton
- A C++ Object Factory

Operator Overloading

- Commonly Overloaded operators
- Conversions
- Constructor Conversions
- Implicit vs Explicit

Templates

- Understanding variance □ Implementing covariant templates
- Implementing contravariant
- templates

- <concepts>
- auto

Functional Programming

- Lambda Expressions
- Functors
- <functional>

Structural Patterns

- Adapter
- Bridge
- Composite
- Decorator
- RAI and Proxy Pattern - Smart
- Pointers
- Strategies for Smart Pointers &
- Raw Pointers
- Other patterns

Behavioral Patterns

- Solving common design smells with behavioral patterns
- Template Method - issues initializing C++ objects
- State Pattern
- Strategy Pattern
- Command Pattern
- Other behavioral Patterns

Threads, Tasks, Async

- All about threads
- Mutex
- Semaphores
- Latch & barrier
- atomics
- All about Tasks
- <future>
- Coroutines (async)

Related Courses

TTCP2000	Introduction to Programming and C++ Basics for Non-Developers
TTCP2100	Introduction to C++ Programming Essentials
TTCP2150	Intermediate C++ 20 Programming Effective C++ 20
TTCP2175	Advanced C++ 20 Programming

All applicable course software, digital courseware files or course notes, labs, data sets and solutions, live coaching support channels and rich extended learning and post training resources are provided for you in our “easy access, no install required” high-speed Learning Experience Platform (LXP), remote lab and content environment. Course materials, software, resources and post-training platform access periods vary by course.

For More Information

Please [contact us](#) or call 844-475-4559 toll free for more information about our training services (instructor-led, self-paced or blended), coaching and mentoring services, public course enrollment or questions, partner programs, courseware licensing options and more.