

Modern C++ Software Design (online)

Wednesday, October 5, 2022 - Friday, October 7, 2022

None

Scientific Program

This advanced C++ training is a course on software development with the C++ programming language. The focus of the training are the essential C++ software development principles, concepts, idioms, and best practices, which enable programmers to create professional, high-quality code. The course will give insight into the different aspects of C++ (object-oriented programming, functional programming, generic programming) and will teach guidelines to develop mature, robust, maintainable, and efficient C++ code.

Agenda

Day 1

Concepts and the STL

Overview of the STL

STL Iterators

STL Algorithms

STL Containers

Day 2

Class Design (I)

Compiler Generated Functions

Copy Elision

Object Lifetimes

RAII

Move Semantics

Day 3

Class Design (II)

Proper Handling of Member Data

Maintainability of Classes

Const Correctness

Dynamic Polymorphism

Inheritance: The Good Parts

Inheritance: The Bad Parts

Value Semantics: From Pointers to Values

Public Inheritance

Surprises in Object Hierarchies

After the course, the participants...

will have gained knowledge about fundamental C++ programming concepts and idioms

will benefit from both object-oriented and functional programming

will have a detailed understanding of template-based programming

will be able to properly design classes and class interfaces

will avoid the usual pitfalls in the context of inheritance

will comprehend the advantages of value-based design

will understand the virtue of clean code.

Prerequisites

At least one year of experience with the language is needed. This includes a good understanding of the basic mechanics (header files, source files, compilation), good knowledge of the syntax of C++, and some experience with templates and inheritance.

It is also beneficial to know the most common classes from the standard library (e.g. `std::vector`, `std::unique_ptr`, ...).

For the programming tasks, it is expected that all participants have a working C++ environment at hand. All operating systems (Windows, Linux, MacOS, ...), all IDEs or editors (Visual Studio, CLion, emacs, vi, ...), and all compilers (GCC, Clang, MSVC, ...) capable of at least C++14 can be used.