# Business Plan and Convener's Report: ISO/IEC JTC1/SC22/WG21 (C++)

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# 1. MANAGEMENT SUMMARY

## 1.1. JTC1/SC22/WG21 STATEMENT OF SCOPE

Development and maintenance of ISO/IEC Standards, Technical Specifications, and Technical Reports related to the programming language C++.

## 1.2. PROJECT REPORT

### 1.2.1. COMPLETED PROJECTS

International Standards

- JTC1.22.14882:1998 - Programming Language C++
- JTC1.22.14882:2003 - Programming Language C++
- JTC1.22.14882:2011 - Programming Language C++
- JTC1.22.14882:2014 - Programming Language C++
- JTC1.22.14882:2017 - Programming Language C++
- JTC1.22.14882:2020 - Programming Language C++
- JTC1.22.14882:2024 - Programming Language C++
- JTC1.22.29124:2010 - International Standard on Special Math Functions

Technical Specifications

- JTC1.22.9922:2024 - C++ Extensions for Concurrency, 2nd edition
- JTC1.22.18822:2014 - C++ Extensions for File System
- JTC1.22.19216:2018 - C++ Extensions for Networking
- JTC1.22.19217:2015 - C++ Extensions for Concepts
- JTC1.22.19568:2015 - C++ Extensions for Library Fundamentals
- JTC1.22.19568:2017 - C++ Extensions for Library Fundamentals, 2nd edition

- JTC1.22.19568:2023 - C++ Extensions for Library Fundamentals, 3rd edition
- JTC1.22.19570:2015 - C++ Extensions for Parallelism
- JTC1.22.19570:2018 - C++ Extensions for Parallelism, 2nd edition
- JTC1.22.19571:2015 - C++ Extensions for Concurrency
- JTC1.22.19768:2007 - C++ Library Extensions
- JTC1.22.19841:2015 - C++ Extensions for Transactional Memory
- JTC1.22.21425:2017 - C++ Extensions for Ranges
- JTC1.22.21544:2018 - C++ Extensions for Modules
- JTC1.22.22277:2017 - C++ Extensions for Coroutines
- JTC1.22.23619:2021 - C++ Extensions for Reflection
- JTC1.22.24733:2011 - Extensions to Support Decimal Floating Point Arithmetic

Technical Reports

- JTC1.22.18015:2006 - C++ Performance

### 1.2.2. PROJECTS UNDERWAY

See isocpp.org/std/status for a summary of projects underway, including contemplated upcoming ballots.

JTC1.22.14882 - The next 14882 edition is now entering CD ballot on schedule to be completed in 2026.

### 1.2.3. CANCELLED PROJECTS

JTC1.22.12907 - C++ Extensions for Transactional Memory, 2nd edition  (delayed by ISO editing; intent is to publish as SC22 white paper instead)

### 1.2.4. COOPERATION and COMPETITION

Where appropriate, WG21 has established liaisons with other SC22 and SC22 liaison organizations' working groups. There is no direct competition with any other current SC22 working group. Occasional overlap with SC22/WG14 (C) is coordinated with regular WG21 liaison.

# 2. PERIOD REVIEW

## 2.1. MARKET REQUIREMENTS

ISO C++ remains a widely-used foundation technology, well-received in the marketplace.

Although C++ has long been a consistently popular language, since 2011 in particular it has enjoyed a renewed cycle of growth and investment in tools and platform support across the industry. This was driven primarily by the C++11 standard's completion at the same time as the industry saw a

resurgence of interest in performance-efficient, hardware-efficient, and especially power-efficient systems programming capability for mobile devices, cloud data centers, high-performance financial systems, vector and GPGPU computing (via nonstandard extensions to C++ that we are now investigating standardizing), and other major growth sectors and environments.

## 2.2. ACHIEVEMENTS

Achievements in the past year include the following.

JTC1.22.14882 - The next 14882 edition is now entering CD ballot on schedule to be completed in 2026.

Its feature set includes significant improvements in the area of memory safety and security, with more such improvements underway.

## 2.3. RESOURCES

WG21 has grown considerably, which reflects the continued growth and investment in C++ across the industry as noted in 2.1.

WG21 has three hybrid meetings a year, and many subgroup telecons via Zoom every month. WG21 regularly has experts from 25 national bodies present at meetings. WG21 has been monitoring the cross-language standards activities, and made use of the ISO/IEC JTC1/SC22 guidelines on extended characters.

# 3. FOCUS NEXT WORK PERIOD

## 3.1. DELIVERABLES

WG21 is working on the next revision of JTC.22.14882 (IS C++) and progressing other projects as noted in 1.2.2.

## 3.2. STRATEGIES

WG21 members have been meeting in parallel subgroups and coordinating work between meetings via e-mail lists, teleconferences, and wiki. WG21 is working on revisions to the central IS JTC1.22.14882 on a regular three-year cadence. In addition, WG21 is parallelizing its work products by producing many work items first as Technical Specifications, which enables each independent work item to progress at its own speed and with less friction, and enables more experimental work to progress outside the main standard until it is more mature while still providing a reference for commercial implementations. When ready, these TS's can then be considered adopted (in whole or in part, and with changes) into the ISO C++ standard.

As of this writing, WG21 has nearly 30 active domain-specific subgroups, focusing on incubating proposals in specific areas, and which meet between WG21 face-to-face meetings via telecon and/or their own face-to-face meetings. These domain-specific groups have directly led to increased participation by leading experts in those domains who had not previously participated in WG21. For a current list of subgroups, see [isocpp.org/std/the-committee](isocpp.org/std/the-committee).

## 3.3. RISKS

None to report.

## 3.4. OPPORTUNITIES

Nothing new to report.

## 3.5. WORK PROGRAM PRIORITIES

WG21 intends to continue working on new language and/or library extensions with a view to publishing another revision of JTC1.22.14882 IS on time in 2026.

# 4. OTHER ITEMS

## 4.1. POSSIBLE ACTION REQUESTS AT FORTHCOMING PLENARY

None.

## 4.2 PROJECT EDITORS

The following individuals have been appointed project editors and backups.

Currently active projects:

- JTC1.22.14882, Programming Language C++:
    - Thomas Köppe (editor)
    - Jens Maurer (backup)

Complete projects:

- JTC1.22.14882:1998 and :2003, Programming Language C++:

    - Andrew Koenig (editor)
    - Tom Plum (backup)
- JTC1.22.14882:2011, Programming Language C++:

- o Pete Becker (editor)
- o Lawrence Crowl (backup)
- o Tom Plum (former backup, until 2006)
- JTC1.22.14882:2014, Programming Language C++:

  - o Stefanus Du Toit (editor)
  - o Lawrence Crowl (backup)
- JTC1.22.14882:2017, Programming Language C++:

  - o Richard Smith (editor)
  - o Thomas Köppe (backup)
- JTC1.22.14882:2020, Programming Language C++:

  - o Richard Smith (editor)
  - o Thomas Köppe (backup)
- JTC1.22.18015, Technical Report on C++ Performance

  - o Lois Goldthwaite (editor)
  - o Detlef Vollmann (backup)
  - o Martin O'Riordan (former editor, until 2003)
- JTC1.22.18822: File System Library

  - o Beman Dawes (editor)
  - o Stefanus Du Toit (backup)
- JTC1.22.19217: Concepts

  - o Andrew Sutton (editor)
- JTC1.22.19568: Library Fundamentals

  - o Thomas Köppe (editor)
  - o Jeffrey Yasskin (backup)
- JTC1.22.19570: Parallelism

  - o Jared Hoberock (editor)
- JTC1.22.19768, Technical Report on C++ Library Extensions

  - o Matt Austern (editor)
  - o Pete Becker (backup)
- JTC1.22.21544: Modules

  - o Gabriel Dos Reis (editor)
- JTC1.22.23619: Reflection

  - o David Sankel (editor)
- JTC1.22.24733, Technical Report on Extensions to Support Decimal Floating Point Arithmetic

  - o Robert Klarer (editor)
  - o Pete Becker (backup)
- JTC1.22.29124 Programming Language C++ - Special Math Functions

  - o Walter Brown (editor)

- o   Pete Becker (backup)
- JTC1.22.19216: Networking

  - o   Jonathan Wakely (editor)
- JTC1.22.19571: Concurrency

  - o   Michael Wong (editor)
- JTC1.22.21425: Ranges

  - o   Casey Carter (editor)

Cancelled projects:

- JTC1.22.19569: Arrays

  - o   Lawrence Crowl (editor)
- JTC1.22.24737, Technical Report on C++ Library Extensions

  - o   Matt Austern (editor)
  - o   Pete Becker (backup)

## 4.3. ELECTRONIC DOCUMENT DISTRIBUTION

WG21 has conducted much of its detailed technical discussion using the email lists provided by the Standard C++ Foundation via [isocpp.org](http://isocpp.org).

WG21 uses a secure wiki maintained by Edison Design Group. This secure wiki is used for quick exchange of documents during and between meetings.

WG21 is now providing all the appropriate committee documents electronically, eliminating the need for paper mailings.

## 4.4. RECENT MEETINGS

See [isocpp.org/std/meetings-and-participation/upcoming-meetings](http://isocpp.org/std/meetings-and-participation/upcoming-meetings) for a list of recent and future meetings.