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SC 22 Business Plan 2020

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Description

This document is circulated for review and consideration at the November 2020 JTC 1 virtual Plenary

Business Plan for JTC 1/SC 22

Programming languages, their environments and system software interfaces

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1.0 Executive Summary

SC 22 continues to operate well. While some WGs' membership and marketplace relevance are in decline, other WG memberships are on the increase. All are operating in a manner appropriate to their needs.

WGs continue to monitor and to consider support for new[er] technologies, such as concurrency, multi-core parallelism (homogeneous and heterogeneous), high-performance computing, and object-oriented and other methodologies, while taking into account educatability and error avoidance.

SC 22 holds its Plenary on an annual basis, typically several weeks prior to the November JTC 1 plenary. Between plenaries, formal business is carried out via letter ballots, and informal business is carried out via teleconferences and an email list. All committee documents are posted on ISO Documents. At most, two WGs meet in conjunction with the plenary.

2.0 CHAIRMAN'S REMARKS

2.1 Market Requirements, Innovation

The classic programming languages, for which SC 22 is well known, remain popular with major development work going on in Fortran, Ada, C, and C++. Interest continues in the WG documenting vulnerabilities of various programming languages. Operating system work is also progressing, in Linux and POSIX.

Newer languages tend to develop their standards using an open-source model, with both the work-in-progress and the final product publicly available for free on Github or similar sites. The ISO/IEC business model precludes this. Consequently, it remains difficult to attract new languages. For example, during the reporting period, members of SC 22 have held discussions with the developers of the Rust and Swift language standards, both of which stated they would never consider becoming an ISO/IEC standard, because they would lose the openness expected by their communities.

2.2 Accomplishments

This varies widely from one WG to another, from little activity besides DR processing in some, to high activity in others.

2.3 Resources

The C and C++ language WGs continue to have high participation, both in the number of members and NBs. The same is true for the WG documenting vulnerabilities of various programming languages. Participation in the other active WGs ranges from barely adequate to good.

2.4 Competition and Cooperation

None of SC 22's projects have direct competition, and most WGs have active liaisons with related groups in their respective industries.

2.5 Issues to bring to JTC 1's Attention

None at this time

3.0 Working Groups

3.1 WG 4 — COBOL

Development and maintenance of ISO/IEC Standards and Technical Reports related to programming language COBOL.

COBOL remains one of the widely-used programming languages for both new development and enhancement of existing applications.

3.1.1 WG 4 Accomplishments

- Continued work on a four-year revision of the language standard. A nine-month extension has been granted (see section 3.1.3).

3.1.2 WG 4 Deliverables

- 2020-07 ISO/IEC CD.2 1989 - COBOL
- 2021-01 ISO/IEC DIS 1989 - COBOL

3.1.3 WG 4 Risks, Opportunities, and Issues

- Further decline in resources. Most of the personnel for the technical work has retired. The U.S. COBOL Committee, INCITS PL22.4, which did much of the technical work, was disbanded.
- The former editor of ISO/IEC 1989 unfortunately passed away. The committee had to redo a substantial amount of editing work.
- This group works best face-to-face, and their schedule has been impacted by COVID-19.

3.2 WG 5 — Fortran

The development and maintenance of ISO/IEC Fortran programming language standards.

Fortran is the language of choice for much scientific, engineering, and economic programming, particularly for very large programs that have evolved over many years.

3.2.1 WG 5 Accomplishments

- Working on a three-year revision of ISO/IEC 1539-1 - Fortran.

3.2.2 WG 5 Deliverables

- 2023-09 ISO/IEC 1539-1 - Fortran

3.2.3 WG 5 Risks, Opportunities, and Issues

- Adapting to COVID-19 has resulted in one meeting being canceled, and a resulting delay in development. Insufficient notice regarding the ISO measures has also made planning more difficult.

3.3 WG 9 — Ada

Development and coordination of ISO standards and Technical Reports for Programming Language Ada. Ada is the language of choice for important parts of the real-time, embedded systems community as well as aerospace and defense segments. For example, all the on-board (embedded) software in the Cassini spacecraft, orbiting Saturn since 2004, is written in Ada. Ada is also being used in other market segments, such as railway and banking.

3.3.1 WG 9 Accomplishments

- Developed the bulk of the draft revision of ISO/IEC 8652, the Ada standard.
- Updated draft TR 24718, Guide for the Use of Ravenscar Profile in High Integrity Systems.
- Worked with WG 23 to produce ISO/IEC TR 24772-2:2020 Part 2: Ada.
- Worked on Defect Reports on ISO/IEC 8652.

3.3.2 WG 9 Deliverables

- Continue to address Ada Defect Reports.
- Complete the draft standard review/prototyping effort.
- Move WG 9 materials from their former IEEE home to ISO Documents.

3.3.3 WG 9 Risks, Opportunities, and Issues

- Possible delays if unexpected technical comments are received during ballot.
- Several members are approaching retirement.
- Some compiler vendors are slow to update core language changes.

3.4 WG 14 — C

Development and maintenance of ISO/IEC Standards related to the programming language C.

3.4.1 WG 14 Accomplishments

- Processed requests for interpretation of 9899:2011 and TS 18661 parts 1-5.
- Has a study group to investigate incorporating TS 18661 into a future edition of the C standard, and investigate updating TS 18661 to the 2019 IEEE floating-point standard.
- Has a study group to investigate updating TS 17961 based on community feedback.
- Has a study group to investigate possible adjustments to the C memory object model.

3.4.2 WG 14 Deliverables

- 2023-08 Revision of ISO/IEC 9899 - Programming Language C.
- 2023-10 (expected) Technical Specification on Pointer Provenance.

3.4.3 WG 14 Risks, Opportunities, and Issues

- The WG has adapted well to virtual meetings. However, virtual meetings have less time

available, so the group now has four virtual meetings per year instead of two physical meetings, putting extra pressure on scheduling. Having the ISO measures extended only one month at a time also makes planning more difficult.

- Undocumented rules being introduced during document editing.

3.5 WG 17 — Prolog

Development and maintenance of ISO/IEC standards related to programming language Prolog.

Prolog is a niche language. It is used extensively by a small number of users mainly for applications in configuration, web and CGI generation, constraint handling and natural language. It is taught in a significant number of universities.

3.5.1 WG 17 Accomplishments

- Worked on a TR on Definite Clause Grammars (DCGs).

3.5.2 WG 17 Deliverables

- Complete the TR on DCGs.

3.5.3 WG 17 Risks, Opportunities, and Issues

- The group is small and the health situation has made work more difficult.

3.6 WG 21 — C++

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

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

Although C++ has long been a consistently popular language, since 2011 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.

This new cycle of industry investment in C++ includes, but is not limited to, investment in:

1) tools, such as the advent of a new major C++ implementation in the Clang compiler and other major new products actively competing to fully implement the latest ISO C++ standard;
2) organization, with the establishment of the Standard C++ Foundation trade association in 2012 (see isocpp.org/about);
3) standardization participation, so that meeting attendance is regularly over 250 experts organized into over 20 active subgroups -- this includes 16 active domain-specific subgroups (e.g., transactional memory, graphics, gaming) that were established since 2012 and have drawn domain experts who did not previously participate in C++ standardization; and

4) faster and more predictable standardization output, with regular releases of the standard every three years along with many concurrent Technical Specifications (13 completed and published from 2014 to 2018).

3.6.1 WG 21 Accomplishments

Work is underway on the following:

- Published JTC1.22.19570: C++ Extensions for Parallelism, 2nd edition.
- JTC1.22.23619: C++ Extensions for Reflection - technical work complete, pending publication.

3.6.2 WG 21 Deliverables

- Working on the next revision of JTC1.22.14882 (IS C++) and progressing other projects as noted.

3.6.3 WG 21 Risks, Opportunities, and Issues

- COVID-19 makes meeting planning for such a large group quite difficult. The ISO measures are not planned far enough ahead to provide reasonable notice for cancellation of such large meetings.
- The WG has divided up into smaller meetings to cope with the need for virtual participation.

3.7 WG 23 — Programming Language Vulnerabilities

Development and maintenance of a TR series regarding “Guidance to Avoiding Vulnerabilities in Programming Languages through Language Selection and Use”

The marketplace demands robust, secure software. Vulnerabilities are the antithesis of robust, secure software. Many of the attacks on software-based systems succeed because the computer language used did not prevent the attack vector, and did not warn the developer that the code being produced contained flaws that could be used to generate attacks.

3.7.1 WG 23 Accomplishments

- Published TR 24772-1, -2, and -3, 3rd Edition.
- Worked on the various other Parts of TR 24772, 3rd edition.

3.7.2 WG 23 Deliverables

- TS 24772-1, -2, and -3 are in the publication process.
- TS 24772 Parts for Python, SPARK, C++, and Java.

3.7.3 WG 23 Risks, Opportunities and Issues

- Some Parts require resources within other working groups or external experts to undertake the work.
- The WG had already become skilled at using hybrid physical/virtual meetings to progress its work, so it adapted readily to COVID-19 restrictions.

3.8 WG 24 — Linux

Development and maintenance of ISO/IEC standards related to the Linux operating system

Linux is the primary operating system in several major categories, from embedded systems to supercomputers.

3.8.1 WG 24 Accomplishments

- Created the Committee Draft for the last of the 20 documents in the ISO/IEC 23360 series, Linux.
- Successful DIS ballot for the other 19 documents.

3.8.2 WG 24 Deliverables

- Continue work on the 23360 series.

3.8.3 WG 24 Risks, Opportunities, and Issues

- Issues to be resolved with ISO CS regarding final editing of the documents for publication.