Accellera SystemC Standards Update

December 2023
Accellera Systems Initiative

accellera.org
Outline

• Accellera Systems Initiative & Working Groups
• SystemC ecosystem
• SystemC Working Groups updates
• Public Repositories
• systemc.org updates
• How to join us
Accellera Systems Initiative

<table>
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<th>Our Mission</th>
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<tr>
<td>To provide a platform in which the electronics industry can collaborate to innovate and deliver global standards that improve design and verification productivity for electronics products.</td>
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Accellera Working Groups

Verification-centric Working Groups
- Portable Stimulus
- Multi-Language
- SV-AMS
- UVM
- UVM-AMS

SystemC Working Groups
- Language
  - DT
  - CPS
- AMS
- CCI
- Verification
- Synthesis

Working Groups in other domains
- Functional Safety
- IP-XACT
- CDC / RDC
- FSS PWG
  - NEW
SystemC ecosystem

- SystemC is a C++-based language standard, widely used for
  - System-level modeling, design and verification
  - Architectural exploration, performance modeling
  - Analog/mixed signal modeling
  - High-level Synthesis
  - Software development
- Released as IEEE standards
  - IEEE Std. 1666-2023 (SystemC)
  - IEEE Std. 1666.1-2016 (SystemC AMS)

More information: [https://systemc.org/](https://systemc.org/)

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Accellera SystemC Working Groups

• SystemC Language Working Group (LWG)
  – Chair: Laurent Maillet-Contoz (ST)
  – Subgroups
    • Common Practices (SCP): Chair: Mark Burton (Qualcomm)
    • SystemC Datatypes (DT), Chair: Frederic Doucet (Qualcomm)

• SystemC Analog/Mixed-Signal Working Group (AMSWG)
  – Chair: Martin Barnasconi (NXP)

• SystemC Configuration, Control & Inspection Working Group (CCIWG)
  – Chair: Lukas Jünger (MachineWare)

• SystemC Synthesis Working Group (SWG)
  – Chair: Mike Meredith (Cadence) - acting

• SystemC Verification Working Group (VWG)
  – Chair: Stephan Gerth (Bosch)
SystemC Language Working Group

• SystemC Language Reference Manual released as IEEE Std. 1666-2023
  – Free download under the Get IEEE Program thanks to Accellera sponsorship:
    https://ieeexplore.ieee.org/document/10246125
• SystemC 3.0.0 public review version to be released soon
  – Fully compliant with IEEE Std. 1666-2023
  – Will be made available via Accellera public repository on GitHub:
    https://github.com/accellera-official/systemc/tags
  – Final version of 3.0.0 expected later this year.
• Next steps
  – Integrate SystemC tests into main SystemC repository.
  – Establishing CI/CD flow in the Accellera public repository on GitHub
  – Start collecting inputs and requirements for next standardization cycle
LWG - SystemC Common Practices Working Group

- Recent discussions focusing on addressing limitations in reporting and logging capabilities in the SystemC core language
- Different proposals available for review
  - Presented in September Fika and SystemC Evolution Day
  - Improvements considered for next standardization round
- This is a public repository, so the community is encouraged to submit proposals
  - [https://github.com/accellera-official/systemc-common-practices](https://github.com/accellera-official/systemc-common-practices)

More information: [https://systemc.org/overview/systemc-scp/](https://systemc.org/overview/systemc-scp/)
LWG - Data types Working Group

• Multi-year effort completed to address the simulation performance improvements of SystemC data types
  – Resolving many issues found in data type implementation of sc_bigint, sc_biguint, sc_signed, sc_unsigned, sc_fixed, and sc_ufixed
  – All improvements are implementation-specific, no change to the language standard / API
  – These updates are integral part of SystemC 3.0.0 public review release
• A detailed technical presentation on this data type refactoring will be shared in an upcoming SystemC Fika Event
• Special Thanks to Andy Goodrich and Fred Doucet to make this happen!
SystemC Analog/Mixed-Signal (AMS) WG

- SystemC AMS regression suite released
  - Covering more than 700 tests, covering unit-level tests, application-level tests and examples

- Developing extensions and enhancements as preparation for the next IEEE update (~2026)
  - Analog solver API
  - Converter primitives between LSF and ELN MoC
  - Interactive tracing and debug interface, tracing customization
  - Analog event detection
  - ...

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<tr>
<th>Methodology- and Technology-specific Libraries</th>
<th>SystemC Analog/Mixed-Signal (AMS) Language</th>
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<tr>
<td>Application</td>
<td>Written by the End User</td>
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<td>SystemC Core Language</td>
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<td>IEEE Std. 1666-2011</td>
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<td>Programming Language C++</td>
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<td>ISO/IEC Std. 14882-2003</td>
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<td>IEEE Std. 1666.1-2016</td>
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<td>Linear DAE Solver</td>
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<td>Time-domain and small-signal frequency-domain simulation infrastructure</td>
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More information
[https://systemc.org/overview/systemc-ams/](https://systemc.org/overview/systemc-ams/)
SystemC Configuration, Control & Inspection WG

• CCI 1.0.1 reference implementation released
  – [https://github.com/accellera-official/cci/releases/tag/v1.0.1](https://github.com/accellera-official/cci/releases/tag/v1.0.1)
  – Improved build infra (automake, cmake, msvc)
  – Established basic CI/CD flow
  – Documentation updates for examples

• Proposal available for Register / Memory Inspection API
  – Ongoing discussion on implementation strategy – topic later today!

More information [https://systemc.org/overview/systemc-cci/](https://systemc.org/overview/systemc-cci/)
SystemC Synthesis WG

• SystemC Synthesis Working Group is restarting its standardization alignments
  – Mike Meredith is coordinating this effort

• Considered activities by the team (not finalized / prioritized list)
  – Next revision of the SystemC Synthesizable Subset
  – Discuss latest technologies and developments in HLS flow/tools and opportunities for standardization

• Sign-up to the Synthesis WG if you are interested to participate and contribute!
SystemC Verification Working Group

• UVM-SystemC library 1.0beta5 was released early this year
  – Various bugfixes and enhancements to uvm_sequencer classes

• The class libraries for Functional Coverage (FC4SC) and Constrained Randomization (CRAVE) are now available via the Accellera public repositories
  – https://github.com/accellera-official/fc4sc
  – https://github.com/accellera-official/crave

• Current focus on supporting SystemC 3.0.0

More information
https://systemc.org/overview/systemc-verification/
Accellera Public Repositories

- The number of Accellera Public Repositories is growing!
- More information: https://github.com/accellera-official/
systemc.org Updates

• New content added
  – SystemC overview pages covering all Working Groups
  – SystemC Evolution Day Events and Fikas: all presentations and videos
  – Open Access Publications
  – Libraries and Projects
• **YOU** can help in adding content!
  – Submit your pull request to [github.com/accellera-official/systemc.org](http://github.com/accellera-official/systemc.org)
How to join us

• Become an Accellera Working Group member
  – Join Accellera and participate in the Accellera working groups
  – Direct access to the latest standardization proposals and development implementations

• Become a member of the IEEE Standards Association
  – Join IEEE-SA to participate in the IEEE P1666 (SystemC) working group

• Share your experiences
  – Visit www.accellera.org and join the community forums at forums.accellera.org
  – Report your issues and/or create pull requests on the public SystemC GitHub repository

• Help us to grow the SystemC ecosystem and community
  – Participate in community events such as the SystemC Evolution Day and Fika
  – Contribute to the SystemC Community Portal systemc.org
  – Promote the use of the SystemC standard in complex system simulation tasks
Thank You

Q&A