Accellera SystemC Standards Update

SystemC Evolution Day 2023

Martin Barnasconi

Accellera Technical Committee Chair

accellera.org

accellera SYSTEMS INITIATIVE™

SYSTEMC™ EVOLUTION DAY

NOV 16, 2023 | MUNICH | GERMANY

Outline

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

© Accellera Systems Initiative

Accellera Systems Initiative

Our Mission

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.

© Accellera Systems Initiative

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)

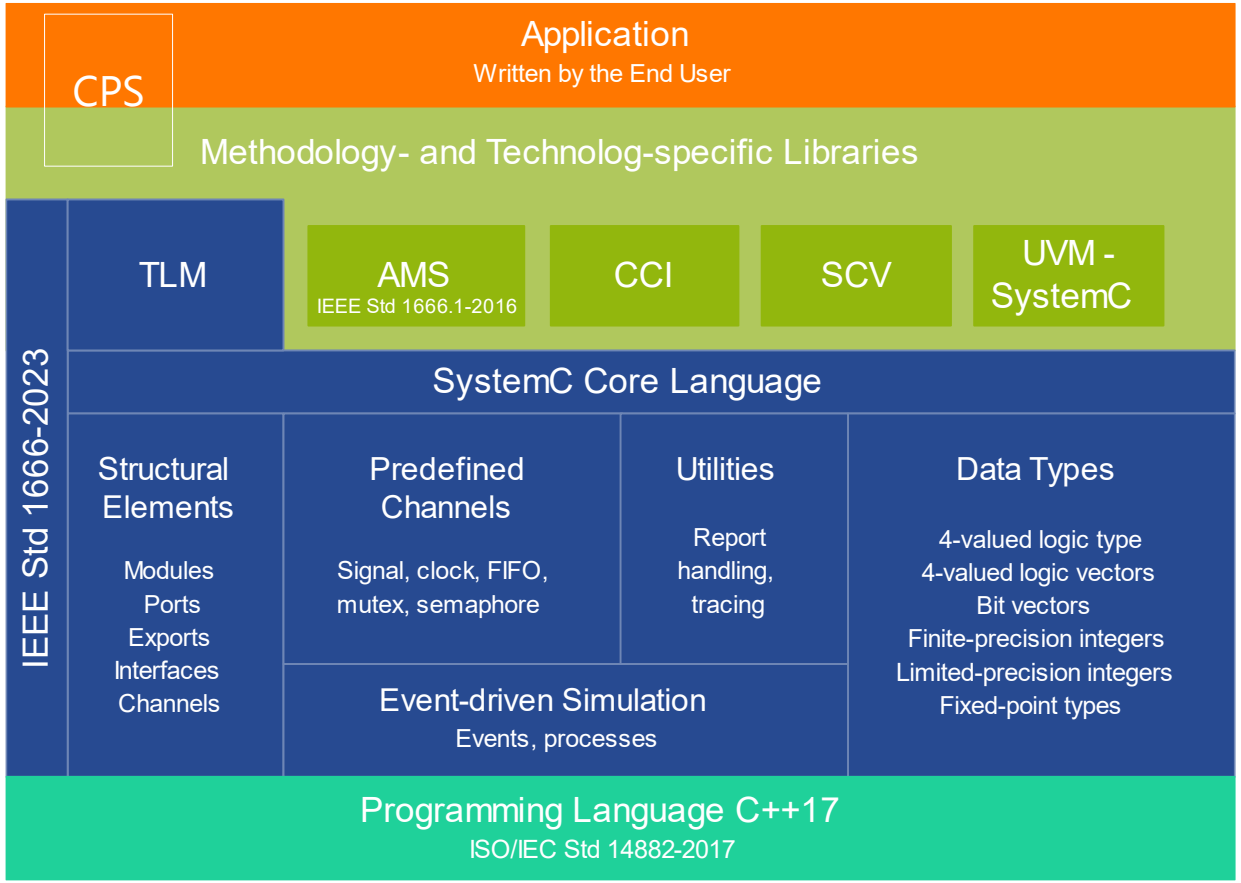
accellera SYSTEMS INITIATIVE™

© Accellera Systems Initiative

SYSTEMC™ EVOLUTION DAY
NOV 16, 2023 | MUNICH | GERMANY

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/

© Accellera Systems Initiative

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)

© Accellera Systems Initiative

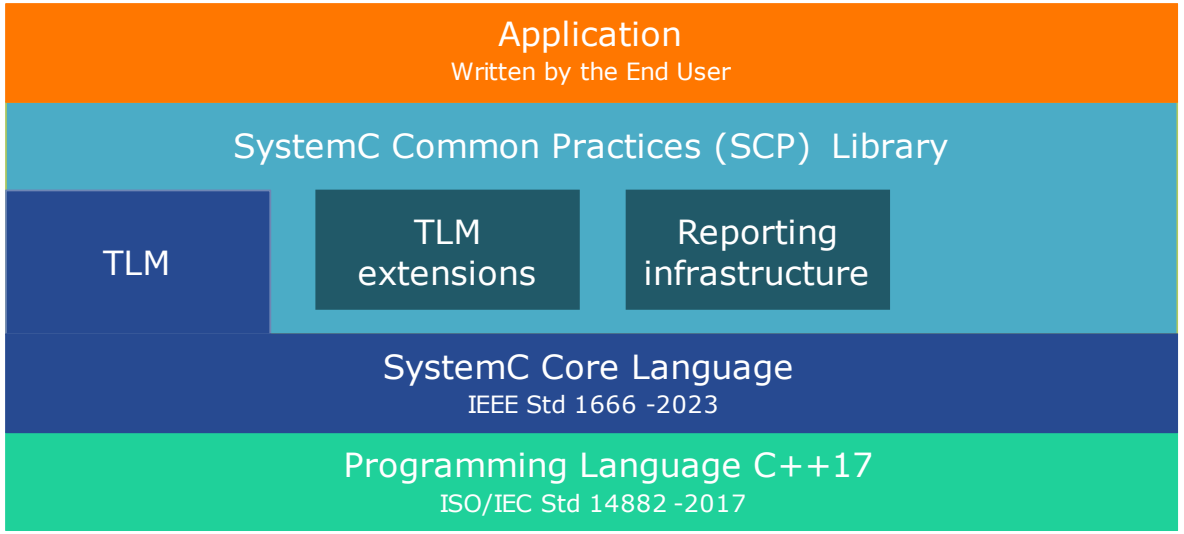
SystemC Language Working Group

- 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

© Accellera Systems Initiative

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 today
  - 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



More information: https://systemc.org/overview/systemc-scp/

© Accellera Systems Initiative

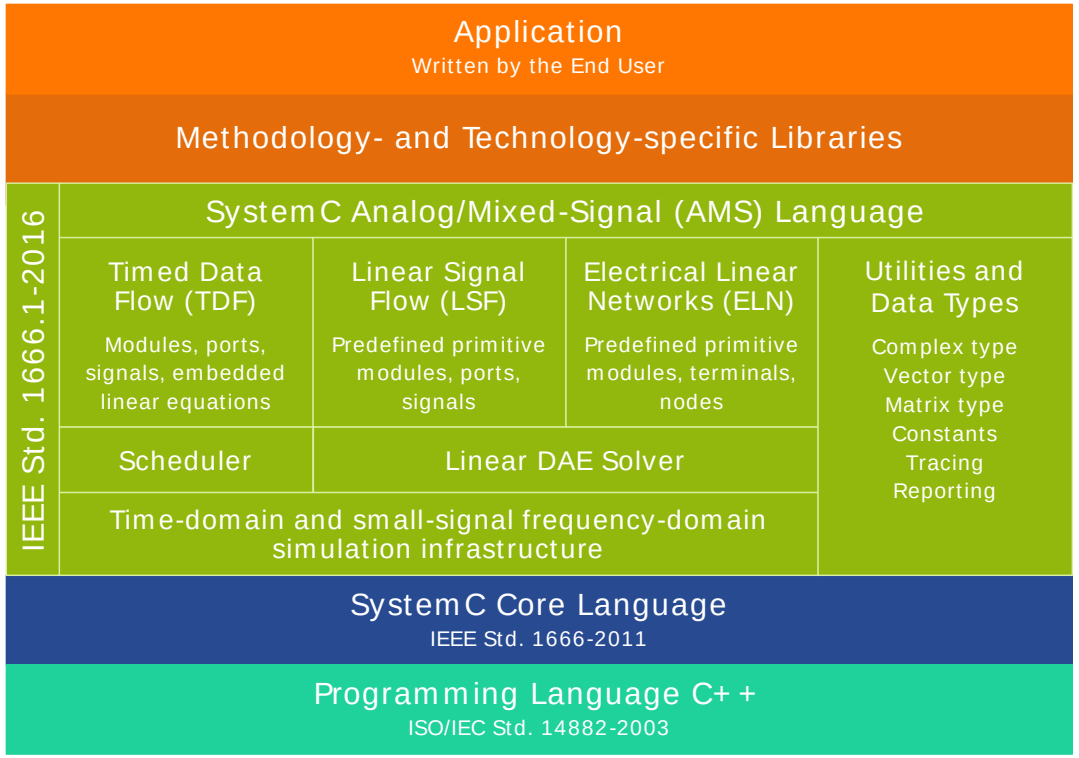
LWG - Data types Working Group

- 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!

© Accellera Systems Initiative

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
  - https://www.accellera.org/images/downloads/standards/systemc/systemc-ams-regressions-1.0.0.tar.gz
- 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
  - …

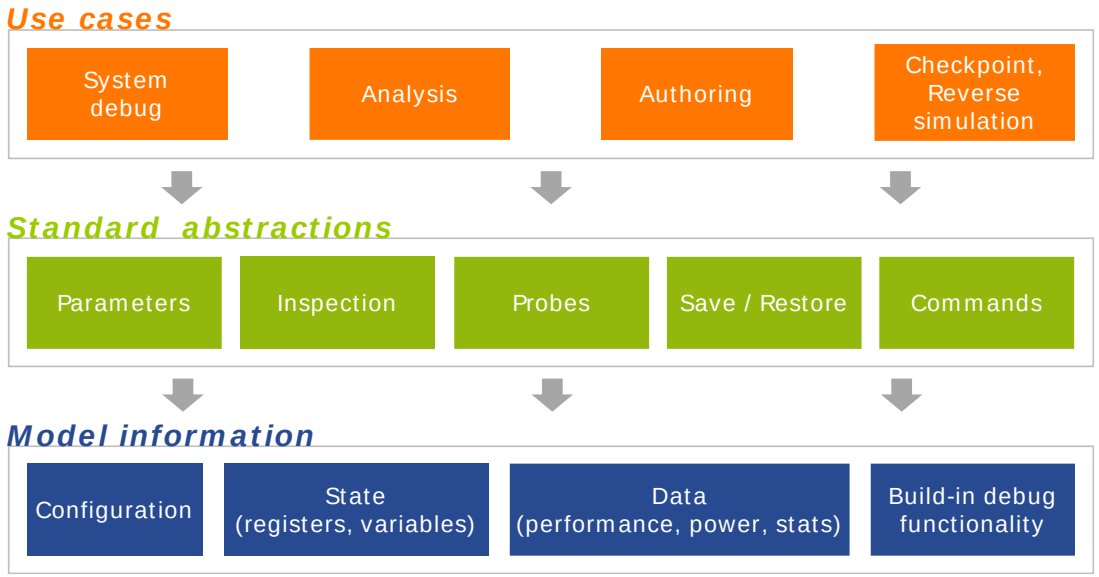


More information
https://systemc.org/overview/systemc-ams/

© Accellera Systems Initiative

SystemC Configuration, Control & Inspection WG

- CCI 1.0.1 reference implementation released
  - 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/

© Accellera Systems Initiative

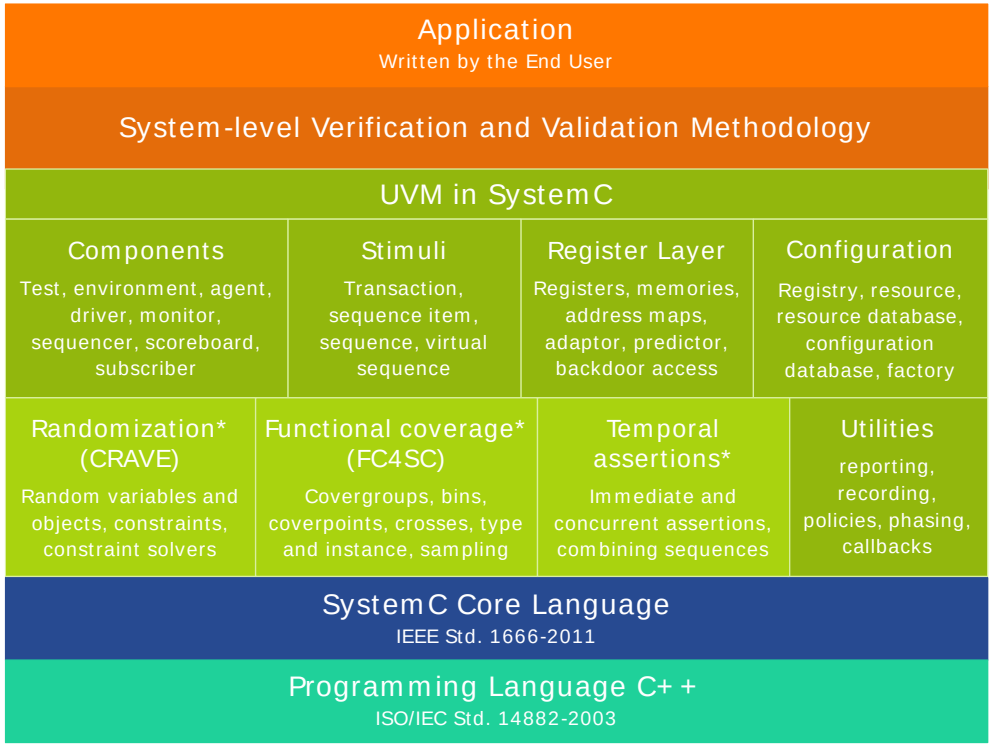
SystemC Synthesis WG

- SystemC Synthesis Working Group is restarting its standardization alignments
  - Mike Meredith is coordinating this effort
- Considered activities by the team (not finalized / prioritized list)
  - Study impact/benefits of SystemC IEEE Std. 1666-2023 and its C++17 baseline on the Synthesis Subset Language Reference Manual
  - 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!

© Accellera Systems Initiative

SystemC Verification Working Group

- UVM-SystemC library 1.0beta5 was released early this year
  - https://www.accellera.org/images/downloads/drafts-review/uvm-systemc-1.0-beta5.tar.gz
  - 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



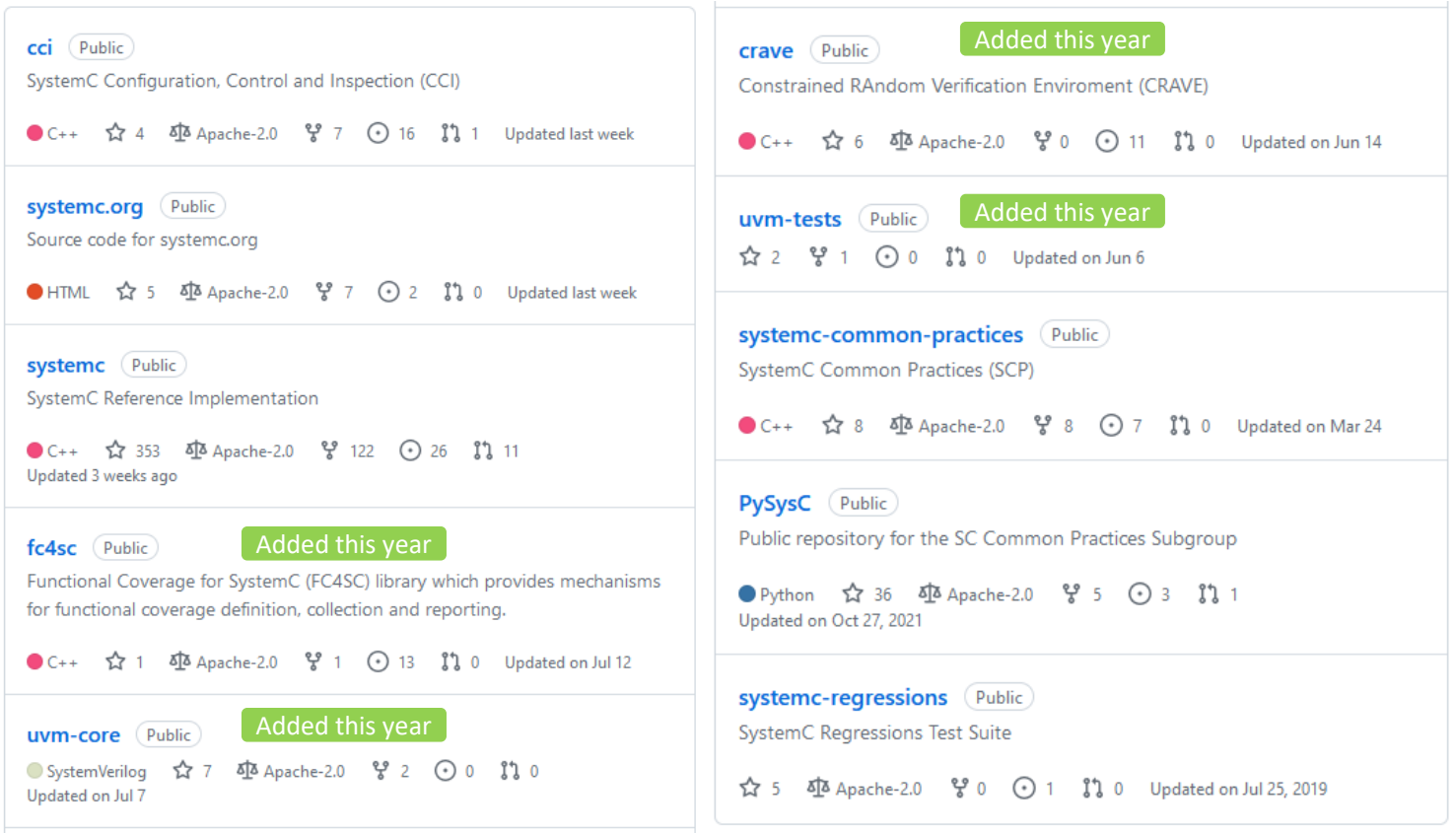
* Integration on Roadmap

More information
https://systemc.org/overview/systemc-verification/

© Accellera Systems Initiative

Accellera Public Repositories

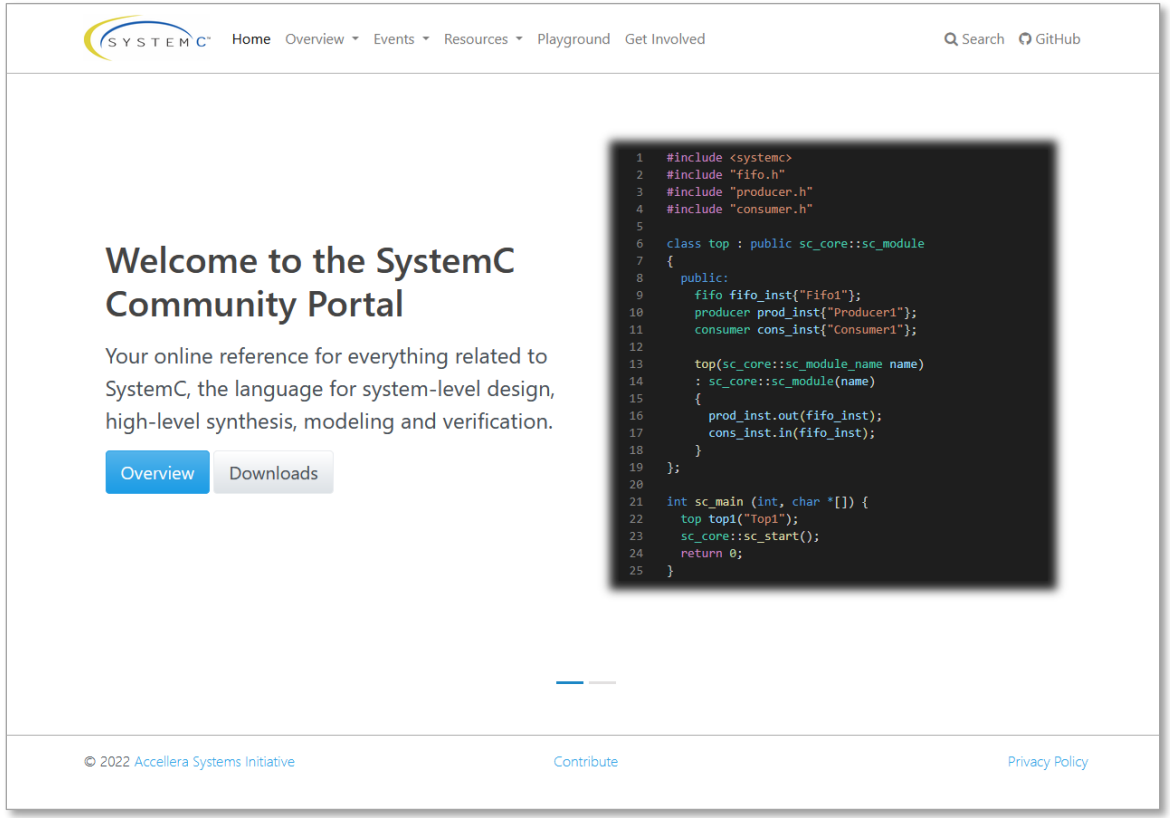
- The number of Accellera Public Repositories is growing!
- More information: https://github.com/accellera-official/



© Accellera Systems Initiative

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



© Accellera Systems Initiative

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

© Accellera Systems Initiative

Thank You

Q&A