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Behavioural languages –
Part 8: Standard SystemC® Analog/Mixed-Signal Extensions Language Reference Manual

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IEEE Std 1666.1™-2016

IEEE Standard for Standard SystemC® Analog/Mixed-Signal Extensions Language Reference Manual

Sponsor

Design Automation Standards Committee
of the
IEEE Computer Society

Approved 29 January 2016

IEEE-SA Standards Board

Abstract: The SystemC® Analog/Mixed-Signal (AMS) extensions are defined in this standard. SystemC AMS is an ANSI standard C++ class library for electronic system-level design and modeling for use by system architects and engineers who need to address complex heterogeneous systems that are a hybrid between analog, digital and software components. This standard provides a precise and complete definition of the SystemC AMS class library so that a SystemC AMS implementation can be developed with reference to this standard alone. The primary audiences for this standard are the implementors of the SystemC AMS class library, the implementors of tools supporting the class library, and the users of the class library.

Keywords: analog mixed signal, behavioral modeling, C++, computer languages, data flow simulation, digital systems, discrete event simulation, electronic design automation, electronic system level, electronic systems, electrical networks, hardware description language, hardware design, hardware verification, IEEE 1666™, IEEE 1666.1™, mixed-signal modeling, SystemC, SystemC AMS, signal flow modeling, system modeling, system-on-chip

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Introduction

This introduction is not part of IEEE Std 1666.1™-2016, IEEE Standard for Standard SystemC® Analog/Mixed-Signal Extensions Language Reference Manual.

This document defines the SystemC Analog/Mixed-Signal (AMS) extensions, which is a C++ class library.

As the electronics industry builds more complex heterogeneous systems involving large numbers of components including analog, digital and software, there is an increasing need for a modeling language that can manage the complexity, heterogeneity, and size of these systems. SystemC AMS provides a mechanism for managing this complexity with its facility for modeling hardware and software together at multiple levels of abstraction. This capability is not available in traditional hardware description languages.

Stakeholders in SystemC AMS include Electronic Design Automation (EDA) companies who implement SystemC AMS class libraries and tools, integrated circuit (IC) suppliers who extend those class libraries and use SystemC AMS to model their intellectual property, and end users who use SystemC AMS to model their systems.

This standard is not intended to serve as a user's guide or to provide an introduction to SystemC AMS. Readers requiring a SystemC AMS tutorial or information on the intended use of SystemC AMS should consult the Accellera Systems Initiative Web site (http://www.accellera.org) to locate the supplemental material and training classes available.

IEEE Standard for Standard SystemC® Analog/Mixed-Signal Extensions Language Reference Manual

1. Overview

1.1 Scope

This standard defines the Analog/Mixed-Signal extensions for SystemC®[1], as an ANSI standard C++ class library based on SystemC for system and hardware design including analog/mixed-signal elements.

1.2 Purpose

The general purpose of the SystemC AMS extensions is to provide a C++ standard for designers and architects, who need to address complex heterogeneous systems that are a hybrid between hardware and software. This standard is built on the IEEE Std 1666™-2011[2] (SystemC Language Reference Manual) and extends it to create analog/mixed-signal, multi-disciplinary models to simulate continuous-time, discrete-time, and discrete-event behavior simultaneously.

The specific purpose of this standard is to provide a precise and complete definition of the AMS class library, so that a SystemC AMS implementation can be developed with reference to this standard alone. This standard is neither intended to serve as a user's guide nor to provide an introduction to AMS extensions in SystemC, but does contain useful information for end users.

[1] SystemC® is a registered trademark of the Accellera Systems Initiative.
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