SystemC – Data Types (06A)

SystemC

Young Won Lim
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Please send corrections (or suggestions) to youngwlim@hotmail.com.

This document was produced by using OpenOffice and Octave.

Based on the following original work

[1]   Aleksandar Milenkovic, 2002
        CPE 626 The SystemC Language – VHDL, Verilog Designer's Guide
        http://www.ece.uah.edu/~milenka/ce626-02S/lectures/cpe626-SystemC-L2.ppt

[2]   Alexander de Graaf, EEMCS/ME/CAS, 2010
        SystemC: an overview ET 4351
        ens.ewi.tudelft.nl/Education/courses/et4351/SystemC-2010v1.pdf

[3]   Joachim Gerlach, 2001
        System-on-Chip Design with Systent of Computer Engineering
        http://www2.cs.uni-paderborn.de/cs/ag-hardt/Forschung/Data/SystemC-Tutorial.pdf

[4]   Martino Ruggiero, 2008
        SystemC
        polimage.polito.it/~lavagno/codes/SystemC_Lezione.pdf

[5]   Deepak Kumar Tal, 1998-2012
        SystemC Tutorial
        http://www.asic-world.com/systemc/index.html

SystemC Data Types

Type	Description
sc_logic	Simple bit with 4 values(0/1/X/Z)
sc_int	Signed Integer from 1-64 bits
sc_uint	Unsigned Integer from 1-64 bits
sc_bigint	Arbitrary size signed integer
sc_biguint	Arbitrary size unsigned integer
sc_bv	Arbitrary size 2-values vector
sc_lv	Arbitrary size 4-values vector
sc_fixed	templated signed fixed point
sc_ufixed	templated unsigned fixed point
sc_fix	untemplated signed fixed point
sc_ufix	untemplated unsigned fixed point

Examples

- **bool** *2 value single bit type [0 or 1]*
  bool A, B;
  sc_in<bool > input
;
- **sc_logic** *4 value single bit type [0, 1, X or Z]*
  sc_logic C, D;
  sc_out<sc_logic > E;

- **sc_int** *[1 to 64]-bit signed integer type*
  sc_int<16> x, y;
  sc_out<sc_int<16> > z;

- **sc_time** *time (units: SC_PS, SC_NS, SC_MS etc.)*
  sc_time t1(10, SC_NS)

Fast Fixed-point Data Types

Arbitrary Precision vs. Simulation Speed

Achieving Faster Speed

- Use double as underlying data type

- Mantissa limited to 53 bits

- Range limited to that of double

Fast Fixed-Point Types

- **sc_fixed_fast**, **sc_ufixed_fast**

- **sc_fix_fast**, **sc_ufix_fast**

Exactly the same declaration format and usage as before

All fixed-point data types, can be mixed freely

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  sc_int<16> x, y;
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- **sc_time** *time (units: SC_PS, SC_NS, SC_MS etc.)*
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References

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