SystemC XOR

FPGAHS Lab - SystemC XOR  
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# Goals

* Get started with SystemC.
* Understand modules, ports, constructors, port mappings, and the basic setup of a SystemC file.
* Run a SystemC binary and see the output.
* Implement an untimed 2-input NAND module in a pre-defined SystemC module.
* Build a new SystemC module that models a 2-input XOR gate based only on 2-input NAND modules.

# Setup

A template code is provided on the GitHub system in the repository:

xor.systemc

Please clone this repository to a working directory. You will find template code for this task and a Makefile there. The files contain the following:

* nand2.h implements the 2-input NAND model.
* exor2.h implements the XOR gate based on 2-input NAND modules.
* stim.h generates the stimuli for the test run.
* mon.h reads the stimuli and the output of the XOR gate and displays the results.
* main.h specifies the executable program that combines all modules to a complete simulation.
* xor.systemc.pro is a project file for QT creator. Open it with: qtcreator xor.systemc.pro &
* Makefile is a pre-defined config file for the make command that holds the settings for building this project (alternative to the QT Creator project file).

# Task Description

1. In nand2.h, you will find a TODO tag where you should place your implementation of the NAND functionality. Please specify only functionally the result of the 2-input NAND there.
2. exor2.h is a template file for placing your 2-input XOR implementation. Please insert a new SystemC module there with Boolean inputs A and B and a Boolean output F. Build your XOR implementation only based on connected instances of the 2-input NAND from nand2.h (no additional logic!).
3. Build your project by execution make on the command line. If successful, run the generated binary by executing ./main. The correct output of your simulation should be:

SystemC 2.3.1-Accellera --- Dec 1 2014 20:17:56

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time A B F

10 ns 0 0 0

20 ns 0 1 1

30 ns 1 0 1

40 ns 1 1 0

Info: /OSCI/SystemC: Simulation stopped by user.

# Questions

* What is the difference between an SC\_METHOD and an SC\_THREAD?
* What is the purpose of the sensitivity list?
* How are SystemC modules instantiated and connected?