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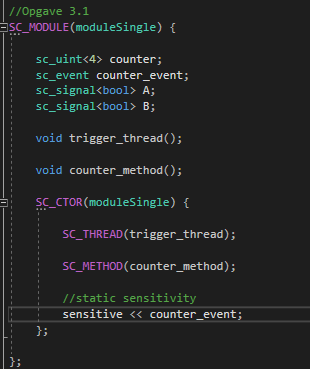
**Embedded Real Time Systems – Assignment 1**

**System level modeling using SystemC**

# Modules, threads, methods and events

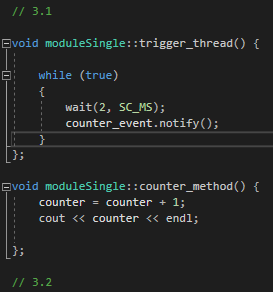
## 3.1:

The module ’moduleSingle’ is created:

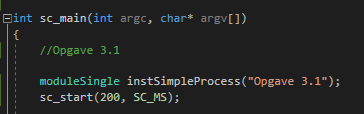


The thread to continuously notify the method, and the method to count, is initialized in the constructor. Static sensitivity is used, so counter\_method() is called everytime the event is raised.

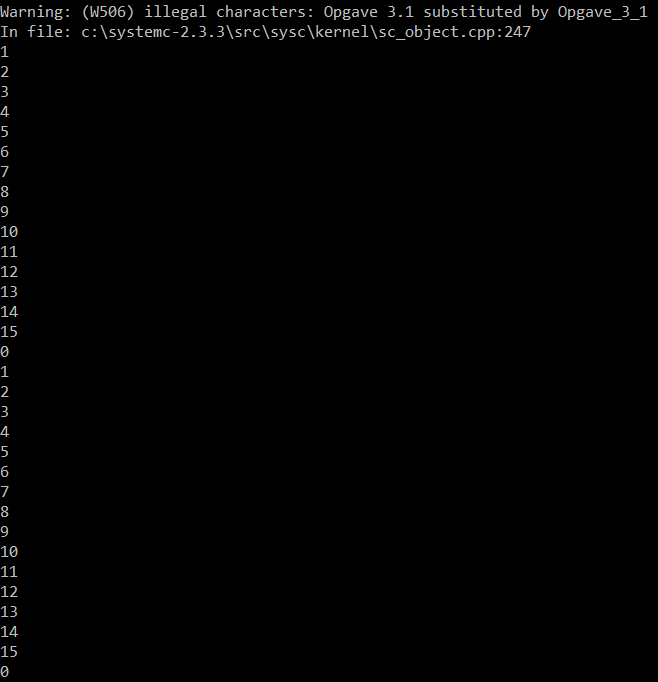
’Trigger\_thread() og ’counter\_method’ looks like this



’Trigger thread’ is an unending loop, calling counter\_event.notify() every other ms. In the main function, the simulation is limited to 200 ms:



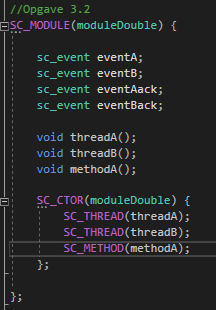
The following is the result:



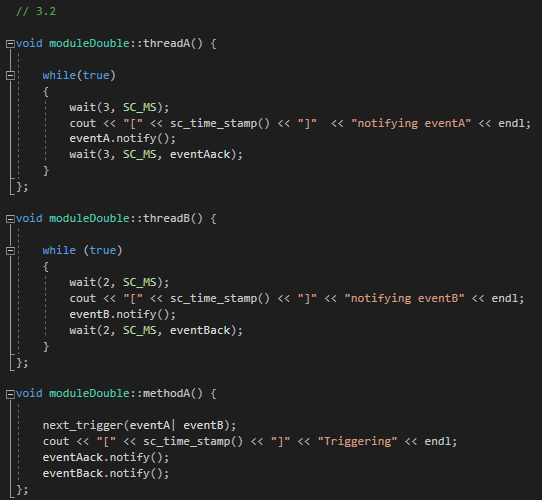
When sc\_uint<4> counter overflows, the program will count from zero again.

## 3.2.

The different threads and events and the method is created:



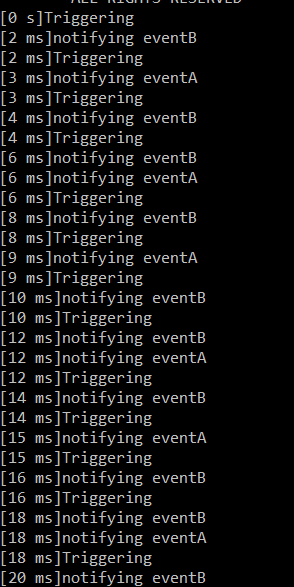
The threads and the method looks like this:



In methodA(), dynamic sensitivity in the form of next\_trigger(eventA | eventB) is used, så the method will be called by if either of the events are called. If the program should work so that methodA knows exactly which event is called, signals would need to be used.

Both event threadA and threadB wait for their event to be called. If no event is called, the thread will timeout and restart. This it done in the wait function by specifying eventAack and eventBack as parameters.

The result looks like this:

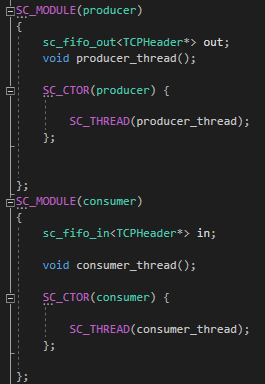


At 6, 12 and 18 ms the events overlap, but eventB is seen to be quickest everytime (because it is called first).

# Channels, signals, hierarchy, communication

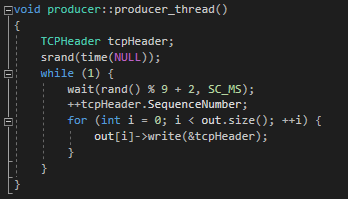
## 3.3

A producer and consumer-thread is created:

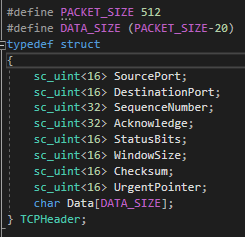


The main object to be used is the sc\_fifo\_in/out, through which data is transferred.

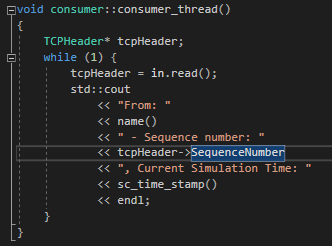
The producer thread is written like this:



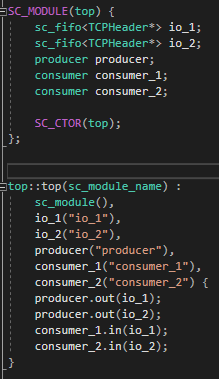
The thread will wait a random amount of time between 2 and 10 ms, increment the sequence-number (the whole TCP segment structure is not used) and write the sequence to the queue. The TCP-struct is defined, but only the sequenceNumber is used to demonstrate the concept:



The consumer-thread read the queues continuously and then writes out the sequenceNumber:



In the top-module, the producer, consumer and fifos are created. More consumers and producers could be added like this, if need be.



## 3.4