Worcester Polytechnic Institute

ECE 5723: Methodologies for System Level Design and Modeling

SystemC Transaction Level Modeling

by

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Laboratory Report

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1. Task

In this problem, system shown in Fig. 1 is to be designed using the TLM2.0 standard. You can base this work on the blocking example done in the lectures. Use the same data and TLM sockets and implementations, except that you have two initiators here, instead of only one. This necessitates the use of an interconnect that you will develop in this problem.

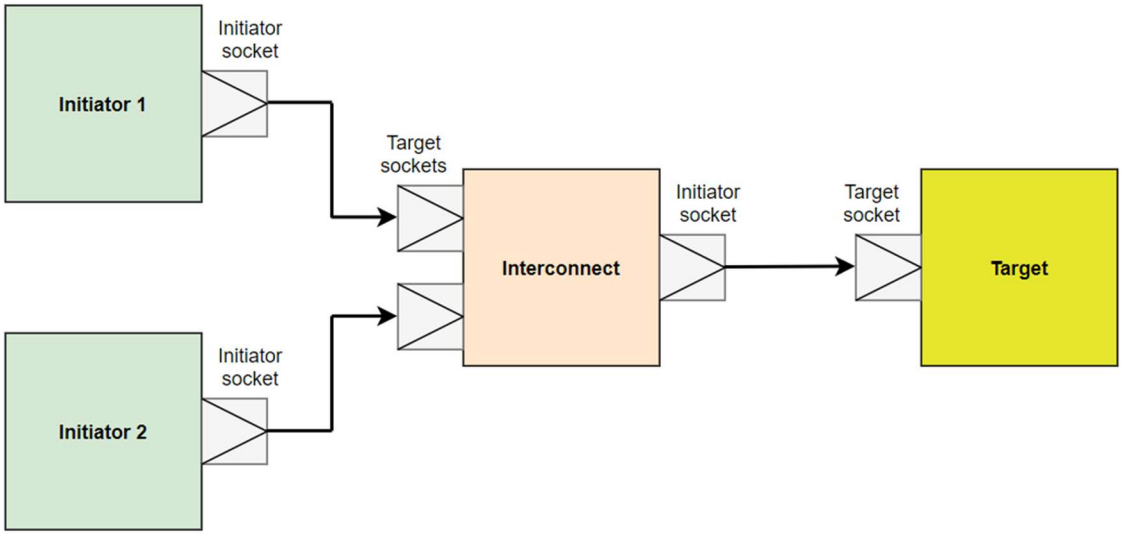

Fig. 1 – Diagram of the system to be designed

You should model two initiator modules wanting to read/write from/to a target (memory) using the *b_transport* interface. For this purpose, the initiators must connect to an interconnect module that internally uses *sc_mutex* for arbitration of the target between the initiators. The interconnect then connects to the target memory.

You can use the SystemC codes of Example 2 in the lectures on the SystemC TLM. The example is: *blockingSocketbasedMemoryRW* in SystemC TLM codes file.

2. Development of the system in SystemC TLM

For implementing the design, a hierarchical project was written in SystemC using TLM2.0 standard.

3. Testing the System

In this chapter, the results of the verification of designed circuit are provided.

```
Interconnect:   at: 9 ns,       passed through Write cmd
Initiator 0:    at: 22 ns,      Writes, Iteration: 0    data:00000101 00000110 00000111 00001000 00001001

Interconnect:   at: 31 ns,      passed through Write cmd
Initiator 1:    at: 44 ns,      Writes, Iteration: 0    data:00000101 00000110 00000111 00001000 00001001

Interconnect:   at: 53 ns,      passed through Write cmd
Initiator 0:    at: 66 ns,      Writes, Iteration: 11   data:00010000 00010001 00010010 00010011 00010100

Interconnect:   at: 75 ns,      passed through Write cmd
Initiator 1:    at: 88 ns,      Writes, Iteration: 11   data:00010000 00010001 00010010 00010011 00010100

Interconnect:   at: 97 ns,      passed through Read cmd
Initiator 0:    at: 110 ns,     Reads,  Iteration: 22   data:00010000 00010001 00010010 00010011 00010100

Interconnect:   at: 119 ns,     passed through Read cmd
Initiator 1:    at: 132 ns,     Reads,  Iteration: 22   data:00010000 00010001 00010010 00010011 00010100

Interconnect:   at: 141 ns,     passed through Read cmd
Initiator 0:    at: 154 ns,     Reads,  Iteration: 33   data:00010000 00010001 00010010 00010011 00010100

Interconnect:   at: 163 ns,     passed through Read cmd
Initiator 1:    at: 176 ns,     Reads,  Iteration: 33   data:00010000 00010001 00010010 00010011 00010100

Interconnect:   at: 185 ns,     passed through Write cmd
Initiator 0:    at: 198 ns,     Writes, Iteration: 44   data:00110001 00110010 00110011 00110100 00110101

Interconnect:   at: 207 ns,     passed through Write cmd
Initiator 1:    at: 220 ns,     Writes, Iteration: 44   data:00110001 00110010 00110011 00110100 00110101

Interconnect:   at: 229 ns,     passed through Read cmd
Initiator 0:    at: 242 ns,     Reads,  Iteration: 55   data:00110001 00110010 00110011 00110100 00110101

Interconnect:   at: 251 ns,     passed through Read cmd
Initiator 1:    at: 264 ns,     Reads,  Iteration: 55   data:00110001 00110010 00110011 00110100 00110101

Interconnect:   at: 273 ns,     passed through Read cmd
Initiator 0:    at: 286 ns,     Reads,  Iteration: 66   data:00110001 00110010 00110011 00110100 00110101

Interconnect:   at: 295 ns,     passed through Read cmd
Initiator 1:    at: 308 ns,     Reads,  Iteration: 66   data:00110001 00110010 00110011 00110100 00110101

Interconnect:   at: 317 ns,     passed through Read cmd
Initiator 0:    at: 330 ns,     Reads,  Iteration: 77   data:00110001 00110010 00110011 00110100 00110101

Interconnect:   at: 339 ns,     passed through Read cmd
Initiator 1:    at: 352 ns,     Reads,  Iteration: 77   data:00110001 00110010 00110011 00110100 00110101

Interconnect:   at: 361 ns,     passed through Read cmd
Initiator 0:    at: 374 ns,     Reads,  Iteration: 88   data:00110001 00110010 00110011 00110100 00110101

Interconnect:   at: 383 ns,     passed through Read cmd
Initiator 1:    at: 396 ns,     Reads,  Iteration: 88   data:00110001 00110010 00110011 00110100 00110101

Interconnect:   at: 405 ns,     passed through Read cmd
Initiator 0:    at: 418 ns,     Reads,  Iteration: 99   data:00110001 00110010 00110011 00110100 00110101

Interconnect:   at: 427 ns,     passed through Read cmd
Initiator 1:    at: 440 ns,     Reads,  Iteration: 99   data:00110001 00110010 00110011 00110100 00110101

Interconnect:   at: 449 ns,     passed through Write cmd
Initiator 0:    at: 462 ns,     Writes, Iteration: 110  data:01110011 01110100 01110101 01110110 01110111

Interconnect:   at: 471 ns,     passed through Write cmd
Initiator 1:    at: 484 ns,     Writes, Iteration: 110  data:01110011 01110100 01110101 01110110 01110111
```

4. Conclusions

In this work, the system (Fig. 1) was designed in SystemC using TLM2.0 (Transaction Level Modeling) standard and tested for 4 scenarios.