COEN-4730 Computer Architecture
HW #7

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1. Objective

To use a network-on-chip (NoC) simulator in order to investigate the performance of a NoC.

2. Network-on-chip (NoC) simulators

While we discussed about NoCs in class, you can read the paper [1] for an additional quick introduction. To investigate the performance of NoCs we'll use NoC simulators, which are very helpful as they provide performance estimations of different NoC topologies, routing strategies, etc. early on – before any physical implementation is available.

In this assignment, you will use one NoC simulator (as assigned on the additional document on D2L). It's one out of the three that we'll all look at. However, there are many more NoC simulators out there. For a somewhat comprehensive list, please see [2].

a) Booksim

One of the most popular NoC simulators is BookSim, which you can download from [3]. Download source code of Booksim 2.0 simulator and install it on your Linux machine. Download also and read its manual from the above webpage (it describes how to install and how to run the simulator).

b) Noxim

Another popular NoC simulator is Noxim.You can download its source code from [4]. Note that you will need to also download SystemC to be able to compile Noxim. At this time, it's your responsibility to figure out how that must be done in order to have Noxim simulator working smoothly.

c) VNOC 2.0

The third NoC simulator we'll use is VNOC 2.0. It can be downloaded from here [5]. Its downloadable source code contains a readme file that describes how to install (it requires some prerequisite installs) and how to run it.

3. Assignment

Your assignment is to run the simulator to collect enough data points (10 data points for each plot) to be able **to create four plots of latency vs. offered load (aka injection rate) for two different NoCs. Two plots should be for an 4x4 regular mesh topology and the other two plots should be for an 8x8 regular mesh topology**. The two plots for each NoC should be **for two different types of traffic**, *uniform* and *transpose*. You should set-up your NoC topology to use XY routing strategy, input buffer size of 128, output buffer size of 16, packet size of 5 flits, 2 virtual channels. All other parameters should be left to their default values.

Basically, your plots should look like those from Fig.6 in the following paper:

[1] Nan Jiang, Daniel U. Becker, George Michelogiannakis, James Balfour, Brian Towles, John Kim and William J. Dally, A Detailed and Flexible Cycle-Accurate Network-on-Chip Simulator, *IEEE*

International Symposium on Performance Analysis of Systems and Software, 2013. Download it from here: http://crd.lbl.gov/assets/booksimispass.pdf

4. Deliverables

A report where you would describe issues that you encountered in doing this assignment and how you solved them. The four plots (collect10 data points for each plot) of latency vs. injection rate. A brief discussion of your plots: their meaning and comparison with each other. When is NoC performance better and Why?

References

[1] Dally and Towles, Route packets, not wires: on-chip interconnection networks, 2001. http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=935594&tag=1
[2] NoC Blog; http://networkonchip.wordpress.com/2011/02/22/simulators/
[3] BookSim; https://github.com/booksim/booksim2
[4] Noxim; https://github.com/davidepatti/noxim
[5] VNOC 2.0; https://github.com/eigenpi/vnoc20