

UC Berkeley Computer Science

Subject: Parallel FIFOs
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UCIES #2006-is19

A SECOND SIMULATION ASSIGNMENT

With ArchSim you should be able to simulate parallel FIFOs. You will need to make the XML files that connect a set of parallel FIFO elements with a source at one end and a sink at the other.

- 1) Make a structure with at least two parallel branches. Make them unequal in length, e.g. 5 stages in one and 3 stages in the other. Set the delays accordingly, so that the longer FIFO is faster. Make the sink slow so that elements pile up in your FIFOs. Simulate the operation long enough to observe a dozen or more data items passing through it. Send problems or comments to Igor at igor.benko@sun.com.
- 2) Use different kinds of branches at the start of your pair. What do you expect to see with the three different kinds of branches available: random branch, toggle branch and data-dependent branch.
- 3) How does the throughput of your FIFO pair depend on the relative speeds of the two branches? Please give an algebraic answer for each type of branch.
- 4) Make a 4-input funnel with a source on each input. Connect it to a trunk, namely a FIFO at least 2 stages long, and thence to a four-output horn with a sink on each output. The sources will generate random addresses for you. Observe the operation of your system. Under what conditions will there be congestion? items per stage and need not be an integer. How is occupancy related to the stage delays?

EXTRA CREDIT FOR THE AMBITIOUS

- 5) Figure out how to build the four-input four-output horn and funnel structure with more than one trunk. Demonstrate that it has better throughput than the one trunk system.
- 6) Repeat question 5 with 64 inputs and 64 outputs.
- 7) Do something else that's interesting.