

Computer Design and Organization

Assignment #5

Due: Wednesday November 27

The goal of this assignment is to help you gain some further understanding on the effects of various cache configuration parameters on performance, and in particular on cache hit rates.

You can do this assignment in groups of two under the same constraints as previously, i.e., with a new partner. Turn in a report with a structure similar to the one you did for Assignment #2 although clearly the methodology section should be longer and the results section shorter.

For this assignment you should use the simulator found at
`/cse/courses/cse471/02au/ass5/bliss5`
and the alpha cross-compiler found at
`/projects/instr/newport/alpha-cross/bin/gccalpha-ug`

Your task is to write applications programs in C that enable you to discover the cache size, associativity, line (block) size, and write update policy of the **L1 data cache** being simulated in a special version of Bliss, named *bliss5*. Design the programs so that each one (maybe with variations) determines a particular cache parameter. The order in which you “discover” these cache parameters might be important, so think about it while designing your experiments.

The cache size, associativity, and line size of the L1 data cache will all be powers of 2. The cache will be no larger than 64KB, the associativity will be no larger than 4-way, and the line size is a minimum of 4B and a maximum of 64B.

The *bliss5* version of Bliss is such that the cache configuration parameters of interest have been set to particular values, but are not printed as part of the output. In other words, your assignment is to discover the cache parameters that are “hidden” in *bliss5*. Of course, you can use the regular version of Bliss to test/guide your experiments.

To compile your C programs into alpha code recognized by Bliss and *bliss5*, use the alpha cross-compiler at
`/projects/instr/newport/alpha-cross/bin/gccalpha-ug`

A typical sequence of compile and run with *bliss5* would be:
`/projects/instr/newport/alpha-cross/bin/gccalpha-ug mytest.cc -o mytest`
`/cse/courses/cse471/02au/ass5/bliss5 mytest`

Only the *bliss5* executable is given to you. Knowing the great hacking ability of many of you, we are sure that you can disassemble this code. However, even if you do so you will have to “prove” that you have discovered the right configuration in your report via graphs/tables and your methodological reasoning. As a further claim to your honesty and inventiveness, attach a sample copy (source code) of the programs you wrote for discovering each of the configuration parameters.