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TCSS 372
Project 4

Executive Summary

This project was pretty challenging. I have no idea how close I am to mimicking an actual cache hierarchy. It started off easy, but as I added more cases and state transitions, it got pretty complex. I started with one CPU with one cache and memory. I then layered in the other caches and added the second CPU and started the MESI state transitioning. At some point the L1d and L2 stopped getting successful hits which concerns me a bit. There may be too much state invalidation going on. I am also considering that I do not fully understand the design since, with the way I have the program designs, the cases where the L2 will be hit would be very rare. It is only in very rare and specific cases where it is removed from the L1 caches, but still in the L2 and does not get invalidated before another possible hit.

Designing an LRU replacement policy proved to be too complicated for me at this time, so I used random instead.

Though it may not be functioning correctly, I definitely think I understand the way a cache hierarchy works better than before. I now understand the concept of locality and the offset calculation. I liked being able to use binary math to calculate the offset and index digit sizes, which I may not have known how to do previously.

I also got the chance to think about the purpose of the MESI state design, including why things get marked as shared, or why shared entries need to be invalidated when modified. I think I set it up so that exclusives do not get invalidated. They are either modified and locally set to modified, or shared and then, when modified, invalidated in the other CPU.

I also did the best that I could putting the java files into a tar with a makefile. I am not sure if they will work on other machines or another OS. I did not get the chance to test it out. This is, however my first time compiling a full program in the command line, so I can say I got farther than I have before with it.

References

http://gnuwin32.sourceforge.net/install.html
Installing GNU make.

http://www.skylit.com/javamethods/faqs/javaindos.html
Testing compiling the program through command line.

http://profesores.elo.utfsm.cl/~agv/elo329/Java/javamakefile.html
MakeFile Example

http://stackoverflow.com/questions/5271598/java-generate-random-number-between-two-given-values
Generating random numbers.

http://www.gnu.org/software/tar/manual/tar.html#SEC17
Creating a GNU tar file.

Team Grade

I worked on this project alone.