CS 3853 Computer Architecture

Project Report

Monday, Dec 2, 2019 7:30 p.m.

Team\_14

By signing this report I affirm that I know and agree with the contents.

Signatures:

Name #1: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name #2: \_\_\_\_\_\_\_\_Zachary Mauldin\_\_\_\_\_\_\_\_\_\_\_\_\_

**Objectives:**

1. **Comprehend how a cache implementation works**

We learned how the cache is created, maintained and all the calculations for determining cache efficiency.

1. **Determine the performance benefits based on cache configuration**

Based on the cache configuration, a cache is a lot faster than disk, time can be used more efficiently and effectively.

1. **Learn to work in a small group**

We spilt up the work throughout the milestones, and have put together this project.

We each kept up doing our parts. Version control implemented.

**Algorithm**

For our algorithm we used dictionaries. The associativity will determine the amount of columns for each entry, a dynamic 2-D array creating more columns based on associativity.. This simulator will read a trace file, and determine where in the cache the data will belong, if it is a destination address. The replacement algorithm will determine which tag of associativity >1 will be replaced. Calculations are done to calculate CPI, hit rate, miss rate, hits, misses, cache accesses.

**Analysis**

The first graph on the last page is from the file: “Trace2A.trc”. It shows how the different replacement algorithms affect the CPI. LRU and RR have a better affect on the CPI than RND. The next 4 graphs are from using our simulator on the file “Corruption1.trc”. These show varying block sizes and cache sizes along with different associativity. Based on our graphs, the change from associativity 1 to 2 makes a huge difference in the CPI. At associativity’s 4, 8, and 16, the change in CPI is significantly less, but improves. Also having a big cache size with a small block size doesn’t affect CPI for associativity greater than 2. Vise-versa having a small cache size with a big block size halts CPI from lowering after associativity of 8.

**Technical Issues:**

(Describe your most prominent technical issues and how you solved them. What was most difficult to figure out? You should have at least one and no more than three.)

**Group Member Contributions:**

Chris - Wrote most of the code for the project, debugging

Zac – Did some testing, and the report.

**Group Issues and Resolutions:**

None

**Conclusion:**

This project was interesting, it definitely helped teach more about how the cache works and gives us a hands on approach to the process of a cache.