Natalie Cluck

CSCE221H Data Structures & Algorithms

Dr. Scott Schaefer

3/5/2015

Seminar Report #1

On Thursday, March 5, 2015 at 1:00pm in the Bright Building at Texas A&M University, Yingying Tian, a doctoral candidate with the Department of Computer Science & Engineering, presented her dissertation defense to a dissertation committee. She worked with Dr. Daniel A. Jimenez, and her work was entitled “Reducing Waste in Memory Heirarchies.” She attended Beijing University of Posts and Telecommunications for her Master’s Degree, and according to her academic history, specializes in caching.

In her presentation, Tian introduced her topic with a quick overview of memory allocation and caching, allowing students who had never heard of the subject to catch up on her topic before further explaining her research. She emphasized a problem with wasted space in the memory system of a cache, repeating terms such as “dead blocks” and “hot blocks.” She stated that caches are important for performance, but lack efficiency. The purpose of the talk was to propose different methods of improvement for cache memory performance and space.

Her two main points of cache memory and performance improvement included dead blocks and data redundancy. Dead blocks are cache lines that will not be referenced again before eviction; otherwise, it is called a live block. There is no purpose in storing dead blocks besides the sole purpose of taking up valuable space and memory. My personal understanding of dead blocks is limited, but from my interpretation, it is the key to the inefficiency of caching. The earlier they can be predicted, the better and faster performance.

The second topic, data redundancy, is easy to see why it would be an issue with cache memory storage. Although I did not understand the technical details, there seemed to be a trade-off between different levels of data, and some “low-level” data that deemed unimportant for storage. Tian demonstrated different methods of determining redundant data, defined as blocks with identical content to other blocks in the cache.

I had no knowledge of caching, cache memory systems, or cache performance before this dissertation defense, but I enjoyed being introduced to the subject. I researched briefly about caching on the Internet after the presentation and learned about cache hits and misses, blocks, when caching is used, and more about the inefficiency of caching due to dead blocks and data redundancy. I also enjoyed learning about the process of dissertation defense and listening to the committee ask questions and discuss the research with Yingying Tian. It helped me consider perhaps working for a doctorate degree in the future.