

Cache hierarchy exploration with PIN: replacement policies, inclusion/exclusion, indexing functions

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March 14, 2016

1 Problem Definition

In order to reduce trips to memory, it is essential to have a good cache replacement algorithm. In many of the recent [1] researches conducted on replacement algorithms, the idea of a hybrid of the basic replacement schemes has been utilized. In this project, the task will be to develop a hybrid replacement scheme that outperforms the existing methods significantly.

2 Project goals

The most important part of the project will be to compare the performance of the proposed algorithm with the existing algorithms. This would mean using only one level of cache hierarchy and trivial indexing functions. Once this is established, then we can move on to more levels of cache and simulate using both inclusion and exclusion policy. Finally, if time permits, we can try out new indexing functions and see which one delivers the best performance.

3 Tools and Benchmarks used

Pintools will be used to build a functional cache simulator. Instruction address trace can be used for simulating an instruction cache and memory reference trace can be used for simulating a data cache. SPEC 2006 benchmarks will be used for the purpose of testing and comparing the performance of the proposed replacement algorithm with the existing algorithms in the literature.

References

- [1] Shaktisinh S. Parmarr Sanjay Bhalgama. A novel adaptive cache replacement policy using weighting and ranking parameter. *American International Journal of Contemporary Scientific Research*, 2, 2015.