Advanced Computer Architecture

Programming Assignment 2

Due on Monday, Mehr 19^{th}, 1395

Overview

In this assignment, you will extend the cache simulator that you developed in PA1 to assess the effective of a recently proposed replacement policy using traces of CloudSuite, PARSEC, and SPEC workloads. You are free to choose the programming language of your choice among C/C++, Java, Perl, PHP, or Python. You are advised to start early.

Programming Exercise

Nathan Beckmann and Daniel Sanchez recently proposed replacing blocks based on *economic value added (EVA)* to bridge the gap between practical and optimal replacement policies. Implement the proposed replacement policy and compare it against the replacement policies of PA 1 on a 2 MB, 16-way associative last-level cache with a 64B block size.

Note: Please refer to Bridging Theory and Practice in Cache Replacement for more information on replacement based on EVA.

Milestone 1

For every workload, measure the hit ratio of the last-level cache with LRU, EVA, and optimal replacement policies.

Milestone 2 (OPTIONAL)

Aamer Jaleel et al. proposed Re-Reference Interval Prediction (RRIP). Implement the proposed replacement policy and compare it against the competing replacement policies on a 2 MB, 16-way associative last-level cache with a 64B block size.

Milestone 3 (OPTIONAL but HIGHLY recommended)

Propose a replacement policy that is better than LRU and EVA. Implement the proposed idea in your cache simulator and measure its effectiveness (what matters the most is *innovation*!).

Deliverable

Hand in the code and a short report (PDF) that describes what you observed in this experiment. Please include the hit ratio for every workload in your report. What did you learn from this

experiment? If you have done Milestone 3, please clearly explain the proposed idea, justify why you believe it works, and report the simulation numbers to back up your claim.

Please put your code and report in separate folders named *code* and *report*, respectively, place both folders in another folder named *pa2_firstname_lastname*, zip the upper folder and email it to plotfi@ipm.ir with subject "Programming Assignment 2". Moreover, please upload the zip file to CW.