

California Institute of Technology  
Department of Computer Science  
Computer Architecture

CS184b, Spring 2003

Assignment 4: Memory Systems

Monday, April 21

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**Due:** Monday, April 28, 9:00AM

**Part A:**

1. HP 5.4
2. HP 5.17

**Part B:** For the `bzip2` you have been using in the previous assignments.

Remember that the SimpleScalar technical report (`TR_1342.ps` in the directory) describes the various simulation tools including `sim-cache`, `sim-cheetah`, and `sim-outorder`.

1. Use `sim-cheetah` on your application to quantify the miss rate differences among the following (use a 16KB cache as your base, 16B cache lines):
  - fully associative, optimal replacement
  - fully associative, LRU replacement
  - 2-way to 8-way set associative, optimal replacement
  - 2-way to 8-way set associative, LRU replacement
  - direct mapped
  - direct mapped twice the capacity
2. Use `sim-cache` to calculate miss rate under the random and FIFO replacement strategies for the 4-way set associative case above. Compare with the LRU and optimal replacement results which you obtained in the previous problem.
3. Summarize the Mulder/Quach/Flynn area for each of the (different) cache organizations above; that model gives no difference for replacement strategies, so area is per organization ignoring replacement differences.