CS203 Computer Architecture

CACHESIM LAB - 2 Report

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Instructions to run program :

***DEVELOPED USING PYTHON V2.7**

- Program can be run using the included script file **cachesim.sh**
- **cachesim.sh** contains the commands to generate all the values required in the Lab2AnswerTemplate.
- To run individually follow the template below
  - From within the CacheSim folder
  - **$python cacheSim.py -i gcc-10K.memtrace -cs 512 -bs 16 -w 1 -vs 0**
  - **"-vs"** flag = 0 for No victim cache. Other allowed values [4, 8, 16]
  - **"-w"** flag for set associativity. 0 for full associative, 1 for direct mapped. Other possible values [2, 4, 8, 16]
  - **"-bs"** flag for block size in Bytes. Possible values [2, 4, 8, 16, 32, 64]
  - **"-cs"** flag for cache size in Kilobytes. Possible values from 1 to 4096

Overview

This Cachesim application was developed as a python based application using python v2.7. It can simulate any cache sizes from 1KB to 4MB and block sizes and associativity as per specification.

Uses Least Recently Used (LRU) policy to evict blocks when handling misses. Write miss policy is to perform a write allocate. Write back is not handled as only hit rates are being computed.

Victim Cache implemented to specification with possible sizes [4, 8, 16]. Victim cache is fully associative and also uses LRU policy for evictions of blocks in the event of a miss.

The application simulates the cache using the provided input files and generates outputs attributes such as:

cache miss rate, hit rate, number of sets, ways, number of address bits for the tag, index, and offset

Sample Output Traces:

python cacheSim.py -i gcc-10K.memtrace -cs 512 -bs 16 -w 1 -vs 0

Reading inputFiles/gcc-10K.memtrace ...

Initializing direct-mapped Cache of 524288 KB ...

Initialization complete

No Victim Cache ...
Starting Cache Simulation ...

Cache Simulation Complete ...

Instructions	10000
SETS	32768
WAYS	1
TAG BITS	13
INDEX BITS	15
OFFSET BITS	4
MISSES	762
HITS	9238
MISS-RATE	7.620000
HIT-RATE	92.380000

Process finished with exit code 0

python cacheSim.py -i gcc-10K.memtrace -cs 512 -bs 16 -w 2 -vs 0

Reading inputFiles/gcc-10K.memtrace ...

Initializing 2-way set associative Cache of 524288 KB ...

Initialization complete

No Victim Cache ...
Starting Cache Simulation ...

Cache Simulation Complete ...

Instructions 10000
SETS 16384
WAYS 2
TAG BITS 14
INDEX BITS 14
OFFSET BITS 4
MISSES 756
HITS 9244
MISS-RATE 7.560000
HIT-RATE 92.440000

Process finished with exit code 0