CS 1541

Project 2

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Experiment 1:

To examine the effect of the block size, consider 3 cache sizes (1KB, 16KB and 128KB) with 4- way set associativity and LRU replacement. Compare the miss rate for block sizes of 4B, 16B, 32B, 64B, 128B and 256B. Produce two plots similar to the one on page 391 of the text book, one for each of the long traces. Produce two corresponding graphs to express the number of bytes written back (the y axis being the number of bytes written back instead of the miss rate).

The result of running our simulation with trace\_view\_on = 0 for each long trace file and the parameters specified in each experiment.

\*\* opening file sample\_large1.tr

+ Cache Size : 1KB

+ Block Size : 16B

+ 4-way set associative

+ Replacement Policy : LRU

+ number of accesses : 30438865

+ number of reads : 20813032

+ number of writes : 9625833

+ number of hits : 12389835

+ number of misses : 18049030

+ number of misses with write back : 18048966

+ rate of misses : 0.592960

\*\* opening file sample\_large1.tr

+ Cache Size : 1KB

+ Block Size : 128B

+ 4-way set associative

+ Replacement Policy : LRU

+ number of accesses : 30438865

+ number of reads : 20813032

+ number of writes : 9625833

+ number of hits : 6368927

+ number of misses : 24069938

+ number of misses with write back : 24069930

+ rate of misses : 0.790763

\*\* opening file sample\_large1.tr

+ Cache Size : 16KB

+ Block Size : 16B

+ 4-way set associative

+ Replacement Policy : LRU

+ number of accesses : 30438865

+ number of reads : 20813032

+ number of writes : 9625833

+ number of hits : 19941072

+ number of misses : 10497793

+ number of misses with write back : 10496769

+ rate of misses : 0.344881

\*\* opening file sample\_large1.tr

+ Cache Size : 16KB

+ Block Size : 128B

+ 4-way set associative

+ Replacement Policy : LRU

+ number of accesses : 30438865

+ number of reads : 20813032

+ number of writes : 9625833

+ number of hits : 20208523

+ number of misses : 10230342

+ number of misses with write back : 10230214

+ rate of misses : 0.336095

\*\* opening file sample\_large2.tr

+ Cache Size : 1KB

+ Block Size : 16B

+ 4-way set associative

+ Replacement Policy : LRU

+ number of accesses : 36084985

+ number of reads : 29411338

+ number of writes : 6673647

+ number of hits : 6464556

+ number of misses : 29620429

+ number of misses with write back : 29620365

+ rate of misses : 0.820852

\*\* opening file sample\_large2.tr

+ Cache Size : 1KB

+ Block Size : 128B

+ 4-way set associative

+ Replacement Policy : LRU

+ number of accesses : 36084985

+ number of reads : 29411338

+ number of writes : 6673647

+ number of hits : 6135180

+ number of misses : 29949805

+ number of misses with write back : 29949797

+ rate of misses : 0.829980

\*\* opening file sample\_large2.tr

+ Cache Size : 16KB

+ Block Size : 16B

+ 4-way set associative

+ Replacement Policy : LRU

+ number of accesses : 36084985

+ number of reads : 29411338

+ number of writes : 6673647

+ number of hits : 8840807

+ number of misses : 27244178

+ number of misses with write back : 27243154

+ rate of misses : 0.755000

\*\* opening file sample\_large2.tr

+ Cache Size : 16KB

+ Block Size : 128B

+ 4-way set associative

+ Replacement Policy : LRU

+ number of accesses : 36084985

+ number of reads : 29411338

+ number of writes : 6673647

+ number of hits : 12393957

+ number of misses : 23691028

+ number of misses with write back : 23690900

+ rate of misses : 0.656534

The data we gathered from running all of the simulations with sample1.tr:





The data we gathered from running all of the simulations with sample2.tr:





Experiment 2:

To examine the effect of the replacement policy, consider a 4KB cache with 32B blocks and 4- way associativity. Use a bar graph to plot the miss rate for each of the two long traces and 2 replacement policies (FIFO and LRU). Your plot should have 4 bars.

The result of running our simulation with trace\_view\_on = 0 for each long trace file and the parameters specified in each experiment.

\*\* opening file sample\_large1.tr

+ Cache Size : 4KB

+ Block Size : 32B

+ 4-way set associative

+ Replacement Policy : FIFO

+ number of accesses : 30438865

+ number of reads : 20813032

+ number of writes : 9625833

+ number of hits : 15648066

+ number of misses : 14790799

+ number of misses with write back : 14790671

+ rate of misses : 0.485918

\*\* opening file sample\_large1.tr

+ Cache Size : 4KB

+ Block Size : 32B

+ 4-way set associative

+ Replacement Policy : LRU

+ number of accesses : 30438865

+ number of reads : 20813032

+ number of writes : 9625833

+ number of hits : 17564071

+ number of misses : 12874794

+ number of misses with write back : 12874666

+ rate of misses : 0.422972

\*\* opening file sample\_large2.tr

+ Cache Size : 4KB

+ Block Size : 32B

+ 4-way set associative

+ Replacement Policy : FIFO

+ number of accesses : 36084985

+ number of reads : 29411338

+ number of writes : 6673647

+ number of hits : 7984444

+ number of misses : 28100541

+ number of misses with write back : 28100413

+ rate of misses : 0.778732

\*\* opening file sample\_large2.tr

+ Cache Size : 4KB

+ Block Size : 32B

+ 4-way set associative

+ Replacement Policy : LRU

+ number of accesses : 36084985

+ number of reads : 29411338

+ number of writes : 6673647

+ number of hits : 8255277

+ number of misses : 27829708

+ number of misses with write back : 27829580

+ rate of misses : 0.771227

The data we gathered from running all of the simulations:



Experiment 3:

To examine the effect of associativity, consider a 4KB cache with 32B blocks and LRU replacement. Use a bar graph to plot the miss rate for associativity = 1, 4 and 8. This plot will have 6 bars, three for each long trace

The result of running our simulation with trace\_view\_on = 0 for each long trace file and the parameters specified in each experiment.

\*\* opening file sample\_large1.tr

+ Cache Size : 4KB

+ Block Size : 32B

+ 1-way set associative

+ Replacement Policy : LRU

+ number of accesses : 30438865

+ number of reads : 20813032

+ number of writes : 9625833

+ number of hits : 20771557

+ number of misses : 9667308

+ number of misses with write back : 9667180

+ rate of misses : 0.317598

\*\* opening file sample\_large1.tr

+ Cache Size : 4KB

+ Block Size : 32B

+ 4-way set associative

+ Replacement Policy : LRU

+ number of accesses : 30438865

+ number of reads : 20813032

+ number of writes : 9625833

+ number of hits : 17564071

+ number of misses : 12874794

+ number of misses with write back : 12874666

+ rate of misses : 0.422972

\*\* opening file sample\_large1.tr

+ Cache Size : 4KB

+ Block Size : 32B

+ 8-way set associative

+ Replacement Policy : LRU

+ number of accesses : 30438865

+ number of reads : 20813032

+ number of writes : 9625833

+ number of hits : 14685055

+ number of misses : 15753810

+ number of misses with write back : 15753682

+ rate of misses : 0.517556

\*\* opening file sample\_large2.tr

+ Cache Size : 4KB

+ Block Size : 32B

+ 1-way set associative

+ Replacement Policy : LRU

+ number of accesses : 36084985

+ number of reads : 29411338

+ number of writes : 6673647

+ number of hits : 15952062

+ number of misses : 20132923

+ number of misses with write back : 20132795

+ rate of misses : 0.557931

\*\* opening file sample\_large2.tr

+ Cache Size : 4KB

+ Block Size : 32B

+ 4-way set associative

+ Replacement Policy : LRU

+ number of accesses : 36084985

+ number of reads : 29411338

+ number of writes : 6673647

+ number of hits : 8255277

+ number of misses : 27829708

+ number of misses with write back : 27829580

+ rate of misses : 0.771227

\*\* opening file sample\_large2.tr

+ Cache Size : 4KB

+ Block Size : 32B

+ 8-way set associative

+ Replacement Policy : LRU

+ number of accesses : 36084985

+ number of reads : 29411338

+ number of writes : 6673647

+ number of hits : 6200529

+ number of misses : 29884456

+ number of misses with write back : 29884328

+ rate of misses : 0.828169

The data we gathered from running all of the simulations: