Indian Institute of Technology, New Delhi

COL 216 Assignment 3

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Contents

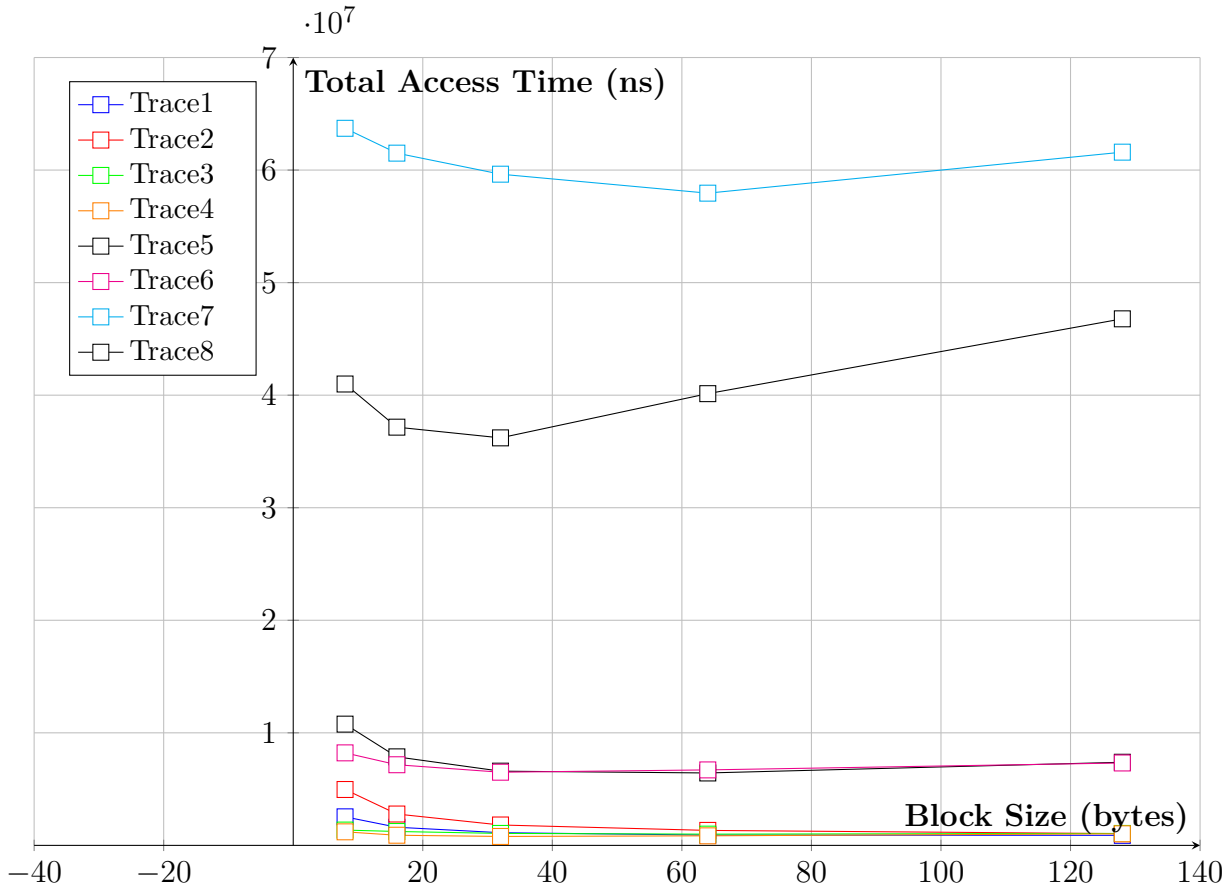
1 Graph with varying Block size

L1 size : 1024

L1 associativity : 2

L2 size : 65536

L2 associativity : 8



The total access time first decreases with the increase in block size for all the trace files, and then increases after reaching a certain minimum value. This initial decrease in the total access time is due to the principle of locality that guarantees the nearby addresses of a particular read/written address to be accessed directly from the caches. But after a certain block size, the number of competitive misses (due to decrease in set numbers with increasing block size) overpower the the locality and so the access time of each trace file increases after the corresponding minimum block size.

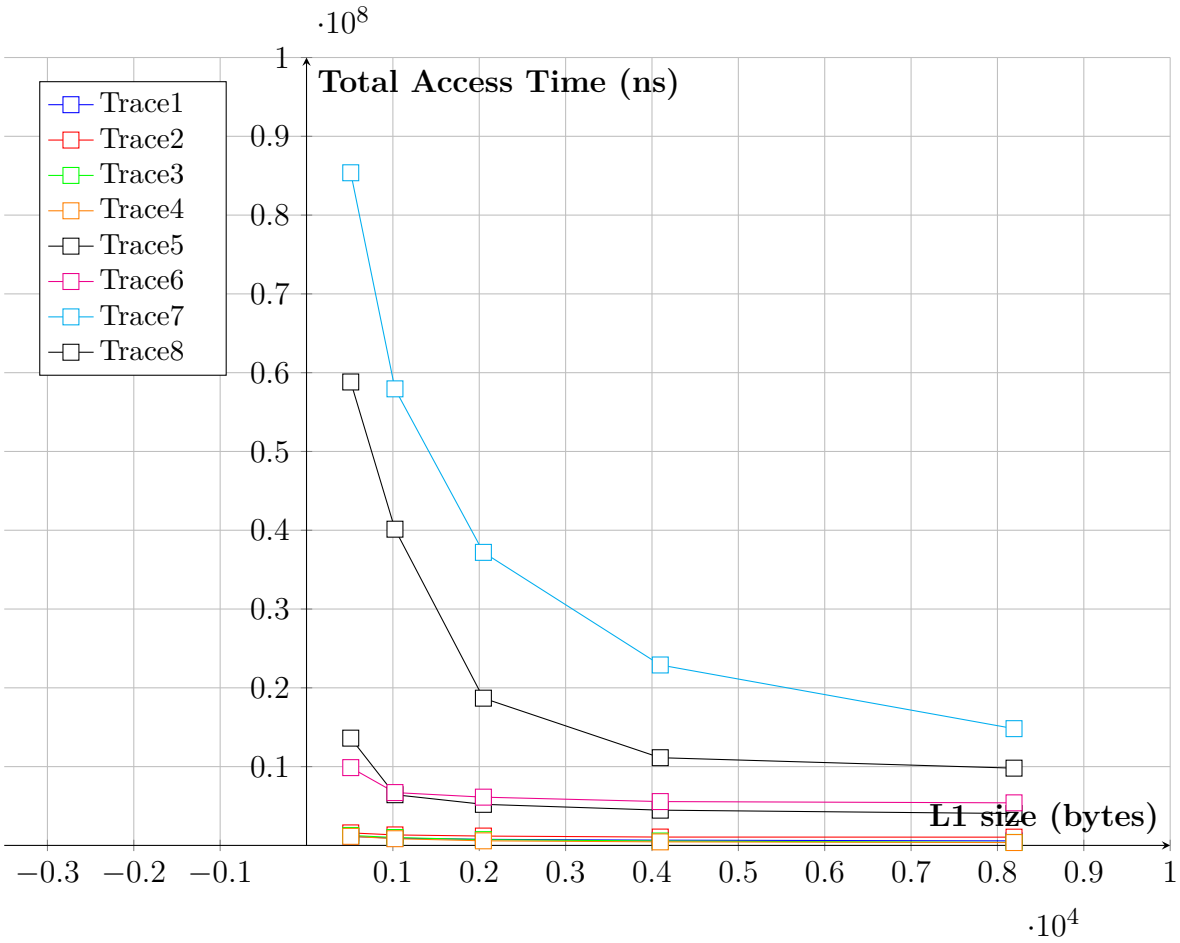
2 Graph with varying L1 size

Block size : 64

L1 associativity : 2

L2 size : 65536

L2 associativity : 8



The total access time for all the trace files decrease with the increase in size of L1 cache. The increase in block size with the associativity and block size being constant leads to increase in the number of sets which decreases the number of competitive misses as well as the number of capacity misses, thus reducing the total access time for each trace file.

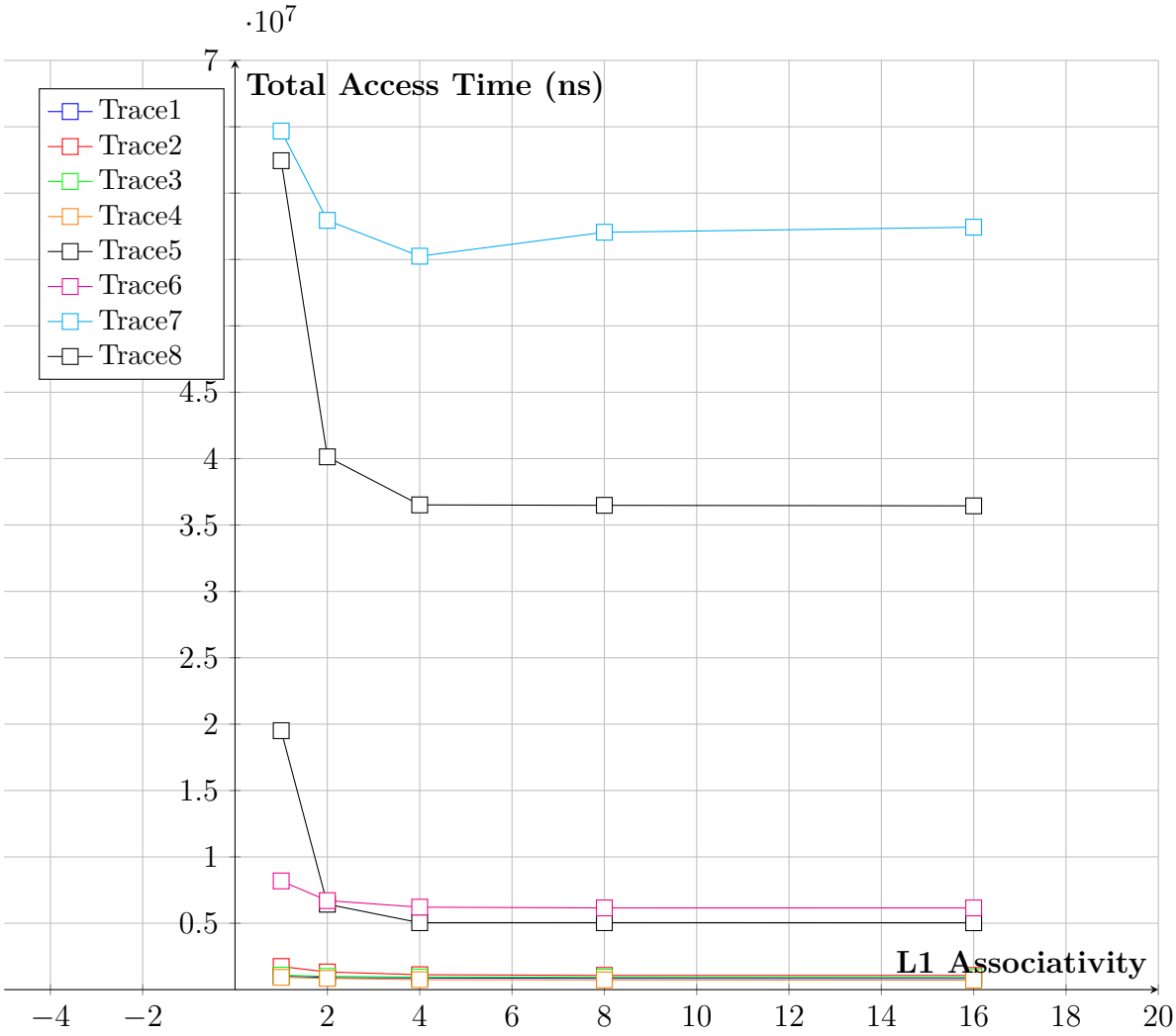
3 Graph with varying L1 associativity

Block size : 64

L1 size : 1024

L2 size : 65536

L2 associativity : 8



With increase in the associativity of L1 cache, the total access time first decreases then becomes almost constant after reaching the minimum value. With increase in associativity, the number of competitive misses decrease but also decrease the number of sets in the cache. After a certain increase , the decrease in the number of sets and increase in the associativity of the cache compete with each other and may even lead to increase in the access time.

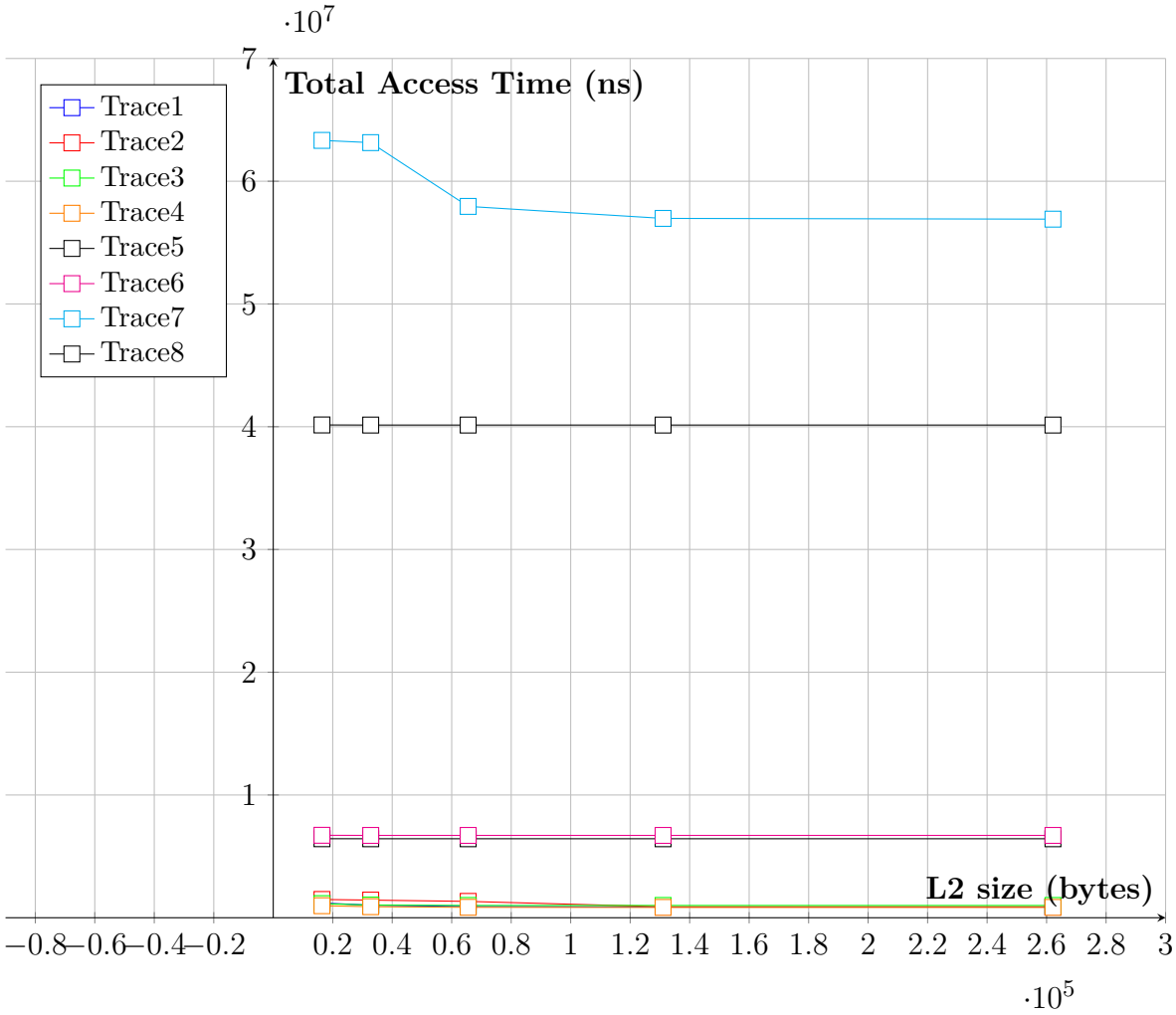
4 Graph with varying L2 size

Block size : 64

L1 size : 1024

L1 associativity : 2

L2 associativity : 8



With an increase in L2 cache size, the total access times for all the trace files decrease to a total minimum amount but becomes almost constant after certain value. The decrease is intuitive and can be reasoned with the increase in the number of sets of the L2 cache thus decreasing the number of competitive misses as well as the capacity misses. But since the miss rate in L2 is relatively lower, the y values don't change much.

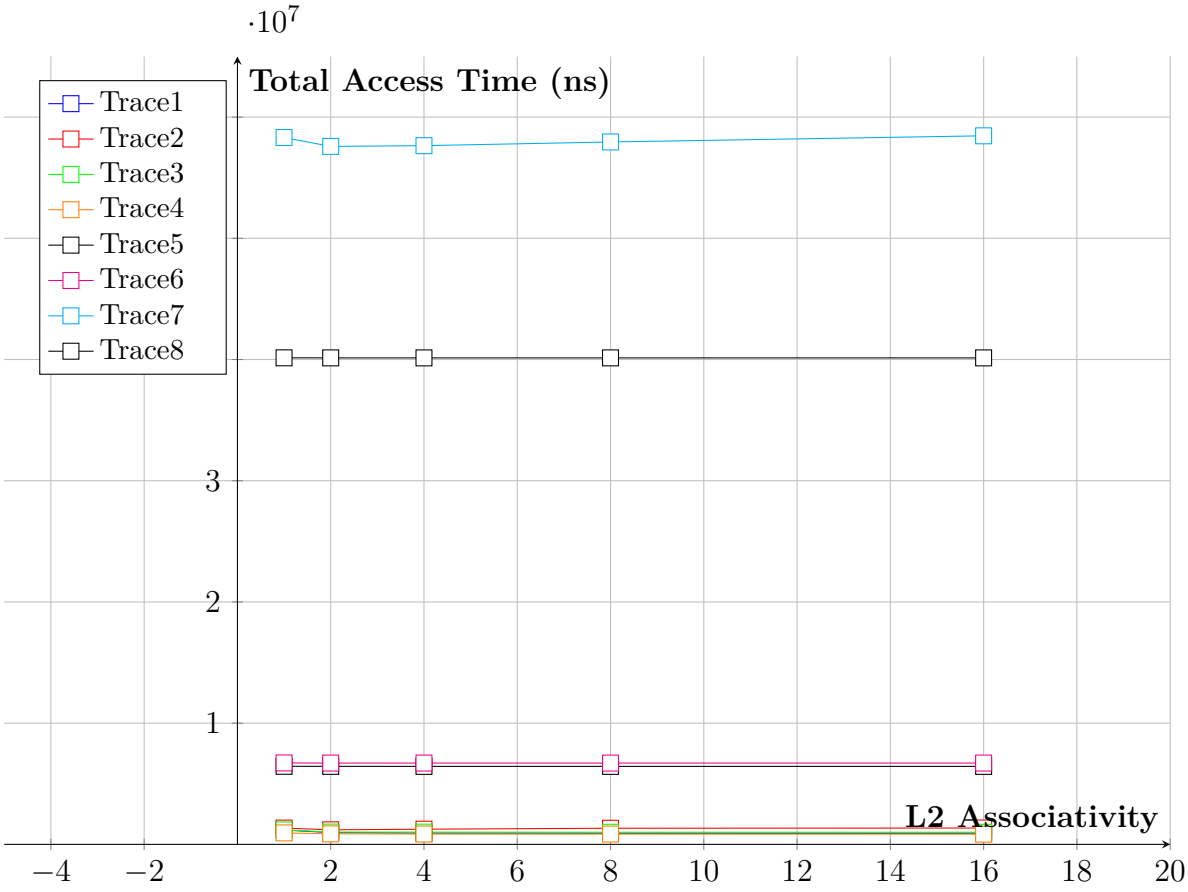
5 Graph with varying L2 associativity

Block size : 64

L1 size : 1024

L1 associativity : 2

L2 size : 65536



With the increase in the associativity of L2 cache, the total access time first decreases then increases slightly or/and becomes almost constant. The reason of such a nature of the graph is similar to that mentioned while increasing the associativity of L1 cache, but the rate of change of the graph is slightly lower due to the comparitively lower miss rate of L2 cache.