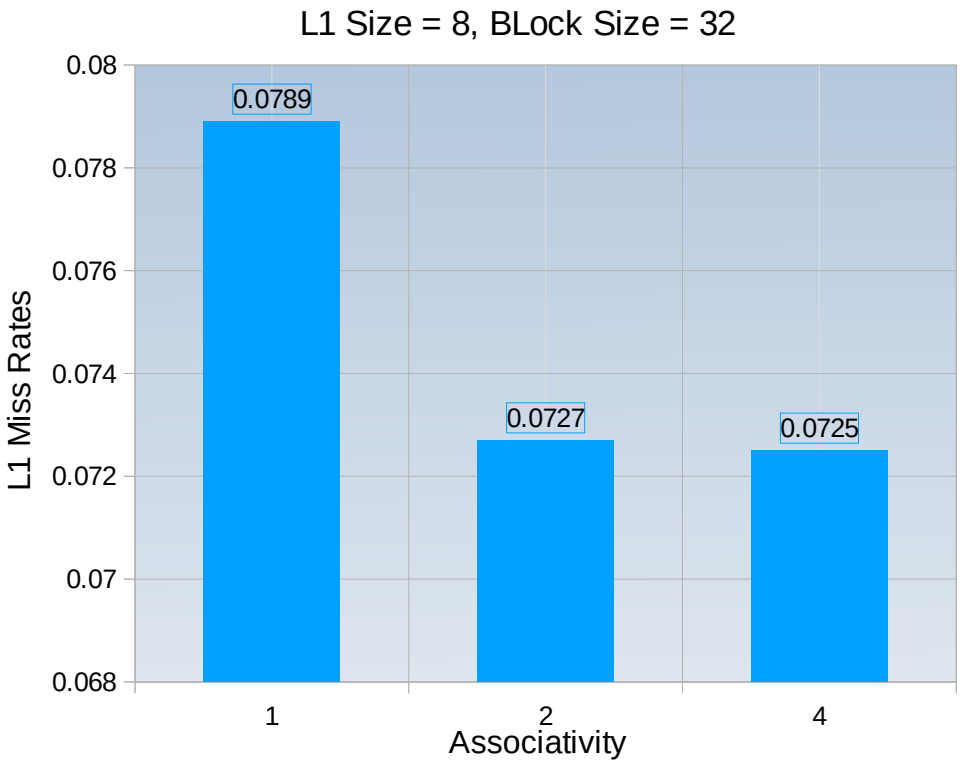
CENG 311 PROGRAMMING ASSIGMENT-4

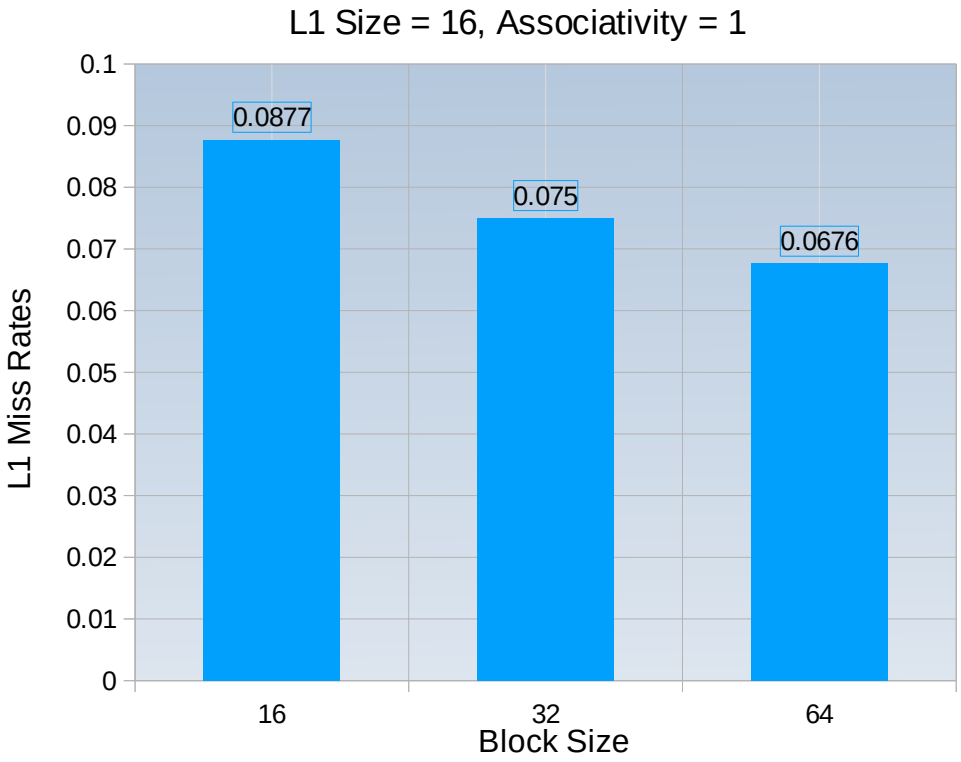
Statistic Number	L1 Size [KB]	Block Size [B]	L1 Associativity	L1 Miss Rates
1	8	32	1	7.89%
2	8	32	2	7.27%
3	8	32	4	7.25%
4	16	16	1	8.77%
5	16	32	1	7.50%
6	16	64	1	6.76%
7	16	16	2	9.54%
8	16	32	2	7.20%
9	16	64	2	6.05%
10	16	16	4	9.56%
11	16	32	4	7.20%
12	16	64	4	6.03%
13	32	32	1	5.55%
14	32	32	2	5.95%
15	32	32	4	6.76%
FOR N = 1000				

GRAPH-1)



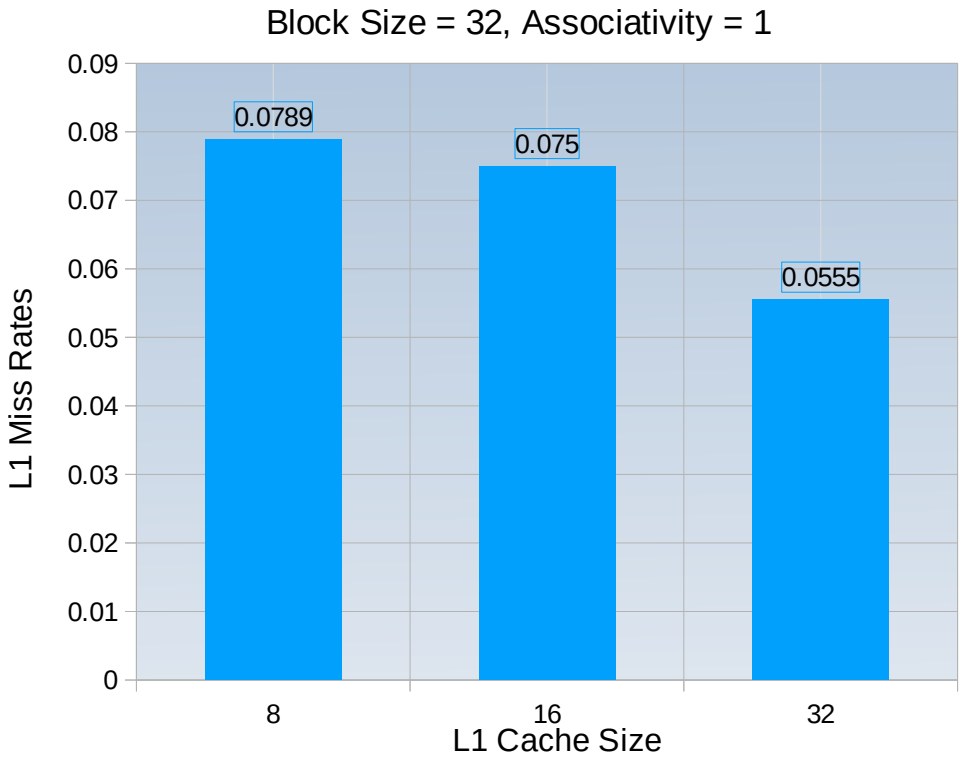
If we compare rows 1,2,and 3 of the table according to collected statistics, increasing associativity by keeping the L1 cache size and block size same decreases miss rates due to decrease in conflict misses.

GRAPH-2)



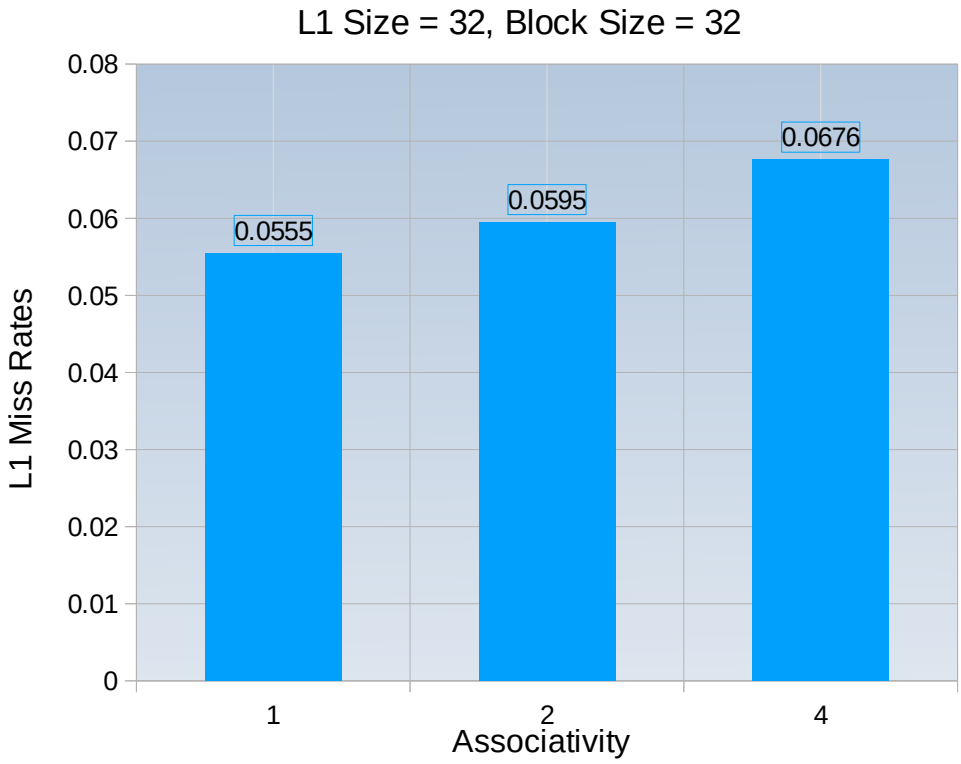
If we compare rows 4,5,and 6 on the table according to collected statistics, increasing block size by keeping L1 cache size and associativity same decreases miss rates due to spatial locality.

GRAPH-3)



If we compare rows 1,5,and 13 on the table according to collected statistics, increasing the L1 cache size by keeping block size and associativity same decreases miss rates due decrease in capacity misses.

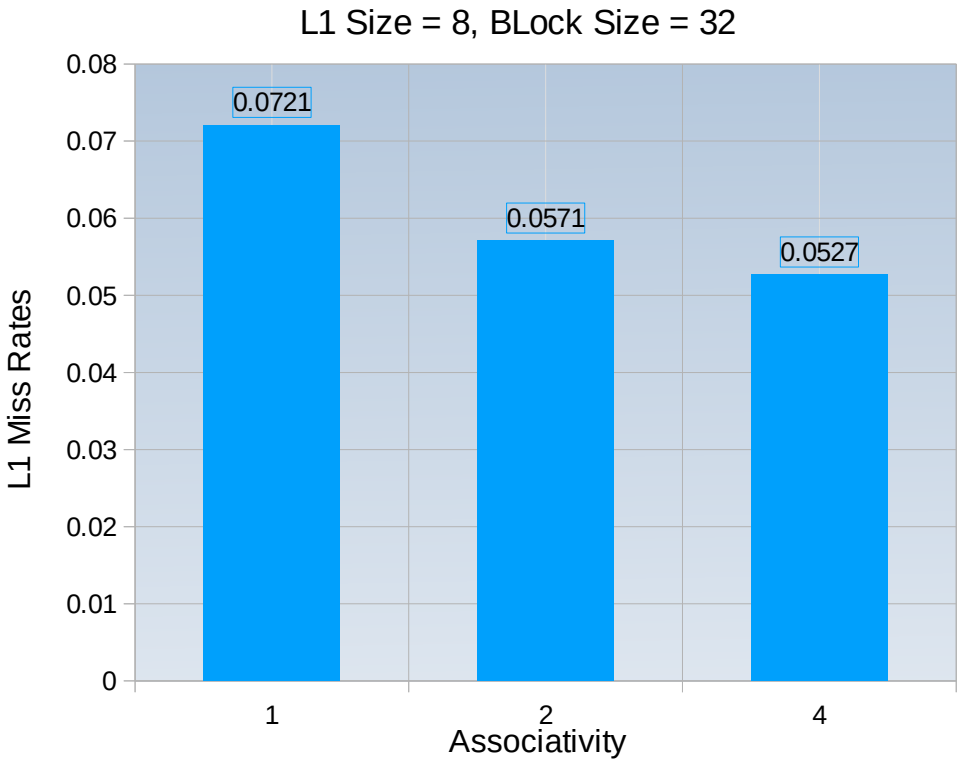
GRAPH-4)



If we compare rows 13,14,and 15 on the table according to collected statistics, increasing associativity when L1 cache size became large enough (32 KB in this case) increases miss rates because large block sizes with matrices that holds large amount of data causes many replacements in L1 cache when we increase associativity.

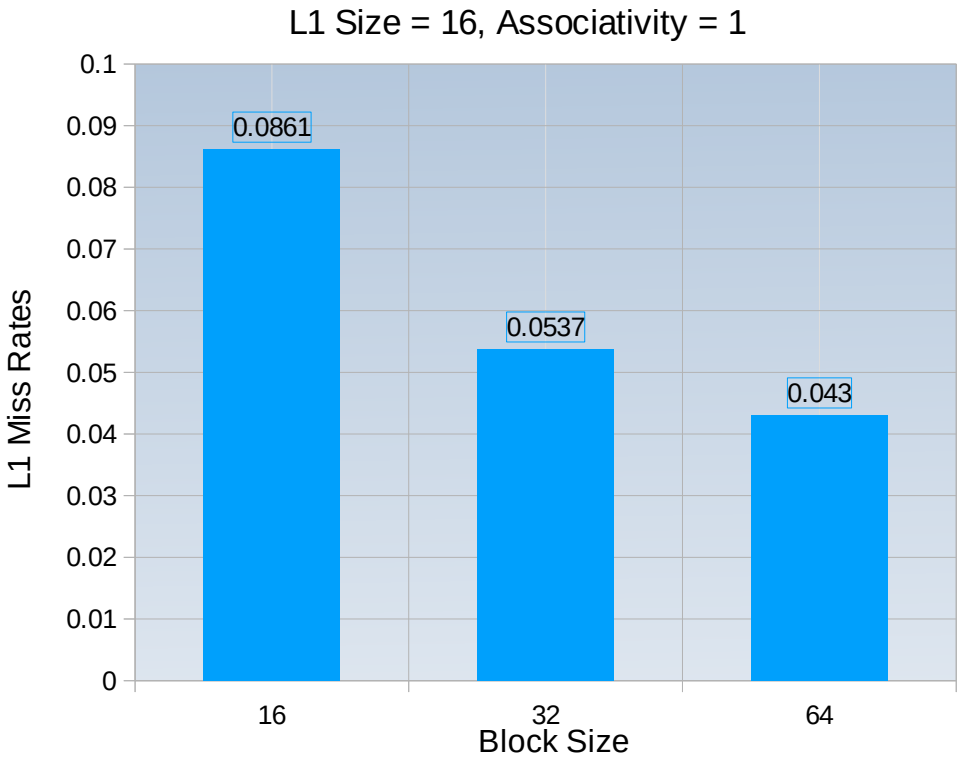
Statistic Number	L1 Size [KB]	Block Size [B]	L1 Associativity	L1 Miss Rates
1	8	32	1	7.21%
2	8	32	2	5.71%
3	8	32	4	5.27%
4	16	16	1	8.61%
5	16	32	1	5.37%
6	16	64	1	4.30%
7	16	16	2	7.56%
8	16	32	2	4.76%
9	16	64	2	3.38%
10	16	16	4	7.44%
11	16	32	4	4.60%
12	16	64	4	3.27%
13	32	32	1	4.67%
14	32	32	2	4.34%
15	32	32	4	4.33%
FOR N = 10				

GRAPH-5)



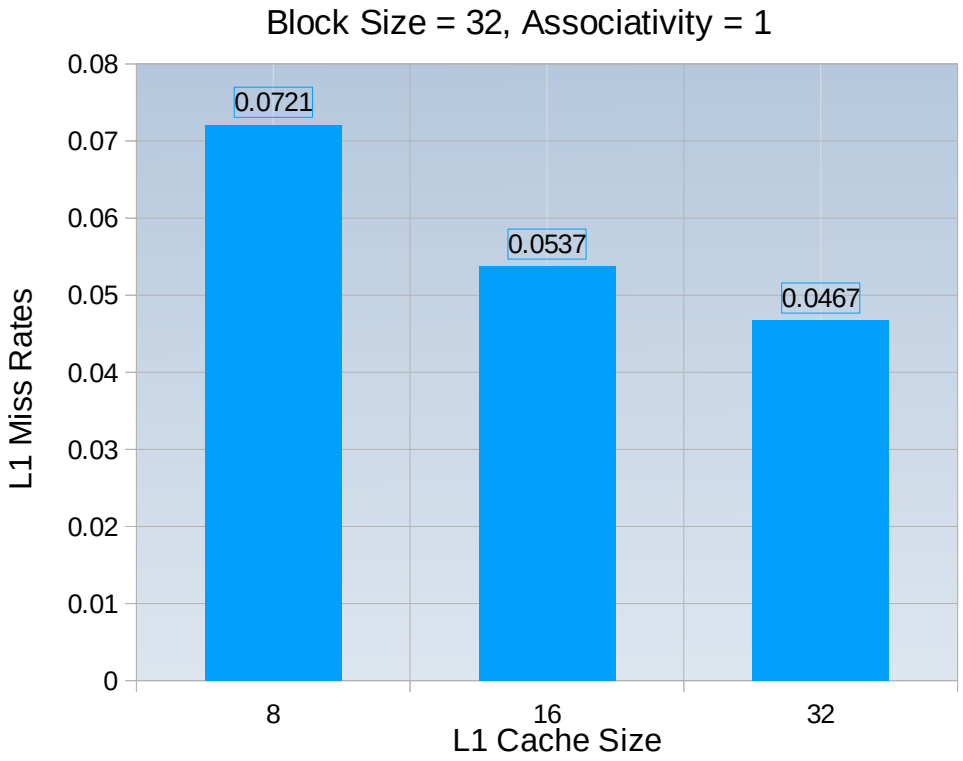
If we compare rows 1,2,and 3 on table according to collected statistics,increasing associativity by keeping L1 cache size and block size same decreases miss rates due decrease in conflict misses. If we compare N = 10 with N = 1000 (previous table) as the data to be hold in L1 cahce is much less in case N = 10 we get less overall conflict misses and thus, miss rates are smaller compared to N = 1000 for same case.

GRAPH-6)



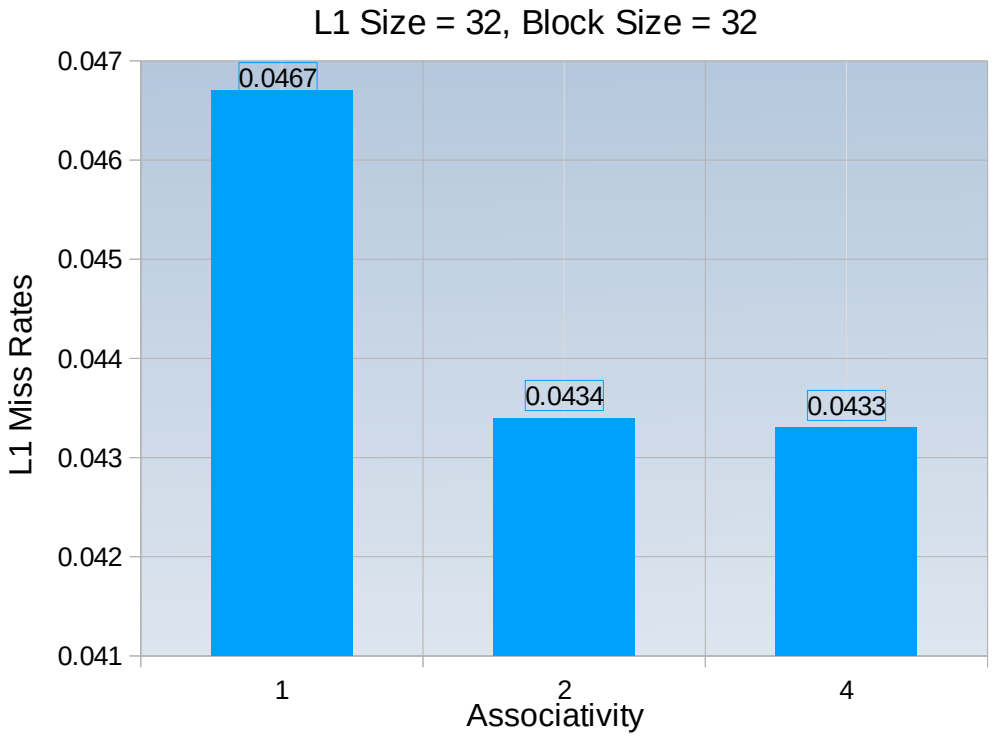
If we compare rows 4,5,and 6 on the table according to collected statistics, increasing block size by keeping L1 cache size and associativity same decreases miss rates due to spatial locality. If we compare N = 10 with N = 1000 (previous table), as the N = 10 case contains much less data it utilizes spatial locality better than N = 1000 because many replacements occur in case of N = 1000.

GRAPH-7)



If we compare rows 1,5,and 13 on the table according to collected statistics, increasing the L1 cache size by keeping block size and associativity same decreases miss rates due to decrease in capacity misses. If we compare N = 10 with N = 1000 (previous table), as the total data to be stored is much less in case N = 10, overall capacity misses is less than N = 1000 case, so miss rates are smaller compared to N = 1000.

GRAPH-8)



If we compare rows 13,14,and 15 on the table according to collected statistics, increasing associativity when L1 cache size became large (32 KB in this case) decreases miss rates in case of N = 10 because number of data in this case is sufficient to be stored in L1 cache and increase in associativity decreases conflict misses. In contrast to N = 10 case, in N = 1000 case when L1 cache size became large (32 KB in this case), increase in associativity increases miss rates because of continious replacements inside cache sets.