CS224
Section No.: 2
Spring 2018
Lab No.: 6
EFE ACER / 21602217

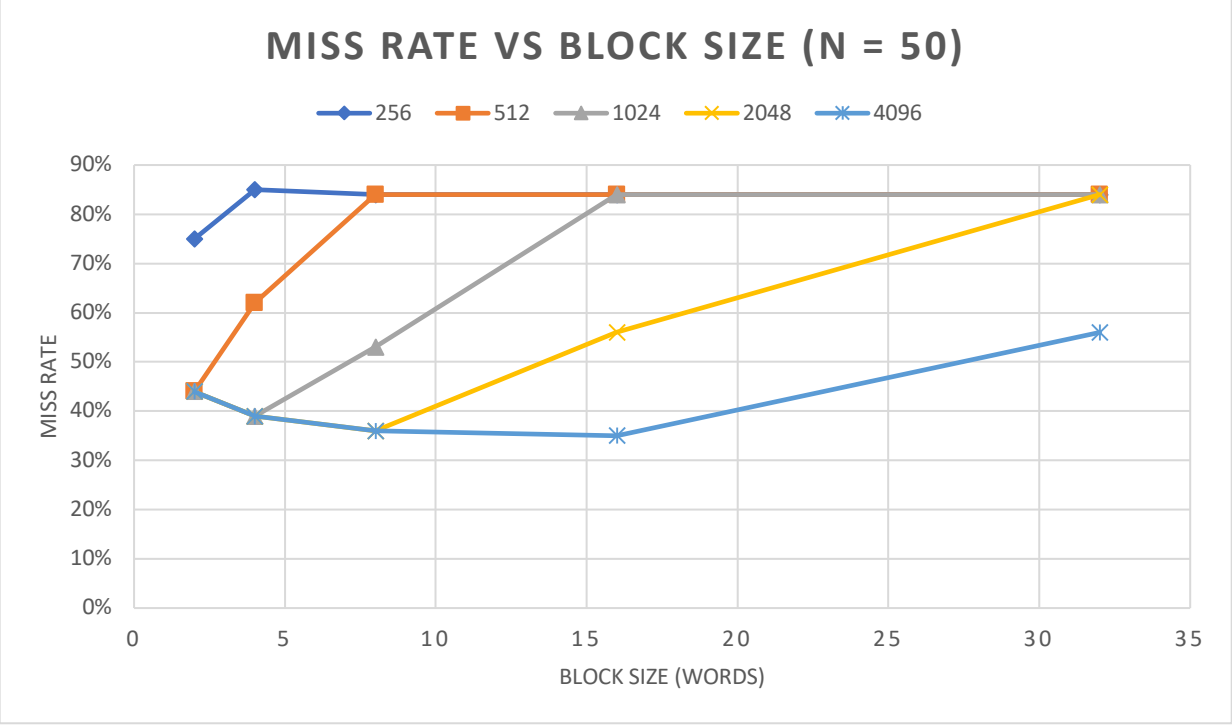
EXPERIMENTS WITH DATA CACHE PARAMETERS

Report for Matrix Size 1 (N = 50)

a)

Block Size (Words) / Cache Size (Bytes)	2	4	8	16	32
256 (0.25KB)	Miss Rate = 75% Number of Misses = 2294	Miss Rate = 85% Number of Misses = 2589	Miss Rate = 84% Number of Misses = 2571	Miss Rate = 84% Number of Misses = 2563	Miss Rate = 84% Number of Misses = 2560
512 (0.5KB)	Miss Rate = 44% Number of Misses = 1344	Miss Rate = 62% Number of Misses = 1892	Miss Rate = 84% Number of Misses = 2571	Miss Rate = 84% Number of Misses = 2563	Miss Rate = 84% Number of Misses = 2560
1024 (1KB)	Miss Rate = 44% Number of Misses = 1343	Miss Rate = 39% Number of Misses = 1191	Miss Rate = 53% Number of Misses = 1625	Miss Rate = 84% Number of Misses = 2562	Miss Rate = 84% Number of Misses = 2558
2048(2KB)	Miss Rate = 44% Number of Misses = 1343	Miss Rate = 39% Number of Misses = 1191	Miss Rate = 36% Number of Misses =1113	Miss Rate = 56% Number of Misses = 1709	Miss Rate = 84% Number of Misses = 2558
4096 (4KB)	Miss Rate = 44% Number of Misses = 1343	Miss Rate = 39% Number of Misses = 1191	Miss Rate = 36% Number of Misses = 1113	Miss Rate = 35% Number of Misses = 1074	Miss Rate = 56% Number of Misses = 1723

Table 1.1: Direct Mapped Cache, Miss Rates for N = 50 Matrix Size



Graph 1: Miss Rate vs Block Size for N = 50 Matrix Size (different colors represent different cache sizes)

b)

	Good hit rate Block Size (words) = 16 Cache Size (bytes) = 4096	Medium hit rate Block Size (words) = 8 Cache Size (bytes) = 1024	Poor hit rate Block Size (words) = 16 Cache Size (bytes) = 1024
Direct Mapped	Miss Rate = 35% Number of Misses = 1074	Miss Rate = 53% Number of Misses = 1625	Miss Rate = 84% Number of Misses = 2562
Fully Associative (LRU)	Miss Rate = 7% Number of Misses = 216	Miss Rate = 84% Number of Misses = 2570	Miss Rate = 84% Number of Misses = 2562
Fully Associative (Random)	Miss Rate = 17% Number of Misses = 510	Miss Rate = 62% Number of Misses = 1897	Miss Rate = 80% Number of Misses = 2454

Table 1.2: Fully Associative Cache, Block Replacement Policies and Miss Rates for N = 50 Matrix Size

c)

N-way Set Associative Set Sizes	Good hit rate Block Size (words) = 16 Cache Size (bytes) = 4096	Medium hit rate Block Size (words) = 8 Cache Size (bytes) = 1024	Poor hit rate Block Size (words) = 16 Cache Size (bytes) = 1024
2	Miss Rate = 19% Number of Misses = 585	Miss Rate = 73% Number of Misses = 2218	Miss Rate = 84% Number of Misses = 2562
4	Miss Rate = 17% Number of Misses = 521	Miss Rate = 84% Number of Misses = 2570	Miss Rate = 84% Number of Misses = 2562
8	Miss Rate = 7% Number of Misses = 216	Miss Rate = 84% Number of Misses = 2570	Miss Rate = 84% Number of Misses = 2562
16	Miss Rate = 7% Number of Misses = 216	Miss Rate = 84% Number of Misses = 2570	Miss Rate = 84% Number of Misses = 2562

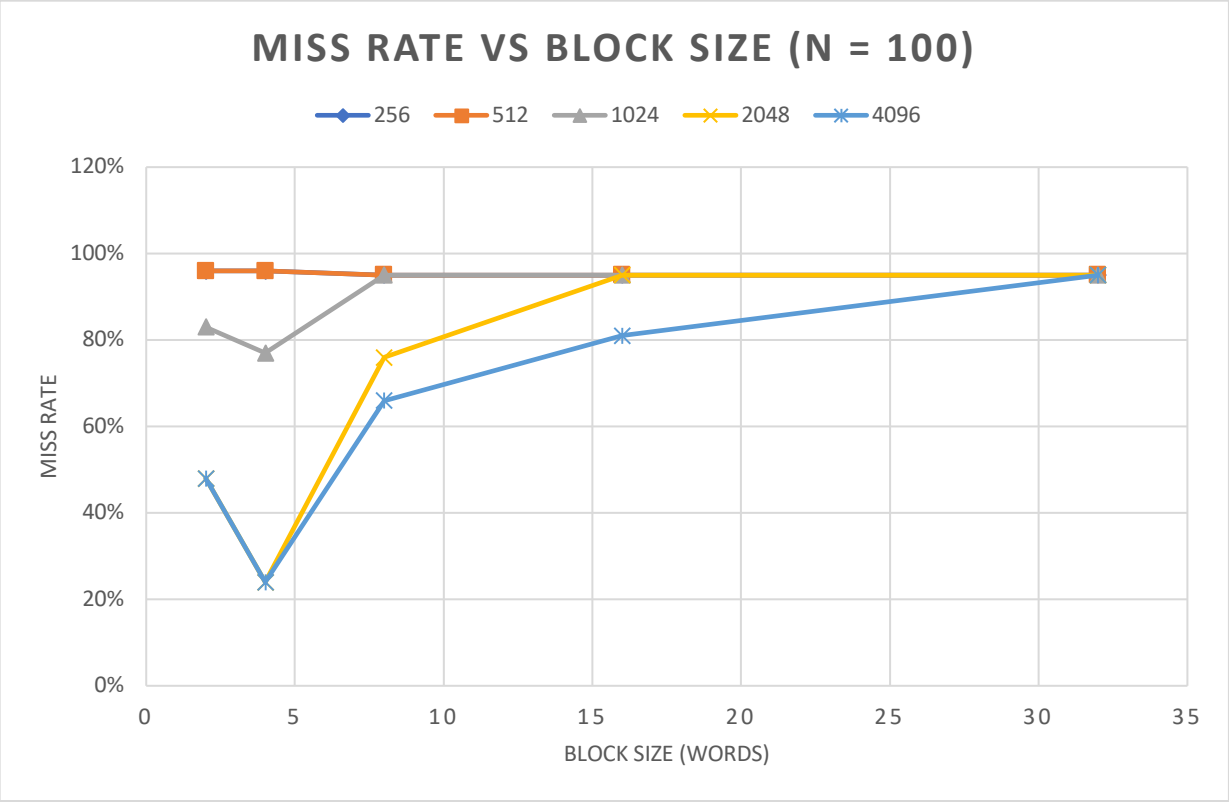
Table 1.3: N-way Set Associative Cache, Set Sizes and Miss Rates for N = 50 Matrix Size

Report for Matrix Size 2 (N = 100)

a)

Block Size (Words) / Cache Size (Bytes)	2	4	8	16	32
256 (0.25KB)	Miss Rate = 96% Number of Misses = 10169	Miss Rate = 96% Number of Misses = 10139	Miss Rate = 95% Number of Misses = 10121	Miss Rate = 95% Number of Misses = 10113	Miss Rate = 95% Number of Misses = 10110
512 (0.5KB)	Miss Rate = 96% Number of Misses = 10169	Miss Rate = 96% Number of Misses = 10139	Miss Rate = 95% Number of Misses = 10121	Miss Rate = 95% Number of Misses = 10113	Miss Rate = 95% Number of Misses = 10110
1024 (1KB)	Miss Rate = 83% Number of Misses = 8818	Miss Rate = 77% Number of Misses = 8113	Miss Rate = 95% Number of Misses = 10120	Miss Rate = 95% Number of Misses = 10112	Miss Rate = 95% Number of Misses = 10108
2048(2KB)	Miss Rate = 48% Number of Misses = 5118	Miss Rate = 24% Number of Misses = 2563	Miss Rate = 76% Number of Misses =8095	Miss Rate = 95% Number of Misses = 10112	Miss Rate = 95% Number of Misses = 10108
4096 (4KB)	Miss Rate = 48% Number of Misses = 5118	Miss Rate = 24% Number of Misses = 2563	Miss Rate = 66% Number of Misses = 7045	Miss Rate = 81% Number of Misses = 8573	Miss Rate = 95% Number of Misses = 10108

Table 2.1: Direct Mapped Cache, Miss Rates for N = 100 Matrix Size



Graph 2: Miss Rate vs Block Size for N = 100 Matrix Size (different colors represent different cache sizes)

b)

	Good hit rate **Block Size (words) = 4** **Cache Size (bytes) = 2048**	**Medium hit rate** **Block Size (words) = 2** **Cache Size (bytes) = 2048**	**Poor hit rate** **Block Size (words) = 8** **Cache Size (bytes) = 512**
Direct Mapped	Miss Rate = 24% Number of Misses = 2563	Miss Rate = 48% Number of Misses = 5118	Miss Rate = 95% Number of Misses = 10121
Fully Associative (LRU)	Miss Rate = 24% Number of Misses = 2563	Miss Rate = 48% Number of Misses = 5118	Miss Rate = 95% Number of Misses = 10120
Fully Associative (Random)	Miss Rate = 42% Number of Misses = 4481	Miss Rate = 58% Number of Misses = 6171	Miss Rate = 95% Number of Misses = 10108

Table 2.2: Fully Associative Cache, Block Replacement Policies and Miss Rates for N = 100 Matrix Size

c)

N-way Set Associative Set Sizes	**Good hit rate** **Block Size (words) = 4** **Cache Size (bytes) = 2048**	**Medium hit rate** **Block Size (words) = 2** **Cache Size (bytes) = 2048**	**Poor hit rate** **Block Size (words) = 8** **Cache Size (bytes) = 512**
2	Miss Rate = 24% Number of Misses = 2563	Miss Rate = 48% Number of Misses = 5118	Miss Rate = 95% Number of Misses = 10121
4	Miss Rate = 24% Number of Misses = 2563	Miss Rate = 48% Number of Misses = 5118	Miss Rate = 95% Number of Misses = 10121
8	Miss Rate = 24% Number of Misses = 2563	Miss Rate = 48% Number of Misses = 5118	Miss Rate = 95% Number of Misses = 10120
16	Miss Rate = 24% Number of Misses = 2563	Miss Rate = 48% Number of Misses = 5118	Miss Rate = 95% Number of Misses = 10120

Table2.3: N-way Set Associative Cache, Set Sizes and Miss Rates for N = 100 Matrix Size