CS 224

Section.: 2

Spring 2019

Lab No.: 6

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Examining the Effect of Cache Parameters and Program Factors on Cache Hit Rate

Report 1st Matrix Size: (N = 100)

Part a.1.

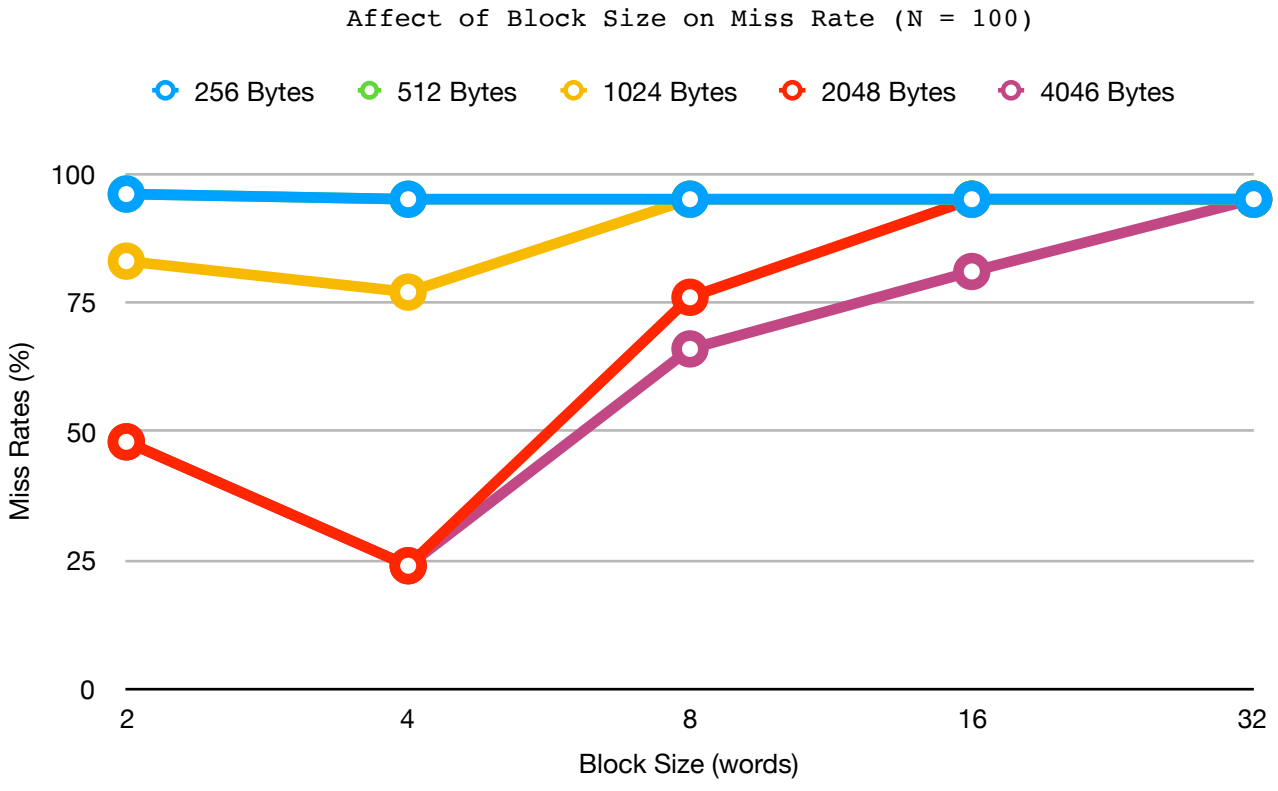
Block Size (words) / Cache Size (bytes)	2	4	8	16	32
256 (0.26 KB)	Miss Rate: 48% Number of Misses: 5073	Miss Rate: 24% Number of Misses: 2240	Miss Rate: 12% Number of Misses: 1273	Miss Rate: 6% Number of Misses: 640	Miss Rate: 3% Number of Misses: 324
512 (0.5 KB)	Miss Rate: 48% Number of Misses: 5072	Miss Rate: 24% Number of Misses: 2239	Miss Rate: 12% Number of Misses: 1272	Miss Rate: 6% Number of Misses: 639	Miss Rate: 3% Number of Misses: 323
1024 (1 KB)	Miss Rate: 48% Number of Misses: 5073	Miss Rate: 24% Number of Misses: 2240	Miss Rate: 12% Number of Misses: 1273	Miss Rate: 6% Number of Misses: 640	Miss Rate: 3% Number of Misses: 324
2048 (2 KB)	Miss Rate: 48% Number of Misses: 5073	Miss Rate: 24% Number of Misses: 2240	Miss Rate: 12% Number of Misses: 1273	Miss Rate: 6% Number of Misses: 640	Miss Rate: 3% Number of Misses: 324
4096 (4 KB)	Miss Rate: 48% Number of Misses: 5072	Miss Rate: 24% Number of Misses: 2239	Miss Rate: 12% Number of Misses: 1271	Miss Rate: 6% Number of Misses: 638	Miss Rate: 3% Number of Misses: 322

Table 1.1: Miss Rates of Row-wise summation for Direct Mapped Cache (N = 100)

Part a.2.

Block Size (words) / Cache Size (bytes)	2	4	8	16	32
256 (0.26 KB)	Miss Rate: 96% Number of Misses: 10174	Miss Rate: 95% Number of Misses: 10141	Miss Rate: 95% Number of Misses: 10123	Miss Rate: 95% Number of Misses: 10141	Miss Rate: 95% Number of Misses: 10111
512 (0.5 KB)	Miss Rate: 96% Number of Misses: 10173	Miss Rate: 95% Number of Misses: 10140	Miss Rate: 95% Number of Misses: 10122	Miss Rate: 95% Number of Misses: 10140	Miss Rate: 95% Number of Misses: 10110
1024 (1 KB)	Miss Rate: 83% Number of Misses: 8812	Miss Rate: 77% Number of Misses: 8113	Miss Rate: 95% Number of Misses: 10123	Miss Rate: 95% Number of Misses: 10122	Miss Rate: 95% Number of Misses: 10111
2048 (2 KB)	Miss Rate: 48% Number of Misses: 5119	Miss Rate: 24% Number of Misses: 2564	Miss Rate: 76% Number of Misses: 8088	Miss Rate: 95% Number of Misses: 10112	Miss Rate: 95% Number of Misses: 10108
4096 (4 KB)	Miss Rate: 48% Number of Misses: 5117	Miss Rate: 24% Number of Misses: 2563	Miss Rate: 66% Number of Misses: 8576	Miss Rate: 81% Number of Misses: 8576	Miss Rate: 95% Number of Misses: 10109

Table 1.2: Miss Rates of Column-wise summation for Direct Mapped Cache (N = 100)



Part b.

	Hit Rate (Good) Cache Size (bytes): 2048 Block Size(words): 4	Hit Rate (Medium) Cache Size (bytes): 2048 Block Size(words): 8	Hit Rate (Poor) Cache Size (bytes): 1024 Block Size(words): 8
Fully Associative (LRU)	Miss Rate: 24% Number of Misses: 2564	Miss Rate: 95% Number of Misses: 10121	Miss Rate: 95% Number of Misses: 10121
Fully Associative (Random)	Miss Rate: 41% Number of Misses: 4384	Miss Rate: 68% Number of Misses: 7266	Miss Rate: 91% Number of Misses: 9720
Direct Mapped	Miss Rate: 24% Number of Misses: 2564	Miss Rate: 76% Number of Misses: 8088	Miss Rate: 95% Number of Misses: 10112

Table 1.3: Examines hit rate performances for various cache designs (N = 100)

Part c.

N-way Set Associative Cache Set Size	Hit Rate (Good) Cache Size (bytes): 2048 Block Size(words): 4	Hit Rate (Medium) Cache Size (bytes): 2048 Block Size(words): 8	Hit Rate (Poor) Cache Size (bytes): 1024 Block Size(words): 8
4	Miss Rate: 24% Number of Misses: 2564	Miss Rate: 95% Number of Misses: 10121	Miss Rate: 95% Number of Misses: 10121
8	Miss Rate: 24% Number of Misses: 2564	Miss Rate: 95% Number of Misses: 10121	Miss Rate: 95% Number of Misses: 10121
16	Miss Rate: 24% Number of Misses: 2564	Miss Rate: 95% Number of Misses: 10121	Miss Rate: 95% Number of Misses: 10121

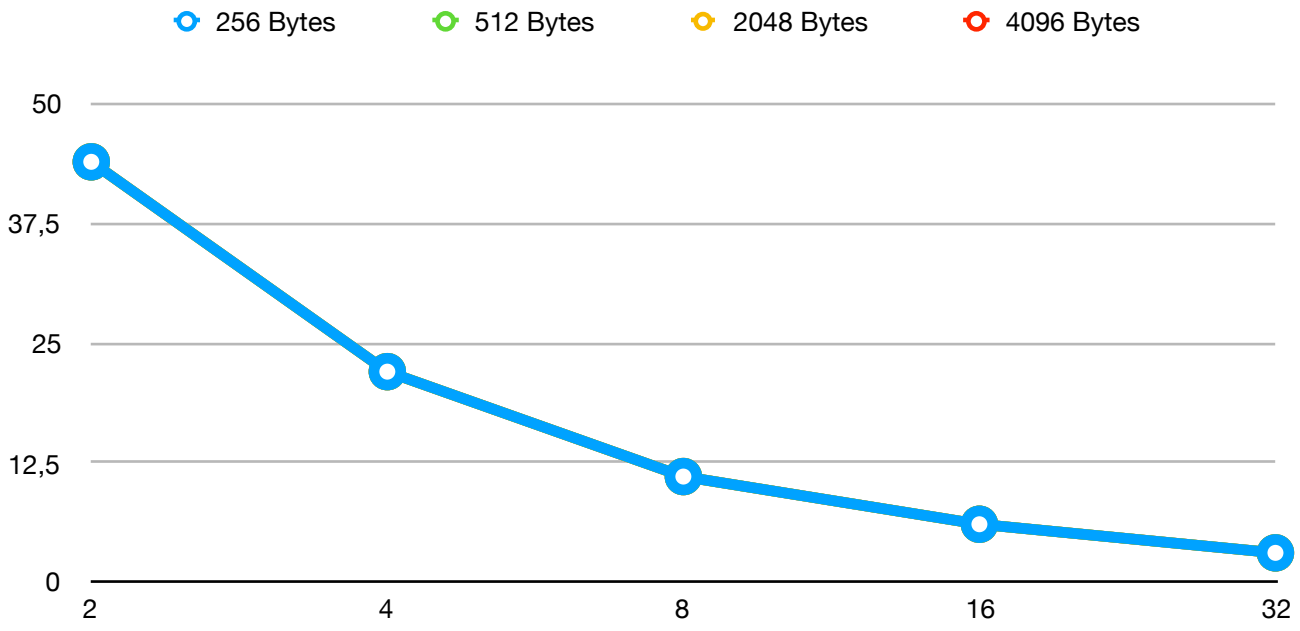
Table 1.4: Examines various hit rate performances for N-way caches (N = 100)

Report 1st Matrix Size: (N = 50)

Part a.1.

Block Size (words) / Cache Size (bytes)	2	4	8	16	32
256 (0.26 KB)	Miss Rate: 44% Number of Misses: 1323	Miss Rate: 22% Number of Misses: 665	Miss Rate: 11% Number of Misses: 335	Miss Rate: 6% Number of Misses: 171	Miss Rate: 3% Number of Misses: 89
512 (0.5 KB)	Miss Rate: 44% Number of Misses: 1322	Miss Rate: 22% Number of Misses: 664	Miss Rate: 11% Number of Misses: 334	Miss Rate: 6% Number of Misses: 170	Miss Rate: 3% Number of Misses: 89
1024 (1 KB)	Miss Rate: 44% Number of Misses: 1321	Miss Rate: 22% Number of Misses: 663	Miss Rate: 11% Number of Misses: 333	Miss Rate: 6% Number of Misses: 169	Miss Rate: 3% Number of Misses: 87
2048 (2 KB)	Miss Rate: 44% Number of Misses: 1321	Miss Rate: 22% Number of Misses: 663	Miss Rate: 11% Number of Misses: 333	Miss Rate: 6% Number of Misses: 169	Miss Rate: 3% Number of Misses: 87
4096 (4 KB)	Miss Rate: 44% Number of Misses: 1321	Miss Rate: 22% Number of Misses: 662	Miss Rate: 11% Number of Misses: 333	Miss Rate: 6% Number of Misses: 169	Miss Rate: 3% Number of Misses: 87

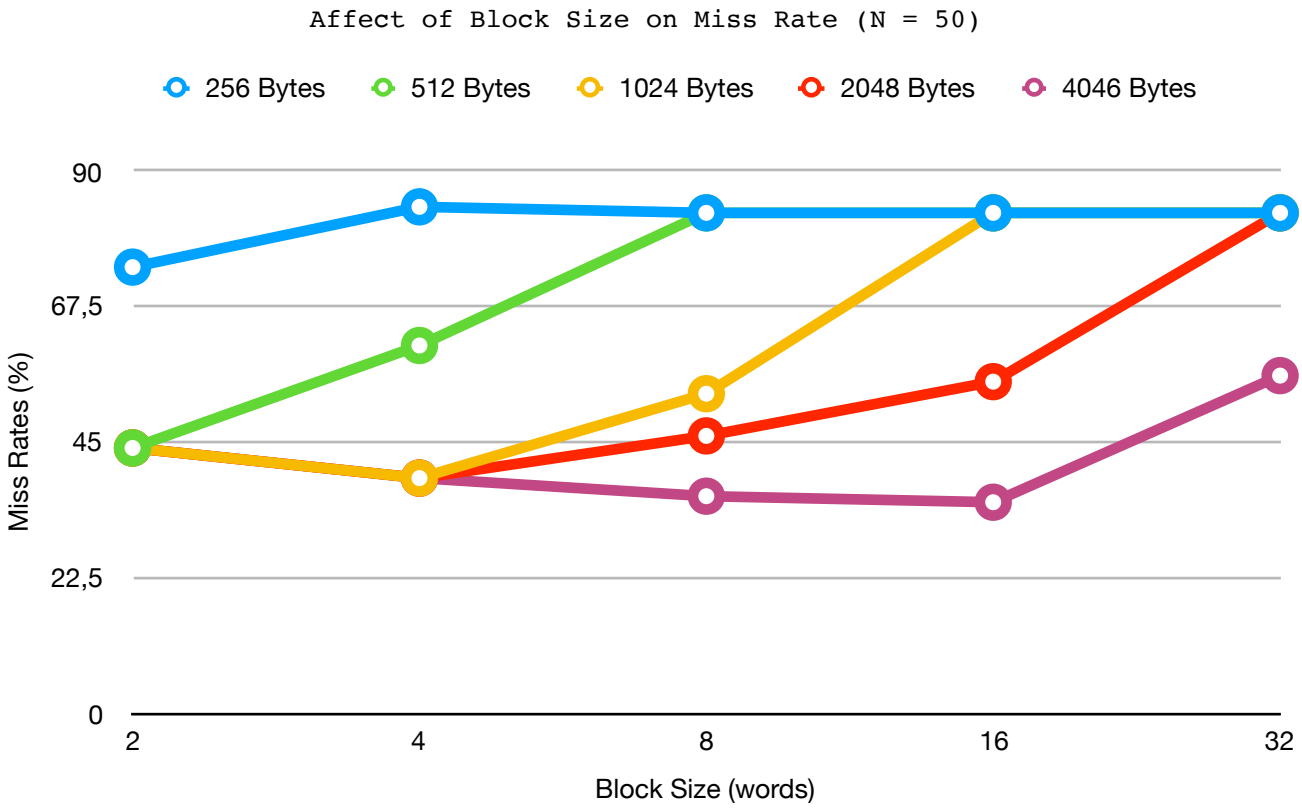
Table 2.1: Miss Rates of Row-wise summation for Direct Mapped Cache (N = 50)



Part a.2.

Block Size (words) / Cache Size (bytes)	2	4	8	16	32
256 (0.26 KB)	Miss Rate: 74% Number of Misses: 2299	Miss Rate: 84% Number of Misses: 2591	Miss Rate: 83% Number of Misses: 2573	Miss Rate: 83% Number of Misses: 2564	Miss Rate: 83% Number of Misses: 2561
512 (0.5 KB)	Miss Rate: 44% Number of Misses: 1348	Miss Rate: 61% Number of Misses: 1893	Miss Rate: 83% Number of Misses: 2572	Miss Rate: 83% Number of Misses: 2563	Miss Rate: 83% Number of Misses: 2561
1024 (1 KB)	Miss Rate: 44% Number of Misses: 1347	Miss Rate: 39% Number of Misses: 1192	Miss Rate: 53% Number of Misses: 1626	Miss Rate: 83% Number of Misses: 2562	Miss Rate: 83% Number of Misses: 2559
2048 (2 KB)	Miss Rate: 44% Number of Misses: 1343	Miss Rate: 39% Number of Misses: 1192	Miss Rate: 46% Number of Misses: 1114	Miss Rate: 55% Number of Misses: 1709	Miss Rate: 83% Number of Misses: 2559
4096 (4 KB)	Miss Rate: 44% Number of Misses: 1343	Miss Rate: 39% Number of Misses: 1192	Miss Rate: 36% Number of Misses: 1114	Miss Rate: 35% Number of Misses: 1074	Miss Rate: 56% Number of Misses: 1724

Table 2.2: Miss Rates of Column-wise summation for Direct Mapped Cache (N = 50)



Part b.

	Hit Rate (Good) Cache Size (bytes): 4096 Block Size(words): 16	Hit Rate (Medium) Cache Size (bytes): 512 Block Size(words): 4	Hit Rate (Poor) Cache Size (bytes): 512 Block Size(words): 16
Fully Associative (LRU)	Miss Rate: 7% Number of Misses: 216	Miss Rate: 84% Number of Misses: 2589	Miss Rate: 83% Number of Misses: 2564
Fully Associative (Random)	Miss Rate: 16% Number of Misses: 497	Miss Rate: 66% Number of Misses: 2046	Miss Rate: 83% Number of Misses: 2562
Direct Mapped	Miss Rate: 35% Number of Misses: 1074	Miss Rate: 61% Number of Misses: 1893	Miss Rate: 83% Number of Misses: 2563

Table 2.3: Examines hit rate performances for various cache designs (N = 50)

Part c.

N-way Set Associative Cache Set Size	Hit Rate (Good) Cache Size (bytes): 4096 Block Size(words): 16	Hit Rate (Medium) Cache Size (bytes): 512 Block Size(words): 4	Hit Rate (Poor) Cache Size (bytes): 512 Block Size(words): 16
4	Miss Rate: 17% Number of Misses: 526	Miss Rate: 84% Number of Misses: 2590	Miss Rate: 83% Number of Misses: 2564
8	Miss Rate: 7% Number of Misses: 216	Miss Rate: 84% Number of Misses: 2589	Miss Rate: 83% Number of Misses: 2564

Table 2.4: Examines various hit rate performances for N-way caches (N = 50)