

BILKENT UNIVERSITY

COMPUTER SCIENCE

CS 224 : COMPUTER ORGANIZATION

EXPERIMENTS WITH DATA CACHE PARAMETERS

LAB REPORT

LAB 6

SECTION 4

ALPEREN CAN

21601740

19.12.2019

REPORT 1 (50x50 MATRIX)

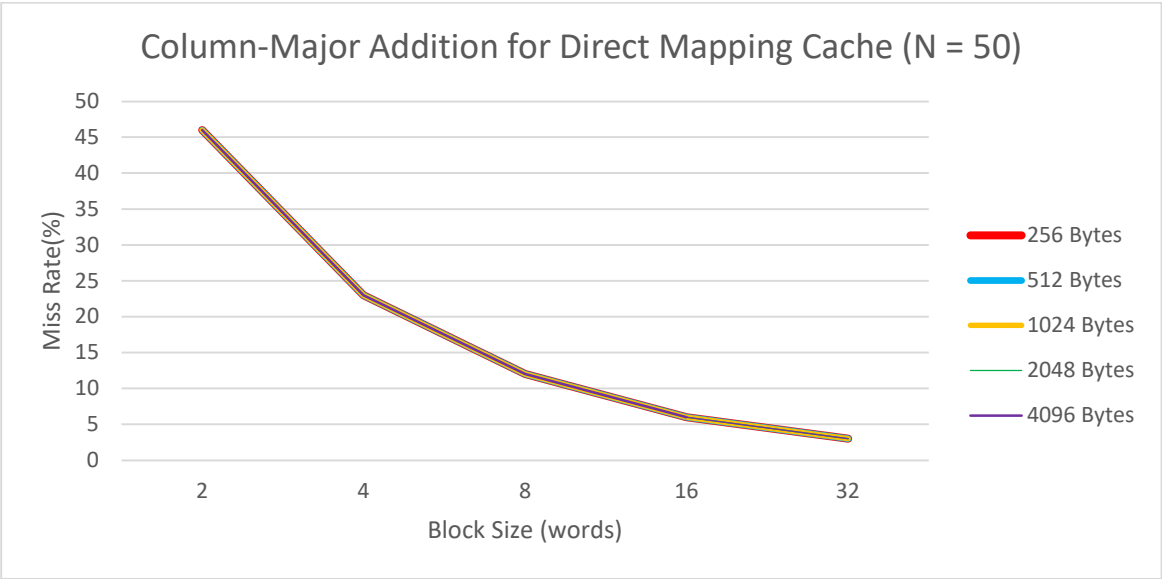
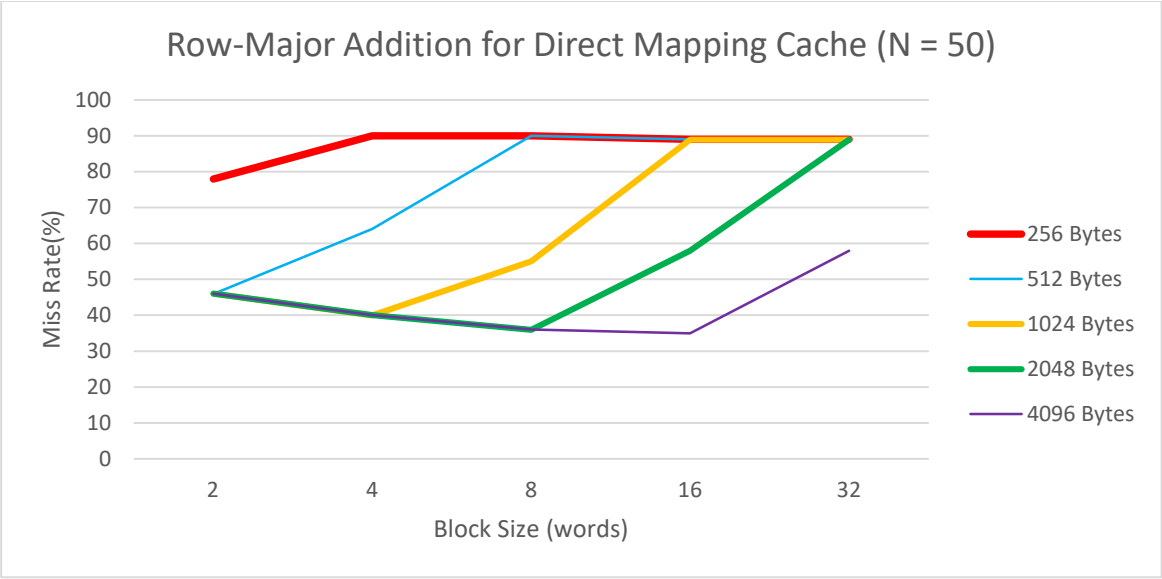
a)

Table 1.1 : Miss Rates and Number of Misses of Row-Major Addition for Direct Mapped Cache (N=50)

Cache Size	Block Size (Words)				
	2	4	8	16	32
256 Bytes	Miss Rate: 78% Number of Misses 2190	Miss Rate: 90% Number of Misses 2520	Miss Rate: 90% Number of Misses 2511	Miss Rate: 89% Number of Misses 2507	Miss Rate: 89% Number of Misses 2505
512 Bytes	Miss Rate: 46% Number of Misses 1290	Miss Rate: 64% Number of Misses 1786	Miss Rate: 90% Number of Misses 2511	Miss Rate: 89% Number of Misses 2506	Miss Rate: 89% Number of Misses 2504
1024 Bytes	Miss Rate: 46% Number of Misses 1290	Miss Rate: 40% Number of Misses 1112	Miss Rate: 55% Number of Misses 1535	Miss Rate: 89% Number of Misses 2506	Miss Rate: 89% Number of Misses 2504
2048 Bytes	Miss Rate: 46% Number of Misses 1289	Miss Rate: 40% Number of Misses 1112	Miss Rate: 36% Number of Misses 1023	Miss Rate: 58% Number of Misses 1619	Miss Rate: 89% Number of Misses 2504
4096 Bytes	Miss Rate: 46% Number of Misses 1289	Miss Rate: 40% Number of Misses 1112	Miss Rate: 36% Number of Misses 1023	Miss Rate: 35% Number of Misses 978	Miss Rate: 58% Number of Misses 1637

Table 1.2 : Miss Rates and Number of Misses of Column-Major Addition for Direct Mapped Cache (N=50)

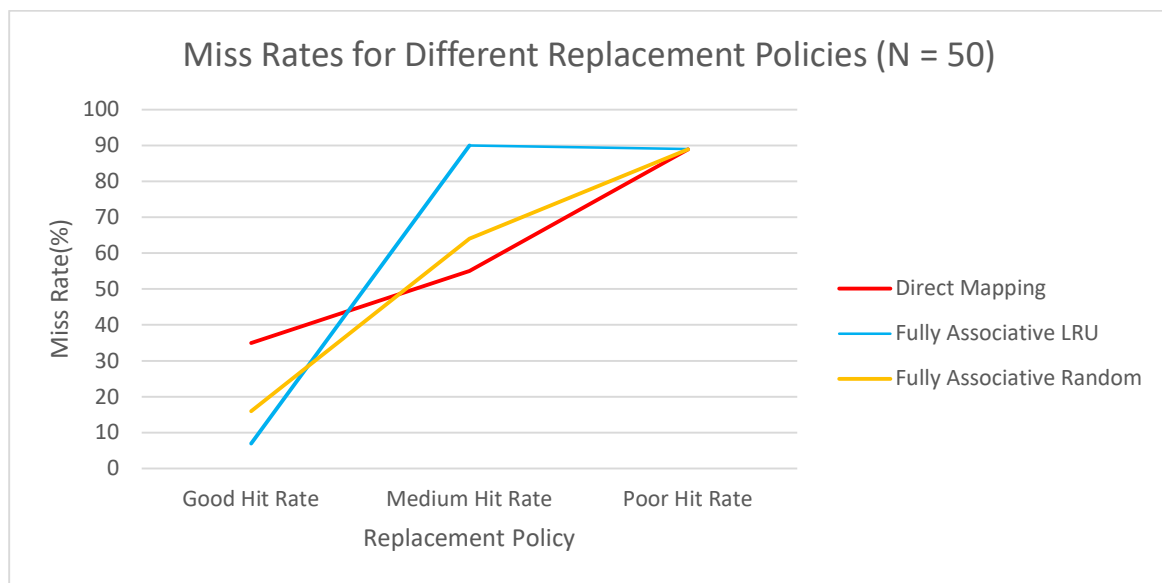
Cache Size	Block Size (Words)				
	2	4	8	16	32
256 Bytes	Miss Rate: 46% Number of Misses 1290	Miss Rate: 23% Number of Misses 646	Miss Rate: 12% Number of Misses 324	Miss Rate: 6% Number of Misses 163	Miss Rate: 3% Number of Misses 83
512 Bytes	Miss Rate: 46% Number of Misses 1289	Miss Rate: 23% Number of Misses 645	Miss Rate: 12% Number of Misses 323	Miss Rate: 6% Number of Misses 162	Miss Rate: 3% Number of Misses 82
1024 Bytes	Miss Rate: 46% Number of Misses 1289	Miss Rate: 23% Number of Misses 645	Miss Rate: 12% Number of Misses 323	Miss Rate: 6% Number of Misses 162	Miss Rate: 3% Number of Misses 82
2048 Bytes	Miss Rate: 46% Number of Misses 1289	Miss Rate: 23% Number of Misses 645	Miss Rate: 12% Number of Misses 323	Miss Rate: 6% Number of Misses 162	Miss Rate: 3% Number of Misses 82
4096 Bytes	Miss Rate: 46% Number of Misses 1289	Miss Rate: 23% Number of Misses 645	Miss Rate: 12% Number of Misses 323	Miss Rate: 6% Number of Misses 162	Miss Rate: 3% Number of Misses 82



b)

Table 1.3 : Comparison of Direct Mapping Cache and Fully Associative Caches Miss Rates (N =50)

	Good Hit Rate Block size: 16 words Cache size : 4096 bytes	Medium Hit Rate Block size: 8 words Cache size : 1024 bytes	Poor Hit Rate Block size: 32 words Cache size : 256 bytes
Direct Mapping	Miss Rate: 35% Number of Misses 978	Miss Rate: 55% Number of Misses 1535	Miss Rate: 89% Number of Misses 2505
Fully Associative LRU	Miss Rate: 7% Number of Misses 206	Miss Rate: 90% Number of Misses 2511	Miss Rate: 89% Number of Misses 2505
Fully Associative Random	Miss Rate: 16% Number of Misses 456	Miss Rate: 64% Number of Misses 1799	Miss Rate: 89% Number of Misses 2505



c)

Table 1.4 : Miss Rates of N-Way Set Associative for Different Set Sizes (N =50)

N-Way Set Associative Set Size	Good Hit Rate Block size: 16 words Cache size : 4096 bytes	Medium Hit Rate Block size: 8 words Cache size : 1024 bytes	Poor Hit Rate Block size: 32 words Cache size : 256 bytes
1	Miss Rate: 35% Number of Misses 978	Miss Rate: 55% Number of Misses 1535	Miss Rate: 89% Number of Misses 2505
2	Miss Rate: 19% Number of Misses 539	Miss Rate: 76% Number of Misses 2123	Miss Rate: 89% Number of Misses 2505
4	Miss Rate: 16% Number of Misses 451	Miss Rate: 90% Number of Misses 2511	Miss Rate: 89% Number of Misses 2505
8	Miss Rate: 7% Number of Misses 206	Miss Rate: 90% Number of Misses 2511	Miss Rate: 89% Number of Misses 2505

REPORT 2 (100x100 MATRIX)

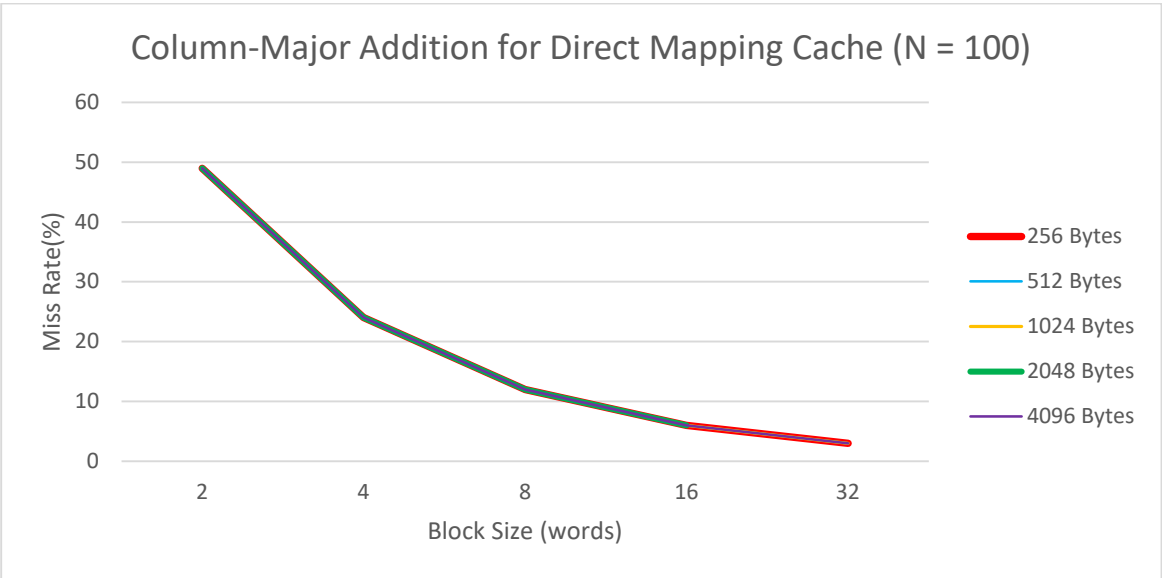
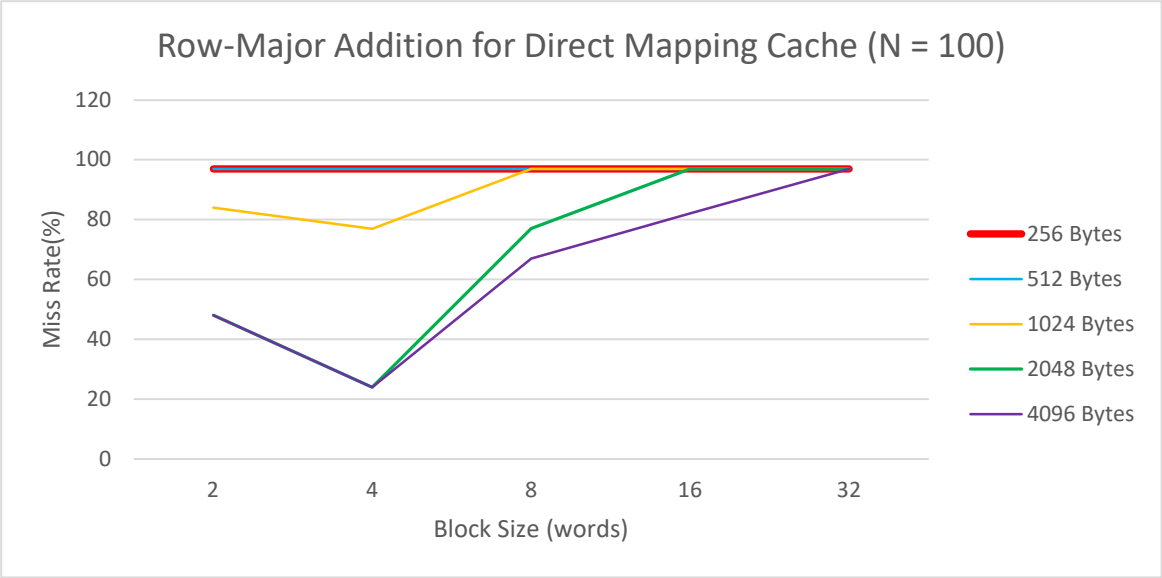
a)

Table 2.1 : Miss Rates and Number of Misses of Row-Major Addition for Direct Mapped Cache (N=100)

Cache Size	Block Size (Words)				
	2	4	8	16	32
256 Bytes	Miss Rate: 97% Number of Misses 10040	Miss Rate: 97% Number of Misses 10020	Miss Rate: 97% Number of Misses 10011	Miss Rate: 97% Number of Misses 10007	Miss Rate: 97% Number of Misses 10005
512 Bytes	Miss Rate: 97% Number of Misses 10040	Miss Rate: 97% Number of Misses 10020	Miss Rate: 97% Number of Misses 10011	Miss Rate: 97% Number of Misses 10006	Miss Rate: 97% Number of Misses 10004
1024 Bytes	Miss Rate: 84% Number of Misses 8640	Miss Rate: 77% Number of Misses 7920	Miss Rate: 97% Number of Misses 10011	Miss Rate: 97% Number of Misses 10006	Miss Rate: 97% Number of Misses 10004
2048 Bytes	Miss Rate: 48% Number of Misses 5115	Miss Rate: 24% Number of Misses 2520	Miss Rate: 77% Number of Misses 7911	Miss Rate: 97% Number of Misses 10006	Miss Rate: 97% Number of Misses 10004
4096 Bytes	Miss Rate: 48% Number of Misses 5118	Miss Rate: 24% Number of Misses 2520	Miss Rate: 67% Number of Misses 6939	Miss Rate: 82% Number of Misses 8470	Miss Rate: 97% Number of Misses 10004

Table 2.2 : Miss Rates and Number of Misses of Column-Major Addition for Direct Mapped Cache (N=100)

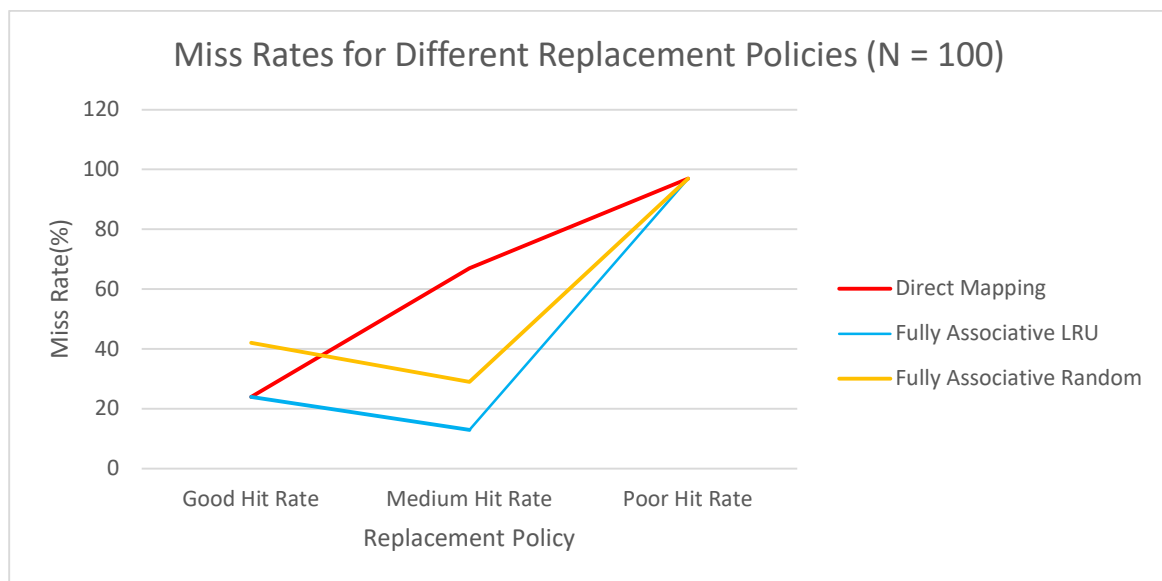
Cache Size	Block Size (Words)				
	2	4	8	16	32
256 Bytes	Miss Rate: 49% Number of Misses 5040	Miss Rate: 24% Number of Misses 2521	Miss Rate: 12% Number of Misses 1261	Miss Rate: 6% Number of Misses 631	Miss Rate: 3% Number of Misses 317
512 Bytes	Miss Rate: 49% Number of Misses 5039	Miss Rate: 24% Number of Misses 2520	Miss Rate: 12% Number of Misses 1260	Miss Rate: 6% Number of Misses 630	Miss Rate: 3% Number of Misses 316
1024 Bytes	Miss Rate: 49% Number of Misses 5039	Miss Rate: 24% Number of Misses 2520	Miss Rate: 12% Number of Misses 1260	Miss Rate: 6% Number of Misses 630	Miss Rate: 3% Number of Misses 316
2048 Bytes	Miss Rate: 49% Number of Misses 5039	Miss Rate: 24% Number of Misses 2520	Miss Rate: 12% Number of Misses 1260	Miss Rate: 6% Number of Misses 630	Miss Rate: 3% Number of Misses 316
4096 Bytes	Miss Rate: 49% Number of Misses 5039	Miss Rate: 24% Number of Misses 2520	Miss Rate: 12% Number of Misses 1260	Miss Rate: 6% Number of Misses 630	Miss Rate: 3% Number of Misses 316



b)

Table 2.3 : Comparison of Direct Mapping Cache and Fully Associative Caches Miss Rates (N =100)

	Good Hit Rate Block size: 4 words Cache size : 2048 bytes	Medium Hit Rate Block size: 8 words Cache size : 4096 bytes	Poor Hit Rate Block size: 32 words Cache size : 1024 bytes
Direct Mapping	Miss Rate: 24% Number of Misses 2520	Miss Rate: 67% Number of Misses 6939	Miss Rate: 97% Number of Misses 10004
Fully Associative LRU	Miss Rate: 24% Number of Misses 2520	Miss Rate: 13% Number of Misses 1311	Miss Rate: 97% Number of Misses 10004
Fully Associative Random	Miss Rate: 42% Number of Misses 4350	Miss Rate: 29% Number of Misses 2978	Miss Rate: 97% Number of Misses 10004



c)

Table 2.4 : Miss Rates of N-Way Set Associative for Different Set Sizes (N =100)

N-Way Set Associative Set Size	Good Hit Rate Block size: 4 words Cache size : 2048 bytes	Medium Hit Rate Block size: 8 words Cache size : 4096 bytes	Poor Hit Rate Block size: 32 words Cache size : 1024 bytes
1	Miss Rate: 24% Number of Misses 2520	Miss Rate: 67% Number of Misses 6939	Miss Rate: 97% Number of Misses 10004
2	Miss Rate: 24% Number of Misses 2520	Miss Rate: 15% Number of Misses 1527	Miss Rate: 97% Number of Misses 10004
4	Miss Rate: 24% Number of Misses 2520	Miss Rate: 13% Number of Misses 1311	Miss Rate: 97% Number of Misses 10004
8	Miss Rate: 24% Number of Misses 2520	Miss Rate: 13% Number of Misses 1311	Miss Rate: 97% Number of Misses 10004