İhsan Doğramacı Bilkent University

Computer Science

Computer Organization

CS 224

Lab 6

Section 1

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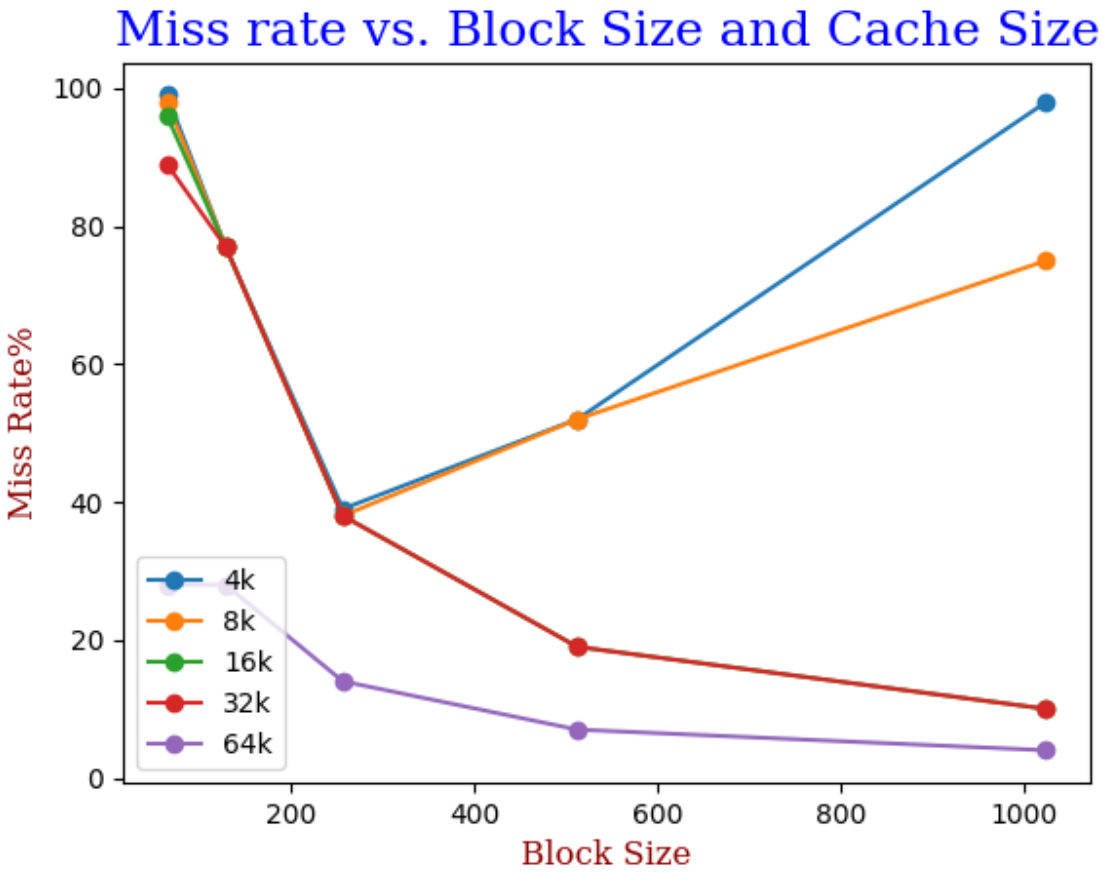
1)

a)

Cache Size (bytes) /Block Size (words)	4k	8k	16k	32k	64k
64	**Miss Rate: 99% Number of Misses: 20002**	**Miss Rate: 98% Number of Misses: 20006**	**Miss Rate: 96% Number of Misses: 19622**	**Miss Rate: 89% Number of Misses: 18032**	**Miss Rate: 28% Number of Misses: 5739**
128	**Miss Rate: 77% Number of Misses: 15635**	**Miss Rate: 77% Number of Misses: 15635**	**Miss Rate: 77% Number of Misses: 15635**	**Miss Rate: 77% Number of Misses: 15635**	**Miss Rate: 28% Number of Misses: 5768**
256	**Miss Rate: 39% Number of Misses: 7835**	**Miss Rate: 38% Number of Misses: 7835**	**Miss Rate: 38% Number of Misses: 7835**	**Miss Rate: 38% Number of Misses: 7837**	**Miss Rate: 14% Number of Misses: 2917**
512	**Miss Rate: 52% Number of Misses: 10502**	**Miss Rate: 52% Number of Misses: 10502**	**Miss Rate: 19% Number of Misses: 3937**	**Miss Rate: 19% Number of Misses: 3937**	**Miss Rate: 7% Number of Misses: 1492**
1024	**Miss Rate: 98% Number of Misses: 20005**	**Miss Rate: 75% Number of Misses: 15305**	**Miss Rate: 10% Number of Misses: 2005**	**Miss Rate: 10% Number of Misses: 2005**	**Miss Rate: 4% Number of Misses: 816**

Table 1.1: Miss Rates of Column-wise Copy for N = 100 in Direct Mapping



32k and 64k lines half graphs that what we expect, if I continue to expand the block size, then we can see that it will resembles the other 3 graphs that become what we expect. Since 64k and 32k are large we do not see the conflict misses yet, therefore, their miss rate decreasing.

b) Take 64k as a good hit rate, 32 k as a medium hit rate, 4k as a bad hit rate.

	Direct Mapped	Fully Associative (LRU)	Fully Associative (Random)
Good Hit Rate (64k byte Cache/1024 Word Block Size)	Miss Rate: 4% Number of Misses: 816	Miss Rate: 10% Number of Misses: 2005	Miss Rate: 4% Number of Misses: 881
Medium Hit Rate (4k byte	Miss Rate: 52% Number of Misses: 10502	Miss Rate: 20% Number of Misses: 4036	Miss Rate: 37% Number of Misses: 7444

Cache/512 Word Block Size)			
Poor Hit Rate (4k byte Cache/64 Word Block Size)	Miss Rate: 99% Number of Misses: 20002	Miss Rate: 98% Number of Misses: 20006	Miss Rate: 98% Number of Misses: 20006

c)

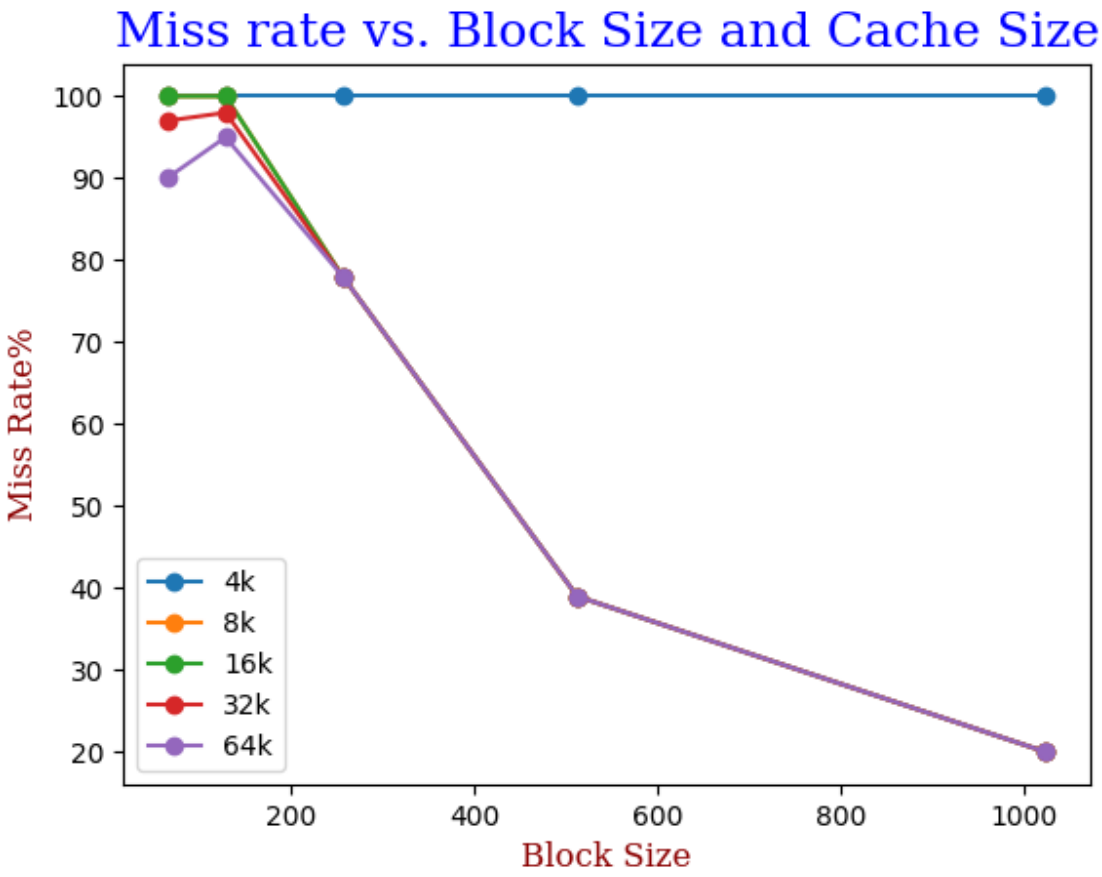
Set Sizes	Good Hit Rate (64k byte Cache/1024 Word Block Size)	Medium Hit Rate (4k byte Cache/512 Word Block Size)	Poor Hit Rate (4k byte Cache/64 Word Block Size)
2	Miss Rate: 6% Number of Misses: 1213 Number of Hits: 19162	Miss Rate: 20% Number of Misses: 4036 Number of Hits: 16339	Miss Rate: 98% Number of Misses: 20006 Number of Hits: 369
4	Miss Rate: 10% Number of Misses: 2005 Number of Hits: 18370		Miss Rate: 98% Number of Misses: 20006 Number of Hits: 369
8	Miss Rate: 10% Number of Misses: 2005 Number of Hits: 18370		Miss Rate: 98% Number of Misses: 20006 Number of Hits: 369
16	Miss Rate: 10% Number of Misses: 2005 Number of Hits: 18370		Miss Rate: 98% Number of Misses: 20006 Number of Hits: 369

2)a)

Cache Size (bytes) /Block Size (words)	4k	8k	16k	32k	64k
64	**Miss Rate: 100% Number of Misses: 80006 Number of Hitts: 369**	**Miss Rate: 100% Number of Misses: 80006 Number of Hitts: 369**	**Miss Rate: 100% Number of Misses: 80006 Number of Hitts: 369**	**Miss Rate: 97% Number of Misses: 78214 Number of Hitts: 2161**	**Miss Rate: 90% Number of Misses: 72346 Number of Hitts: 8029**
128	**Miss Rate: 100% Number of Misses: 80005 Number of Hitts: 370**	**Miss Rate: 100% Number of Misses: 80005 Number of Hitts: 370**	**Miss Rate: 100% Number of Misses: 80005 Number of Hitts: 370**	**Miss Rate: 98% Number of Misses: 79109 Number of Hitts: 1266**	**Miss Rate: 95% Number of Misses: 76175 Number of Hitts: 4200**
256	**Miss Rate: 100% Number of Misses: 80004 Number of Hitts: 371**	**Miss Rate: 78% Number of Misses: 62533 Number of Hitts: 17842**	**Miss Rate: 78% Number of Misses: 62533 Number of Hitts: 17842**	**Miss Rate: 78% Number of Misses: 62533 Number of Hitts: 17842**	**Miss Rate: 78% Number of Misses: 62533 Number of Hitts: 17842**
512	**Miss Rate: 100% Number of Misses: 80004 Number of Hitts: 371**	**Miss Rate: 39% Number of Misses: 31333 Number of Hitts: 49042**	**Miss Rate: 39% Number of Misses: 31333 Number of Hitts: 49042**	**Miss Rate: 39% Number of Misses: 31333 Number of Hitts: 49042**	**Miss Rate: 39% Number of Misses: 31333 Number of Hitts: 49042**
1024	**Miss Rate: 100% Number of Misses: 80005**	**Miss Rate: 20% Number of Misses: 15734**	**Miss Rate: 20%**	**Miss Rate: 20% Number of Misses: 15733**	**Miss Rate: 20%**

	Number of Hitts: 370	Number of Hitts: 64641	Number of Misses: 15733 Number of Hitts: 64642	Number of Hitts: 64642	Number of Misses: 15733 Number of Hitts: 64642

Table 2.1: Miss Rates of Column-wise Copy for N = 200 in Direct Mapping



8k, 16k, 32k, and 64k do not see the conflict misses yet. 4k is not enough for N = 200. Therefore, it's miss rate is very high. If we further continue to increase block size it will eventually increase miss rate since there will be conflict misses that caused by our number of blocks will be decrease.

b) Take 64k 1024 Block Size as a good hit rate, 16k 256 Block Size as a medium hit rate, 16k 64 Block Size as a bad hit rate.

	Direct Mapped	Fully Associative (LRU)	Fully Associative (Random)
Good Hit Rate (64k byte Cache/1024 Word Block Size)	Miss Rate: 20% Number of Misses: 15733	Miss Rate: 20% Number of Misses: 15733	Miss Rate: 20% Number of Misses: 15733
Medium Hit Rate (16k byte Cache/256 Word Block Size)	Miss Rate: 78% Number of Misses: 62533	Miss Rate: 78% Number of Misses: 62533	Miss Rate: 79% Number of Misses: 63616
Poor Hit Rate (16k byte Cache/64 Word Block Size)	Miss Rate: 100% Number of Misses: 80006	Miss Rate: 100% Number of Misses: 80006	Miss Rate: 99% Number of Misses: 79874

c)

Set Sizes	Good Hit Rate (64k byte Cache/1024 Word Block Size)	Medium Hit Rate (16k byte Cache/256 Word Block Size)	Poor Hit Rate (16k byte Cache/64 Word Block Size)
2	Miss Rate: 20% Number of Misses: 15733 Number of Hits: 17737	Miss Rate: 22% Number of Misses: 62533 Number of Hits: 17737	Miss Rate: 100% Number of Misses: 80006 Number of Hits: 369
4	Miss Rate: 20% Number of Misses: 15733 Number of Hits: 17737	Miss Rate: 22% Number of Misses: 62533 Number of Hits: 17737	Miss Rate: 100% Number of Misses: 80006 Number of Hits: 369
8	Miss Rate: 20% Number of Misses: 15733	Miss Rate: 22% Number of Misses: 62533	Miss Rate: 100% Number of Misses: 80006

	Number of Hits: 17737	Number of Hits: 17737	Number of Hits: 369
16	Miss Rate: 20% Number of Misses: 15733 Number of Hits: 17737	Miss Rate: 22% Number of Misses: 62533 Number of Hits: 17737	Miss Rate: 100% Number of Misses: 80006 Number of Hits: 369