Computer Architecture HW2. cache Simulator

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1.코드 구현 설명

Main 함수에서 mode, address를 불러와 trace 2차원 리스트에 저장합니다. Cache에 명령을 입력하는 역할을 합니다. cache, block, associative 크기 별로 solution 함수를 실행합니다.

solution 함수는 trace의 입력 전체를 실행합니다. 입력 mode에 따라 read, write, fetch 기능을 수행합니다. 기능에 따라 data, instruction cache 접근 횟수가 증가합니다. 또한 각 기능에서는 time_count를 증가시켜 높을수록 최근에 접근했음을 알립니다. 이는 다음에 LRU방식에 사용됩니다. 전체 명령을 시행한 후 data, instruction miss rate를 계산 후 출력형식에 맞게 출력합니다.

read 기능은 data cache에 접근합니다. direct mapped 방식이 아니라면 set이 형성됩니다. data cache valid==1, 같은 tag가 존재하면 hit로 판단합니다. miss라면 d_miss를 증가시키고 evit 함수를 통해 데이터를 저장할 block의 index를 계산하여 cache에 입력합니다. 또한 메모리와 내용이 다르다면(dirty 상태) memory write를 실행합니다.

write 기능은 read 기능과 유사하나 데이터가 dirty 상태로 변한다는 점에서 차이가 있습니다. write back 방식을 사용해서 cache에 write하는 순간 메모리와 다른 데이터가 되기 때문입니다.

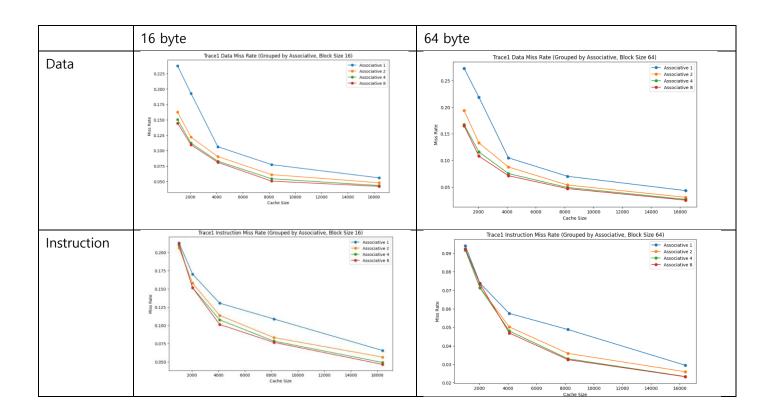
fetch 기능은 instruction을 불러옵니다. read 기능과 유사하나 data cache가 아닌 instruction cache에 접근한다는 점에서 차이가 있습니다. 또한 dirty 상태를 고려하지 않습니다.

evict 함수는 LRU 기능을 사용하기 위함입니다. 각 cache에서 time 정보를 불러옵니다. 낮을수록 접근을 안 한데이터로 판단됩니다. time이 가장 낮은 데이터를 찾아 index를 반환합니다. cache의 각 기능에서 데이터 삽입 또는 수정 위치를 계산합니다.

2.출력결과 표

	trace1-out					
	cache si	ze block size	associative	d-miss rate	1 to 40 of 40 i-miss rate	entries Filter mem writ
	1024	ze block size	associative 1	0.2376	0.2133	2636
	1024	16	2	0.1625	0.2064	1623
	1024	16	4	0.1503	0.2101	1461
	1024	16	8	0.1445	0.2118	1409
	1024 1024	64 64	2	0.2731 0.1936	0.0941	2856 1916
	1024	64	4	0.167	0.0917	1467
	1024	64	8	0.1649	0.0924	1436
	2048	16	1	0.1928	0.1704	2080
	2048	16	2	0.1219	0.1579	1126
	2048	16	4	0.1122	0.1518	1008
	2048	16	8	0.1095	0.1517	998
	2048	64	1	0.2189	0.0738	2368
	2048 2048	64 64	4	0.1329 0.1159	0.0715 0.0713	1140 847
	2048	64	8	0.108	0.0734	778
	4096	16	1	0.1064	0.1304	902
_	4096	16	2	0.0904	0.1136	728
1	4096	16	4	0.0829	0.1075	660
	4096	16	8	0.081	0.1012	651
	4096	64	1	0.1048	0.0575	831
	4096 4096	64 64	4	0.0876 0.0752	0.0502	578 461
	4096	64	8	0.0752	0.048	461
	8192	16	1	0.0712	0.1087	536
1	8192	16	2	0.0611	0.0832	288
	8192	16	4	0.0544	0.0783	244
	8192	16	8	0.0506	0.0766	217
	8192	64	1	0.0701	0.0488	507
	8192	64	2	0.0537	0.0359	281
	8192	64	4	0.049	0.033	239
	8192	64 16	8	0.0469	0.0325	230 191
	16384 16384	16	2	0.0559	0.0655	191
	16384	16	4	0.0434	0.0504	31
	16384	16	8	0.0421	0.0464	21
	16384	64	1	0.0432	0.0295	213
	16384	64	2	0.0306	0.026	115
	16384	64	4	0.0267	0.0234	85
	40204	0.4				73
	16384 Show 100 v	trace2-out.txt				t.csv × 40 entries F
	Show 100 •	per page trace2-out.txt			race2-out-resul	t.csv × 40 entries F
	Show 100 vtrace1-out.txt	per page trace2-out.txt block size	trace1-out-	result.csv t	race2-out-resul 1 to 40 of i-miss rat	t.csv × 40 entries F
	Show 100 vtrace1-out.txt	per page trace2-out.txt block size	trace1-out-	d-miss rate	1 to 40 of i-miss rat	t.csv X 40 entries F mem 1177
	Show 100 v trace1-out.txt cache size 1024 1024	per page trace2-out.txt block size 16 16	trace1-out- associative 1	d-miss rate 0.1335 0.0596	1 to 40 of i-miss rat 0.0937 0.0941	40 entries F e mem 1177 531
	show 100 v trace1-out.txt cache size 1024 1024 1024	per page trace2-out.txt block size 16 16 16	trace1-out- associative 1 2 4	d-miss rate 0.1335 0.0596 0.0482	1 to 40 of i-miss rat 0.0937 0.0941 0.079	40 entries F e mem 1177 531 398
	Show 100 v trace1-out.txt cache size 1024 1024 1024 1024	per page trace2-out.txt block size 16 16 16 16	trace1-out- associative 1 2 4 8	d-miss rate 0.1335 0.0596 0.0482 0.0467	1 to 40 of i-miss rat 0.0937 0.0941 0.079 0.0776	40 entries F we mem 1177 531 398 379
	show 100 v trace1-out.txt cache size 1024 1024 1024 1024 1024 1024	per page trace2-out.txt block size 16 16 16 16 16	trace1-out- associative 1 2 4 8	d-miss rate 0.1335 0.0596 0.0482 0.0467 0.1378	1 to 40 of i-miss rat 0.0937 0.0941 0.079 0.0776 0.0521	40 entries Fine mem 1177 531 398 379 1305
	Show 100 x trace1-out.txt cache size 1024 1024 1024 1024 1024 1024 1024	per page trace2-out.txt block size 16 16 16 16 64 64	trace1-out- associative 1 2 4 8 1 2	d-miss rate 0.1335 0.0596 0.0482 0.0467 0.1378 0.0662	1 to 40 of i-miss rat 0.0937 0.0941 0.079 0.0776 0.0521 0.0536	40 entries Fine mem 1177 531 398 379 1305 674
	Show 100 x	per page trace2-out.txt block size 16 16 16 16 16 64 64 64	trace1-out- associative 1 2 4 8 8 1 2 4	d-miss rate 0.1335 0.0596 0.0482 0.0467 0.1378 0.0662 0.0504	1 to 40 of i-miss rat 0.0937 0.0941 0.079 0.0776 0.0521 0.0536 0.0438	40 entries Fee mem 1177 531 398 379 1305 674 489
	cache size 1024 1024 1024 1024 1024 1024 1024 1024	per page trace2-out.txt block size 16 16 16 16 16 64 64 64	trace1-out- associative 1 2 4 8 1 1 2 4 8	d-miss rate 0.1335 0.0596 0.0482 0.0467 0.1378 0.0662 0.0504 0.0503	1 to 40 of i-miss rat 0.0937 0.0941 0.079 0.0726 0.0521 0.0536 0.0438 0.0451	40 entries Fee mem 1177 531 398 379 1305 674 489 430
	show 100 v trace1-out.txt cache size 1024 1024 1024 1024 1024 1024 1024 1024	block size	trace1-out- associative 1 2 4 8 1 1 2 4 8 1 2 4 4 8 1	d-miss rate 0.1335 0.0596 0.0482 0.0467 0.1378 0.0662 0.0504 0.0503 0.0445	1 to 40 of i-miss rat 0.0937 0.0941 0.079 0.0776 0.0521 0.0536 0.0438 0.0451 0.0583	40 entries Fie mem 1177 531 398 379 1305 674 489 430 315
	Show 100 x trace1-out.txt cache size 1024 1024 1024 1024 1024 1024 1024 1024	block size	trace1-out- associative 1 2 4 8 1 2 4 8 1 2 2 4 8 1 2	d-miss rate 0.1335 0.0596 0.0482 0.0467 0.1378 0.0662 0.0504 0.0503 0.0445 0.0362	1 to 40 of i-miss rat 0.0937 0.0941 0.079 0.0521 0.0536 0.0438 0.0451 0.0527	t.csv X 40 entries F te mem 1177 531 398 379 1305 674 489 430 315 253
	Cache size 1024 1024 1024 1024 1024 1024 1024 1024	block size 16 16 16 16 16 64 64 64 16 16	trace1-out- associative 1 2 4 8 1 1 2 4 8 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	d-miss rate 0.1335 0.0596 0.0482 0.0467 0.1378 0.0662 0.0504 0.0503 0.0445 0.0362 0.0359	1 to 40 of i-miss rat 0.0937 0.0941 0.0776 0.0521 0.0536 0.0438 0.0451 0.0583 0.0527 0.0398	40 entries F te mem 1177 531 398 379 1305 674 489 430 315 253 253
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	Cache size 1024 1024 1024 1024 1024 1024 1024 1024	block size 16 16 16 16 64 64 64 16 16 16	trace1-out- associative 1 2 4 8 8 1 2 4 8 8 1 1 2 4 4 8 1 2 4 4 8 1	d-miss rate 0.1335 0.0596 0.0482 0.0467 0.1378 0.0662 0.0504 0.0503 0.0445 0.0362 0.0359 0.0359 0.0314 0.025 0.0234	1 to 40 of i-miss rat 0.0937 0.0941 0.0776 0.0521 0.0536 0.0438 0.0451 0.0527 0.0398 0.0378 0.0353 0.0353 0.0305 0.0247	t.csv X 40 entries F e mem 1177 531 398 379 1305 674 489 430 315 253 253 241 220 183 170
	Cache size 1024 1024 1024 1024 1024 1024 1024 1024	block size 16 16 16 64 64 16 16 16	trace1-out- associative 1 2 4 8 1 1 2 4 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 8	d-miss rate 0.1335 0.0596 0.0482 0.0467 0.1378 0.0662 0.0504 0.0503 0.0445 0.0362 0.0359 0.0353 0.0314 0.025 0.0234 0.0193	1 to 40 of i-miss rat 0.0937 0.0941 0.076 0.0521 0.0536 0.0438 0.0527 0.0398 0.0378 0.0353 0.0305 0.0247 0.0216	t.csv × 40 entries F te mem 1177 531 398 379 1305 674 489 430 315 253 253 241 220 183 170 126
	Cache size 1024 1024 1024 1024 1024 1024 1024 1024	block size	trace1-out- associative 1 2 4 8 1 1 2 4 8 1 1 2 4 8 1 1 2 4 8 1 1 1 2 4 8 1 1 1 2 4 8 1 1 1 2 4 8 1 1 1 2 4 8 1 1 2 4 8 1 1 2 4 8 1 1 2 4 8 8 1	d-miss rate 0.1335 0.0596 0.0482 0.0467 0.1378 0.0662 0.0504 0.0503 0.0445 0.0362 0.0359 0.0353 0.0314 0.025 0.0234 0.0193 0.031	1 to 40 of i-miss rat 0.0937 0.0941 0.079 0.0776 0.0521 0.0536 0.0438 0.0451 0.0583 0.0527 0.0398 0.0378 0.0353 0.0353 0.0355 0.0247 0.0216	11.csv × 40 entries F 1177 531 398 379 1305 674 489 430 315 253 253 241 220 183 170 126 152
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	Cache size 1024 1024 1024 1024 1024 1024 1024 1024	block size 16 16 16 16 64 64 64 16 16 16	trace1-out- associative 1 2 4 8 1 1 2 4 8 8 1 1 2 4 8 8 1 2 4 8 8 1 2 4 8 8 1 8 8 1 8 8 8 8 8 8 8 8 8 8 8 8 8	d-miss rate 0.1335 0.0596 0.0482 0.0467 0.1378 0.0662 0.0504 0.0504 0.0503 0.0445 0.0362 0.0359 0.0359 0.0314 0.025 0.0234 0.0193 0.031 0.0214 0.0172 0.0165	1 to 40 of i-miss rat 0.0937 0.0941 0.0776 0.0521 0.0536 0.0438 0.0451 0.0527 0.0398 0.0378 0.0353 0.0305 0.0247 0.0216 0.0421 0.0294 0.0275	t.csv X 40 entries F te mem 1177 531 398 379 1305 674 489 430 315 253 253 241 220 183 170 126 152 152 154 156 49
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	Cache size 1024 1024 1024 1024 1024 1024 1024 1024	block size	trace1-out- associative 1 2 4 8 8 1 2 4 8 8 1 2 4 8 8 1 2 4 8 1 2 4 8 1 2 4 8 1 2 4 8 1 2 4 8 1 2 4 8 8 1 2 4 8 8 1 2 4 8 8 1 2 4 8 8 1 2 4 8 8 1 2 4 8 8 1 2 4 8 8 1 2 4 8 8 1 2 4 8 8 1 2 4 8 8 1 2 4 8 8 1 2 4 8 8 1 2 4 8 8 1 2 4 8 8 1 2 4 8 8 1 2 4 8 8 1 2 4 8 8 1 2 4 8 8 8 1 2 4 8 8 8 1 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	d-miss rate 0.1335 0.0596 0.0482 0.0467 0.1378 0.0662 0.0504 0.0503 0.0445 0.0362 0.0359 0.0353 0.0314 0.025 0.0234 0.0193 0.031 0.0214 0.0172 0.0165 0.0229 0.0135 0.0144 0.0177 0.0229 0.0162 0.0162	1 to 40 of i-miss rat 0.0937 0.0941 0.0776 0.0521 0.0536 0.0438 0.0527 0.0398 0.0378 0.0353 0.0305 0.0247 0.0216 0.0421 0.0294 0.0272 0.0275 0.02 0.015 0.0109 0.0111 0.0249 0.021 0.0249 0.021 0.0249 0.021 0.0249 0.021 0.0249 0.021 0.0249 0.021 0.0249 0.021 0.0249 0.021 0.0249 0.021 0.0249 0.021 0.0249 0.021 0.0249 0.021 0.0188	t.csv × 40 entries F te mem 1177 531 398 379 1305 674 489 430 315 253 253 241 220 183 170 126 152 87 56 49 151 69 78 81 77 19
	Cache size 1024 1024 1024 1024 1024 1024 1024 1024	block size 16 16 16 16 16 16 16 1	trace1-out- associative 1 2 4 8 1 1 2 4 8 1 1 2 4 8 1 1 2 4 8 1 1 2 4 8 1 1 2 4 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 8 8 1 8 8 8 8 8 8 8 8 8 8 8 8 8	d-miss rate 0.1335 0.0596 0.0482 0.0467 0.1378 0.0662 0.0504 0.0503 0.0445 0.0362 0.0359 0.0353 0.0314 0.025 0.0234 0.0193 0.031 0.0214 0.0172 0.0165 0.0229 0.0135 0.0144 0.0137 0.0229 0.0145 0.0145 0.0145	1 to 40 of i-miss rat 0.0937 0.0941 0.079 0.076 0.0521 0.0536 0.0438 0.0451 0.0527 0.0398 0.0353 0.0353 0.0353 0.0350 0.021 0.0216 0.0212 0.0272 0.0275 0.02 0.015 0.0109 0.0111 0.0249 0.021 0.0249 0.021 0.0219 0.0211 0.0249 0.0211 0.0249 0.0211 0.0249 0.0271	t.csv X 40 entries F in mem 1177 531 398 379 1305 674 489 430 315 253 241 220 183 170 126 152 87 56 49 151 69 78 81 77 19 4 3
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	Cache size 1024 1024 1024 1024 1024 1024 1024 1024	block size 16 16 16 64 64 64 64 64	trace1-out- associative 1 2 4 8 8 1 2 4 8 8 1 2 4 8 8 1 2 4 8 1 2 4 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 8 1 1 2 4 8 8 8 1 1 2 4 8 8 8 1 1 2 4 8 8 8 1 1 2 4 8 8 8 1 1 2 4 8 8 8 1 1 2 4 8 8 8 1 1 2 4 8 8 8 1 1 2 4 8 8 8 1 1 2	d-miss rate 0.1335 0.0596 0.0482 0.0467 0.1378 0.0662 0.0504 0.0504 0.0503 0.0445 0.0362 0.0359 0.0359 0.0314 0.025 0.0234 0.0193 0.031 0.0214 0.0172 0.0165 0.0229 0.0135 0.0137 0.0229 0.0162 0.0145 0.0145 0.0145	1 to 40 of i-miss rat 0.0937 0.0941 0.079 0.0521 0.0536 0.0438 0.0451 0.0527 0.0398 0.0353 0.0305 0.0247 0.0216 0.0421 0.0272 0.0275 0.02 0.015 0.015 0.015 0.0249 0.0219 0.0210 0.015 0.0199 0.0111 0.0249 0.0249 0.0210 0.0188 0.0188 0.0188 0.0195 0.0116 0.0096	t.csv × 40 entries Fe mem 1177 531 398 379 1305 674 489 430 315 253 253 241 220 183 170 126 152 87 56 49 151 69 78 81 77 19 4 3 3 79 19
	Cache size 1024 1024 1024 1024 1024 1024 1024 1024	block size 16 16 16 64 64 64 64 64	trace1-out- associative 1 2 4 8 1 1 2 4 8 1 1 2 4 8 1 1 2 4 8 1 1 2 4 8 1 1 2 4 8 1 1 2 4 8 1 1 2 4 8 1 1 2 4 8 1 1 2 4 8 8 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 8 1 1 2 4 8 8 8 1 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	d-miss rate 0.1335 0.0596 0.0482 0.0467 0.1378 0.0662 0.0504 0.0504 0.0503 0.0445 0.0362 0.0359 0.0353 0.0314 0.025 0.0234 0.0193 0.031 0.0214 0.0172 0.0165 0.0229 0.0135 0.0144 0.0137 0.0229 0.0162 0.0145 0.0145 0.0145 0.0145 0.0145 0.0145 0.0145 0.0145 0.0145 0.0145 0.0145 0.0145 0.0145 0.0144 0.0077	1 to 40 of i-miss rat 0.0937 0.0941 0.079 0.0521 0.0536 0.0438 0.0527 0.0398 0.0378 0.0305 0.0247 0.0216 0.0421 0.0294 0.0272 0.0275 0.02 0.015 0.0109 0.0111 0.0249 0.021 0.0188 0.0195 0.0116 0.0096 0.0081	t.csv × 40 entries File mem 1177 531 398 379 1305 674 489 430 315 253 253 241 220 183 170 126 152 87 56 49 151 69 78 81 77 19 4 3 79 19 11
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	Cache size 1024 1024 1024 1024 1024 1024 1024 1024	block size 16 16 16 16 16 16 16 1	trace1-out- associative 1 2 4 8 8 1 2 4 8 8 1 2 4 8 8 1 2 4 8 1 1 2 4 8 1 1 2 4 8 1 1 2 4 8 8 1 1 2 4 8 8 1 2 4 8 8 1 2 4 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	d-miss rate 0.1335 0.0596 0.0482 0.0482 0.0467 0.1378 0.0662 0.0504 0.0503 0.0445 0.0362 0.0359 0.0353 0.0314 0.025 0.0234 0.0193 0.031 0.0214 0.0172 0.0165 0.0229 0.0135 0.0144 0.0177 0.0029 0.0145 0.0145 0.0145 0.0145 0.0145 0.0147 0.0177 0.0062 0.0067	1 to 40 of i-miss rat 0.0937 0.0941 0.079 0.0521 0.0536 0.0438 0.0527 0.0388 0.0527 0.0398 0.0378 0.0353 0.0305 0.0247 0.0216 0.0421 0.0294 0.0275 0.02 0.015 0.0109 0.0111 0.0249 0.021 0.0249 0.021 0.0249 0.021 0.0249 0.021 0.0249 0.0016 0.0016 0.0016 0.0016 0.0096 0.0081 0.0082	t.csv × 40 entries File mem 1177 531 398 379 1305 674 489 430 315 253 253 241 220 183 170 126 152 87 56 49 151 69 78 81 77 19 4 3 79 19 11 3
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	Cache size 1024 1024 1024 1024 1024 1024 1024 1024	block size 16 16 16 16 16 16 16 1	trace1-out- associative 1 2 4 8 1 1 2 4 8 1 1 2 4 8 1 1 2 4 8 1 1 2 4 8 1 1 2 4 8 1 1 2 4 8 1 1 2 4 8 1 1 2 4 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 1 2 4 8 8 1 2 4 8 8 1 1 2	d-miss rate 0.1335 0.0596 0.0482 0.0467 0.1378 0.0662 0.0504 0.0503 0.0445 0.0362 0.0359 0.0359 0.0314 0.025 0.0234 0.0193 0.031 0.0214 0.0172 0.0165 0.0229 0.0135 0.0144 0.0177 0.0162 0.0145 0.0145 0.0145 0.0145 0.0145 0.0145 0.0145 0.0145 0.0145 0.0145 0.0145 0.0172 0.0162 0.0145 0.0172 0.0165 0.0057 0.0172	1 to 40 of i-miss rat 0.0937 0.0941 0.079 0.0536 0.0536 0.0438 0.0527 0.0536 0.0438 0.0527 0.0398 0.0378 0.0305 0.0247 0.0216 0.0272 0.0275 0.02 0.015 0.0110 0.0249 0.021 0.0195 0.0116 0.0096 0.0081 0.0082 0.0131	t.csv × 40 entries File mem 1177 531 398 379 1305 674 489 430 315 253 253 241 220 183 170 126 152 87 56 49 151 69 78 81 77 19 4 3 79 19 11 3 36 9 0
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	Cache size 1024 1024 1024 1024 1024 1024 1024 1024	block size 16 16 16 16 16 16 16 1	trace1-out- associative 1 2 4 8 8 8 1 2 4 8 8 8 1 2 4 8 8 8 1 2 4 8 8 8 1 2 4 8 8 8 1 2 4 8 8 8 1 2 4 8 8 8 1 2 4 8 8 8 1 2 4 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	d-miss rate 0.1335 0.0596 0.0482 0.0467 0.1378 0.0662 0.0504 0.0504 0.0503 0.0345 0.0359 0.0359 0.0359 0.0359 0.0359 0.0310 0.025 0.0234 0.0193 0.031 0.0214 0.0172 0.0165 0.0229 0.0135 0.0144 0.0177 0.0062 0.0145 0.01745 0.0175 0.0175 0.0175 0.0175 0.0175 0.0175 0.0175 0.0175 0.0175 0.0175 0.0175 0.0175 0.0175 0.0145 0.0145 0.0145	1 to 40 of i-miss rat 0.0937 0.0941 0.079 0.0521 0.0536 0.0438 0.0451 0.0527 0.0398 0.0378 0.0378 0.0305 0.0247 0.0216 0.0421 0.0294 0.0272 0.0275 0.015 0.0110 0.0249 0.021 0.0183 0.0183 0.0186 0.0082 0.0081 0.0082 0.0158 0.0082 0.0158 0.0093	t.csv × 40 entries File mem 1177 531 398 379 1305 674 489 430 315 253 253 241 220 183 170 126 152 87 56 49 151 69 78 81 77 19 4 3 79 19 11 3 36 9 0
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3. 그래프



1. cache size가 증가할수록 Miss rate가 감소하는 경향을 보입니다. 이는 시간 지역성, 공간 지역성으로 설명 가능합니다. cache size 증가는 더 많은 정보를 저장할 수 있게 합니다. 인접한 데이터 접근 확률을 증가시고, 데이터를 더 오래 유지함으로써 cache miss를 줄일 수 있습니다. 작은 cache size는 cache에 저장할 수 있는 block불수가 제한되어 높은 충돌과 교체로 인해 Miss rate이 증가하는 것을 확인할 수 있습니다.

2. associate이 증가할수록 miss rate이 감소하는 경향을 보입니다. 이는 충돌 가능성이 낮아지기 때문입니다. 충돌은 서로 다른 메모리 주소가 같은 index에 매핑 될 때 발생합니다. n이 증가할 수록 동일한 index에 여러 개의 블록을 저장할 수 있게되어 충돌 가능성이 감소합니다.

이번 실험에서 이 경향은 Data cahce에서 더 크게 보여줍니다. 접근 패턴이 다르기 때문이라고 예측합니다. Data cache에서는 read, write 기능을 수행하지만, instruction cache에서는 fetch(read) 기능만을 주로 사용합니다. read, write에서 충돌이 더 자주 발생하기 때문에 이런 결과가 발생했습니다.

3. 블록 크기가 증가할수록 miss rate가 감소하는 경향을 보입니다. 공간 지역성을 증가시켜 cache miss를 줄입니다.