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CS210 PS3

Problem 1

1.

12	11	10	9	8	7	6	5	4	3	2	1	0
CT	*CT*	*CT*	*CT*	*CT*	*CT*	*CT*	*CT*	*CI*	*CI*	*CI*	*CO*	*CO*

2A.

12	11	10	9	8	7	6	5	4	3	2	1	0
0	*1*	*1*	*1*	*0*	*0*	*0*	*1*	*1*	*0*	*1*	*0*	*0*

2B.

Parameter	Value
Byte Offset	*0x00*
Cache Index	*0x05*
Cache Tag	*0x71*
Cache Hit (Y/N)	*Y*
Cache Byte Returned	*0x0B*

Problem 3

A.

1. Total number of misses in the first loop: **128**
   256 runs, half of them miss (256*0.5 = 128).
2. Total number of misses in the second loop: **128**
   Candidates is cached, so it's still 128 misses, but 1792 runs.
3. Overall miss rate for writes to vote_array: **1/8**
   256 (128 * 2) misses in total, divided by 2048 (256 + 1798) runs in total = 1/8.

B.

Miss rate for writes to vote_array: 128/ 1792 = **1/14**
Still 128 misses, but only 1798 runs (127/1798 = 1/14).

Problem 4

A.
Size C = 8 * 4 * 4 = **128**

B.

12	11	10	9	8	7	6	5	4	3	2	1	0
CT	*CT*	*CT*	*CT*	*CT*	*CT*	*CT*	*CT*	*CI*	*CI*	*CI*	*CO*	*CO*

Problem 5

A. Miss rate: **100%**
It keeps overwriting, so all of them miss.
B. Miss rate: **1/4**
There's room for both now, so no overwriting.
C. Miss rate: **1/4**
They map to different sets, so no overwriting (just like previous).
D. No. A larger cache size would not help decrease the miss rate, as it wouldn't pull in more elements from x[0] or x[1] into the cache. And since they aren't overwriting each other, there would be no difference to the miss rate.
E. Yes. A larger block size would mean more elements from x[0] and x[1] would be pulled into the cache, effectively decreasing the miss rate.

Problem 6

0x027c

A.

13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	*0*	*0*	*0*	*1*	*0*	*0*	*1*	*1*	*1*	*1*	*1*	*0*	*0*

B.

Parameter	Value
VPN	*0x09*
TLB Index	*0x01*
TLB Tag	*0x02*
TLB Hit	*N*
Page Fault	*N*
PPN	*0x17*

C.

11	10	9	8	7	6	5	4	3	2	1	0
0	*1*	*0*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0*	*0*

D.

Parameter	Value
Byte Offset	*0x00*
Cache Index	*0x0F*
Cache Tag	*0x17*
Cache Hit (y/n)	*N*
Cache Byte Returned	-

Problem 7

0x03a9

A.

13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	*0*	*0*	*0*	*1*	*1*	*1*	*0*	*1*	*0*	*1*	*0*	*0*	*1*

B.

Parameter	Value
VPN	*0x0E*
TLB Index	*0x02*
TLB Tag	*0x03*
TLB Hit	*N*
Page Fault	*N*
PPN	*0x11*

C.

11	10	9	8	7	6	5	4	3	2	1	0
0	*1*	*0*	*0*	*0*	*1*	*1*	*0*	*1*	*0*	*0*	*1*

D.

Parameter	Value
Byte Offset	*0x01*
Cache Index	*0x0A*
Cache Tag	*0x11*
Cache Hit (y/n)	*N*
Cache Byte Returned	*-*

Problem 8

0x0040

A.

13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*0*

B.

Parameter	Value
VPN	*0x01*
TLB Index	*0x01*
TLB Tag	*0x00*
TLB Hit	*N*
Page Fault	*Y*
PPN	*-*