Lab 7

Total points 21/21

Please have a single tab with this form open alongside the spec as you work on Lab 7.

Exercise 1 - Memory Accesses

19 of 19 points

All answers for this section should be lowercased. This form is unable to recognize typos and misformatted answers. Please use spaces as indicated. Do not type the quotes.

Scenario 1

✓ How many memory accesses are there in one iteration of the loop? (one iteration means that index = 0) 1/1

1 ✓

Complete this sentence: The hit rate with this configuration was 0 because [parameter A] in bytes is exactly equal to [parameter B]. (parameter A will come first alphabetically)

	cache size	step size	block size	number of blocks	Score	
Parameter A	◉	○	○	○	1/1	✓
Parameter B	○	◉	○	○	1/1	✓

✓ Which of the following changes would improve the hit rate of this program (with keeping the program parameters the same)? Try to answer this without the simulator, but feel free to use it if you get stuck. 1/1

- [ ] Increase rep count
- [ ] Decrease rep count
- [x] Make this a fully associative cache ✓
- [ ] Make this a 2-way set associative cache
- [ ] Increase the block size to 16 bytes
- [x] Increase the block size to 32 bytes ✓
- [x] Increase block size to 64 bytes ✓

Scenario 2

✓ How many memory accesses are there per iteration of the loop? 1/1

2 ✓

✓ What is the repeating hit/miss pattern? Write your answer in the form "mmhhmh" and so on, where your response is the shortest pattern that gets repeated. 1/1

mhhh ✓

✓ Keeping everything else the same, would the hit rate change if we changed the associativity to 1? Try to answer this without the simulator, but feel free to use it if you get stuck. 1/1

- ○ Yes
- ◉ No ✓

✓ Keeping everything else the same, what does our hit rate approach as Rep Count goes to infinity? Try to answer this without the simulator, but feel free to use it if you get stuck. 1/1

- ○ 0 %
- ○ 25 %
- ○ 50 %
- ○ 75 %
- ◉ 100 % ✓

Scenario 3

✓ How many total accesses do we have to the L1 cache? 1/1

32 ✓

✓ How many L1 misses do we have? 1/1

16 ✓

✓ What is the hit rate of the L1 cache? (round answer to two decimal places) 1/1

0.50 ✓

✓ How many total accesses do we have to the L2 cache? HINT: Think about what the L1 cache has to do in order to make us access the L2 cache? 1/1

16 ✓

✓ What is the hit rate of the L2 cache? (round answer to two decimal places) 1/1

0 ✓

✓ What is the overall hit rate? (round answer to 2 decimal places) 1/1

0.33 ✓

✓ Changing what program parameter would allow us to increase the L2 hit rate, but keep the L1 hit rate the same? 1/1

- ○ array size
- ○ step count
- ◉ rep count ✓
- ○ option

What happens to the L1 and L2 hit rates as we increase the number of blocks in L1? What happens to the L1 and L2 hit rates as we increase the L1 block size?

	decrease (-)	stay the same (=)	increase (+)	Score	
L1 hit rate when we increase the number of blocks in L1	☐	☑	☐	1/1	✓
L2 hit rate when we increase the number of blocks in L1	☐	☑	☐	1/1	✓
L1 hit rate when we increase the L1 block size	☐	☐	☑	1/1	✓
L2 hit rate when we increase the L1 block size	☐	☑	☐	1/1	✓

Exercise 2 - Loop Ordering and Matrix Multiplication

2 of 2 points

All answers for this section should be lowercased. This form is unable to recognize typos and misformatted answers. Please use spaces as indicated. Do not type the quotes.

✓ Task 1

1/1

Which 2 orderings perform the best for these 1000-by-1000 matrices? Write your answer in the form "[Ordering1], [Ordering2]" (e.g. "ijk, ikj").

jki, kji ✓

✓ Task 2

1/1

Which 2 orderings perform the worst for these 1000-by-1000 matrices? Write your answer in the form "[Ordering1], [Ordering2]" (e.g. "ijk, ikj").

ikj, kij ✓