**Computer Organization 2019**

**HOMEWORK 6**

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問題(Question)

Q1. How do you know the number of block from input file?

Q2. How do you know how many set in this cache?

direct-mapped:

four-way set associative:

fully associative:

Q3. How do you know the bits of the width of the Tag ?

The width of the word offset is

The width of the cache index is different for each associativity:

direct-mapped:

four-way set associative:

fully associative:

I use unsigned long long (64 bits) to store addresses, so the width is .

Q4. Briefly describe your data structure of your cache.

It’s an array of block, and a block includes three variables: valid, tag, ref (short for reference, used to decide victim).

Q5. Briefly describe your algorithm of LRU.

When there is a memory miss, I choose the cache block with highest ref as victim, and there are three situations where we should update ref:

1. When finding an invalid block, I insert the address into cache with the ref set to zero, and add one to the ref of all the other valid blocks.
2. When there is a memory hit, I add one to the ref of valid blocks which is smaller than the ref of current block, and then set the ref of current block to zero.
3. When we need to replace a block, it’s same as memory hit, adding one to smaller ref and set ref to zero.

Q6. Run trace2.txt, trace3.txt and get the miss rate and put it in your report.

trace2.txt: 0.5

trace3.txt: 0.216545

心得(Report)

(請寫下完成本次作業的心得、學到哪些東西、困難點的部分。)

(Please write your learned lesson and conclusion, and difficult point.)

I learned that associativity is just deciding different widths of tag and cache index, and the most difficult part is to find out how to update the “ref” in cache block.