CSE-520/2020
ASSIGNMENT-2
REPORT

Refcount Replacement Policy:

Refcount is a counter based cache replacement policy. The paper has proposed two replacement algorithms, Access Interval Predictor(AIP) and Live-time Predictor(LvP). Both algorithms uses an event counter for the L2 cache line, which is incremented whenever cache access to a block or any block in a set occurs. AIP algorithm has been implemented here. A prediction table is defined in the replacement policy which stores the 4 bit maxCstored and the 1 bit confidence bit defined as confstored. Row of the prediction table is indexed through 8 bit hashedPC, which is obtained by XOR-ing all 8 bits part of the 48 bit program counter and Column of the prediction table is indexed through 8 bit hashedline block address, which is obtained by XOR-ing all 8 bit parts of the set address or concatenating 4 bits XOR-ed set address and 4 bits XOR-ed way address. Each block has 4 fields defined, 4 bit counter, 4 bit maxCpresent, 4 bit maxCpast and a confidence bit.

Whenever there is a hit or miss to a block, counter value of the each block is incremented by 1. In case of a hit, counter of that particular block is reset to 0 and maxCpresent of that block is updated with the maximum value after comparing the counter and the existing maxCpresent values.

In case of a miss, all the expired blocks are found. An expired block has the following conditions:

1. Counter>maxCpresent
2. Counter>maxCpast
3. Confidence bit=1

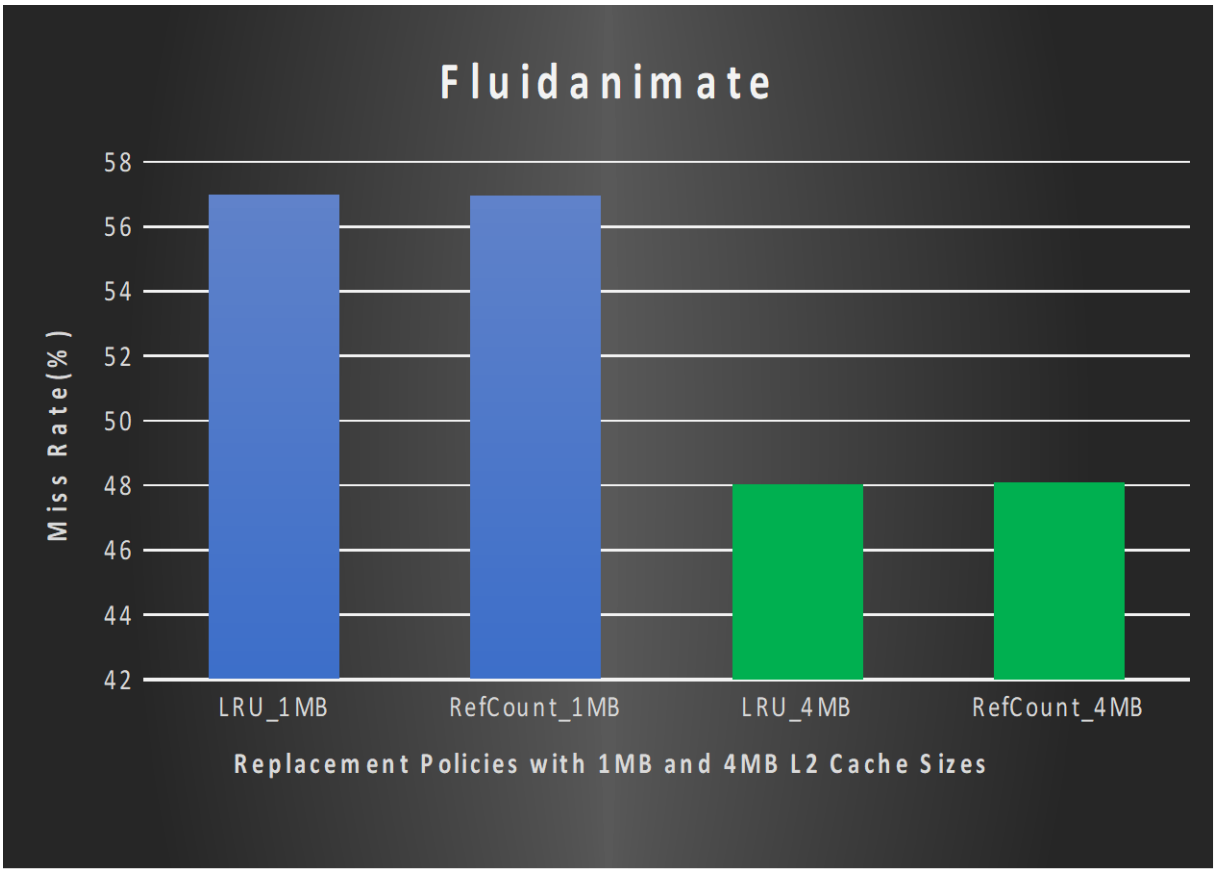
Replacement block is found based on the two conditions:

1. Priority is given to the expired non-MRU block closest to the LRU position.
2. In case there are no expired non-MRU blocks, LRU blocks are chosen for replacement.

Once the block is chosen for replacement, it's maxCpresent is stored in the maxCstored in the prediction table indexed by the hashedPC and hashedline. And the maxCpresent and maxCpast values are compared and if they are equal confidence bit is stored as 1 in the prediction table otherwise confidence bit is stored as 0 in the prediction table.

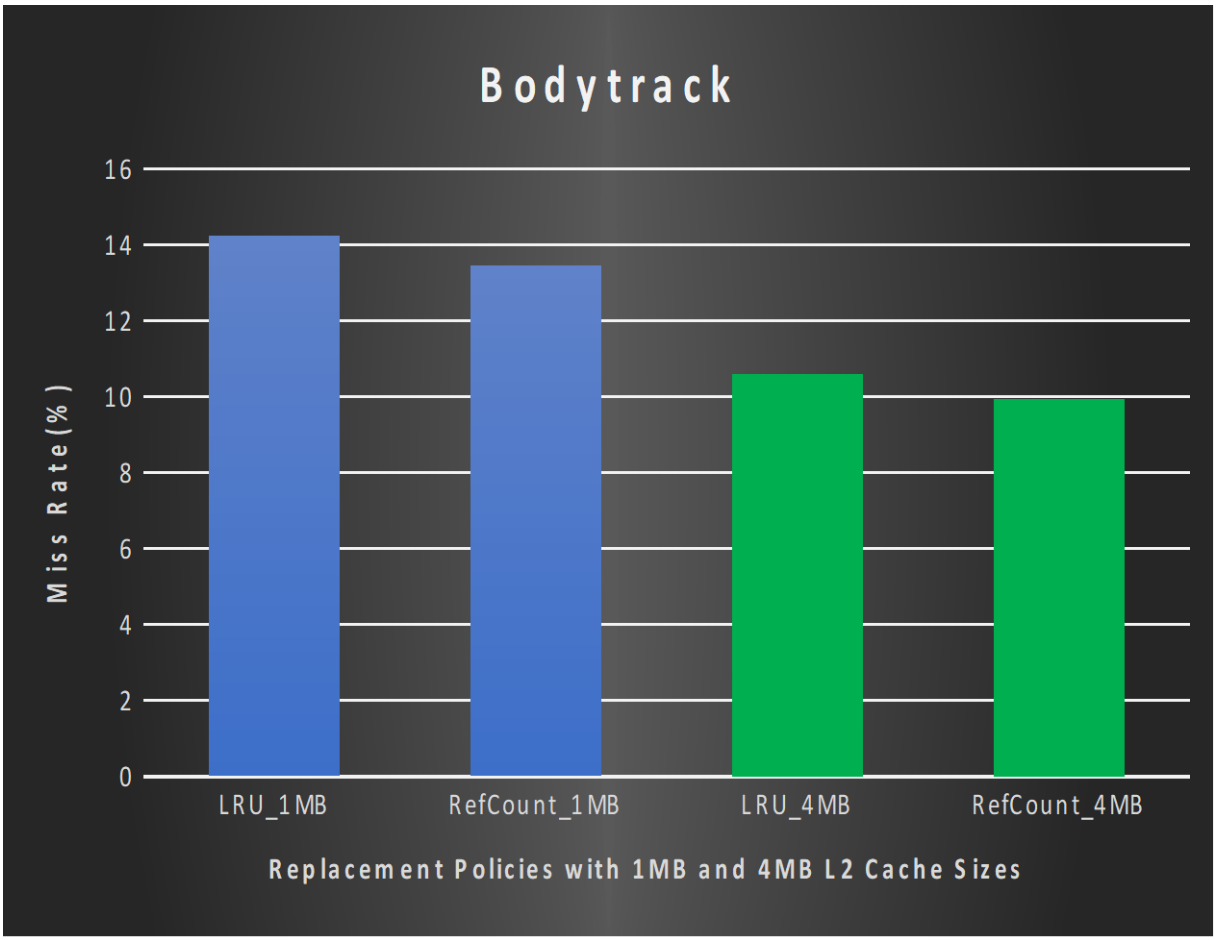
The counter and maxCpresent of the block to be placed in cache is set to 0 and maxCpast and confidence bit value is retrieved from the prediction table after indexing it through the hashedPC and the hashedline.

Total miss rates for Fluidanimate:



Fluidanimate	LRU_1MB	RefCount_1MB	LRU_4MB	RefCount_4MB
Miss Rates(%)	56.999	56.964	48.037	48.098

Total miss rates for Bodytrack:



Bodytrack	LRU_1MB	RefCount_1MB	LRU_4MB	RefCount_4MB
Miss Rates(%)	14.242	13.447	10.602	9.930