**COMPUTER ARCHITECTURE PROJECT REPORT**

20181269 박현우

The goal of this term-project is to implement a simulator for N-way set associative caches. I used C++ for the implementation.

**- overall procedures**

First, define a class named ‘Cache’ that has int-type variable ‘sets’, ‘blocks’, and ‘words’. In main function, create a Cache object ‘c’ and store the arguments entered in the form of "Cache\_Simulator.exe -s 2 -n 4 -m 1 input.txt" in ‘c.sets’, ‘c.blocks’, and ‘c.words’. Then store the values that are taken log of these values in the int-type variables ‘setnum’, ‘blocknum’, and ‘wordnum’, respectively.

Read the input file line by line and save it in the string array ‘line’. Declare ‘count’, a variable that stores the number of addresses in the input file, and update the value using while statement. The entered address is stored in hexadecimal form in the array ‘line’. Convert it to binary form and store it in the array ‘adr’. Declare ‘content’, a two-dimensional array for expressing the cache block, and initialize it to "0”. Obtain the block address and tag value and store them in the array ‘block’ and the array ‘tag’ respectively. Convert the set index in binary form expressed as a string to an int-type decimal number and store it in the array ‘index’.

Declare the variable ‘hitnum’, which represents the number of cache hits, and the variable ‘missnum’, which represents the number of cache misses. In addition, declare an int-type array ‘LRU’ to display the index of the Least-recently used (LRU) block and initialize it to zero. Open the file to save the output value.

Check the set corresponding to the set index value of each address and check the tag value of the cache block. If the tag value stored in the block is "0" (if empty), output “miss” and store the tag value of the current address in the block. Then, increase the ‘missnum’ by 1 and change the ‘check’ to true. If the tag value stored in the block is the same as the tag value of the current address, output “hit” and increase the ‘hitnum’ by 1 and change the ‘check’ to true. Unless these are the two cases (check == false, if the block of the set is full), output “miss” and store the tag value of the current address in the LRU block. And increase the ‘missnum’ by 1 and update ‘LRU’. Finally, print the ‘hitnum’ and ‘missnum’ values.

**- working example**

