In the fourth programming assignment cache simulator I used a couple of data structures to implement to the assignment. First i had used to an array stores all of the characters of the a string for things like the binary number, the index portion, or the tag portion. The next data structures used were the main used in the program for implementing the cache. I had used a hash table to store all the sets of blocks. For the associtivity I used a link list of the blocks to keep track. It was easy to do the first in first out algorithm, because you just had to move the head over one to update. Some problems I encountered during this assignment were learning how to use hash tables properly in C and computing the all the propotions of the binary number for the block. This was mainly my biggest issue, as I was computing the number of offsets bits wrong and didnt realize until very late in the assignment, which is why I was continously getting my outputs wrong, which I swore I was correct for my algorithm, which I was doing correctly but just for the wrong tags and then everything worked correctly once I had ifxed that litle problem. I noticed while do the assignment that one of the caches had a bett hit ratio, which was cache A, because the tag portion of the is the first part of the binary number, and the beggining has mostly zeros in it since the string is 48 bits, but most of the time not all those bits are used.