Performance Assessment

Based on the results of our 18 different tests. We have concluded that the best highest performing configuration is the one with a cache index, Block Size and Associativity of 4 with the branches not taken. This can be proved by 3 key statistics.

First, we will talk about CPI. CPI is the average number of CPU clock cycles that occur per an instruction are being executed. It can be calculated by taking the total amount of cycles and dividing it by the amount of instructions.
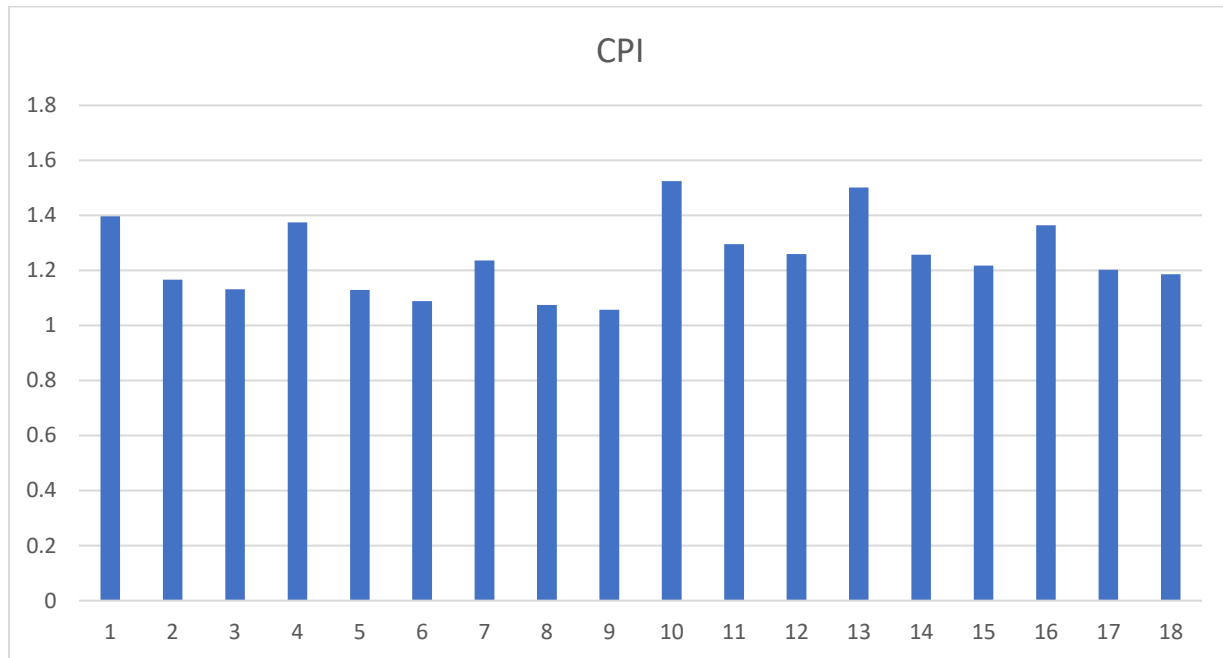

As we can see the 9th bar on the bar graph is below the average. The average CPI for all 18 tests was 1.248122389 while the CPI of this specific configuration is 1.057491. The standard deviation for this data was 0.135008803. Thus, we know that the CPI of 9th bar is well below one standard deviation meaning that's its CPI is in about the lowest 13 percentile. A low CPI is good because you want the least amount of cycles to pass per instruction, meaning that it takes less time to complete and instruction.

Second, we will discuss the miss rate. The miss rate is fraction of memory references not found in the cache. It can be calculated by dividing the cache misses by the cache accesses.
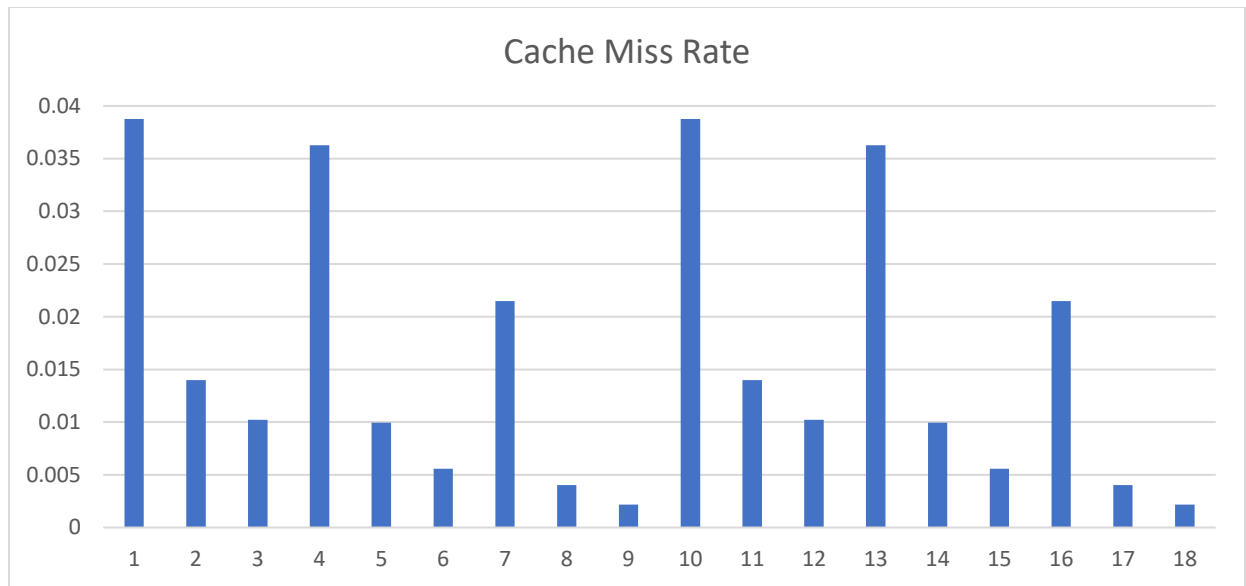
Cache Miss Rate

We can see that the 9th configuration had an extremely low miss rate to many of the other configurations. The average miss rate was 0.015827444 while the miss rate for the 9th configuration was 0.002175. The standard deviation of the data is 0.012806946, thus the 9th configuration is more than a standard deviation away from the average meaning that again, it is in the lowest 13 percentile. Having a low miss rate is good because that means that you spend less time copying things from the main memory to the cache.

Lastly, we would like to bring up the statistic of the total correct branch predictions. This basically means how many times did our program guess the right way to branch off to.

Total Correct Branch Predictions
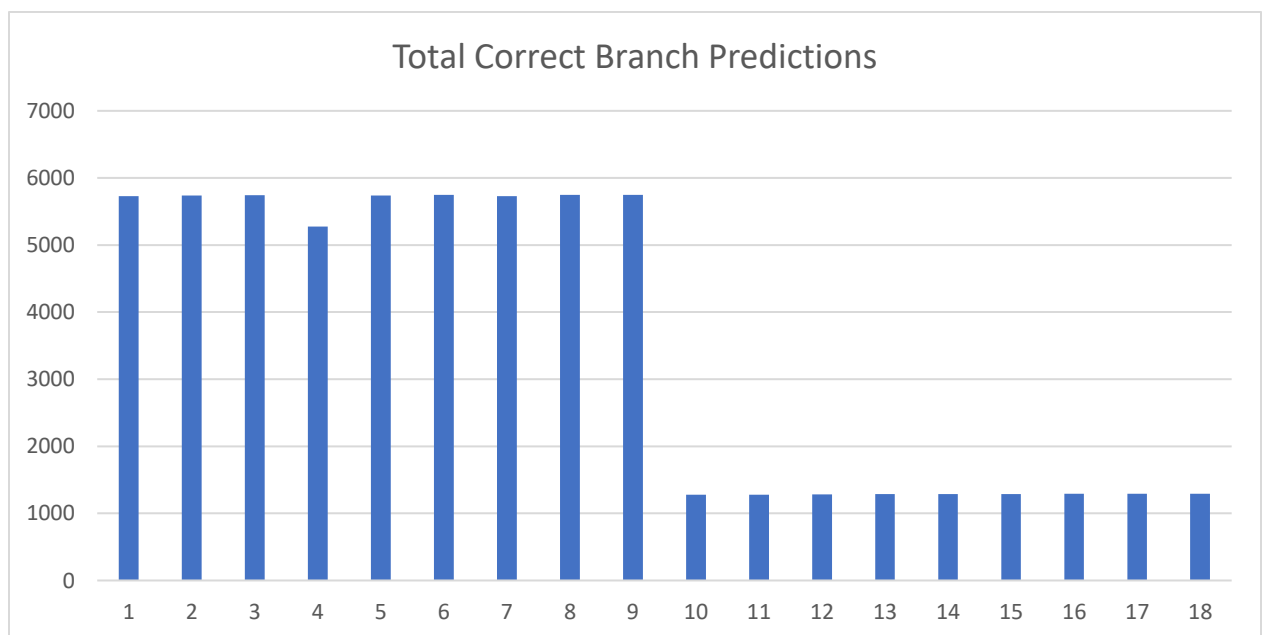
This data clearly shows that the branch not taken method usually yielded better result than the branch taken method by a lot.

These three statistic give us plentiful evidence that the 9th configuration performs because it has one of the lowest CPI's and miss rates and has a higher correct branch prediction rate than the branch taken method configurations.