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Final Project Report

1. If I were to implement a static branch prediction algorithm, I would have branches that go backwards be assumed to be taken. This is because during loops, you would be correct every time except for the last one where you do not branch backwards and loop again. For branches that go forward, I would have them assumed to not be taken. Forward branches are less obvious as to the correct choice, however the results from shang would lead me to believe that assumed not taken is the correct choice.

2. You should choose a cache with 16 entries, each having a block size of 16 bytes. Looking at the results from all levels of optimization, this resulted in the highest hit rate on average.

3. Compiling with -O0 optimization resulted in roughly 6x as many dynamic instructions, 8x as many writes to memory, 8x as many backwards branches not taken. However, -O0 also had 1/10 as many forward branch misses and in general had significantly higher cache hit rates. From this we can conclude that compiling with -O2 will result in a faster program but with more cache misses, however, the overall amount of cache references is significantly lower so it would still perform better overall.