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CPE 315 - 07 // 09

Thumb Write Up

1. If you are building a processor and have to do static branch prediction (meaning you have to assume at compile time whether a branch is taken or not), how should you do it? You can make a different decision for branches that go forward or backward.

Based on the stats from Shang, the ratio of taken to not taken helps determine what predictions should we make. For example, Backwards branch is taken 39109 times in -O2 and 41650 times in -O0. Therefore, if it is a backwards branch, we should assume/predict that it will be taken. On the other hand, forward branches should predict to not be taken.

2. If you are building a 256-byte direct-mapped cache, what should you choose as your block (line) size?

Based off of all the given outputs by teacher for Shang O1 and O2 a trend has shown that using a block size of 32 bytes is the best choice due to it consistently having the highest hit rate compared to the other block sizes.

3. What conclusions can you draw about the differences between compiling with no optimization and -O2 optimization?

Using -O2 optimization is significantly better in every aspect. -O2 has lower amount of instructions, mem reads/writes, reg read/writes and branches significantly less, although it has a lower hit rate. Despite that, it still hits fairly often at O2. The performance is overall superior when using -O2 optimization compared to no optimization.