ASSIGNMENT- BRANCH PREDICTION

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Branch prediction is a technique used to find the outcome of a conditional operation and gives the result. When a condition operation like if-else is executed then branch prediction speculates which condition will be executed, it then executes the instruction ahead of time. To make the forecast we must perform the following operations.

For each instruction we must store binary label components separately. Then we must combine the bits of the global history register with the most significant bits of the program counter to perform XOR operation. Then to generate the final string we must combine the result with the remaining bits of the program counter. To predict an output, we need to have a decimal value, so we must convert the result into the decimal form then if the result is greater than or equals to 2 then we must predict as taken or else not taken. Then we must compare actual and predicted values, if they are not equal then increase the count of misprediction. At the current entry based on actual value and taken value we must increase or decrease the counter by 1. Then we must left shift the global history register based on the outcome value.

```
traces/164.gzip/gzip.trace.bz2                12.056
traces/175.vpr/vpr.trace.bz2                  13.213
traces/176.gcc/gcc.trace.bz2                  12.852
traces/181.mcf/mcf.trace.bz2                  15.486
traces/186.crafty/crafty.trace.bz2            7.166
traces/197.parser/parser.trace.bz2            10.157
traces/201.compress/compress.trace.bz2        8.879
traces/202.jess/jess.trace.bz2                5.639
traces/205.raytrace/raytrace.trace.bz2        2.696
traces/209.db/db.trace.bz2                    4.225
traces/213.javac/javac.trace.bz2             2.591
traces/222.mpegaudio/mpegaudio.trace.bz2      2.581
traces/227.mtrt/mtrt.trace.bz2                3.030
traces/228.jack/jack.trace.bz2                3.226
traces/252.eon/eon.trace.bz2                  7.208
traces/253.perlbmk/perlbmk.trace.bz2          3.127
traces/254.gap/gap.trace.bz2                  5.933
traces/255.vortex/vortex.trace.bz2            1.223
traces/256.bzip2/bzip2.trace.bz2              0.086
traces/300.twolf/twolf.trace.bz2             20.027
average MPKI: 7.070
```