

Name: Rohan Jhaveri

Checkpoint 1A: Branch Prediction

1) Prediction Accuracy in %

Predictor	Bzip2(401)	PerlBench(400)	Sjeng(458)	403.gcc
1-bit	91.2	88.06	80.8	88.92
2-bit	93.74	89.5	84.52	86.33
GAg(8-bit history)	92.1	80.50	73.08	81.56
PAG(12-bit history)	94.21	95.69	81.85	90.20

We can see that the accuracy of each predictor varies according to the application. This maybe because of how and when the branches are created, and how many different paths they take.

2) Analysis

We can see that the gag branch predictors value varies the most across the applications. Almost by a 15% range. Hence it is the most uncertain. While PAG seems suitable for all forms and seems to be the most stable.

3) Table: Comparison between Gag 8bit history and Gag 12 bit history

Predictor	Bzip2	PerlBench	Gcc	Sjeng
GAg(8-bit history)	92.1	80.50	81.56	73.08
GAg(12-bit history)	93.39	88.52	88.04	83.28

Longer History provide better prediction accuracy?

Yes

The increases in length of the predictor causes a longer history or pattern storage of the branches. Hence it results in a better accuracy. There may be many if statements that have a lot of for loops or if statements (branches below branches) under them, the longer history allows to maintain a larger pattern and hence causing accuracy increase.

Which applications have the most global correlation and why?

Bzip is seen to have the maximum accuracy and hence can be said to have the maximum co-relation between the branches.

Co-relation refers to prediction technique where 2 bits are assigned to each branch, indicating what to do if previous branch was taken(1) or not taken(0). Bzip would be having maximum successive branches that followed this relationship and hence accuracy was high.

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What is the miss rate ?

Applications	Miss Rate in %
Bzip2	6.22
PerlBench	33.66
Gcc	4.25
Sjeng	16.04

There are different miss rates for different applications. The Bzip has a low miss rate because it has the highest rate of co-related branches globally.