

Name: _____

HW 3: Branch Prediction

For the purposes of this assignment:

- the "Static-First" predictor makes its first prediction false (predicting the branch will not be taken)
- the bimodal dynamic predictor begins in the state that will predict false but not confidently (assumes the previous prediction was an error)
- the two-layered bimodal predictor uses a 2-bit history to index its prediction table and sets the Prediction:ErrCount bits to 0:1, 1:1, 0:1, and 1:1 for the histories 00, 01, 10, and 11, respectively and an initial history two branches were not taken.

1) For the branch trace below, how many accurate predictions are made by a Fixed-False predictor? You shouldn't need to underline any mispredictions to answer this.

$$\frac{44}{100}$$

2) For the branch trace below, how many accurate predictions are made by a Static-First predictor? You shouldn't need to underline any mispredictions to answer this.

$$\frac{55}{100}$$

3) For the branch trace below, how many accurate predictions are made by a Bimodal Dynamic predictor? Please underline mispredictions. 37

$$\frac{37}{100}$$

assumed

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$\frac{a}{b} \cdot \frac{c}{d}$ $\frac{a}{b} \cdot \frac{c}{d}$ $\frac{a}{b} \cdot \frac{c}{d}$ $\frac{a}{b} \cdot \frac{c}{d}$ $\frac{a}{b} \cdot \frac{c}{d}$ $\frac{a}{b} \cdot \frac{c}{d}$

$\underline{a}\underline{a} \cdot \cdot$ $\underline{a} \cdot \underline{a}\underline{a}$ $\cdot \cdot \underline{a} \cdot$ $\underline{a}\underline{a}\underline{a} \cdot$ $\cdot \underline{a} \cdot \cdot$ $\underline{a} \cdot \underline{a}\underline{a}$

$\frac{a}{b} \cdot \frac{c}{d} = \frac{ac}{bd}$
 $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c} = \frac{ad}{bc}$

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Prediction : F » T » F » T » F » T » F » T » F » T » F » T » F » T
» F » T » F » T » F » T » F » T » F » T » F

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- 5) For the branch trace below, how many accurate predictions are made by a Fixed-False predictor? You shouldn't need to underline any mispredictions to answer this.

$$\frac{33}{100}$$

- 6) For the branch trace below, how many accurate predictions are made by a Static-First predictor? You shouldn't need to underline any mispredictions to answer this.

$$\frac{33}{100}$$

- 7) For the branch trace below, how many accurate predictions are made by a Bimodal Dynamic predictor? Please underline mispredictions.

$$\frac{71}{100}$$

assumed
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Prediction : F >> T >> F >> T



assumed

$$\frac{68}{100}$$

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• ②
② •
② ②

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01
11
01
11

 $\gg 00 \gg 01 \gg 00 \gg 01$

② $\gg 10 \gg 11 \gg 10 \gg 01 \gg 00 \gg 11 \gg 10 \gg 01 \gg 00$

③ $\gg 10 \gg 11 \gg 01$

④ $\gg 00 \gg 01 \gg 00 \gg 01 \gg 11 \gg 10 \gg 11 \gg 10$

① $[\cdot \cdot]$

② [·e]

③ [a.]

[illegible]