

CS311 - Computer Architecture - Spring 2015
In-class Lab
Branch Prediction

Consider the following code:

```
int a[1000][4]

int main()
{
    for(int i=0; i<1000; i++) {
        for(int j=0; j<4; j++) {
            a[i][j] = 0;
        }
    }
    ...
}
```

The MIPS assembly code for this would include two conditional branches at the end of each loop.

1. What would the prediction rate be for the static scheme “Assume Taken”?
2. Assuming that all table entries are initialized to 0 (strong not taken), determine the number of conditional branches that will be mispredicted and the prediction rate using the following schemes:
 - (a) A BHT using 1-bit counters.
 - (b) A BHT using 2-bit saturation counters.
 - (c) A correlating predictor which uses a 4-bit global register and 2-bit saturation counters in the PHT (this is known as a (4,2) correlating predictor).
3. If we change the 1000 to n , find an expression for the percentage of correct predictions in terms of n for each of the dynamic schemes used above. Determine the limit for each expression as n gets very large.