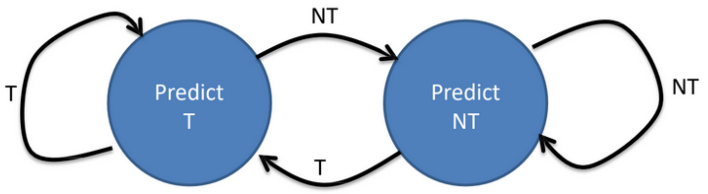
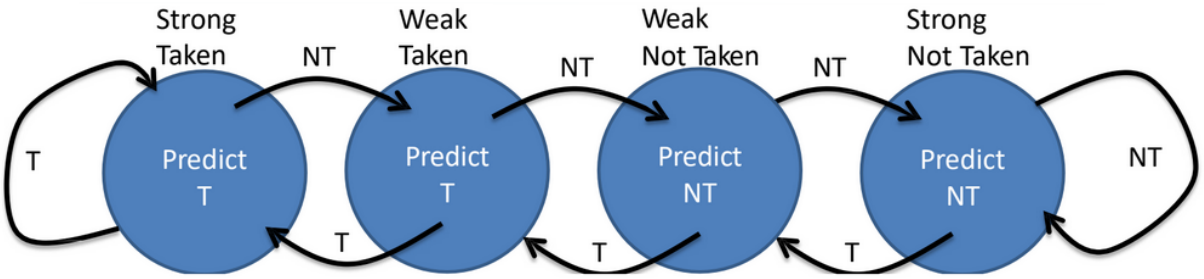
CSE/ECE 511: Quiz 3: Set A

Q1. Given the following two codes, calculate the number of mispredictions in by the branch predictors. You are given 2 branch predictors, both of which are shown in the given figure:

1. Having 1-bit history



2. Having 2 bits history



State which branch predictor performs better on the given codes. Assume all branch predictors start from the branch NOT TAKEN state. Branch Taken here means to execute the for loop. Branch Not taken is to come out of the for loop. Also, the branches are evaluated in the order of the "for loops." **[10 Marks]**

1.
```
Int sum = 0;
for (int i =0; i<100;i++){
Sum += i;
}
```

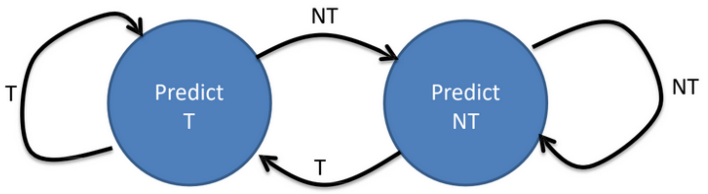
2.
```
Int sum = 0;
For (int i =0; i<10;i++){
        for(j =0;j<10;j++){
                Sum += i*j;}
        }
```

Q2. A victim cache for a 4KB direct mapped cache removes 80% of the conflict misses in a program. Without the victim cache, the miss rate is 0.064 (6.4%), and 67% of these misses are conflict misses. What is the percentage improvement in the AMAT (average memory access time) due to the victim cache? Assume a hit in the main (4KB) cache takes 1 cycle. For a miss in the main cache that hits in the victim cache, the Hit time of the victim cache is 2 cycles. For a miss in both the main and victim caches, assume a further penalty of 48 cycles to get the data from memory. Calculate the AMAT for the cache setup with and without the victim Cache. **[10 Marks]**

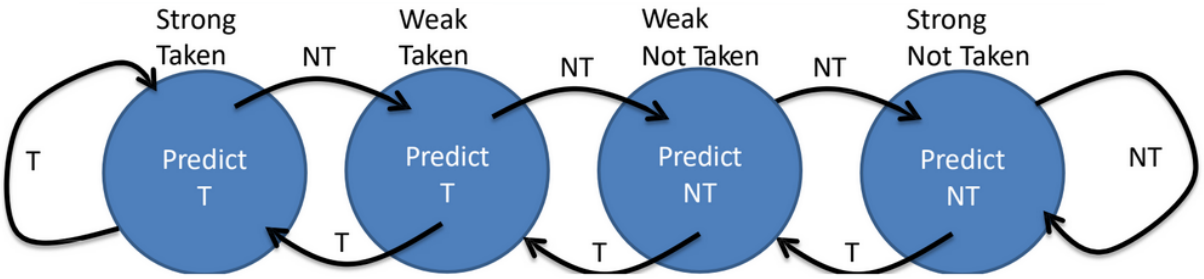
CSE/ECE 511: Quiz 3: Set B

Q1. Given the following two codes, calculate the number of mispredictions in by the branch predictors. You are given 2 branch predictors, both of which are shown in the given figure:

1. Having 1-bit history



2. Having 2 bits history



State which branch predictor performs better on the given codes. Assume all branch predictors start from the branch NOT TAKEN state. Branch Taken here means to execute the for loop. Branch Not taken is to come out of the for loop. Also, the branches are evaluated in the order of the "for loops." **[10 Marks]**

1.
```
Int sum = 0;
for (int i =0; i<100;i++){
Sum += i;
}
```

2.
```
Int sum = 0;
For (int i =0; i<10;i++){
        for(j =0;j<10;j++){
                Sum += i*j;}
        }
```

Q2.A victim cache for a 4KB direct mapped cache removes 80% of the conflict misses in a program. Without the victim cache, the miss rate is 0.07 (7%), and 70% of these misses are conflict misses. What is the percentage improvement in the AMAT (average memory access time) due to the victim cache? Assume a hit in the main (4KB) cache takes 1 cycle. For a miss in the main cache that hits in the victim cache, the Hit time of the victim cache is 2 cycles. For a miss in both the main and victim caches, assume a further penalty of 50 cycles to get the data from memory. Calculate the AMAT for the cache setup with and without the victim Cache. **[10 Marks]**