

Variant 2

(code attached)

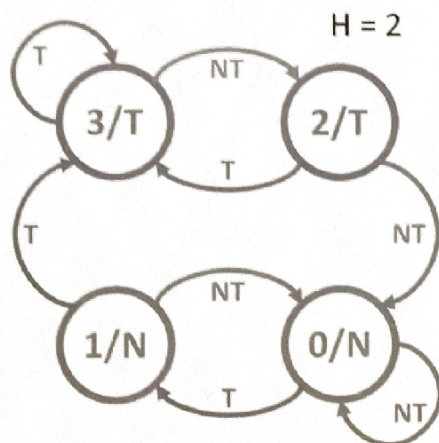
The main branch currently has 70% prediction accuracy. Reorder the magic numbers to make it 0%. Explain the solution.

Use BHT tool in MARS to generate branch predictions.

BHT parameters:

- History size: 2
- Entries: any
- Initial value: NOT TAKE

Prediction model used in BHT:



History	Prediction	State
NT, NT / T, NT	NOT TAKE	0/N
NT, T	NOT TAKE	1/N
T, NT	TAKE	2/T
T, T / NT, T	TAKE	3/T

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1. The edited code
2. 3-sentence explanation of the solution
3. Snapshot of branch predictor state at the end of the program

MARS link: https://courses.missouristate.edu/KenVollmar/mars/MARS_4_5_Aug2014/Mars4_5.jar


```

.data
    magic_numbers: .word 35, 40, 65, 41, 215, 90, 15, 320, 544,
540, 85, 915, 1351, 66, 13, 26, 97, 32, 48, 58

.text
main:
    li        $t1, 0
loop:
    mul       $t3, $t1, 4
    lw        $t0, magic_numbers($t3)
    rem       $t4, $t0, 5
    beq       $t4, 0, magic_br # the main branch
    move      $t4, $zero

magic_br:
    addi      $t1, $t1, 1
    beq       $t1, 20, endloop
    j         loop

endloop:
    li        $v0, 10
    syscall

```