

BPU Example 2

lunedì 28 ottobre 2024 10:14

QUESTI SONO I 2 PATTERN D'ESAME

(10 PUNTI + 10 PUNTI) e mi si aggiungono 2 domande relati agli s. per arrivare a 30 (poi 30 di proporz. e si fa media). Una domanda può essere:

BPU Question 1

Considering a 2-bit saturating counter BHT of 1K entries; and assuming that the processor executes the following code fragment, determine the BHT final state and calculate the misprediction ratio in the presented case. The BPU initial state is indicated in the table.

General assumptions:

- R10 is the main loop control register and is initialized to 100
- R3 and R7 are reference values set to 1
- R2 is the input register
 - o the input value is the incremental sequence of integer numbers starting from 0 (in the first iteration) to 99 (during the last iteration)

Address	Instruction	BHT (2-bit)	Prediction	misP. counter
0x0000	L0: ...	0	NT	
...	Reading input values	0	NT	
0x0010	AND R1, R2, R3	0	NT	
0x0014	BEQZ R1, L1	0 - 1 - 0	NT	1 + 1 ... 50
0x0018	...	0	NT	
0x001C	L1: XOR R4, R1, R7	0	NT	
0x0020	BEQZ R4, L2	0 - 1 - 0	NT	1 + 1 ... 50
0x0024	...	0	NT	
0x0028	L2: ...	0	NT	
0x002C	DADDI R10, R10, #-1	0	NT	
0x0030	BNEZ R10, L0	0 - 1 - 2 - 3 ... -2	NT - T	1 + 1 + 1
0x0038	...	0	NT	

"Cosa succede se la BHT invece di 12 MESSE 10 ENTRA?"

(ossicella alla fine entry più di un'inf.)

MIS
PRED

questi per il ciclo 1, per il secondo accade l'opposto, mentre (E TUTTI I DISPARI)

l'ultimo salto (BNEZ R10, L0)

Viene sempre preso l'opposto della 100esima

(rimane NT fino ai 2 MIS, che convergono)

SUBITO noi primi 2 cicli, l'ultimo MIS avviene alla fine quando ho comb. a T ma in realtà è NT. Alla fine rimane lo pred. T però non ho il secondo MIS)

$$\Rightarrow 35 \cdot 100 = 300$$

$$50 + 50 + 3 = 103$$

$$\Rightarrow \frac{103}{300} = 34\%$$

BPU Question 2

Considering a (2,2) correlating predictor of 1K entries; and assuming that the processor executes the following code fragment, determine the BPU final state and calculate the misprediction in the presented case. The BPU initial state is indicated in the table.

General assumptions:

- R10 is the main loop control register and is initialized to 100
- R3 and R7 are reference values set to 1
- R2 is the input register
 - o the input values are the integer numbers from 0 to 99

predittori e 2 NT
 $\Rightarrow \begin{matrix} 0 \\ 1 \end{matrix} \} NT$
 $\begin{matrix} 3 \\ 2 \end{matrix} \} T$

(SHIF NEG.

General assumptions:

- R10 is the main loop control register and is initialized to 100
- R3 and R7 are reference values set to 1
- R2 is the input register
 - o the input values are the integer numbers from 0 to 99

$\Rightarrow \begin{matrix} 0 \\ 1 \end{matrix} \} NT$
 $\begin{matrix} 2 \\ 3 \\ 4 \end{matrix} \} T$

Address	Instruction	2-bit predictors				2-bit shift register	misP. counter
		00	01	10	11		
0x0000	L0: ...	0	0	0	0	00-01-11	
...	; Reading input values	0	0	0	0		
0x0010	AND R1, R2, R3	0	0	0	0		
0x0014	BEQZ R1, L1	0-1	0	0	0-1-2-3	01-10-11	1+1+1
0x0018	...	0	0	0	0		
0x001C	L1: XOR R4, R1, R7	0	0	0	0		
0x0020	BEQZ R4, L2	0	0	0-1-2-3	0	10-01-10-01-10-01	1+1
0x0024	...	0	0	0	0		
0x0028	L2: ...	0	0	0	0		
0x002C	DADDI R10, R10, #-1	0	0	0	0		
0x0030	BNEZ R10, L0	0	0-1-2-3-2	0-1-2-3	0	01-11-01-11-01	1+1+1+1+1
0x0038	...	0	0	0	0	11-01-10	

$$3+2+5 = \frac{10}{300} = 3.3\%$$

lascio il predittore
 del salto neg.
 riportando sull'iniz.

SHIF REG.
 → a portine
 da 00 SHIF 10
 a DX
 1 SE MIPS
 0 SE HIT