

Cache dados

V	TAG	DATA	V	TAG	DATA
00	1	00002h 00b   M[208h]   M[200h] R	00	1	00001h 00b   M[108h] B[01]   M[100h] B[00]
01	1	00000h 10b   M[098h] A[03]   M[090h] A[02]	01	1	00001h 00b   M[118h] B[03]   M[110h] B[02]
10	1	00000h 10b   M[0A8h] A[05]   M[0A0h] A[04]	10	1	00001h 00b   M[128h] B[05]   M[120h] B[04]
11	1	00000h 10b   M[0B8h] A[07]   M[0B0h] A[06]	11	1	00001h 00b   M[138h] B[07]   M[130h] B[06]

$(MMMM) \times 8 + M$   $33A$   $MR = 51,5\%$

Ex2

Cache instruções

V	TAG	DATA
00	1	M[00Ch] M[008h] M[004h] M[000h]
01	1	M[01Ch] M[018h] M[014h] M[010h]
10	1	M[02Ch] M[028h] M[024h] M[020h]
11	1	M[03Ch] M[038h] M[034h] M[030h]

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↑  
Vou traçar

ultima instrucao

$M1111 \quad M111 \quad M11111 \quad 15 \times M11111 \quad 16 \times M11111 \quad M$

$168A = 36M + 132H$

Ex 1

$\log_2(256MB) = 28$

Instruções

$offset = \log_2(16) = 4$   
 $index = \log_2\left(\frac{64}{16}\right) = 2$

$Tag = 28 - 4 - 2 = 22$

$26MB \times 4 = 1,8 \text{ ciclos} = 2 \text{ ciclos}$

Dados

$offset = \log_2(16) = 4$   
 $index = \log_2\left(\frac{128}{16 \times 2}\right) = 2$

$Tag = 28 - 4 - 2 = 22$

$2 \times 1,2 = 2,4 = 3 \text{ ciclos}$

Ex 3 Instruções

$Mim Rate = 21,4\%$

$T_{clk} = 0,5ns$

$T_{mem} = 20ns = 40T_{clk}$

$T_I = 0,9ns = 2T_{clk}$

$2T + 0,214 \times 40T \approx 10,56T = 5,28ns$

Dados

$Mim Rate = 51,5\%$

$T_{clk} = 0,5ns$

$T_{mem} = 40T_{clk}$

$T_D = 3T_{clk}$

$3T + 0,515 \times 40T \approx 23,6T = 11,8ns$

Ex 7

$L_1 \text{ offset} = \log_2(16) = 4$   
 $\text{index} = \log_2\left(\frac{64}{16}\right) = 2$   
 $T_{tag} = 28 - 4 - 2 = 22$

$L_2 \text{ offset} = \log_2(16) = 4$   
 $\text{index} = \log_2\left(\frac{128}{16 \times 2}\right) = 2$   
 $T_{tag} = 28 - 4 - 2 = 22$

$L_1$

	V	D	TAG	DATA
00	1	1	A[09]	A[08]
01	1	1	A[11]	A[10]
10	1	1	A[13]	A[12]
11	1	1	A[15]	A[14]

$L_2$

	V	D	TAG	DATA		V	D	TAG	DATA
00	1	1	A[01]	A[00]	00	1	1	A[09]	A[08]
01	1	1	A[03]	A[02]	01	1	1	A[11]	A[10]
10	1	1	A[05]	A[04]	10	1	1	A[13]	A[12]
11	1	1	A[07]	A[06]	11	1	1	A[15]	A[14]

TAG	IND	OFF	ADR	DATA
0h	00	0h	000h	A[00]
0h	00	8h	008h	A[01]
0h	01	0h	010h	A[02]
0h	01	8h	018h	A[03]
0h	10	0h	020h	A[04]
0h	10	8h	028h	A[05]
0h	11	0h	030h	A[06]
0h	11	8h	038h	A[07]
1h	00	0h	040h	A[08]
1h	00	8h	048h	A[09]
1h	01	0h	050h	A[10]
1h	01	8h	058h	A[11]
1h	10	0h	060h	A[12]
1h	10	8h	068h	A[13]
1h	11	0h	070h	A[14]
1h	11	8h	078h	A[15]

$N = 4$   
 $90L_1 A \quad 9L_2 A$   
 $86L_1 H \quad 0L_2 H$   
 $9L_1 M \quad 9L_2 M$   
 $MR = 4,4\% \quad MR = 100\%$

$T_{L_1} = T \quad T_{L_2} = 5T$   
 $T_{MA-L_2} = T + 0,044 \times 50T = 3,2T$   
 $T_{MA+L_2} = T + 0,044 \times 55T = 3,42T$

$\frac{3,2}{3,42} = 0,9 \leftarrow \text{Fica mais lento}$

$N = 12$   
 $210L_1 A \quad 80L_2 A$   
 $130L_1 H \quad 72L_2 H$   
 $80L_1 M \quad 8L_2 M$   
 $MR = 38,1\% \quad MR = 10\%$

$T_{MA-L_2} = T + 38,1\% \times 50T \approx 20T$

$T_{MA+L_2} = T + 38,1\% \cdot (5T + 10\% \times 55T) \approx 4,8T$

$SP = \frac{20}{4,8} = 4,2 //$