CEng 355

Assignment 4

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a)

Tag	word 1	word 0	
011	[25C]	[258]	Block 0
010	[094]	[090]	Block 1
001	[20C]	[208]	Block 2
			Block 3
			Block 4
			Block 5
			Block 6
			Block 7

Direct-mapped: Miss rate = $\frac{4}{10}$

b)

Tag	word 1	word 0	
011	[25C]	[258]	Set 0
010	[254]	[250]	Set 0
001	[20C]	[204]	Set 0
			Set 0
			Set 1
			Set 1
			Set 1
			Set 1

2-way set-associative: Miss rate = $\frac{2}{10}$

c)

Tag	word 1	word 0
010011	[09C]	[098]
010010	[094]	[090]
110010	[254]	[250]
101001	[20C]	[204]
110011	[25C]	[258]

Fully associative: Miss rate = $\frac{5}{10}$

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a)

Tag	word 7	word 6	word 5	word 4	word 3	word 2	word 1	word 0	
00001	[09C]	[098]	[094]	[090]	[08C]	[088]	[084]	[080]	Block 0
00100	[23C]	[238]	[234]	[230]	[22C]	[228]	[224]	[220]	Block 1
00100	[25C]	[258]	[254]	[250]	[24C]	[248]	[244]	[240]	Block 2
									Block 3

Direct-mapped: 2-bit Block = A_{6-5} 3-bit Word = A_{4-2}
Miss rate = $\frac{5}{10}$

b)

Tag	word 7	word 6	word 5	word 4	word 3	word 2	word 1	word 0	
01000	[21C]	[218]	[214]	[210]	[20C]	[208]	[204]	[200]	Set 0
00010	[09C]	[098]	[094]	[090]	[08C]	[088]	[084]	[080]	Set 0
01000	[23C]	[238]	[234]	[230]	[22C]	[228]	[224]	[220]	Set 1
									Set 1

2-way set-associative: 1-bit Set = A_5 3-bit Word = A_{4-2}
Miss rate = $\frac{5}{10}$

c)

Tag	word 7	word 6	word 5	word 4	word 3	word 2	word 1	word 0
0000100	[09C]	[098]	[094]	[090]	[08C]	[088]	[084]	[080]
0010000	[25C]	[258]	[254]	[250]	[24C]	[248]	[244]	[240]
0010010	[21C]	[218]	[214]	[210]	[20C]	[208]	[204]	[200]
0010001	[23C]	[238]	[234]	[230]	[22C]	[228]	[224]	[220]

Fully associative: 3-bit Word = A_{4-2}
Miss rate = $\frac{4}{10}$

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$T_{ave} = h_1C_1 + (1-h_1)h_2C_2 + (1-h_1)(1-h_2)M = 7.2\tau - 4.8h_2$

$If\ h_2 = 1\ \ (is\ 100\%\ hit\ rate) \quad \overset{then}{\Longrightarrow} \quad T_{ave} = 2.4\tau\ \ (min)$

$If\ T_{ave} = 4\tau \quad \overset{then}{\Longrightarrow} \quad h_2 = \frac{2}{3}\ \ (66.66\%\ hit\ rate)$