CS224
Section No.: 1
Spring 2021
Lab No.: 6
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1)

No.	Cache Size KB	N way cache	Word Size in Bits	Block Size (no. of words)	No. of Sets	Tag Size in Bits	Index Size (Set No.) in Bits	Word Block Offset Size in bits	Byte Offset Size in bits	Block Replacement Policy Needed
1	8	1	8	8	2^{10}	16	10	3	0	No
2	8	2	16	8	2^{8}	17	8	3	1	Yes
3	8	4	16	4	2^{8}	18	8	2	1	Yes
4	8	Full	16	4	$2^{0} = 1$	26	0	2	1	Yes
5	32	1	16	2	2^{13}	14	13	1	1	No
6	32	2	16	2	2^{12}	15	12	1	1	Yes
7	32	4	8	8	2^{10}	16	10	3	0	Yes
8	32	Full	8	8	$2^{0} = 1$	26	0	3	0	Yes

2)

a)

Instruction	Iteration No.				
	1	2	3	4	5
lw $t1, 0xA4($0)	Compulsory	-	-	-	-
lw $t2, 0xA8($0)	-	-	-	-	-
lw $t3, 0xAC($0)	-	-	-	-	-

b)

N: 2
Cache size (no. of words): 4
Block Size (no. of words): 1
No. Of Sets: 2

Word Block Offset Size in bits: 1
Byte Offset Size in bits: 1

Tag: 32 - (2 + 2 + 1) = 27

Total Cache: 312 bits = (2 x 27 + 2) + 256

c) 1 x AND gate, 1 x Equality Comparator, 1 x 4:1 MUX

3)

a)

Instruction	**Iteration No.**				
	1	**2**	**3**	**4**	**5**
lw $t1, 0xA4($0)	Compulsory	Capacity	Capacity	Capacity	Capacity
lw $t2, 0xA8($0)	Compulsory	Capacity	Capacity	Capacity	Capacity
lw $t3, 0xAC($0)	Capacity	Capacity	Capacity	Capacity	Capacity

b)

N: 2
Cache size (no. of words): 2
Block Size (no. of words): 1
No. Of Sets: 0
Word Block Offset Size in bits: 0
Byte Offset Size in bits: 2

Tag: 27 = 32 - (2 + 0 + 0)

Total Cache: 126 bits = 2^0 x [1 + 2 x (1 + 30 + 32)]

c) 2 x AND gates, 1 x OR gate, 1 Equality Comparator, 1 x 2:1 MUX