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Section: 12

Course : CSE 340

Assignment:

4

Ans to the Q: N: 1

(A)

Cache size = 16 blocks

1 block = 1 word

memory address = 32 bit

Now,

$$2^n = 2^4 = 16$$

$$\therefore n = 4$$

\therefore Index size = 4 bits

Again,

$$2^m = 2$$

$$\Rightarrow m = 1$$

$\therefore m + 2 = 2 = \text{Byte offset}$

Byte Offset = 2 bits

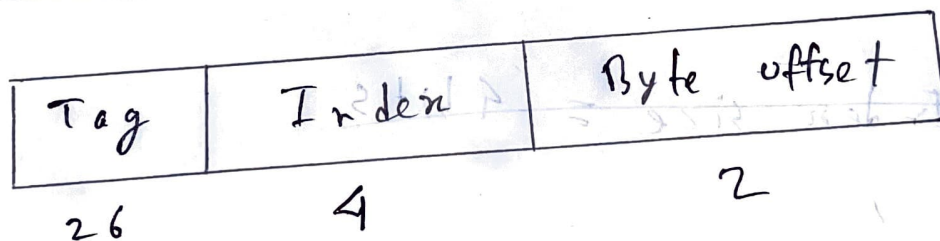
Tag field size,

$$= 32 - (r + m + 2)$$

$$= 32 - (4 + 0 + 2)$$

$$= 26$$

Binary address (32 bit)



Memory address of the references,

Decimal Address	Binary address	Hit / Miss	Cache Block
2	<div> <div>00000000</div> <div>00000000</div> <div>00000000</div> <div>Tag</div> </div> <div> <div>00000000</div> <div>00000000</div> <div>00000010</div> <div>Index</div> </div>	MISS	0000
3	<div> <div>00000000</div> <div>00000000</div> <div>00000000</div> </div> <div> <div>00000000</div> <div>00000000</div> <div>00000011</div> </div>	HIT	0000
170	<div> <div>00000000</div> <div>00000000</div> <div>00000000</div> </div> <div> <div>00000000</div> <div>00000000</div> <div>10101010</div> </div>	MISS	1010
45	<div> <div>00000000</div> <div>00000000</div> <div>00000000</div> </div> <div> <div>00000000</div> <div>00000000</div> <div>00101101</div> </div>	MISS	1011
7	<div> <div>00000000</div> <div>00000000</div> <div>00000000</div> </div> <div> <div>00000000</div> <div>00000000</div> <div>00000111</div> </div>	MISS	0001
176	<div> <div>00000000</div> <div>00000000</div> <div>00000000</div> </div> <div> <div>00000000</div> <div>00000000</div> <div>00001000</div> </div>	MISS	0001
189	<div> <div>00000000</div> <div>00000000</div> <div>00000000</div> </div> <div> <div>00000000</div> <div>00000000</div> <div>10111101</div> </div>	MISS	1111
191	<div> <div>00000000</div> <div>00000000</div> <div>00000000</div> </div> <div> <div>00000000</div> <div>00000000</div> <div>10111111</div> </div>	HIT	1111
215	<div> <div>00000000</div> <div>00000000</div> <div>00000000</div> </div> <div> <div>00000000</div> <div>00000000</div> <div>11010111</div> </div>	MISS	0101

Decimal Address	Binary Address		Hit/ Miss	Cache Block
172	00000000 00000000	00000000 <u>10101100</u>	MISS	1011
15	00000000 00000000	00000000 <u>00101101</u>	MISS	1011
182	00000000 00000000	00000000 <u>10111011</u>	MISS	1110
256	00000000 00000000	00000000 <u>11111110</u>	MISS	1111

For all the accesses:

Index	Valid bit	Tag field		Data field
0000	0 1	00000000 00000000	00000000 00	Mem[2]
0001	0 1	00000000 00000000	00000000 00	Mem[7]
	1	00000000 00000000	00000000 11	MEM[196]
0010	0			

Index	Valid bit	Tag field	Data field
0011	0		
0100	0		
0101	0 1	00000000 00000000 00000000 11	Mem[215]
0110	0		
0111	0		
1000	0		
1001	0		
1010	0 1	00000000 00000000 00000000 10	Mem[170]
1011	0 1	00000000 00000000 00000000 00	Mem[45]
	1	00000000 00000000 00000000 10	Mem[172]
	1	00000000 00000000 00000000 00	Mem[45]
1100	0		
1101	0		
1110	0 1	00000000 00000000 00000000 10	Mem[187]
1111	0 1	00000000 00000000 00000000 10	Mem[189]
	1	00000000 00000000 00000000 11	Mem[255]

B

We have 2 Hits and 11 misses in the provided memory access.

$$\therefore \text{Hit ratio} = \frac{2}{13}$$

$$\text{Miss ratio} = \frac{11}{13} \quad (\text{Ans})$$

C

$$\text{Total bits} = 2^h \times (\text{block size} + \text{tag size} + \text{valid size})$$

$$= 2^h \times (2^m \times 32 + (32 - h - m - 2) + 1)$$

$$= 2^4 \times (2^0 \times 2^5 + (32 - 4 - 0 - 2) + 1)$$

$$= 944 \text{ bits}$$

(Ans)

(D)

Number of blocks = 16

1 block = 1 word

= 4 bytes

= (4×8) bits

= 32 bits

\therefore Cache size = (16×32) bits

= 512 bits

(Ans)

Ans to the Q: N: 2

(a)

~~Ans~~

Process P = 32 bytes.

Page = 2 bytes

$$\therefore \text{Number of pages} = \frac{32}{2} = 16$$

(Ans)

(b)

Main memory has 64 frames.

$$\therefore \text{Main memory size} = (64 \times 2) \text{ bytes} \\ = 128 \text{ bytes}$$

(c)

Page Table:

frame

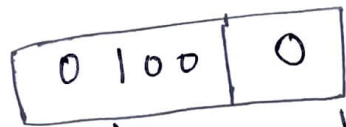
0	f_7	0	1
1	f_9	2	3
2	f_{11}	4	5
3	f_{13}	6	7
4	f_{15}	8	9
5	f_{17}	10	11
6	f_{19}	12	13
7	f_{21}	14	15
8	f_{23}	16	17
9	f_{25}	18	19
10	f_{27}	20	21
11	f_{29}	22	23
12	f_{31}	24	25
13	f_{33}	26	27
14	f_{35}	28	29
15	f_{37}	30	31



Created Per process

(d)

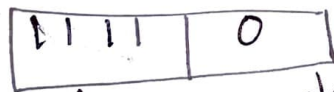
Logical address for byte number 8:



↓ ↓
Page ~~Table~~ Page
No offset

(e)

Physical Address for the byte number 8:



↓ ↓
Frame No. Frame
 offset