Assignment 5

1)

a) Write to AE (1010 1110)

Set-1 C.M.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| TAG | D0 | D1 | D2 | D3 | D4 | D5 | D6 | D7 | V | D | LRU |
| 1011 | X | X | X | X | X | X | X | X | 1 | 0 | 0 |
| 1010 | X | X | X | X | X | X | X | X | 1 | 0 | 1 |

1. Write to AC (1010 1100)

Set-1 Hit

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| TAG | D0 | D1 | D2 | D3 | D4 | D5 | D6 | D7 | V | D | LRU |
| 1011 | X | X | X | X | X | X | X | X | 1 | 0 | 0 |
| 1010 | X | X | X | X | X | X | X | X | 1 | 0 | 1 |

c) Write to B4 (1011 0100)

Set-0 Hit

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| TAG | D0 | D1 | D2 | D3 | D4 | D5 | D6 | D7 | V | D | LRU |
| 1010 | X | X | X | X | X | X | X | X | 0 | 1 | 0 |
| 1011 | X | X | X | X | X | X | X | X | 1 | 1 | 1 |

1. Write to C7 (1100 0111)

Set-0 C.M

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| TAG | D0 | D1 | D2 | D3 | D4 | D5 | D6 | D7 | V | D | LRU |
| 1100 | X | X | X | X | X | X | X | X | 1 | 0 | 1 |
| 1011 | X | X | X | X | X | X | X | X | 1 | 1 | 0 |

1. Write to D2 (1101 0010)

Set-0 Miss

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| TAG | D0 | D1 | D2 | D3 | D4 | D5 | D6 | D7 | V | D | LRU |
| 1100 | X | X | X | X | X | X | X | X | 1 | 0 | 0 |
| 1101 | X | X | X | X | X | X | X | X | 1 | 0 | 1 |

f) Write to F4 (1111 0100)

Set-0 Miss

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| TAG | D0 | D1 | D2 | D3 | D4 | D5 | D6 | D7 | V | D | LRU |
| 1111 | X | X | X | X | X | X | X | X | 1 | 0 | 1 |
| 0100 | X | X | X | X | X | X | X | X | 1 | 0 | 0 |

g) Write to F7 (1111 0111)

Set-0 Hit

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| TAG | D0 | D1 | D2 | D3 | D4 | D5 | D6 | D7 | V | D | LRU |
| 1111 | X | X | X | X | X | X | X | X | 1 | 1 | 1 |
| 0111 | X | X | X | X | X | X | X | X | 1 | 0 | 0 |

h) Write to 29 (0010 1001)

Set-1 Miss

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| TAG | D0 | D1 | D2 | D3 | D4 | D5 | D6 | D7 | V | D | LRU |
| 0010 | X | X | X | X | X | X | X | X | 1 | 0 | 1 |
| 1001 | X | X | X | X | X | X | X | X | 1 | 0 | 0 |

i) Write to 10 (0001 0000)

Set-0 Miss

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| TAG | D0 | D1 | D2 | D3 | D4 | D5 | D6 | D7 | V | D | LRU |
| 0001 | X | X | X | X | X | X | X | X | 1 | 1 | 0 |
| 0000 | X | X | X | X | X | X | X | X | 1 | 0 | 1 |

j) Write to 2A (0010 1010)

Set-1 Hit

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| TAG | D0 |  | D1 | D2 | D3 | D4 | D5 | D6 | D7 | V | D | LRU |
| 0010 | X |  | X | X | X | X | X | X | X | 1 | 0 | 1 |
| 1010 | X |  | X | X | X | X | X | X | X | 1 | 0 | 0 |

2)

a)

Index: (4\*1024) / 64 = 64 blocks ~ 6 bits (11-6)

Offset: 64 = 2^6 ~ 6 bits (5-0)

Tag: 32 – 6 – 6 = 20 bits (31-12)

b)

Index: 2 bits (8-7)

Offset: 128 = 2^7 ~ 7 bits (6-0)

Tag: 24 – 7 – 2 = 15 bits (23 - 9)

3)

3.1) U, V, W, X, W, Y, U, Z

U

V

W

X

W

Y

U

Z

3.2) U, V, W, X, U, V, W, U, V, U, Y, Y, Y, Z, V, V, V, V

I don’t know