**CS 4400 - Problem Set 8**

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1. Problem 6.31:  
   1. The size (*C*) of the cache in bytes is:  
        
      *C* = *E* \* *B* \* *S* = 4 \* 4 \* 8 = 128
   2. These are the bits for the ***CO*** (cache block offset), ***CI*** (cache set index), and ***CT*** (cache tag):

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| ***CT*** | ***CT*** | ***CT*** | ***CT*** | ***CT*** | ***CT*** | ***CT*** | ***CT*** | ***CI*** | ***CI*** | ***CI*** | ***CO*** | ***CO*** |

1. Problem 6.32:  
   1. This is the address format:

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| ***0*** | ***0*** | ***1*** | ***1*** | ***1*** | ***0*** | ***0*** | ***0*** | ***1*** | ***1*** | ***0*** | ***1*** | ***0*** |

* 1. This is the memory reference:

|  |  |
| --- | --- |
| Parameter | Value |
| Block offset (CO) | 0x2 |
| Index (CI) | 0x6 |
| Cache tag (CT) | 0x38 |
| Cache hit? (Y/N) | Y |
| Cache byte returned | 0xEB |

1. Problem 6.33:  
   1. This is the address format:

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| ***1*** | ***0*** | ***1*** | ***1*** | ***0*** | ***1*** | ***1*** | ***1*** | ***0*** | ***1*** | ***0*** | ***0*** | ***0*** |

* 1. This is the memory reference:

|  |  |
| --- | --- |
| Parameter | Value |
| Block offset (CO) | 0x0 |
| Index (CI) | 0x2 |
| Cache tag (CT) | 0xB7 |
| Cache hit? (Y/N) | N |
| Cache byte returned | — |

1. Problem 6.34. These are the 8 memory addresses (in hex) that will hit in set 2:

0x1788  
0x1789  
0x178A  
0x178B  
0x16C8  
0x16C9  
0x16CA  
0x16CB

1. Problem 6.35:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | dst array | | | |
|  | Col 0 | Col 1 | Col 2 | Col 3 |
| Row 0 | m | m | m | m |
| Row 1 | m | m | m | m |
| Row 2 | m | m | m | m |
| Row 3 | m | m | m | m |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | src array | | | |
|  | Col 0 | Col 1 | Col 2 | Col 3 |
| Row 0 | m | m | m | m |
| Row 1 | m | m | m | m |
| Row 2 | m | m | m | m |
| Row 3 | m | m | m | h |