

CS 351 sample VM problems.

#1 VA: offset = 1KB (10 bits)

VPN = 10 bits

TLBI = 2 bits, TLBT = 8 bits

PA: offset = 10 bits

PPN = 5 bits

CO = 2 bits

CI = 2 bits

CT = 11 bits.

(a) VA = 0x67F06

01100111,111100000110

TLBI = 3 } hit!

TLBT = 0x67

PPN = 0x10

PA = 1000011,00000110

= 0x4306

CO = 2, CI = 1, CT = 430

cache hit! data = 0xE7.

(b) VA = 0x037BB.

00000011,01110111000

TLBI = 1; TLBT = 03 miss!

VPN = 0xD → PPN = 0xE.

PA = 011,1011,011,1000 (0x3BB8)

CO = 0, CI = 2, CT = 0x3BB

hit! data = 0xCA.

#2. offset = 5 bits (page # = 9 bits)
TLBI = 3 bits, TLBT = 6 bits
CO = 0 bits, CI = 2 bits,
CT = 8 bits

(a) VA = 0x1BA3

011011,10100011

TLBI = 5 } hit! PPN = 3
TLBT = 1B }

PA = 0001100011 (0x063)

CI = 3, CT = 18 → hit!

data = 0xCB.

(b) VA = 0x0194.

00000110010100

TLBI = 4, TLBT = 1 → miss!

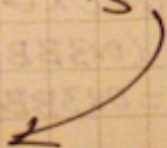
VPN = 0xC → PPN = 0x16.

PA = 1011010100 (0x2D4)

CI = 0, CT = 15 → hit!

data = 0x92.

#3



#3. offset = 12 bits (VPN = 20 bits)
 TLBI = 2 bits, TLBT = 18 bits
 CO = 3 bits, CI = 3 bits, CT = 24 bits

Ⓐ VA = 0x0868161E
 = 0000100001, 010, 0000P | 0100001...
 ...1110

TLBI = 1, TLBT = 0x021A, 0F → hit!

PPN = 0x23818

PA = 0x2381861E

CO = 6, CI = 3, CT = ...

1000, 110, 0000P, 1100001, 1000011110

0x8E0618 → hit!

data = 0xA0

Ⓑ VA = 0x(0000)1B70

no TLB hit! ← VPN = 1

PPN = 0x3E44B

PA = 1111001000010001011000010110110110000

CO = 0, CI = 6

CT = 0xF912C6D 0xF912ED

hit!

data = 0x00