EC 605 Homework 3   Simin Zhai

1. a) add x5, x7, x1

b) ldur x0, [x6, 16]

c) sub x6, x5, x11
   cbz x6, END

d) LSR x10, x9, #15

2. a) STUR opcode : 11111000000 = $(7C0)_{Hex.}$

$D : \underbrace{11111000000}_{\text{opcode}}\ \underbrace{~~0001~~\ 00000}_{\text{DT address}}\ \underbrace{00}_{\text{op}}\ \underbrace{01010}_{\text{Rn}}\ \underbrace{01001}_{\text{Rt.}}$

~~0X 7C0080A9~~ 0X F8~~1~~0201 49

b) addi opcode : 1001000100

$I : \underbrace{1001000100}_{\text{opcode}}\ \underbrace{0000\ 0000\ 1000}_{\text{ALU immediate}}\ \underbrace{00110}_{\text{Rn}}\ \underbrace{01001}_{\text{Rd.}}$

0X910020C9

3. a) $(0x8B000000)_{Hex} = \underbrace{1000\ 1011\ 000}_{\text{OPCODE}}\ \underbrace{0\ 0000}_{\text{Rm}}\ \underbrace{0000\ 00}_{\text{Shamt}}\ \underbrace{00\ 000}_{\text{Rn}}\ \underbrace{0\ 0000}_{\text{Rd}}$

OPCODE ↓ ADD. R.

add x0, x0. x0.

b). $(0xB4016B54)_{Hex} = \underbrace{10110100}_{\text{CBZ CB}}\ \underbrace{000000\ 0001\ 0110\ 1011\ 010}_{\text{COND BR address.}}\ \underbrace{1\ 0100}_{\text{Rt.}}$

CBZ. x20, ~~END~~ . 0x8B5A

4. a) lsl x12, x10, 4

x10 = 0x 000 00000 1010 1010 1010 1010 1010 1010 1010 1010

x12 = 0x 0000 1010 1010 1010 1010 1010 1010 1010 1010 0000

x11 = 0x 0001 0010 0011 0100 0101 0110 | 0111 1000 0001 0010 0011 0100 0101 0110 0111 1000

orr x12, x12, x11

x12 = 0001 0010 0011 0100 0101 0110 0111 | 1010 1011 1010 1011 1110 1111 1110 1111 1000

$x12 = 0x\overset{00000}{}1234567ABABEFEF8$

b) lsr x12, x10, 3 → x12 = 00000101010101010101010101010101

andi x12, x12, 0xFEF . 0xFEF = (111111101111)B.

x12 = 0000010101010101010101010101000101

$x12 = 0x\overset{00000}{}0155555545$

5. a) f = g + (h - 5);

(f: x_0, g: x_1, h: x_2)

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subi x2, x2, #5    // h-5
add  x0, x1, x2    //f=g+(h-5)
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b) B[8] = A[i-j]

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assume i in x3
assume j in x4
assume &A in x6.
assume &B in x7
                    sub x3, x3, x4   //x3=i-j
lsl  x11, x3, #3   // x11 = (i-j) * 8.
add  x12, x6, x11  // x12 = address of A[i-j].
ldur x13, [x12, 0] // x13 = A[i-j]

ldur x9, [x7, 8]   // x9 = B[8]

~~right~~ <— addi x9, x13, #0   // B[8] = A[i-j]
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c). if (f == g) i = i+1 else i = i+2

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assume f in. x0
assume g in  x1
assume i in. x3.

        sub  x10, x1, x0     // x10 = x1 - x0
        cbnz x4, ELSE.
        addi x3, x3, #1      // i = i+1.
        b END
ELSE:
        addi x3, x3, #2      // i = i+2.

END:
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