

2.4 110

$s0 = f$   
 $s1 = g$   
 $s2 = h$   
 $s3 = i$

20181210 9:28

18

$sll \$t0, \$s0, 2 \quad \# \ \$t0 = f \times 4$   
 $add \$t0, \$s6, \$t0 \quad \# \ \$t0 = \&A[f]$   
 $sll \$t1, \$s1, 2 \quad \# \ \$t1 = g \times 4$   
 $add \$t1, \$s7, \$t1 \quad \# \ \$t1 = \&B[g]$   
 $lw \$s0, 0(\$t0) \quad \# \ f = A[f]$   
 $addi \$t2, \$t0, 8 \quad \# \ \$t2 = \&A[f] + 8 = \&A[f+2]$   
 $lw \$t0, 0(\$t2) \quad \# \ \$t0 = A[f+2]$   
 $add \$t0, \$t0, \$s0 \quad \# \ \$t0 = A[f+2] + A[f]$   
 $sw \$t0, 0(\$t1) \quad \# \ B[g] = A[f+2] + A[f]$

$B[g] = A[f+2] + A[f]$

115

2.10

$\$s0 = 0x80000000 \quad \$s1 = 0xD0000000$

2.10.1 add \$t0, \$s0, \$s1

$\$t0 = 0x80000000 + 0xD0000000$   
 $= 0x50000000$

2.10.2 overflow

2.10.3 sub \$t0, \$s0, \$s1

$\$t0 = 0x80000000 - 0xD0000000$   
 $= 0xB0000000$

2.10.4 no overflow

	1000	0000
-	1101	0000
=	1000	0000
+	0011	0000
	1011	0000

+15

2.12

	6 op	5 rs	5 rt dest	5 rd	5 shamt	6 funct
2.12.1	0000 00	10 000	1 0000	1000	1000	0010 0000

Rtype add instruction

add \$s1, \$s0, \$s0

2.12.2

i type save word instruction

op	rs	rt	
1010 11	01 010	01 001	0000 0000 0010 0000

sw

32

0xAD490020

2.12.3

6 op	5 rs	5 rt	5 rd	5 shamt	6 funct
000000	01001 \$t1	01010 \$t2	01000 \$t0	00000	100010 34 → sub

R type subtraction instruction

sub \$t0, \$t1, \$t2

0000 0001 0010 1010 0100 0000 0010 0010 (2)

2.17 <sup>+10</sup>

1) `sl $t2, $t0, 4`

$$\$t2 = \$t0 \ll 4$$

$$\$t2 = 0xBBBBBBB0$$

2) `or $t2, $t2, $t1`

$$\$t2 = \$t2 \vee \$t1$$

$$\$t2 = 0xBBBBFFFF$$

2.21 <sup>+5</sup>

1) `sl $t2, $0, $t0`

$$\$t2 = 1$$

2) `bne $t2, $0, ELSE`

$$\$t2(2) \neq 0.$$

3) `ELSE addi $t2, $t2, 2`

$$\$t2 = 1 + 2 = 3$$

4) DONE

$$\$t2 = 3$$

<sup>+8</sup>

2.22

2.22.1

`0x/00000000 jal`

$$0x/00000000 \sim 0x/ \text{FFFFFC}$$

first 4 bits of PC

$$2^{26} \ll 2 - 1$$

$$2^{26} \ll 2$$

address  $\times 4$

last 26 bits are 0

$$= 0x/00000000 \sim 0x/FFFFFFC$$

2.22.2

`0x/00000000 beq`

$$(-2)^{15} 4 \sim 0x/00000000 \sim (2^{15} - 1) 4 \quad \text{offset 4}$$

$$(-2)^{15} 4 + 4 \sim 0x/00000000 \sim (2^{15} - 1) 4 + 4 \quad \text{PC is added 4 before jump}$$

$$0x/00000000 - 2^{15} 4 + 4 \sim 0x/00000000 + 2^{15} 4 - 4 + 4$$

$$= 0x/00000000 - 0x/0001FFFF \sim 0x/00000000 + 0x/0001FFFF$$

$$= 0x/0FFE0004 \sim 0x/001FFFF$$

$\times -2$

$2^{15} 4 - 1$

?

2.24 <sup>15</sup>

0 2 1 0 5 2 t20K0.  
1 ≠ 0. 1000 — dhr.  
2 -- = 1 1 -- = 0  
slr add.  
u j

2.24.1 5N + 2

2.24.2 \$s1 = A \$s2 = B \$t1 = i \$t2 = temp

while (0 < i) {  
    i --;  
    B += 3;  
}

---