BILKENT UNIVERSITY

COMPUTER SCIENCE

CS224

Preliminary Design Report - Lab4

Section 2

İrem Seven

21704269

27.11.19

imem module instructions

ADDRESS	MACHINE	ASSEMBLY
0x00	0x20020005	addi $v0,$0,5
0x04	0x2003000c	addi $v1,$0,12
0x08	0x2067fff7	addi $a3,$v1,-9
0x0c	0x00e22025	or $a0,$a3,$v0
0x10	0x00642824	and $a1,$v1,$a0
0x14	0x00a42820	add $a1,$a1,$a0
0x18	0x10a7000a	beq $a1,$a3,10
0x1c	0x0064202a	slt $a0,$v1,$a0
0x20	0x10800001	beq $a0,$0,1
0x24	0x20050000	addi $a0,$0,0
0x28	0x00e2202a	slt $a0,$a3,$v0
0x2c	0x00853820	add $a3,$a0,$a1
0x30	0x00e23822	sub $a3,$a3,$v0
0x34	0xac670044	sw $a3,68($v1)
0x38	0x8c020050	lw $v0,80($0)
0x3c	0x08000011	j 17
0x40	0x20020001	addi $v0,$0,1
0x44	0xac020054	sw $v0,84($0)
0x48	0x08000012	j 18

RTL Expressions

ble

IM[PC]

if (RF[rs] <= RF[rt])
    PC <--- PC + 4 + SignExt(immed) * 4
else
    PC <--- PC + 4

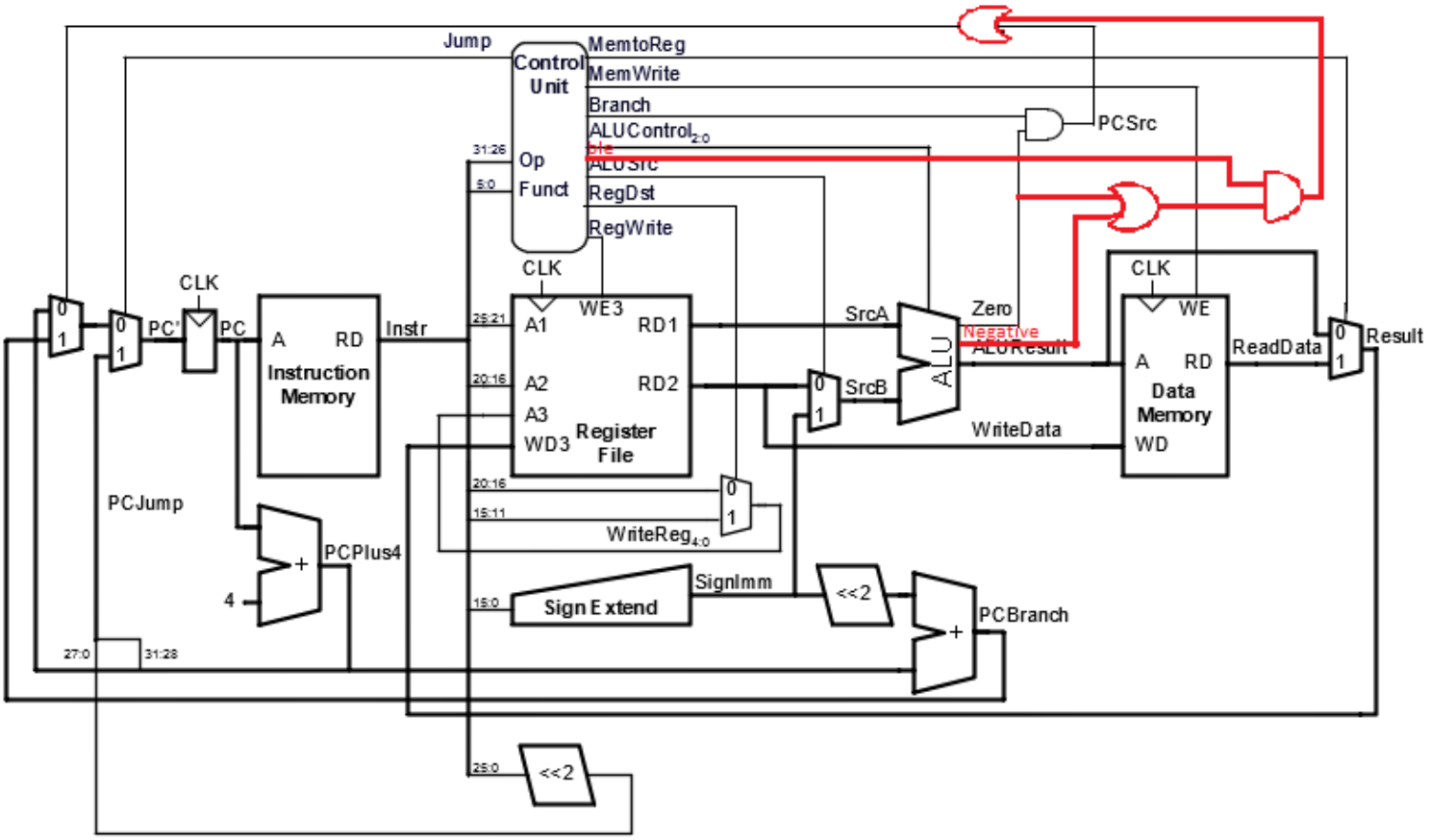
push

IM[PC]

DM[RF[29]] <--- RF[rt]

PC <--- PC + 4

Extended Datapath



Control Tables

Instruc-tion	$Op_{5:0}$	Reg Write	Reg Dst	Alu Src	Branch	Mem Write	Mem toReg	ALU $Op_{1:0}$	Jump	Ble
R-type	000000	1	1	0	0	0	0	1x	0	0
lw	100011	1	0	1	0	0	1	00	0	0
sw	101011	0	X	1	0	1	X	00	0	0
beq	000100	0	X	0	1	0	X	01	0	0
j	000010	0	X	X	X	0	X	XX	1	0
addi	001000	1	0	1	0	0	0	00	0	0
ble	010100	0	X	0	0	0	X	01	0	1
push	010101	0	X	1	0	1	X	0X	0	0

ALUOp	Funct	ALUControl
00	x	010 (add)
01	x	110 (sub)
1x	100000 (add)	010 (add)
1x	100010 (sub)	110 (sub)
1x	100100 (and)	000 (and)
1x	100101 (or)	001 (or)
1x	101010 (slt)	111 (set less than)

Test Code

```
#if s0 is 1 ble works properly, and if s1 is 1 push works properly

addi $t0,$0,10
addi $t1,$0,15
ble $t0,$t1,true
addi $s0,$0,0
j false
true:
        addi $s0,$0,1
false:

addi $t0,$0,100
addi $t1,$t0,111
sub $a0,$t1,$t0
jal test
add $s1,$v0,$0


test:
        addi $sp,$sp,-8
        sw $t0,0($sp)
        sw $t1,4($sp)
        push $a0
        lw $t2,0($sp)
        beq $t2,$a0,works
        addi $v0,$0,0
        j notworks
        works:
                addi $v0,$0,1
        notworks:

        addi $sp,$sp,8
        jr $ra
```