

Bilkent University CS224 Spring 2020

Design Report

Lab4

Section 1

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b)

Location	Machine Instruction	Assembly Equivalent
0x00	0x20020005	addi \$v0, \$zero, 5
0x04	0x2003000c	addi \$v1, \$zero, 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, 0x44
0x1c	0x0064202a	slt \$a0, \$v1, \$a0
0x20	0x10800001	beq \$a0, \$zero, 1
0x24	0x20050000	addi \$a1, \$zero, 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(\$zero)
0x3c	0x08000011	j 0x44
0x40	0x20020001	addi \$v0, \$zero, 1
0x44	0xac020054	sw \$v0, 84(\$zero)
0x48	0x08000012	j 0x48

c)

ble:

IM[PC]

if ((RF[rs] - RF[rt] == 0) || (RF[rs] < RF[rt]))

PC \leftarrow BTA

else

PC \leftarrow PC + 4

subi:

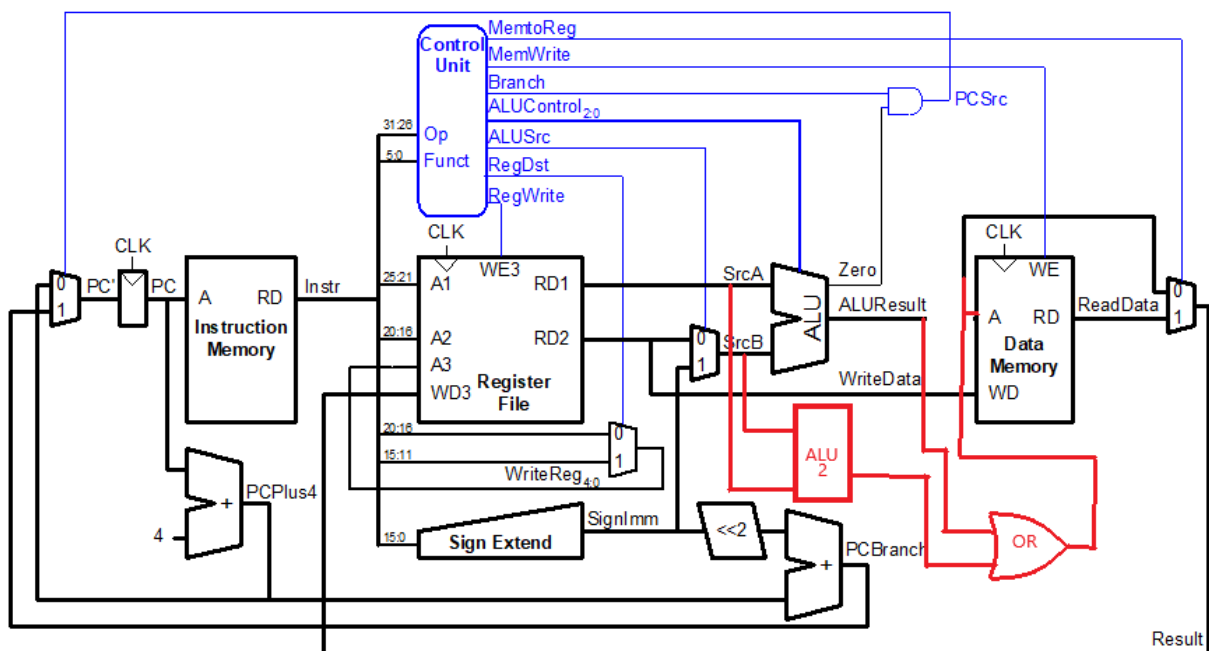
IM[PC]

RF[rd] = RF[rs] - SignExt(immed)

PC \leftarrow PC + 4

d)

ble



for subi, we don't need to change the datapath, since it's like addi but with different ALU control signal (subtraction).

e)

Instruction	RegWrite	RegDst	AluSrc	Branch	MemWrite	MemtoReg	ALUOp	ALUcontrol	Jump
subi	1	0	1	0	0	0	10	110	0

Instruct ion	RegWr ite	Reg Dst	AluS rc	Bran ch	MemW rite	Memto Reg	ALU Op	ALUcon trol	Ju mp	ALU2 Op	ALU2con trol
ble	0	0	0	1	0	0	01	110	0	10	111