C-Code:

```
if  (i ==j)
     f = g+h ;
else:
     f = g-h ;
```

$f \rightarrow \$s0$ | $i \rightarrow \$s3$

$g \rightarrow \$s1$ | $j \rightarrow \$s4$

$h \rightarrow \$s2$

MIPS Code:

$I \begin{cases} beq \\ bne \end{cases}$

$\rightarrow 2$

PC	0	bne $\$s3, \$s4,$ Else
PC+4	4	add $\$s0, \$, s1, \$s2$
PC+8	8	j Exit
⋮		
	12	Else: sub $\$s0, \$s1, \$s2$
	16	Exit:

$4 \times 2 = 8$

$4 + 8 = 12$

5 bit register

$$4 \longrightarrow \underset{}{00100}(4) \xrightarrow{1 bit \ L.shift} 01000 (8) \xrightarrow{1 bit \ L.shift} 10000 (16)$$

$4 \times 2^{1} = 8$

$4 \times 2^{②} = 16$ no. of shifts

no. of L. shift

$\uparrow$

n

$x \times 2$

no. of R. shift

$\uparrow$

n

$x / 2$

$\rightarrow 2$

0 beq $51, $52, L1

2×4 bits
= 8 bits
= 2×2^r

PC+4 ← 4 add .....

adress

8 j Exit

← 12 L1:

16 add .....

$\underbrace{0...00010}_{16\ bit}$

000...10 0̲ 0̲

$\downarrow 16$

| offset | → 16 bits of 2

Sign Extend ↑

16 bits

| 0 0 | | 0̲ 0̲ |

32 bits   32   8

32   add   12
4

PC 0 ⟶ [mux] j Label   10 ↑

4 ⟶

10 × 4 = 40
10 × 2 ② L.shift

OP	26 bit address

↓ 10

| | (box) | |

10 এর 26 bit

↓ 26 bit

| PC+4 এর MSB 4 bits | Left shift | 00 |

32

| 4 | PC | → 32 |

t_0 t_1

↑   ↑
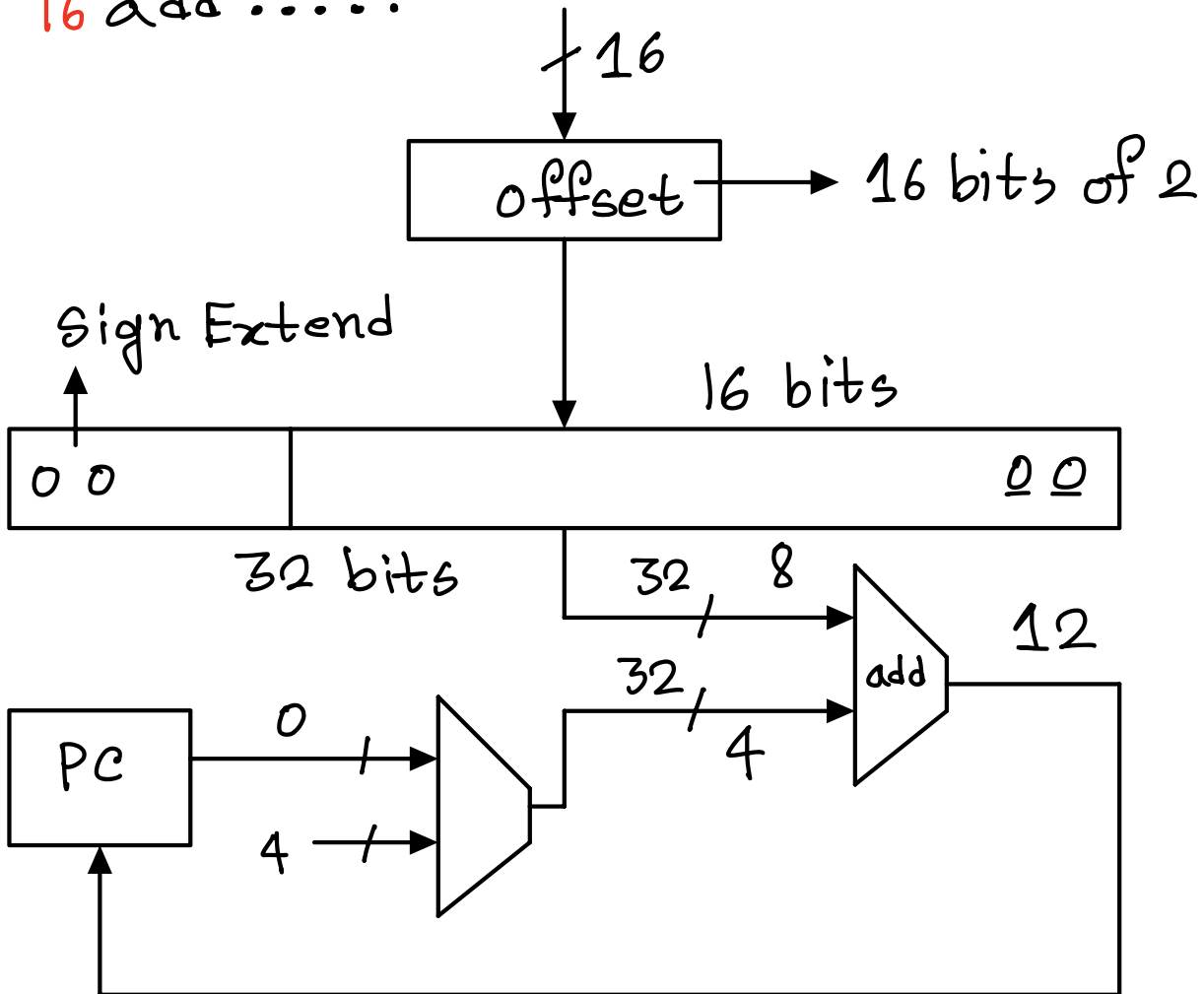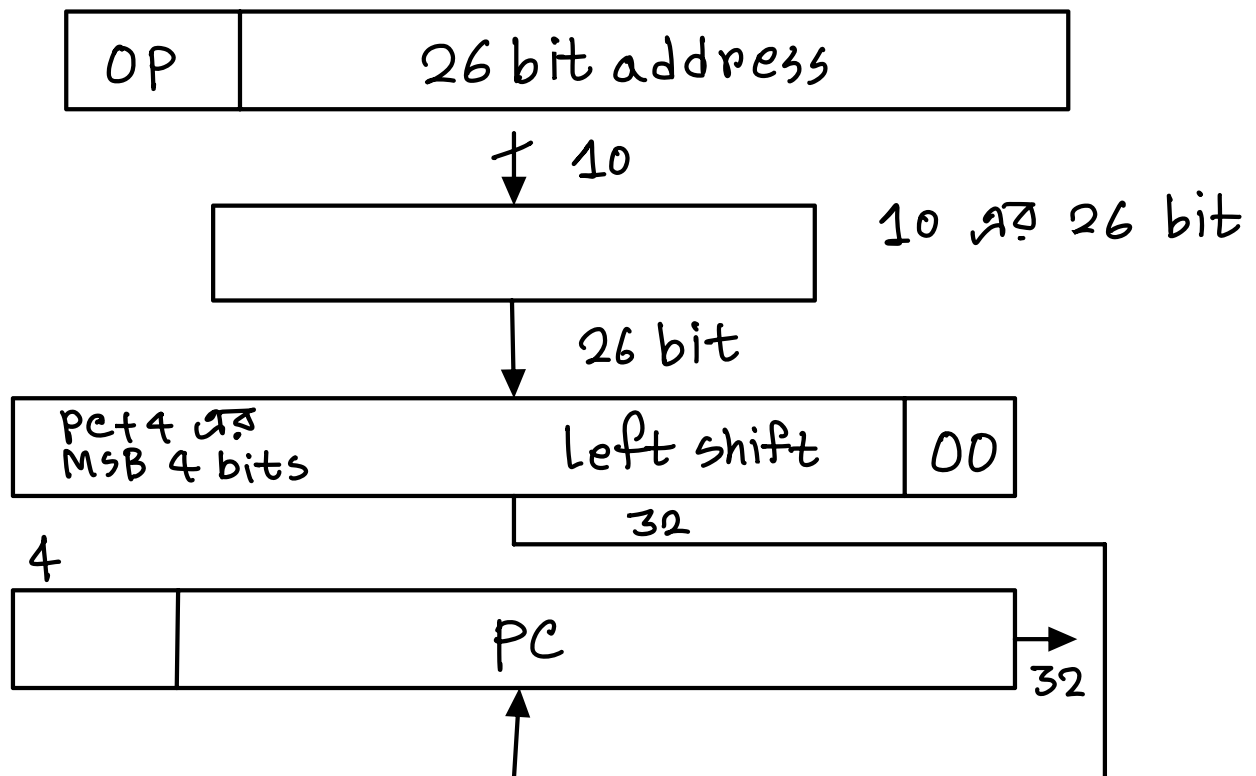
$x = 2y + 65z - 10$

x, y, z are in $50, $51 and $52

Mips:

add $t_0, $51, $52

sll $t_1, $52, 6 ⟶ 64z

add $t_1, $t_1, $52 ⟶ 65z

add $t_0, $t_0, $t_1

add $s_0, $t_0, -10

$64z + z = 65z$

↓

$z \times 2^6 \rightarrow LS$

More conditional operations:

$\begin{cases} == \\ != \\ >= \\ <= \end{cases}$ slt, slti $\$s3 > \$s4 \longrightarrow \$t0 = 0$

                    0|1 $\$s3 < \$s4 \longrightarrow \$t1 = 0$
                     ↑
          slt $\$t1, \$s3, \$s4$

                                0|1
                                 ↑
                         slti $\$t1, \$s3, \$s4$

a,b ⟶ $\$s0, \$s1$ | <u>Mips</u>   1 $\$s0 < \$s1$
                            | ↑
    if (a > b) { | slt $\$t0, \$s0, \$s1$
        a = a + 1; | bne $\$t0, \$zero$, Else
    } | addi 1
    else { | j Exit
        a = a + 2; | Else: addi 2
    } | Exit:

a,b ⟶ $\$s0, \$s1$ | <u>Mips</u>   0 $\$s0 \geq \$s1$
                            | ↑
    if (a < b) { | slt $\$t0, \$s0, \$s1$
        a = a + 1; | beq $\$t0, \$zero$, Else
    } | addi 1
    else { | j Exit
        a = a + 2; | Else: addi 2
    } | Exit:

$= \$t0 / 16 = \$t0 / 2^4 \longrightarrow$ 4 bit right shift