# 331 Computer Organization
## Assignment-1

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R-type : 50 instructions - 2 cycles ⎫
I-type : 30 instructions - 4 cycles ⎬ 100 instructions total
J-type : 20 instructions - 3 cycles ⎭

R → %50
I → %30
J → %20

$$\text{Program} = (0.5 \times 2) + (0.3 \times 4) + (0.2 \times 3)$$

under R, I, J

$$= 2.80;$$

Improve R %50 ⟹   %100 performance → 2 cycles
                  %150 performance → 1.33 cycles

Improve I %50 ⟹   %100 performance → 4 cycles
                  %150 performance → 2.66 cycles

Improve J %50 ⟹   %100 performance → 3 cycles
                  %150 performance → 2 cycles

$$CPI_R = (0.5 \times 1.33) + (0.3 \times 4) + (0.2 \times 3)$$

$$= 2.455;$$

$$CPI_I = (0.5 \times 2) + (0.3 \times 2.66) + (0.2 \times 3)$$

$$= 2.398;$$

$$CPI_J = (0.5 \times 2) + (0.3 \times 4) + (0.2 \times 2)$$

$$= 2.40;$$

I is the best option

$$\frac{2.80}{2.398} = 1.168 \text{ times faster}$$

% 16.8 improved performance