

4) Amdahl's Law Formula

$$\begin{aligned}\text{Overall speed} &= \frac{\text{old execution time}}{\text{new execution time}} \\ &= \frac{1}{\left((1 - \text{Fraction enhanced}) + \frac{\text{Fraction enhanced}}{\text{Speedup enhanced}} \right)}\end{aligned}$$

$$\text{Overall Speedup} = 2$$

$$\text{Speedup enhanced} = 6$$

Fraction enhanced = fraction of the time spent on the instructions that can be run on the CUS in order to achieve an overall speedup.

$$2 = \frac{1}{(1-x) + \frac{x}{6}} \quad (x \text{ is the fraction enhanced})$$

$$\Rightarrow 2 - 2x + \frac{x}{3} = 1$$

$$\Rightarrow 1 = 2x - \frac{x}{3}$$

$$\Rightarrow 3 = 5x$$

$$\Rightarrow x = \frac{3}{5}$$

$$\text{The \% of time spent} = \frac{3}{5} \times 100 = 60\%$$