

Lab 1

Exercise 3

- $i = 1$: `calculate_pi.s`
- $i = 2$: `insertion_sort.s`
- $i = 3$: `program_1.s`
- $i = 4$: `program_2.s`
- $i = 5$: `program_3.s`

Istruzioni completate

1. $I_1 = 1066$
2. $I_2 = 10686$
3. $I_3 = 13$
4. $I_4 = 126$
5. $I_5 = 594$

CPI

1. $CPI_1 = 2.842$
2. $CPI_2 = 1.268$
3. $CPI_3 = 1.769$
4. $CPI_4 = 1.238$
5. $CPI_5 = 1.335$

Periodo di clock

$$T_{clk} = \frac{1}{f} = \frac{1}{1750} s$$

Initial scenario

$$t_i = I_i \cdot CPI_i \cdot T_{clk}$$

$$1. t_1 = I_1 \cdot CPI_1 \cdot T_{clk} = 1066 \cdot 2.842 \cdot \frac{1}{1750} s = 1.731 s$$

$$2. t_2 = I_2 \cdot CPI_2 \cdot T_{clk} = 10686 \cdot 1.268 \cdot \frac{1}{1750} s = 7.743 s$$

$$3. t_3 = I_3 \cdot CPI_3 \cdot T_{clk} = 13 \cdot 1.769 \cdot \frac{1}{1750} s = 0.013 s$$

$$4. t_4 = I_4 \cdot CPI_4 \cdot T_{clk} = 126 \cdot 1.238 \cdot \frac{1}{1750} s = 0.089 s$$

$$5. t_5 = I_5 \cdot CPI_5 \cdot T_{clk} = 594 \cdot 1.335 \cdot \frac{1}{1750} s = 0.453 s$$

$$T = \sum_{i=1}^5 t_i = 1.731 s + 7.743 s + 0.013 s + 0.089 s + 0.453 s = 10.029 s$$

Scenario 1

$$1. w_1 = 0.25 \Rightarrow t_1 = 0.25 \cdot 1.731 s = 0.4328 s$$

$$2. w_2 = 0.11 \Rightarrow t_2 = 0.11 \cdot 7.743 s = 0.8517 s$$

$$3. w_3 = 0.01 \Rightarrow t_3 = 0.01 \cdot 0.013 s = 0.0001 s$$

$$4. w_4 = 0.50 \Rightarrow t_4 = 0.50 \cdot 0.089 s = 0.0445 s$$

$$5. w_5 = 0.13 \Rightarrow t_5 = 0.13 \cdot 0.453 s = 0.0589 s$$

$$T = \sum_{i=1}^5 t_i = 0.4328 s + 0.8517 s + 0.0001 s + 0.0445 s + 0.0589 s = 1.3880 s$$

Scenario 2

$$1. w_1 = 0.10 \Rightarrow t_1 = 0.10 \cdot 1.731 s = 0.1731 s$$

$$2. w_2 = 0.25 \Rightarrow t_2 = 0.25 \cdot 7.743 s = 1.9358 s$$

$$3. w_3 = 0.10 \Rightarrow t_3 = 0.10 \cdot 0.013 s = 0.0013 s$$

$$4. w_4 = 0.05 \Rightarrow t_4 = 0.05 \cdot 0.089 s = 0.0045 s$$

$$5. w_5 = 0.50 \Rightarrow t_5 = 0.50 \cdot 0.453 s = 0.2265 s$$

$$T = \sum_{i=1}^5 t_i = 0.1731 \text{ s} + 1.9358 \text{ s} + 0.0013 \text{ s} + 0.0045 \text{ s} + 0.2265 \text{ s} = 2.3412 \text{ s}$$

Scenario 3

$$1. \ w_1 = 0.314 \Rightarrow t_1 = 0.314 \cdot 1.731 \text{ s} = 0.5435 \text{ s}$$

$$2. \ w_2 = 0.167 \Rightarrow t_2 = 0.167 \cdot 7.743 \text{ s} = 1.2931 \text{ s}$$

$$3. \ w_3 = 0.200 \Rightarrow t_3 = 0.200 \cdot 0.013 \text{ s} = 0.0026 \text{ s}$$

$$4. \ w_4 = 0.300 \Rightarrow t_4 = 0.300 \cdot 0.089 \text{ s} = 0.0267 \text{ s}$$

$$5. \ w_5 = 0.019 \Rightarrow t_5 = 0.019 \cdot 0.453 \text{ s} = 0.0086 \text{ s}$$

$$T = \sum_{i=1}^5 t_i = 0.5435 \text{ s} + 1.2931 \text{ s} + 0.0026 \text{ s} + 0.0267 \text{ s} + 0.0086 \text{ s} = 1.8745 \text{ s}$$