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Class : C1

# Chapter 1

## **Excercise 1.**

We have formula:

Performance = = intruction per second

|  |  |  |  |
| --- | --- | --- | --- |
|  | P1 | P2 | P3 |
| Clock rate | 3 GHz | 2.5 GHz | 4 GHz |
| CPI | 1.5 | 1 | 2.2 |

a)

|  |  |  |  |
| --- | --- | --- | --- |
|  | P1 | P2 | P3 |
| Instruction per second | CPU time x 2x10^9 | CPU time x 2.5x10^9 | CPU time x 1.82x10^9 |

🡪 P2 has the highest performance

b)

Number of cycles = Clock rate × time

# intructions is the numbers of steps that need to finish a program

Number of intructions =

#CPI is number of cycles for a intructions

|  |  |  |  |
| --- | --- | --- | --- |
|  | P1 | P2 | P3 |
| Number of Instructions | 2x10^10 | 2.5x10^10 | 1.82x10^10 |
| Number of Cycles | 3.10^10 | 2.5x10^10 | 4.10^10 |

c)

T reduce by 30 % 🡪 Tnew  = 7 s

Cpi is increased by 20 % 🡪 CPInew  = CPI­­­­old ­x 1.2

Clock rate = =

Clock Rate new = (Instruction Count x CPI new) / CPU time new

=(Instruction Count x 1.2xCPI old) / 0.7xCPU time old

=(Instruction Count x 1.2xCPI old x Clock Rate old) / (0.7 x Instruction x CPI old)

= (1.2/0.7) Clock Rate old

≈ 1.714 x Clock Rate old

## Excercise 2

1.0E6 = 1.0 x

Global CPI =∑

a)

|  |  |  |
| --- | --- | --- |
|  | P1 | P2 |
| Global CPI | 1 x 10% + 2 x 20% + 3 x 50% + 3 x 20% = 2.6 | 2 x 100% = 2 |

b)

clock cycles = Instructions count x Global CPI

CPU Time = Clock Cycle / Clock Rate

1.0E6 = 1x10^6

Instruction Count = 100% x 1x10^6 = 1x10^6

|  |  |  |
| --- | --- | --- |
|  | P1 | P2 |
| Clock Cycles | 2.6x10^6 | 2x10^6 |
| CPU time | 1.04x10^-3 | 6.667x10^-4 |

* P2 is faster than P1

## Excercise 3

Complier A 🡪 Intructions count of A = 1.1 x 10 9

Time = 1.1s

Complier B 🡪 Intructions count of B = 1.2 x 109

Time = 1.5s