Additional Computer Performance Questions

Performance = 1 / CPU Execution time

EQ1: CPU Execution Time = Clock Cycles For program x clock speed per cycle

EQ2: CPU Execution Time = Instruction Count x Average Clock Cycles per Instruction x clock cycle speed

# Questions over EQ.1:

Q1: For a given program machine A takes 35 clock cycles at 40ns, for the same program machine B takes 88 clock cycles at 20ns. A) Which machine is faster? B) By how much

Q2: Two machines (A, and B) have the same clock speed 5ns per cycle. But for a given program Machine A executes in 55ns versus machine B that executes in 125ns. How many clock cycles does each machine take to complete the given program?

Q3: Machine A and B bot use the same compiler, and as such generate the same number of clock cycles (15) per a given program. However machine A executes in 15s versus machine B which executes in 60s. A) What is the clock speed of Machine A? B) What is the clock speed of machine B?

# Questions Over Average Cycles Per Instruction (CPI):

Q4: Machine A, Program A Q5: Machine B, program B

|  |  |  |
| --- | --- | --- |
| Instruction | Cycles | #In program |
| Add | 4 | 2 |
| Sub | 2 | 1 |
| Mult | 9 | 5 |

|  |  |  |
| --- | --- | --- |
| Instruction | Cycles | #In program |
| Add | 3 | 1 |
| Sub | 2 | 4 |
| Mult | 7 | 2 |
| Div | 9 | 1 |

What is the Average CPI? What is the Average CPI?

# Questions over EQ.2:

# Q6: Machine X, and Machine Y share the same clock speed and use the same compiler (Instruction Count same). But for the same program each generates a different CPI. X generates 5 CPI versus Y which generates 8. A) Which machine is faster? B) By how much?

# 

Q7: Two machines J and K are built with the same clock speed and for a given program generate the same CPI. However with different compilers Machine J takes 3 times the execution time of Machine K. If machine J’s compiler generates 18 instructions, how many instructions does machine K’s compiler generate?