Vivian Do

CSC 3210

Lab 3 c

Problem 1: Suppose a program contains 500 million instructions (# of instructions) to execute on a processor running on 2.2 GHz (f). Half of the instructions takes 3 clock cycles (cpi) to execute, where the rest of the instructions take 10 clock cycles (cpi). What is the execution time of the program?

# of instructions = 500 mil. = 500×10^6

$= 5 \times 10^8$

frequency of processor = 2.2 GHz

clock time = $1/f$

$\frac{1}{2.2\ \text{GHz}} = 0.45\ \text{ns} = 0.45 \times 10^{-9}$ seconds

Clocks per instructions

$3(0.5) + 10(0.5)$

$= 13(0.5)$

$= 6.5$ CPI

execution of program = (# of instructions)(clocks per instructions)(clock time)

$= (5 \times 10^8)(6.5)(0.45 \times 10^{-9}) =$ **1.4625 seconds**

Problem 2: A processor is 20 (# of instructions) MIPS. If you run a program on that processor and the program takes 30 seconds (exe. time) to finish. How many instructions are there in this program?

20 MIPS = (2×10^7) instructions per seconds

number of instructions = (MIP rate)(execution time of program)

$= (2 \times 10^7)(30) = 600000000$

$= \boxed{6 \times 10^8}$ = number of instructions