George Fraher - Computer Org and Arc Assignment 1

1.4 - a. Total pixels = 1280 \* 1024 = 1,310,720 pixels each pixel is a byte. So 1,310,720

b. 1.31072 Mb for each frame so .0131 seconds

1.5 a. # instructions per second = Processor speed / CPI

P1 = 2.0 \* 10^9 P2 = 2.5 \* 10^9 P3 = 1.8 \* 10^9 so P2 is highest

b. # of cycles = Processor speed \* time

# of instructions = number of instructions per second \* time

(all values are multiplied to 10^10)

P1 = 3.0 cycles and 2.0 Instructions

P2 = 2.5 and 2.5

P3 = 4.0 and 1.8

c. CPI has to increase 20% so new CPI’s are P1 - P3 = 1.8, 1.2, 2.64

Execution time has to be reduced thirty so P1 - P3 = 7, 7 ,7

The number of instructions remains the same so using the formula clock = # of instructions \* CPI / Time

P1 - P3 = 5.143 GHz, 4.286 GHz, 6.789 GHz

1.6. Number of instructions per class (times 10^5) (A-D) = 1,2,5,2

So time is # instructions \* CPI/ Clock

time P1 = (10^5\*1 +2\*10^5\*2 +5\*10^5\*3 +2\*10^5\*3)/(2.5\*10^9) = 10.4\*10^-4 s

time P2 = (10^5\*2 +2\*10^5\*2 +5\*10^5\*2 +2\*10^5\*2)/(3\*10^9) = 6.66\*10^-4 s

b. CPI P1 = 10.4\*10^-4 \* 2.5 \* 10^9/10^6 = 2.6

CPI P2 = 6.66\*10^-4 \* 3 \* 10^9/10^6 = 2.0

1.14

1. CPI = -206/50 or -4
2. CPI = 64/80 or .8
3. (30 + 66 + 224 + 22.4 ) x 10^-3/ 2 -> 171.2 x 10^-3 sec

Time Enhanced = Time OG / New Time

256 x 10-3/ 171.2 x 10^-3 = 1.495

T = Total time / execution time + Overhead

Speed up = 100/ T

Ideal = 100/ T-4 (Minus the overhead)

For Each Execution time:

2: T = 54 so Speed up = 1.85 Ideal: 2

4: T = 29 so Speed up = 3.44 Ideal: 4

8: T = 16.5 so Speed up = 6.06 Ideal: 8

16: T = 10.25 so Speed up = 9.75 Ideal: 16

32: T = 7.125 so Speed up = 14.03 Ideal: 32

64: T = 5.5625 so Speed up = 17.97 Ideal: 64

128: T = 4.781 so Speed up = 20.91 Ideal: 128