**INHA UNIVERSITY TASHKENT**

**DEPARTMENT OF CSE & ICE**

**SPRING SEMESTER 2017**

**SOC 2060 - COMPUTER ARCHITECTURE**

**HOME ASSIGNMENT 1**

**Submitted by**

**Student Name**

**Student ID**

**Group : 15.1 Sophomore**



**INSTRUCTIONS :**

**- Answer All the QUESTIONS**

**- Home Assignments are to be carried out individually and not in Groups**

**- Home Assignment Report should be prepared using this Template provided**

**- Last date for submission of the Home Assignment is 28th  Feb. 2017**

**- Late submissions not entertained, Adhere to the deadline strictly**

1. **CPI =**  = =1.92

**Execution time =**  = = 1.92•10-3

**MIPS =**  = = 260416.7

1. №1 7+2+2 = 11 instructions №2 4+2+4 = 10 instructions

**CPU clock cycle = CPIi • Ii**

№1 = 2•7+3•2+4•2 = 28 cycles №2 = 2•4+3•2+4•4 = 30 cycles

It can be seen that Code Sequence 1 is faster, despite quantity of instructions.

**CPI =**

CPI №1 = = 2.55 CPI №2 = = 3

1. (i) **Average CPI = CPIn•InsturctionMix** = 2.4 1•0.5+2•0.2+4•0.15+6•0.15 = 2.4

(ii) **Execution Time =**  = = 0.16

(iii) **MIPS rate =**  = = 1250

(iv) **MIPS rate =**  = = 1250

1. a) **CPI** №1 **=**  = =2.1428571429

**MIPS** №1 **=**  = = 933.3

**Execution time** №1 **=**  = = 0.0225

**CPI** №2 **=**  = = 1.7777777778

**MIPS** №2 **=**  = = 1125

**Execution time** №2 **=**  = = 0.024

b) According to CPI and Execution time Machine M1 is faster, while MIPS is showing opposite result.

1. **CPI** №1 **=**  = =2.3076923077

**MIPS** №1 **=**  = = 1646.7

**Execution time** №1 **=**  = = 7.89

**CPI** №2 **=**  = = 2.22

**MIPS** №2 **=**  = = 1710

**Execution time** №2 **=**  = = 10.5

According to MIPS Compiler2 is faster, whereas Execution time gives the result that Compiler1 is faster.

1. a) **Instruction Count = MIPS • Execution time • 106** Instruction Count VAX = 2•106•16x = 32x•106

Instruction Count IBM = 60•106•x = 60x•106

It can be seen that Instruction count in IBM is higher.

= 1.875 times

b) **CPI** VAX **=** =  = 10-2

**CPI** IBM **=** =  = 10-3

1. a) **MIPS** **=**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Computer A | Computer B | Computer C |
| Program 1 | 100 | 10 | 5 |
| Program 2 | 0.1 | 1 | 5 |
| Program 3 | 0.2 | 0.1 | 2 |
| Program 4 | 1 | 0.125 | 1 |

b and c) Arithmetic mean: **RA = ∑Ri**

Harmonic mean: **RH =**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Arithmetic mean | Rank by (arithmetic) | Harmonic mean | Rank by (harmonic) |
| Computer A | 2001.25 | 2 | 19.74 | 1 |
| Computer B | 2387.5 | 3 | 178.2 | 3 |
| Computer C | 237.5 | 1 | 153.9 | 2 |

8.

|  |  |  |  |
| --- | --- | --- | --- |
| Benchmark | A | B | C |
| B1 | 1 | 1.71 | 3.11 |
| B2 | 1 | 1.19 | 1.19 |
| B3 | 1 | 0.43 | 0.49 |
| B4 | 1 | 1.11 | 0.49 |
| B5 | 1 | 2.1 | 0.6 |
| Arithmetic mean | 1 | 1.31 | 2.09 |
| Harmonic mean | 1 | 0.98 | 1.50 |
| Geometric mean | 1 | 1.15 | 1.18 |

|  |  |  |  |
| --- | --- | --- | --- |
| Benchmark | A | B | C |
| B1 | 0.59 | 1 | 1.82 |
| B2 | 0.84 | 1 | 1 |
| B3 | 2.32 | 1 | 1.13 |
| B4 | 0.90 | 1 | 0.54 |
| B5 | 0.48 | 1 | 1 |
| Arithmetic mean | 1.01 | 1 | 1.1 |
| Harmonic mean | 0.77 | 1 | 0.95 |
| Geometric mean | 0.87 | 1 | 1.02 |

|  |  |  |  |
| --- | --- | --- | --- |
| Benchmark | A | B | C |
| B1 | 0.32 | 0.55 | 1 |
| B2 | 0.84 | 1 | 1 |
| B3 | 2.05 | 0.88 | 1 |
| B4 | 1.67 | 1.86 | 1 |
| B5 | 0.48 | 1 | 1 |
| Arithmetic mean | 1.07 | 1.06 | 1 |
| Harmonic mean | 0.67 | 0.91 | 1 |
| Geometric mean | 0.85 | 0.98 | 1 |

(iv) When A is reference

According to Arithmetic mean: fastest – A, slowest – C.

According to Harmonic mean: fastest – C, slowest – B.

According to Geometric mean: fastest – A, slowest – C.

With bigger probability A – fastest and C – slowest.

When B is reference

According to Arithmetic mean: fastest – B, slowest – C.

According to Harmonic mean: fastest – B, slowest – A.

According to Geometric mean: fastest – A, slowest – C.

With bigger probability B – fastest and C – slowest.

When C is reference

According to Arithmetic mean: fastest – C, slowest – A.

According to Harmonic mean: fastest – C, slowest – A.

According to Geometric mean: fastest – A, slowest – C.

With bigger probability C – fastest and A – slowest.

Overall, there is no same answers, thus I think this method is incorrect for finding the faster Processor.

9. (a) (i) **CPIaverage = ∑CPIiInstructionMix** **CPIaverage** = 10.6+20.18+40.12+80.1= 2.24

(ii) **MIPS** **=**  = = 179

(b) (i) **CPIaverage** = 10.6+20.18+40.12+120.1= 2.64 Cache miss change to 12 has increased CPI.

(ii) **MIPS** **=**  = = 152 MIPS has decreased.

(iii) We need to find Execution time for both.

T\_single\_proc =  **=** 11

T\_parallel\_proc = = 1.8

Speedup = = = 6.11 times

10. Fractionenhanced= 0.7

Speedupenhanced =20

Speed = = = 2.99

So, overall speed is 2.99

11. (i) speedupFPSQR= = 1.4

(ii) speedupFP= = 1.49

Improvement of FP operations is better than FPSQR