Fall, 2022 Week 2 2021.09.19

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組別:	簽名:

[group2]

cik permi 18

1. Fred previously designed two compilers, he wanted to compare them with the same computer to know which compiler performed better. CPU TIME V

Compiler Alpha:

Instuction Class	CPI	Instruction Count
А	4	2,000
В	8	500

Compiler Beta:

Compiler Dotal		1 0 110 0 110 0 1
Instruction Class	СРІ	Instruction Count
A'	5	1,400
B'	6	800

Question:

- (a) Which compiler is more efficient in terms of this program?
- (b) The program compiled with Compiler Beta runs 0.2s faster than the one compiled with Compiler Alpha. What is the clock rate of the machine?

(G) ? Tak 10, Topu: 11800 < 1200

:, Beta better #

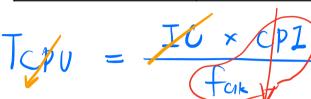
$$J_{\alpha} - J_{\alpha} = 0.2$$

[group14]

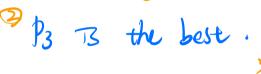
2. Consider the following processors and their specifications.

91	•
TC How many instructions can it process i	n 10 seconds? Which
	~~~
processor has the best performance?	2

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Processor	Clock rate ←CI/k	CPI
P1	1 GHz	3 3
P2	2 GHz	2
P3	3 GHz	1



9	PI	13	×1 0/0	



出題不合理 Y falk ↑ (= Talk b) → 1 J cycle 能做的task b Te. noeds more cycles (CPI↑)



- 3. Please select the correct options. 2.5.6
- Instruction Count for a program is determined by program, or and compiler.
- 2. Throughput is total work done per unit time. Adding more processors can not only shorten the response time but enhance the throughput.
- 4. Compiler translates assembly language to binary machine language.
- 5. Compiler performance depends on Instruction count and CPI.
- 6. Elapsed time is a total respone time of processing, I/O, OS overhead, and Idle time, which also can determine the performance of system.
- 7. Given two computers, computer_A: Cycle Time=250ps, CPI=2.0; and computer_B: Cycle Time=500ps, CPI=1.2, we can conclude that A is faster. Also depends on IC.

[group5]

Speedup = 1 = 1219

- instructions are Floating Point instructions. The overall speedup would be 3.
 - For a given program, its average cycles per instruction (CPI) is affected not only by the instruction set architecture, but also by the compiler used. depends on propram Also
 - By changing the clock frequency of a processor from 1.5 GHz to 2 GHz, and supply voltage from 1 Volt to 1.25 Volt, the dynamic power consumption of this processor will theoretically increase by more than 3 times.
 - d. According to Amdahl's law, it is theoretically possible to achieve a 6X speedup on executing a program which is 87% parallelizable, by using a 16-core multiprocessor.

(d) speedup =
$$\frac{1}{(1-081) + \frac{0.81}{16}} = 5.42 < 6$$

(c). $P = C \cdot \sqrt{2}$ freq = 1.25 $\cdot \frac{2}{1.5} = 2.08 < 3$

[group11]

5. A common performance figure is GFLOPS (billions of floating-point operations per second), defined as

To fifth performance $GFLOPS = \frac{No. FP \text{ operations}}{CPU \text{ time}} \times 10_9$

but this figure has the same problems as MIPS Miller Institutions Per Sound

By using the table below, calculate the GFLOPS of P1 running a particular program.

processor	Instruction count					Clock rate
		Type of instructions		СРІ		
		Load/Store Memory	Floating Point	Load/Store	Floating Point	
P1	1*109	40%	60%	1	2	4GHz

GFLOPS =
$$\frac{10. \text{ FP This method}}{\text{(CPU time)}} \times 10^9 = \frac{0.6}{0.4} = 1.5 \text{ GFLOPS}$$

$$\frac{10. \text{ FP This method}}{\text{CPU time)}} \times 10^9 \times$$

[group8]

- 6. What performance factor(s) below may be affected
 - (1) Instruction count (2) CPI (3) Cycle time Tok (Clk pund)
- (A) Algorithm : (1) (1) (multiple choice)
- (B) Program: (1) (multiple choice)
- (C) Compiler: (multiple choice)
- (D) Computer organization: (2) . (3) (multiple choice)

Handware

[group12]

7. The division operation of a certain program requires 8 cycles, and other operations require 4 cycles. Assuming that 60% of the operations of this program are division and 40% are other operations, CPI=?

CPI of Div = 8 Avg. CPI =
$$8 \times 0.6 + 4 \times 0.4 = 6.4$$

[group 7] of others = 4

Detremine if each of the following statements is True or False and explain why.

- 1.CPU time increases when the clock rate increases
- 2.CPU time increases when the CPI increases
- 3.CPU time increases when the instruction count(IC) increases