

Chương 1

Bài Tập

- Consider three different processors P1, P2, and P3 executing the same instruction set with the clock rates and CPIs given in the following table.

Processor	Clock Rate	CPI
P1	2 Ghz	1.5
P2	1.5 Ghz	1.0
P3	3 Ghz	2.5

- Which processor has the highest performance expressed in instructions per second (MIPS)?
- If the processors each execute a program in 10 seconds, find the number of cycles and the number of instructions

Bài Tập

Processor	Clock Rate	CPI
P1	2 Ghz	1.5
P2	1.5 Ghz	1.0
P3	3 Ghz	2.5

- We are trying to reduce the time by 30% but this leads to an increase of 20% in the CPI. What clock rate should we have to get this time reduction?

Bài tập

- Consider two different implementations of the same instruction set architecture. There are four classes of instructions, A, B, C, and D. The clock rate and CPI of each implementation are given in the following table.

	Clock rate	CPI Class A	CPI Class B	CPI Class C	CPI Class D
P1	1.5 Ghz	1	2	3	4
P2	2 Ghz	2	2	2	2

- Given a program with 10^6 instructions divided into classes as follows: 10% class A, 20% class B, 50% class C, and 20% class D, which implementation is faster?

Bài tập

- What is the global CPI for each implementation?
- Find the clock cycles required in both cases

	Clock rate	CPI Class A	CPI Class B	CPI Class C	CPI Class D
P1	1.5 Ghz	1	2	3	4
P2	2 Ghz	2	2	2	2

Bài tập

- Assuming that arith instructions take 1 cycle, load and store 5 cycles, and branches 2 cycles, what is the execution time of the program in a 2 GHz processor?

Arith	Store	Load	Branch	Total
500	50	100	50	700

- Find the CPI for the program
- If the number of load instructions can be reduced by one half, what is the speedup and the CPI?

Bài tập

- Consider two different implementations, P1 and P2, of the same instruction set. There are five classes of instructions (A, B, C, D, and E) in the instruction set. The clock rate and CPI of each class is given below.

		Clock Rate	CPI Class A	CPI Class B	CPI Class C	CPI Class D	CPI Class E
a	P1	1.0 GHz	1	2	3	4	3
	P2	1.5 GHz	2	2	2	4	4
b	P1	1.0 GHz	1	1	2	3	2
	P2	1.5 GHz	1	2	3	4	3

Bài tập

- Assume that peak performance is defined as the fastest rate that a computer can execute any instruction sequence. What are the peak performances of P1 and P2 expressed in instructions per second.
- If the number of instructions executed in a certain program is divided equally among the classes of instructions except for class A, which occurs twice as often as each of the others, which computer is faster? How much faster is it?

Bài tập

- If the number of instructions executed in a certain program is divided equally among the classes of instructions except for class E, which occurs twice as often as each of the others, which computer is faster? How much faster is it?

Bài tập

- Assuming that computes take 1 cycle, loads and store instructions take 10 cycles, and branches take 3 cycles, find the execution time on a 3 GHz MIPS processor.
- The table below shows instruction type breakdown for different programs. Using this data, you will be exploring the performance tradeoffs for different changes made to an MIPS processor.

Bài tập

	No Instruction				
	Compute	Load	Store	Branch	total
Program 1	1000	400	100	50	15500
Program 2	1500	300	100	100	1750

Bài tập

- Assuming that computes take 1 cycle, loads and store instructions take 2 cycles, and branches take 3 cycles, find the execution time on a 3 GHz MIPS processor.

Bài tập