

Chapter 2

Computer Evolution and Performance – Part 08

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Performance Assessment

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| Agenda



Intro



Clock Speed – Instruction per second

- Million Instruction per second (MIPS)
- Million Floating Point Operations per second MFLOPS rate

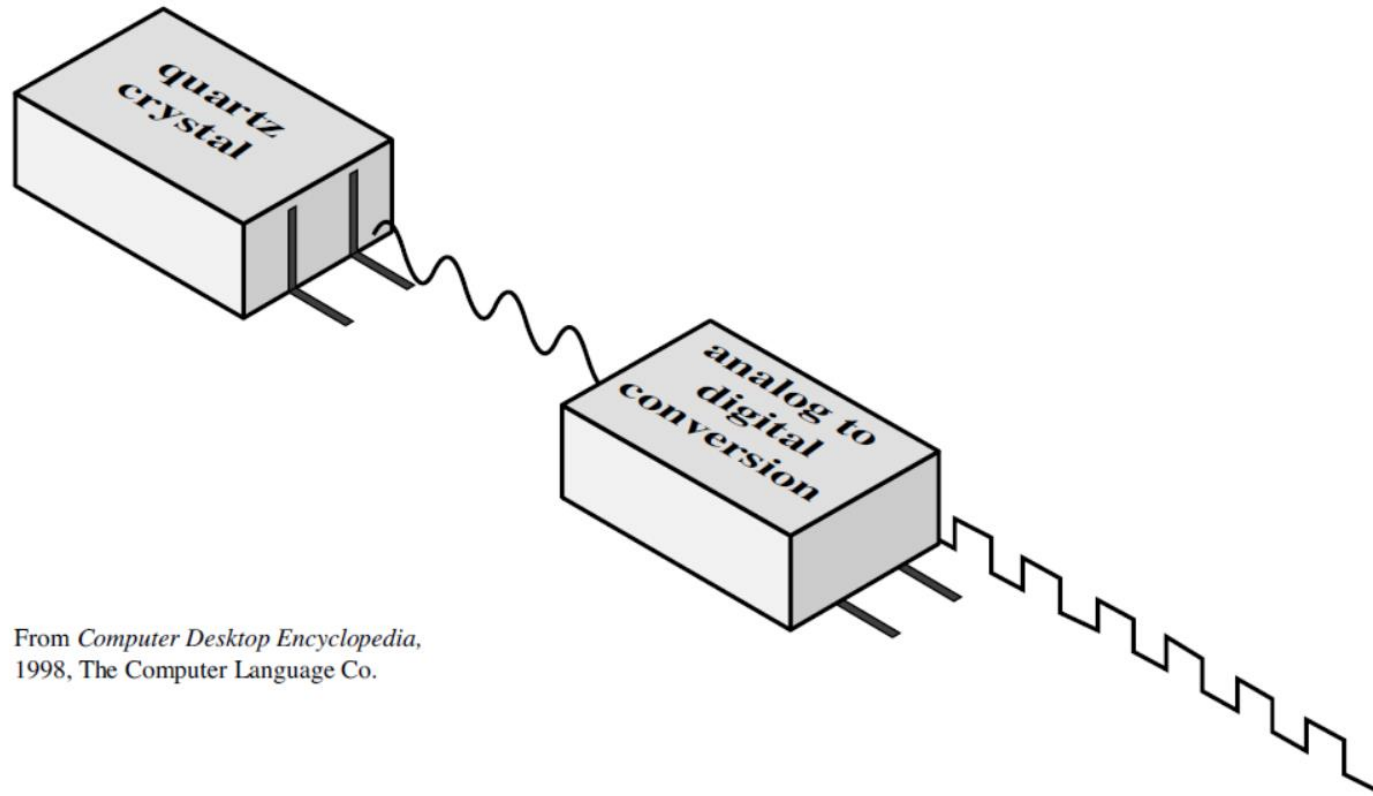
| Intro...

- In evaluating processor hardware and setting requirements for new systems, **performance** is one of the key parameters to consider

| Clock Speed and Instruction per second

- Operations performed by a processor, such as fetching an instruction, decoding the instruction, performing an arithmetic operation, and so on, are governed by a system clock

| Clock Speed and Instruction per second



From *Computer Desktop Encyclopedia*,
1998, The Computer Language Co.

Figure 2.14 System Clock

| why do you need clock pulse

- Operations must be synchronized

| Clock Speed only, does not make sense

- **Most instructions** on most processors require multiple clock cycles to complete.

| Instruction Execution Rate

Table 2.9 Performance Factors and System Attributes

	I_c	p	m	k	τ
Instruction set architecture	X	X			
Compiler technology	X	X	X		
Processor implementation		X			X
Cache and memory hierarchy				X	X

| Instruction Execution Rate

- A common measure of performance for a processor is the rate at which instructions are executed, expressed as millions of instructions per second (**MIPS**), referred to as the MIPS rate

| Instruction Execution Rate

- For example, consider the execution of a program which results in the execution of 2 million instructions on a 400-MHz processor. The program consists of four major types of instructions. The instruction mix and the CPI for each instruction type are given below based on the result of a program trace experiment

Instruction Type	CPI	Instruction Mix
Arithmetic and logic	1	60%
Load/store with cache hit	2	18%
Branch	4	12%
Memory reference with cache miss	8	10%

| Instruction Execution Rate

| Floating-point Performance