

**WEEK-2**

## 1.3 An Example System

Consider this advertisement:

**MHz??**

**MB??**

**PCI??**

**USB?**

**L1 Cache?**

*What does it all mean?*

Measures of capacity and speed:

- Kilo- (K) = 1 thousand =  $10^3$  and  $2^{10}$
- Mega- (M) = 1 million =  $10^6$  and  $2^{20}$
- Giga- (G) = 1 billion =  $10^9$  and  $2^{30}$
- Tera - (T) = 1 trillion =  $10^{12}$  and  $2^{40}$
- Peta - (P) = 1 quadrillion =  $10^{15}$  and  $2^{50}$

**Whether a metric refers to a power of ten or a power of two typically depends upon what is being measured.**

- **Hertz** = clock cycles per second (frequency)

$$1\text{MHz} = 1,000,000\text{Hz}$$

- Processor speeds are measured in MHz or GHz.

- **Byte** = a unit of storage

- $1\text{KB} = 2^{10} = 1024$  Bytes

- $1\text{MB} = 2^{20} = 1,048,576$  Bytes

- Main memory (RAM) is measured in MB
- Disk storage is measured in GB for small systems, TB for large systems.

Measures of time and space:

- Millie- (m) = 1 thousandth =  $10^{-3}$
- Micro- ( $\mu$ ) = 1 millionth =  $10^{-6}$
- Nano- (n) = 1 billionth =  $10^{-9}$
- Pico- (p) = 1 trillionth =  $10^{-12}$
- Femto- (f) = 1 quadrillionth =  $10^{-15}$
- Millisecond = 1 thousandth of a second
  - Hard disk drive access times are often 10 to 20 milliseconds.
- Microsecond = 1 millionth of a second
  - Circuits on computer chips are measured in microns.
- Nanosecond = 1 billionth of a second
  - Main memory access times are often 50 to 70 nanoseconds.
- We note that cycle time is the reciprocal of clock frequency.
- A bus operating at 133MHz has a cycle time of 7.52 nanoseconds:

**Now back to the advertisement.**

Frequency=133,000,000 cycles/second

Cycle Time= $1/F=1/133 \times 10^6$

$=0.00752 \times 10^6 = 7.52\text{ns/cycle}$

A system bus moves data within the computer. The faster bus is the better.

This one runs at 133MHz.

The microprocessor is the “brain” of the system. It executes instructions program. This one is a Pentium III (Intel) running at 667MHz.

- Computers with large main memory capacity can run larger programs with greater speed than computers having small memories.

- **RAM:**

Is a short form for *random access memory*.

Random access means those memory contents can be accessed directly if you know its location.

- **Cache:**

Is a type of temporary memory that can be accessed faster than RAM. Two levels of cache memory, the level 1 (L1) cache is smaller and (probably) faster than the L2 cache.

- **Hard disk:**

This one can store 30GB. 7200 RPM is the rotational speed of the disk. Generally, the faster a disk rotates, the faster it can deliver data to RAM. (There are many other factors involved.)

Hard disk capacity determines the amount of data and size of programs you can store.

- **CD-ROM:**

Can store about 650MB of data making it an ideal medium for distribution of commercial software packages.

48x describe its speed.

- **EIDE:**

Stands for *enhanced integrated drive electronics*, which describes how the hard disk interfaces with or connects to other system components.

) **Refresh rate:**

The number of times per second that the image on the monitor is repainted is its *refresh rate*.

) **The dot pitch:**

The *dot pitch* of a monitor tells us how clear the image is.

This monitor has a dot pitch of 0.24mm and a refresh rate of 85Hz. The graphics card contains memory and programs that support the monitor.