

	Department of Computer and Mathematical Sciences	CS 1305 Intro to Computer Technology	3
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Module 3: Computer Hardware

Objectives:

- Understand computer hardware.
- Understand basic computer components.
- Learn the function of storage.
- Learn about history of computers.

Task 1: Computer Components

As previously mentioned, the computers that are used nowadays are based upon the stored-program computer concept proposed by John Von Neumann. Also, in Module 1, we pointed out that a computer is a device capable of *storing*, *retrieving*, and *processing information* or *data*. These suggest that a computer must consist of four basic components. These components are

- Central processing unit (CPU)
- Memory unit
- Input unit
- Output unit

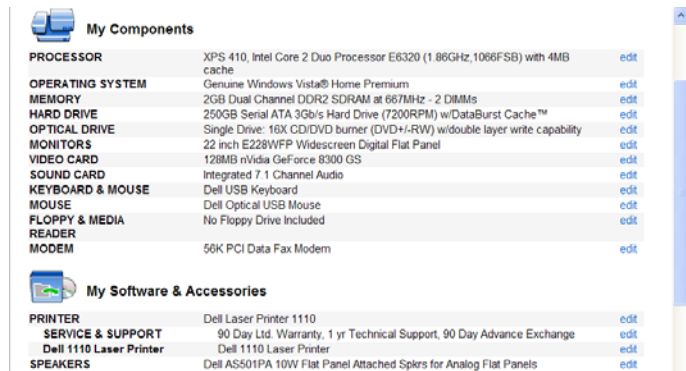


Figure 1: Computer Advertisement

Activity 1.1: Complete the following table by listing the actual components from the ad in Figure 1 to match the categories listed.

Basic Component	Component from Figure 1
Central Processing Unit	
Memory Unit	
Input Unit	
Output Unit	

Processor

Activity 1.2: A central processing unit or processor consists of *Arithmetic Logic unit* (ALU) and *Control unit* (CU) unit. What is the function of ALU?

Activity 1.3: What is the function of control unit?

Activity 1.4: What does “*Core 2 Duo Processor*” in the description of processor in Figure 1 mean?

Processor Speed

What does “*1.86 GHz*” in the description of processor in Figure 1 mean?

GHz stands for **giga-Hertz**, which means **billion cycles/ticks per second**. This is a unit used to measure CPU/processor or clock speed. Clock speed is the speed at which the processor executes instructions. The CPU requires a fixed number of clock cycles/ticks to execute each instruction. The faster the clock, the more instructions the CPU can execute per second.

So, **1.86 GHz** refers to the processor that can process instructions at the speed of 1.86 billion cycles per second.

Clock speed can be used as a rough comparison of the speed of two processors as long as they are the same type and the same brand/maker. Comparing different processors is much more difficult. The clock still makes each processor do something each cycle, but what that something is can be very different. For example, on old computers, it would take several cycles for the processor to complete one operation. On a Pentium4, however, it usually completes two operations per cycle.



Figure 2: Description of Two Intel Processors

Activity 1.5: In the above Figure 2, what does “*2.4 GHz*” in the description of processor *Intel core 2 Duo Processor E6600* mean?

Activity 1.6: In the above Figure 2, which processor is faster, E6320 or E6600? Why?

Task 2: Memory

What is computer memory or memory? From:

1. The American Heritage® Dictionary: **Memory** is
 - a. *A unit of a computer that preserves data for retrieval.*
 - b. *Capacity for storing information: two gigabytes of memory.*
2. The Encyclopedia Britannica: **Computer Memory** is device that is used to store data or programs (sequences of instructions) on a temporary or permanent basis for use in an electronic digital computer.

From the Webopedia Computer Dictionary, “Every computer comes with a certain amount of physical memory, usually referred to as **main memory** or **RAM**. You can think of main memory as an array of boxes, each of which can hold a single byte of information. A computer that has 1 megabyte of memory, therefore, can hold about 1 million bytes (or characters) of information.”

Activity 2.1: What does RAM stand for?

Activity 2.2: There are two basic types of RAM: **Dynamic RAM** (DRAM) and **Static RAM** (SRAM). What is a **Dynamic RAM**?

Activity 2.3: What is a **Static RAM**?

Activity 2.4: Which is more expensive **Dynamic RAM** or **Static RAM**?

Activity 2.5: When someone says a computer has “one gigabyte of RAM”, do they mean the computer has one gigabyte of **Dynamic RAM** or **Static RAM**?

 My Components	
PROCESSOR	XPS 410, Intel Core 2 Duo Processor E6320 (1.86GHz, 1066FSB) with 4MB cache
OPERATING SYSTEM	Genuine Windows Vista® Home Premium

Figure 3: Description of Memory

Activity 2.6: Is the memory listed in **My Components** in Figure 3 of type *Dynamic RAM* or *Static RAM*?

Activity 2.7: What is “*SDRAM*” in the description of **Memory** in Figure 3?

Activity 2.8: What does “*DDR2*” in the description of **Memory** in Figure 3 stand for?

Activity 2.9: What is “*cache*” in the description of **Processor** in Figure 3?

Activity 3.10: Is **cache** a memory of type *Dynamic RAM* or *Static RAM*?

Activity 3.11: How many types are of **cache**? What are they?

Task 3: Input and Output and Secondary Storage

Input and Output

Input and output are the basic computer components that communicate with CPU. An input device sends data/information to CPU. An output device takes the processed data/information from CPU and makes it available for the user.

Activity 3.1: List all input devices that you know?

Activity 3.2: List all output devices that you know?

Activity 3.4: What is a USB/flash drive?

Activity 3.5: Is USB/flash drive an input or output device?

Activity 3.6: What does USB stand for?

Activity 3.7: What is secondary storage?

Activity 3.8: Is USB/flash drive a secondary storage?

Activity 3.9 List all secondary storages that you know?

Activity 3.10 What do CD and DVD stand for?

Activity 3.11 Are CD and DVD secondary storage?

Activity 3.12 What is a capacity of a CD?

Activity 3.15 What is a capacity of a DVD?

Activity 3.16 What is a CD-R?

Activity 3.17 What is a CD-RW?

Task 4: History of Computers

The first computing device is **Abacus** which can be traced back to 5,000 years ago in Asia and still is being used today. **Abacus** is considered to be a mechanical computing device. Hence we can categorize computing devices/computers into two types: **mechanical** and **electronic** computing devices/computers.



Use the Internet to perform these activities.

Activity 4.1 The real beginnings of computers as we know them today lay with an English mathematics professor, **Charles Babbage**. In 1822, what machine did he invent to be able to compute tables of numbers, such as logarithm tables? What did it use to make the machine run?

Activity 4.2 An important step in the history of computers was the design of a **mechanical general-purpose computer** by **Charles Babbage** in 1837. What machine did he invent?

Activity 4.3 Who created a program for the mechanical general-purpose built by **Charles Babbage** in 1837.

Activity 4.4 What is the **Turing Machine**? Who developed it and in what year?

Activity 4.5 Who proposed the so called *Stored-Program Computer* concept or model in his paper that we are still using till these days? In what year did he propose?

Activity 4.6 What is the first electronic computer? Who created it and in what year?

Activity 4.7 What is the first general-purpose electronic computer? Who created it and in what year?

Activity 4.8 The history of computer development is often referred to in reference to the different generations of computing devices. Each generation of computer is characterized by a major technological development that fundamentally changed the way computers operate, resulting in increasingly smaller, cheaper, more powerful and more efficient and reliable devices. For example, the *First Generation* covers 1940-1956 and *vacuum tubes* were the fundamental change. Complete the following table:

	From Year	To Year	Fundamental Change
<i>Second Generation</i>			
<i>Third Generation</i>			
<i>Fourth Generation</i>			

