**Parts of a Digital Computer System**

A working computer requires both hardware and software. Hardware is the computer's

physical electronic and mechanical parts. Software consists of the programs that instruct the

hardware to perform tasks.

**a) Hardware**

A digital computer's hardware is a complex system of four functionally different elements—a

central processing unit, input devices, memory-storage devices, and output devices.

**The central processing unit**

The heart of a computer is the central processing unit (CPU). In addition to performing

arithmetic and logic operations on data, it times and controls the rest of the system. Mainframe

and supercomputer CPUs sometimes consist of several linked microchips, called

microprocessors, each of which performs a separate task, but most other computers require

only a single microprocessor as a CPU.

Most CPUs have three functional sections:

(1) the arithmetic/logic unit (ALU), which performs arithmetic operations (as addition and

subtraction) and logic operations (such as testing a value to see if it is true or false);

(2) temporary storage locations, called registers, which hold data, instructions, or the

intermediate results of calculations; and

(3) the control section, which times and regulates all elements of the computer system and

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also translates patterns in the registers into computer activities (such as instructions to add,

move, or compare data).

A very fast clock times and regulates a CPU. Every tick, or cycle, of the clock causes each

part of the CPU to begin its next operation and to stay synchronized with the other parts. The

faster the CPU's clock, the faster the computer can perform its tasks. The clock speed is

measured in cycles per second, or hertz (Hz). Today's desktop computers have CPUs with 1 to

4 GHz (gigahertz) clocks. The fastest desktop computers therefore have CPU clocks that tick 4

billion times per second. The early PCs had CPU clocks that operated at less than 5 MHz. A

CPU can perform a very simple operation, such as copying a value from one register to

another, in only one or two clock cycles.