# What is inside a PC system?

## Processing

The nerve centre of a PC is the **processor**, also called the **CPU**, or **central processing unit**. This is built into a single **chip** which executes program instructions and coordinates the activities that take place within
5 the computer system. The chip itself is a small piece of silicon with a complex electrical circuit called an **integrated circuit**.

The processor consists of three main parts:
- The **control unit** examines the instructions in
10 the user's program, interprets each instruction and causes the circuits and the rest of the components – monitor, disk drives, etc. – to execute the functions specified.
- The **arithmetic logic unit** (**ALU**) performs
15 mathematical calculations (+, -, etc.) and logical operations (AND, OR, NOT).
- The **registers** are high-speed units of memory used to store and control data. One of the registers (the program counter, or PC) keeps track
20 of the next instruction to be performed in the main memory. The other (the instruction register, or IR) holds the instruction that is being executed (see Fig. 1 on page 13).

The power and performance of a computer is partly
25 determined by the speed of its processor. A **system clock** sends out signals at fixed intervals to measure and synchronize the flow of data. **Clock speed** is measured in **gigahertz** (**GHz**). For example, a CPU running at 4GHz (four thousand million hertz, or
30 cycles, per second) will enable your PC to handle the most demanding applications.
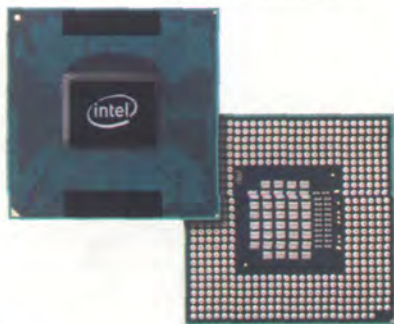


*The Intel Core 2 Duo processor; other chip manufacturers are AMD and Motorola*

## RAM and ROM

The programs and data which pass through the processor must be loaded into the main memory in order to be processed. Therefore, when the user runs
35 a program, the CPU looks for it on the hard disk and transfers a copy into the **RAM** chips. RAM (**random access memory**) is volatile – that is, its information is lost when the computer is turned off. However,

**ROM** (**read only memory**) is non-volatile, containing
40 instructions and routines for the basic operations of the CPU. The **BIOS** (**basic input/output system**) uses ROM to control communication with peripherals.

RAM capacity can be expanded by adding extra
45 chips, usually contained in small circuit boards called dual in-line memory modules (**DIMMs**).
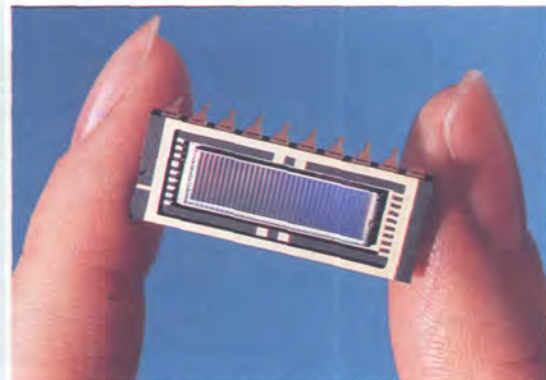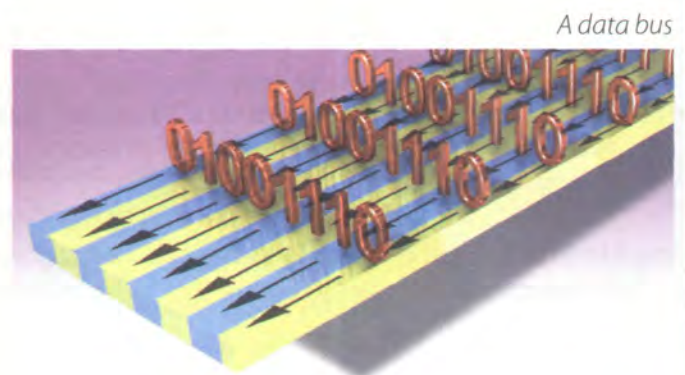


*A RAM chip*

## Buses and cards

The main circuit board inside your system is called the **motherboard** and contains the processor, the memory chips, expansions slots, and controllers
50 for peripherals, connected by **buses** – electrical channels which allow devices inside the computer to communicate with each other. For example, the front side bus carries all data that passes from the CPU to other devices.

55 The size of a bus, called **bus width**, determines how much data can be transmitted. It can be compared to the number of lanes on a motorway – the larger the width, the more data can travel along the bus. For example, a 64-bit bus can transmit 64 bits of data.

60 **Expansion slots** allow users to install **expansion cards**, adding features like sound, memory and network capabilities.



*A data bus*