

What's binary all about?

Computers today use the binary system to represent information. It is called binary because only two different digits are used. It is also known as base two (humans normally use base 10). Each zero or one is called a *bit* (**binary digit**). A bit is usually represented in a computer's main memory by a transistor that is switched on or off, or a capacitor that is charged or discharged. When data must be transmitted over a telephone line or radio link, high and low-pitched tones are used for the ones and zeros.

On magnetic disks (floppy disks and hard disks) and tapes, bits are represented by the direction of a magnetic field on a coated surface, either North-South or South-North. Audio CDs, CD-ROMs and DVDs store bits optically—the part of the surface corresponding to a bit either does or does not reflect light. One bit on its own can't represent much, so they are usually grouped together in groups of eight, which can represent numbers from 0 to 255. A group of eight bits is called a byte.

The speed of a computer depends on the number of bits it can process at once. For example, a 32-bit computer can process 32-bit numbers in one operation, while a 16-bit computer must break 32-bit numbers down into smaller pieces, making it slower.

Ultimately bits and bytes are all that a computer uses to store and transmit numbers, text, and all other information. In some of the later activities we will see how other kinds of information can be represented on a computer.