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FIBONACCI SEQUENCE

Developed by a Florentine mathematician, Leonardo Fibonacci, in the 13th century, the *Fibonacci sequence* is an infinite series of numbers in which each number is the sum of the two preceding numbers. The sequence begins with 0, 1 and continues:

1 (the sum of 0 and 1), 2, 3, 5, 8, 13 . . .

The formal mathematical definition of the Fibonacci sequence is:

$$F_0=0, F_1=1, F_{n+2}=F_{n+1}+F_n, n \geq 0$$

FIBRE OPTICS

Optical fibres, made of extremely thin glass or plastic, can be used instead of copper wire for voice or data transmissions over very long distances. A single strand of glass may carry several thousand signals. *Fibre optics* works on the principle of internal reflection: light is held within the strand because it reflects inwards from the exterior surfaces. This means that the strands may be bent or twisted through sharp angles with no effect on transmission. We can illustrate this principle by considering a container holding water. A light source shines into the container and, because the walls are solid, the light remains inside until a hole is created in one wall, allowing water to flow out. The water carries the light with it in the same way that an optical fibre would, so the light actually bends as it flows with the water.

The amount of information a fibre can carry and the quality of the signal transmitted both depend on the optical density of the glass. Cables constructed of optical fibres are non-conductive, which makes them useful in applications where normal conductive cables could present a safety hazard. They are also relatively secure, being much more difficult to tap into than ordinary coaxial cables.

FIELD

In a database, a *field* is a group of data items under a specific heading. In a telephone directory, for instance, the surname is usually the first field, followed by the forename field, the address field, and the phone number field. A collection of fields comprising a defined range of information — a complete telephone book listing, for example — is called a *record*, while each individual piece of data (a specific person's surname, for instance) is an *entry*. The number of characters contained in an entry is often restricted; the length being determined by the nature of the field — so a surname field might be limited to 26 characters, the telephone number restricted to 10, and so on.

The word 'field' can also be used to refer to a descriptive element attached to a word or function. For example, in the address:

POKE 57367, n

the number 57367 can be referred to as the instruction field.

FIFO

An acronym for 'First In First Out', FIFO is one way of dealing with information held in a *stack* (a sequential data list in memory). The first element that is placed in the stack is also the first to be removed and acted on when the stack is filled. The stack may be manipulated in the opposite way, in which case it is referred to as LIFO (for 'Last In First Out'). A FIFO list is also called a *queue list* or a *pushup stack*.

FILE

A *file* is a collection of related information that is saved, altered and re-used after its creation. Computer files are saved to cassette or disk. They can contain whole programs, listings of programming instructions (often-used subroutines saved as library modules), data files that are loaded into other programs for specific applications, text files (such as memos, letters and other word processing documents), or graphic data for visual presentations.

In a database, information related to a specific subject forms a file, which is acted on as a unit. For instance, in a database of company records all information concerning personnel would be held in a 'Personnel' file. To locate information about one particular employee, the database would search the Personnel file, which would have its own location on the storage disk or cassette.

FILE MAINTENANCE

Several operations must be carried out on files to safeguard the information they contain and to ensure that such data is up to date. Making backup copies of files, deleting out-of-date and unused records, and updating files are all part of *file maintenance*. Vital in a business or programming context, file maintenance is also essential in small databases, such as name and address files or a list of valuable items in a collection.

