



The New Penguin
DICTIONARY of
COMPUTING

Dick Pountain

AN A-Z OF COMPUTING
JARGON AND CONCEPTS

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intermediate **FRAMES** that lie between two key positions in a motion sequence, to create the impression of smooth motion. Originally performed manually by teams of assistant animators, in-betweening is now performed automatically by powerful computer animation programs such as **SOFTIMAGE** and **MAYA**. See also **INVERSE KINEMATICS**, **KEY FRAME**.

Inbox A software component of most **EMAIL** and other communications programs, typically represented by an icon installed on the user's **DESKTOP**, which gives the user access to any incoming messages. See also **UNIFIED MESSAGING**.

in-circuit emulator (ICE) A hardware device that plugs into the **PROCESSOR** socket of a circuit board under development and imitates the action of the central processor while enabling the system's designer to set both hardware and software **BREAKPOINTS**, inspect its register contents and examine the timing windows for critical **EVENTS** such as bus transfers – in effect it is a **DEBUGGER** for hardware circuits. ICEs are widely used in the design of **EMBEDDED** systems.

include file, include In programming, a file of **SOURCE CODE** that is to be used in several different programs. The include file is simply mentioned by name, normally at the beginning of any program that will use it, and the **COMPILER** treats it as if its whole text were present at that point.

increment To increase the value of some quantity, often by one, as when increasing a **COUNTER** (see under **BUMP**) or when moving a **POINTER** to point to the next address in a sequence. See also **AUTO-INCREMENT**, **PRE-INCREMENT**, **POST-INCREMENT**, **DECREMENT**.

incremental backup A particular class of **BACKUP** regime for computer data in which only those files whose contents have changed since the last full or incremental backup are copied into the backup set, and these files then have their **ARCHIVE FLAG** reset to false. An incremental backup therefore copies the minimum number of files strictly necessary, and is the fastest option. After a mishap the last full backup must be restored and then all subsequent incremental backups must be applied, in strict date order. Compare with **DIFFERENTIAL BACKUP**.

incremental compiler A programming language **COMPILER** that compiles each new **PROCEDURE** as the programmer writes it, rather than forcing recompilation of the whole program after every alteration.

indent In typography, the displacement of the start of one or more lines of text toward the right **MARGIN**, often used to distinguish a quoted passage or the start of a new paragraph. In some **PROGRAMMING LANGUAGES** indentation is employed as a syntactic element to mark the boundaries between structures.

Indeo A video compression **CODEC** developed by **INTEL CORPORATION**, designed to exploit the **MMX** extensions of **PENTIUM** processors.

InDesign **ADOBE'S** successor to its groundbreaking **PAGEMAKER** desktop publishing program. InDesign provides greatly enhanced controls over typographical quality, including **GLYPH SCALING**, **OPTICAL MARGIN ADJUSTMENT** and multiple line composition, all features designed to produce justified text in the way that is most pleasing to the human eye rather than being merely mathematically correct. See also **QUARK XPRESS**.

index 1 A separate file that contains the locations of all the **RECORDS** in a database file. Just as the index of a book helps to locate words in the book, an index enables data to be retrieved more quickly than by searching the whole database file from the beginning; any record that is listed in the index can be retrieved directly. Indexing also permits very fast **SORTING** of the database, since only the index information need be sorted, with no need to move the much larger data records themselves. See also **INVERTED INDEX**.

2 A number used to select one element of a sequential data structure such as an **ARRAY** or **LINKED LIST**. For example the expression **Weekdays [7]** refers to the 7th element of an array called **Weekdays** and thus the index is 7.

indexed addressing See under **ADDRESSING MODE**.

Indexed Sequential Access Method (ISAM) A type of **FLAT-FILE DATABASE** technology that permits records either to be retrieved directly via an **INDEX**, or else sequentially, in ascending or descending order of the value of a particular **FIELD**. ISAM databases have now been

all these words alongside the positions of all their occurrences. An inverted file thus contains a sequence of locations in word order, rather than a sequence of words in location order, hence its name. An inverted file index offers fast and comprehensive searching abilities, but has the disadvantage that the size of the index may approach or even exceed that of the original document.

inverted index The most commonly used technique for creating an INDEX for a DATABASE file, under which one or more of the FIELDS that make up each RECORD in the database is designated a KEY field to be indexed. The resulting INDEX file contains pairs consisting of the contents of a key field together with the location of the corresponding record in the database. For example if the 47th record in a database were:

47, Penguin, London, publisher

then an index on the Name field would contain an entry

Penguin, 47

The index is kept in sorted order of key values, so that a record may be located via its key rather than vice versa, hence the name 'inverted'. A database may be indexed on several fields (e.g. Name and Town) but typically the key values are required to be unique (i.e. there can be only one record with Name=Penguin).

inverter A digital LOGIC GATE that reverses the value of its input, outputting a 0 whenever it receives a 1 and vice versa. It is equivalent to the Boolean function NOT and its TRUTH TABLE is:

A	NOT A
True	False
False	True

invoke To cause a software routine to be executed.

I/O (Input/Output) Any communication between a computer and the outside world inhabited by the user.

1 Applied to a whole computer, the term covers all those devices (KEYBOARD, MOUSE, VDU, DISK DRIVE, SERIAL PORT and so on) that may be used to put data in or take data out.

2 Applied to a lone microprocessor it refers to any subsystem such as a PORT or BUS that

moves data on and off the chip as opposed to processing it within the chip.

3 Applied to an operating system, application program or programming language, it refers to those commands responsible for creating and manipulating files or communication channels. See also BIOS, I/O redirection.

Iomega A US manufacturer of removable disk storage devices, best known for its ZIP DRIVE and JAZ DRIVE. See also BERNOULLI DRIVE.

ion implantation The process of infusing a DOPANT substance, for example arsenic, into a SEMICONDUCTOR such as SILICON by bombarding its surface with a beam of high-speed ions from a particle accelerator.

I/O redirection A facility provided by most computer operating systems to greater or lesser degree, which enables data to be rerouted from one of its defined input or output devices to another by issuing a suitable command. For example text typed at the keyboard might be redirected from screen into a disk file, or the contents of a file redirected to the screen. UNIX provides the most powerful example in its STANDARD INPUT/OUTPUT concept, which permits the output of any program to be piped into any other (or to a disk, screen, printer or communication port).

IP 1 Abbreviation of INTELLECTUAL PROPERTY.

2 Abbreviation of Internet Protocol. The NETWORK LAYER component of the TCP/IP protocol suite that controls all traffic carried via the INTERNET. IP is a CONNECTIONLESS, packet routing protocol which determines the routes that packets will take to get to their destination. The sender, the receiver and each ROUTER that the packets pass through during the journey between them, are each assigned a unique IP ADDRESS, which is a 32-bit number (normally written in a dot-separated format such as 198.83.41.77). These addresses are stored in routing tables that provide the 'roadmap' for the network.

IP is also responsible for fragmentation, the splitting of large message packets into smaller units as and when required by the underlying network hardware (for example by ASYNCHRONOUS TRANSFER MODE) and their subsequent reassembly to reconstitute the original packets. IP does not perform any error detection or