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COMPUTER DICTIONARY

SECOND EDITION



THE COMPREHENSIVE
STANDARD FOR
BUSINESS, SCHOOL,
LIBRARY, AND HOME



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INTRODUCTION

The *Microsoft Press Computer Dictionary* is designed to be a comprehensive and authoritative source of definitions for computer-related terms and abbreviations. Written and reviewed by a distinguished team of experts from the computer industry and the business and academic communities, the dictionary includes terms drawn from a wide variety of topics:

Applications	History
Communications	Information Processing
Data and Data Storage	General Computing
Databases	Input/Output
Desktop Publishing	Memory and Memory Management
Electronics	Networks
Hardware	Output
Chips, Cards, and Boards	Print
Computers	Screen
Disks, Drives, and Other Media	Programming
Keyboards	Systems and Environments
Printers and Plotters	
Video	
Other Devices	

Although the book covers nearly every aspect of computing, it does not include entries on specific companies or on most makes and models of computers, nor does it contain entries on most application software products, although some key products of universal importance are covered.

Order of Presentation

Entries are alphabetized letter by letter. Spaces are ignored, as are characters such as hyphens and slashes; for example, *Baudot code* falls between *baud* and *baud rate*, and *machine-independent* falls between *machine identification* and *machine instruction*. Numbers and symbols are located at the beginning of the book and are listed in ascending ASCII order. If an entry begins with a letter or letters but contains a number, it is listed alphabetically, according to the initial letter(s), and then according to ASCII order. Thus, *V20* precedes *V.2x*, and both precede *VAB*.

Format

Information in each entry is presented in a consistent format: entry name, abbreviation, pronunciation (if supplied), alternative name or names, definition, and cross-references (if any).

Phonetic pronunciations are given where appropriate or in cases where pronunciation might not be apparent. If an abbreviation is pronounced simply by saying the successive letters it contains, no pronunciation is given.

Cross-references are of three kinds: A *See* reference simply points to another entry that contains the information sought; a *See also* reference points to one or more entries that contain additional or supplemental information about the topic; and a *Compare* reference points to an entry or entries that offer contrast.

Illustrations are called out in the text. In most cases, illustrations appear on the same page as the entries to which they apply. In some instances, however, page-layout requirements have forced them to a subsequent page. In any event, the caption of each illustration identifies the entry to which it belongs.

Future Printings and Editions

Every effort has been made to ensure the accuracy and completeness of this book. If you find an error, think that an entry does not contain enough information, or seek an entry that does not appear in this edition, please let us know. Address your letter to: Dictionary Editor, Microsoft Press, Dept. 302, One Microsoft Way, Redmond, WA 98052-8302.



absolute value The magnitude of a number, without respect to its sign (+ or -). An absolute value is always either positive or zero; for example, the absolute value of both 10 and -10 is 10. Programming languages and spreadsheet programs commonly include functions that return the absolute value of a number.

abstract In information processing and library science, a summary, often consisting of one paragraph or a few paragraphs, at the beginning of an investigative document such as a scientific paper.

In character recognition systems, an adjective describing a type of symbol that, unlike a letter or a numeral, has no intrinsic meaning and must be defined before it can be interpreted.

In programming, an adjective referring to a data type that is defined by the operations that can be performed on objects of that type rather than by the properties of the objects themselves. *See also* abstract data type.

abstract data type In programming, a data type that is defined in terms of the information it can contain and the operations that can be performed with it. An abstract data type is more generalized than one constrained by the properties of the objects it contains—for example, the data type “pet” is more generalized than the data types “pet dog,” “pet bird,” and “pet fish.” The standard example used in illustrating an abstract data type is the stack, a small portion of memory used to store information, generally on a temporary basis. As an abstract data type, the stack is simply a structure onto which values can be pushed (added) and from which they can be popped (removed). The type of value, such as *integer*, is irrelevant to the definition.

The way in which the program performs operations on abstract data types is encapsulated, or hidden, from the rest of the program. Encapsulation enables the programmer to change the definition of the data type or its operations without introducing errors to the existing code that uses the abstract data type. Abstract data types represent an intermediate step between traditional programming and object-oriented programming. *See also* module, object-oriented programming.

AC *See* alternating current.

accelerator In applications, a key or combination of keys that a user presses to perform an application-defined function. Also called a short-cut key, an accelerator offers a convenient alternative to the mouse in a graphical application.

In hardware, a device that quickens or otherwise improves the operation of one or more subsystems, resulting in better overall system performance. Accelerators are commonly used in computers’ display adapters and microprocessors. Depending on the application, an accelerator might not need special software in the form of a device driver to control it. *See also* accelerator card, Windows-based accelerator.

accelerator card A printed circuit board that replaces or augments the computer’s main microprocessor with a faster one. An accelerator card allows a user to upgrade a system to a faster microprocessor without having to replace the cards, drives, keyboard, or case.

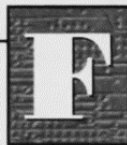
acceptance test A formal evaluation performed by a customer, usually at the factory, to verify that the manufacturer has met the agreed-upon specifications and that a device is functioning as intended.

access To obtain entry to, or to locate, read into memory, and make ready for, some operation. *Access* is used with regard to disks, files, records, and network entry procedures.

access arm The arm that carries the read/write head(s) over the surface of the disk in a disk drive. *See* the illustration.

access code A unique combination of characters, usually letters or numbers, used in communications as identification for gaining access to a remote computer. On a network or an online service, the access code is generally referred to as user name or user ID and password.

access mechanism The disk-drive components that position the read/write head(s) over the tracks of a magnetic or an optical disk. More generally, *access mechanism* is used to mean any circuit board or integrated circuit that permits one part of a computer system to send signals to another part. For example, a central processing unit



8, 13, 21, 34.... Fibonacci numbers, also called the Fibonacci sequence, are named for the thirteenth-century mathematician Leonardo Fibonacci. In computing, Fibonacci numbers are used to speed binary searches by repeatedly dividing a set of data into groups in accordance with successively smaller pairs of numbers in the Fibonacci sequence. For example, a data set of 34 items would be divided into one group of 21 and another of 13. If the item being sought were in the group of 13, the group of 21 would be discarded, and the group of 13 would be divided into 5 and 8; the search would continue thus, through successive divisions, until the item was located. The ratio of two successive terms in the Fibonacci sequence converges on the Golden Ratio, a "magic number" that describes many things, from the curve of a nautilus shell to the proportions of the Parthenon.

fiche *See* microfiche.

field A location in a record in which a particular type of data is stored. For example, EMPLOYEE-RECORD might contain fields to store Last-Name, First-Name, Address, City, State, Zip-Code, Hire-Date, Current-Salary, Pay-Grade, Title, Department, Last-Increase-Date, and so on.

Individual fields have their own specifications as to maximum length and the type of data (for example, alphabetic, numeric, or financial) that can be placed in them. The facility for creating these specifications usually is contained in the data definition language (DDL).

In relational database management systems, fields are called columns.

field-effect transistor *See* FET.

field-programmable logic array Abbreviated FPLA; also known as programmable logic array (PLA). An integrated circuit containing an array of logic circuits in which the connections between the individual circuits, and thus the logic functions of the array, can be programmed after manufacture, typically at the time of installation (in the field). The programming can be performed only once, and it is typically done by passing high current through fusible links on the chip.

field separator Any character that separates one field of data from another. *See also* delimiter, field.

FIFO *See* first in, first out.

fifth-generation computer *See* computer.

fifth normal form (5NF) *See* normal form.

file A complete, named collection of information, such as a program, a set of data used by a program, or a user-created document. A file is the basic unit of storage that enables a computer to distinguish one set of information from another. A file might or might not be stored in human-readable form, but it is still the "glue" that binds a conglomeration of instructions, numbers, words, or images into a coherent unit that a user can retrieve, change, delete, save, or send to an output device.

file allocation table A table or list maintained by some operating systems to keep track of the status of various segments of disk space used for file storage. Files on a disk are stored, as space allows, in fixed-size groups of bytes (characters) rather than from beginning to end as neat, continuous strings of text or numbers. A single file can thus be scattered in pieces over many separate storage areas. A file allocation table enables the operating system to maintain a "map" of available disk storage space so that it can mark flawed segments that should not be used and can find and link the pieces of a file. In the MS-DOS operating system, the file allocation table is commonly known as the FAT (pronounced "fat"). *See also* FAT file system.

file attribute A restrictive label attached to a file that describes and regulates its use—for example, hidden, system, read-only, archive, and so forth. In MS-DOS, this information is stored as part of the file's directory entry.

file backup *See* backup.

file compression The process of reducing the storage space required for a file. *See also* data compression.

file control block Abbreviated FCB. A small block of memory temporarily assigned by a computer's operating system to hold information about a file that has been opened for use. A file control block typically contains such information as the file's identification, its location on disk, and a pointer



per minute (ppm), used for page printers such as laser printers.

line style In desktop publishing, printing, and high-end word processing, the form and quality of a line, such as a dotted line, a double line, or a hairline. *See also* hairline.

line surge A sudden, transient increase in the voltage or current carried by a line. A nearby lightning strike, for example, can cause a surge in power lines that can damage electrical equipment. Delicate types of equipment such as computers are often protected from line surges by surge suppressors placed in the power lines.

line voltage The voltage present in a power line. In North America, line voltage is approximately 115 volts alternating current (AC).

line width The length of a line of type measured from the left margin to the right margin on a piece of paper or on a computer screen. On a typewriter, line width is usually measured in terms of the number of monospace alphanumeric characters that can fit on the line; on a computer printer or monitor, line width is normally measured in inches, centimeters, points, or picas.

linguistics The analytic study of human language. Close ties exist between linguistics and computer science because of mutual interest in grammar, syntax, semantics, formal language theory, and natural-language processing.

link To produce an executable program from compiled modules (programs, routines, libraries) by merging the object code (assembly language object code, executable machine code, or a variation of machine code) of the program and resolving interconnecting references (such as a library routine called by a program). Also, to connect two elements in a data structure by using index variables or pointer variables. *See also* index, linker, pointer.

linkage editor *See* linker.

linked list In programming, a list of nodes or elements of a data structure connected by pointers. A singly linked list has one pointer in each node, pointing to the next node in the list; a doubly linked list has two pointers in each node, pointing to the next and previous nodes. In a circular

list, the first and last nodes of the list are linked together. Both linked lists and arrays are often used to implement the list, stack, and queue data structures. Linked lists have the advantages of dynamic node allocations and no requirements that nodes all be of the same type; arrays have the advantage of direct access to a given node. *Compare* linear list; *see also* array, key, list, node.

linker A program that links compiled modules and data files to create an executable program. A linker can also have other functions, such as creation of libraries. *See also* library, link, program creation.

link time The length of time required to link a program; also, the period during which a program is being linked (for example, static binding occurs at link time, whereas dynamic binding occurs at run time). *See also* compile time, link, run time.

Linotronic Any in the series of high-quality typesetting devices known as Linotronic laser image-setters, which can print at resolutions such as 1270 and 2540 dots per inch (dpi). These devices are commonly attached to PostScript raster image processors (RIPs) so that desktop publishing applications can typeset directly from a microcomputer. *See also* imagesetter, PostScript, raster image processor.

Linpack A benchmarking routine that solves 100 simultaneous equations in a test of CPU, floating-point, and memory-access speeds. As with many benchmarking tests, compiler efficiency is a major component in the result.

LIPS Acronym for linear inferences per second. A measure of speed for some types of artificial-intelligence machines and expert systems.

liquid crystal display Abbreviated LCD. A type of display that uses a liquid compound having a polar molecular structure, sandwiched between two transparent electrodes. When an electric field is applied, the molecules align with the field, forming a crystalline arrangement that polarizes the light passing through it. A polarized filter laminated over the electrodes blocks polarized light and transmits nonpolarized light. In this way, a grid of electrodes can selectively "turn on"



fabricate. P-channel MOS is used in such devices as electronic calculators.

PMS See Pantone Matching System.

PNP transistor A type of transistor in which a base of N-type material is sandwiched between an emitter and a collector of P-type material. See the illustration. The base, emitter, and collector are the three terminals of the transistor through which current flows. In a PNP transistor, holes (electron "vacancies") are the majority of the charge carriers, and these holes flow from the emitter to the collector. *Compare* NPN transistor.

point As a noun, referring to printed output, a typographical unit of measure equal to approximately $\frac{1}{72}$ inch, often used to indicate character height and the amount of space (leading) between lines of text. In programming and video graphics, a point can be either a single pixel on the screen (as in the all-points-addressable mode on IBM computers) or a location in a geometric form (as in a point on a line or a point in a circle).

As a verb, to move an arrow or other such indicator to a particular item or position on the screen by using direction keys or by maneuvering a pointing device such as a mouse.

point chart See scatter diagram.

point diagram See scatter diagram.

pointer In graphics-based environments, an on-screen symbol, such as an arrowhead, that is controlled by a mouse or other input device and is used as a means of indicating (and selecting) locations or choices on the screen.

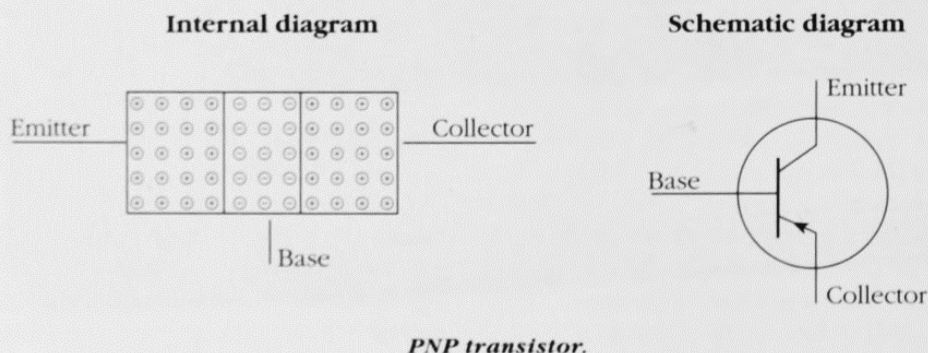
In programming and information processing, a variable that contains the memory location (address) of some data rather than the data itself. This allows the memory for that data to be dynamically allocated (and deallocated). *See also* allocate, deallocate, dereference, handle.

pointing device An input device used to control an on-screen cursor for such actions as "pressing" on-screen buttons in dialog boxes, choosing menu items, and selecting ranges of cells in spreadsheets or groups of words in a document. A pointing device is also often used to create drawings or graphical shapes. The most common pointing device is the mouse, which was popularized by its central role in the design of the Apple Macintosh. Other pointing devices include the graphics tablet, the stylus, the light pen, the joystick, the puck, and the trackball. *See also* graphics tablet, joystick, light pen, mouse, puck, stylus, trackball.

point of sale See POS.

point-to-point configuration A communications link in which two stations are directly joined.

Poisson distribution A mathematical curve used in statistics, named after the French mathematician S. D. Poisson, used to approximate the distribution and probability of various kinds of events. In certain cases the curve approximates the normal and binomial distributions, and the Poisson distribution is often used instead of these distributions for ease of calculation. Poisson distributions are used in communications and other areas





and inserting specified files. The preprocessed version is then passed to the main part of the compiler for translation into machine code. *Compare* postprocessor; *see also* front-end processor.

presentation graphics The representation of business information, such as sales figures and stock prices, in chart form rather than as lists of numbers. Capitalizing on the idea that a picture is worth a thousand words (or numbers), presentation graphics are used to give viewers an immediate grasp of business statistics and their significance. Common examples are area charts, bar charts, line charts, and pie charts. Although they may incorporate drawings and decorative type, presentation graphics have a different purpose than graphics created for engineering, architectural, or ornamental purposes.

presentation layer The sixth of the seven layers in the International Organization for Standardization's Open Systems Interconnection (OSI) model for standardizing computer-to-computer communications. The presentation layer is responsible for formatting information so that it can be displayed or printed. This task generally includes interpreting codes (such as tabs) related to presentation, but it can also include converting encryption and other codes and translating different character sets. *See also* ISO/OSI model.

Presentation Manager The graphical user interface provided with OS/2 versions 1.1 and later. The Presentation Manager derives from the MS-DOS-based Windows environment and provides similar capabilities. The user sees a graphical, window-oriented interface, and the programmer uses a standard set of routines for handling screen, keyboard, mouse, and printer input and output, no matter what hardware is attached to the system. *See also* OS/2, Windows.

pressure-sensitive An adjective describing a device in which pressing on a thin surface produces an electrical connection and causes an event to be registered by the computer. Pressure-sensitive devices include touch-sensitive drawing pens, membrane keyboards, and some touch screens. *See also* touch screen.

preventive maintenance Routine servicing of

hardware intended to keep equipment in good operating condition and to find and correct problems before they develop into severe malfunctions.

primary channel The data-transmission channel in a communications device, such as a modem. *Compare* secondary channel.

primary key Also called the major key. In databases, the key field that serves as the unique identifier of a specific tuple (row) in a relation (database table). *See also* alternate key, candidate key.

primary storage Random access memory (RAM); the main general-purpose storage region to which the microprocessor has direct access. A computer's other storage options, such as disks and tape, are called secondary storage or (sometimes) backing storage.

primitive In computer graphics, a shape, such as a line, circle, curve, or polygon, that can be drawn, stored, and manipulated as a discrete entity by a graphics program. Primitives, also called geometric primitives, are the elements from which large graphic designs are created.

In programming, a fundamental element in a language that can be used to create larger procedures that do the work a programmer wants to do. At the machine language level, a primitive is also a fundamental machine instruction.

print In computing, to send information to a printer. The word is also sometimes used in the sense of "show me" or "copy this." For example, the PRINT statement in BASIC causes output to be displayed (printed) on the screen. Similarly, an application program that can be told to "print" a file to disk interprets the command as an instruction to route output to a disk file instead of to a printer.

print buffer A section of memory to which print output can be sent for temporary storage until the printer is ready to handle it. A print buffer can exist in a computer's random access memory (RAM), in the printer, in a separate unit between the computer and the printer, or on disk. Regardless of its location, the function of a print buffer is to free the computer for other tasks by taking print output at high speed from the computer and



SDLC Abbreviation for Synchronous Data Link Control, the data link (data transmission) protocol most widely used in networks conforming to IBM's Systems Network Architecture (SNA). SDLC is a communications guideline that defines the format in which information is transmitted. As its name implies, SDLC applies to synchronous transmissions; it is also a bit-oriented protocol and organizes information in rigidly structured units called frames. SDLC is similar to the High-level Data Link Control protocol developed by the International Organization for Standardization (ISO). *See also* HDLC.

SDM *See* space-division multiplexing.

seamless integration The (desirable) result that occurs when new hardware, a new program, or a program addition blends smoothly into the overall working of a system. Seamless integration is the result of careful design or programming and attention to detail. It occurs, for example, when a modem and its controlling software settle into a system without interfering with other software or hardware, or when a spelling module added to a word processor works flawlessly without requiring considerable effort in installation or program adjustments.

search To seek the location of a file, or to search a file or data structure for specific data. A search is carried out by comparison or calculation to determine whether a match to some specified pattern exists or whether some other criteria have been met. For example, a program might be instructed to search for the words *Meet me in St. Louis* in a data file. Such a search might or might not be sensitive to uppercase and lowercase, depending on the program. *See also* replace, search and replace, wildcard character.

search algorithm An algorithm designed to locate a particular element, called the target, in a list. *See also* binary search, hash search, linear search.

search and replace A process typical of application programs such as word processors in which the user can specify two strings of characters—one string for the program to find and replace with the second string. For example, a program

might be instructed to find the word *company* and replace it with the word *corporation*. Search-and-replace procedures might or might not be sensitive to uppercase and lowercase, depending on the program.

search key The particular field (or column) of the records to be searched in a database, or the value that is to be found in a document or any collection of data. *See also* primary key, secondary key.

search string The string of characters to be matched in a search—typically (but not necessarily) a text string.

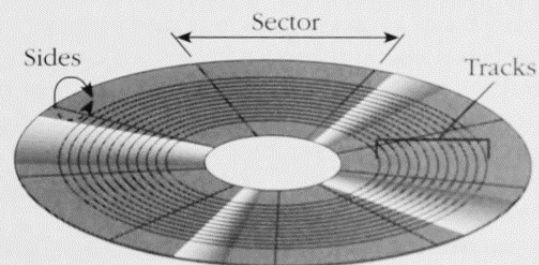
secondary channel A transmission channel in a communications device, such as a modem, that carries testing and diagnostic information rather than actual data.

secondary key A field that is to be sorted or searched within a subset of the records having identical primary key values. *Compare* primary key; *see also* alternate key, candidate key.

secondary storage Any data storage medium other than a computer's random access memory—typically, tape or disk. *Compare* primary storage.

second normal form (2NF) *See* normal form.

sector A portion of the data storage area on a disk. A disk is divided into sides (top and bottom), tracks (rings on each surface), and sectors (sections of each ring) as shown in the illustration. Sectors are the smallest physical storage units on a disk and are of fixed size—typically, capable of holding 512 bytes of information apiece.



Sector.

sector interleave *See* interleaving.

sector map A map that indicates the unusable



code name for the first hard disk that stored 30 megabytes (MB) and had a 30-millisecond access time, reminding its inventors of a Winchester .30-caliber rifle known as a ".30-30."

window In applications and graphical interfaces, a portion of the screen that can contain its own document or message. In window-based programs, the screen can be divided into several windows, each of which has its own boundaries and can contain a different document (or another view into the same document). Each window might also contain its own menu or other controls, and the user might be able to enlarge and shrink individual windows at will. In some programs, windows are opened side by side on the screen; in others, open windows can overlap one another.

In computer graphics, a software tool for scaling (sizing) an image to fit within certain boundaries on the display screen. In this sense, a window not only provides a working area for a program and a view into a particular portion of a document or graphical image but can also be used as a reference area for translating an image based on three-dimensional coordinates (points on *x*-, *y*-, and *z*- axes) into an appropriately scaled pattern of pixels (dots) on the screen.

windowing environment An operating system or shell that presents the user with specially delineated areas of the screen called windows. Each window can act independently, as if it were a virtual display device. Windowing environments typically allow windows to be resized and moved around on the display. The Macintosh Finder, Windows, and the OS/2 Presentation Manager are all examples of windowing environments. *See also* graphical user interface.

Windows An operating system introduced by Microsoft Corporation in 1983. Windows is a multitasking graphical user interface environment that runs on MS-DOS-based computers. Windows provides a standard interface based on drop-down menus, windowed regions on the screen, and a pointing device such as a mouse. Programs must be specially designed to take advantage of these features.

Windows-based accelerator Also called a Windows-based accelerator card. A type of super VGA (SVGA) video adapter designed specifically to run Windows and Windows-based applications more quickly. A Windows-based accelerator achieves performance improvements over a standard SVGA video adapter with the help of special routines built into the adapter's read-only memory (ROM); these routines relieve the Windows operating system of some of the video-related duties it must perform on a nonaccelerated system. Like any other SVGA adapter, a Windows-based accelerator requires that an appropriate driver be properly installed in the system before the full benefit of the accelerator can be realized. *See also* SVGA.

Windows for Workgroups A version of Windows released in 1992 and designed to run on an Ethernet-based LAN (local area network) without the need for separate LAN software. *See also* Windows.

Windows NT An operating system released by Microsoft Corporation in 1993. The Windows NT operating system, sometimes incorrectly referred to as simply NT, is the high-end member of a family of operating systems from Microsoft. Unlike Windows, Windows NT does not rely on the presence of MS-DOS on the system; it is a completely self-contained operating system with a built-in graphical user interface. Windows NT is a 32-bit, preemptive multitasking operating system that features networking, symmetric multiprocessing, multithreading, and security. It is a portable operating system that can run on a variety of hardware platforms including those based on the Intel 80386, i486, and Pentium microprocessors, as well as DEC Alpha AXP microprocessors and MIPS microprocessors; it can also run on multiprocessor computers. Windows NT supports up to 4 gigabytes (GB) of virtual memory and can run MS-DOS, POSIX, and OS/2 (character-mode) applications. *See also* MS-DOS, operating system, OS/2, POSIX, Windows.

Windows NT Advanced Server A superset of Windows NT that provides centralized, domain-based network management and security. Win-