

OVER
10,000
ENTRIES

Microsoft

Computer Dictionary

Fifth Edition

- Fully updated with the latest technologies, terms, and acronyms
- Easy to read, expertly illustrated
- Definitive coverage of hardware, software, the Internet, and more!



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Introduction

The *Microsoft Computer Dictionary, Fifth Edition* is designed to be a comprehensive and authoritative source of definitions for computer-related terms and abbreviations. The dictionary includes terms drawn from a wide variety of topics relevant to computer users, including software, hardware, networking, data storage, graphics, games, information processing, the Internet and the World Wide Web, gaming, history, jargon and slang, organizations, programming, and standards.

Although this book covers nearly every aspect of computing, it does not include entries on most companies or on most makes and models of computers, nor does it contain entries on most application software products. The few exceptions to this rule of thumb are key companies and products that have a historical or universal importance within the computing industry.

This dictionary emphasizes terminology that the average computer user will encounter in documentation, online help, computer manuals, marketing and sales materials, the popular media, and the computer trade press. Because most computer users operate personal computers and desktop systems at home, work, or both, the majority of the entries in this dictionary cover the terminology used in describing and working with these systems. However, some specialized or highly technical language is included that pertains to areas of industry, academia, software and hardware development, and research. These terms have been included because they have a bearing on more common computer terminology or because they are of historical significance.

Changes in the Fifth Edition

The fifth edition of the *Microsoft Computer Dictionary* has been revised and expanded to include over 10,000 entries, reflecting the many advances in the computer field and

including several areas that have come into prominence in the public eye, such as networking, Web authoring, and new technologies, such as .NET. The content from the Year 2000 appendix has been integrated into the body of the dictionary and a new appendix on emoticons and instant messaging symbols has been added.

Order of Presentation

Entries are alphabetized by letter. Spaces are ignored, as are characters such as hyphens and slashes; for example, *Baud-dot 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.

Entries

Entries are of two types: main entries, which contain full definitions, and synonymous cross-references, which contain *See* references to the appropriate main entries. Synonymous cross-references are generally secondary or less common ways of referring to a main entry. The definition at the main entry can be substituted as a definition for the synonymous cross-reference.

Format

Information in each main entry is presented in a consistent format: entry name in boldface, spelling variants (if any), part of speech, definition, illustration or table reference (if any), acronym (if any), alternative names (if any), and cross-references (if any).

Main Entries

Entries that are acronyms or abbreviations for one or more words or concatenations of two or more words have those words spelled out at the beginning of the definition. The letters in these words or phrases that make up the acronym, abbreviation, or concatenation are in boldface.

When a main entry is spelled exactly the same as another main entry, the two entries are differentiated by the use of a superscript numeral after each term. These entries are called homographs, and they are generally different parts of speech. For example,

e-mail¹ (*noun*)

e-mail² (*verb*)

Spelling Variants

When a main entry has one or more variations in the way it is spelled, each spelling variant follows the main entry, after the word *or*.

Parts of Speech

Entries are broken down into four parts of speech, in addition to prefixes, abbreviated as follows:

n. noun

vb. verb

adj. adjective

adv. adverb

Definitions

Each of the more than 10,000 entries is written in clear, standard English. Many go beyond a simple definition to provide additional detail and to put the term in context for a typical computer user. When an entry has more than one sense or definition, the definitions are presented in a numbered list, to make it easier to distinguish the particular, sometimes subtle, variations in meaning.

Illustration and Table References

Some entries have affiliated illustrations or tables that aid in defining the entry. In most cases, illustrations and tables 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. Entries with illustrations or tables usually have references at the end of the definition for an entry, in the following formats:

See the illustration.

See the table.

Acronyms

Some terminology in the computer field, particularly computer standards and Internet slang, can be shortened to form acronyms. Sometimes the acronym is the more common way to refer to the concept or object; in these cases, the acronym is the main entry. In other cases, the acronym is not as commonly used as the words or phrase for which it stands. In these cases, the words or phrase constitute the main entry. The acronym is given after the definition for these entries in the following format:

Acronym:

Alternative Names

Some items or concepts in the computer field can be referred to by more than one name. Generally, though, one way is preferred. The preferred terminology is the main entry. Alternative names are listed after any acronyms; otherwise they are listed after the definition in the following format:

Also called:

Cross-References

Cross-references are of three types: *See*, *See also*, and *Compare*. A *See* reference is used in an entry that is a synonymous cross-reference and 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 a topic and follows any acronyms or alternative names after the definition. A *Compare* reference points to an entry or entries that offer contrast and follows any *See also* references; otherwise it follows any acronyms or alternative names after the definition.

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, One Microsoft Way, Redmond, WA 98052-6399. Or send e-mail to mspcd@microsoft.com.

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Web page, including such features as providing a form that users can fill out, image maps that contain links to other Web pages or resources, and links that users can click on to send e-mail to a specified address. ActiveX controls and Java applets can provide much the same functionality as CGI scripts, through different means. *See also* CGI (definition 1), cgi-bin, image map, Perl. *Compare* ActiveX control, Java applet.

CGM *n.* *See* Computer Graphics Metafile.

chad *n.* The paper removed when a hole is punched in a card, in a tape, or at the perforated edge of continuous-form paper—the computer equivalent of a doughnut hole.

chaining *n.* **1.** In computers, the linking of two or more entities so that they are dependent upon one another for operation. **2.** In programming, the linking of two or more programs so that the first program causes the second program to begin executing. **3.** In programming, linking program statements so that each statement, except for the first, relies on the previous statement for input. **4.** With batch files, linking two or more batch files so that the completion of the first batch file causes the second batch file to begin executing. **5.** With data storage, linking two or more individual units of storage. For example, a single file on a disk may actually be stored on several different sectors of the disk, each of which points to the next sector containing a piece of that file. These sectors are said to be chained together, or, more literally, to be a chain of clusters. **6.** *See* daisy chaining.

chain printer *n.* *See* line printer.

chalkware *n.* *See* vaporware.

Challenge Handshake Authentication Protocol *n.* An authentication scheme used by PPP servers to validate the identity of the originator of a connection, upon connection or any time later. *Acronym:* CHAP. *See also* authentication, PPP.

change directory *n.* *See* cd.

change file *n.* A file that records transactional changes occurring in a database, providing a basis for updating a master file and establishing an audit trail. *Also called:* transaction log. *See also* addition record.

change management *n.* **1.** The process of tracking and controlling updates, revisions, and other changes to a hardware or software product or project. **2.** The process of managing change during a company's restructuring or reengineering.

channel *n.* **1.** A path or link through which information passes between two devices. A channel can be either internal or external to a microcomputer. **2.** In communications, a medium for transferring information. Depending on its type, a communications channel can carry information (data, sound, and/or video) in either analog or digital form. A communications channel can be a physical link, such as the cable connecting two stations in a network, or it can consist of some electromagnetic transmission on one or more frequencies within a bandwidth in the electromagnetic spectrum, as in radio and television, or in optical, microwave, or voice-grade communication. *Also called:* circuit, line. *See also* analog, band, bandwidth, digital, electromagnetic spectrum, frequency. **3.** A single color within a digital color space. For example, the RGB color space contains three channels—red, green, and blue—and all colors within the RGB color space are created with a combination of one or more of those three color channels. In CMYK there are four channels—cyan, magenta, yellow, and black. Color management and graphics applications rely on control and manipulation of individual color channels. *See also* color space.

channel access *n.* **1.** A method used in networked systems to gain access to the data communication channel that links two or more computers. Common methods of channel access are contention, polling, and the token ring network. *See also* channel, contention, polling, token ring network. **2.** In wireless technology, an access method such as CDMA (Code Division Multiple Access). *See also* Code Division Multiple Access.

channel adapter *n.* A device that enables hardware using two different types of communications channels to communicate.

channel aggregator *n.* *See* content aggregator.

channel capacity *n.* The speed at which a communications channel can transfer information, measured in bits per second (bps) or in baud.

Channel Definition Format *n.* A file format based on XML that describes a channel—a collection of Web pages—on a server. The Channel Definition Format is used with the Active Channel feature in Microsoft Internet Explorer to deliver selected, often personalized, information to individuals on a subscription basis. *See also* Active Channel, webcasting.

channel hop *vb.* To switch repeatedly from one IRC channel to another. *See also* IRC.

EPS *n.* Acronym for **Encapsulated PostScript**. A PostScript file format that can be used as an independent entity. The EPS image must be incorporated into the PostScript output of an application such as a desktop publisher. Many high-quality clip-art packages consist of such images. *See also* PostScript.

EPSF *n.* Acronym for **Encapsulated PostScript file**. *See* EPS.

equality *n.* The property of being identical, used most often in reference to values and data structures.

equalization *n.* A form of conditioning used to compensate for signal distortion and delay on a communication channel. Equalization attempts to maintain the amplitude and phase characteristics of a signal so that it remains true to the original when it reaches the receiving device.

equation *n.* A mathematical statement that indicates equality with the use of an equal sign (=) between two expressions. In programming languages, assignment statements are written in equation form. *See also* assignment statement.

erasable programmable read-only memory *n.* *See* EPROM.

erasable storage *n.* Storage media that can be used repeatedly because the user has the ability to erase whatever data was previously there. Most forms of magnetic storage, such as tape and disk, are erasable.

erase *vb.* To remove data permanently from a storage medium. This is usually done by replacing existing data with zeros or meaningless text or, in magnetic media, by disturbing the magnetic particles' physical arrangement, either with the erase head or with a large magnet. *Erase* differs from *delete* in that *delete* merely tells the computer that data or a file is no longer needed; the data remains stored and is recoverable until the operating system reuses the space containing the deleted file. *Erase*, on the other hand, removes data permanently. *See also* erase head. *Compare* delete.

erase head *n.* The device in a magnetic tape machine that erases previously recorded information.

Eratosthenes' sieve *n.* *See* sieve of Eratosthenes.

ergonomic keyboard *n.* A keyboard designed to reduce the risk of wrist and hand injuries that result from prolonged use or repetitive movement. An ergonomic keyboard can include such features as alternative key layouts, palm rests, and shaping designed to minimize strain. *See*

also Dvorak keyboard, keyboard, Kinesis ergonomic keyboard.

ergonomics *n.* The study of people (their physical characteristics and the ways they function) in relation to their working environment (the furnishings and machines they use). The goal of ergonomics is to incorporate comfort, efficiency, and safety into the design of keyboards, computer desks, chairs, and other items in the workplace.

Erlang *n.* A concurrent functional programming language. Originally developed for controlling telephone exchanges, Erlang is a general-purpose language best suited for applications where rapid development of complex systems and robustness are essential. Erlang has built-in support for concurrency, distribution, and fault tolerance. The most widely implemented version of Erlang is the open source version.

ERP *n.* *See* Enterprise Resource Planning.

error *n.* A value or condition that is not consistent with the true, specified, or expected value or condition. In computers, an error results when an event does not occur as expected or when impossible or illegal maneuvers are attempted. In data communications, an error occurs when there is a discrepancy between the transmitted and received data. *See also* critical error, error message, error rate, error ratio, fatal error, hard error, inherent error, intermittent error, logic error, machine error, overflow error, parity error. *Compare* fault.

error analysis *n.* The art and science of detecting errors in numeric calculations, especially in long and involved computations, where the possibility of errors increases.

error checking *n.* A method for detecting discrepancies between transmitted and received data during file transfer.

error control *n.* **1.** The section of a program, procedure, or function that checks for errors such as type mismatches, overflows and underflows, dangling or illegal pointer references, and memory-use inconsistencies. **2.** The process of anticipating program errors during software development.

error-correcting code *n.* *See* error-correction coding.

error-correction coding *n.* A method for encoding that allows for detection and correction of errors that occur during transmission. Data is encoded in such a way that transmission errors may be detected and corrected by examination of the encoded data on the receiving end. Most error-correction codes are characterized by the maximum number of errors they can detect and by the maximum number of errors they can correct. Error-correction coding is

High resolution is achieved by using a large number of pixels (dots) to create an image in a given area. For screen displays, the resolution is stated in terms of the total number of pixels in the horizontal and vertical dimensions. For example, the VGA video adapter has a resolution of 640 by 480 pixels. In printing, resolution refers to the number of dots per inch (dpi) produced by the printer, such as 300 to 600 dpi for a desktop laser or ink-jet printer or 1000 to 2000 dpi for a production-quality imagesetter. *Also called:* hi-res.

High Sierra specification *n.* An industry-wide format specification for the logical structure, file structure, and record structures on a CD-ROM. The specification is named after a meeting on CD-ROM held near Lake Tahoe in November 1985. It served as the basis for the international standard, ISO 9660.

high tech *n.* **1.** Cutting-edge applied science and engineering, usually involving computers and electronics. **2.** Sophisticated, often complex, specialized technical innovation.

hijackware *n.* Software that appears to be a useful plug-in or utility, but which will take over a user's Internet surfing or shopping activity by creating pop-up advertisements for competing products or redirecting the user to competitor's Web sites. Typically users will download and install a hijackware product believing it to be free browser enhancement software. Businesses pay the makers of hijackware products to push their shopping sites and product advertising onto Internet users, sometimes to the point of denying the user access to competing Web sites. *See also* gatored.

Hijiri calendar *n.* The lunar calendar used in Islamic countries. *Compare* Gregorian calendar, Julian calendar.

HIPPI *n.* Acronym for **H**igh-**P**erformance **P**arallel **I**nterface. An ANSI communications standard used with supercomputers.

hi-res *n.* *See* high resolution.

histogram *n.* A chart consisting of horizontal or vertical bars, the widths or heights of which represent the values of certain data.

history *n.* A list of the user's actions within a program, such as commands entered in an operating system shell, menus passed through using Gopher, or links followed using a Web browser.

hit *n.* **1.** A successful retrieval of data from a cache rather than from the slower hard disk or RAM. *See also* cache,

hard disk, RAM. **2.** A successful retrieval of a record matching a query in a database. *See also* query (definition 1), record¹. **3.** Retrieval of a file from a Web site. Each separate file accessed on a Web page, including HTML documents and graphics, counts as a hit. **4.** In computer war and other games, when a character is successfully fired on, attacked, or otherwise taken out.

hit points *n.* Used in most computer and console war games to refer to the amount of times a player can be damaged before his or her character passes out or dies.

hive *n.* One of the top-level sets of keys, subkeys, and values in Windows 9x, Windows NT, Windows 2000, and Windows CE Registries. The term was created by a Microsoft programmer who thought the structure of the Registry resembled a beehive. Each hive is a permanent part of the Registry and is associated with a set of files containing information related to the configuration (applications, user preferences, devices, and so on) of the computer on which the operating system is installed. Registry hives include HKEY_LOCAL_MACHINE, HKEY_CURRENT_USER, and HKEY_CURRENT_CONFIG. *See also* Registry.

HKEY *n.* Short for **h**key handle. In Windows 9x, Windows NT, and Windows 2000, a handle to a Registry key in which configuration information is stored. Each key leads to subkeys containing configuration information that, in earlier versions of Windows, was stored in .ini files. For example, the handle key HKEY_CURRENT_USERControl Panel leads to the subkey for the Windows Desktop. *See also* handle (definition 1).

HLL *n.* *See* high-level language.

HLS *n.* Acronym for **h**ue-**l**ightness-**s**aturation. *See* HSB.

HMA *n.* *See* high memory area.

HMD *n.* *See* head-mounted device.

Hollerith tabulating/recording machine *n.* An electromechanical machine invented by Herman Hollerith in the late 1800s for processing data supplied in the form of holes punched at predetermined locations in cards. Contacts made through the holes completed electrical circuits, allowing signals to be passed to counting and tabulating devices. This machine is considered to have reduced the time required to finish the 1890 U.S. census by two-thirds. Such machines were manufactured in the early 1900s by Hollerith's Tabulating Machine Company, which eventually became the International Business Machines Corporation (IBM).

read¹ *n.* The action of transferring data from an input source into a computer's memory or from memory into the CPU (central processing unit). *Compare* write¹.

read² *vb.* To transfer data from an external source, such as from a disk or the keyboard, into memory or from memory into the central processing unit (CPU). *Compare* write².

read-after-write *n.* A feature of certain data storage devices, such as tape drives, in which the device reads data immediately after it is written as a means of verifying data integrity.

reader *n.* *See* card reader.

Reader *n.* *See* Microsoft Reader.

read error *n.* An error encountered while a computer is in the process of obtaining information from storage or from another source of input. *Compare* write error.

README *n.* A file containing information that the user either needs or will find informative and that might not have been included in the documentation. README files are placed on disk in plain-text form (without extraneous or program-specific characters) so that they can be read easily by a variety of word processing programs.

read notification *n.* An e-mail feature providing feedback to the sender that a message has been read by the recipient.

read-only *adj.* Capable of being retrieved (read) but not changed (written). A read-only file or document can be displayed or printed but not altered in any way. Read-only memory (ROM) holds programs that cannot be changed; a read-only storage medium, such as CD-ROM, can be played back but cannot be used for recording information. *Compare* read/write.

read-only attribute *n.* A file attribute, stored with a file's directory entry, indicating whether or not a file may be changed or erased. When the read-only attribute is off, the file can be modified or deleted; when it is on, the file can only be displayed.

read-only memory *n.* *See* ROM.

read-only terminal *n.* *See* RO terminal.

read/write *adj.* Able to be both read from and written to. *Abbreviation:* R/W. *Compare* read-only.

read/write channel *n.* *See* input/output channel.

read/write head *n.* *See* head.

read/write memory *n.* Memory that can be both read from and written to (modified). Semiconductor RAM and core memory are typical read/write memory systems. *Compare* ROM (definition 2).

real address *n.* An absolute (machine) address specifying a physical location in memory. *See also* physical address. *Compare* relative address, virtual address.

RealAudio *n.* Streaming audio technology developed by RealNetworks, Inc., for distributing radio and FM-quality sound files over the Internet in real time. RealAudio is based on two components: client software for decompressing the sound on the fly and server software for delivering it. The client software is free, distributed either as a downloadable program or as part of browser software. *See also* RealPlayer, RealVideo, stream, streaming.

reallocate *n.* A function in C that allows the programmer to request a larger portion of heap memory than was previously assigned to a particular pointer. *See also* dynamic memory allocation, heap (definition 1).

reallysafe palette *n.* A color look-up table (CLUT) consisting of 22 colors from the 216-color websafe palette that are completely consistent when viewed with all Web browsers on all major computer platforms. The reallysafe palette arose from an experiment that indicated that most of the colors of the websafe palette shift to some degree in different viewing environments. *See also* browser CLUT, websafe palette.

real mode *n.* An operating mode in the Intel 80x86 family of microprocessors. In real mode, the processor can execute only one program at a time. It can access no more than about 1 MB of memory, but it can freely access system memory and input/output devices. Real mode is the only mode possible in the 8086 processor and is the only operating mode supported by MS-DOS. In contrast, the protected mode offered in the 80286 and higher microprocessors provides the memory management and memory protection needed for multitasking environments such as Windows. *See also* 8086, privileged mode. *Compare* protected mode, virtual real mode.

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reuse a disk that already contains programs or data, effectively destroying the existing contents.

refresh *vb.* **1.** To retrace a video screen at frequent intervals, even if the image does not change, so as to keep the phosphors irradiated. **2.** To recharge dynamic random access memory chips (DRAMs) so that they continue to retain the information stored in them. Circuitry on the memory board automatically performs this function. *See also* refresh cycle.

refreshable *adj.* In programming, referring to a program module capable of being replaced in memory without affecting processing of the program or the information being used by the program.

refresh cycle *n.* The process in which controller circuitry provides repeated electric pulses to dynamic random access memory chips in order to renew the stored electric charges in those locations that contain binary 1. Each pulse is one refresh cycle. Without constant refreshing, dynamic semiconductor RAM loses any information stored in it—as it does when the computer is turned off or when the power fails. *See also* dynamic RAM, static RAM.

refresh rate *n.* In reference to video hardware, the frequency with which the entire screen is redrawn to maintain a constant, flicker-free image. On TV screens and raster-scan monitors, the electron beam that lights the phosphor coating on the inner surface of the screen typically refreshes the entire image area at a rate of about 60 hertz, or 60 times per second. Interlaced monitors, which redraw alternate lines during each sweep of the electron beam, actually refresh any particular line only 30 times per second. Because odd and even lines are refreshed on successive sweeps, however, the effective refresh rate is 60 times per second. *See also* refresh (definition 1).

REGEDIT *n.* *See* Registry Editor.

regenerate *vb.* *See* rewrite.

regeneration buffer *n.* *See* video buffer.

regenerator *n.* *See* repeater.

region *n.* **1.** An area dedicated to or reserved for a particular purpose. **2.** In video programming, a contiguous group of pixels that are treated as a unit. On the Apple Macintosh, for example, a region is an area in a grafPort that can be defined and manipulated as an entity. The visible working area within a window is an example of a region. *See also* grafPort.

region code *n.* Codes on DVD movie titles and DVD-ROM drives that prevent playback of certain DVDs in certain geographical regions. Region codes are part of the DVD specification. *See also* CSS, DeCSS.

region fill *n.* In computer graphics, the technique of filling a defined region on the screen with a selected color, pattern, or other attribute. *See also* region (definition 2).

register *n.* A set of bits of high-speed memory within a microprocessor or other electronic device, used to hold data for a particular purpose. Each register in a central processing unit is referred to in assembly language programs by a name such as AX (the register that contains the results of arithmetic operations in an Intel 80x86 processor) or SP (the register that contains the memory address of the top of the stack in various processors).

registered file type *n.* File types that are tracked by the system registry and are recognized by the programs you have installed on your computer. *See also* file type.

registration *n.* The process of precisely aligning elements or superimposing layers in a document or a graphic so that everything will print in the correct relative position. *See also* registration marks.

registration marks *n.* Marks placed on a page so that in printing, the elements or layers in a document can be arranged correctly with respect to each other. Each element to be assembled contains its own registration marks; when the marks are precisely superimposed, the elements are in the correct position. *See the illustration.*



Registration marks.

registry *n.* A central hierarchical database in Windows 9x, Windows CE, Windows NT, and Windows 2000 used to store information necessary to configure the system for one or more users, applications, and hardware devices. The Registry contains information that Windows continually references during operation, such as profiles for each user, the applications installed on the computer and the types of documents each can create, property sheet settings for folders and application icons, what hardware exists on the system, and which ports are being used. The Registry replaces most of the text-based .ini files used in Windows 3.x and MS-DOS configuration files, such as AUTOEXEC.BAT and CONFIG.SYS. Although the Registry is common to the several Windows platforms, there

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are some differences among them. *Also called:* system registry. *See also* hierarchical database, .ini, input/output port, property sheet, Registry Editor.

Registry Editor *n.* An application under Windows that allows the user to edit the entries in the registry. *Acronym:* REGEDIT. *See also* registry.

regression analysis *n.* In statistics, an analysis of the degree to which variations in an independent variable affect a dependent variable (a variable whose value depends on the value of another variable). *See also* multiple regression.

regression testing *n.* Complete retesting of a modified program, rather than a test of only the modified routines, to ensure that no errors have been introduced with the modifications.

relation *n.* A structure composed of attributes (individual characteristics, such as name or address, corresponding to the columns in a table) and tuples (sets of attribute values describing particular entities, such as customers, corresponding to the rows in a table). Within a relation, tuples cannot be repeated; each must be unique. Further, tuples are unordered within a relation; interchanging two tuples does not change the relation. Finally, if relational theory is to be applicable, the domain of each attribute must be atomic—that is, a simple value, rather than a structure such as an array or a record. A relation in which the domains of all attributes are atomic is said to be normalized or in first normal form. *See also* normal form (definition 1).

relational algebra *n.* A collection of rules and operators that permits relations (tables) to be manipulated. Relational algebra is usually described as having the following operators: SELECT, PROJECT, PRODUCT, UNION, INTERSECT, DIFFERENCE, JOIN (or INNER JOIN), and DIVIDE. In a relational database, relational algebra is used to develop procedures to build new relations based on the existing relations.

relational calculus *n.* In database management, a non-procedural method for manipulating relations (tables). There are two families of relational calculus: domain calculus and tuple calculus. The two families of relational calculus are mathematically equivalent to each other and to relational algebra. Using either family, one can formulate a description of a desired relation, based on the existing relations in the database.

relational database *n.* A database or database management system that stores information in tables—rows and columns of data—and conducts searches by using data in specified columns of one table to find additional data in another table. In a relational database, the rows of a table represent records (collections of information about separate items) and the columns represent fields (particular attributes of a record). In conducting searches, a relational database matches information from a field in one table with information in a corresponding field of another table to produce a third table that combines requested data from both tables. For example, if one table contains the fields EMPLOYEE-ID, LAST-NAME, FIRST-NAME, and HIRE-DATE, and another contains the fields DEPT, EMPLOYEE-ID, and SALARY, a relational database can match the EMPLOYEE-ID fields in the two tables to find such information as the names of all employees earning a certain salary or the departments of all employees hired after a certain date. In other words, a relational database uses matching values in two tables to relate information in one to information in the other. Microcomputer database products typically are relational databases. *Compare* flat-file database, inverted-list database.

relational database management system *n.* *See* relational database.

relational expression *n.* An expression that uses a relational operator such as “less than” or “greater than” to compare two or more expressions. A relational expression resolves to a Boolean (true/false) value. *See also* Boolean, relational operator.

relational model *n.* A data model in which the data is organized in relations (tables). This is the model implemented in most modern database management systems.

relational operator *n.* An operator that allows the programmer to compare two (or more) values or expressions. Typical relational operators are greater than (>), equal to (=), less than (<), not equal to (<>), greater than or equal to (>=), and less than or equal to (<=). *See also* relational expression.

relational structure *n.* The record organization used in the implementation of a relational model.

relative address *n.* A location, as in a computer’s memory, that is specified in terms of its distance (displacement or offset) from a starting point (base address). A relative

necessary to run the Windows operating environment. The win.ini file has been supplanted by the registry database in Windows 95 and later and Windows NT and later. *See also* configuration file, ini file, registry.

Winipcfg *n.* Short for **Windows IP Configuration**. A Windows 9x utility that enables users to access information about their TCP/IP (Transmission Control Protocol/Internet Protocol) and network adapter card settings. Running the Winipcfg program (winipcfg.exe) opens the IP Configuration window, which reveals the physical address, IP address, subnet mask, and default gateway settings of the primary TCP/IP adapter (or settings of multiple adapters if more than one is installed). This information is also helpful for troubleshooting. *See also* TCP/IP.

WINS *n.* Acronym for **Windows Internet Naming Service**. A Windows NT Server method for associating a computer's host name with its address. *Also called:* INS, Internet Naming Service. *Compare* DNS (definition 1).

Winsock *n.* Short for **Windows Sockets**. An application programming interface standard for software that provides a TCP/IP interface under Windows. The Winsock standard developed out of a Birds of a Feather (BOF) discussion that arose among software vendors at a UNIX conference in 1991; it has gained the general support of software developers, including Microsoft. *See also* application programming interface, BOF, socket (definition 1), sockets API, TCP/IP.

Wintel *adj.* Of, pertaining to, or characteristic of a computer that uses the Microsoft Windows operating system and an Intel central processing unit (CPU). *See also* Windows.

wired *adj.* **1.** Of, pertaining to, or characteristic of an electronic circuit or hardware grouping in which the configuration is determined by the physical interconnection of the components (as opposed to being programmable in software or alterable by a switch). *See also* hardwired (definition 1). **2.** Knowledgeable about Internet resources, systems, and culture. **3.** Having access to the Internet.

Wired Equivalent Privacy *n.* *See* WEP.

wired home *n.* *See* smart home.

wire-frame model *n.* In computer graphics applications such as CAD programs, a representation of a three-dimensional object using separate lines that resemble strands of wire joined to create a model. *Compare* solid model, surface modeling.

wireless *adj.* Of, pertaining to, or characteristic of communications that take place without the use of interconnecting wires or cables, such as by radio, microwave, or infrared light.

Wireless Application Protocol *n.* A specification for a global standard for enabling digital cellular phones and other wireless devices to access Internet and other information services. The Wireless Application Protocol, or WAP, is supported by an organization known as WAP Forum, which includes such members as Motorola, Nokia, L. M. Ericsson, and Unwired Planet. The goal of the forum is to create an open standard that works with different wireless technologies. *Acronym:* WAP.

wireless communication *n.* Communication between a computer and another computer or device without wires. The form of wireless communication provided as part of the Windows operating system uses infrared light to transmit files. Radio frequencies, as used by cellular and cordless telephones, are another form of wireless communication. *See also* infrared, infrared device, infrared port.

Wireless Information Device *n.* *See* WID.

wireless Internet *n.* Version of the Internet designed for use on wireless phones and handheld devices with small display screens, limited memory, and slower data transmission speeds than a personal computer. Most wireless Internet sites offer content as basic text with limited graphics.

wireless LAN *n.* A LAN (local area network) that sends and receives data via radio, infrared optical signaling, or some other technology that does not require a physical connection between individual nodes and the hub. Wireless LANs are often used in office or factory settings where a user must carry a portable computer from place to place. *Also called:* WLAN.

Wireless Markup Language *n.* *See* WML.

Wireless Multimedia Forum *n.* *See* WMF (definition 2).

wireless phone *n.* Telephone that operates by means of radio waves without a wire connection. A base station (cell tower) relays the phone's signal to a wireless carrier's network, where it is transmitted to another wireless phone or to a wired telephone network.

Wireless Services server component *n.* A component that allows a content provider or carrier to configure and schedule any number of information acquisition/encoding/transmission components to create a data stream to be transmitted by a carrier to a device. The server component builds

altered after it has been recorded. WORMs are high-capacity storage devices. Because they cannot be erased and rerecorded, they are suited to storing archives and other large bodies of unchanging information. *See also* compact disc.

WOSA *n.* Acronym for **Windows Open Services Architecture**, also known as **Windows Open System Architecture**. A set of application programming interfaces from Microsoft that is intended to enable Windows-based applications from different vendors to communicate with each other, such as over a network. The interfaces within the WOSA standard include Open Database Connectivity (ODBC), the Messaging Application Programming Interface (MAPI), the Telephony Application Programming Interface (TAPI), Windows Sockets (Winsock), and Microsoft Remote Procedure Calls (RPC). *See also* MAPI, ODBC, remote procedure call, TAPI, Winsock.

.wp *n.* A file extension used to identify files formatted for the WordPerfect word processor.

WP *n.* *See* word processing.

WPS *n.* *See* Workplace Shell.

WRAM *n.* Acronym for **window random access memory**. A type of RAM used in video adapters. Like video RAM (VRAM), WRAM allows the screen to be repainted while a graphical image is being written, but WRAM is faster. *Compare* video RAM.

wrap around *vb.* To continue movement, as with the cursor or a search operation, to the beginning or to a new starting point rather than stopping when the end of a series is reached. For example, the screen cursor might wrap around to the first column of the next line rather than stopping when it reaches the last column of the current line. Likewise, a program starting a search or replace operation in the middle of a document might be instructed to wrap around to the beginning rather than stop when it reaches the end of the document.

wrapper *n.* In the Java programming language, an object that encapsulates and delegates to another object with the aim of altering its behavior or interface. *See also* Java, object.

.wri *n.* The file format that identifies document files in the Microsoft Write format.

wrist support *n.* A device placed in front of a computer keyboard to support the wrists in an ergonomically neutral position, thereby safeguarding against repetitive strain injuries,

such as carpal tunnel syndrome. *Also called:* wrist rest. *See also* carpal tunnel syndrome, repetitive strain injury.

write¹ *n.* A transfer of information to a storage device, such as a disk, or to an output device, such as a monitor or a printer. For example, a disk write means that information is transferred from memory to storage on disk. *See also* output¹. *Compare* read¹.

write² *vb.* To transfer information either to a storage device, such as a disk, or to an output device, such as a monitor or a printer. Writing is the means by which a computer provides the results of processing. A computer can also be said to write to the screen when it displays information on the monitor. *See also* output¹. *Compare* read¹.

write access *n.* A privilege on a computer system that allows a user to save, change, or delete stored data. Write access is usually set by the system administrator for a networked or server system and by the owner of the computer for a stand-alone machine. *See also* access privileges.

write-back cache *n.* A type of cache with the following feature: when changes are made to cached data, they are not simultaneously made to the original data as well. Instead, the changed data is marked, and the original data is updated when the cached data is deallocated. A write-back cache can perform more quickly than a write-through cache. But in some contexts, differences between cached and original data could lead to problems, and write-through caches must be used. *See also* cache. *Compare* write-through cache.

write-behind cache *n.* A form of temporary storage in which data is held, or cached, for a short time in memory before being written on disk for permanent storage. Caching improves system performance in general by reducing the number of times the computer must go through the relatively slow process of reading from and writing to disk. *See also* CPU cache, disk cache.

write cache *n.* *See* write-behind cache.

write error *n.* An error encountered while a computer is in the process of transferring information from memory to storage or to another output device. *Compare* read error.

write mode *n.* In computer operation, the state in which a program can write (record) information in a file. In write mode, the program is permitted to make changes to existing information. *Compare* read-only.

write protect *vb.* To prevent the writing (recording) of information, usually on a disk. Either a floppy disk or an individual file on a floppy disk or a hard disk can be

